Ecoregion

Northern Lower Peninsula

State Forest Area:
2,036,486 acres

Location:
28 counties in the Northern Lower Peninsula

Population Centers:
Traverse City, Alpena, Mt. Pleasant, Petoskey, Gaylord and Cadillac

Landcover:
Forested: 1,766,447 acres
Nonforested: 270,038 acres

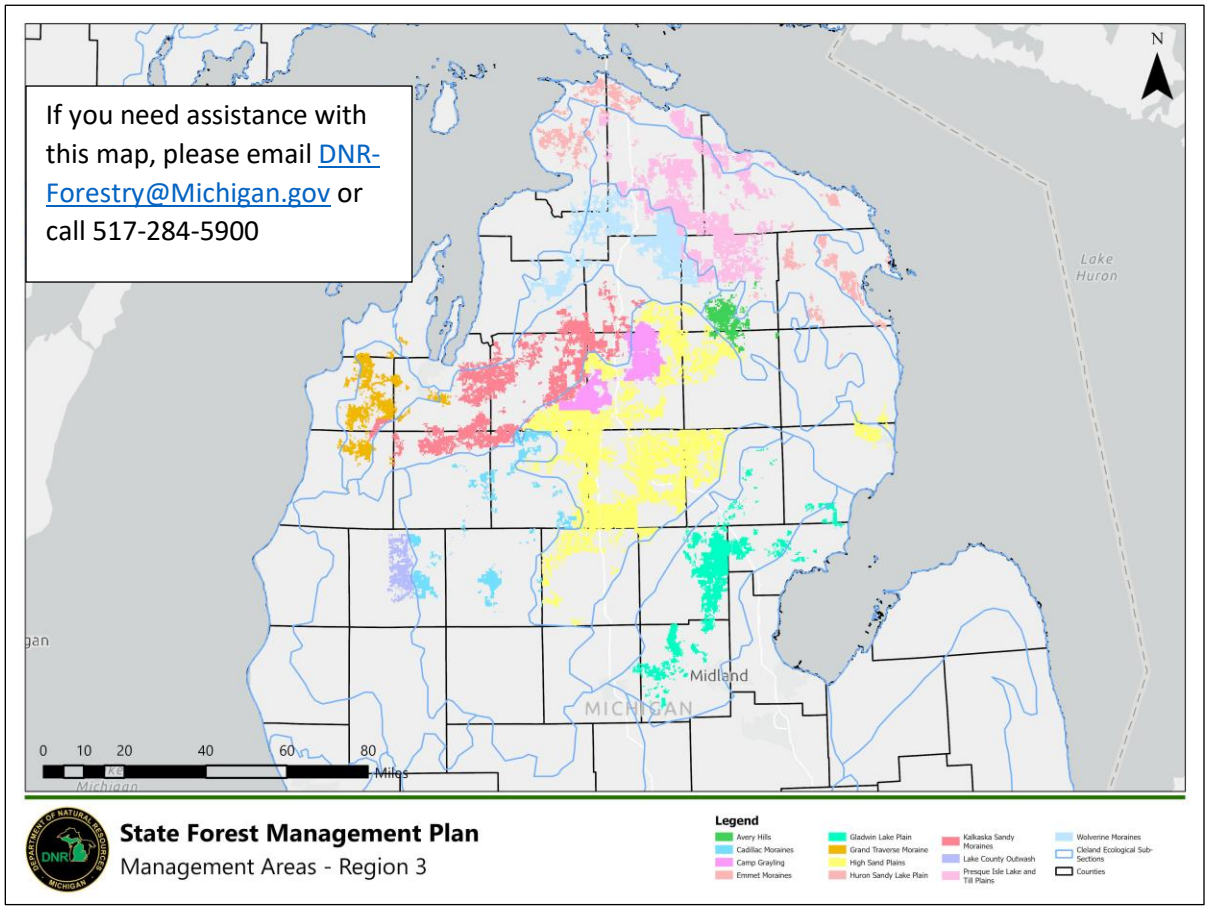


Figure 1. Northern Lower Peninsula Ecoregion.

Forested landscape

Current and projected future condition

The Northern Lower Peninsula Ecoregion is comprised of 87% forested cover types and 13% nonforested cover types (Table 1). Of the forested cover types, the upland is 70% of the total area and lowland landscape is only 17%. The largest contributors to upland cover types are aspen and northern hardwood. Lowland deciduous and lowland conifer make up 8% of the total landscape position. Lowland shrub is the most common nonforested cover type in the ecoregion representing 5% of the landscape.

Table 1. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Acres	Acres by Category		
Forested (≥25% CC)	Upland	Deciduous	Aspen	477,069	932,444	1,425,996	1,766,447
			Northern Hardwood	198,396			
			Black Red Hybrid Oak	54,880			
			Northern Red Oak	47,599			
			Oak Mix	38,167			
			Mixed Upland Deciduous	116,334			
		Mixed	Upland Mixed Forest	63,384	63,384		
		Coniferous	Planted Red Pine	141,545	430,168		
			Planted Jack Pine	100,867			
			Planted White Pine	6,907			
			Planted Mixed Pine	12,455			
			Natural Red Pine	22,675			
			Natural Jack Pine	65,184			
			Natural White Pine	22,107			
			Natural Mixed Pines	44,458			
			Upland Spruce/Fir	3,572			
			Upland Conifers	9,273			
			Hemlock	1,125			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	44,928	131,576	340,452	
			Lowland Deciduous	86,648			
		Mixed	Lowland Mixed Forest	28,039	28,039		
		Coniferous	Cedar	74,169	180,837		
			Lowland Conifers	84,947			
			Lowland Spruce/Fir	12,555			
			Tamarack	9,166			
Nonforested (<25% CC)	Upland		Herbaceous Openland	37,818	104,946		270,038
			Upland Shrub	34,825			
			Low Density Trees	16,201			

Land Type	Landscape Position	Forest Type	Cover Type	Acres	Acres by Category	
			Bare/Sparsely Vegetated	3,745		
			Cropland	1,443		
			Urban	10,914		
	Lowland		Lowland Shrub	95,600	165,092	
			Marsh	31,563		
			Bog	10,023		
			Treed Bog	7,420		
			Water	20,486		
					Grand Total:	2,036,486

There are 1,425,518 acres (70% of the total ecoregion and 80% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Northern Lower Peninsula Ecoregion (Table 2). Of the total area, over 23% is in the aspen cover type, 7% in planted red pine, and 10% in northern hardwood. The remaining 33 cover types represent less than 6% each of the ecoregion. Acres unavailable for management are categorized by site condition (Table 3).

Table 2. Current cover type composition by management availability.

Forested Cover Type	Available Acres	Available Percent	Unavailable Acres	Unavailable Percent	Total Acres	Total Percent
Aspen	459,176	26.0%	17,894	1.0%	**477,069**	**27.0%**
Northern Hardwood	184,463	10.4%	13,933	0.8%	**198,396**	**11.2%**
Planted Red Pine	137,366	7.8%	4,179	0.2%	**141,545**	**8.0%**
Mixed Upland Deciduous	107,390	6.1%	8,944	0.5%	**116,334**	**6.6%**
Planted Jack Pine	100,141	5.7%	726	0.0%	**100,867**	**5.7%**
Lowland Deciduous	23,281	1.3%	63,368	3.6%	**86,648**	**4.9%**
Lowland Conifers	11,888	0.7%	73,059	4.1%	**84,947**	**4.8%**
Cedar	8,094	0.5%	66,076	3.7%	**74,169**	**4.2%**
Natural Jack Pine	60,819	3.4%	4,365	0.2%	**65,184**	**3.7%**
Upland Mixed Forest	57,288	3.2%	6,096	0.3%	**63,384**	**3.6%**
Black Red Hybrid Oak	50,593	2.9%	4,287	0.2%	**54,880**	**3.1%**
Northern Red Oak	42,889	2.4%	4,698	0.3%	**47,587**	**2.7%**
Lowland Aspen Balsam Poplar	28,394	1.6%	16,534	0.9%	**44,928**	**2.5%**
Natural Mixed Pines	39,739	2.2%	4,719	0.3%	**44,458**	**2.5%**
Oak Mix	35,405	2.0%	2,762	0.2%	**38,167**	**2.2%**
Lowland Mixed Forest	8,900	0.5%	19,140	1.1%	**28,039**	**1.6%**
Natural Red Pine	20,170	1.1%	2,505	0.1%	**22,675**	**1.3%**
Natural White Pine	19,204	1.1%	2,903	0.2%	**22,107**	**1.3%**
Lowland Spruce Fir	2,203	0.1%	10,352	0.6%	**12,555**	**0.7%**

Forested Cover Type	Available Acres	Available Percent	Unavailable Acres	Unavailable Percent	Total Acres	Total Percent
Planted Mixed Pine	11,600	0.7%	855	0.0%	**12,455**	**0.7%**
Upland Conifers	6,335	0.4%	2,938	0.2%	**9,273**	**0.5%**
Tamarack	685	0.0%	8,481	0.5%	**9,166**	**0.5%**
Planted White Pine	6,546	0.4%	361	0.0%	**6,907**	**0.4%**
Upland Spruce Fir	2,606	0.1%	965	0.1%	**3,572**	**0.2%**
Hemlock	347	0.0%	778	0.0%	**1,125**	**0.1%**
Total	**1,425,518**	**80.7%**	**340,918**	**19.3%**	**1,766,435**	**100.0%**

Table 3. Site conditions (reason area in unavailable for commercial harvest) for unavailable acres.

Site Condition	Acres	Percent of Unavailable Area
Too Wet	194,685	57.1%
Conservation Values	29,590	8.7%
Best Management Practices	24,205	7.1%
Military Lease/Easement	14,865	4.4%
Blocked by Obstacle	12,896	3.8%
Federal/State/Local Law	11,049	3.2%
Too Steep	8,616	2.5%
Other Influence Zones	6,671	2.0%
Denied Access	6,144	1.8%
Recreation/Scenic	6,031	1.8%
Long-Term Retention	5,975	1.8%
Cannot Regenerate	5,895	1.7%
Other Department/Division Processes	3,585	1.1%
Species of Special Concern or Threatened and Endangered	3,580	1.1%
Rare Landforms	1,836	0.5%
Non-Military Lease/Easement	1,823	0.5%
Wildlife Concerns	921	0.3%
Unproductive	867	0.3%
Deer Wintering Area	532	0.2%
Blocked by Railroad	525	0.2%
Non-DNR Agency Concerns	218	0.1%
Natural/Quiet/Wilderness Area	176	0.1%
Neighbor/Interest Group	165	0.0%
Historical/Archaeological	68	0.0%
Total Unavailable	**340,918**	**100%**

Projected 10-year cover type management actions

Each cover type in the Northern Lower Peninsula Ecoregion has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 4. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods.

Table 4. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Total
Northern Hardwood	1,766	65,148	--	4,336	343	**71,594**
Aspen	65,212	--	--	--	--	**65,212**
Planted Red Pine	11,230	--	43,773	--	--	**55,003**
Mixed Upland Deciduous	13,881	1,645	--	--	1,087	**16,613**
Natural Jack Pine	10,950	--	--	--	--	**10,950**
Black Red Hybrid Oak	8,006	--	619	--	353	**8,978**
Lowland Deciduous	1,193	485	-	173	6,274	**8,124**
Northern Red Oak	6,484	--	310	591	82	**7,467**
Planted Jack Pine	6,981	--	--	--	--	**6,981**
Lowland Aspen/Balsam Poplar	5,632	--	--	--	--	**5,632**
Natural Mixed Pines	--	--	2,529	--	2,510	**5,039**
Upland Mixed Forest	4,438	--	--	--	--	**4,438**
Oak Mix	3,799	--	409	--	81	**4,288**
Planted White Pine	481	--	3,025	--	--	**3,506**
Natural White Pine	--	--	1,722	--	1,662	**3,384**
Lowland Conifers	1,919	--	--	--	--	**1,919**
Planted Mixed Pine	1,150	--	497	--	--	**1,647**
Upland Spruce/Fir	1,453	--	--	--	--	**1,453**
Natural Red Pine	--	--	582	--	610	**1,192**
Lowland Mixed Forest	970	--	--	--	--	**970**
Upland Conifers	896	--	--	--	64	**960**
Lowland Spruce/Fir	446	--	--	--	--	**446**
Hemlock	--	326	--	--	--	**326**
Cedar	74	--	--	25	--	**100**
Tamarack	44	--	--	--	--	**44**
Total	**147,006**	**67,604**	**53,465**	**5,125**	**13,066**	**286,266**

There are a few cover type transitions projected for the Northern Lower Peninsula Ecoregion (Table 5). The managed area of each cover type is projected to remain fairly stable as treatment regimes will not significantly change the amount of area in each cover type except for aspen and northern red oak. The largest decrease forecasted is in the northern red oak cover type where approximately 10.7% or 5,110 acres will convert to other cover types such as upland mixed forest through forest management and regeneration activities. The largest increase occurs on the aspen cover type where 6,335 acres are projected to convert into this cover type increasing by 1.3%, mostly from the oak cover types.

Table 5. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Aspen	477,069	483,404	6,335
Northern Hardwood	198,396	199,257	861
Planted Red Pine	141,545	142,359	814
Mixed Upland Deciduous	116,334	116,609	275
Planted Jack Pine	100,867	100,515	-351
Lowland Deciduous	86,648	86,742	94
Lowland Conifers	84,947	84,241	-706
Cedar	74,169	74,169	0
Natural Jack Pine	65,184	64,990	-194
Upland Mixed Forest	63,384	67,045	3,661
Black Red Hybrid Oak	54,880	51,418	-3,461
Northern Red Oak	47,599	42,489	-5,110
Lowland Aspen/Balsam Poplar	44,928	44,958	30
Natural Mixed Pines	44,458	45,214	756
Oak Mix	38,167	37,786	-381
Lowland Mixed Forest	28,039	28,840	801
Natural Red Pine	22,675	22,782	108
Natural White Pine	22,107	22,396	288
Lowland Spruce/Fir	12,555	12,336	-220
Planted Mixed Pine	12,455	11,305	-1,150
Upland Conifers	9,273	8,638	-635
Tamarack	9,166	9,166	0
Planted White Pine	6,907	6,427	-481
Upland Spruce/Fir	3,572	2,236	-1,335
Hemlock	1,125	1,125	0
Lowland Shrub	95,600	95,600	0
Herbaceous Openland	37,818	37,818	0
Upland Shrub	34,825	34,825	0
Marsh	31,563	31,563	0
Water	20,486	20,486	0
Low Density Trees	16,201	16,201	0
Urban	10,914	10,914	0
Bog	10,023	10,023	0
Treed Bog	7,420	7,420	0
Bare/Sparsely Vegetated	3,745	3,745	0
Cropland	1,443	1,443	0
Total	**2,036,486**	**2,036,486**	**0**

NLP management areas

Avery Hills

State Forest Area: 43,770 acres	Location: Northeastern Lower Peninsula	Population Centers: Atlanta Lewiston
Subsection: Avery Hills	Landforms: Steep moraine ridges, outwash channels and plains	Landcover: Forested: 41,002 acres Nonforested: 2,769 acres

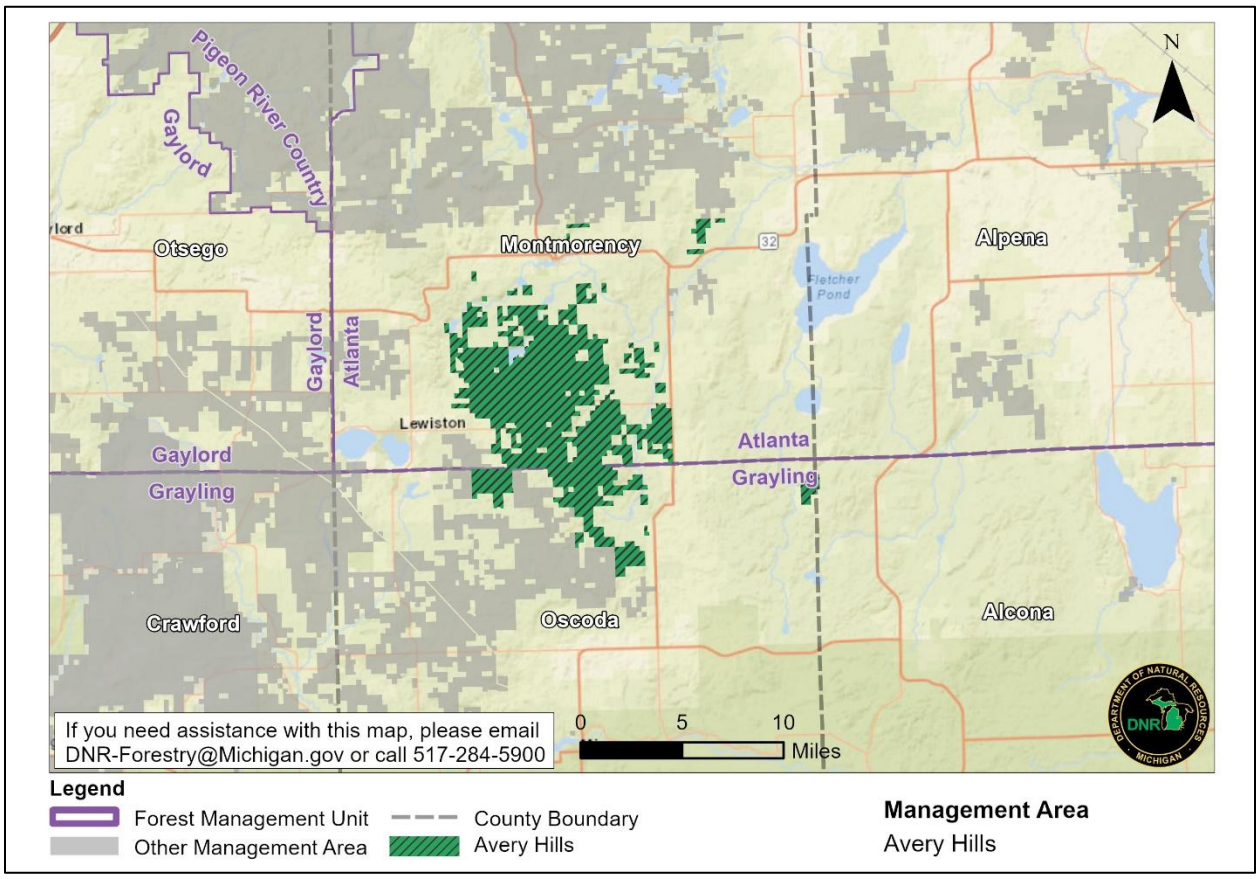


Figure 1. Avery Hills Management Area.

Forested landscape

Current and projected future condition

The Avery Hills Management Area consists mostly of shade-intolerant species throughout all the age groups (Figure 2). Available upland and unavailable lowland contain the majority of shade tolerant acres, primarily in the mature age category.

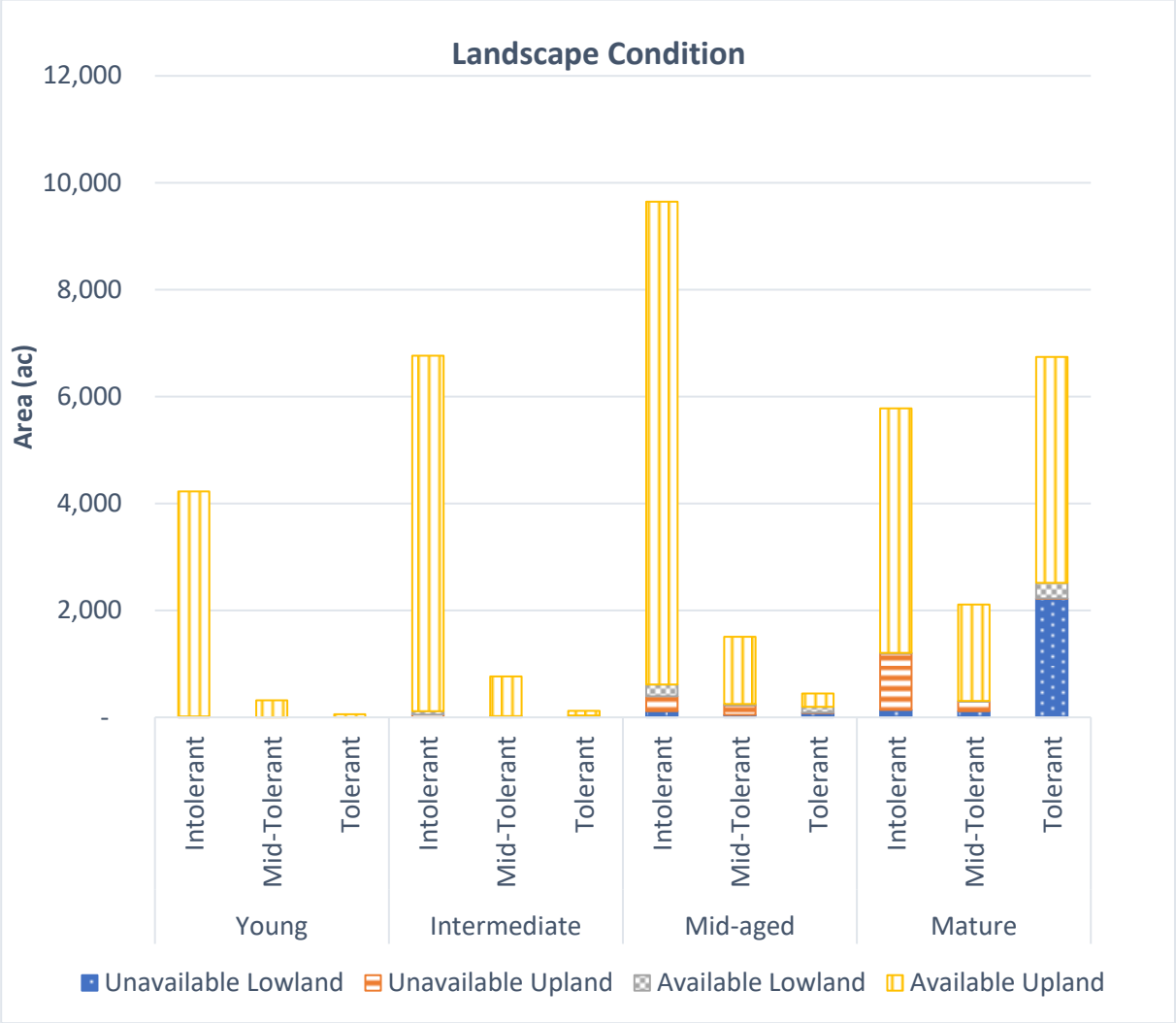


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

The mature shade-tolerant areas of the management area should be maintained at the current distribution of age categories. The areas of contiguous hardwood in large patches should be maintained as well through treatments that do not reduce the canopy closure beyond a typical selection harvest regime. A more even distribution of the shade intolerant area across the age categories is desirable in the Avery Hills Management Area, and this can be achieved by accomplishing individual cover type age class goals over the next several decades.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	4,223
Mature Forest	Acres of 80+ year stands across cover types	14,633
Mature Forest	Acres of 120+ year stands across cover types	438
Mesic Conifer Cover types	Acres of mesic conifer cover types	424
Mesic Conifers in other Cover types	Average canopy occupancy	14%
Mast – Oak Cover types	Acres of Oak cover types	4,677
Mast Tree Species in other Cover types	Acres of Total Canopy Occupancy of Mast Tree Acres (Trace-100%)	27,365
Big Trees	Total Canopy Stand Occupancy of Species in Sawlog or Greater Size Class	26,124
Nonforested Openings	Acres of Total Herbaceous Openland, Upland Shrub and Cropland	1,356
Landscape Forest Matrix	Percent Deciduous Forest	83%
Landscape Forest Matrix	Percent Coniferous Forest	15%

The Avery Hills Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management Site (GEMS) – Greasy Creek

The Avery Hills Management Area is comprised of 94% forested cover types and 6% nonforested cover types. Of the forested cover types, 86% are in the upland landscape position. The largest contributors to upland cover types are aspen, northern hardwoods and northern red oak. Cedar and lowland conifer make up 77% of the lowland landscape position. Herbaceous openland is the most common nonforested cover types in the management area representing 2% of the landscape (Table 2).

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	20,297	33,504	37,468	41,002
			Northern Hardwood	4,504			
			Black Red Hybrid Oak	371			
			Northern Red Oak	4,019			
			Oak Mix	753			
			Mixed Upland Deciduous	3,560			
		Mixed	Upland Mixed Forest	701	701		
		Coniferous	Planted Red Pine	1,135	3,263		
			Planted Jack Pine	564			
			Planted White Pine	0			
			Planted Mixed Pine	182			
			Natural Red Pine	208			
			Natural Jack Pine	750			
			Natural White Pine	44			
			Natural Mixed Pines	214			
			Upland Spruce/Fir	96			
			Upland Conifers	70			
			Hemlock	0			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	353	469	3,534	
			Lowland Deciduous	117			
		Mixed	Lowland Mixed Forest	125	125		
		Coniferous	Cedar	1,907	2,940		
			Lowland Conifers	831			
			Lowland Spruce/Fir	88			
			Tamarack	114			
Nonforested	Upland	N/A	Herbaceous Openland	1,032	N/A	1,870	2,769
			Upland Shrub	324			
			Low Density Trees	114			
			Bare/Sparsely Vegetated	41			
			Cropland	0			
			Urban	359			
	Lowland	N/A	Lowland Shrub	236	N/A	899	
			Marsh	274			
			Bog	25			
			Treed Bog	68			
			Water	296			
						Grand Total:	**43,770**

There are 36,494 acres (89% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Avery Hills Management Area (Table 3). Of that, over 48% is in the aspen cover type, 11% in the northern hardwoods cover type, 8% in the northern red oak, and 8% in the mixed upland deciduous. The remaining 19 cover types represent less than 3% each of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

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Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	19,830	48.3%	472	1.1%	20,302	49.5%
Black Red Hybrid Oak	323	0.8%	49	0.1%	372	0.9%
Cedar	251	0.6%	1,658	4.0%	1,909	4.7%
Hemlock	0	0.0%	0	0.0%	0	0.0%
Lowland Aspen/Balsam Poplar	254	0.6%	99	0.2%	353	0.9%
Lowland Conifers	176	0.4%	656	1.6%	832	2.0%
Lowland Deciduous	31	0.1%	86	0.2%	117	0.3%
Lowland Mixed Forest	34	0.1%	91	0.2%	125	0.3%
Lowland Spruce/Fir	36	0.1%	52	0.1%	88	0.2%
Mixed Upland Deciduous	3,442	8.4%	118	0.3%	3,560	8.7%
Natural Jack Pine	750	1.8%	0	0.0%	750	1.8%
Natural Mixed Pines	187	0.5%	27	0.1%	214	0.5%
Natural Red Pine	195	0.5%	14	0.0%	209	0.5%
Natural White Pine	43	0.1%	1	0.0%	44	0.1%
Northern Hardwood	4,487	10.9%	18	0.0%	4,505	11.0%
Northern Red Oak	3,282	8.0%	738	1.8%	4,019	9.8%
Oak Mix	705	1.7%	47	0.1%	753	1.8%
Planted Jack Pine	564	1.4%	0	0.0%	564	1.4%
Planted Mixed Pine	182	0.4%	0	0.0%	182	0.4%
Planted Red Pine	1,059	2.6%	77	0.2%	1,136	2.8%
Tamarack	2	0.0%	112	0.3%	114	0.3%
Upland Conifers	24	0.1%	46	0.1%	70	0.2%
Upland Mixed Forest	575	1.4%	128	0.3%	703	1.7%
Upland Spruce/Fir	61	0.1%	36	0.1%	96	0.2%
Grand Total	**36,494**	**89.0%**	**4,522**	**11.0%**	**41,016**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too Wet	1,646	36.4%
BMPs	1,020	22.6%
Too Steep	669	14.8%
Long-Term Retention	308	6.8%
Conservation Values	190	4.2%
Other Dept./Div. Processes	168	3.7%
Cannot Regenerate	164	3.6%
Recreation/Scenic	158	3.5%
Blocked by Obstacle	88	1.9%
Other Influence Zones	83	1.8%
Denied Access	15	0.3%
Species of special concern or T&E	10	0.2%
Non-Military Lease/Easement	4	0.1%
Total Unavailable	**4,522**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Avery Hills Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among cover types like northern hardwoods. Implementing these silvicultural regimes will yield an estimated 85,624 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Aspen	1,636	-	-	-	-	697	-	2,333
Northern Hardwood	-	-	-	-	-	405	1,441	1,846
Northern Red Oak	469	-	-	25	20	-	232	746
Mixed Upland Deciduous	463	71	-	-	-	-	-	534
Planted Red Pine	-	-	171	-	-	40	39	250
Natural Jack Pine	-	-	-	-	-	197	-	197
Planted Jack Pine	-	-	-	-	-	96	-	96
Upland Mixed Forest	93	-	-	-	-	-	-	93
Oak Mix	-	-	-	-	-	88	-	88
Upland Spruce/Fir	57	-	-	-	-	-	-	57
Lowland Aspen/Balsam Poplar	52	-	-	-	-	-	-	52
Lowland Conifers	23	-	-	-	-	-	-	23
Lowland Spruce/Fir	10	-	-	-	-	-	-	10
Natural Red Pine	-	-	10	-	-	-	-	10
Natural Mixed Pines	-	-	3	-	2	-	-	4
Upland Conifers	-	-	-	-	-	-	-	-
Planted White Pine	-	-	-	-	-	-	-	-
Natural White Pine	-	-	-	-	-	-	-	-
Black Red Hybrid Oak	-	-	-	-	-	-	-	-
Tamarack	-	-	-	-	-	-	-	-
Cedar	-	-	-	-	-	-	-	-
Lowland Deciduous	-	-	-	-	-	-	-	-
Planted Mixed Pine	-	-	-	-	-	-	-	-
Hemlock	-	-	-	-	-	-	-	-
Lowland Mixed Forest	-	-	-	-	-	-	-	-
Totals	**2,804**	**71**	**184**	**25**	**22**	**1,523**	**1,712**	**6,340**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection Avery Hills Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Aspen	22,033	20,711
	Mixed Hardwood	21,520	20,228
	Jack Pine	4,488	4,219
	Mixed Spruce	4,207	3,955
	Mixed Oak	4,175	3,925
	Mixed Softwood	2,445	2,299
	Red Pine	2,192	2,060
	White Pine	1,332	1,252
	Pulpwood Total	**62,391**	**58,648**
Sawtimber (MBF)	Red Oak	6,003	5,643
	Mixed Aspen	4,487	4,218
	White Pine	2,139	2,011
	Red Pine	1,909	1,795
	Red Maple	654	615
	White Oak	577	542
	Sugar Maple	433	407
	Mixed Oak	72	68
	Basswood	28	26
	Sawtimber Total	**16,302**	**15,324**
	Total Sawtimber Harvest Volume in Cords	**85,624**	**80,486**
	Grand Total Harvest Volume in Cords	**148,015**	**139,134**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are few cover type transitions projected for the Avery Hills Management Area (

Table 7). The managed area of each cover type is projected to remain stable as treatment regimes will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the northern red oak cover type where 314 acres will likely convert to aspen or other cover types through forest management and regeneration activities. The largest increase occurs in the aspen type where 276 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	20,297	20,573	276
Northern Hardwood	4,504	4,504	0
Northern Red Oak	4,019	3,705	-314
Mixed Upland Deciduous	3,560	3,575	15
Cedar	1,907	1,907	0
Planted Red Pine	1,135	1,249	114
Lowland Conifers	831	823	-8
Natural Jack Pine	750	750	0
Upland Mixed Forest	701	652	-49
Black Red Hybrid Oak	371	371	0
Lowland Aspen/Balsam Poplar	353	350	-2
Natural Mixed Pines	214	214	0
Natural Red Pine	208	208	0
Planted Mixed Pine	182	182	0
Lowland Mixed Forest	125	137	12
Lowland Deciduous	117	119	2
Tamarack	114	114	0
Upland Spruce/Fir	96	44	-52
Lowland Spruce/Fir	88	84	-4
Upland Conifers	70	70	0
Natural White Pine	44	44	0
Oak Mix	753	762	9
Planted Jack Pine	564	564	0
Herbaceous Openland	1,032	1,032	0
Urban	359	359	0
Upland Shrub	324	324	0
Marsh	274	274	0
Lowland Shrub	236	236	0
Low Density Trees	114	114	0
Treed Bog	68	68	0
Bare/Sparsely Vegetated	41	41	0
Bog	25	25	0
Water	296	296	0
Total:	**43,770**	**43,770**	**0**

Featured species current and projected habitat acres

There are seven featured species in this management area that span various cover types, age classes, and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Two of these species, black bear and wild turkey, were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black Bear	Generalist/mast	--	--	--	--
Black-Throated Blue Warbler	Northern hardwoods, mixed upland deciduous	4,276	4,745	2,163	4,565
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	11,111	11,508	9,177	10,907
Ruffed Grouse	Aspen	8,740	7,930	6,290	6,543
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	10,529	10,113	7,650	7,968
Wild Turkey	Nonforested openings	1,032	--	--	--
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	7,687	8,132	5,374	7,542
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

The aspen cover type is currently distributed well across most of the age classes. There are larger spikes in the 0-9 and 10-19 age classes and a large deficit in the 20-29 age class. The larger 0-9 age class spike is in part due to the compensatory approach used to help balance age classes in the last 10 years. Meaning, larger amounts of acres were put into the 0-9 age class to compensate for the lack of acres in the 20-29 age class (Figure 3). The past management regime has been primarily clearcut for this cover type. This current planning period will continue to smooth out the distribution of the aspen in this management area.

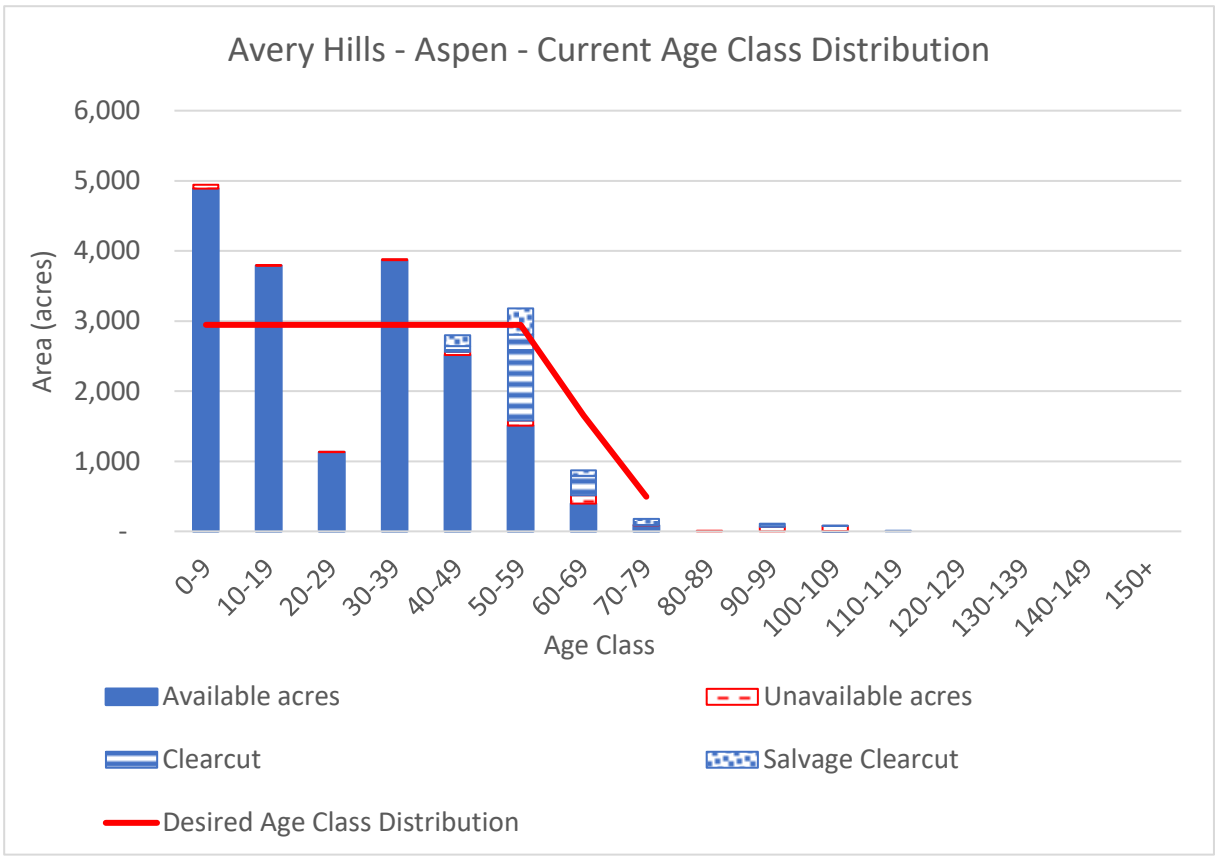


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	8,686	54
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	8,686	54

Desired future condition

The projected long-term cover type trend for aspen is stable in the Avery Hills Management Area. There are a few transitions into this cover type from other cover types forecasted in this management area increasing the aspen cover type acreage by approximately 276 acres in the first 10-year planning period, then continuing this trend in the following planning periods.

The long-term goal for this cover type is balanced age classes between 0 and 60-years-old for all available aspen stands in this management area. Maintaining lower acreage in the 60-69- and 70-79-year-old age classes continues to be desirable from a habitat standpoint and to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of the desired amount of regeneration in the upcoming 0-9 age class. Progress toward the long-term age class distribution of aspen will take several decades in the management area (Figure 4).

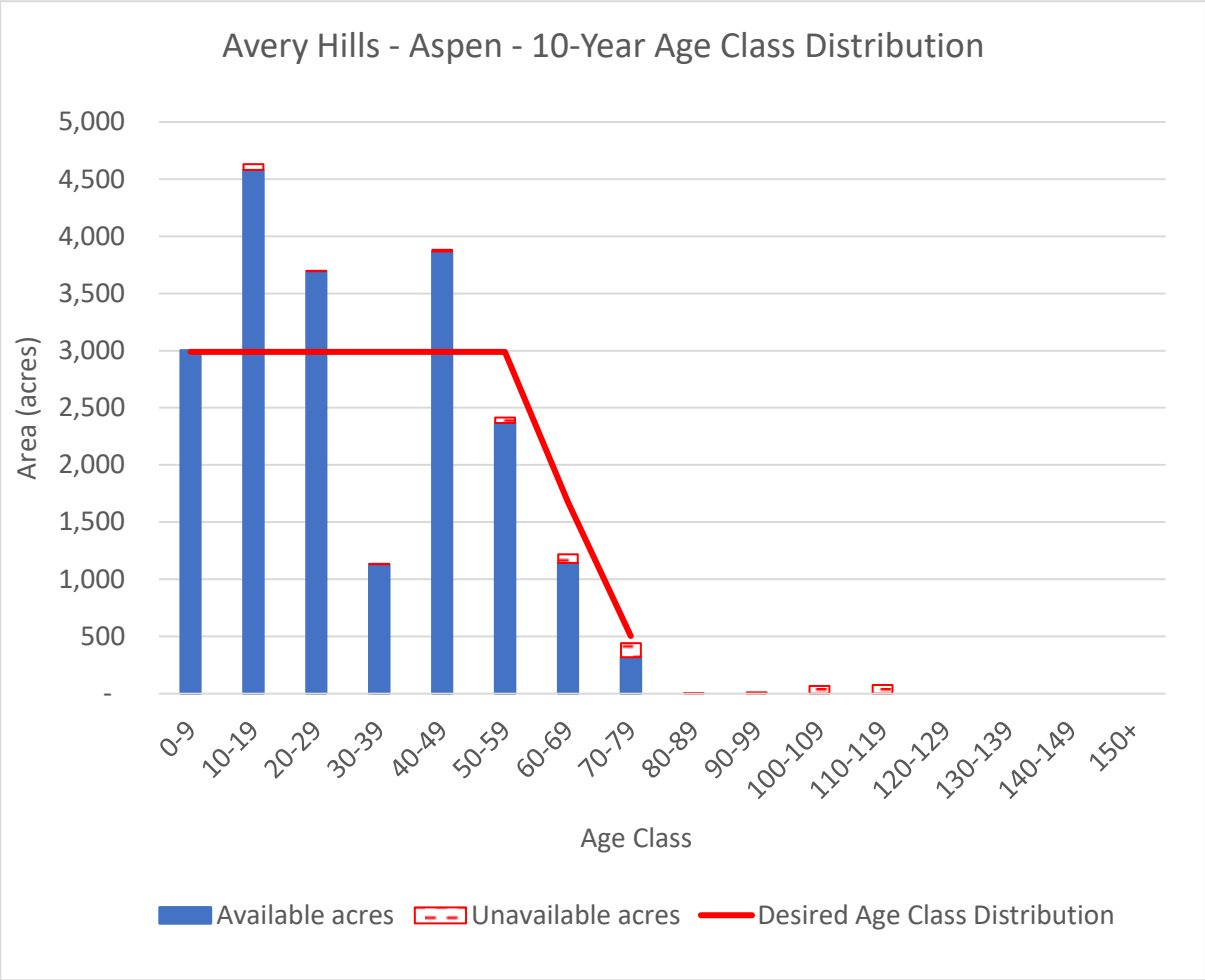


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres has nearly reached the desired future condition (Figure 5).

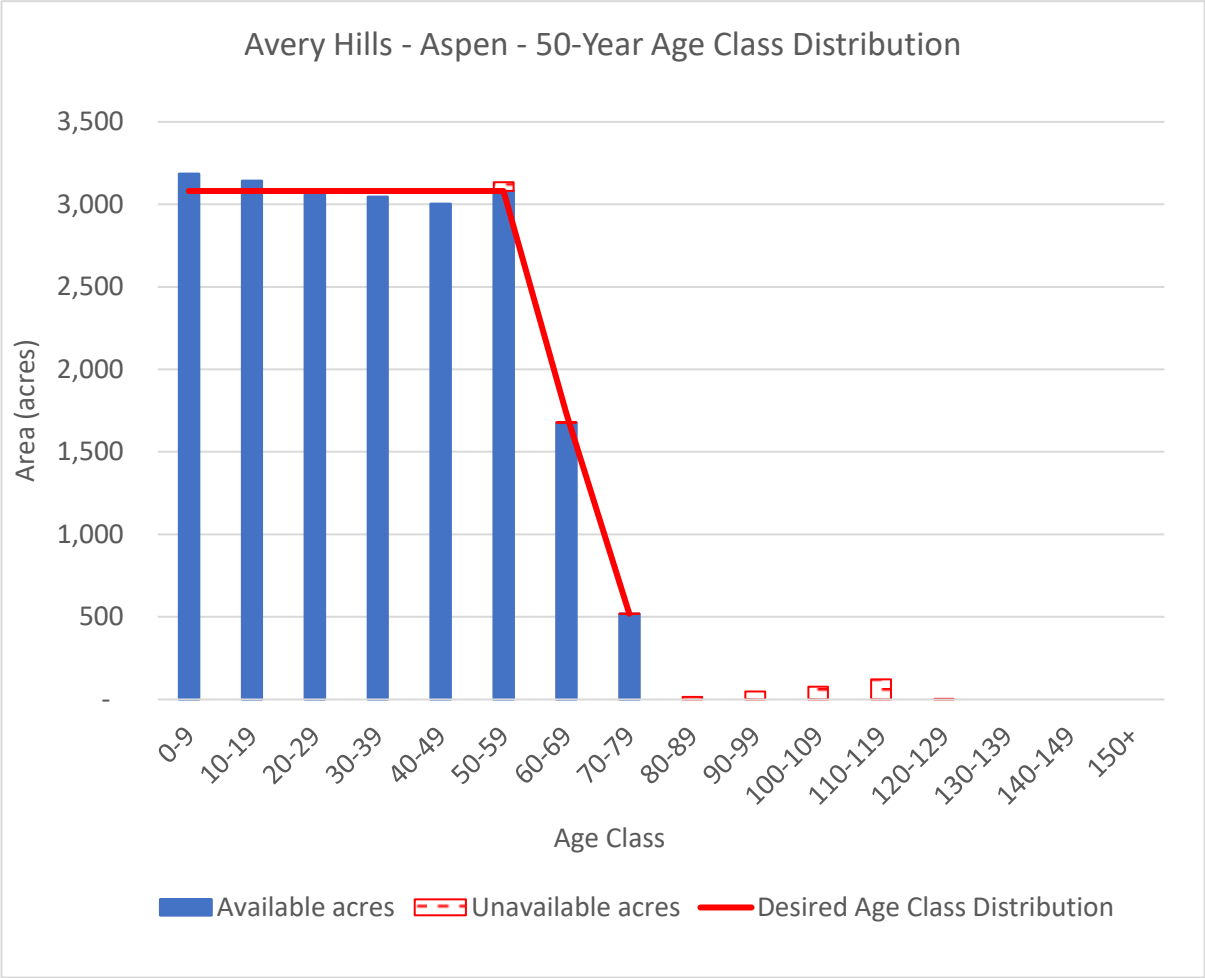


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

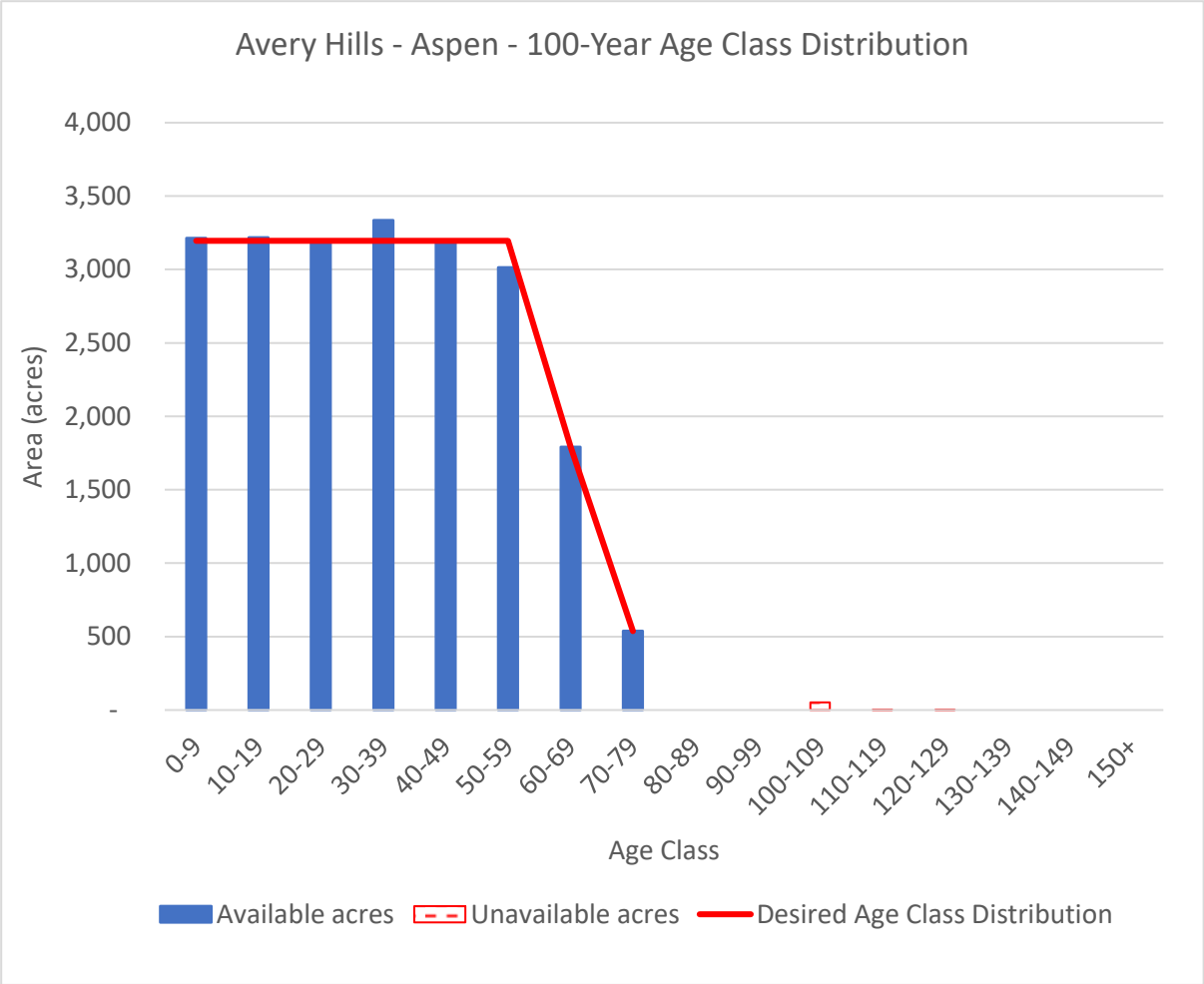


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

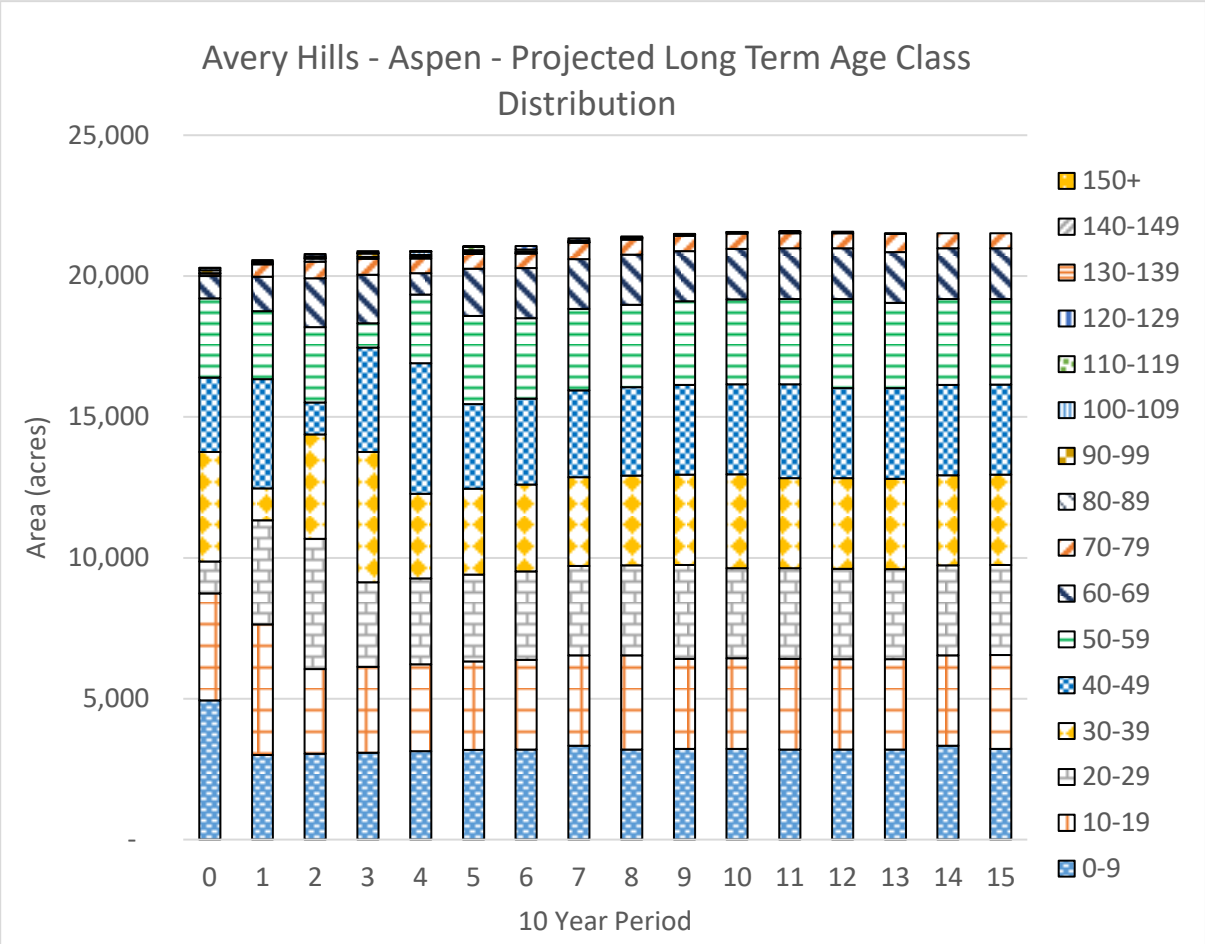


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 2,333 acres of projected clearcut harvest in the aspen cover type during this planning period. There are an additional 409 acres that the model expects will regenerate due to 2025 ice storm damage. These acres, plus the 276 acres that will transition from other cover types total 3,018 acres, slightly over the desired establishment of 2,947 acres per decade.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 119 years old in the Avery Hills Management Area (Figure 8). The past management regime has been primarily single-tree selection which allows for stand age to continue to increase over time. Group selection harvests were used in less amounts over the last planning period.

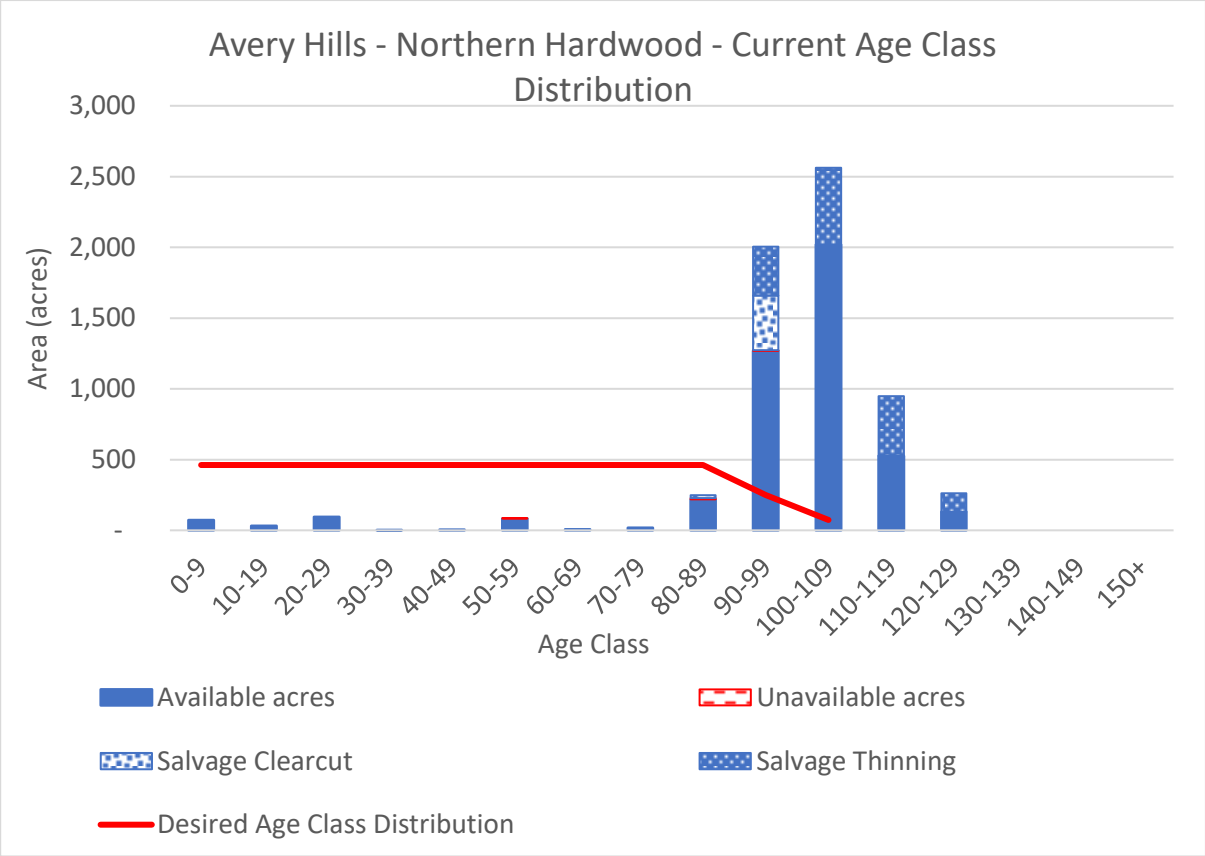


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Avery Hills Management Area (Figure 9). Current conditions are a result of a regulated selection harvest regime that has been in place in this management area. Ash and beech salvage efforts have aided in maintaining this 81-110 basal area condition.

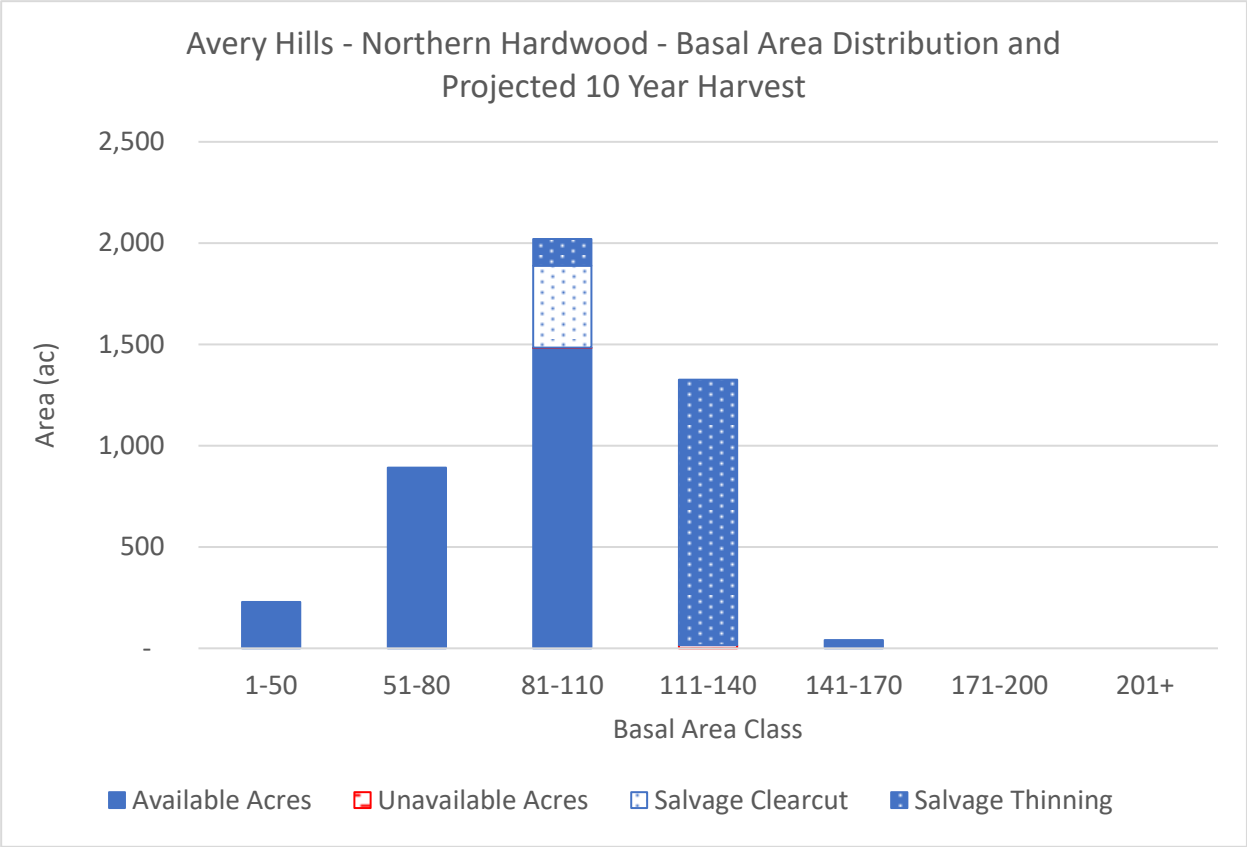


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Selection harvest and thinning are the primary silvicultural treatment projected during this 10-year planning period with clearcutting opportunities present in order to salvage damaged trees from the 2025 ice storm and to utilize even-aged management silvicultural regimes to increase stem density, species composition, and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for black-throated blue warbler and marten (Table 10).

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	3,306	16
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	3,367	18

Desired future condition

The projected cover type trend for northern hardwood is slightly decreasing in the Avery Hills Management Area over the next 60 years followed by slight increases over the next 90 years (Figure 10). There are no projected transitions into this cover type from other cover types forecasted in this management area over the next 10 years and no projected transitions from northern hardwoods to other cover types during the same period.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. The Avery Hills Management Area will take several decades to reach the desired future condition.

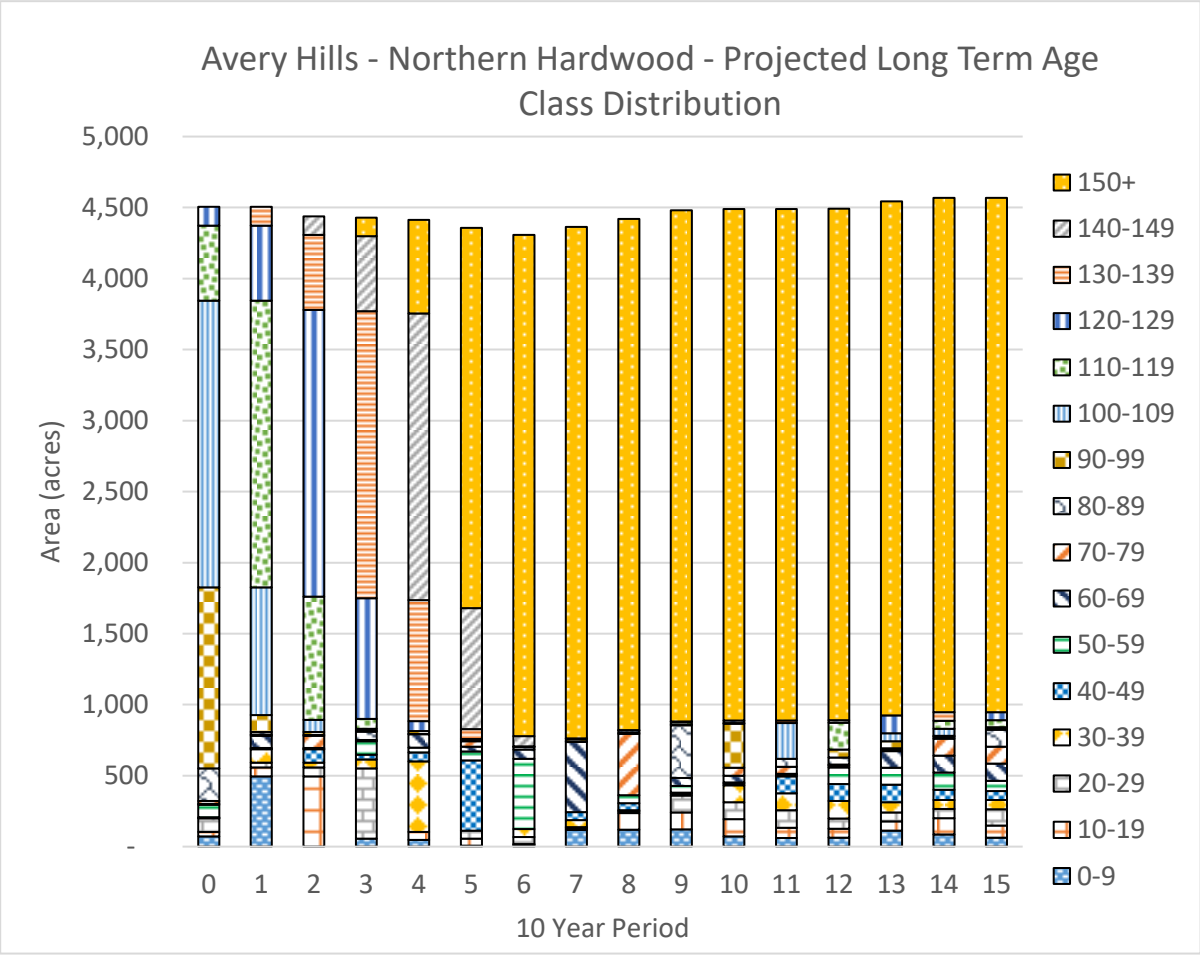


Figure 10. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected single tree selection harvest regime on 1,441 acres and clearcut on 405 acres throughout the first 10-year planning period (Table 3). Multiple silvicultural regimes should have continued consideration as emerging research results become available. Emphasis on larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Northern red oak

Current condition

Most of the northern red oak cover type is currently in the 100-109 age class in the Avery Hills Management Area (Figure 11). The past management regime has been a mix of single tree selection, group selection and some clearcutting. These stands were generally fire originated about 100-plus years ago. Regeneration of these stands through traditional management has been very difficult and has resulted in some stand conversions. The stands that have remained in northern red oak through selection harvesting continue to age. The northern red oak cover type in the Avery Hills Management Area is of medium quality but seems to hold strong in older age classes compared to oak that declines at much younger ages in other areas.

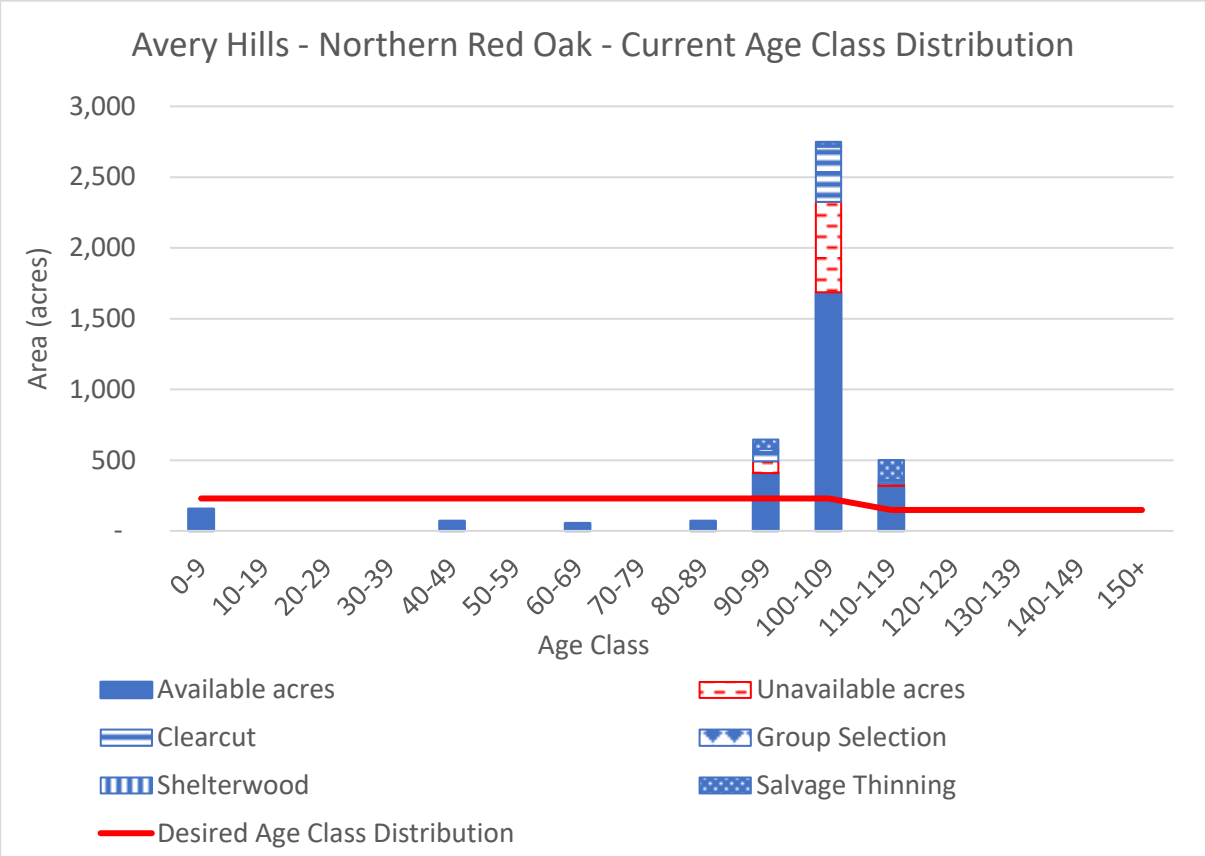


Figure 11. Current age class distribution and projected harvests in the northern red oak cover type.

The area of northern red oak is well distributed in the ideal basal area classes for optimal growing conditions in the Avery Hills Management Area (Figure 12). Current conditions are a result of past shelterwood and selection harvests maintaining the basal area in a bell-shaped curve across the basal area classes.

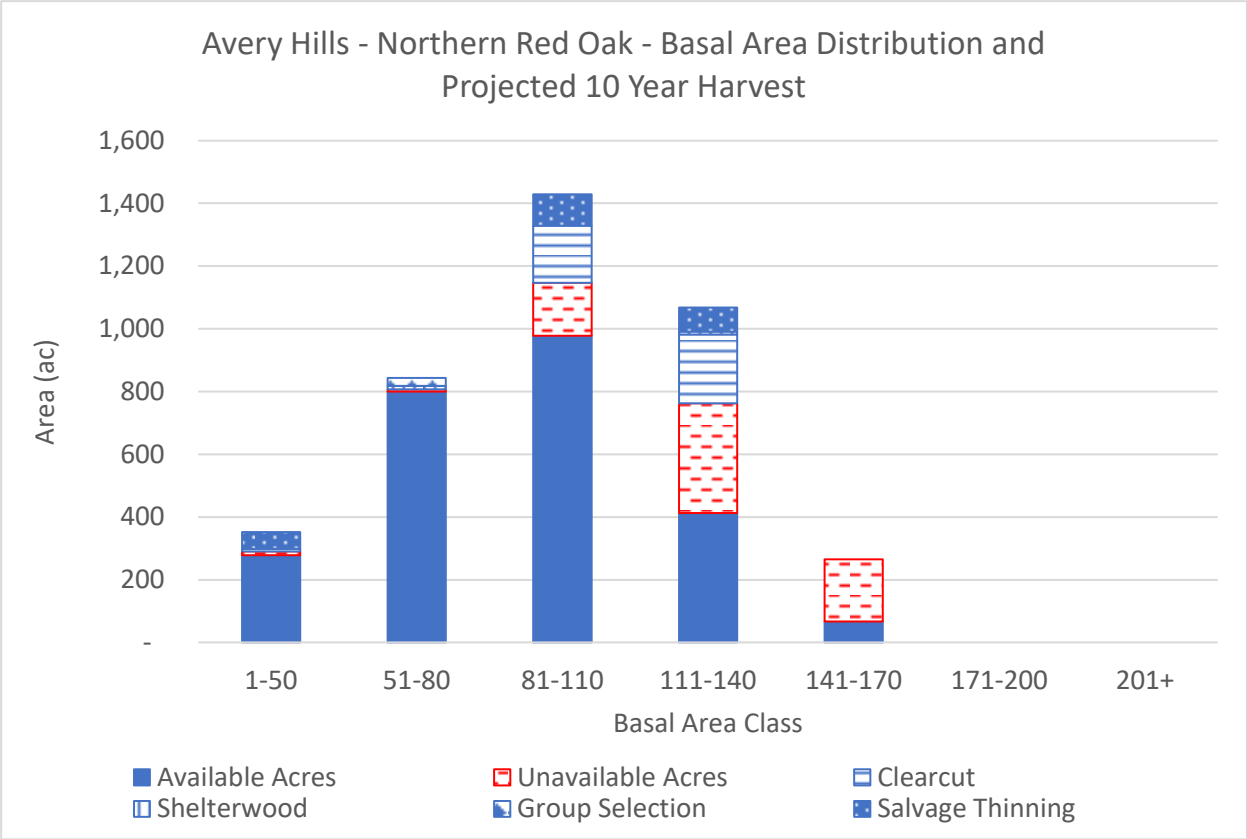


Figure 12. Current basal area distribution of the northern red oak cover type as well as the projected harvests from each basal area class.

Clearcut harvest and thinning are the primary silvicultural treatments projected during this 10-year planning period. These silvicultural regimes will help to maintain optimal growing basal areas while providing some regeneration opportunities. Some of these stands will be converted to other cover types over time throughout this planning period and future periods. These conversions are primarily due to regeneration difficulties and lack of stand replacing fires pushing them into more of the mixed cover types. A portion of this cover type meets the habitat requirements for marten and wood thrush (Table 11).

Table 11. Featured species with northern red oak as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Red Oak	Northern Red Oak Habitat Acres – Available	Northern Red Oak Habitat Acres - Unavailable
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	2,208	718
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	2,208	718

Desired future condition

The projected long-term cover type trend for northern red oak is decreasing in the Avery Hills Management Area (Figure 13). There are no transitions into this cover type from other cover types forecasted in this management area over the next planning period. There are about 314 acres that will be transitioning to other cover types during the planning period.

The desired basal-area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal-area class with recently harvested stands occupying the 51-80 class and stands ready for harvest occupy the 111-140 basal-area class. The age class trend will continue to get older while regenerating some of the stands where possible will help add acres to the 0-9 age class. The northern red oak in this management area can sustain longer into older age classes before significant decline takes place.

Regeneration and recruitment continue to be a focus in the northern red oak cover type across this management area. The long-term sustainability of the northern red oak will be more as a component of the mixed upland deciduous cover type as some acres will transition out of the northern red oak cover type and into the mixed upland deciduous through clearcutting. The percentage of northern red oak seedlings that recruit are expected to be less than the current cover type but will still be a significant component in these stands. Thinning, shelterwood and groups selection will continue to be used as silvicultural methods to maintain basal area and provide habitat into older age classes. The Avery hills Management Area will take several decades to achieve this future condition.

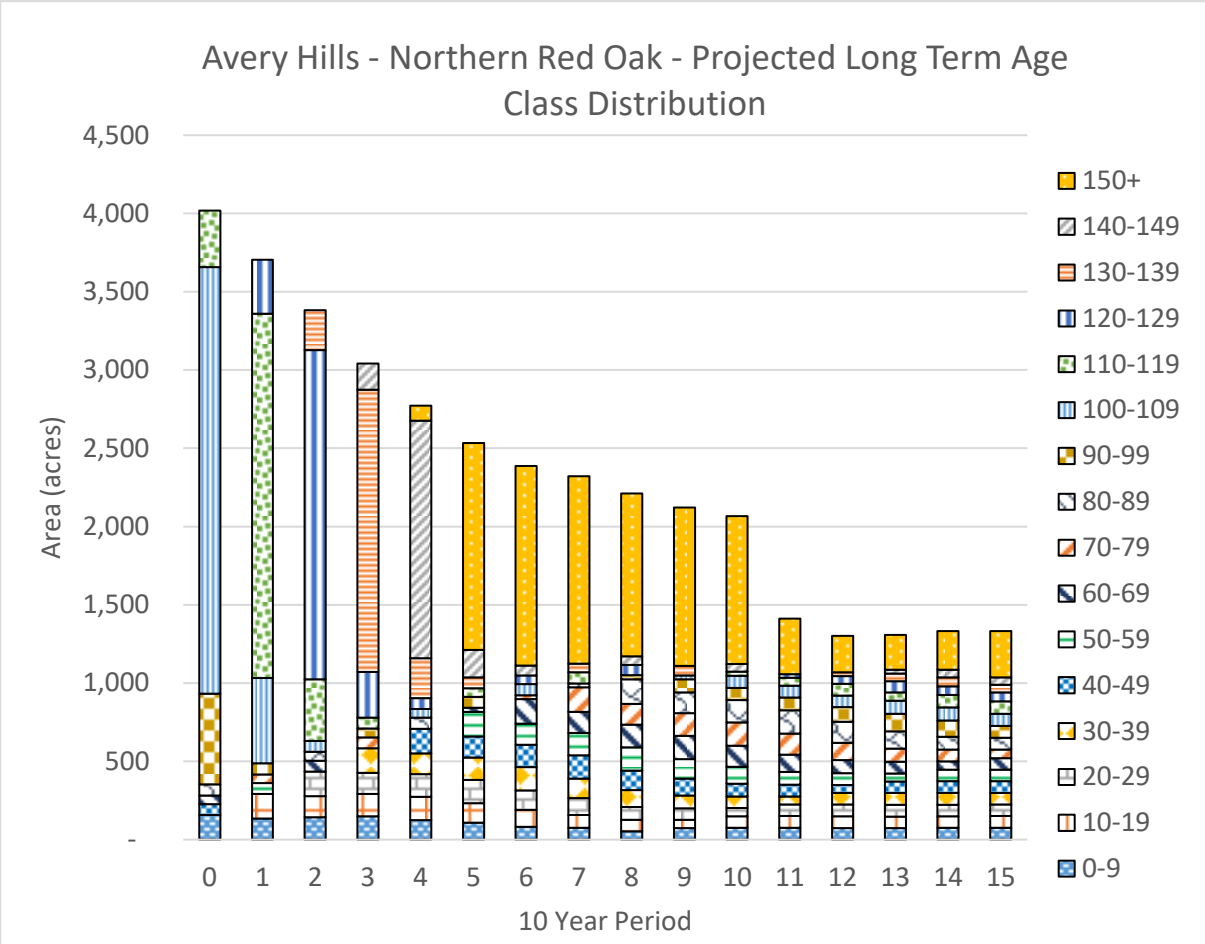


Figure 13. Projected age class distribution for all acres of northern red oak over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of an array of different silvicultural treatments including 469 acres of clearcut, 25 acres of group selection, 20 acres of shelterwood, and about 232 acres of ice storm salvage treatments throughout the first 10-year planning period (Table 5).

Mixed upland deciduous

Current condition

The mixed upland deciduous cover type is currently distributed well across most of the age classes (Figure 14). There is a larger spike in the 0-9 class and deficits in the rest of the age classes until the 90-109 ages where there is a spike in acreage in these older two groups. The larger 0-9 spike is partially due to the conversion of many oak stands over the last 10-year planning period. Many of the more purely oak stands regenerate to a more mixed stands with an oak component. The past management regime has been primarily clearcut for this cover type. This current planning period will continue to smooth out the distribution of the mixed upland deciduous in this management area.

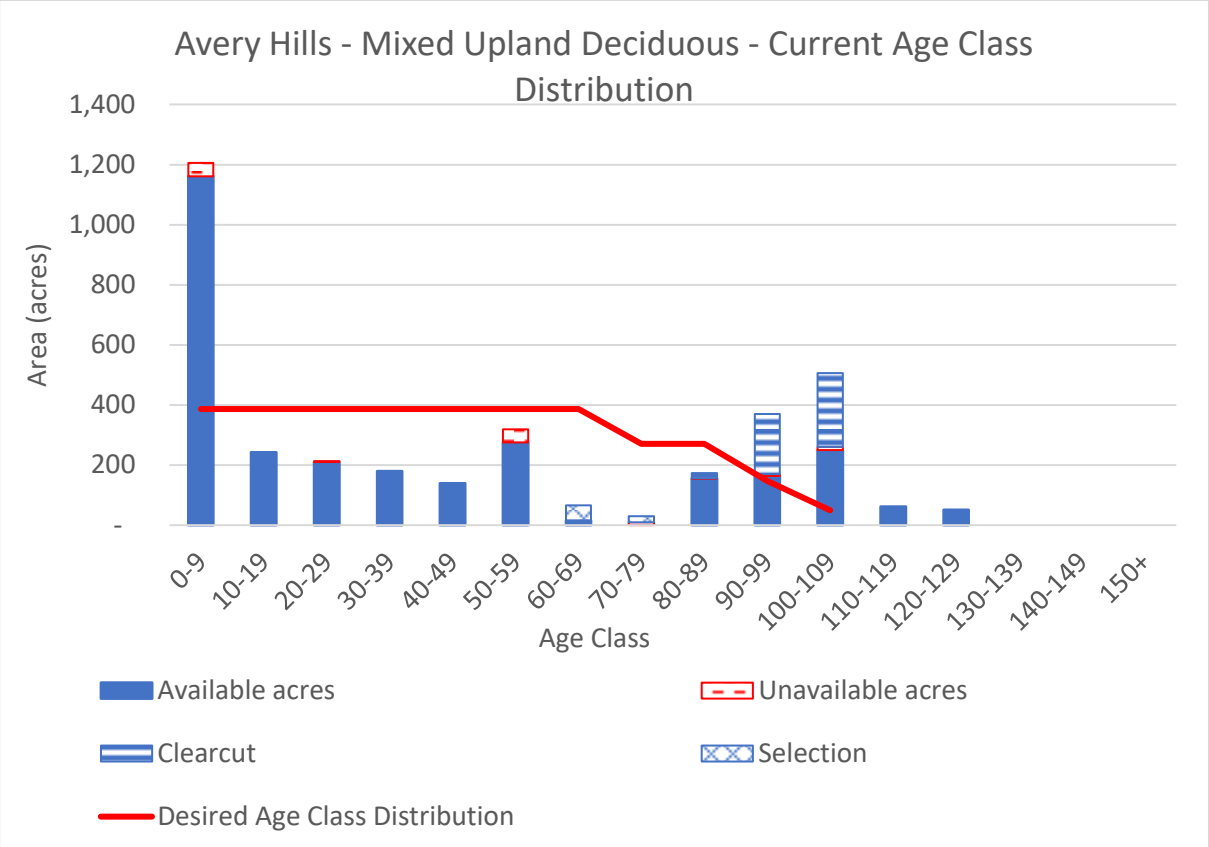


Figure 14. Current age class distribution, the desired age class distribution, and the projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

Current conditions are a result of consistent conversions or reclassification of oak stands into the mixed cover type. Commercial harvests and regeneration efforts on available mixed upland deciduous acres have also contributed to large number of acres in the 0-9 year-old age class over the last planning period.

Table 12. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres – Available	Mixed Upland Deciduous Habitat Acres – Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	1,404	44
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	947	7
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	1,267	31
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	1,267	31

Desired future condition

The projected long-term cover type trend for mixed upland deciduous is gradually increasing then stabling off in later planning periods in the Avery Hills Management Area. There are a few transitions into this cover type from other cover types forecasted in this management area increasing the mixed upland deciduous cover type acreage by approximately 15 acres in the first 10-year planning period, then continuing this trend in the following planning periods.

The long-term goal for this cover type is balanced age classes between 0 and 60-years-old for all available mixed upland deciduous stands in this management area. Then maintaining lower acreage in the 70- to 79 and 80- to 89-year-old age classes before tapering off throughout the classes maintaining lesser amount out until the 110-119-year-old age class. This continues to be desirable from a habitat standpoint and to ensure the mixed upland deciduous cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of slightly higher amounts of the desired amount of regeneration in the upcoming 0-9 age class. Progress toward the long-term age class distribution of the mixed upland deciduous cover type will take several decades in the management area (Figure 15).

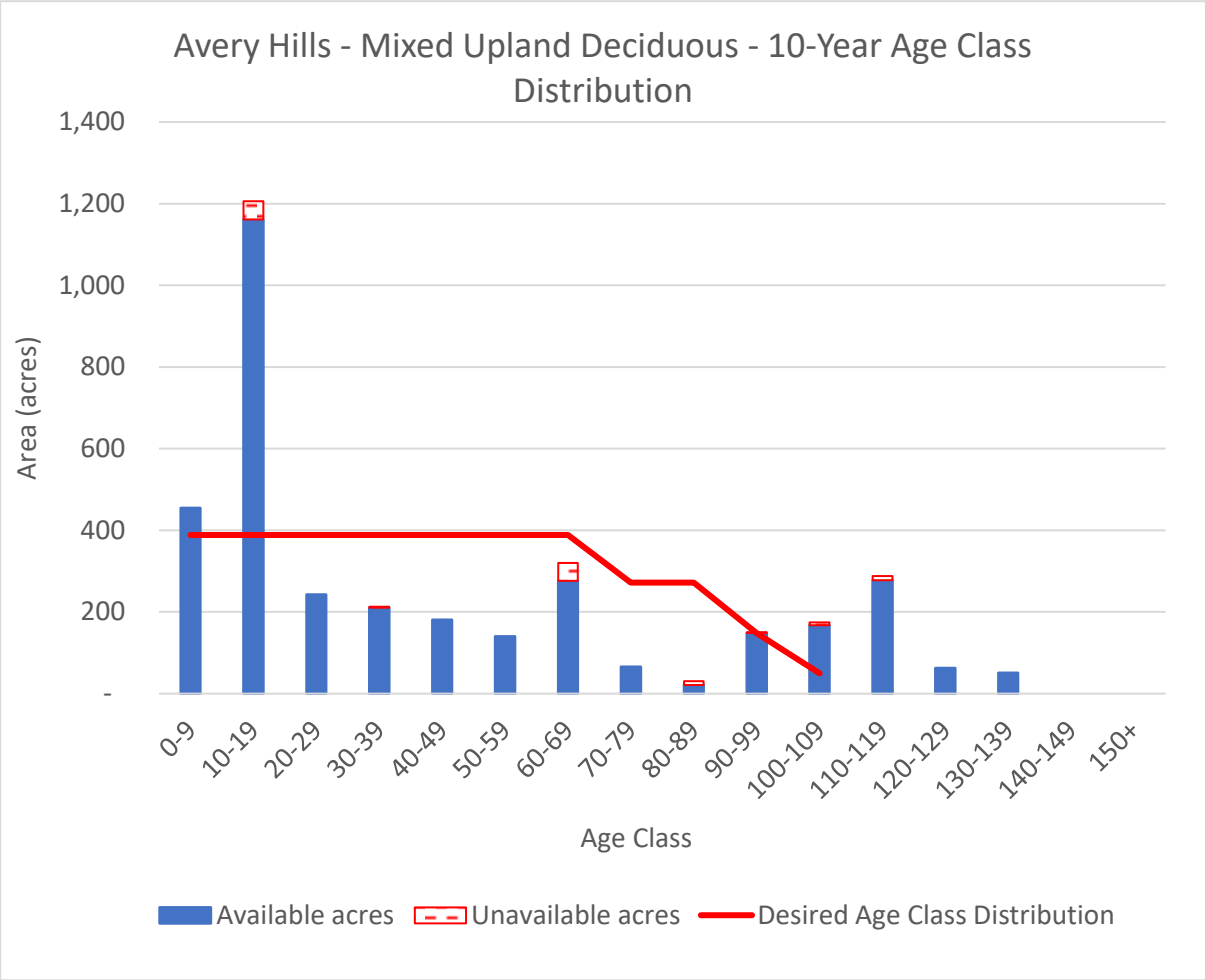


Figure 15. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed-upland deciduous acres progressing toward the desired future condition (Figure 16).

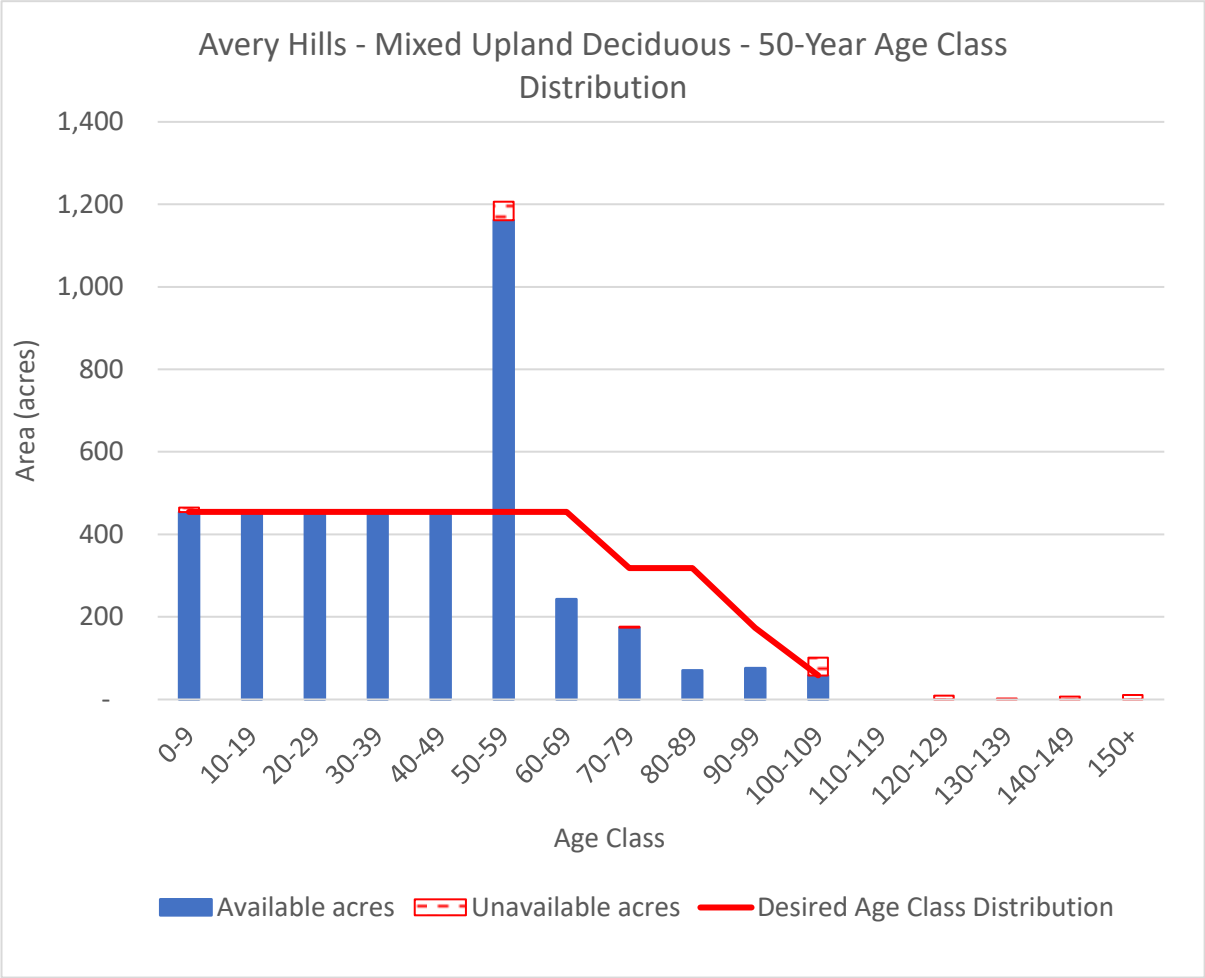


Figure 16. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 17) will concentrate the manageable acres of mixed-upland deciduous in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 18).

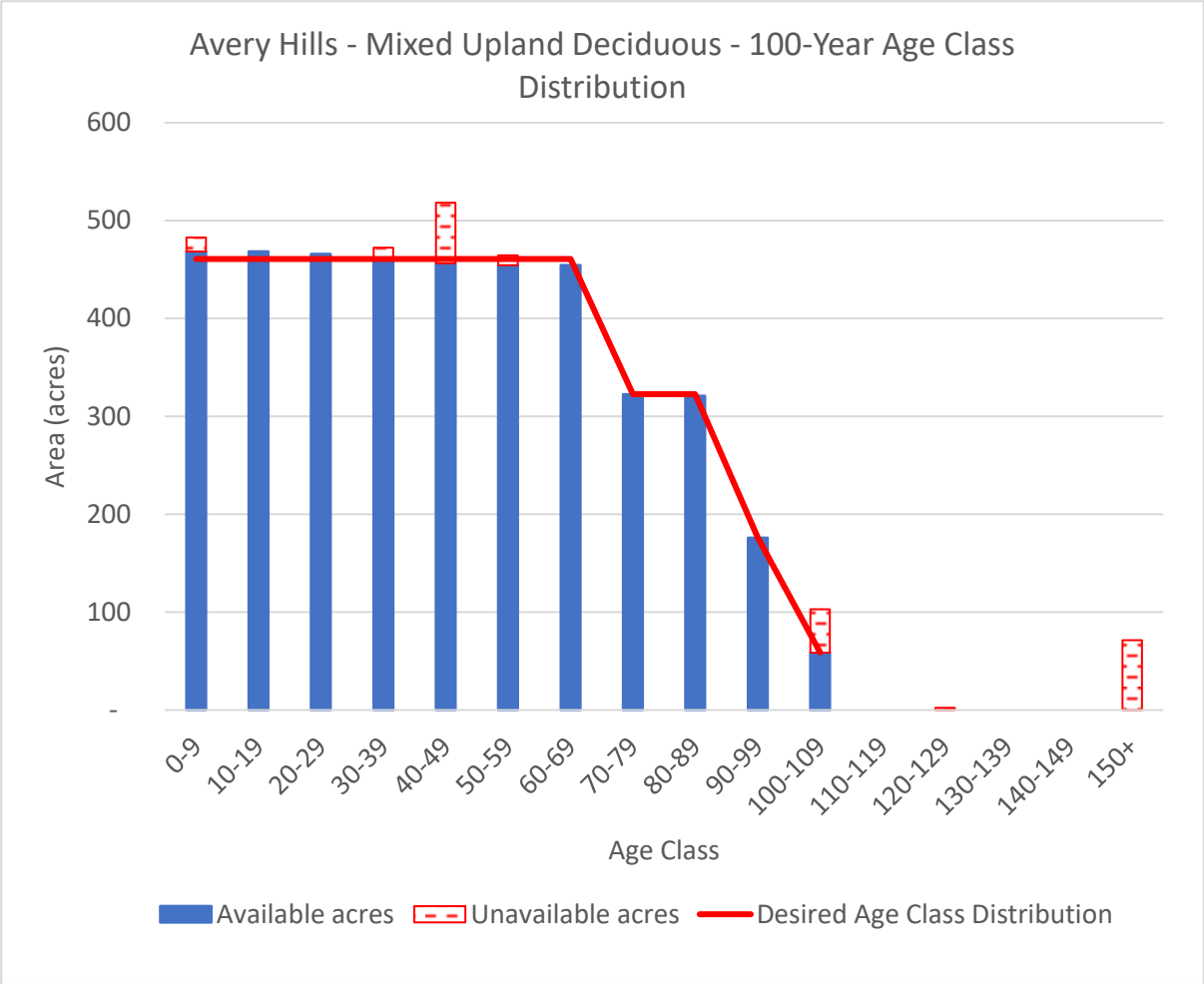


Figure 17. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

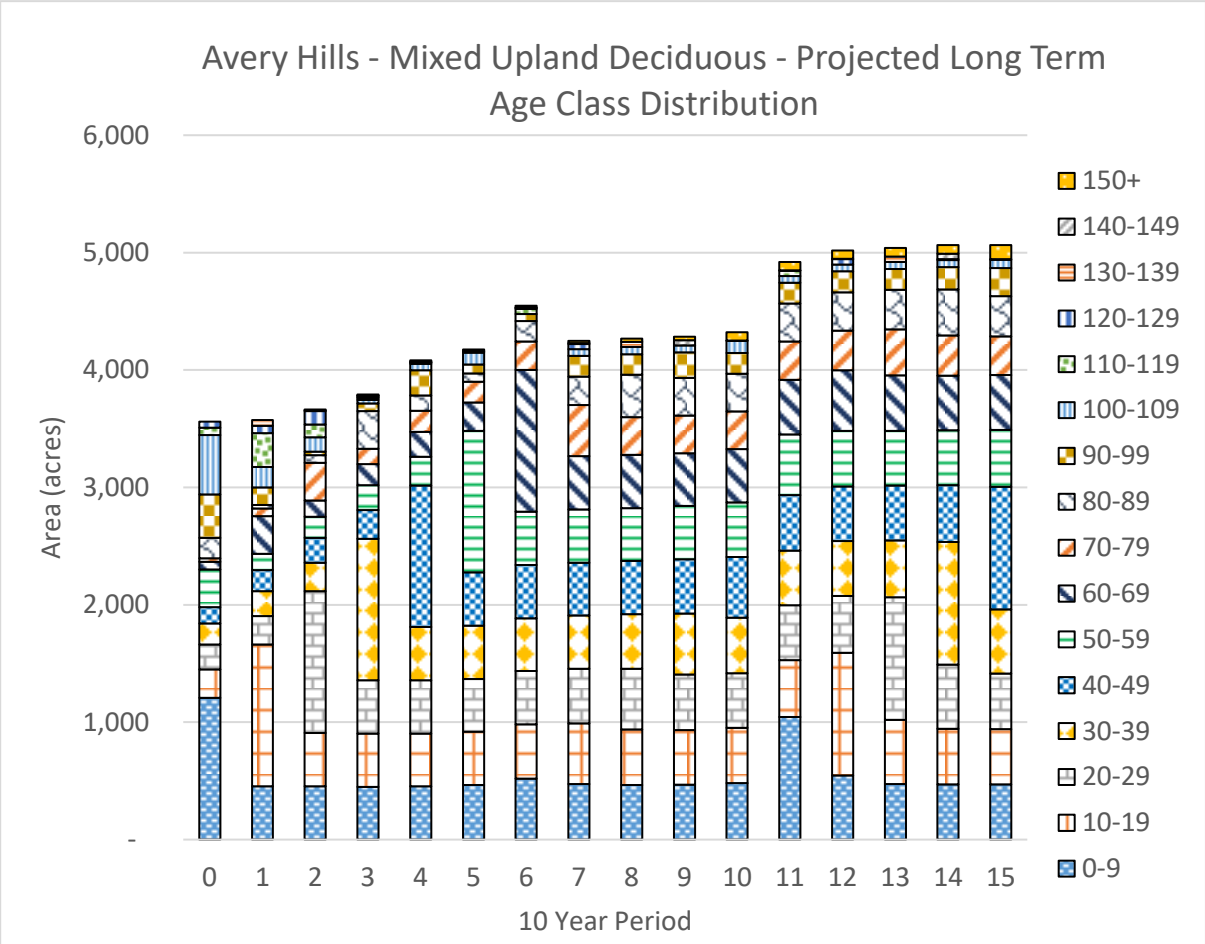


Figure 18. Projected age class distribution for all acres of mixed-upland deciduous over the next 150 years in the Avery Hills Management Area.

Management actions

There are 463 acres of projected clearcut harvest, and 71 acres projected for selection harvest in the mixed-upland deciduous cover type during this planning period. This target is slightly higher than the desirable amount of acreage going into the 0-9 year-old age class in part due to stand sizes and spatial allocation of the acreage across available stands. With the addition of the 15 acres transitioning into this cover type, this will be slightly higher than the target for the planning period resulting in the gradual increase of acreage across this cover type.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 14; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas within the management area.

High Conservation Value Area Type and Name	Acres
GEMS	**1,078**
Greasy Creek	1,078
Grand Total	**1,078**

Ecological reference areas

Ecological reference areas are a type of HCVA and are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 15. Ecological reference areas (ERAs) within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	**Dry-mesic Northern Forest**	D	G4	S3	1
Existing ERA	**Rich Conifer Swamp**	B			1
Existing ERA	**Rich Conifer Swamp**	BC	G4	S3	1
Grand Total					**3**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 16) refers to those area types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) refers to those area types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the Avery Hills Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Habitat Area or Habitat Corridor	**98**
Sage Lake ERA	98
Mineral Resource Area	**16**
Montmorency County Road Commission	4
Pit # 129- Greasy Creek Gravel Pit	1
Pit # 14- Greasy Creek	11
Spring, Wetlands or Riparian Areas	**2**
Spring Seep	1
Vernal Pond Cedar Seep	1
Grand Total	**116**

Table 17. Static special conservation areas within the Avery Hills Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer		**828**
		425
Barger Creek		10
Crooked Creek		43
Fuller Creek		37
Gilchrist Creek		37
Greasy Creek		20
Hunt Creek		107
Miller Creek		14
Nugent Creek		13
Sage Creek		66
Sheridan Creek		14
Stanniger Creek		7
Thunder Bay River		35
Designated Trout and Coldwater Streams	**31.0**	
	15.7	
Barger Creek	0.4	
Crooked Creek	1.6	
Fuller Creek	1.4	
Gilchrist Creek	1.4	
Greasy Creek	0.7	
Hunt Creek	4.1	
Miller Creek	0.5	
Nugent Creek	0.5	
Sage Creek	2.4	
Sheridan Creek	0.5	
Stanniger Creek	0.2	
Thunder Bay River	1.6	
Important Bird Areas		**1,668**
Pigeon Country moraines		1,668
Research Areas		**2,693**
Hunt Creek Fish Research Station		2,693
Wood Turtle Stream 100 ft Buffer		**7**
Thunder Bay River		7
Wood Turtle Stream 660 ft Buffer		**43**
Thunder Bay River		43
Grand Total	**31.0**	**5,238**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 18, Table 20 and Table 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal occurrence within the Avery Hills Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alasmidonta viridis	Slippershell	T		1
Animal	Appalachia arcana	Secretive locust	SC		2
Animal	Appalachina sayanus	Spike-lip crater	SC		3
Animal	Bombus terricola	Yellow banded bumble bee	SC		1
Animal	Buteo lineatus	Red-shouldered hawk	SC		2
Animal	Emydoidea blandingii	Blanding's turtle	SC		2
Animal	Gavia immer	Common loon	T		4
Animal	Glyptemys insculpta	Wood turtle	T		2
Animal	Haliaeetus leucocephalus	Bald eagle	SC		4
Animal	Hesperia metea	Cobweb skipper	SC		1
Animal	Lasmigona compressa	Creek heelsplitter	SC		2
Animal	Lithobates palustris	Pickerel frog	SC		1
Animal	Opheodrys vernalis	Smooth green snake	SC		1
Animal	Pyrgus centaureae wyandot	Grizzled skipper	T		1
Animal	Setophaga discolor	Prairie warbler	SC		1
Animal	Setophaga kirtlandii	Kirtland's warbler	E		1
Total	-	-	-	-	**29**

Table 20. Rare plant occurrence within the Avery Hills Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Agoseris glauca	Prairie or pale agoseris	T		1
Plant	Amerorchis rotundifolia	Small round-leaved orchis	E		1
Plant	Cirsium hillii	Hill's thistle	SC		1
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		2
Plant	Festuca altaica	Rough fescue	SC		1
Plant	Gymnocarpium robertianum	Limestone oak fern	T		1
Plant	Prunus umbellata	Alleghany or Sloe plum	SC		1
Total	-	-	-	-	**8**

Table 21. Other rare occurrence within Avery Hills Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	-	Great blue heron rookery			1
Total	-	-	-	-	**1**

Non-ERA Natural Communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 22).

Table 22. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non-ecological reference area natural communities within Avery Hills Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Dry-mesic Northern Forest	D	S3	G4	1
Rich Conifer Swamp	B	S3	G4	1
Rich Conifer Swamp	BC	S3	G4	1
Total	-	-	-	**3**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Avery Hills Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	
Jack pine budworm	Choristoneura pinus	Native	

Watch for and retain lingering ash with potential resistance to emerald ash borer.

Table 25. Maladies of concern in the Avery Hills management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	
Oak decline	Various	Various	Yes

Watch for and report symptoms of oak wilt and follow guidance in the oak wilt management guidance for state land.

Aquatic resources

Riparian habitat

A total of 24 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as cold types comprise approximately 96% of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	18
Cold Small River	0
Cold Transitional Stream	5
Cold Transitional Small River	0
Cold Transitional Large River	0
Warm Transitional Stream	1
Warm Transitional Small River	0
Warm Transitional Large River	0
Warm Stream	0
Warm Small River	0
Warm Large River	0

Lacustrine habitat

A total of nine lakes and ponds of at least 1 surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	6
100-499	3
500+	0

Wetlands

A total of 3,484 acres of wetlands are found in the management area (Table 28). Forested wetlands comprise approximately 93% of wetland types found in the management area.

Table 28. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Area (acres)
Emergent	217
Forested	3,227
Riverine	40

Vernal pools and seeps

A total of 1,050 acres of stands containing vernal pools have been inventoried in the management area while 1,011 acres of stands with seeps have been identified.

Riparian vegetation cover

Aspen is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 29).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Area (acres)
Aspen	1,052
Cedar	885
Lowland Conifers	327
Marsh	185
Northern Red Oak	149
Northern Hardwood	141
Mixed Upland Deciduous	112
Lowland Shrub	100
Natural Jack Pine	96
Planted Red Pine	74

Watershed vegetation cover

The management area includes portions of important watersheds of the Thunder Bay River and East Branch Big Creek (Table 30). Aspen is a major cover type of the state forest in each watershed.

Table 30. Largest vegetative cover types (i.e., top five) and area of the Thunder Bay River watershed located within the management area.

Cover Type	Area (acres)
Aspen	19,013
Northern Red Oak	4,741
Northern Hardwood	4,413
Mixed Upland Deciduous	2,903
Cedar	1,910

Table 31. Largest vegetative cover types (i.e., top five) and area of the East Branch Big Creek watershed located within the management area.

Cover Type	Area (acres)
Aspen	651
Planted Jack Pine	513
Planted Mixed Pine	147
Mixed Upland Deciduous	123
Planted Red Pine	90

Recreation

Avery Hills Management Area has good public access for management and public recreation with a system of county and forest access roads. The area is accessible from the communities of Atlanta, Fairview, Lewiston and Mio. Recreation facilities found here include several snowmobile trails, off-road vehicle trails, including 2.8 miles of the Mio Trail; the Atlanta to Hunt Creek Motorcycle Michigan Cross Country Cycle Trail; the Hunt Creek Motorcycle Trail; and the Big Oaks Equestrian Trail.

There are two state forest campgrounds (rustic) within the management area, both on Avery Lake with Big Oaks designated for equestrian camping.

Table 32. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types) Snowmobile	35 26
Nonmotorized Recreation Trails	Hiking Equestrian Biking Hunter Walking Trails	0 15.6 0 1.3
Total		**77.8**

Note: Trail use types may overlap.

Table 33. State forest campgrounds.

Name	# of sites	# of Equestrian Sites	ORV Access
Avery Lake State Forest Campground	15	-	-
Big Oaks Equestrian State Forest Campground	-	24	X

The Greasy Creek Grouse Enhanced Management Area is on the east side of the management area, accessed off M-33. The roads within this area are currently open to vehicles as the site is currently used for oil and gas extraction. In addition, hunter access trails provide access to the grouse habitat.

Table 34. Areas managed for hunting.

Type	Name	# of Acres
Grouse Enhanced Management Area	Greasy Creek	1,077.7

Boating access sites provide access to several inland lakes including the Sage Lake Flooding.

Table 35. Boating access sites.

Name	Waterbody
Avery Lake State Forest Campground	Avery Lake
Lake Fifteen State Forest Campground	Lake Fifteen

Name	Waterbody
McCormick Lake	McCormick Lake
Sage Lake Flooding	Sage Lake Flooding

Bois Blanc Island

State Forest Area: 10,882 acres	Location: Northeastern Lower Peninsula Eastern Upper Peninsula	Population Centers: Mackinaw City Cheboygan St. Ignace
Subsection: Valders Red Till and Sandy Lake Plain/St. Ignace Lake Plain	Landforms: Lacustrine sand Exposed Limestone bedrock	Landcover: Forested: 10,236 acres Nonforested: 646 acres

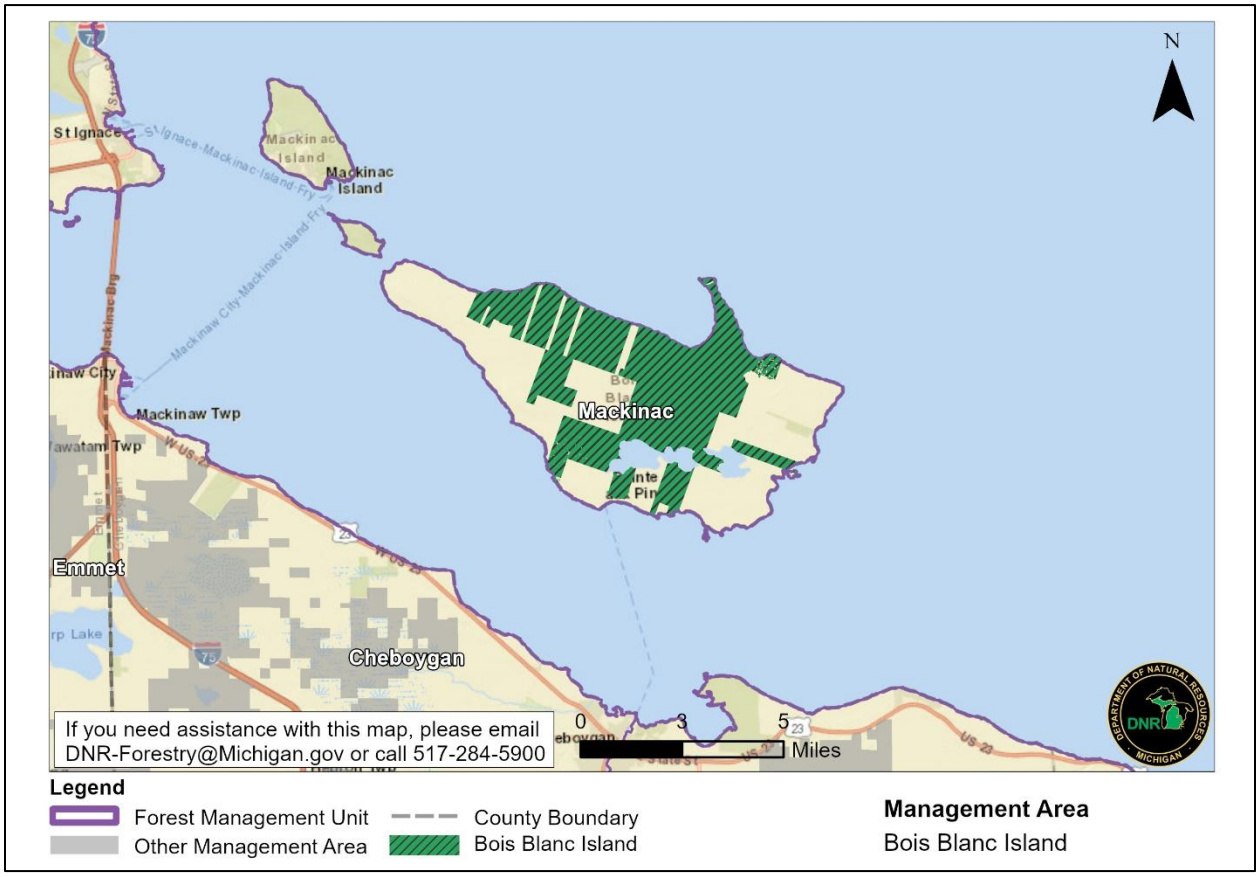


Figure 1. Bois Blanc Island Management Area.

Forested landscape

Current and projected future condition

The Bois Blanc Island Management Area has primarily shade-tolerant tree species mostly in the mature age category (Figure 2). Harvesting has been limited in the past due to difficulties associated with an island as well as cultural and historical protection.

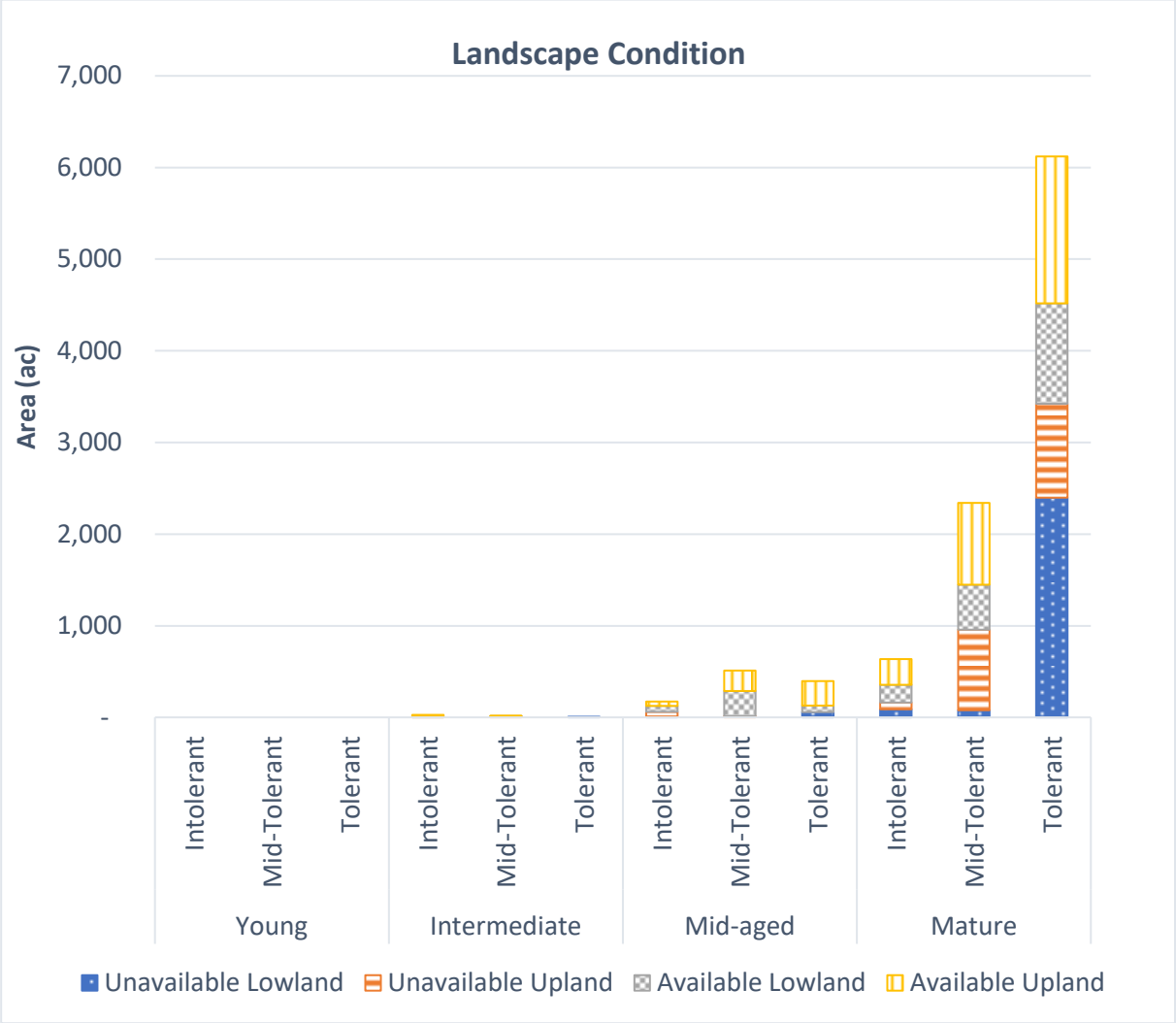


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	0
Mature Forest	Acres of 80+ year stands across cover types	9,099
Mature Forest	Acres of 120+ year stands across cover types	1,328
Mesic Conifer Cover Types	Acres of mesic conifer cover types	209
Mesic Conifers in other Cover Types	Average canopy occupancy	16%
Mast – Oak Cover Types	Acres of oak cover types	10,449
Mast Tree Species in other Cover Types	Acres of total canopy occupancy of mast tree acres (trace-100%)	52,414
Big Trees	Total canopy stand occupancy of species in sawlog or greater size class	7,464
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	47
Landscape Forest Matrix	Percent deciduous forest	53%
Landscape Forest Matrix	Percent coniferous forest	38%

The Bois Blanc Island management area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

The Bois Blanc Island management area is comprised of 94% forested cover types and 6% nonforested cover types (

Table 2). Of the forested cover types, 53% are upland and 47% are lowland. The largest contributors to upland cover types are northern hardwoods and mixed upland deciduous. Cedar and lowland conifer are the largest contributors to lowland cover types. Lowland shrub is the most common nonforested cover type in the management area representing only 2% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	392	4,529	5,384	10,236
			Northern Hardwood	2,869			
			Black Red Hybrid Oak	0			
			Northern Red Oak	10			
			Oak Mix	9			
			Mixed Upland Deciduous	1,249			
		Mixed	Upland Mixed Forest	646	646		
		Coniferous	Planted Red Pine	0	209		
			Planted Jack Pine	0			
			Planted White Pine	0			
			Planted Mixed Pine	0			
			Natural Red Pine	0			
			Natural Jack Pine	0			
			Natural White Pine	0			
			Natural Mixed Pines	0			
			Upland Spruce/Fir	63			
			Upland Conifers	126			
			Hemlock	21			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	319	876	4,852	
			Lowland Deciduous	557			
		Mixed	Lowland Mixed Forest	294	294		
		Coniferous	Cedar	2,642	3,682		
			Lowland Conifers	992			
			Lowland Spruce/Fir	48			
			Tamarack	0			
Nonforested	Upland	N/A	Herbaceous Openland	41	N/A	86	646
			Upland Shrub	6			
			Low Density Trees	2			
			Bare/Sparsely Vegetated	17			
			Cropland	0			
			Urban	21			
	Lowland	N/A	Lowland Shrub	189	N/A	560	
			Marsh	103			
			Bog	62			
			Treed Bog	103			
			Water	103			
						Grand Total:	**10,882**

Bois Blanc Island is currently under a series of archeological surveys to determine cultural and historical significance of many of the forested stands. This, in addition to the difficulties with managing the forest through commercial timber sales on the island, access issues, and other influences, the vast majority of the forested stands are unavailable for commercial harvesting (Table 3). Acres unavailable for management are categorized by site conditions (Table 4).

Table 3. Current cover type composition by management availability.

BOIS BLANC ISLAND Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen			392	3.8%	392	3.8%
Cedar			2,642	25.8%	2,642	25.8%
Hemlock			21	0.2%	21	0.2%
Lowland Aspen/Balsam Poplar			319	3.1%	319	3.1%
Lowland Conifers			992	9.7%	992	9.7%
Lowland Deciduous			557	5.4%	557	5.4%
Lowland Mixed Forest			294	2.9%	294	2.9%
Lowland Spruce/Fir			48	0.5%	48	0.5%
Mixed Upland Deciduous			1,249	12.2%	1,249	12.2%
Northern Hardwood			2,869	28.0%	2,869	28.0%
Northern Red Oak			10	0.1%	10	0.1%
Oak Mix			9	0.1%	9	0.1%
Upland Conifers			126	1.2%	126	1.2%
Upland Mixed Forest			646	6.3%	646	6.3%
Upland Spruce/Fir			63	0.6%	63	0.6%
Grand Total			**10,237**	**100.0%**	**10,237**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason Area is Unavailable for Commercial Harvest)	Area (ac)	% of Unavailable Area
Blocked by Obstacle	5,862	57.3%
Federal/State/Local Law	1,902	18.6%
Too Wet	850	8.3%
Species of special concern or T&E	629	6.1%
Rare Landforms	305	3.0%
Cannot Regenerate	252	2.5%
Natural/Quiet/Wilderness Area	198	1.9%
Conservation Values	95	0.9%
Unproductive	58	0.6%
Other Influence Zones	51	0.5%
Best Management Practices	24	0.2%
Deer Wintering Area	11	0.1%
Total Unavailable	**10,236**	**100%**

Projected 10-year cover type management actions

No management actions are planned for the Bois Blanc Management Area. As a result, there are very few cover type transitions projected (Table 5). The managed area of each cover type is projected to remain stable with the absence of commercial harvesting. Some natural transitions will occur over time as aspen stands grow older and die out, other hardwood species will grow into these stands increasing the northern hardwoods and upland conifer stands over time.

Table 5. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Northern Hardwood	2,869	2,907	38
Cedar	2,642	2,642	0
Mixed Upland Deciduous	1,249	1,249	0
Lowland Conifers	992	992	0
Upland Mixed Forest	646	646	0
Lowland Deciduous	557	557	0
Aspen	392	341	-51
Lowland Aspen/Balsam Poplar	319	319	0
Lowland Mixed Forest	294	294	0
Upland Conifers	126	131	5
Upland Spruce/Fir	63	63	0
Lowland Spruce/Fir	48	48	0
Hemlock	21	21	0
Northern Red Oak	10	10	0
Oak Mix	9	9	0
Black Red Hybrid Oak	0	8	8
Lowland Shrub	189	189	0
Treed Bog	103	103	0
Marsh	103	103	0
Bog	62	62	0
Herbaceous Openland	41	41	0
Urban	21	21	0
Bare/Sparsely Vegetated	17	17	0
Upland Shrub	6	6	0
Low Density Trees	2	2	0
Water	103	103	0
Total:	**10,882**	**10,882**	**0**

Featured species current and projected habitat acres

There are no featured species assigned for the Bois Blanc Management Area, and thus there are no current or projected habitat acres.

Cover type composition and associated featured species

Age class and basal area distribution by cover type is not provided, and there are no associated featured species.

Management actions

There are no projected harvests on Bois Blanc Island in the next 10-year planning cycle. This is due to large areas that are protected for historical and cultural significance in addition to the logistical problems associated with a commercial harvest on the island.

Conservation area network

High conservation value areas

There are up to nine different high conservation value areas (HCVA) types that can be found in each management area (Table 6; see Biodiversity in Section 3 for more information).

Table 6. High conservation value areas within Bois Blanc Island Management Area.

High Conservation Value Area Type and Name	Acres
Coastal Environmental Areas	**2**
	2
Eastern Massasauga Managed Land	**3,271**
	3,271
Forest Habitat Core Interior	**1,936**
	1,936
Natural Areas Legally Dedicated	**264**
	264
Grand Total	**5,473**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 7. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 8. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Boreal Forest	AB		S3	2
Existing ERA	Coastal Fen	C	G1G2	S2	1
Existing ERA	Limestone Cobble Shore	B		S3	1
Existing ERA	Limestone Cobble Shore	B	G2G3	S3	1
Existing ERA	Mesic Northern Forest	AB		S3	2
Existing ERA	Northern Wet Meadow	AB	G4G5	S4	1
Existing ERA	Rich Conifer Swamp	AB		S3	2
Existing ERA	Wooded Dune and Swale Complex	C	G3	S3	1
Grand Total					**11**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 9) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 10) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 9. Reviewable special conservation areas within Bois Blanc Island Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**92**
Continuation of North Shore cover type	92
Cultural or Customary Area	**17**
Bois Blanc Sugar Bush	17
Mineral Resource Area	**13**
Island Contractors Inc.	7
Mackinac County Road Commission	6
Spring, Wetlands, or Riparian Areas	**824**
Wooded Dune and Swale Complex	824
Grand Total	**946**

Table 10. Static special conservation areas within Bois Blanc Island Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Great Lakes Islands		**10,881**
Bois Blanc Island		10,881
Non-dedicated Natural Areas		**2**
Natural Area Bois Blanc Island		2
Grand Total		**10,883**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 11 and Table 13) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 11. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 12. Rare animal occurrence within Bois Blanc Island Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Buteo lineatus	Red-shouldered hawk	SC		3
Animal	Cistothorus palustris	Marsh wren	SC		1
Animal	Gavia immer	Common loon	T		3
Animal	Haliaeetus leucocephalus	Bald eagle	SC		4
Animal	Opheodrys vernalis	Smooth green snake	SC		1
Animal	Pandion haliaetus	Osprey	SC		2
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	1
Animal	Somatochlora hineana	Hine's emerald dragonfly	E	LE	3
Animal	Sterna forsteri	Forster's tern	T		1
Total	-	-	-	-	**19**

Table 13. Rare plant occurrence within Bois Blanc Island Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Adlumia fungosa	Climbing fumitory	T		1
Plant	Arnoglossum plantagineum	Prairie Indian-plantain	SC		2
Plant	Barbarea orthoceras	Northern winter cress	SC		1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T		2
Plant	Cirsium pitcheri	Pitcher's thistle	T	LT	2
Plant	Crataegus douglasii	Douglas's hawthorn	SC		1
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		1
Plant	Gymnocarpium robertianum	Limestone oak fern	T		2
Plant	Iris lacustris	Dwarf lake iris	T	LT	3
Plant	Pinguicula vulgaris	Butterwort	SC		3
Plant	Solidago houghtonii	Houghton's goldenrod	T	LT	1
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC		1
Total	-	-	-	-	**20**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly. There are no non-ERA natural communities in this management area at the present time.

Forest Health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 14) and diseases (Table 15) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 14. Defoliating insects of concern in the Bois Blanc Island Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	
Forest tent caterpillar	Malacosoma disstria	Native	
Spruce budworm	Choristoneura fumiferana	Native	

Watch for and retain lingering ash with potential resistance to emerald ash borer. Monitor the limited hemlock resource, hemlock woolly adelgid is not known to occur near this management area, however climate moderated areas near Lake Huron may be at greater risk.

Table 15. Maladies of concern in the Bois Blanc Island Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	

Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic Resources

Riparian Habitat

Only small intermittent stream/rivers are found in the management area on the island.

Lacustrine Habitat

A total of five lakes and ponds of at least one surface acre are found in the management area (Table 16).

Table 16. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	2
100-499	3
500+	0

Wetlands

A total of 3,277 acres of wetlands are found in the management area (Table 17). Forested wetlands comprise approximately 94% of wetland types found in the management area.

Table 17. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	148
Forested	3,089
Riverine	40

Vernal pools and seeps

A total of 121 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Cedar is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 18).

Table 18. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Cedar	397
Lowland Conifers	77
Lowland Shrub	49
Treed Bog	40
Upland Conifers	35
Bog	25
Marsh	24
Northern Hardwood	24
Upland Mixed Forest	23
Mixed Upland Deciduous	19

Watershed vegetation cover

The management area includes small watersheds with short portions streams/rivers that all drain to Lake Huron (Table 19). Northern hardwood, cedar and mixed upland deciduous are major cover types on the island.

Table 19. Largest vegetative cover types (i.e., top five) and area of the Michigamme River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	2,871
Cedar	2,643
Mixed Upland Deciduous	1,250
Lowland Conifers	993
Upland Mixed Forest	646

Recreation

The Bois Blanc Island Management Area has limited access for management and public recreation. There are three dedicated natural areas in this management area, providing opportunities for wildlife viewing, bird watching and wildflower viewing, as well as hunting and fishing. There are no designated trails, state forest campgrounds or boating access sites on state forest land on the island.

Cadillac Moraines

State Forest Area: 78,295 acres	Location: Wexford, Missaukee, Lake and Osceola counties	Population Centers: Cadillac, Lake City, Reed City and Evart
Subsection: Interlobate End and Ground Moraines	Landforms: Moraine ridges, outwash channels and plains	Landcover: Forested: 73,424 acres Nonforested: 4,872 acres

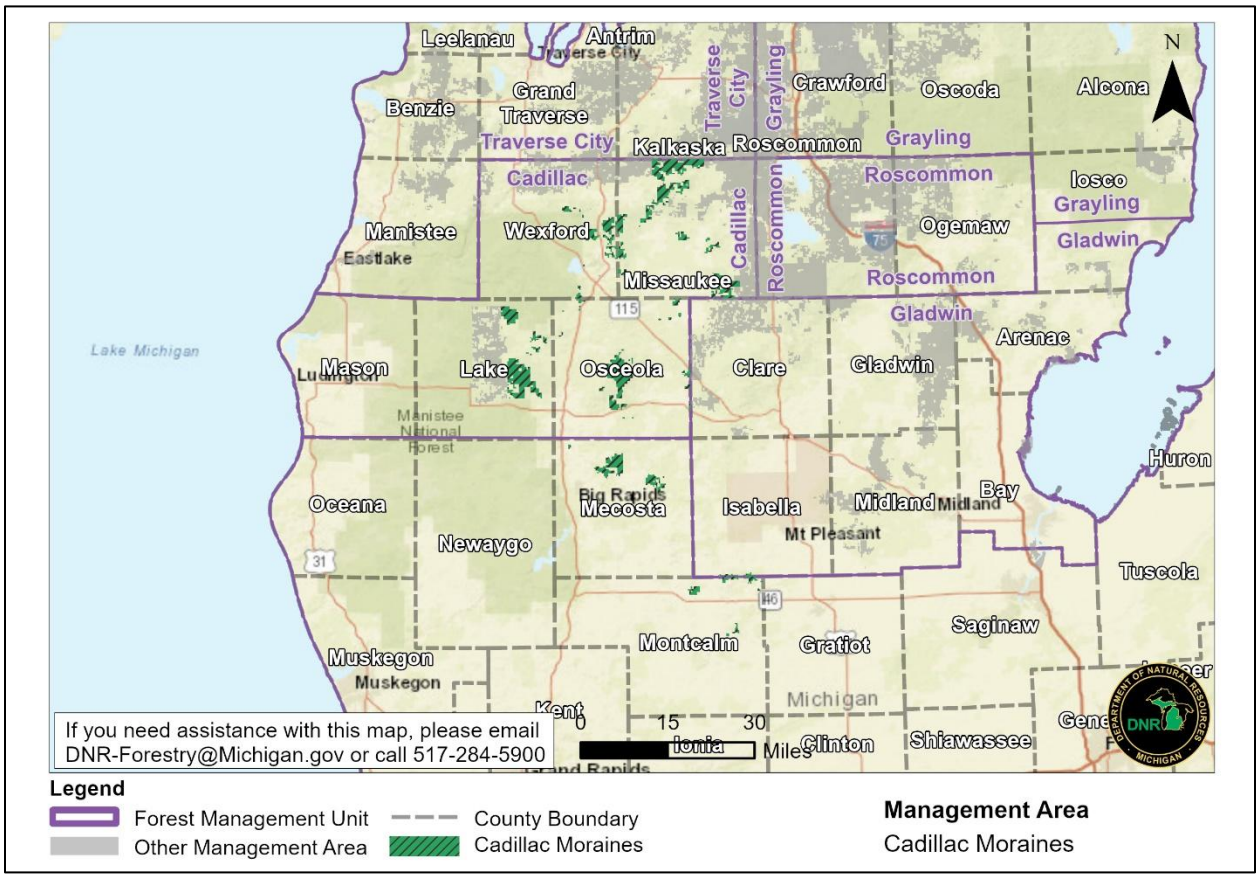


Figure 1. Cadillac Moraines Management Area.

Forested landscape

Current and projected future condition

The Cadillac Moraines Management Area includes a variety of shade tolerance levels, most of which are available uplands (Figure 2). The majority of tolerant cover types occur on available uplands located in the mid-aged and mature categories. Mid-tolerant cover types mostly occur on available uplands in the mid-aged category while the intolerant cover types have the highest amount in the intermediate category.

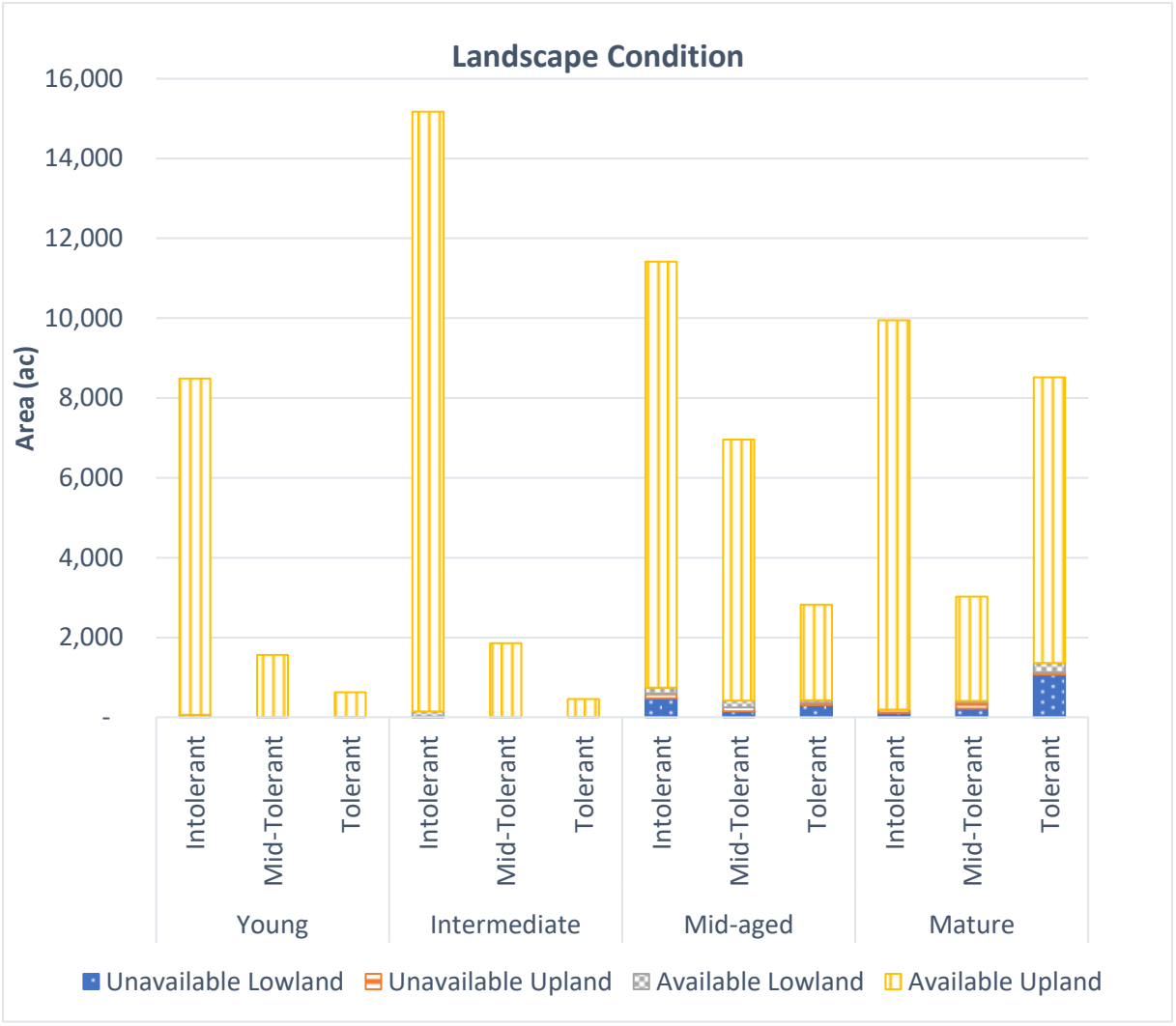


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

A more-even distribution of the shade intolerant area across the age categories is desirable in the Cadillac Moraines Management Area and this can be achieved by accomplishing individual cover type age class goals over the next several decades.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	8,324
Mature Forest	Acres of 80+ year stands across cover types	21,488
Mature Forest	Acres of 120+ year stands across cover types	297
Mesic Conifer Cover Types	Acres of mesic conifer cover types	1,898
Mesic Conifers in Other Cover Types	Average canopy occupancy	18%
Mast – Oak Cover Types	Acres of oak cover types	10,449
Mast Tree Species in other Cover Types	Acres of total canopy occupancy of mast tree acres (trace-100%)	52,414
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	35,507
Nonforested Openings	Acres of total herbaceous openland, upland shrub and cropland	1,494
Landscape Forest Matrix	Percent deciduous forest	81%
Landscape Forest Matrix	Percent coniferous forest	16%

The Cadillac Moraines Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management Site (GEMS) – Mark Knee Memorial

The Cadillac Moraines Management Area is comprised of 94% forested cover types and 6% nonforested cover types (

Table 2). Of the forested cover types, the upland landscape position makes up 90% of the total landscape while the lowland is at only 4%. The largest contributors to upland cover types are aspen, northern hardwoods, mixed upland deciduous, planted red pine and northern red oak. Lowland conifer

makes up about 39% of the lowland forested landscape position. Lowland shrub is the most common nonforested cover type in the management area representing 2% of the total landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	33,264	58,807	70,198	73,424
			Northern Hardwood	8,931			
			Black Red Hybrid Oak	2,999			
			Northern Red Oak	5,569			
			Oak Mix	2,336			
			Mixed Upland Deciduous	5,707			
		Mixed	Upland Mixed Forest	1,795	1,795		
		Coniferous	Planted Red Pine	5,604	9,596		
			Planted Jack Pine	271			
			Planted White Pine	915			
			Planted Mixed Pine	395			
			Natural Red Pine	216			
			Natural Jack Pine	299			
			Natural White Pine	766			
			Natural Mixed Pines	525			
			Upland Spruce/Fir	453			
			Upland Conifers	133			
			Hemlock	21			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	515	904	3,226	
			Lowland Deciduous	389			
		Mixed	Lowland Mixed Forest	278	278		
		Coniferous	Cedar	425	2,044		
			Lowland Conifers	1,264			
			Lowland Spruce/Fir	243			
			Tamarack	111			
Nonforested	Upland	N/A	Herbaceous Openland	1,151	N/A	1,971	4,872
			Upland Shrub	253			
			Low Density Trees	214			
			Bare/Sparsely Vegetated	22			
			Cropland	43			
			Urban	289			
	Lowland	N/A	Lowland Shrub	1,222	N/A	2,901	
			Marsh	771			
			Bog	204			
			Treed Bog	62			
			Water	642			

	Grand Total:	78,295

There are 70,493 acres (90% of the total management area and 96% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Cadillac Moraines Management Area (Table 3). Of that, over 42% is in the aspen cover type, 11% in northern hardwood, 7% in mixed upland deciduous and 7% in northern red oak. The remaining 20 cover types represent less than 5% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

Cadillac Moraines Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	33,116	45.1%	148	0.2%	33,264	45.3%
Northern Hardwood	8,819	12.0%	112	0.2%	8,931	12.2%
Mixed Upland Deciduous	5,561	7.6%	146	0.2%	5,707	7.8%
Planted Red Pine	5,596	7.6%	8	0.0%	5,604	7.6%
Northern Red Oak	5,517	7.5%	52	0.1%	5,569	7.6%
Black Red Hybrid Oak	2,981	4.1%	19	0.0%	2,999	4.1%
Oak Mix	2,336	3.2%	0	0.0%	2,336	3.2%
Upland Mixed Forest	1,735	2.4%	59	0.1%	1,795	2.4%
Lowland Conifers	286	0.4%	978	1.3%	1,264	1.7%
Planted White Pine	915	1.2%	0	0.0%	915	1.2%
Natural White Pine	763	1.0%	3	0.0%	766	1.0%
Natural Mixed Pines	522	0.7%	3	0.0%	525	0.7%
Lowland Aspen	260	0.4%	255	0.3%	515	0.7%
Upland Spruce Fir	453	0.6%	0	0.0%	453	0.6%
Cedar	34	0.0%	392	0.5%	425	0.6%
Planted Mixed Pine	395	0.5%	0	0.0%	395	0.5%
Lowland Deciduous	191	0.3%	199	0.3%	389	0.5%
Natural Jack Pine	293	0.4%	6	0.0%	299	0.4%
Lowland Mixed Forest	110	0.1%	168	0.2%	278	0.4%
Planted Jack Pine	270	0.4%	1	0.0%	271	0.4%
Lowland Spruce Fir	24	0.0%	220	0.3%	243	0.3%
Natural Red Pine	200	0.3%	16	0.0%	216	0.3%
Upland Conifers	110	0.1%	23	0.0%	133	0.2%
Tamarack	0	0.0%	111	0.2%	111	0.2%
Hemlock	8	0.0%	12	0.0%	21	0.0%
Total	**70,493**	**96.0%**	**2,930**	**4.0%**	**73,424**	**100%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason Area is Unavailable for Commercial Harvest)	Acres	% of Unavailable Area
Too Wet	1,700	58.0%
Best Management Practices	407	13.9%
Too Steep	186	6.3%
Long-Term Retention	123	4.2%
Recreation/Scenic	119	4.1%
Conservation Values	68	2.3%
Deer Wintering Area	64	2.2%
Blocked by Obstacle	63	2.1%
Denied Access	61	2.1%
Wildlife Concerns	59	2.0%
Other Dept./Division Processes	44	1.5%
Cannot Regenerate	20	0.7%
Other Influence Zones	16	0.6%
Total Unavailable	**2,930**	**100%**

Projected 10-year cover type management actions

Each cover type in the Cadillac Moraines Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvest levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 275,294 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Aspen	4,673	-	-	-	-	-	-	4,673
Northern Hardwood	34	2,185	-	613	-	-	-	2,832
Planted Red Pine	185	-	2,587	-	-	-	-	2,772
Northern Red Oak	468	-	-	313	-	-	-	780
Mixed Upland Deciduous	529	92	-	-	7	-	-	628
Upland Mixed Forest	471	-	-	-	-	-	-	471
Upland Spruce/Fir	421	-	-	-	-	-	-	421
Planted White Pine	1	-	376	-	-	-	-	377
Black Red Hybrid Oak	365	-	-	-	-	-	-	365
Oak Mix	212	-	-	-	-	-	-	212
Natural White Pine	-	-	85	-	51	-	-	136
Upland Conifers	76	-	-	-	19	-	-	95
Lowland Aspen/Balsam Poplar	90	-	-	-	-	-	-	90
Lowland Conifers	42	-	-	-	-	-	-	42
Natural Jack Pine	39	-	-	-	-	-	-	39
Planted Mixed Pine	3	-	11	-	-	-	-	14
Hemlock	-	8	-	-	-	-	-	8
Natural Red Pine	-	-	7	-	-	-	-	7
Planted Jack Pine	2	-	-	-	-	-	-	2
Totals	**7,610**	**2,285**	**3,066**	**925**	**77**	**-**	**-**	**13,963**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Cadillac Moraines Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Aspen	44,882	42,189
	Mixed Hardwood	32,879	30,906
	Red Pine	22,797	21,429
	Mixed Spruce	12,646	11,887
	White Pine	6,166	5,796
	Mixed Oak	5,845	5,494
	Mixed Softwood	5,234	4,920
	Jack Pine	3,144	2,956
	Pulpwood Total	**133,594**	**125,578**
Sawtimber (MBF)	Red Pine	20,945	19,688
	Mixed Aspen	12,358	11,617
	Red Oak	9,120	8,573
	Sugar Maple	8,378	7,876
	Red Maple	5,518	5,187
	White Pine	4,845	4,554
	Mixed Oak	1,742	1,638
	White Oak	1,676	1,576
	Basswood	782	735
	Sawtimber Total	**65,365**	**61,443**
	Total Sawtimber Harvest Volume in Cords	**141,700**	**133,198**
	Grand Total Harvest Volume in Cords	**275,294**	**258,776**
* Volume estimates based on 100% of the projected harvests for the 10 year planning period. ** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are very few cover type transitions projected for the Cadillac Moraines Management Area. The managed area of each cover type is projected to remain stable as treatment regimes will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the

northern red oak, 386 acres and upland spruce/fir, 378 acres, will convert to other cover types through forest management and regeneration activities. The largest increase occurs in the aspen acreage, where 454 total acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	33,264	33,718	454
Northern Hardwood	8,931	8,972	41
Mixed Upland Deciduous	5,707	5,806	99
Planted Red Pine	5,604	5,853	249
Northern Red Oak	5,569	5,183	-386
Black Red Hybrid Oak	2,999	2,857	-142
Oak Mix	2,336	2,500	163
Upland Mixed Forest	1,795	1,762	-33
Lowland Conifers	1,264	1,240	-24
Planted White Pine	915	914	-1
Natural White Pine	766	767	1
Natural Mixed Pines	525	540	15
Lowland Aspen/Balsam Poplar	515	514	-1
Upland Spruce/Fir	453	74	-378
Cedar	425	425	0
Planted Mixed Pine	395	392	-3
Lowland Deciduous	389	394	5
Natural Jack Pine	299	307	8
Lowland Mixed Forest	278	301	23
Planted Jack Pine	271	248	-22
Lowland Spruce/Fir	243	241	-2
Natural Red Pine	216	216	0
Upland Conifers	133	68	-65
Tamarack	111	111	0
Hemlock	21	21	0
Lowland Shrub	1,222	1,222	0
Herbaceous Openland	1,151	1,151	0
Marsh	771	771	0
Water	642	642	0
Urban	289	289	0
Upland Shrub	253	253	0

Low Density Trees	214	214	0
Bog	204	204	0
Treed Bog	62	62	0
Cropland	43	43	0
Bare/Sparsely Vegetated	22	22	0
Total:	**78,295**	**78,295**	**0**

Featured species current and projected habitat acres

There are nine featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be managed for or found. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species, black bear, wild turkey and black-backed woodpecker, were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Current Habitat Acres	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	11,020	11,772	10,717	10,656
Black Bear	Mast	--	--	--	--
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Black-Throated Blue Warbler	Northern hardwoods, mixed upland deciduous	7,803	8,569	4,210	9,372
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	12,499	13,602	11,048	11,214
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	18,497	18,356	17,888	22,177
Ruffed Grouse	Aspen	10,932	11,606	10,443	10,525
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	12,695	13,338	11,891	12,101
Wild Turkey	Openings	1,194	--	--	--
Wood Turtle	Nonforested Openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

Most of the aspen cover type is currently between stand ages of 0 and 39 years old in the Cadillac Moraines Management Area (Figure 3). The age class distribution is currently somewhat balanced, except for a spike in the 30-39 age class. There is a deficit in the 50-59 age class which will lead to a deficit in the 50- to 59 and 60- to 69-year age class for the next planning period.

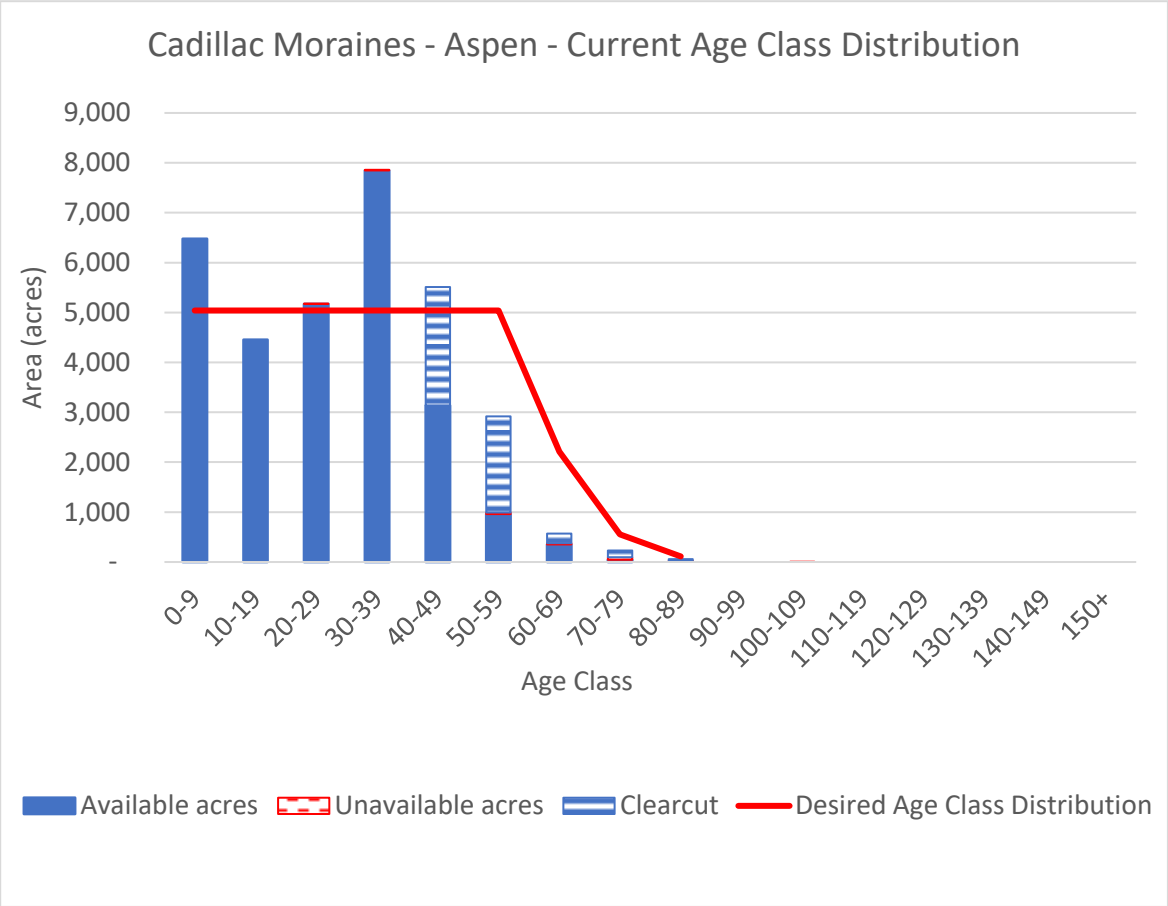


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Class: Sapling	10,932	0
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	10,932	0
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	10,932	0
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	10,932	0

Desired Future Condition

The projected long-term cover type trend for aspen is increasing in the Cadillac Moraines Management Area. Much of the aspen area falls within the available category and will have other cover types transition into this. There will be an increase of about 1% in this cover type. Habitat elements in this cover type will be preserved due to the abundance of availability.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old with a tail to 80 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen in the stand stays vigorous allowing for best regeneration results.

The end of the planning period will result in the establishment of a desirable number of 5,133 acres in the 0-9 age class (Figure 4). Progress toward the long-term desired age class distribution of aspen will take a few decades of even-aged management in this management area.

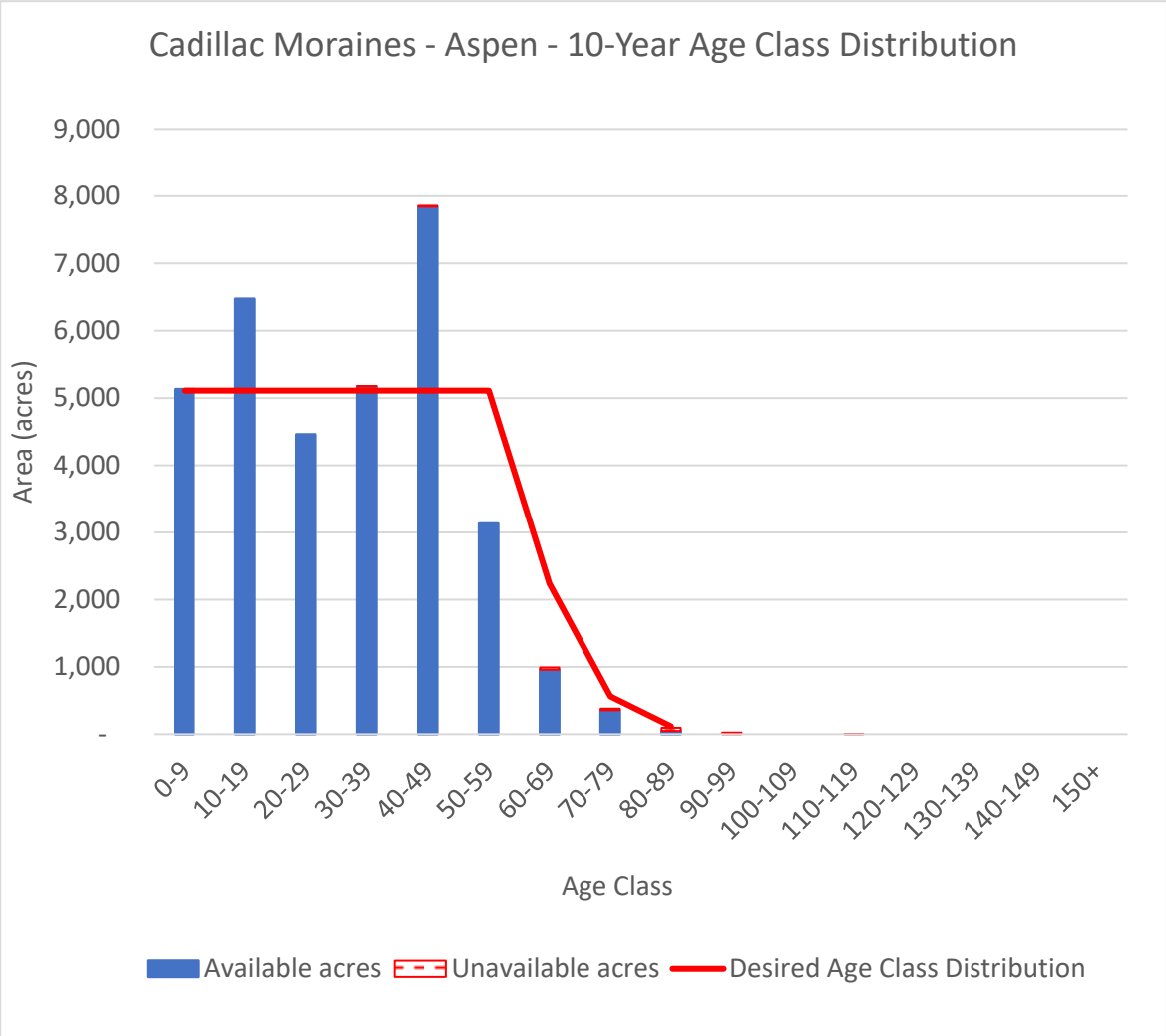


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of aspen has reached the desired future condition for available acres (Figure 5). There is an increase in acres in the older age classes, beyond the desired age of 60 years old, due to the tail built into this management area.

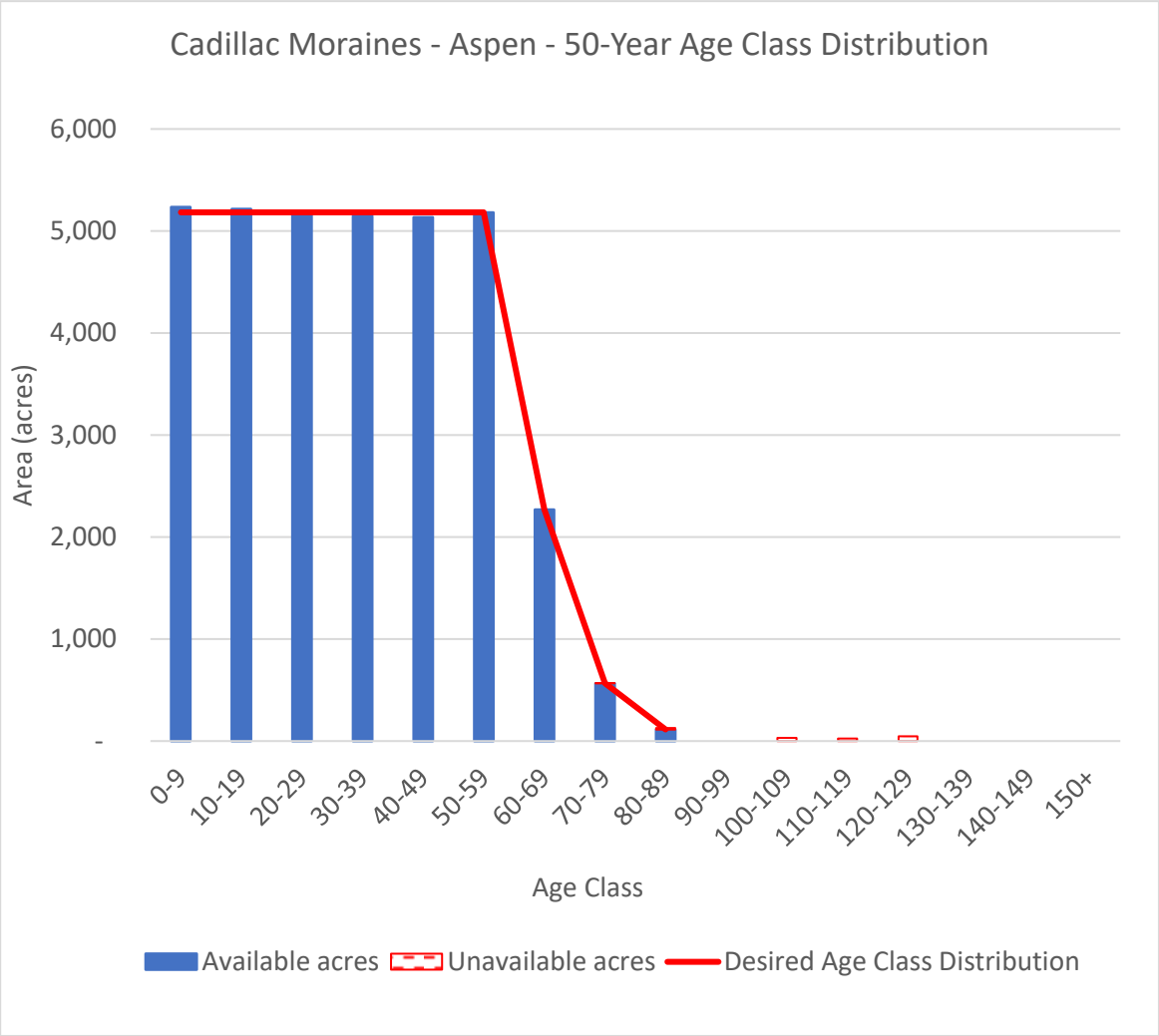


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

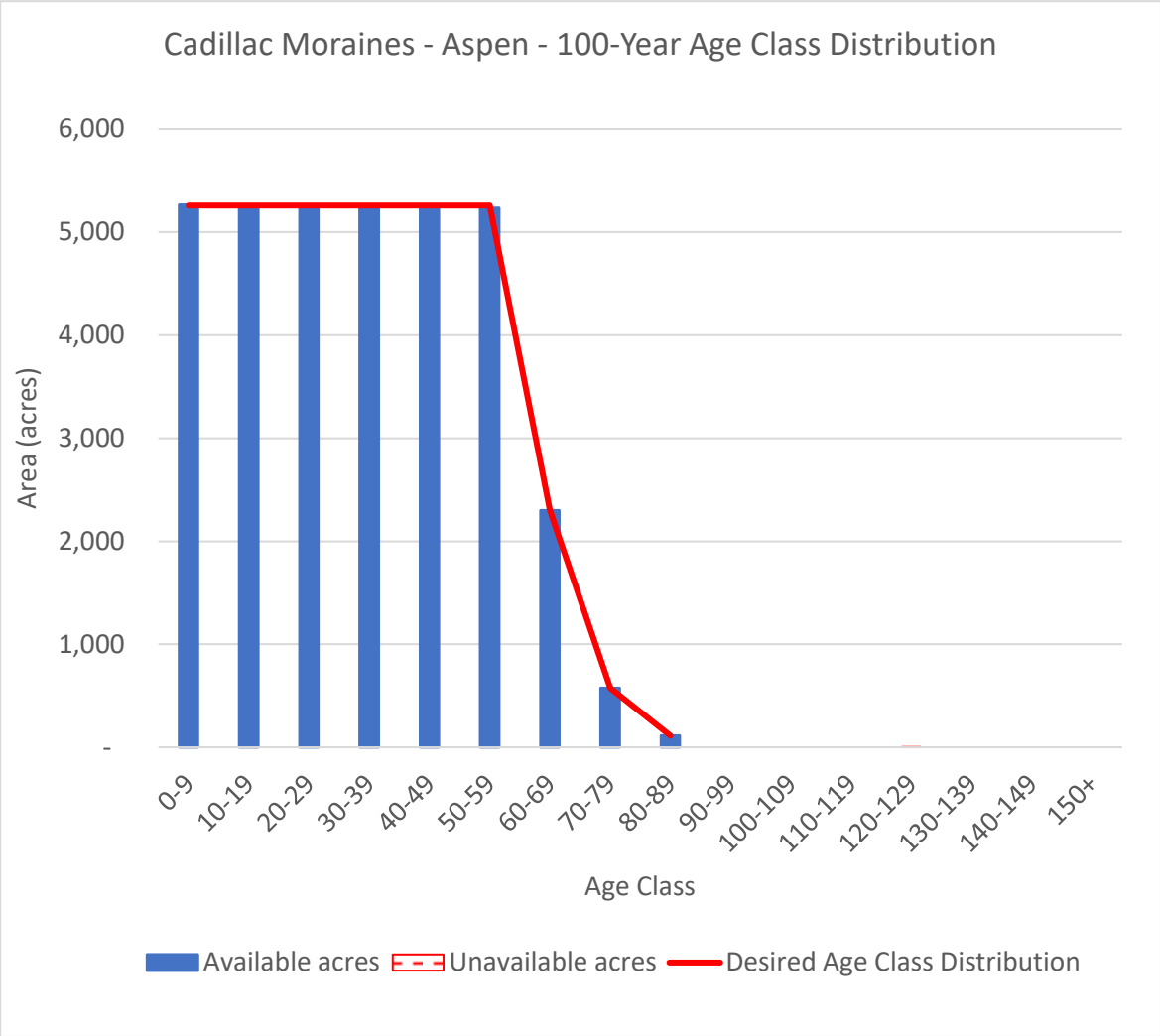


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

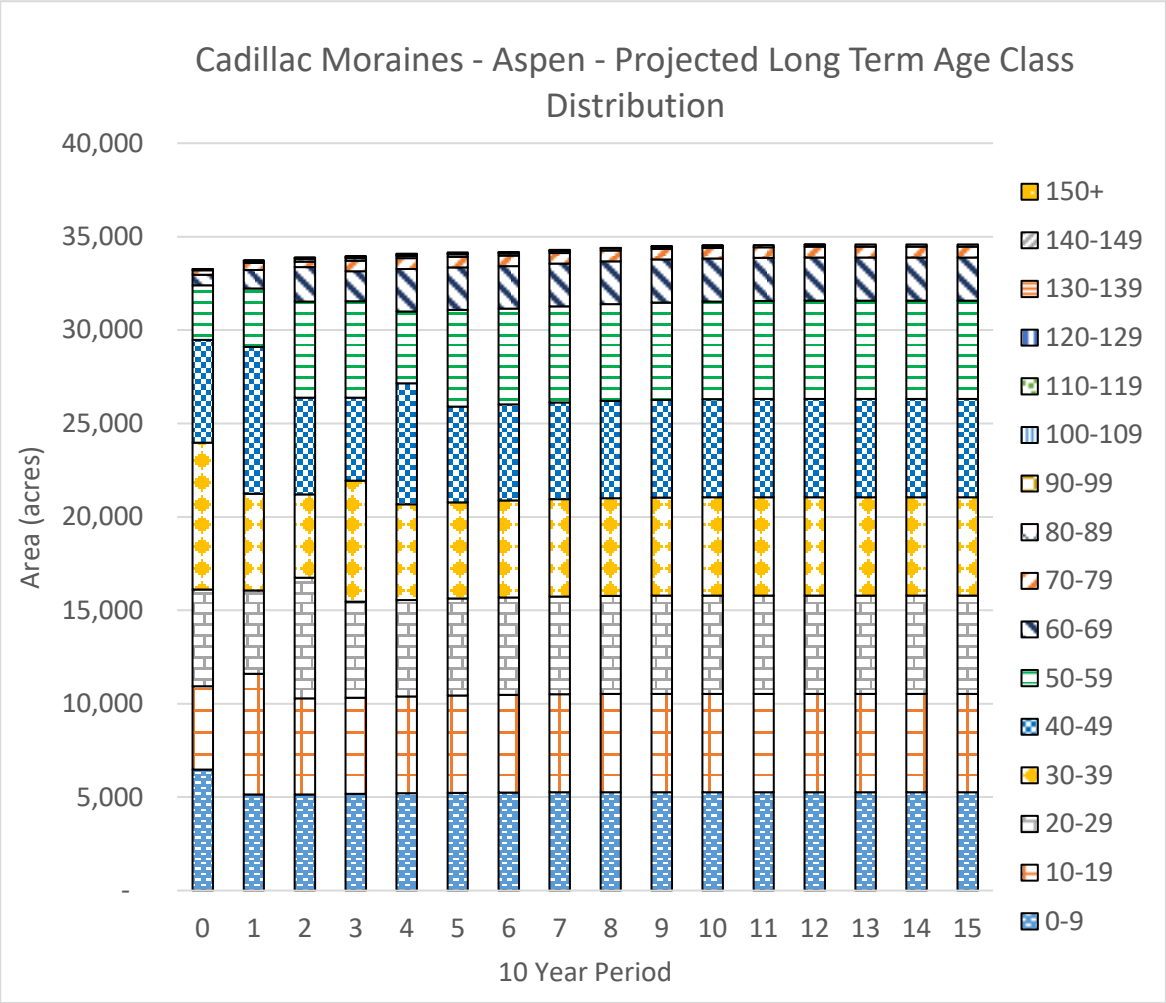


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years in the Cadillac Moraines Management Area.

Management actions

There are 4,673 acres of projected clearcut harvest in the aspen cover type during the planning period. This falls slightly short of the desired establishment of 5,133 acres of aspen per decade because of the current unbalanced age class condition in the 30-39 age class. There are projected to be 454 acres converting into this cover type by the end of the planning period totaling 5,127 acres in the 0-9 age class.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 99 years old in the Cadillac Moraines Management Area (Figure 8). The past management regime has been primarily single tree selection which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands.

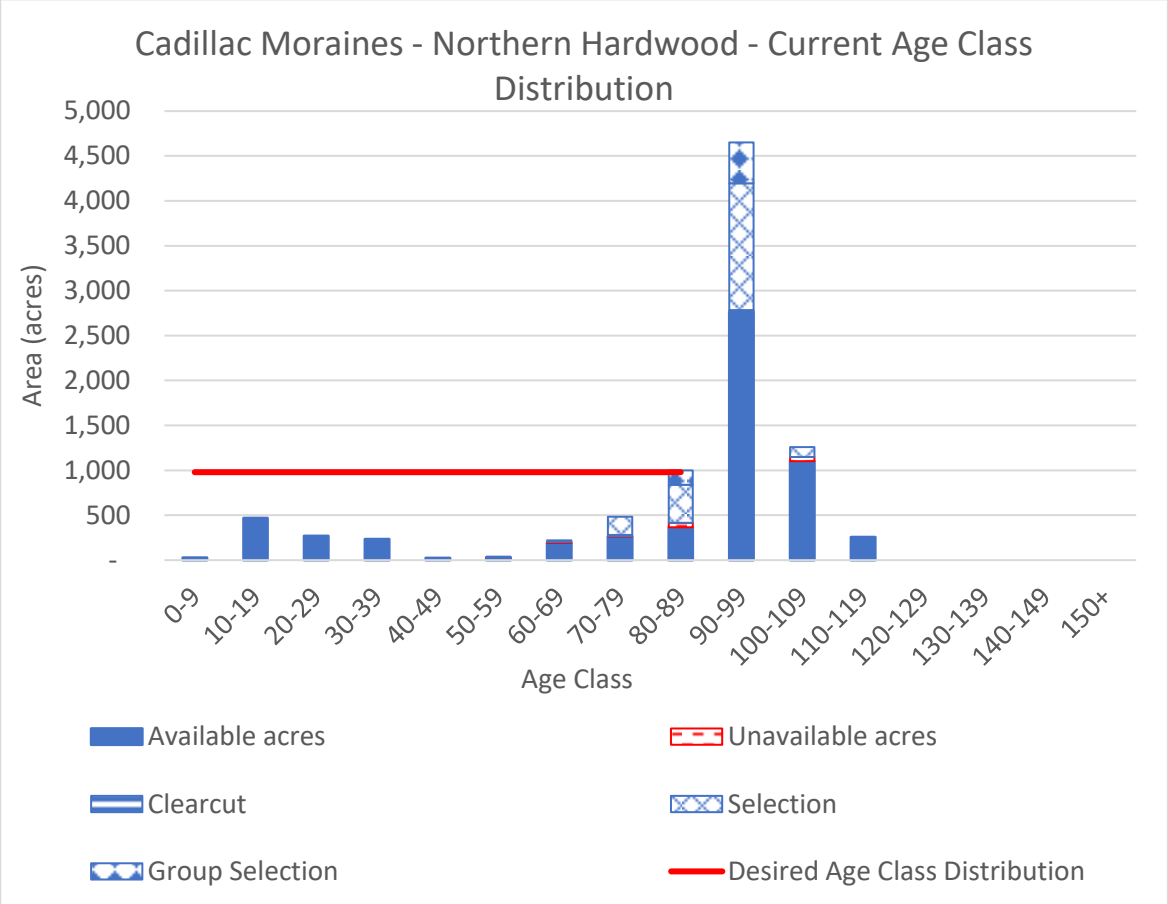


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type.

Northern hardwood acres are generally well positioned in the ideal basal area classes for optimal growing conditions, with most of the acres falling in the 80-140 basal area class, in the Cadillac Moraines Management Area (Figure 9). Current conditions are a result of beech and ash salvage efforts in the previous planning period and a regulated selection harvest regime that has been in place in this management area for decades.

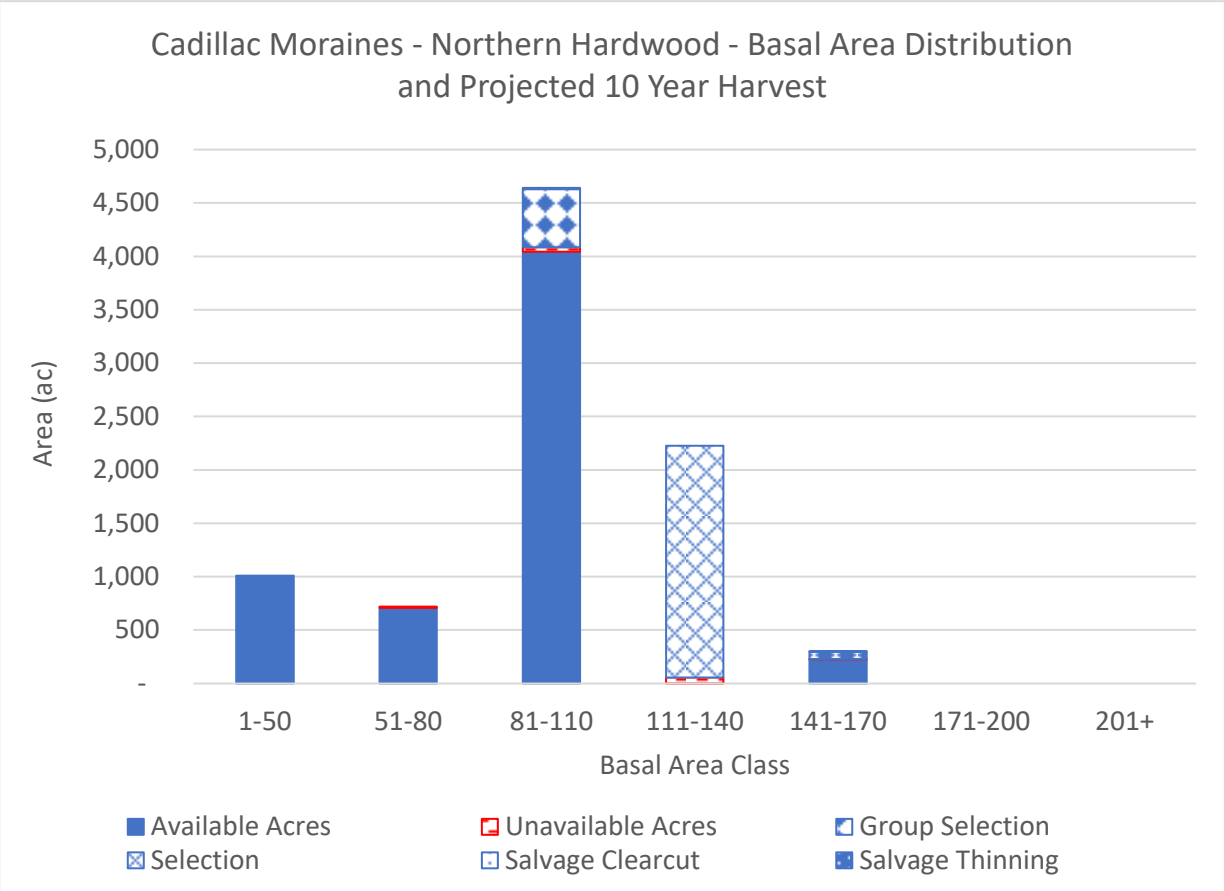


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are very few acres of unavailable northern hardwoods in the Cadillac Moraines Management Area. Opportunities to utilize a proportion of a stand to include in gaps will vary based on the age and condition of a stand, but the guidance for a typical log-sized hardwood stand will be 10-20% of the area, with the remaining 80-90% subject to thinning or no harvesting. Small group selection is the primary silvicultural treatment projected during this 10-year planning period. A portion of this cover type meets the habitat requirements for black-throated blue warbler and marten (Table 10).

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
Black-Throated Blue warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	6,465	92
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	7,101	102

Desired future condition

The projected long-term cover type trend for northern hardwood is stable in the Cadillac Moraines Management Area (Figure 10). There are almost no transitions into this cover type or out from northern hardwoods to other cover types with only a 0.4% increase.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. The Cadillac Moraines Management Area will take several decades to reach the desired future condition.

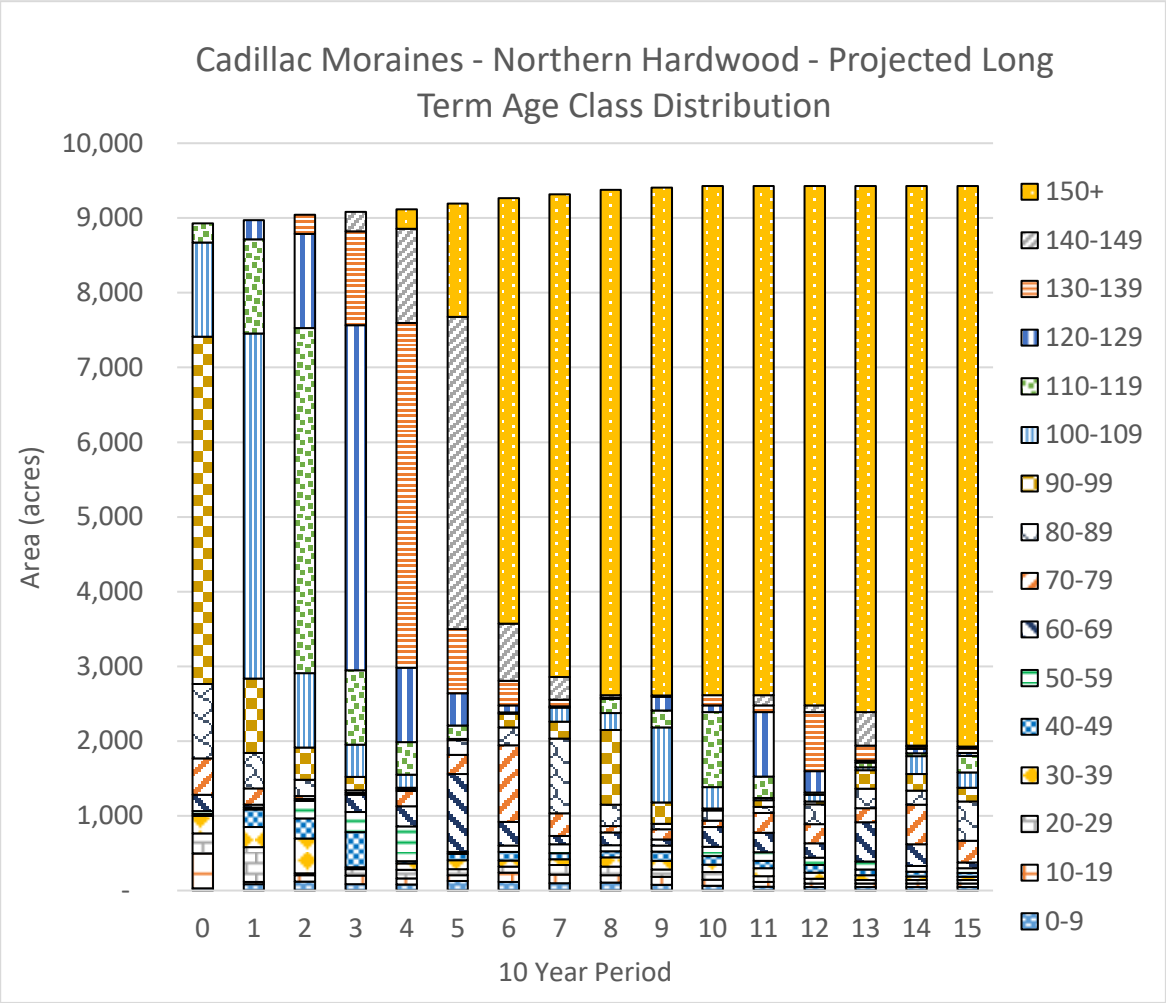


Figure 10. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected harvest regimes. It includes 2,185 acres of selection, 613 acres of group selection, and 34 acres of clearcut harvest methods (Table 7). Multiple silvicultural regimes should have continued consideration as emerging research results become available. Emphasis on canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Mixed upland deciduous

Current condition

The Cadillac Moraines Management Area has a surplus of acres in the 20- to 29-year-old age class mostly with 90- to 109-year-old age classes contributing to the rest of the surplus (Figure 11). The age class distribution is just over the balanced distribution of 641 acres in the 0- to 19-year-old age classes.

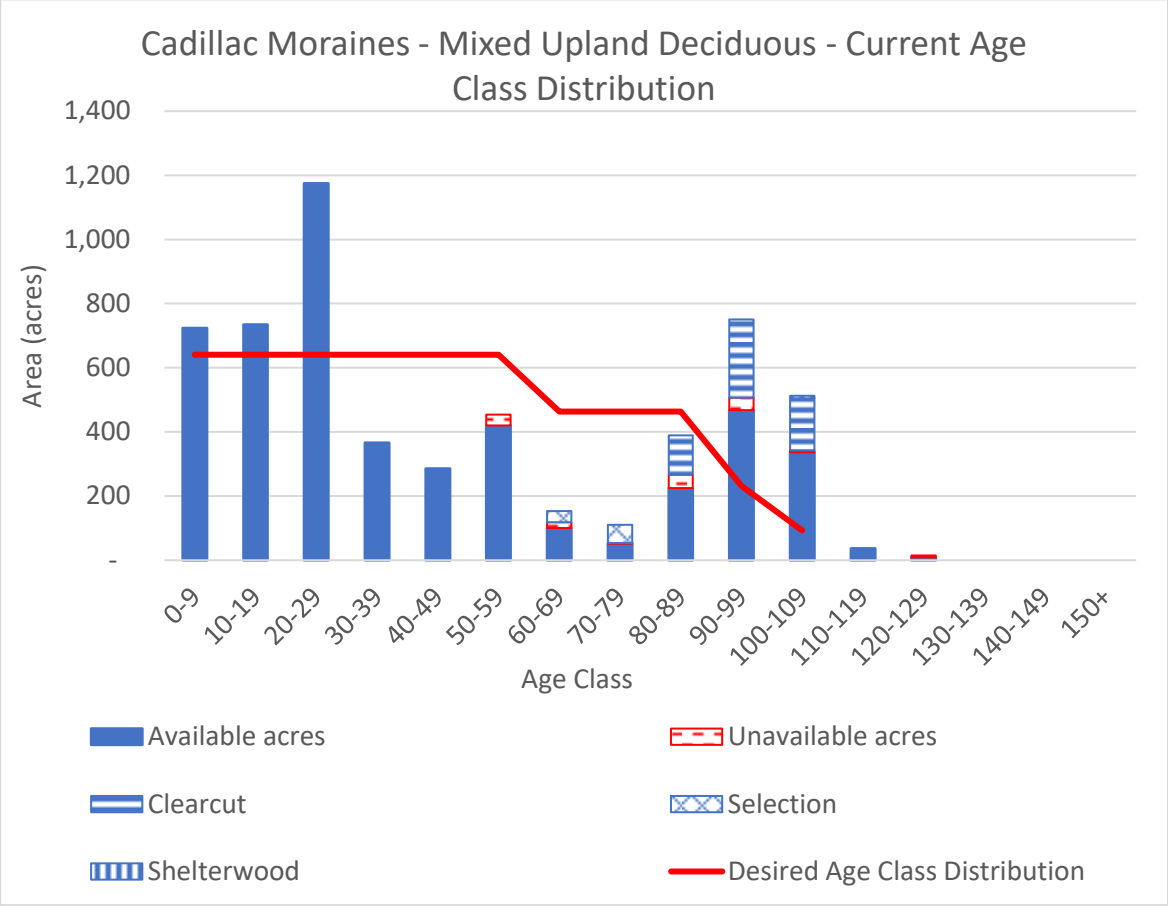


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

A portion of this cover type meets the habitat requirements for black-throated blue warbler and marten (Table 11).

Table 11. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres - Available	Mixed Upland Deciduous Habitat Acres - Unavailable
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	1,159	87
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	1,741	140

Desired future condition

The projected long-term cover type trend for mixed upland deciduous is increasing by 1% in the Cadillac Moraines Management Area. There are a few transitions in and out of this cover type during this planning period.

The long-term goal for this cover type is an age class distribution with a rotation age of 50 years with a drop of approximately 28% in acres for the individual age class until the 80-year-old age class and tail off to the 100-year-old age class.

The end of the planning period will result in the establishment of approximately 724 acres of mixed upland deciduous to the 0- to 9-year-old age class in the available acres (Figure 12). This is just above the 641 acres of desired acres. Progress toward the long-term desired age class distribution of mixed upland deciduous will take many decades to achieve the desired balanced age class condition.

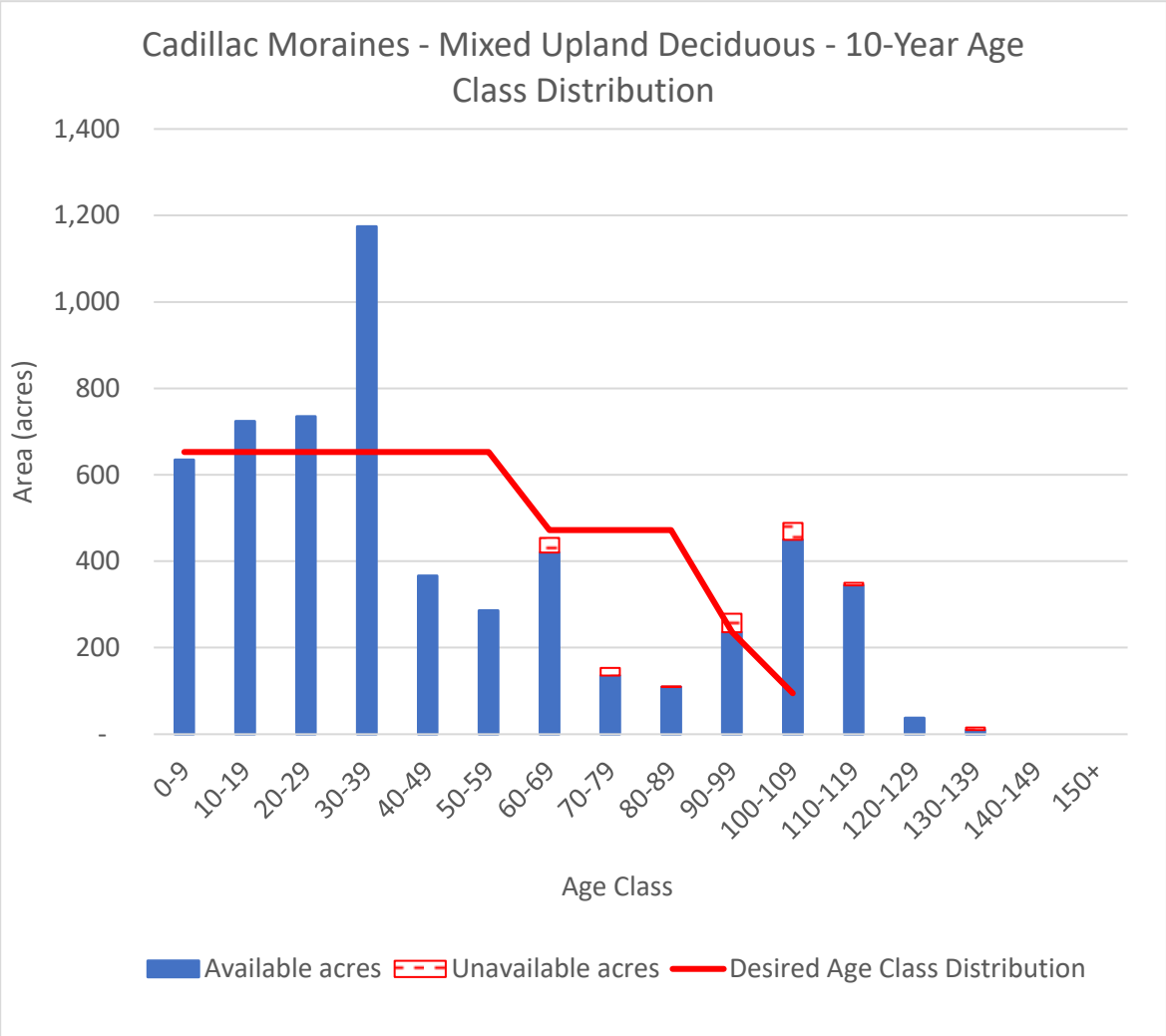


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of mixed upland deciduous is beginning to reach the desired future condition for available acres (Figure 13). The number of acres in the older age classes, 110 years and older, continues to increase due to unavailable landscape conditions.

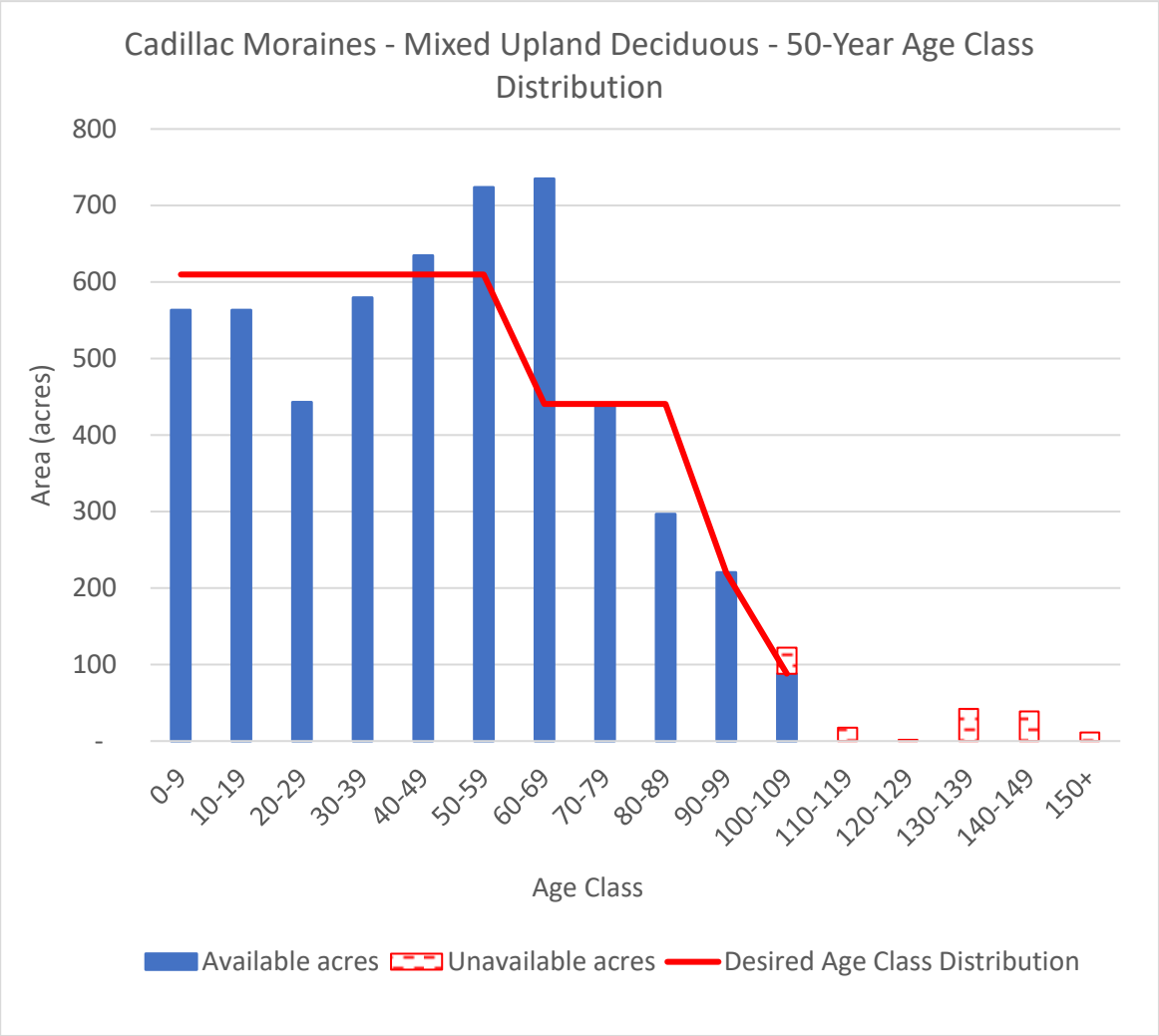


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate on the manageable acres of mixed upland deciduous cover type in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest (Figure 15). Only the 60- to 69-year-old age class is over the desirable amount of 417 acres in the age class.

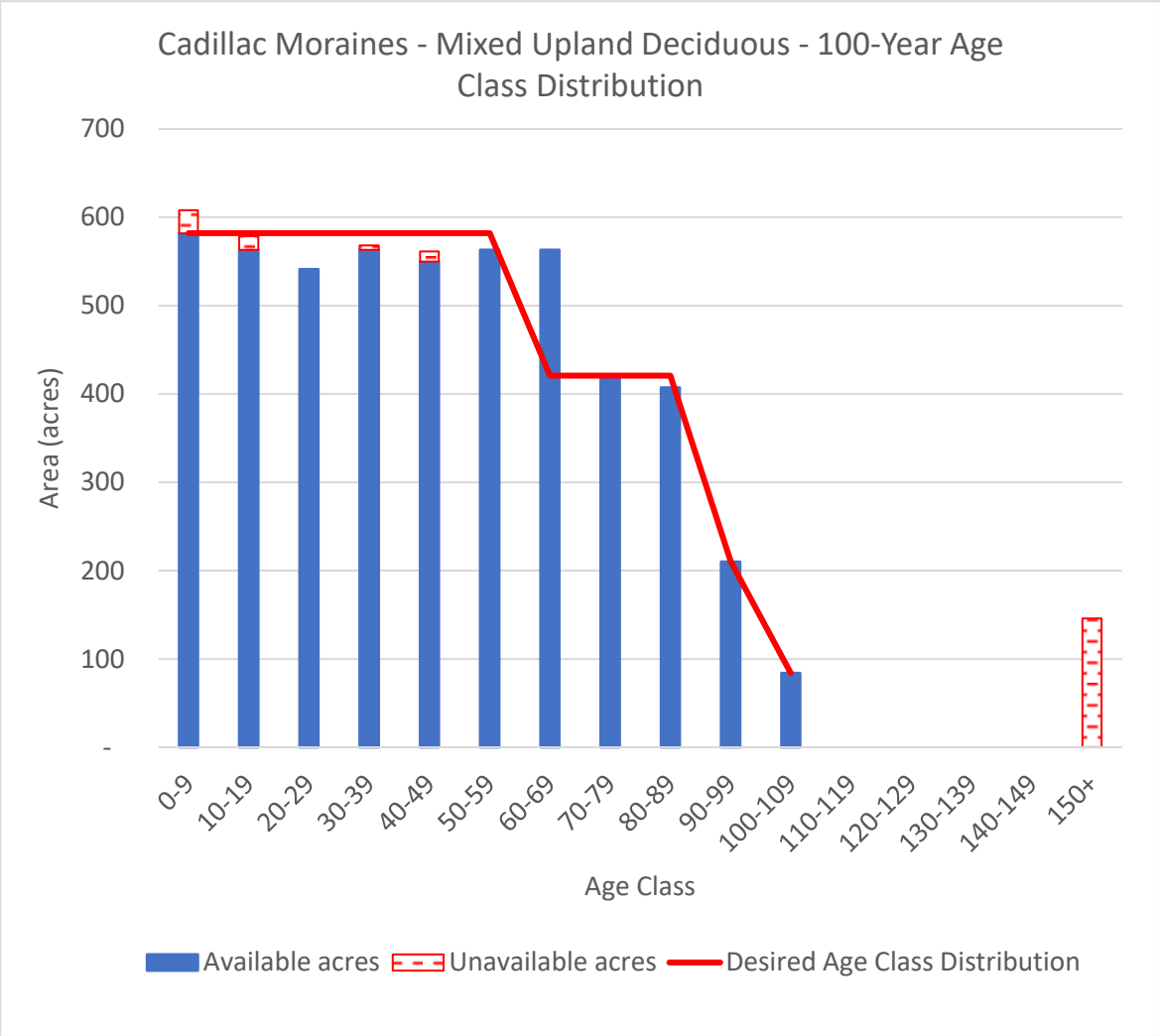


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

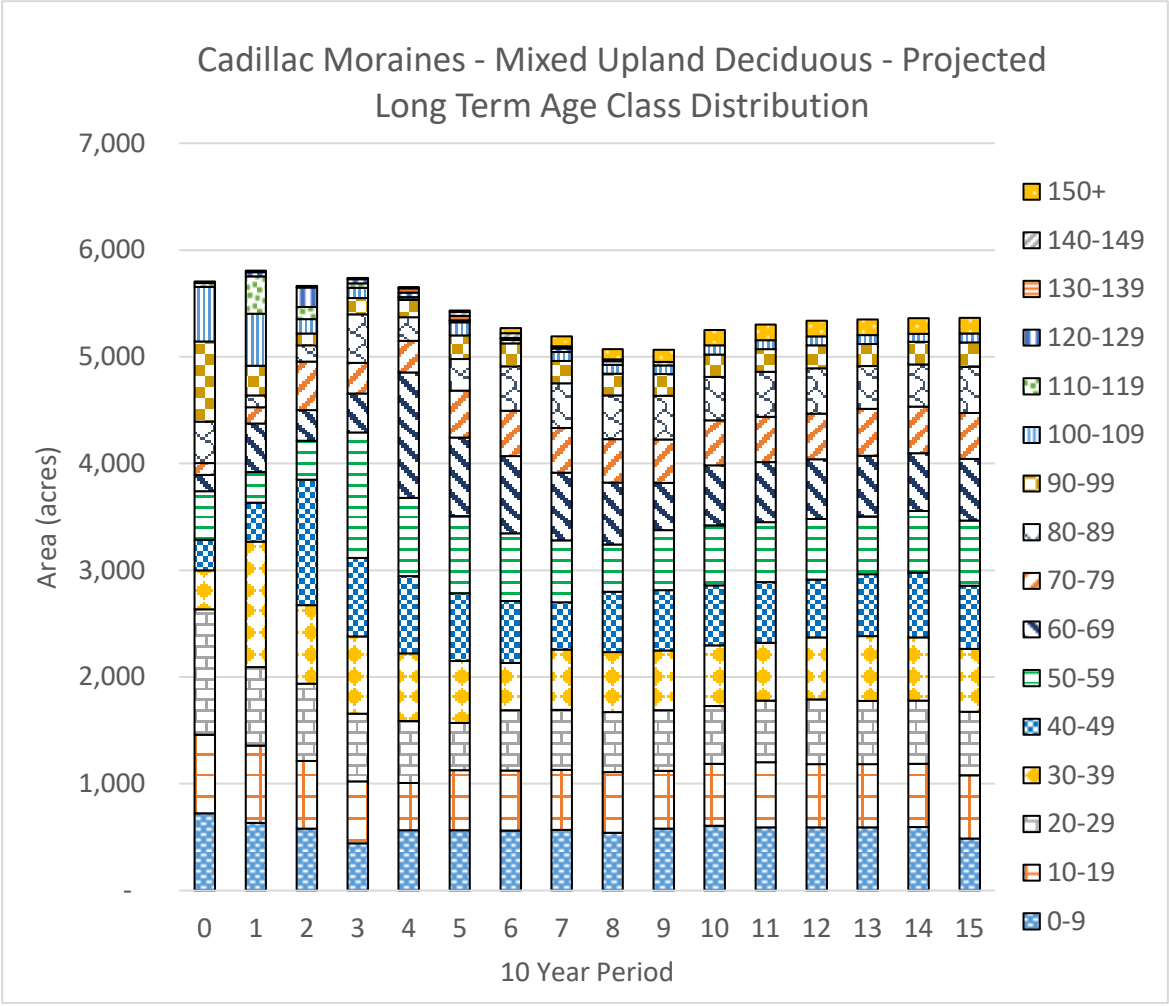


Figure 15. Projected age class distribution for all acres of mixed upland deciduous over the next 150 years.

Management Actions

There are 529 acres of projected clearcut harvest in the mixed upland deciduous cover type during the planning period. There are also predicted to be 99 acres to be converted into this cover type. This is just under the desired establishment of 641 acres of mixed upland deciduous per decade.

Planted red pine

Current Condition

The Cadillac Moraines management area has a surplus of acres in the 0- to 9-year age class and 60- to 69-year-old age class that was created due to the harvesting of the large number of mature and over-mature acres on the landscape and most being planted within the same decade (Figure 16). The age class distribution is currently very unbalanced across almost all the age class categories. Additionally, a deficit of available acres occurs in almost all age classes.

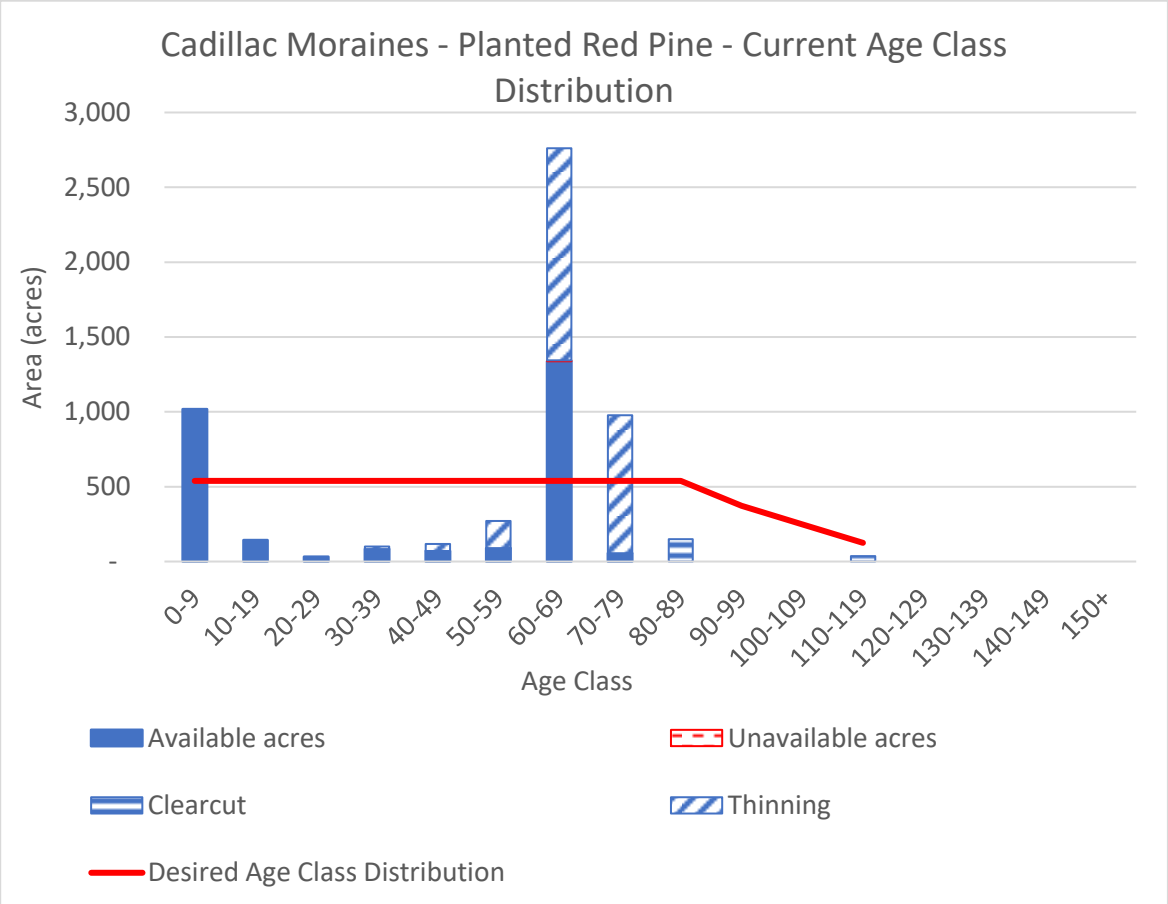


Figure 16. Current age class distribution, the desired age class distribution, and the projected harvests in the planted red pine cover type over the 10-year planning period.

Desired Future Condition

The projected long-term cover type trend for planted red pine is fairly stable in the Cadillac Moraines Management Area. There are a few transitions in and out of this cover type during this planning period with only a 4% growth.

The long-term goal for this cover type is balanced age classes between 0 and 80-years-old for all available planted red pine acres and then decreasing number of acres in until the max tail of 110-years-old is reached.

The end of the planning period will result in the establishment of approximately 423 acres of planted red pine from the available acres (Figure 17). In addition, another 66 acres are projected to transition into this cover type. Progress toward the long-term desired age class distribution of 562 of planted red pine in each age class from 0 to 80-year-old age class will take many decades to achieve the desired balanced age class condition.

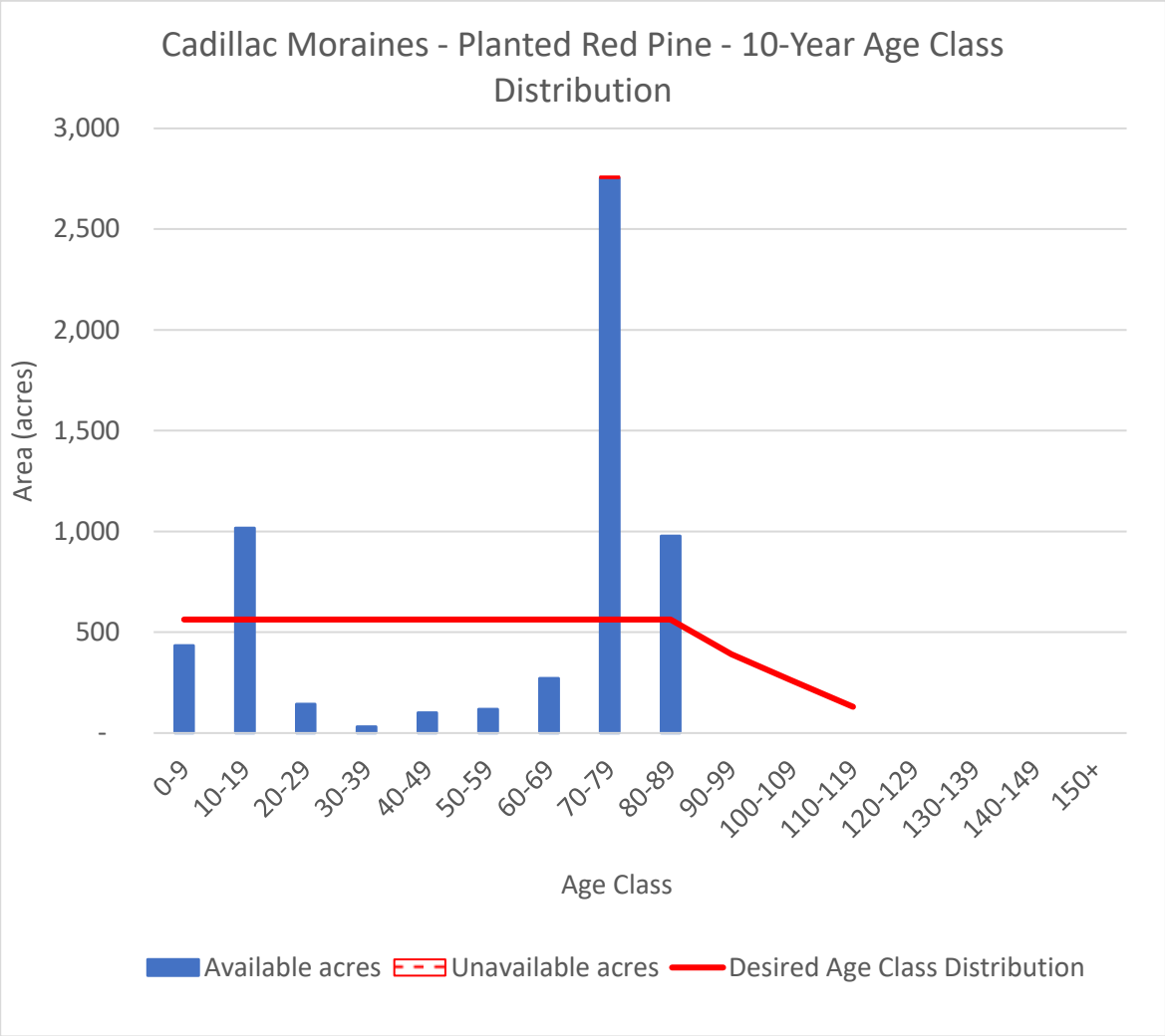


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of planted red pine is beginning to reach the desired future condition for available acres in the age classes between 0 and 40-year-old age (Figure 18). The number of acres in the older age classes, 120 years and older, continues to increase as the spike in the 110- to 119-year-old age class continues to get harvested over time.

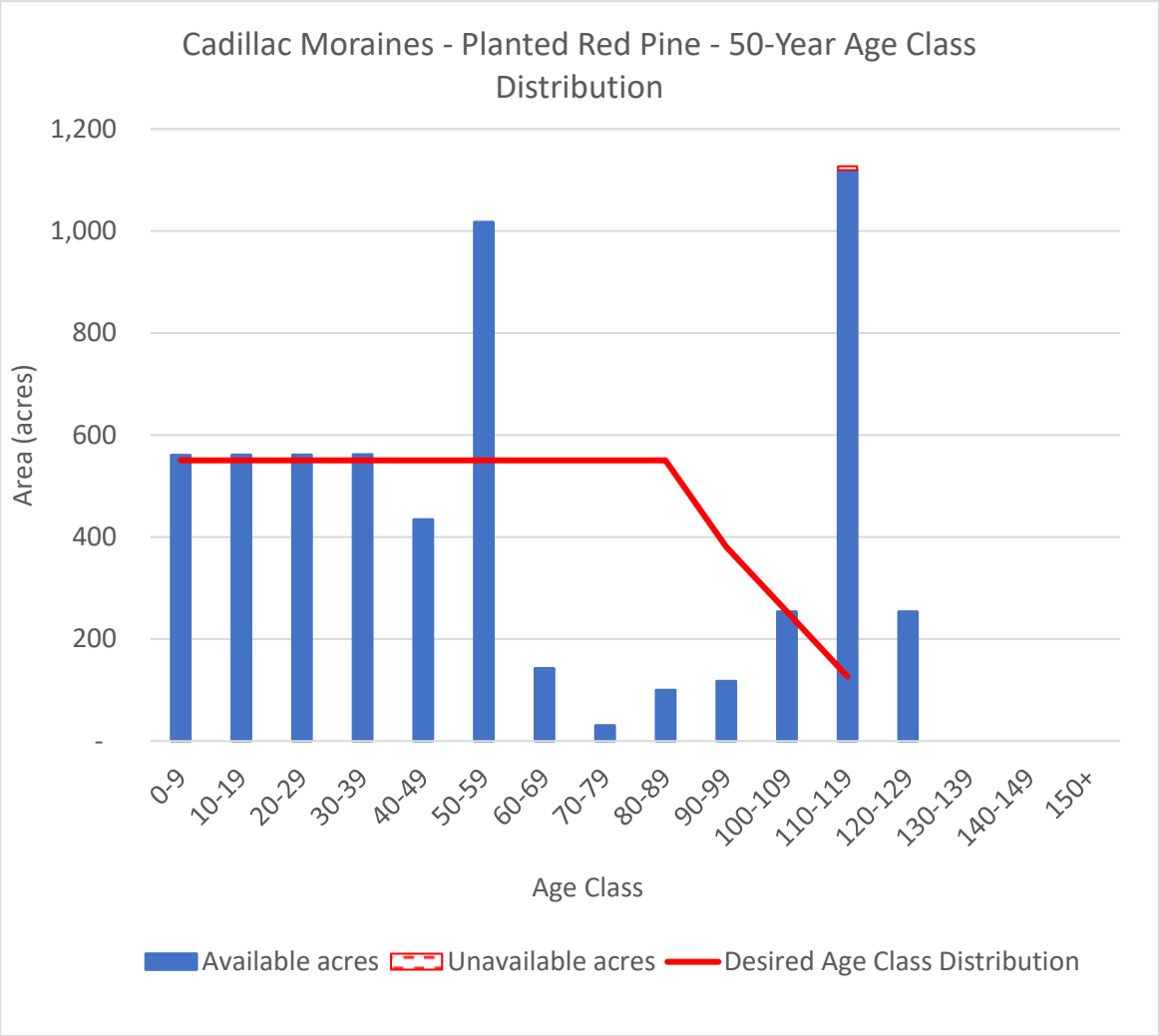


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate on the manageable acres of planted red pine cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest (Figure 20).

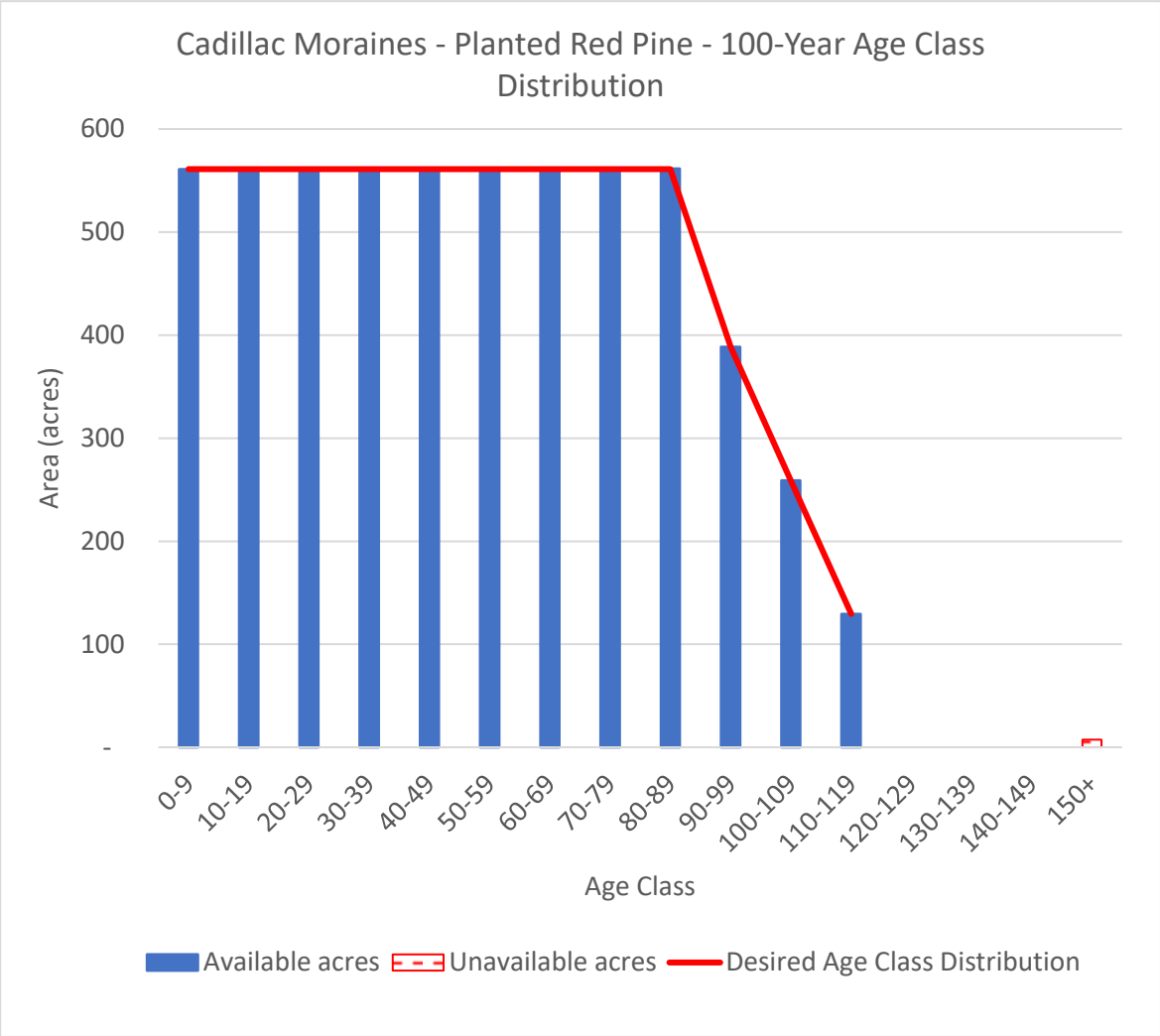


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

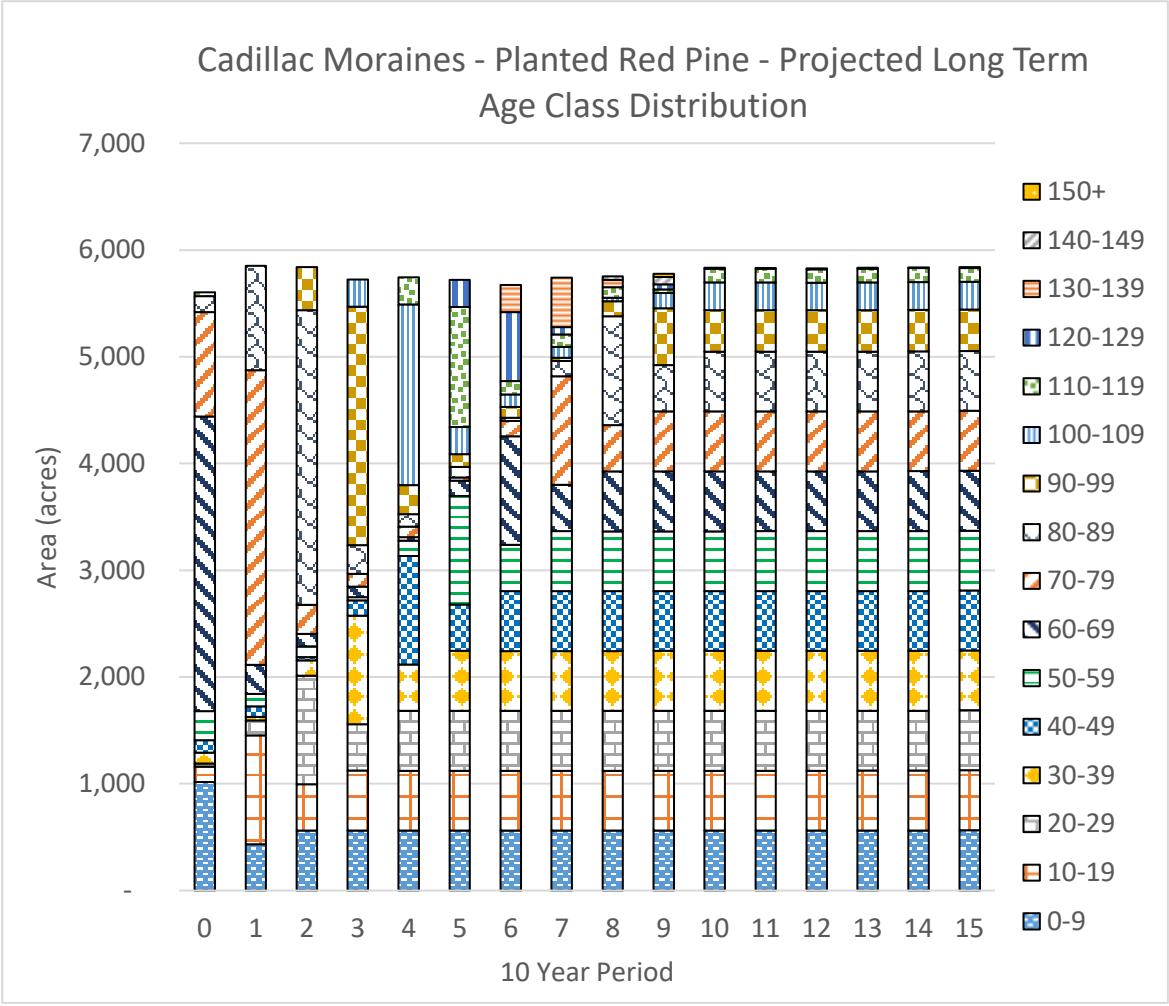


Figure 20. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

There are 185 acres of projected clearcut harvest in the planted red pine cover type during the planning period. An additional 238 acres are projected to transition into this cover type as well. This is below the desired establishment of 562 acres of planted red pine per decade because of the current unbalanced age class condition and the number of acres in the same 10-year age class spike.

Northern red oak

Current condition

Most of the northern red oak cover type is currently in the 90- to 119-year-old age classes (Figure 21). The past management regime has been primarily single-tree selection which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands.

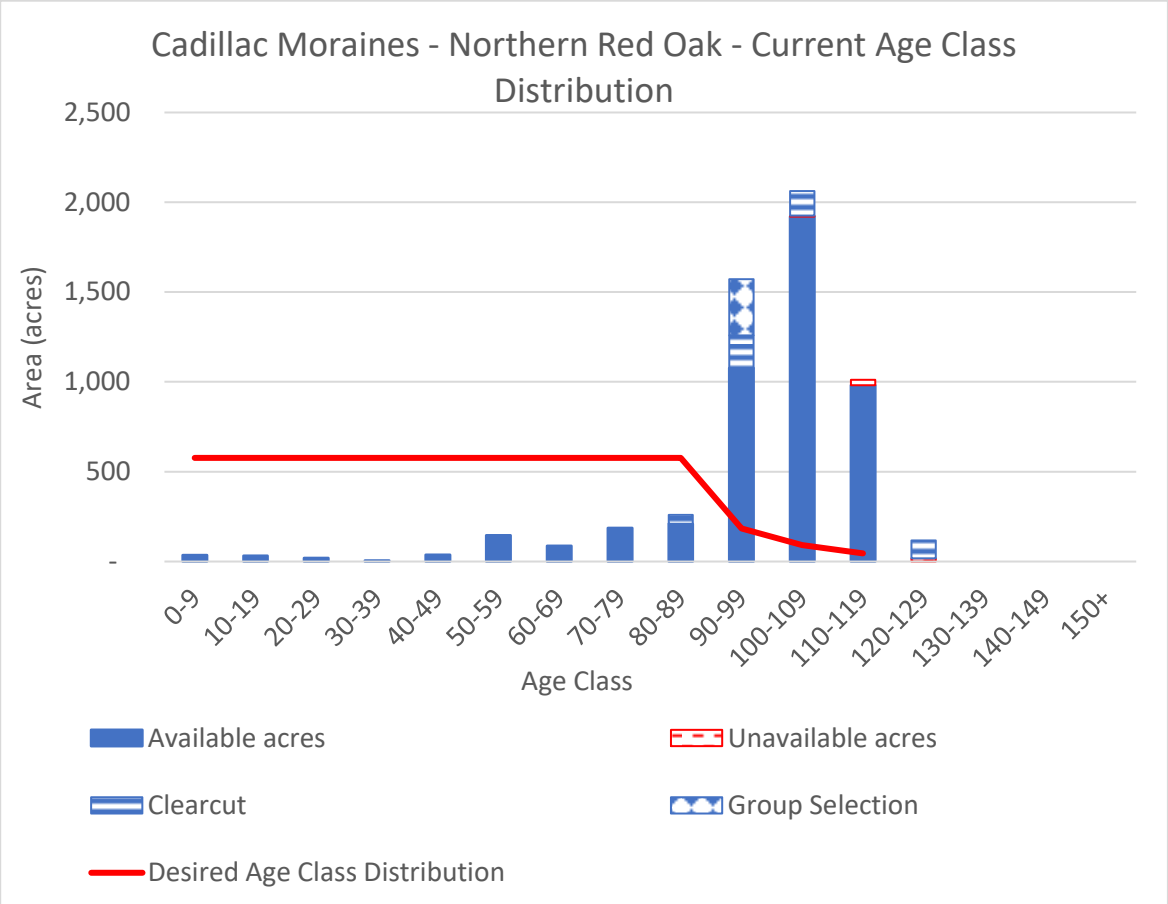


Figure 21. Current age class distribution, the desired age class distribution, and the projected harvests in the northern red oak cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests efforts on available northern red oak acres during the previous planning periods. Much of the northern red oak acres are distributed across the 81-110, and 111-140 basal area classes, but there are also quite a few in the 1-50 basal area class (Figure 22). A portion of this cover type meets the habitat requirements for marten (Table 50).

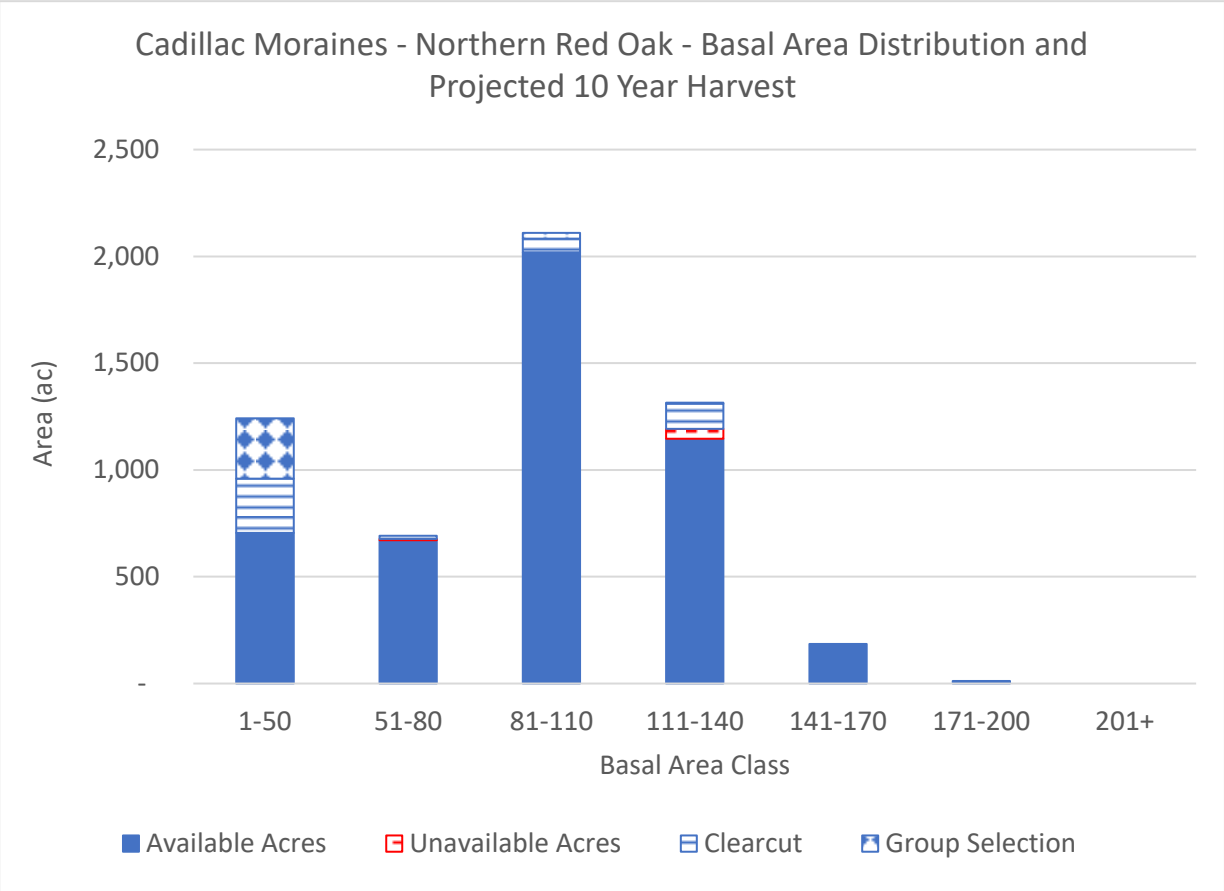


Figure 22. Current basal area distribution of the northern red oak cover type as well as the projected harvests from each basal area class.

Table 12. Featured species with northern red oak as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Red Oak	Northern Red Oak Habitat Acres - Available	Northern Red Oak Habitat Acres - Unavailable
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	3,774	46

Desired future condition

There are very few acres of unavailable northern red oak in the Cadillac Moraines Management Area. Clearcut is the primary silvicultural treatment projected during this 10-year planning period to increase stem density, species composition and regeneration of younger stands within the northern red oak areas.

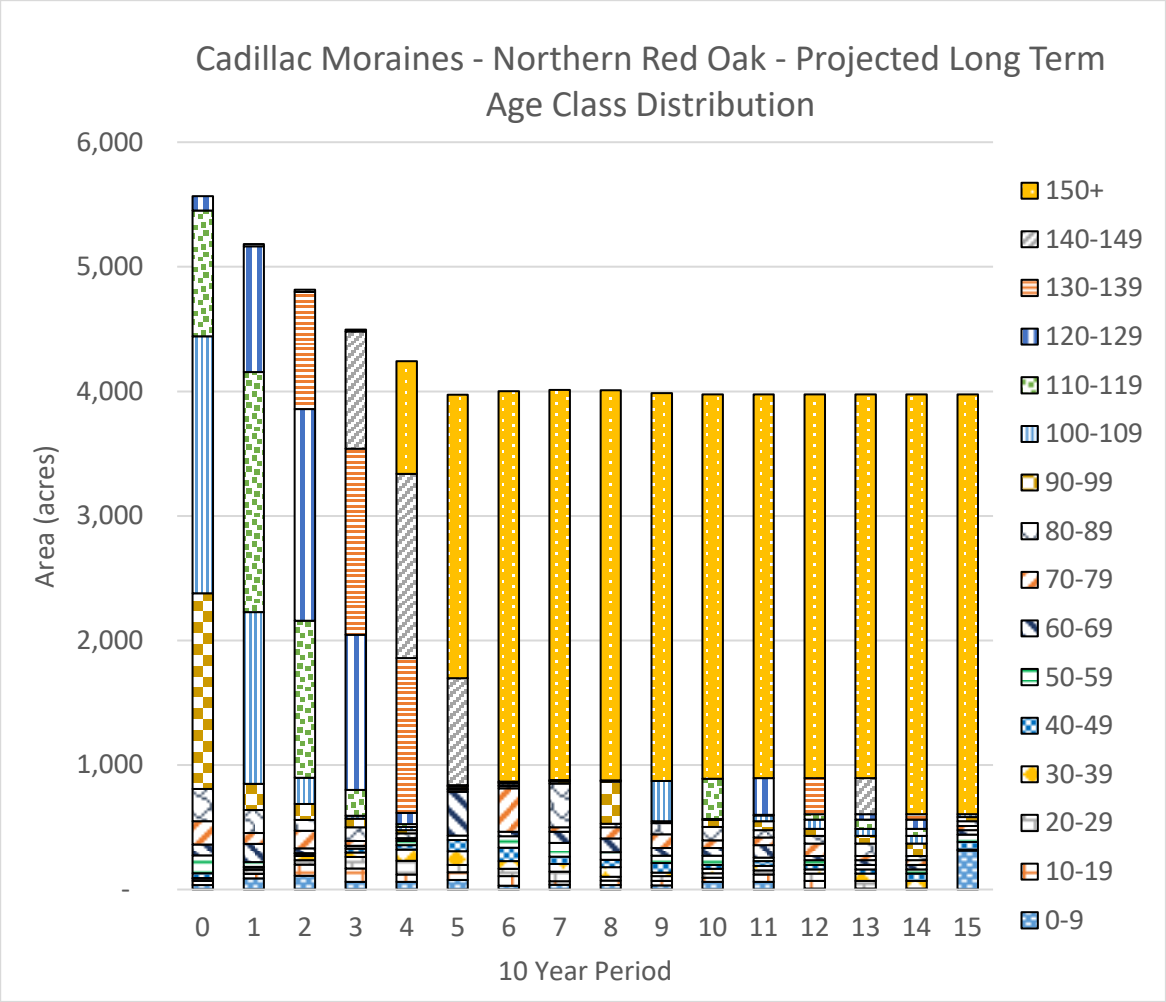


Figure 23. Projected age class distribution for all acres of northern red oak over the next 150 years.

Management actions

There are 948 acres of projected clearcut harvest, 122 acres of thinning and 42 acres of projected shelterwood in the northern red oak cover type during this planning period. Some of this cover type will be converting into others such as oak mix.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High value conservation areas within Cadillac Moraines Management Area.

High Conservation Value Area Type and Name	Acres
Eastern Massasauga Managed Land	**0**
-	0
Natural Rivers Vegetative Buffer	**293**
-	293
Natural Rivers Zoning District	**702**
-	702
GEMS	**4,024**
Mark Knee Memorial GEMS	4,024
Grand Total	**5,019**

Ecological reference areas

Ecological reference areas are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 15. Ecological reference areas (ERA) within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Northern Wet Meadow	C	G4G5	S4	2
Existing ERA	Rich Conifer Swamp	BC	G4	S3	1
Existing ERA	Submergent Marsh	AB	GU	S4	1
Grand Total	-	-	-	-	**4**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 16) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within Cadillac Moraines Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**22**
Dyer Lake Campground	7
Long Lake (Missaukee) Campground	13
Tin Cup Spring Motorcycle Trail and Route	1
Grand Total	**21**

Table 17. Static special conservation areas within Cadillac Moraines Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**68**
Poor Conifer Swamp	-	68
Designated Trout and Cold Water Stream Buffer	**-**	**895**
--	-	488
Coe Creek	-	17
East Branch Pine River	-	7
Filer Creek	-	9
Ham Creek	-	9
Hopkins Creek	-	14
Manton Creek	-	6
Middle Branch River	-	35
North Branch Pine River	-	7
Pine River	-	202
Sanborn Creek	-	76
Silver Creek	-	9
Twin Creek	-	15
Designated Trout and Coldwater Streams	**33.3**	**-**
--	17.8	-
Coe Creek	0.7	-
East Branch Pine River	0.3	-
Filer Creek	0.3	-
Ham Creek	0.4	-
Hopkins Creek	0.7	-
Manton Creek	0.2	-
Middle Branch River	1.2	-
North Branch Pine River	0.3	-
Pine River	7.4	-
Sanborn Creek	3.1	-
Silver Creek	0.3	-
Twin Creek	0.5	-
Mussel Stream Group 2 - State threatened or endangered	**0.0**	**-**
Cunnerson Creek-Clam River	0.0	-
Wild and Scenic Rivers	**0.7**	**-**
Pine Wild and Scenic River	0.7	-
Wood Turtle Stream 100ft Buffer	**-**	**73**
Pine River	-	73
Wood Turtle Stream 660ft Buffer	**-**	**370**
Pine River	-	370
Grand Total	**34.0**	**1,406**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 18, Table 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal occurrence within Cadillac Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alasmidonta viridis	Slippershell	T	-	2
Animal	Asio flammeus	Short-eared owl	E	-	1
Animal	Bombus borealis	Northern amber bumble bee	SC	-	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	-	1
Animal	Centronyx henslowii	Henslow's sparrow	E	-	1
Animal	Emydoidea blandingii	Blanding's turtle	SC	-	1
Animal	Gavia immer	Common loon	T	-	4
Animal	Glyptemys insculpta	Wood turtle	T	-	3
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	5
Animal	Lanius ludovicianus migrans	Migrant loggerhead shrike	E	-	1
Animal	Lasmigona compressa	Creek heelsplitter	SC	-	1
Animal	Notropis dorsalis	Bigmouth shiner	T	-	1
Animal	Planogyra asteriscus	Eastern flat-whorl	SC	-	1
Animal	Setophaga kirtlandii	Kirtland's warbler	E	-	1
Animal	Spiza americana	Dickcissel	SC	-	1
Animal	Terrapene carolina carolina	Eastern box turtle	T	-	2
Animal	Thamnophis butleri	Butler's garter snake	SC	-	1
Total	-	-	-	-	**28**

Table 20. Rare plant occurrence within Cadillac Moraines Management Area.

	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Juncus vaseyi	Vasey's rush	T	-	1
Total	-	-	-	-	**1**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the Michigan Natural Features Inventory Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 21).

Table 21. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non-ecological reference area natural communities within Cadillac Moraines Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Poor Conifer Swamp	B	S4	G4	1
Grand Total	**-**	**-**	**-**	**1**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Cadillac Moraines management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Hemlock wooly adelgid	Adelges tsugae	Non-native	Yes

Watch for and retain lingering ash with potential resistance to emerald ash borer.

Table 24. Maladies of concern in the Cadillac Moraines Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak decline	Various	Various	Yes

Monitor planted red pine for pockets of mortality that may suggest Heterobasidion root disease and follow guidance in areas near disease-positive stands. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

Approximately 32 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as cold types comprise approximately 69% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	15
Cold Small River	7
Cold Transitional Stream	<1
Cold Transitional Small River	<1
Cold Transitional Large River	0
Warm Transitional Stream	8
Warm Transitional Small River	2
Warm Transitional Large River	0
Warm Stream	0
Warm Small River	0
Warm Large River	0

Lacustrine habitat

A total of 15 lakes and ponds of at least one surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	14
100-499	1
500+	0

Wetlands

A total of 5,627 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 89% of wetland types found in the management area.

Table 27. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	511
Forested	4,993
Riverine	123

Vernal pools and seeps

A total of 92 acres of vernal pools and seeps have been inventoried in the management area while 244 acres of seeps have been identified.

Riparian vegetation cover

Aspen is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Aspen	1,672
Northern Hardwood	679
Planted Red Pine	437
Mixed Upland Deciduous	389
Lowland Shrub	365
Northern Red Oak	288
Marsh	249
Lowland Conifers	235

Cover Type	Acres
Herbaceous Openland	223
Lowland Aspen/Balsam Poplar	196

Watershed vegetation cover

The management area includes portions of important watersheds of the Manistee and Pere Marquette rivers (Table 29 & Table 30). Aspen and hardwoods are major cover types of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top five) and area of the Manistee River watershed located within the management area.

Cover Type	Acres)
Aspen	8,756
Northern Hardwood	5,637
Planted Red Pine	1,684
Black-Red Hybrid Oak	1,223
Northern Red Oak	1,138

Table 30. Largest vegetative cover types (i.e., top five) and area of the Pere Marquette River watershed located within the management area.

Cover Type	Acres
Aspen	4,586
Black-Red Hybrid Oak	1,932
Mixed Upland Deciduous	1,166
Northern Red Oak	859
Northern Hardwood	494

Recreation

The Cadillac Moraines Management Area consists of several smaller, non-contiguous blocks of land. Nonetheless, it has good access to recreation opportunities with a well-developed road/trail system.

Off-road vehicle trails in this management area are extensive and include the Lincoln Hills ORV/snowmobiling route/motorcycle trail; the North Missaukee ORV route; the Michigan Cross Country Cycle Trail; and the Tin Cup, Evart and Long Lake motorcycle/ORV trails. Nonmotorized trails include the Cadillac Pathway and Silver Creek Pathway open to hiking and biking; and 4.9 miles of the Shore-to-Shore equestrian trail.

There are six state forest campgrounds (rustic) within the management area, all of which provide water access. Additional recreation opportunities are provided by nearby Mitchell State Park and the Manistee National Forest.

Table 31. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types)	140.8
Motorized Recreation Trails	Snowmobile	34.2
Nonmotorized Recreation Trails	Hiking	19.9
Nonmotorized Recreation Trails	Equestrian	4.9
Nonmotorized Recreation Trails	Biking	15.1
Nonmotorized Recreation Trails	Hunter Access Trails	10.4
Total	-	**225.2**

Note: Trail-use types may overlap.

Table 32. State forest campgrounds.

State Forest Campground	# of sites	ORV Access
Long Lake (Wexford)	12	X
Silver Creek	26	-
Sunrise Lake	17	-
Goose Lake	30	-
Long Lake (Missaukee)	11	-
Lincoln Bridge	9	-

The Mark Knee Memorial Grouse Enhanced Management Site provides excellent habitat for bird hunting, with over ten miles of hunter access trails.

The Pine River is popular for water recreation with multiple access points. Other boating access sites provide access to the Middle Branch River, Silver Creek and inland lakes.

The Cadillac Moraines Management Area is also popular for dispersed recreation such as hunting and mushroom picking.

Table 33. Areas managed for hunting.

Type	Name	Acres
Grouse Enhanced Management Site	Mark Knee Memorial	4,020.9

Table 34. Boating access sites.

Boating Access Site	Waterbody
Coe Creek	Pine River
Edgetts Bridge	Pine River
Goose Lake State Forest Campground	Goose Lake
Graver Road Pine River	Pine River
Lincoln Bridge State Forest Campground	Pine River
Long Lake State Forest Campground	Long Lake
Marion Ponds	Middle Branch River
Middle Branch	Middle Branch River
Pine River	Pine River
Silver Creek State Forest Campground	Silver Creek
Sunrise Lake State Forest Campground	Sunrise Lake

Camp Grayling

State Forest Area:	Location:	Population Centers:
105,874 acres	Kalkaska, Crawford and southern Otsego counties	Grayling

Subsection:	Landforms:	Landcover:
Grayling Outwash Plain, Kirtland's Warbler High Sand Plains	Ice-contact formed end-moraine ridges and outwash areas	Forested: 83,574 acres Nonforested: 22,300 acres

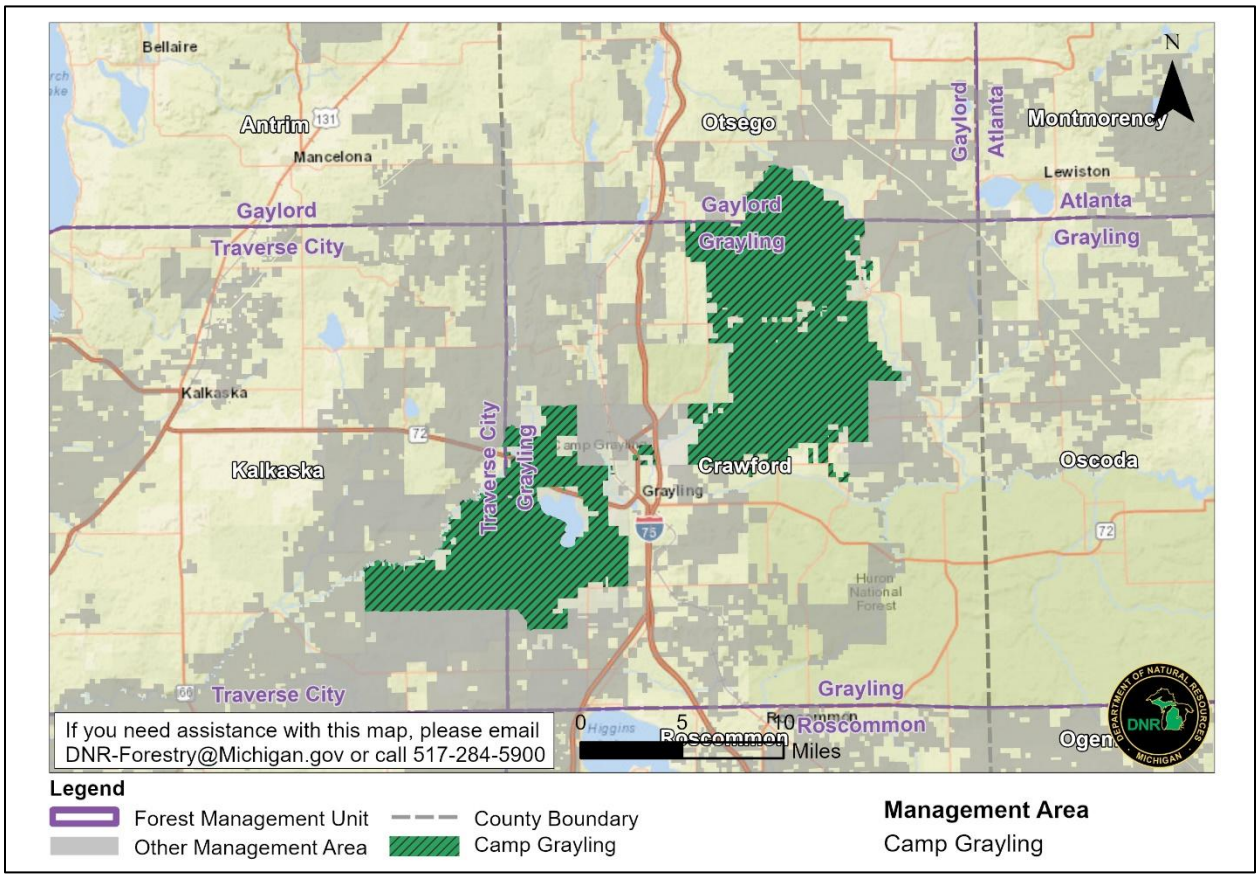


Figure 1. Camp Grayling Management Area.

Forested landscape

Current and projected future condition

The Camp Grayling Management Area includes mostly shade-intolerant species across the four different age categories (Figure 2). The tolerant cover types occur on available uplands in the mature age category. Mid-tolerant cover types occur almost equally on available uplands in the mid-aged and mature age categories while the majority of the intolerant cover types occur in the intermediate category.

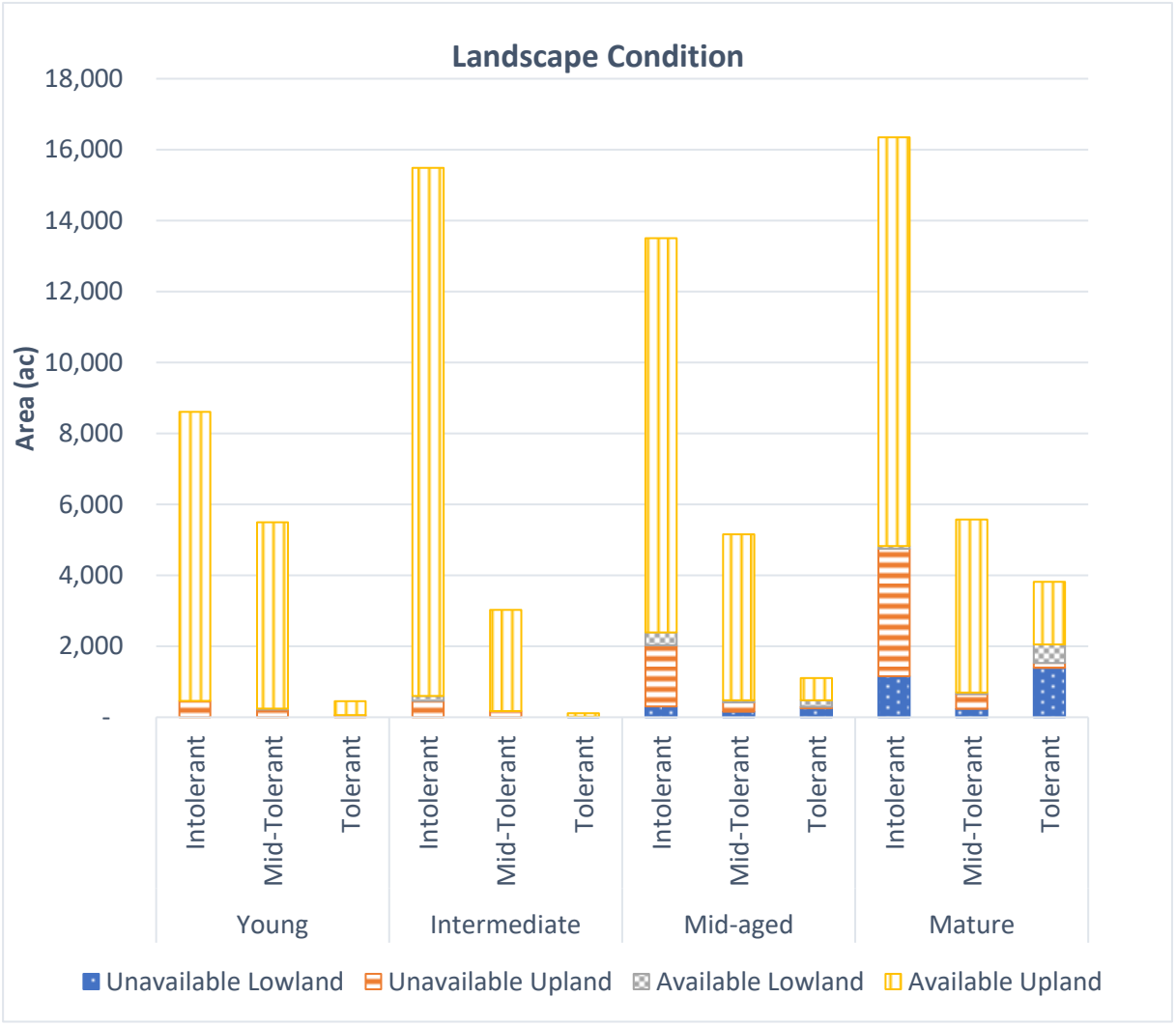


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	6,717
Mature Forest	Acres of 80+ year stands across cover types	25,504
Mature Forest	Acres of 120+ year stands across cover types	908
Mesic Conifer Cover types	Acres of mesic conifer cover types	2,273
Mesic Conifers in other Cover types	Average canopy occupancy	18%
Mast – Oak Cover types	Acres of Oak cover types	15,066
Mast Tree Species in other Cover types	Acres of Total Canopy Occupancy of Mast Tree Acres (Trace-100%)	50,143
Big Trees	Acres of Total Canopy Stand Occupancy of Species in Sawlog or Greater Size Class	30,909
Nonforested Openings	Acres of Total Herbaceous Openland, Upland Shrub, and Cropland	13,849
Landscape Forest Matrix	Percent Deciduous Forest	65%
Landscape Forest Matrix	Percent Coniferous Forest	30%

The Camp Grayling Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Kirtland's warbler – Special analysis unit

The Camp Grayling Management Area is comprised of 79% forested cover types and 21% nonforested cover types (Table 2). Within the forested cover types, the upland landscape position makes up 74% of the total landscape and lowland landscape makes up only 5% of the total landscape. The largest contributors to upland cover types are aspen, mixed upland deciduous and natural jack pine. Lowland conifer and lowland spruce/fir take up 50% of the lowland forested landscape position. Upland shrub is the most common nonforested cover type in the management area representing 9% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	21,261	53,718	78,466	83,574
			Northern Hardwood	2,190			
			Black Red Hybrid Oak	7,356			
			Northern Red Oak	5,048			
			Oak Mix	5,341			
			Mixed Upland Deciduous	12,522			
		Mixed	Upland Mixed Forest	3,758	3,758		
		Coniferous	Planted Red Pine	4,093	20,990		
			Planted Jack Pine	3,241			
			Planted White Pine	38			
			Planted Mixed Pine	265			
			Natural Red Pine	800			
			Natural Jack Pine	10,281			
			Natural White Pine	293			
			Natural Mixed Pines	1,791			
			Upland Spruce/Fir	7			
			Upland Conifers	99			
			Hemlock	82			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	553	783	5,108	
			Lowland Deciduous	231			
		Mixed	Lowland Mixed Forest	359	359		
		Coniferous	Cedar	754	3,966		
			Lowland Conifers	1,759			
			Lowland Spruce/Fir	818			
			Tamarack	635			
Nonforested	Upland	N/A	Herbaceous Openland	4,329	N/A	19,730	22,300
			Upland Shrub	9,520			
			Low Density Trees	3,265			
			Bare/Sparsely Vegetated	554			
			Cropland	0			
			Urban	2,062			
	Lowland	N/A	Lowland Shrub	1,629	N/A	2,571	
			Marsh	100			
			Bog	208			
			Treed Bog	224			
			Water	410			
						Grand Total:	**105,874**

There are 75,544 acres (87% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Camp Grayling Management Area (Table 3). Of that, over 24% is in the aspen cover type, 14% in mixed upland deciduous, and 11% in natural jack pine. The remaining 22 cover types represent less than 7% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

CAMP GRAYLING Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	20,833	24.1%	859	1.0%	21,692	25.1%
Black Red Hybrid Oak	5,355	6.2%	2,003	2.3%	7,358	8.5%
Cedar	309	0.4%	445	0.5%	754	0.9%
Hemlock	0	0.0%	82	0.1%	82	0.1%
Lowland Aspen/Balsam Poplar	371	0.4%	182	0.2%	553	0.6%
Lowland Conifers	533	0.6%	1,240	1.4%	1,773	2.0%
Lowland Deciduous	62	0.1%	168	0.2%	231	0.3%
Lowland Mixed Forest	124	0.1%	235	0.3%	359	0.4%
Lowland Spruce/Fir	241	0.3%	691	0.8%	931	1.1%
Mixed Upland Deciduous	12,145	14.0%	545	0.6%	12,690	14.7%
Natural Jack Pine	9,830	11.4%	1,268	1.5%	11,098	12.8%
Natural Mixed Pines	1,427	1.6%	374	0.4%	1,800	2.1%
Natural Red Pine	774	0.9%	71	0.1%	845	1.0%
Natural White Pine	218	0.3%	76	0.1%	294	0.3%
Northern Hardwood	2,106	2.4%	84	0.1%	2,190	2.5%
Northern Red Oak	3,918	4.5%	1,149	1.3%	5,067	5.9%
Oak Mix	4,792	5.5%	556	0.6%	5,348	6.2%
Planted Jack Pine	4,231	4.9%	116	0.1%	4,348	5.0%
Planted Mixed Pine	301	0.3%	0	0.0%	301	0.3%
Planted Red Pine	4,161	4.8%	69	0.1%	4,230	4.9%
Planted White Pine	38	0.0%	0	0.0%	38	0.0%
Tamarack	25	0.0%	648	0.7%	673	0.8%
Upland Conifers	86	0.1%	13	0.0%	99	0.1%
Upland Mixed Forest	3,664	4.2%	111	0.1%	3,775	4.4%
Upland Spruce/Fir	0	0.0%	7	0.0%	7	0.0%
Grand Total	**75,544**	**87.3%**	**10,991**	**12.7%**	**86,535**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Military Lease/Easement	7,506	68.3%
Too Wet	1,606	14.6%
Conservation Values	472	4.3%
Species of special concern or T&E	299	2.7%
BMPs	250	2.3%
Long-Term Retention	213	1.9%
Federal/State/Local Law	151	1.4%
Recreational/Scenic	142	1.3%
Too Steep	112	1.0%
Non-DNR agency concerns	86	0.8%
Wildlife Concerns	43	0.4%
Other Influence Zones	36	0.3%
Cannot Regenerate	28	0.3%
Other Dept./Div. Processes	21	0.2%
Blocked by Obstacle	17	0.2%
Denied Access	8	0.1%
Rare Landforms	2	0.0%
Total Unavailable	**10,991**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Camp Grayling Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in (Table 3). These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like mixed upland deciduous. Implementing these silvicultural regimes will yield 199,571 cords, the planned harvest volume for the decade (Table 4).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Aspen	2,511	-	-	-	-	589	-	3,100
Natural Jack Pine	1,495	-	-	-	-	531	-	2,026
Planted Red Pine	424	-	1,068	-	-	47	40	1,579
Mixed Upland Deciduous	1,334	128	-	-	19	-	-	1,481
Oak Mix	522	-	53	-	-	-	-	574
Northern Red Oak	572	-	-	-	-	-	-	572
Northern Hardwood	-	-	-	-	-	-	528	528
Planted Jack Pine	120	-	-	-	-	99	-	219
Natural Mixed Pines	-	-	74	-	44	-	-	118
Lowland Aspen/Balsam Poplar	59	-	-	-	-	-	-	59
Natural White Pine	-	-	29	-	28	-	-	57
Lowland Conifers	40	-	-	-	-	-	-	40
Natural Red Pine	-	-	10	-	4	-	-	14
Planted Mixed Pine	14	-	-	-	-	-	-	14
Upland Conifers	14	-	-	-	-	-	-	14
Lowland Mixed Forest	7	-	-	-	-	-	-	7
Totals	**7,112**	**128**	**1,234**	**-**	**96**	**1,266**	**568**	**10,402**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection Camp Grayling Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed Aspen	25,214	23,701
	Jack Pine	23,813	22,384
	Mixed Hardwood	22,147	20,818
	Red Pine	7,786	7,319
	Mixed Oak	7,136	6,708
	Mixed Spruce	4,961	4,664
	Mixed Softwood	3,175	2,984
	White Pine	2,197	2,065
	Pulpwood Total	**96,429**	**90,643**
Sawtimber (MBF)	Red Pine	12,629	11,872
	Red Oak	9,903	9,309
	Mixed Aspen	5,557	5,224
	White Pine	3,139	2,950
	Red Maple	2,405	2,261
	White Oak	1,321	1,242
	Sugar Maple	830	780
	Mixed Oak	552	519
	Basswood	96	90
	Sawtimber Total	**36,433**	**34,247**
	Total Sawtimber Harvest Volume in Cords	**93,667**	**88,047**
	Grand Total Harvest Volume in Cords	**190,096**	**178,690**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are a few cover type transitions projected for the Camp Grayling Management Area (Table 7). The managed area of cover types are projected to remain fairly stable as treatment regimes will not change the amount of area in each cover type by a significant amount. The largest decrease forecasted is in the northern red oak where 402 acres will convert to other cover types through forest management,

military activities and regeneration activities. The largest increase occurs on the aspen forest type where 427 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	21,261	21,688	427
Mixed Upland Deciduous	12,522	12,319	-203
Natural Jack Pine	10,281	9,976	-305
Black Red Hybrid Oak	7,356	7,356	0
Oak Mix	5,341	5,458	117
Northern Red Oak	5,048	4,647	-402
Planted Red Pine	4,093	4,257	165
Upland Mixed Forest	3,758	3,982	224
Planted Jack Pine	3,241	3,207	-34
Northern Hardwood	2,190	2,221	31
Natural Mixed Pines	1,791	1,794	3
Lowland Conifers	1,759	1,745	-13
Lowland Spruce/Fir	818	802	-16
Natural Red Pine	800	800	0
Cedar	754	754	0
Tamarack	635	635	0
Lowland Aspen/Balsam Poplar	553	551	-1
Lowland Mixed Forest	359	387	28
Natural White Pine	293	293	0
Planted Mixed Pine	265	251	-14
Lowland Deciduous	231	233	3
Upland Conifers	99	91	-8
Hemlock	82	82	0
Planted White Pine	38	38	0
Upland Spruce/Fir	7	7	0
Upland Shrub	9,520	9,520	0
Herbaceous Openland	4,329	4,329	0
Low Density Trees	3,265	3,265	0
Lowland Shrub	1,629	1,629	0
Bare/Sparsely Vegetated	554	554	0
Water	410	410	0
Treed Bog	224	224	0
Bog	208	208	0
Marsh	100	100	0
Urban	2,062	2,062	0
Total:	**105,874**	**105,874**	**0**

Featured species current and projected habitat acres

There are nine featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be managed for or found. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Two of these species were not included in the State Forest Management Plan model, black bear and wild turkey, but are included here to inform management decisions over the decade. Kirtland's warbler habitat is described in the Kirtland's Warbler Special Analysis Unit (Section 5).

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	6,852	7,215	8,085	8,549
Black Bear	Mast	--	--	--	--
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	10,533	11,007	8,865	9,699
Kirtland's Warbler	Jack pine	--	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	13,250	13,347	19,617	17,842
Ruffed Grouse	Aspen	6,639	6,931	7,968	8,384

Featured Species	Priority Cover types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	19,035	16,811	14,283	14,965
Wild Turkey	Nonforested openings	--	--	--	--
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	7,091	6,929	9,144	9,743

Cover type composition and associated featured species

Aspen

Current condition

The largest age class of the aspen cover type is currently between stand ages of 30 and 39 years old in the Camp Grayling Management Area (Figure 3). The age class distribution is currently fairly close to being balanced. There is a deficit in the 50-59 but that should not lead to a deficit in the 0- to 9-year age class for the next planning period. A small number of unavailable acres that extend beyond the desired maximum age class distribution.

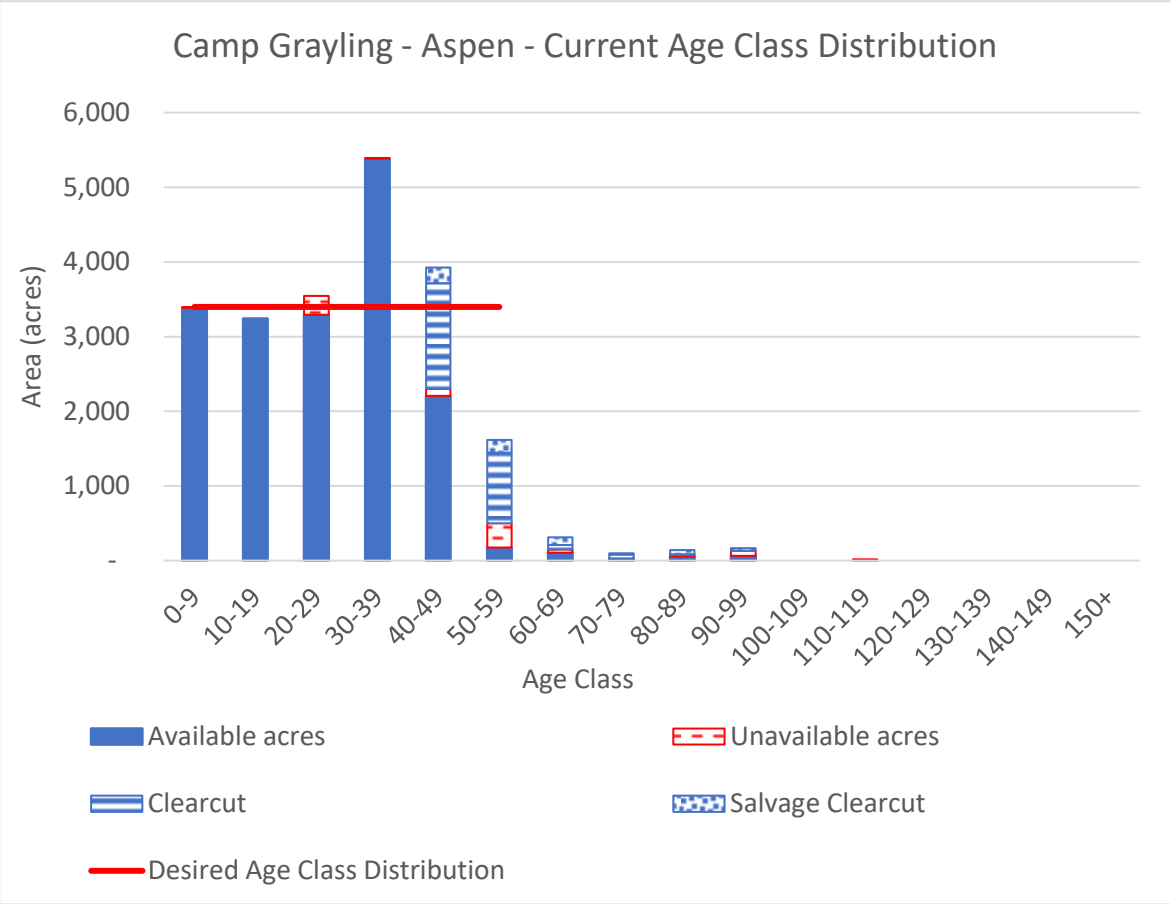


Figure 3. Current age class distribution and projected harvests in aspen cover type.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Class: Sapling	6,631	8
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	6,631	8
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	6,631	8
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	6,631	8

Desired future condition

The projected long-term cover type trend for aspen is increasing in the Camp Grayling Management Area. Much of the aspen area falls under the available category and will have other cover types transition into it. Habitat elements in this cover type will be preserved due to the abundance of this cover type.

The long-term goal for this cover type is balanced age classes between 0 and 59 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to maintain vigor in the stand promoting regeneration abilities.

The end of the planning period will result in the establishment of 3,389 acres in the 0-9 age class which is very close to the 3,400 acres desired (Figure 4). Progress toward the long-term desired age class distribution of aspen will take a couple decades of even-aged management in this management area.

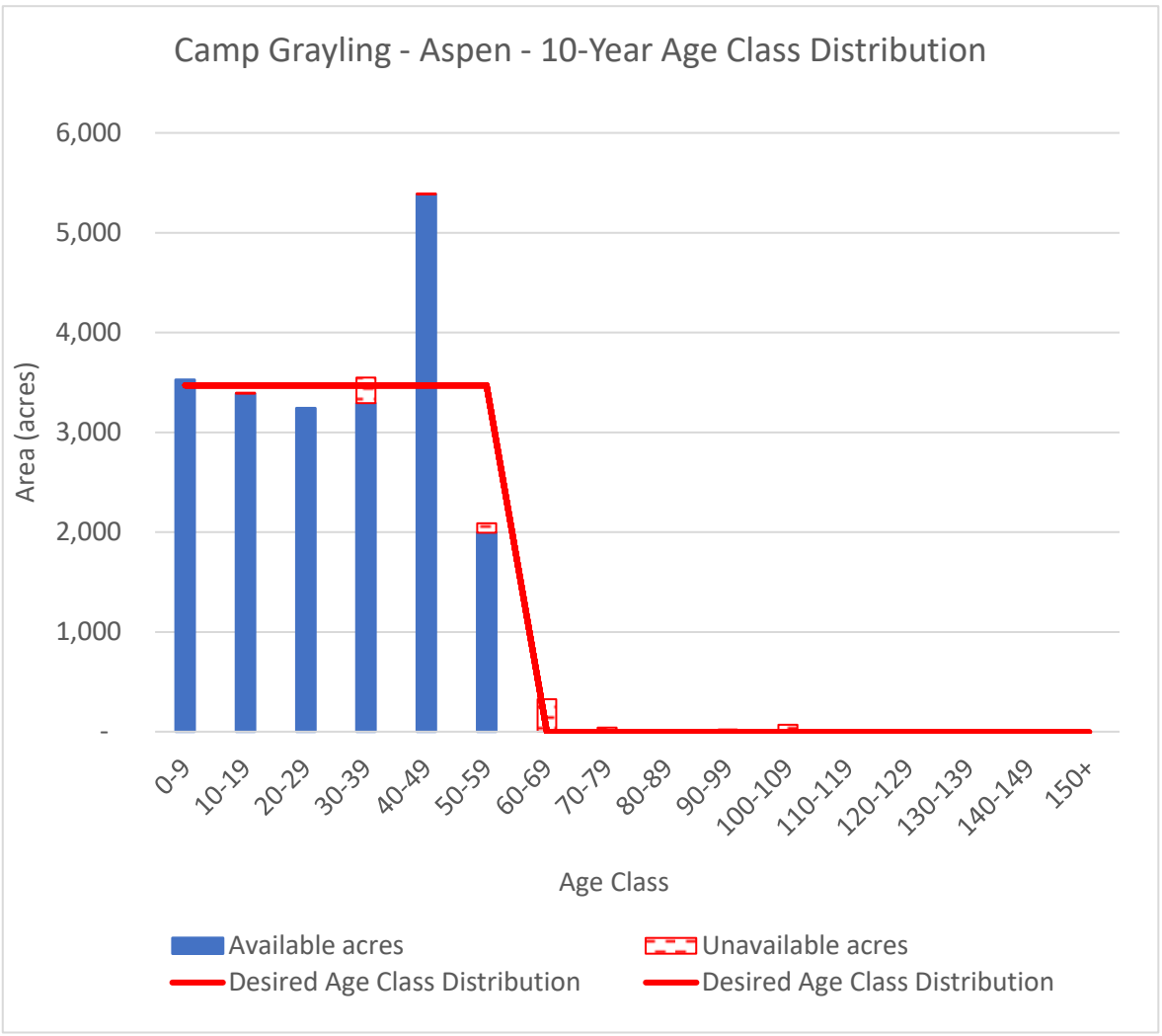


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of aspen has about reached the desired future condition for available acres (Figure 5). There is an increase in acres in the older age classes, beyond the desired age of 50 years old, due to the unavailable acres in this management area.

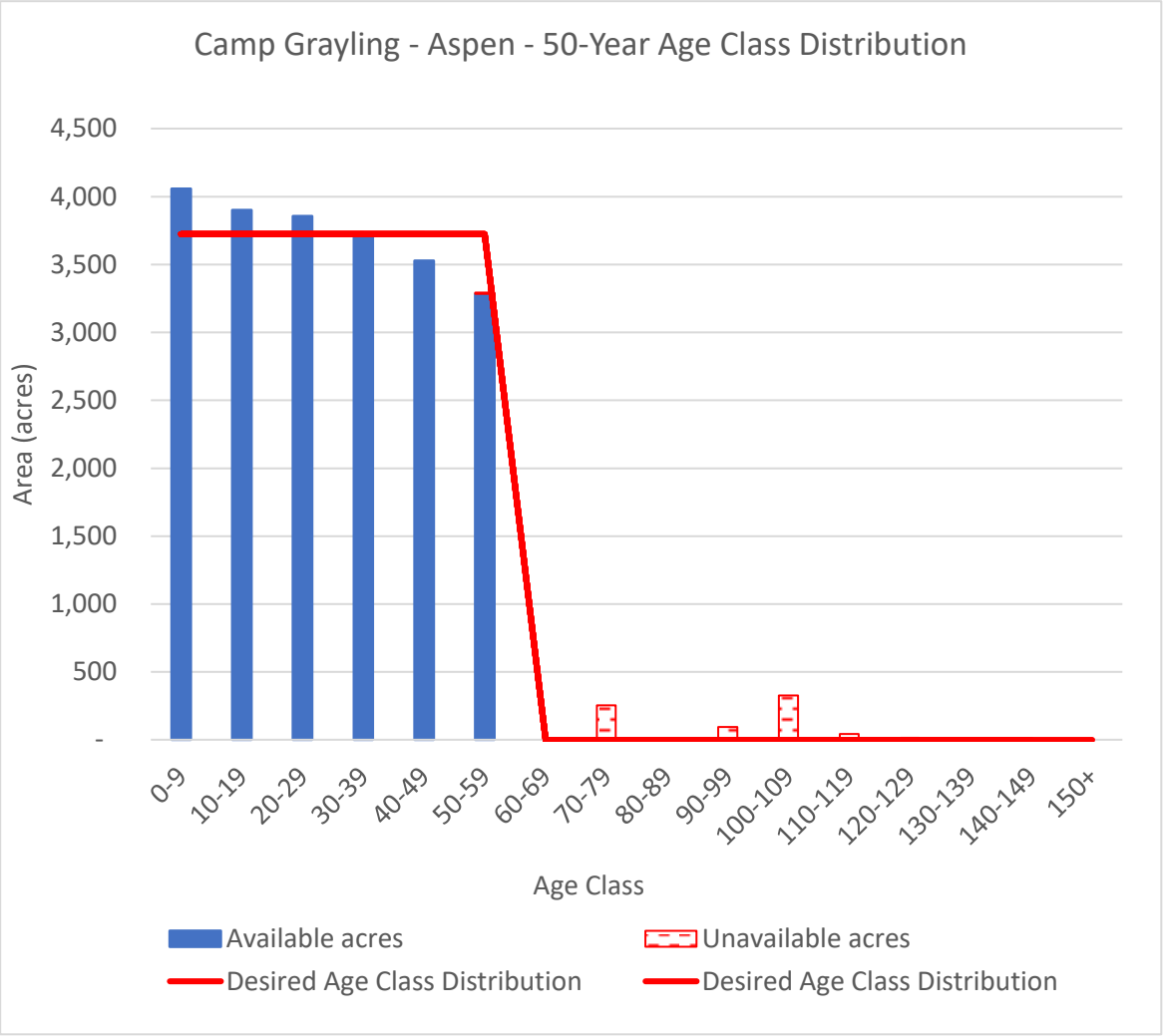


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

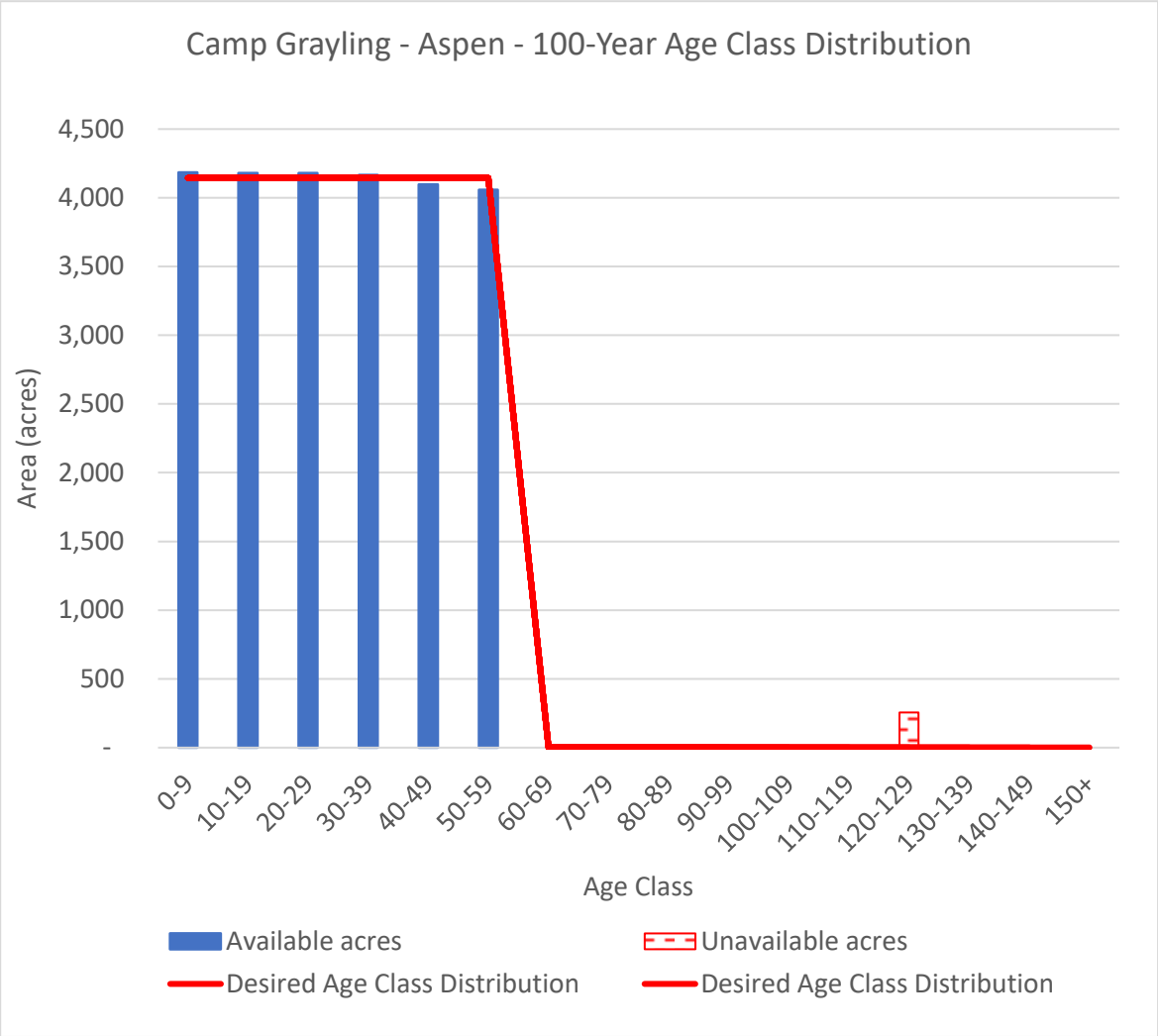


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

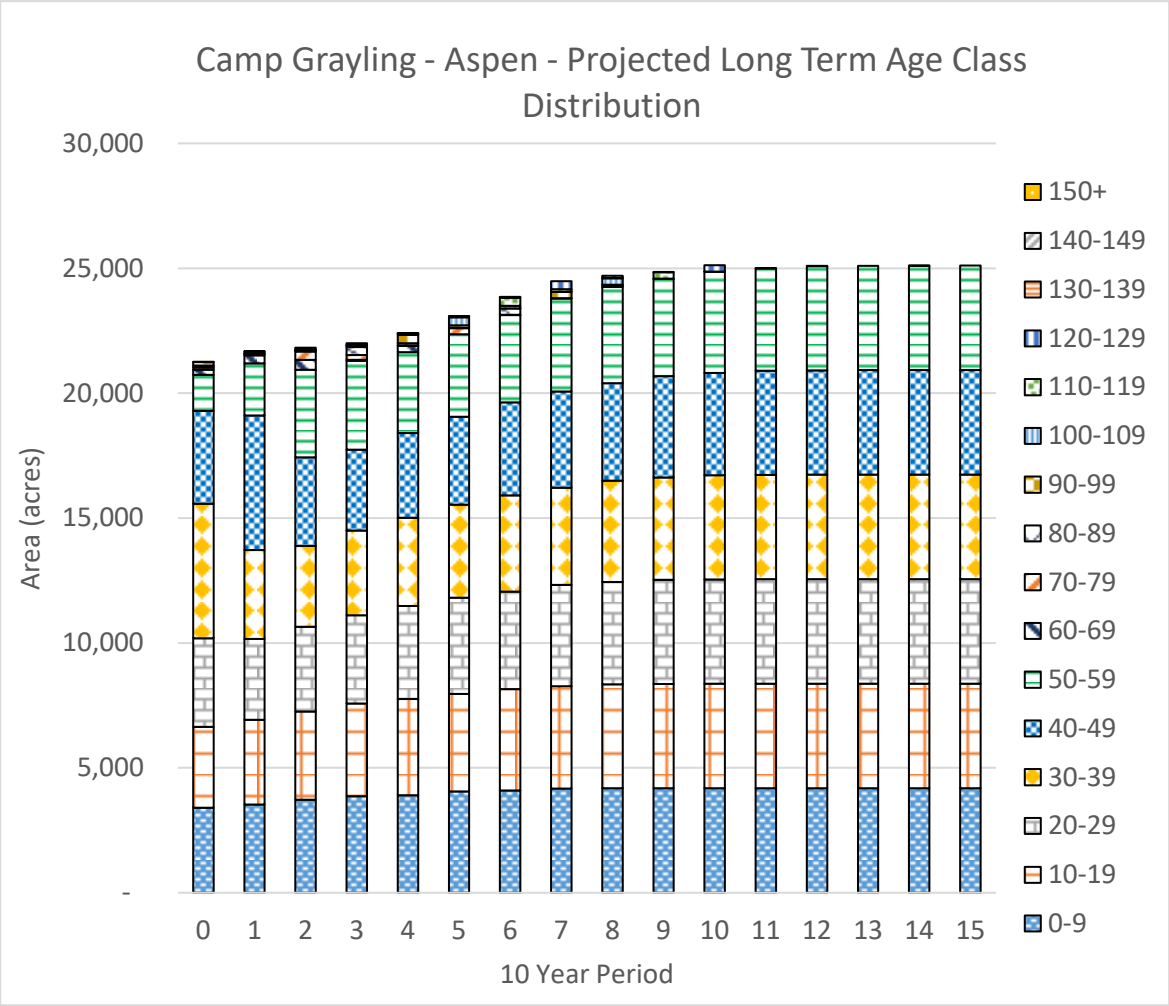


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years in the Camp Grayling Management Area.

Management actions

There are 2,511 acres of projected clearcut harvest and 589 acres of ice storm salvage clearcut harvest in the aspen cover type during the planning period. This along with the 427 acres transitioning into this cover type will fall slightly higher than the desired establishment of 3,400 acres of aspen per decade.

Mixed upland deciduous

Current condition

The Camp Grayling Management Area in mixed upland deciduous has a surplus of acres in the 0-19-year age classes that was created due to the harvesting of the large number of mature and over-mature acres on the landscape (Figure 8). The age class distribution is currently unbalanced across almost all the age class categories. Additionally, a deficit of available acres occurs in almost all age classes 20 years up to 89 years old. A portion of this cover type meets the habitat requirements for black-throated blue warbler and marten (Table 10).

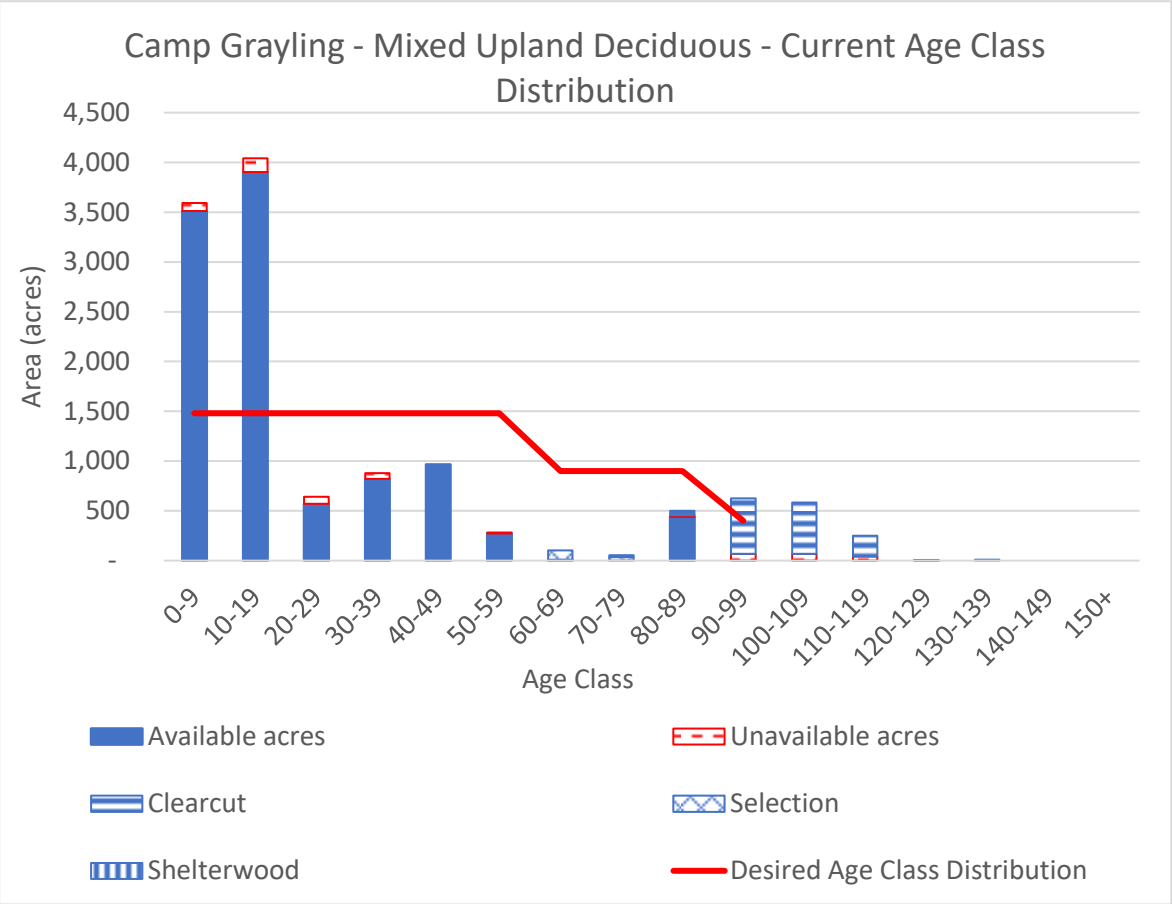


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

Table 10. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres - Available	Mixed Upland Deciduous Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	7,417	218
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	2,004	161
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	2,004	161

Desired future condition

The projected long-term cover type trend for mixed upland deciduous is fairly unstable in the Camp Grayling Management Area. There are a few transitions in and out of this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available mixed upland deciduous acres and then decreasing number of acres in until 80 years old followed by the max tail of 90 years old is reached.

The end of the planning period will result in the establishment of approximately 1,141 acres of mixed upland deciduous from the available acres (Figure 9). Progress toward the long-term desired age class distribution of mixed upland deciduous will take many decades to achieve the desired balanced age class condition.

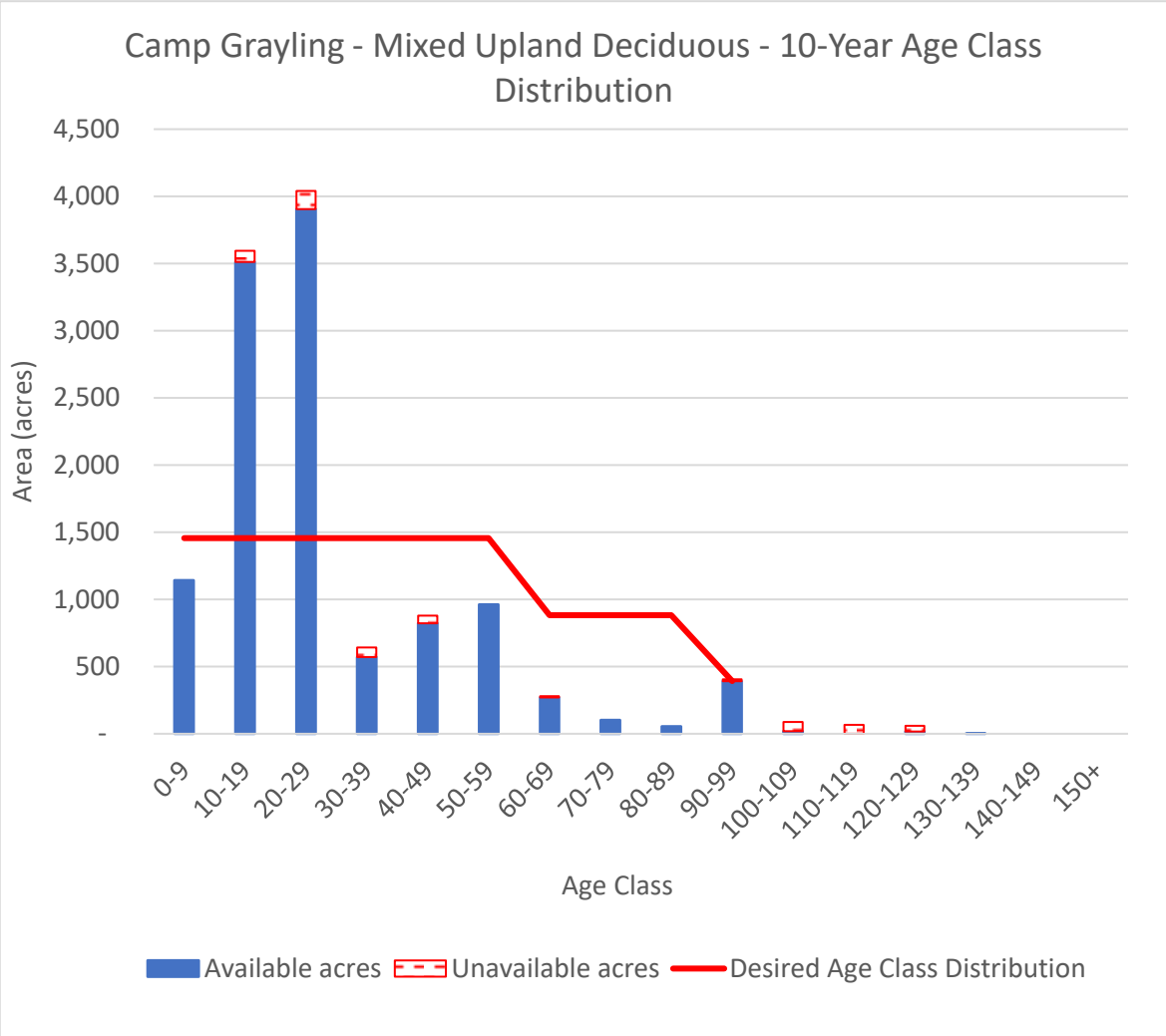


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of mixed upland deciduous is beginning to reach the desired future condition for available acres in the age classes (Figure 10). The number of acres in the age classes of 50-69 years old are still high due to previous management activities.

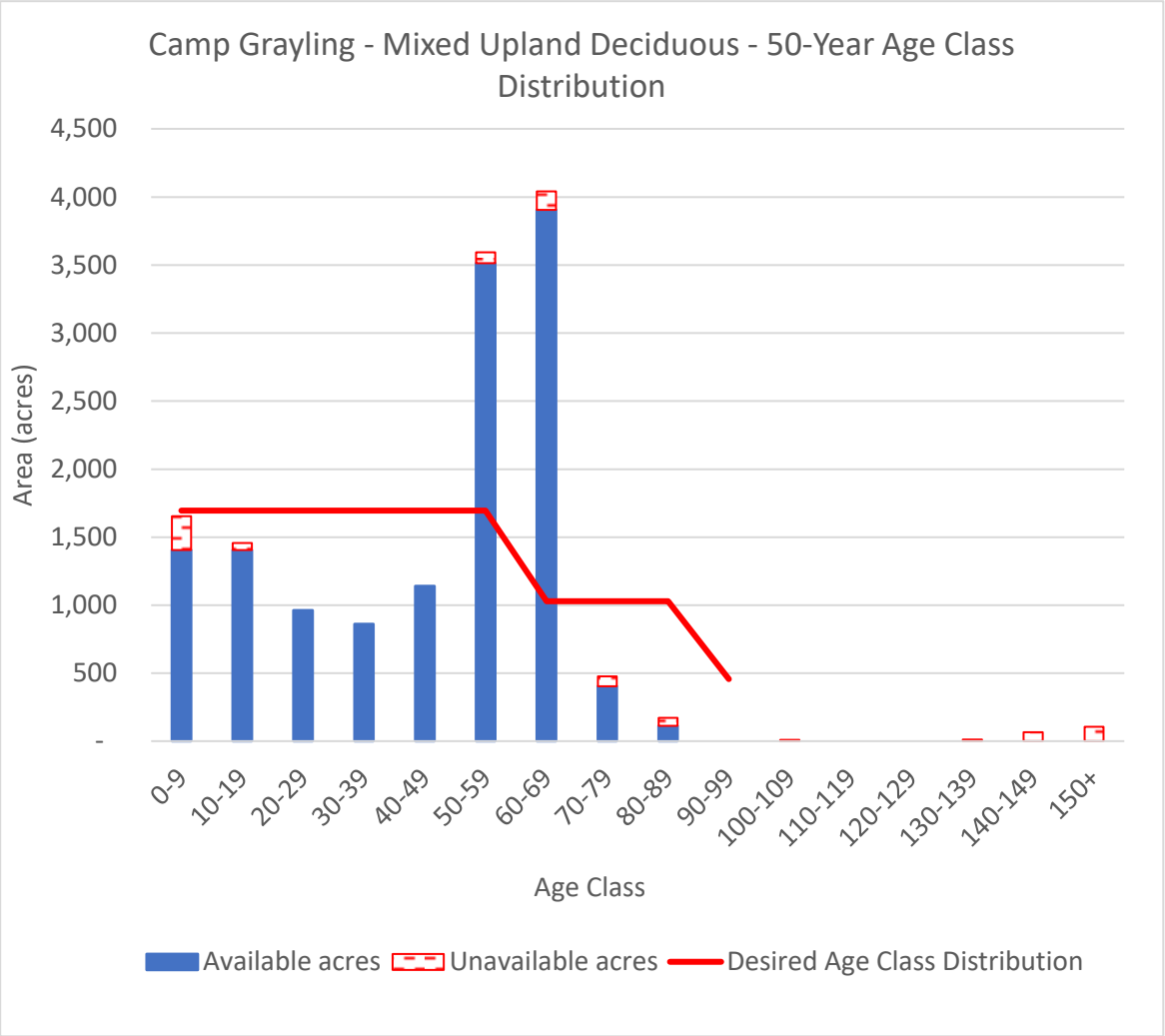


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate on the manageable acres of mixed upland deciduous cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 12).

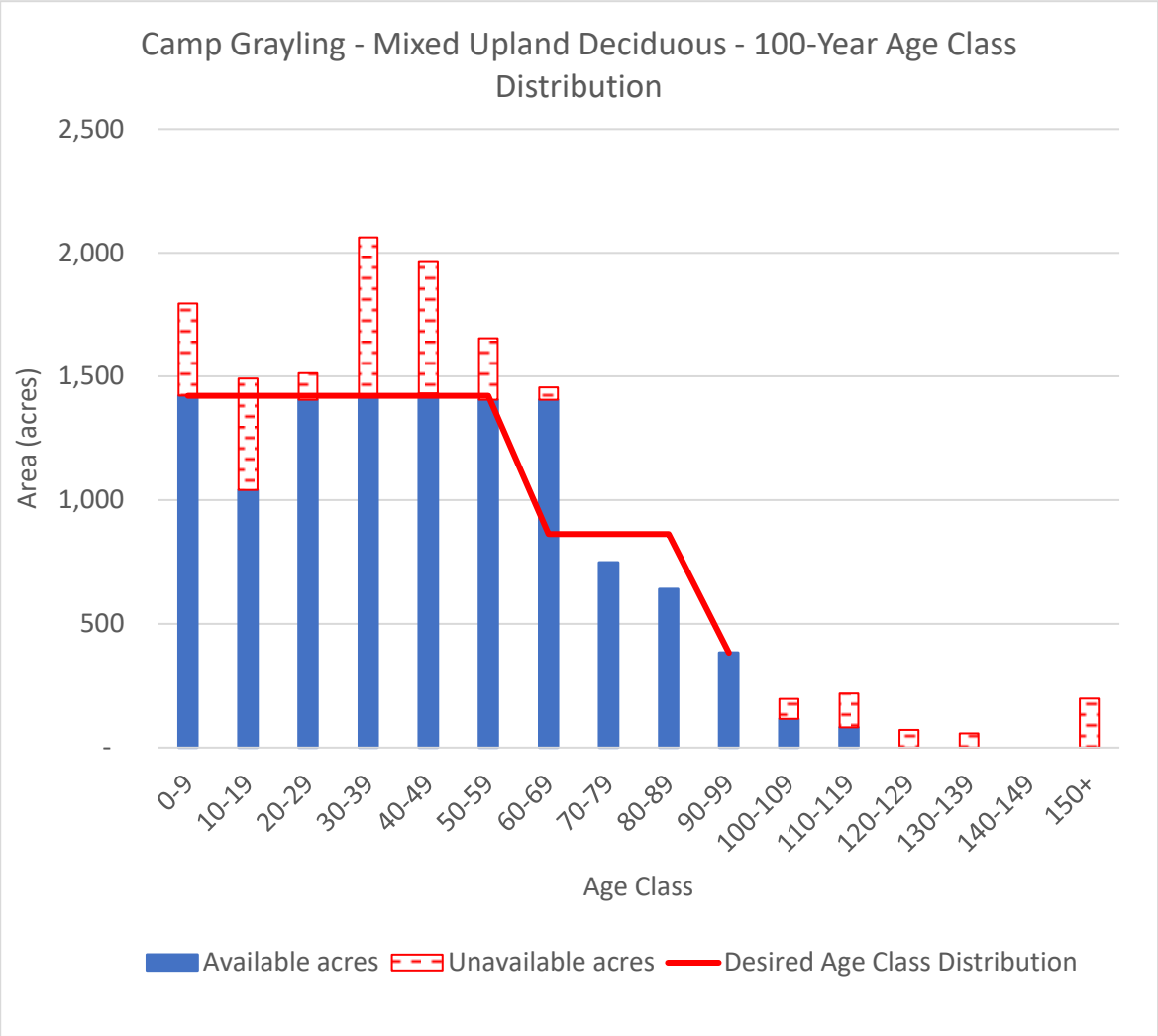


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

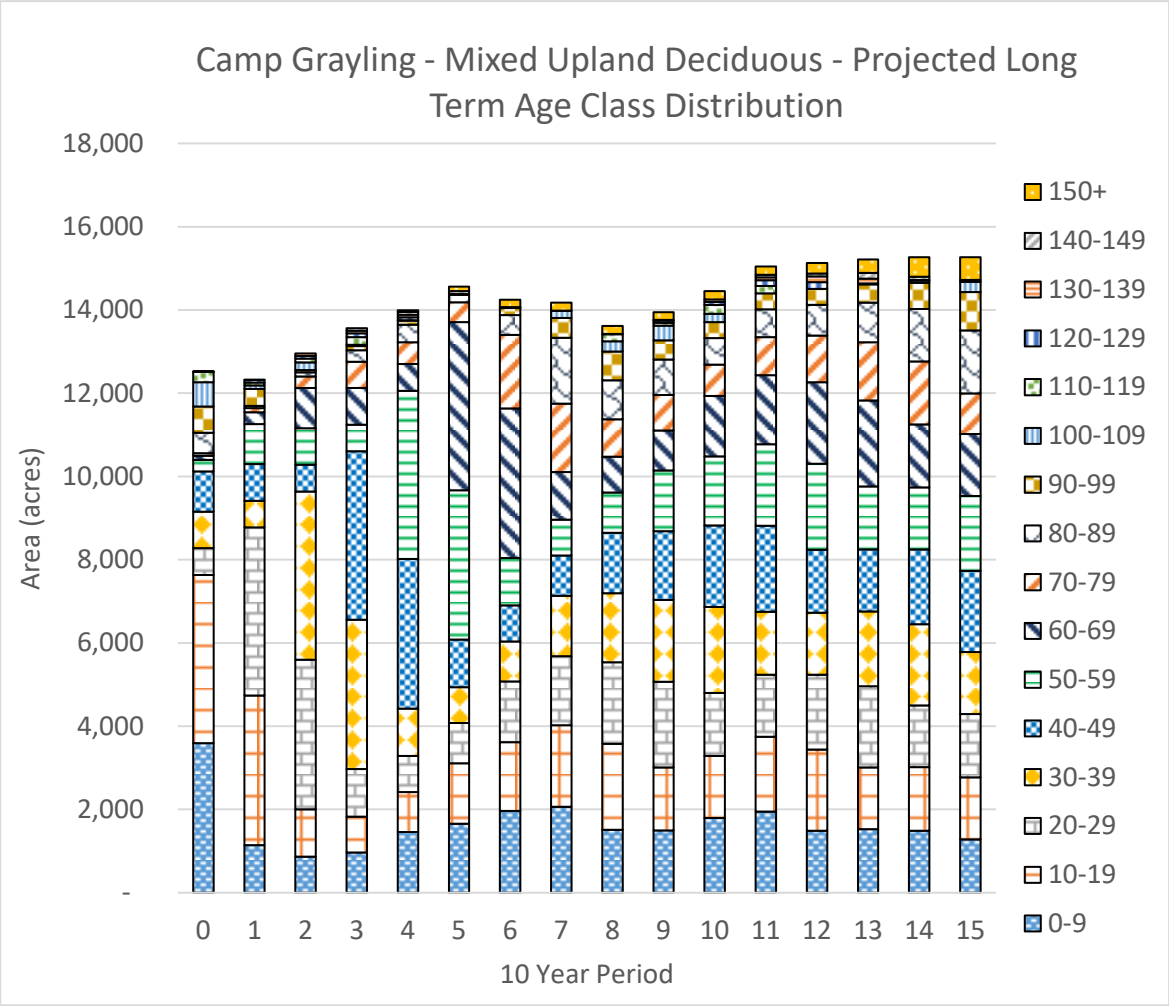


Figure 12. Projected age class distribution for all acres of mixed upland deciduous over the next 150 years.

Management actions

There are 1,334 acres of projected clearcut harvest in the mixed upland deciduous cover type during the planning period. There are also 203 acres projected to transition out of this cover type resulting in 1,131 acres regenerating in this cover type. This is below the desired establishment of 1,455 acres of mixed upland deciduous per decade because of the current unbalanced age class condition and the high amount of acres already below the age of 19.

Natural jack pine

Current condition

Most of the natural jack pine cover type is currently in three main age classes (Figure 13). They are 0-9, 30-39, and 50-59-year-old age classes. The past management regime has been primarily clearcut for this cover type. The 10-29 age classes have a deficit as well as 40-49-year-old age class.

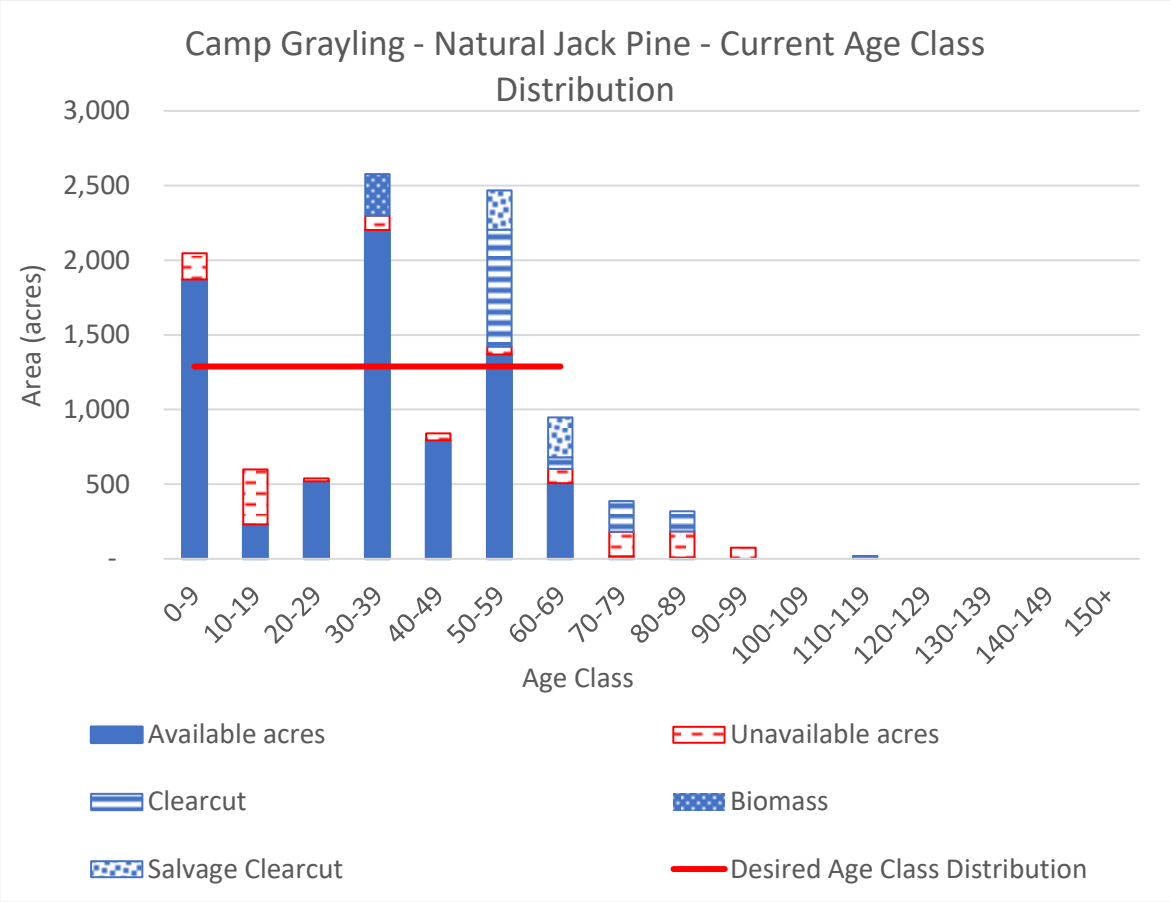


Figure 13. Current age class distribution, the desired age class distribution, and the projected harvests in the natural jack pine cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available natural jack pine acres during the previous planning period. A portion of this cover type meets the habitat requirements for Kirtland's warbler (Section 5) and snowshoe hare (Table 11). No data is provided for Kirtland's warbler, because the jack pine acres in this management area that have relevance are those within designated essential habitat. Because essential habitat was represented as a whole in the SAU, and the SAU provides unit-level management actions, it is best to refer to Section 5 for more information.

Table 11. Featured species with natural jack pine as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Natural Jack Pine	Natural Jack Pine Habitat Acres - Available	Natural Jack Pine Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	2,102	543
Kirtland's Warbler	Age Category: 0-19 Size Category: Sapling, Pole	NA	NA

Desired future condition

The projected long-term cover type trend for natural jack pine is decreasing in the Camp Grayling Management Area. There are few transitions from the natural jack pine into other cover types forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old for all available natural jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of jack pine budworm outbreaks and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of a desirable number of acres in the 0-9 age class (Figure 14). Progress toward the long-term desired age class distribution of natural jack pine will take many decades of even-aged management in this management area.

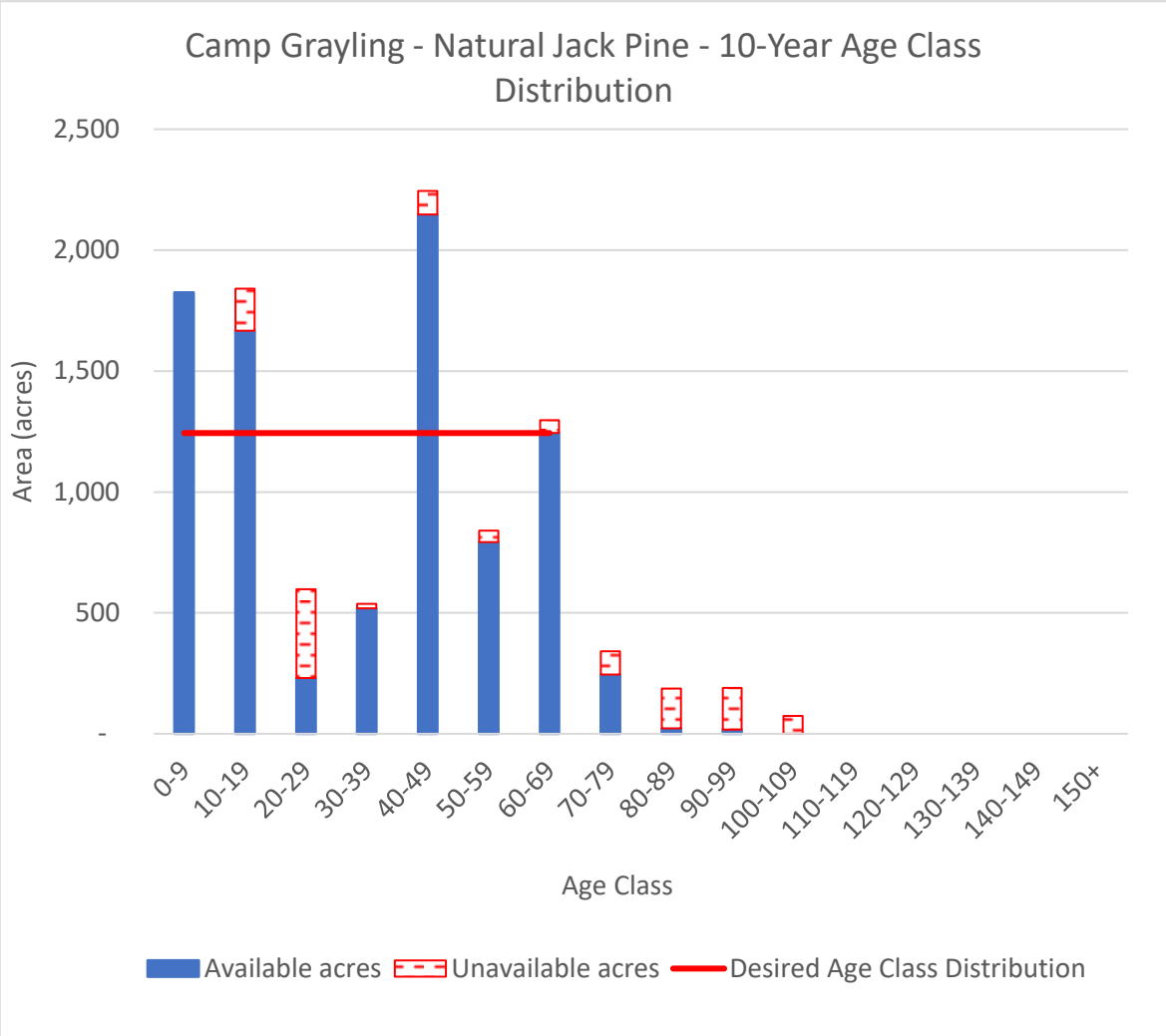


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of natural jack pine acres nearly reaching the desired future condition with only two age classes deviating from the target proportions (Figure 15). As is often the case, an unbalanced condition in the first planning period can often result in the need to carry some acres above the target rotation age to achieve the desired age class goals.

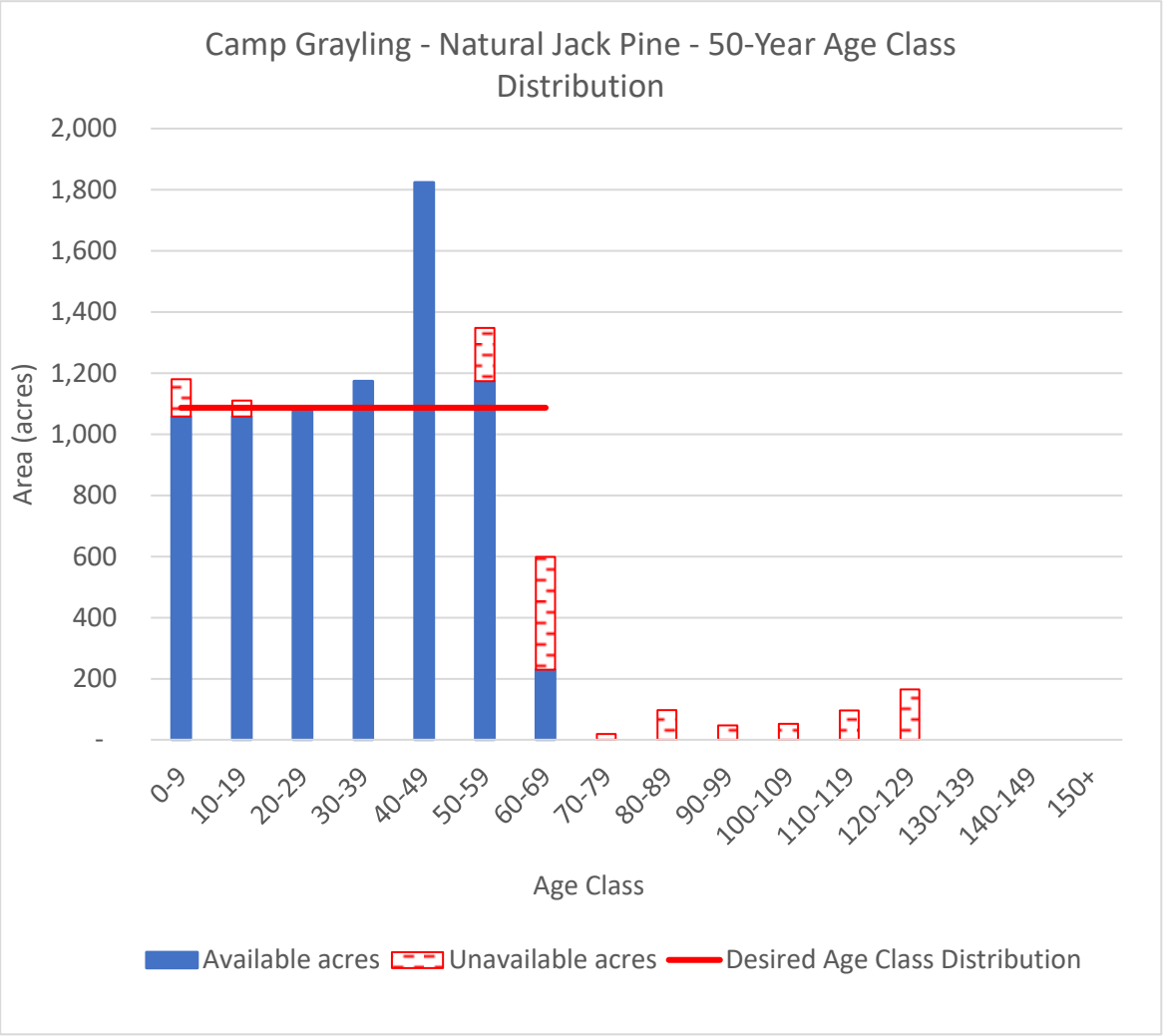


Figure 15. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate the manageable acres of natural jack pine in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 17).

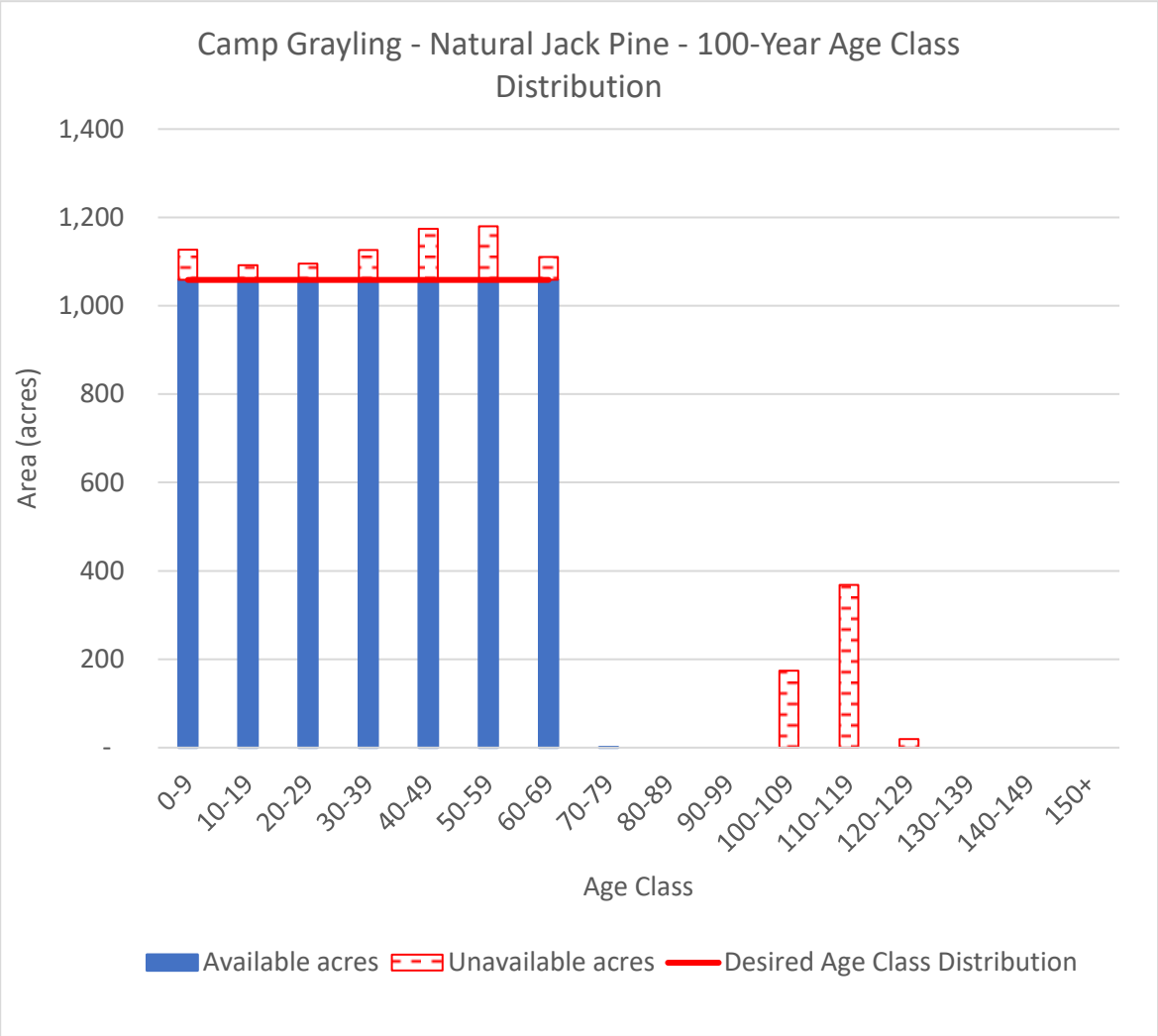


Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

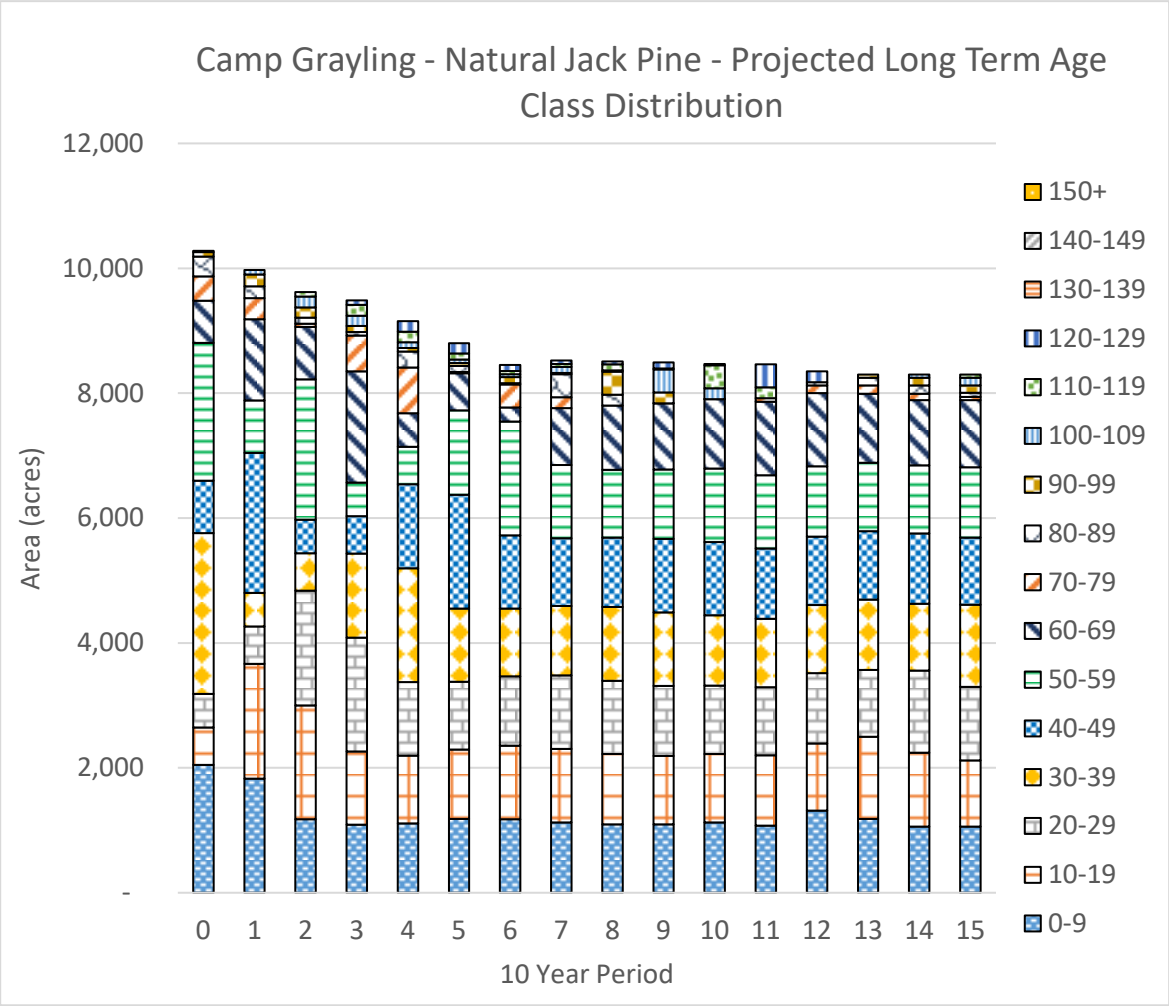


Figure 17. Projected age class distribution for all acres of natural jack pine over the next 150 years.

Management Actions

There are 1,495 acres of projected clearcut harvest and 531 acres of ice storm salvage clearcut harvest in the natural jack pine cover type during this planning period. There are approximately 440 acres of jack pine projected to regenerate due to severe ice storm damage and about 305 acres that will transition into other cover types. This results in a total of approximately 1,833 acres of regeneration in this period. This falls above the desired establishment of 1,288 acres per decade because of the current unbalanced conditions in the 10-19 and the 20-29-year-old age classes.

Conservation area network

High conservation value areas

There are up to eight different high conservation value areas (HCVA) types that can be found in each management area (**Error! Reference source not found.**; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within Camp Grayling Management Area.

High Conservation Value Area Type and Name	Acres
Eastern Massasauga Managed Land	**4,337**
--	4,337
Kirtland's Warbler Habitat	**1,486**
Down River	485
Lovells	1
Manistee	972
Sharon	24
Staley Lk	4
Natural Rivers Vegetative Buffer	**553**
--	553
Natural Rivers Zoning District	**1,890**
--	1,890
Grand Total	**8,267**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 13. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 14. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Intermittent Wetland	B	-	-	1
Existing ERA	Intermittent Wetland	B	G2	S3	1
Existing ERA	Northern Shrub Thicket	A	G4	S5	1
Existing ERA	Poor Fen	B	G3	S3	2
Existing ERA	Rich Conifer Swamp	B	G4	S3	1
Existing ERA	Wet-mesic Sand Prairie	BC	-	-	1
Proposed ERA	Dry Northern Forest	CD	G3?	S3	2
Proposed ERA	Intermittent Wetland	B	G2	S3	1
Proposed ERA	Intermittent Wetland	C	G2	S3	1
Proposed ERA	Northern Fen	C	G3	S3	1
Proposed ERA	Pine Barrens	BC	G3	S2	2
Proposed ERA	Pine Barrens	C	G3	S2	3
Proposed ERA	Poor Fen	-	G3	S3	2
Grand Total	-	-	-	-	**17**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 15) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within Camp Grayling Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**105**
Jones Lake Campground	32
Manistee River Bridge Campground	49
Shupac Lake Campground	24
Habitat Area or Habitat Corridor	**907**
Block 3BCamp Grayling Pine Barrens Management Area	311
Stand 1 Camp Grayling Pine Barrens Management	8
Stand 10 sm Camp Grayling Pine Barrens Management	4
Stand 11 sm Camp Grayling Pine Barrens Management	12
Stand 12 Camp Grayling Pine Barrens Management	58
Stand 13 Camp Grayling Pine Barrens Management	36
Stand 14 Camp Grayling Pine Parrens Management	10
Stand 2 Camp Grayling Pine Barrens Management	4
Stand 3 Camp Grayling Pine Barrens Management	10
Stand 4 Camp Grayling Pine Barrens Management	16
Stand 5 Camp Grayling Pine Barrens Management	32
Stand 6 Camp Grayling Pine Barrens Management	8
Stand 7 Camp Grayling Pine Barrens Management	151
Stand 8 Camp Grayling Pine Barrens Management	18
Stand 9 Camp Grayling Pine Barrens Management	110
Unspecified	117
Mineral Resource Area	**44**
Crawford County Road Commission	7
DMVA	23
MPRC Pit	13
Grand Total	**1,055**

Table 16. Static special conservation areas within Camp Grayling Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**103**
Bog	-	42
Northern Shrub Thicket	-	53
Poor Conifer Swamp	-	9
Designated Trout and Coldwater Stream Buffer	**-**	**746**
--	-	278
Au Sable River	-	15
Barker Creek	-	13
Clear Creek	-	13
East Branch Au Sable River	-	167
Manistee River	-	56
North Branch Au Sable River	-	55
Portage Creek	-	150
Designated Trout and Coldwater Streams	**27.1**	**-**
<Null>	10.3	-
Au Sable River	0.2	-
Barker Creek	0.5	-
Clear Creek	0.5	-
East Branch Au Sable River	6.3	-
Manistee River	1.7	-
North Branch Au Sable River	2.0	-
Portage Creek	5.8	-
Important Bird Areas	**-**	**3,060**
Kirtland's Warbler Management Units & Guide's Rest	-	3,060
Military Lease Land	**-**	**95,855**
Board Purchases	-	12,633
Deeded to Board	-	17,484
Federal Land	-	146
Hanson Grant	-	14,024
Long Term Lease	-	51,569
Military Research Areas	**-**	**101,221**
Camp Grayling	-	101,221
Mussel Stream Group 2 - State threatened or endangered	**0.6**	**-**
East Branch Au Sable River	0.6	-
Wood Turtle Stream 660ft Buffer	**-**	**1**
North Branch Au Sable River	-	1
Grand Total	**27.7**	**200,987**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 17 and Table 19) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 17. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal occurrence within Camp Grayling Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	-	1
Animal	Alasmidonta viridis	Slippershell	T	-	2
Animal	Ammodramus savannarum	Grasshopper sparrow	SC	-	1
Animal	Antrostomus vociferus	Eastern whip-poor-will	T	-	4
Animal	Appalachia arcana	Secretive locust	SC	-	11
Animal	Atrytonopsis hianna	Dusted skipper	SC	-	11
Animal	Bartramia longicauda	Upland sandpiper	T	-	3
Animal	Bombus terricola	Yellow banded bumble bee	SC	-	1
Animal	Brychius hungerfordi	Hungerford's crawling water beetle	E	LE	4
Animal	Buteo lineatus	Red-shouldered hawk	SC	-	3
Animal	Chordeiles minor	Common nighthawk	SC	-	6
Animal	Clemmys guttata	Spotted turtle	T	-	1
Animal	Eacles imperialis pini	Pine imperial moth	SC	-	1
Animal	Emydoidea blandingii	Blanding's turtle	SC	-	3
Animal	Gavia immer	Common loon	T	-	6
Animal	Glyptemys insculpta	Wood turtle	T	-	2
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	5
Animal	Hesperia metea	Cobweb skipper	SC	-	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Hylocichla mustelina	Wood thrush	SC	-	1
Animal	Lasmigona compressa	Creek heelsplitter	SC	-	2
Animal	Lasmigona costata	Flutedshell	SC	-	1
Animal	Lithobates palustris	Pickerel frog	SC	-	1
Animal	Melanerpes erythrocephalus	Red-headed woodpecker	SC	-	3
Animal	Microtus pinetorum	Woodland vole	SC	-	1
Animal	Myotis lucifugus	Little brown bat	T	-	1
Animal	Necturus maculosus	Mudpuppy	SC	-	1
Animal	Opheodrys vernalis	Smooth green snake	SC	-	5
Animal	Physella magnalacustris	Great Lakes physa	SC	-	1
Animal	Setophaga kirtlandii	Kirtland's warbler	E	-	5
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	6
Animal	Sturnella magna	Eastern meadowlark	SC	-	3
Animal	Vermivora chrysoptera	Golden-winged warbler	T	-	5
Total	-	-	-	-	102

Table 19. Rare plant occurrence within Camp Grayling Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Agoseris glauca	Prairie or pale agoseris	T	-	1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T	-	1
Plant	Cirsium hillii	Hill's thistle	SC	-	14
Plant	Corispermum pallasii	Pallas' bugseed	SC	-	2
Plant	Dalibarda repens	False violet	T	-	1
Plant	Festuca altaica	Rough fescue	SC	-	7
Plant	Juncus vaseyi	Vasey's rush	T	-	1
Plant	Piptatherum canadense	Canada rice grass	T	-	1
Plant	Potentilla canadensis	Canada cinquefoil	SC	-	1
Plant	Prunus umbellata	Alleghany or Sloe plum	SC	-	5

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Solidago vossii	Voss's goldenrod	E	LT	3
Plant	Sporobolus heterolepis	Prairie dropseed	SC	-	2
Plant	Stellaria crassifolia	Fleshy stitchwort	E	-	1
Plant	Trichophorum clintonii	Clinton's bulrush	SC	-	1
Plant	Viola novae-angliae	New England violet	T	-	2
Grand Total	-	-	-	-	**43**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 20).

Table 20. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 21. Non-ecological reference area natural communities within Camp Grayling Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Bog	B	S4	G3G5	1
Northern Shrub Thicket	BC	S5	G4	2
Northern Wet Meadow	-	S4	G4G5	2
Poor Conifer Swamp	BC	S4	G4	2
Grand Total	-	-	-	**7**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 22) and diseases (Table 23) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 22. Defoliating insects of concern in the Camp Grayling management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	-
Jack pine budworm	Choristoneura pinus	Native	-

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 23. Maladies of concern in the Camp Grayling management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	-
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

Approximately 31 miles of streams and rivers are found in the management area (Table 24). Streams/rivers classified as cold types comprise approximately 90% of the riverine mileage.

Table 24. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	18
Cold Small River	3
Cold Transitional Stream	5
Cold Transitional Small River	2
Cold Transitional Large River	0
Warm Transitional Stream	3
Warm Transitional Small River	0

Type	Length (miles)
Warm Transitional Large River	0
Warm Stream	0
Warm Small River	<1
Warm Large River	0

Lacustrine habitat

A total of 14 lakes and ponds of at least one surface acre are found in the management area (Table 25).

Table 25. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	11
100-499	2
500+	1

Wetlands

A total of 7,721 acres of wetlands are found in the management area (Table 26). Forested wetlands comprise approximately 93% of wetland types found in the management area.

Table 26. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	443
Forested	7,168
Riverine	110

Vernal pools and seeps

A total of 65 acres of vernal pools and seeps have been inventoried in the management area while 20 acres of seeps have been identified.

Riparian vegetation cover

Lowland shrub, aspen and lowland conifers are predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 27).

Table 27. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland Shrub	823
Aspen	519

Cover Type	Acres
Lowland Conifers	406
Natural Jack Pine	276
Mixed Upland Deciduous	248
Planted Red Pine	234
Natural Mixed Pines	222
Lowland Aspen/Balsam Poplar	166
Upland Shrub	164
Northern Red Oak	105

Watershed vegetation cover

The management area includes portions of important watersheds of the Manistee and Au Sable rivers (Table 28 & Table 29). Aspen, red pine, jack pine and red oak are major cover types of the state forest in each watershed.

Table 28. Largest vegetative cover types (i.e., top five) and area of the Manistee River watershed located within the management area.

Cover Type	Acres
Natural Jack Pine	5,455
Northern Red Oak	3,268
Mixed Upland Deciduous	2,943
Planted Jack Pine	2,794
Aspen	2,096

Table 29. Largest vegetative cover types (i.e., top five) and area of the Au Sable River watershed located within the management area.

Cover Type	Area (acres)
Aspen	14,268
Mixed Upland Deciduous	6,733
Upland Shrub	5,500
Black-Red Hybrid Oak	5,418
Natural Jack Pine	4,846

Recreation

The Camp Grayling Management Area is the Michigan National Guard training grounds with some areas used for military exercise, therefore access to recreation varies.

Motorized trails in this management area include parts of the Frederick Route and Trail and the West Higgins Route and Trail and several snowmobile trails running both north-south and east-west.

Nonmotorized trails are limited and include the Grayling Area Community Pathway open to hiking and biking, and a short section of the Shore-to-Shore equestrian trail. The 3,500-acre Hanson Hills Recreation Area, administered by the Grayling Recreation Authority, offers intensive all-season, nonmotorized recreation opportunities on land leased from the Michigan Department of Military and Veterans Affairs.

There are five state forest campgrounds (rustic) within the management area, all of which provide water access. Additional recreation opportunities are provided by the adjacent Hartwick Pines State Park.

Table 30. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	Off-Road Vehicles (all types)	15.1
Motorized Recreation Trails	Snowmobile	29.7
Nonmotorized Recreation Trails	Hiking	1.4
Nonmotorized Recreation Trails	Equestrian	0.1
Nonmotorized Recreation Trails	Biking	0.3
Nonmotorized Recreation Trails	Hunter Access Trails	10.4
Total	-	**46.3**

Note: Trail-use types may overlap.

Table 31. State forest campgrounds.

State Forest Campground	# of sites	Off-Road Vehicle Access
CCC Bridge	31	Yes
Manistee River Bridge	23	-
Lake Margrethe	37	-
Jones Lake	42	-
Shupac Lake	30	-

There are no areas managed specifically for hunting in this management area.

The Manistee River runs along the northwest boundary of the Camp Grayling Management Area and is popular for fishing and paddling with three boating access sites within the management area. Other boating access sites provide access to small inland lakes and the larger Lake Margrethe.

Portions of the Camp Grayling Management Area are popular destinations for hunting, hiking, mushroom hunting, etc. for the nearby community of Grayling.

Table 32. Boating access sites.

Name	Waterbody
Burnt Cabin	Manistee River
CCC Bridge State Forest Campground	Manistee River
Guthrie Lake	Guthrie Lake
Hole in the Fence	Manistee River
Jones Lake State Forest Campground	Jones Lake State Forest Campground
K.P. Lake	K.P. Lake
Lake Margrethe State Forest Campground	Lake Margrethe State Forest Campground
Section One Lake	Section One Lake
Shupac Lake State Forest Campground	Shupac Lake State Forest Campground

Emmet Moraines

State Forest Area: 29,586 acres	Location: Northeastern Lower Peninsula	Population Centers: Petoskey Harbor Springs Pellston
Subsection: Emmet Moraines	Landforms: Steep sandy ridges Ground moraines	Landcover: Forested: 26,942 acres Nonforested: 2,644 acres

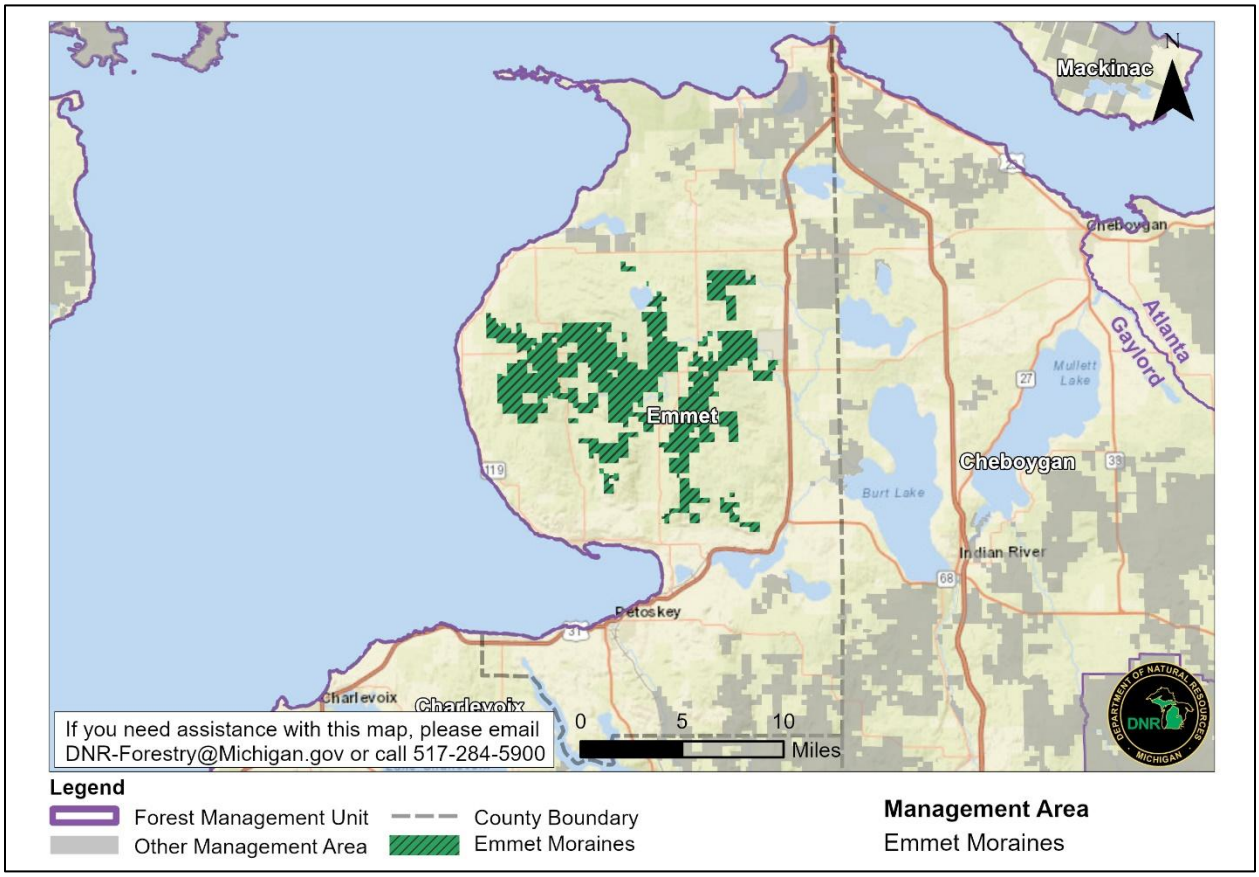


Figure 1. Emmet Moraines Management Area.

Forested landscape

Current and projected future condition

The Emmet Moraines Management Area includes a variety of shade-tolerance levels with the most tolerant occurring mostly in the mature age category. The mid-tolerant category occurs mostly in the mature age. The intolerance occurs mostly in the young and mid-age categories (Figure 2).

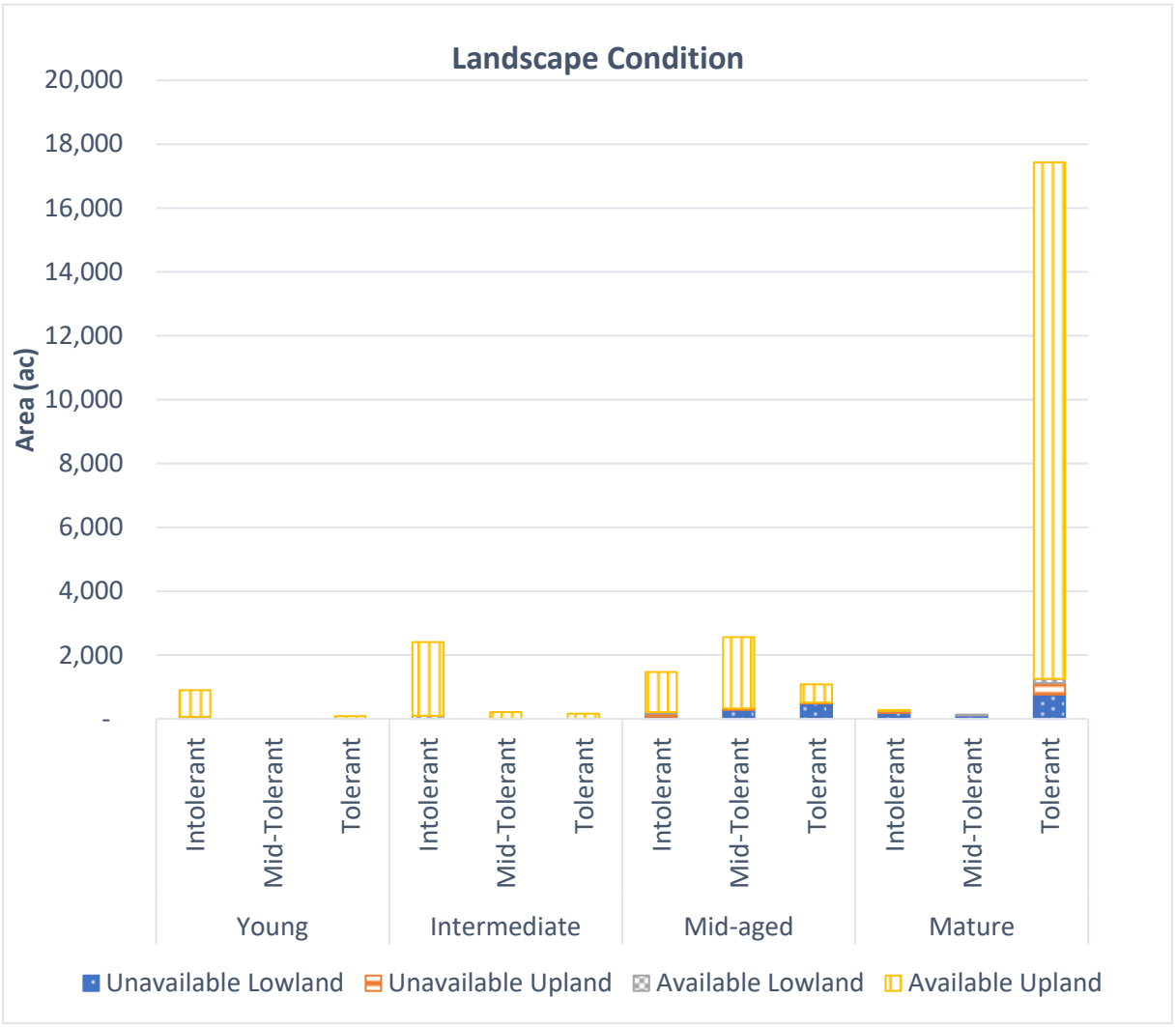


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	902
Mature Forest	Acres of 80+ year stands across cover types	17,845
Mature Forest	Acres of 120+ year stands across cover types	97
Mesic Conifer Cover types	Acres of mesic conifer cover types	73
Mesic Conifers in other Cover types	Average canopy occupancy	4%
Mast – Oak Cover types	Acres of oak cover types	22
Mast Tree Species in other Cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	18,181
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	17,688
Nonforested Openings	Acres of total herbaceous openland, upland shrub and cropland	650
Landscape Forest Matrix	Percent deciduous forest	84%
Landscape Forest Matrix	Percent coniferous forest	15%

The Emmet Moraines Management Area is comprised of 91% forested cover types and 9% nonforested cover types (Table 2). Of the forested cover types, 83% are in the upland landscape position. The largest contributors to upland cover types are northern hardwoods, aspen and planted red pine. Lowland conifer and cedar take up 60% of the lowland landscape position. Lowland shrub is the most common nonforested cover type in the management area representing 6% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	4,540	22,097	24,636	26,942
			Northern Hardwood	17,441			
			Black Red Hybrid Oak	0			
			Northern Red Oak	22			
			Oak Mix	0			
			Mixed Upland Deciduous	95			
		Mixed	Upland Mixed Forest	7	7		
		Coniferous	Planted Red Pine	2,426	2,533		
			Planted Jack Pine	0			
			Planted White Pine	11			
			Planted Mixed Pine	0			
			Natural Red Pine	23			
			Natural Jack Pine	0			
			Natural White Pine	0			
			Natural Mixed Pines	3			
			Upland Spruce/Fir	70			
			Upland Conifers	0			
			Hemlock	0			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	344	633	2,305	
			Lowland Deciduous	289			
		Mixed	Lowland Mixed Forest	137	137		
		Coniferous	Cedar	486	1,535		
			Lowland Conifers	896			
			Lowland Spruce/Fir	48			
			Tamarack	105			
Nonforested	Upland	N/A	Herbaceous Openland	280	N/A	829	2,644
			Upland Shrub	370			
			Low Density Trees	87			
			Bare/Sparsely Vegetated	5			
			Cropland	0			
			Urban	88			
	Lowland	N/A	Lowland Shrub	1,781	N/A	1,815	
			Marsh	18			
			Bog	0			
			Treed Bog	9			
			Water	8			
						Grand Total:	**29,586**

There are 24,441 acres (83% of the total management area and 91% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Emmet Moraines Management Area (Table 3). Of that, over 63% is in the hardwood cover type, 17% in the aspen cover type, and 9% in planted red pine. The remaining 15 cover types represent less than 1% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

EMMET MORAINES Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	4,458	16.5%	81	0.3%	4,540	16.8%
Cedar	129	0.5%	357	1.3%	486	1.8%
Lowland Aspen/Balsam Poplar	227	0.8%	117	0.4%	344	1.3%
Lowland Conifers	0	0.0%	896	3.3%	896	3.3%
Lowland Deciduous	2	0.0%	288	1.1%	289	1.1%
Lowland Mixed Forest	31	0.1%	106	0.4%	137	0.5%
Lowland Spruce/Fir	0	0.0%	48	0.2%	48	0.2%
Mixed Upland Deciduous	95	0.4%	0	0.0%	95	0.4%
Natural Mixed Pines	3	0.0%	0	0.0%	3	0.0%
Natural Red Pine	23	0.1%	0	0.0%	23	0.1%
Northern Hardwood	17,060	63.3%	381	1.4%	17,441	64.7%
Northern Red Oak	0	0.0%	22	0.1%	22	0.1%
Planted Red Pine	2,365	8.8%	61	0.2%	2,426	9.0%
Planted White Pine	11	0.0%	0	0.0%	11	0.0%
Tamarack	9	0.0%	96	0.4%	105	0.4%
Upland Mixed Forest	7	0.0%	0	0.0%	7	0.0%
Upland Spruce/Fir	22	0.1%	48	0.2%	70	0.3%
Grand Total	**24,441**	**90.7%**	**2,501**	**9.3%**	**26,942**	**100%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too Wet	1,872	74.9%
Too Steep	236	9.4%
BMPs	182	7.3%
Other Dept./Div. Processes	78	3.1%
Conservation Values	72	2.9%
Long-Term Retention	57	2.3%
Neighbor / Interest Group	2	0.1%
Denied Access	2	0.1%
Total Unavailable	**2,501**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Emmet Moraine Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvest levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 154,484 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern Hardwood	-	516	-	331	-	140	1,653	2,639
Planted Red Pine	-	-	658	-	-	672	497	1,827
Aspen	271	-	-	-	-	217	-	488
Lowland Aspen/Balsam Poplar	37	-	-	-	-	-	-	37
Planted White Pine	-	-	11	-	-	-	-	11
Totals	**307**	**516**	**669**	**331**	**-**	**1,029**	**2,150**	**5,001**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Emmet Moraines Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Hardwood	20,390	19,166
	Red Pine	13,993	13,154
	Mixed Aspen	6,291	5,914
	Mixed Softwood	5,688	5,347
	Mixed Spruce	1,323	1,243
	Mixed Oak	467	439
	White Pine	423	398
	Jack Pine	408	383
	Pulpwood Total	**48,983**	**46,044**
Sawtimber (MBF)	Sugar Maple	6,992	6,572
	Red Pine	3,231	3,037
	Red Maple	1,496	1,406
	Basswood	1,244	1,169
	Red Oak	618	581
	Mixed Aspen	485	456
	White Pine	124	116
	Mixed Oak	70	65
	White Oak	3	3
	Sawtimber Total	**14,261**	**13,406**
	Total Sawtimber Harvest Volume in Cords	**105,501**	**99,171**
	Grand Total Harvest Volume in Cords	**154,484**	**145,215**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are very few cover type transitions projected for the Emmet Moraines management area (Table 7). The managed area of each cover type is projected to remain fairly stable as treatment regimes will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the aspen cover type where only 14 acres will convert to other cover types through forest management and

regeneration activities. The largest increase occurs in the northern hardwoods type where only 14 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Northern Hardwood	17,441	17,455	14
Aspen	4,540	4,525	-14
Planted Red Pine	2,426	2,426	0
Lowland Conifers	896	896	0
Cedar	486	486	0
Lowland Aspen/Balsam Poplar	344	342	-2
Lowland Deciduous	289	291	2
Lowland Mixed Forest	137	137	0
Tamarack	105	105	0
Mixed Upland Deciduous	95	95	0
Upland Spruce/Fir	70	70	0
Lowland Spruce/Fir	48	48	0
Natural Red Pine	23	23	0
Northern Red Oak	22	22	0
Planted White Pine	11	11	0
Upland Mixed Forest	7	7	0
Natural Mixed Pines	3	3	0
Lowland Shrub	1,781	1,781	0
Upland Shrub	370	370	0
Herbaceous Openland	280	280	0
Urban	88	88	0
Low Density Trees	87	87	0
Marsh	18	18	0
Treed Bog	9	9	0
Bare/Sparsely Vegetated	5	5	0
Water	8	8	0
Total:	**29,586**	**29,586**	**0**

Featured species current and projected habitat acres

There are six featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more

nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground.

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black-Throated Blue Warbler	Northern hardwoods, mixed upland deciduous	13,384	16,302	7,415	16,835
Cerulean Warbler	Northern hardwoods, mixed upland deciduous, lowland deciduous	16,498	16,845	16,373	17,125
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	1,297	1,596	1,132	1,134
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	14,658	17,761	9,736	18,950
Ruffed Grouse	Aspen	1,297	1,595	1,130	1,129
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	1,479	1,813	1,202	1,220
Wood Turtle	Nonforested Openings	--	--	--	--

Cover type composition and associated featured species

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 109 years old in the Emmet Moraines Management Area (Figure 3). The past management regime has been primarily single tree selection which allows for stand age to continue to increase over time. Group selection harvesting was used in less amounts over the last planning period.

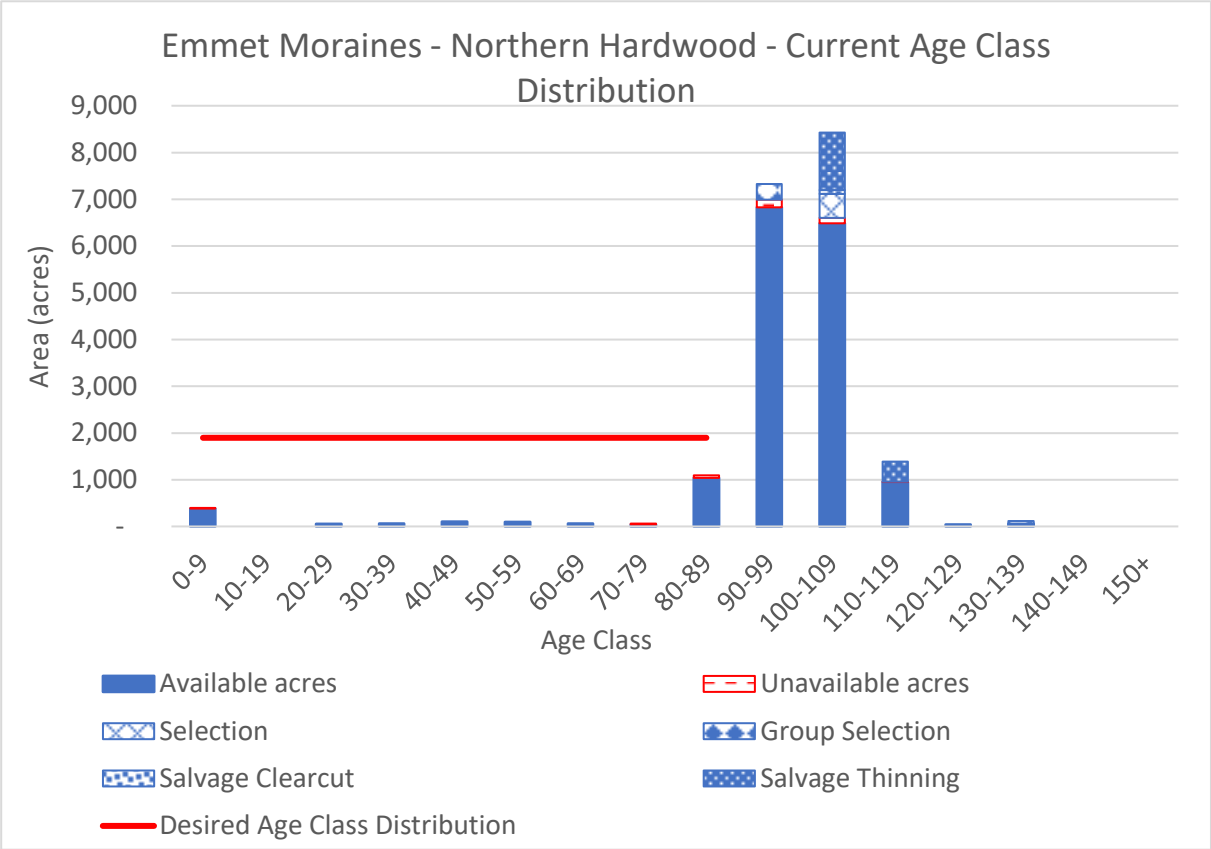


Figure 3. Current age class distribution and projected harvests in the northern hardwood cover type.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Emmet Moraines Management Area (Figure 4). Current conditions are a result of ash and beech salvage efforts in the previous planning period and a regulated selection harvest regime that has been in place in this management area for decades.

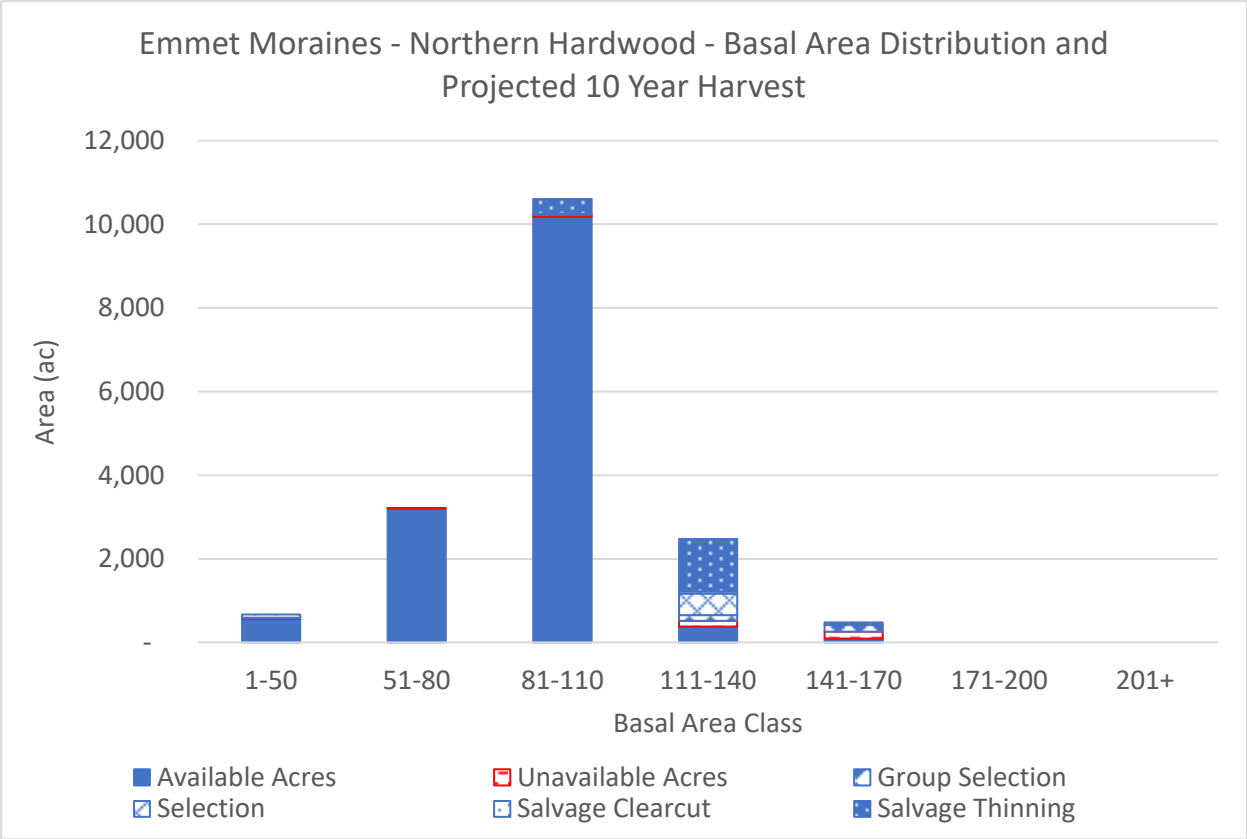


Figure 4. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are 381 acres of unavailable northern hardwoods in the Emmet Moraines Management Area. Selection is the primary silvicultural treatment projected during this 10-year planning period but there may be opportunities to utilize even-aged management silvicultural regimes to increase stem density, species composition, and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for cerulean warbler, black-throated blue warbler and marten (Table 9).

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
Cerulean Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	16,150	348
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	13,046	338
Marten	Age Category: 40+	13,115	357

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
	Size Category: Pole, Sawlog Basal Area: 81+		

Desired future condition

The projected long-term cover type trend for northern hardwood is pretty stable with slight increases in the first few planning periods in the Emmet Moraines Management Area (Figure 5). There are few transitions into this cover type from other cover types forecasted in this management area and equally few transitions from northern hardwoods to other cover types.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for most northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. The Emmet Moraines Management Area will take several decades to reach the desired future condition because of the impacts from beech bark disease and the emerald ash borer. The amount of American beech and ash that once occupied much of the northern hardwood stands have resulted in lower-than-normal residual basal area and decreased stocking levels across much of the northeastern Lower Peninsula. To add to these lower basal areas, the 2025 ice storm damage has also reduced the basal area on some stands.

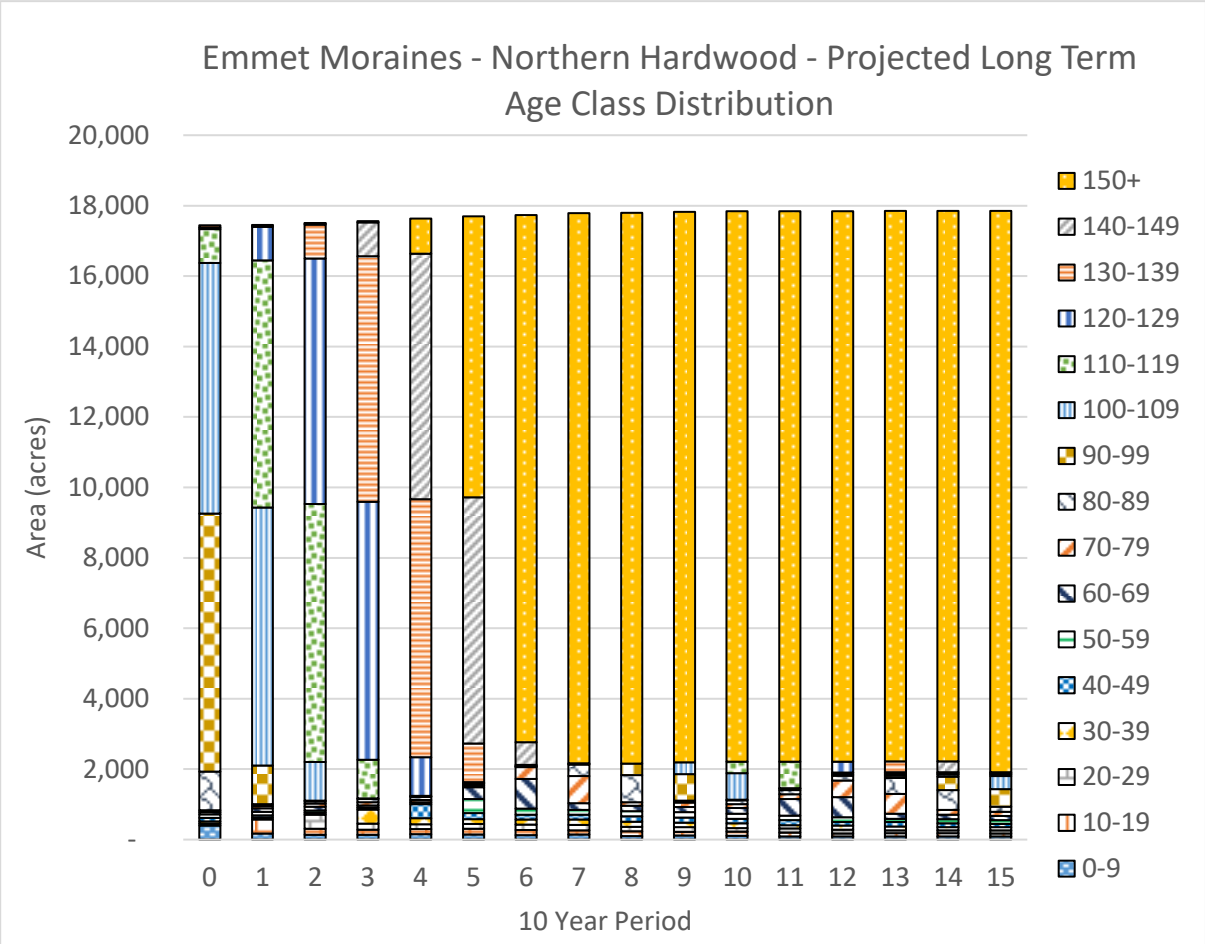


Figure 5. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected single tree selection harvest regime on 516 acres, group selection on 331 acres as well as ice storm salvage thinning on 1,653 acres and salvage clearcuts on 140 acres throughout the first 10-year planning period. Multiple silvicultural regimes should have continued consideration as emerging research results become available. Emphasis on larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Aspen

Current condition

Most of the aspen cover type is currently in the 0-9-year-old age class and the 20-49-year-old age classes. (Figure 6). The past management regime has been primarily clearcut for this cover type. The 10-19 age class has a deficit. The 0–9-year-old class is much higher due to past management using the compensatory approach where the management regimes intentionally harvest more to create a short-term spike in the 0-9 age class in order to compensate for the shortages in the 10-19-year-old age class. This current planning period will continue to smooth out the distribution of the aspen in this management area.

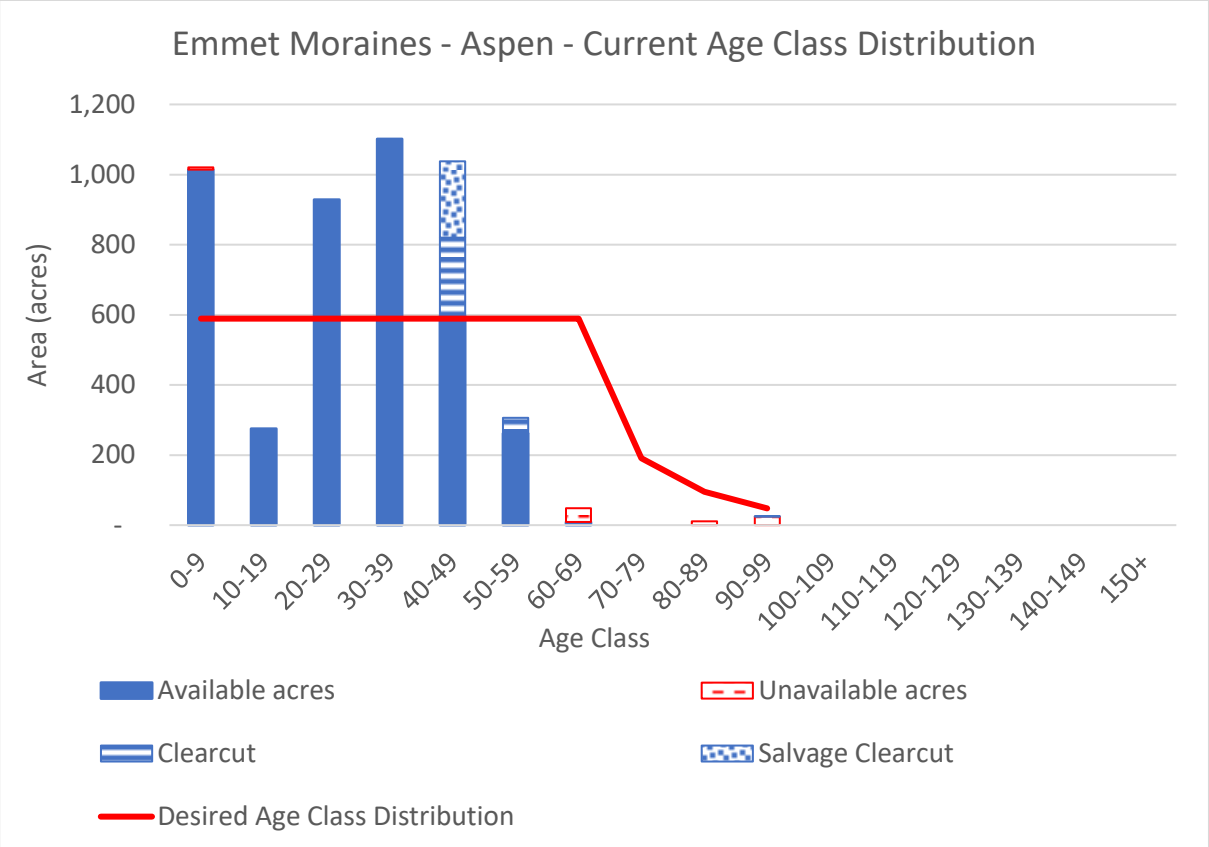


Figure 6. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse and snowshoe hare (Table 10).

Table 10. Featured species with aspen as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	1,290	7
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	1,290	7
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	1,290	7

Desired future condition

The projected long-term cover type trend for aspen is stable in the Emmet Moraines Management Area. There are a few transitions into or out of this cover type from or to other cover types forecasted in this management area decreasing the aspen cover type acreage by approximately only 14 acres in the first 10-year planning period.

The long-term goal for this cover type is balanced age classes between 0 and 70 years old for all available aspen stands in this management area. Maintaining some lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of the desired amount of regeneration in in the upcoming 0-9 age class (Figure 7). Progress toward the long-term age class distribution of aspen will take several decades in the management area.

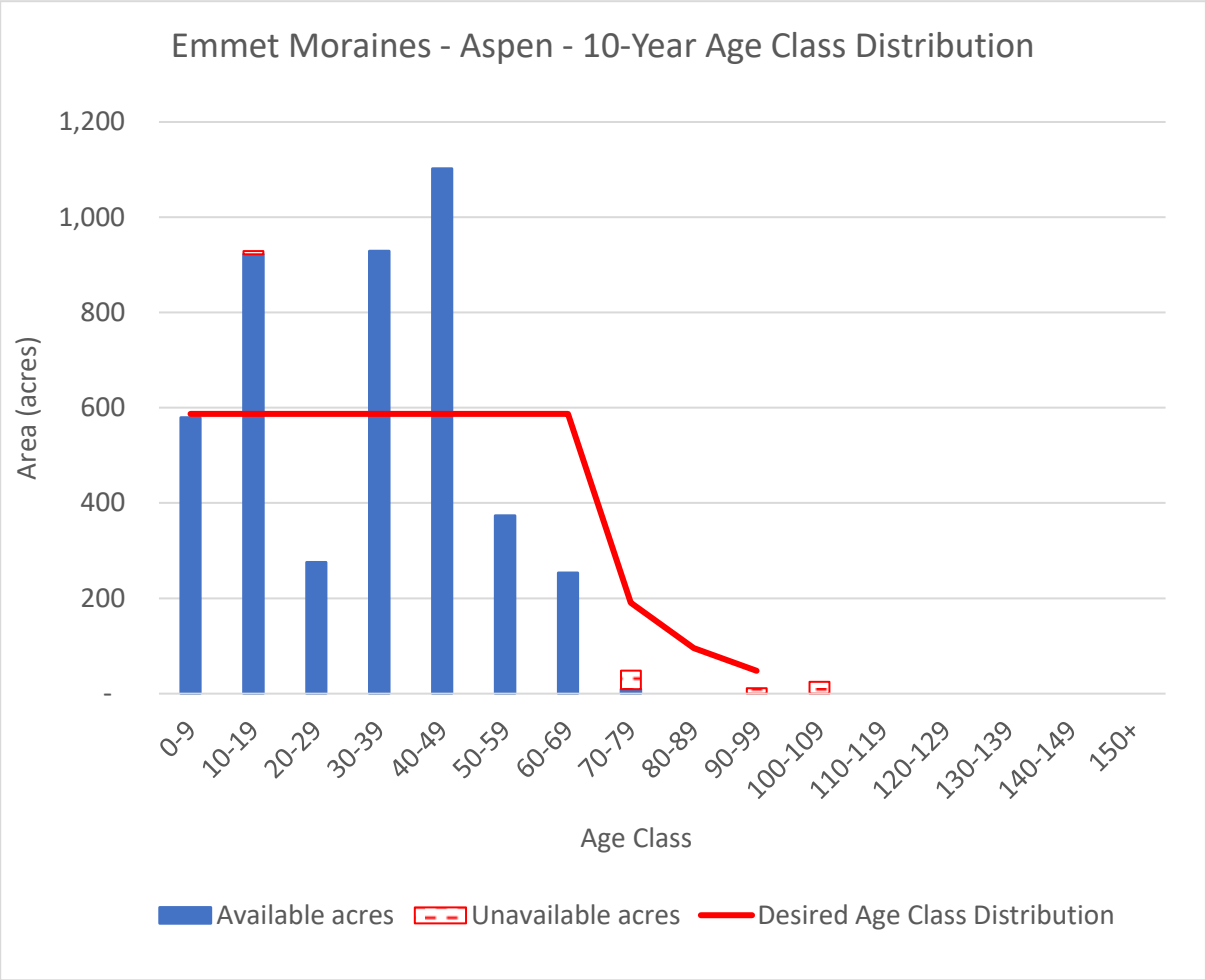


Figure 7. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres is beginning to reach the desired future condition (Figure 8).

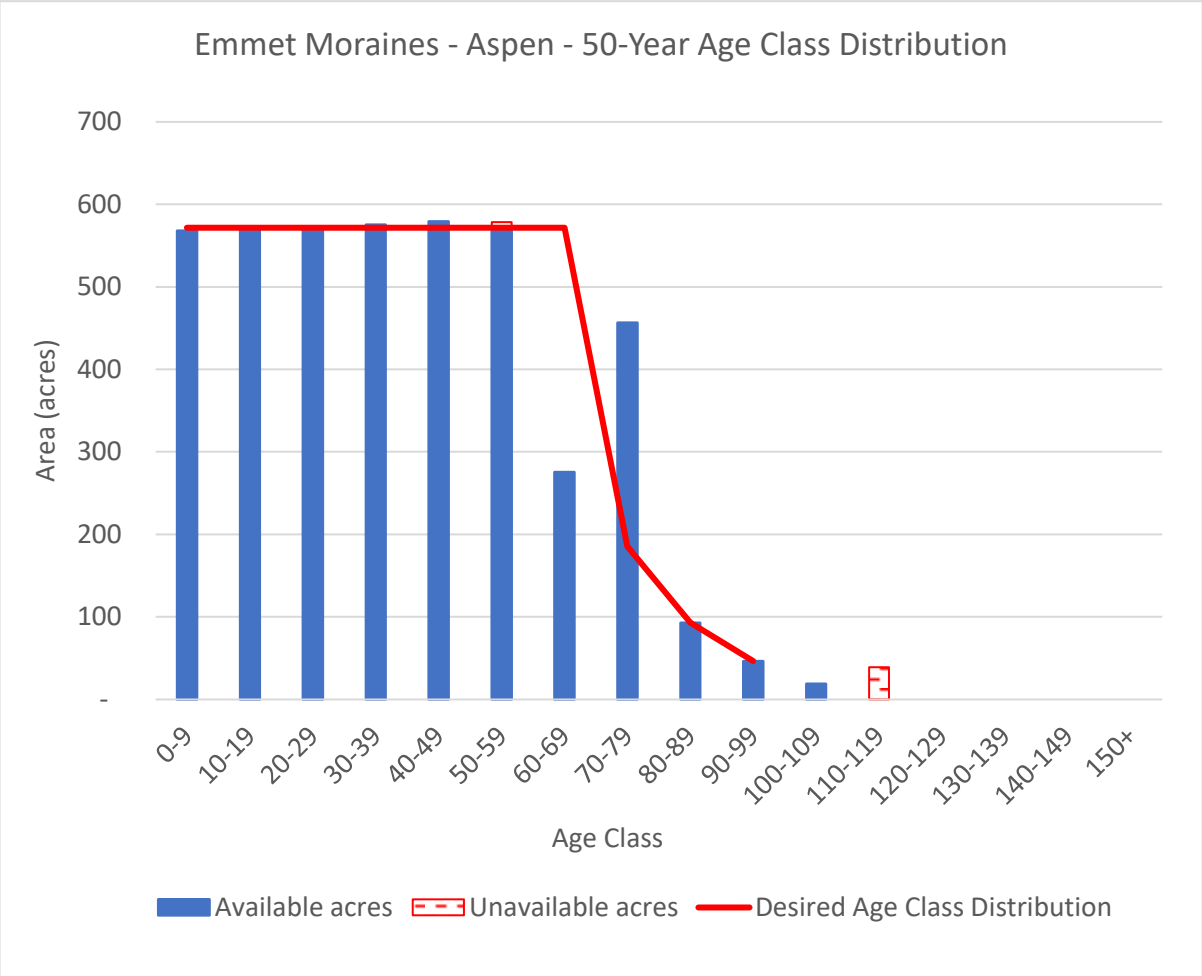


Figure 8. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 9) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 10).

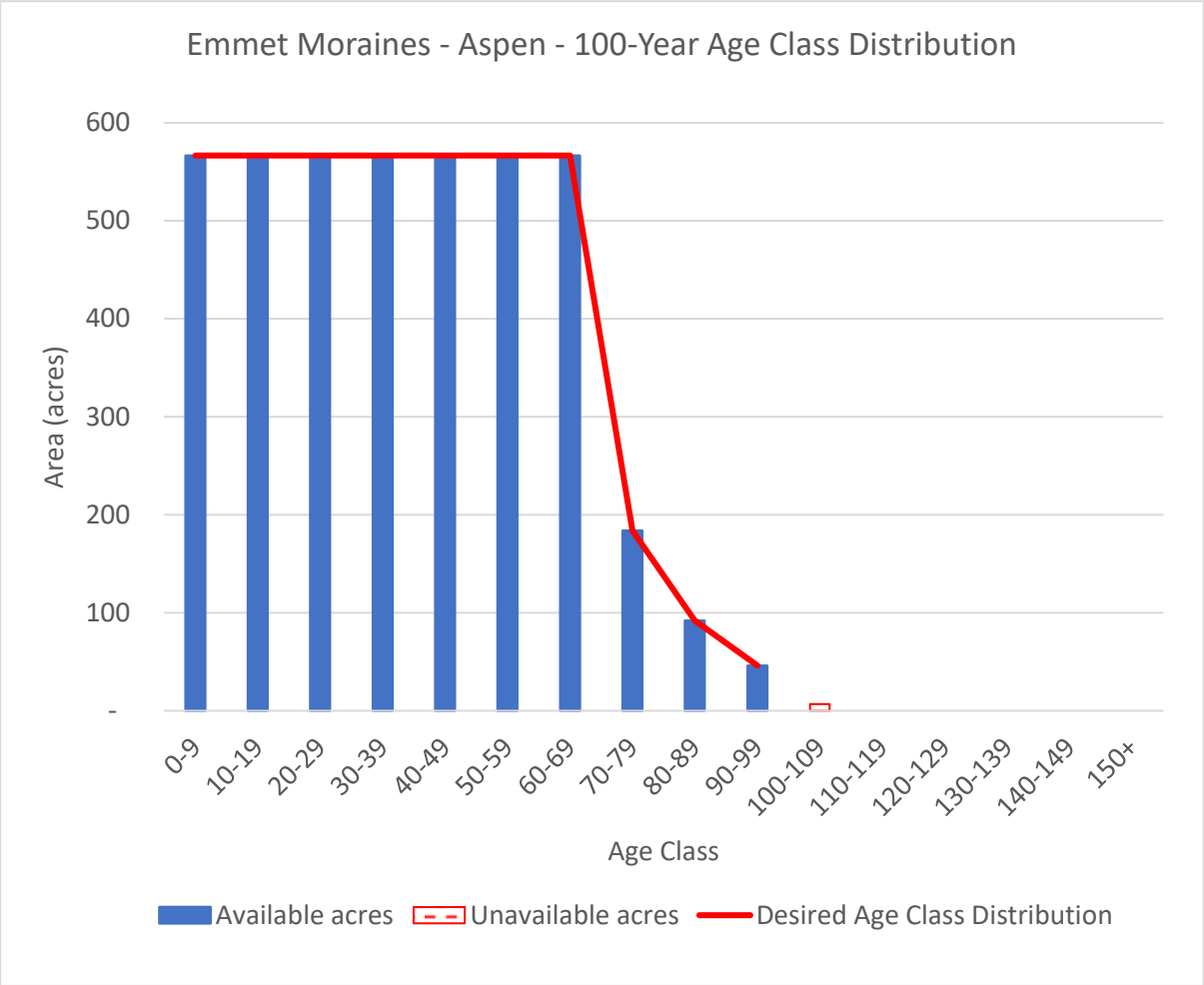


Figure 9. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

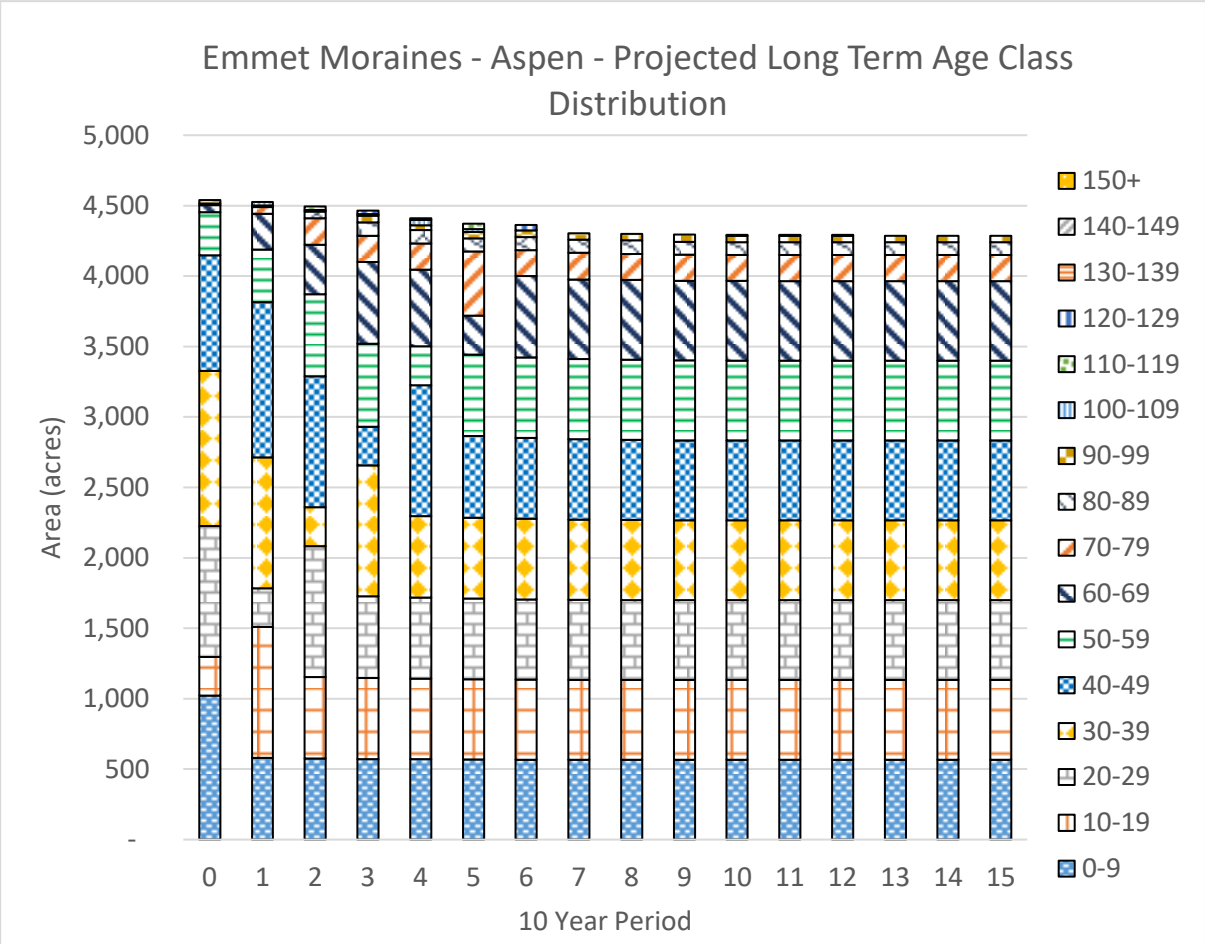


Figure 10. Projected age class distribution for all acres of aspen over the next 150 years in the Emmet Moraines Management Area.

Management actions

There are 271 acres of projected clearcut harvest plus another 217 acres of clearcut salvage due to ice storm damage in the aspen cover type during this planning period. This plus another 92 acres forecasted to naturally regenerate due to ice storm damage and minus the 14 acres projected to transition to another cover type will be slightly under the desired regeneration establishment of 587 acres per decade.

Planted red pine

Current condition

Most of the planted red pine cover type is currently between stand ages of 0-9 years old and 60- to 79-year-old age classes in the Emmet Moraines Management Area (Figure 11). The age class distribution is currently unbalanced. There is a deficit in all six age classes from 10 to 59 years old. The 0-9 age class will only compensate for some of those deficits.

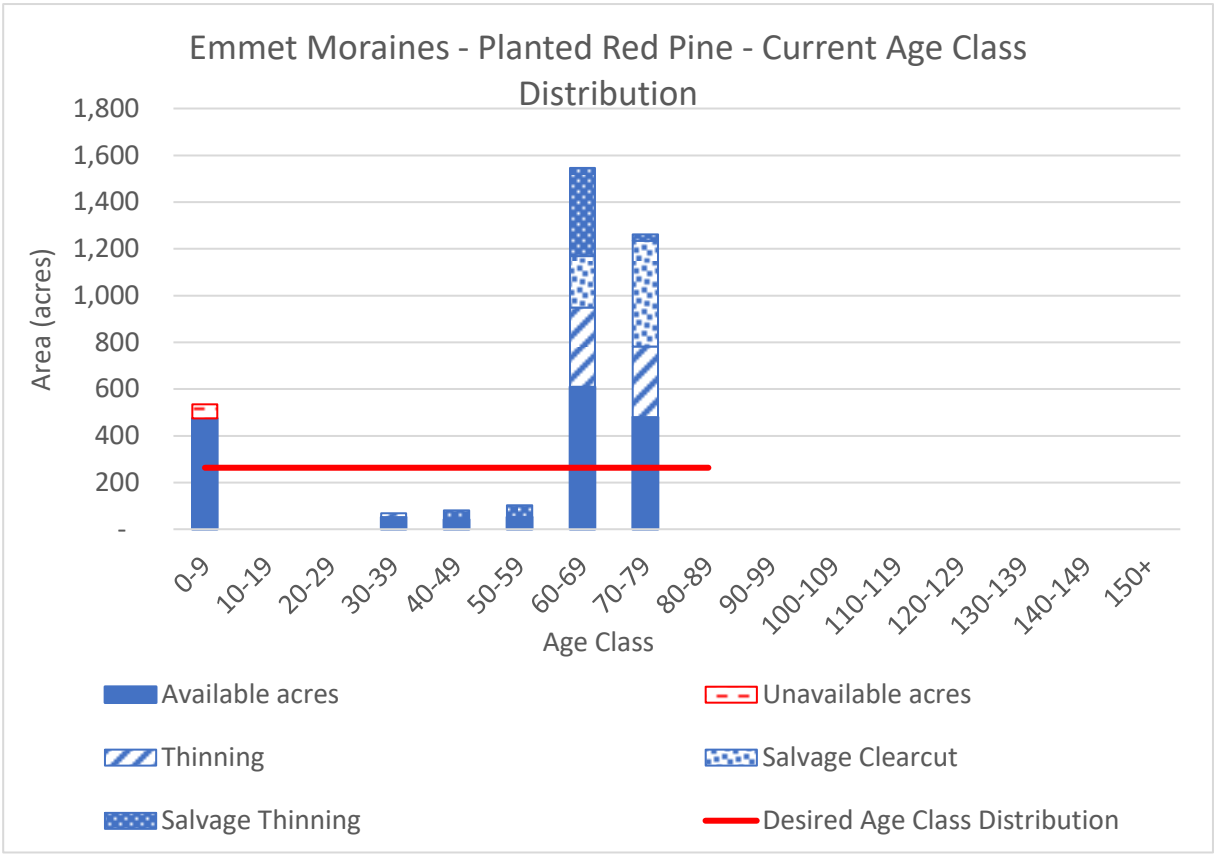


Figure 11. Current age class distribution and projected harvests in planted red pine cover type.

Desired future condition

The projected long-term cover type trend for planted red pine is decreasing in the Emmet Moraines Management Area. The long-term goal for this cover type is balanced age classes between 0 and 90 years old age classes for all available red pine stands in this management area.

The end of the planning period will result in the establishment of 672 acres being established in the 0-9 age class (Figure 12). These 672 acres are forecasted due to ice storm salvage clearcuts. The ice storm salvage will add another spike in the 0-9 age class. Reaching desired age class distribution will take longer due the storm damage and salvage efforts. The active presences of Heterobasidion root disease in many of the red pine stands in the management area may limit which stands can be replanted.

Progress toward the long-term desired age class distribution of red pine will take many decades of even-aged management in this management area.

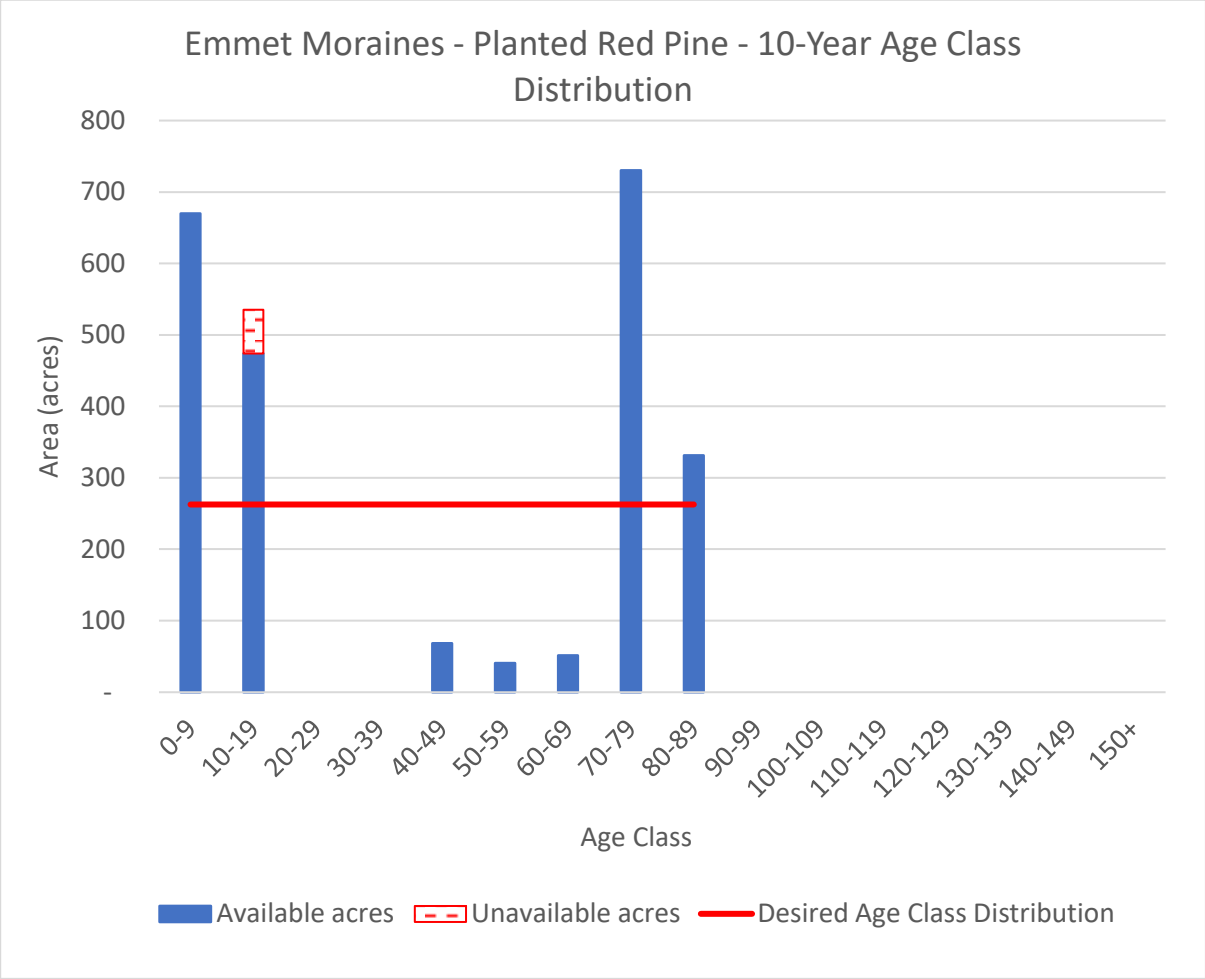


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of planted red pine is beginning to reach the desired future condition for available acres (Figure 13). As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

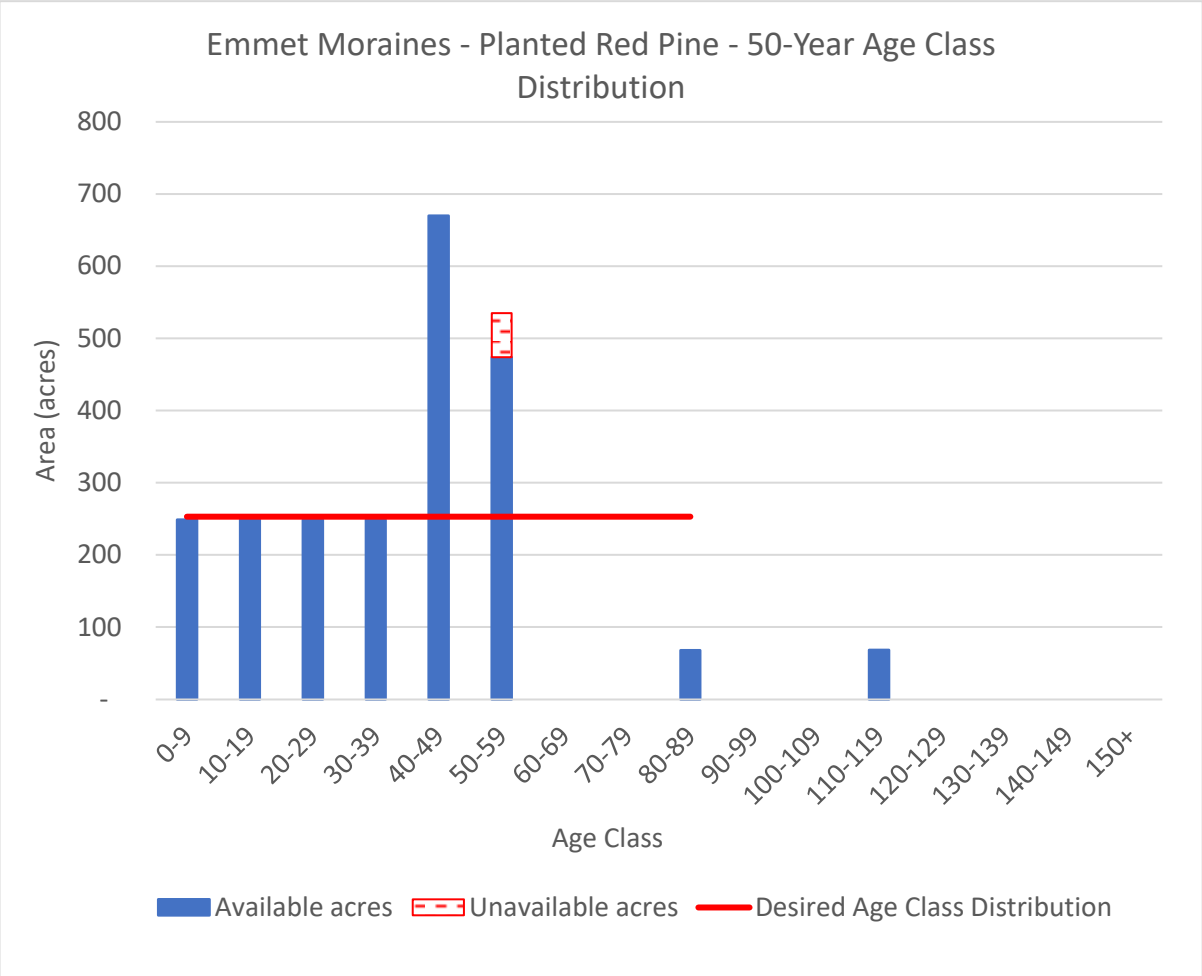


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of red pine in productive growing conditions while providing an even flow of forest products. This may take several more decades beyond 100 years to achieve the desired age class distribution.

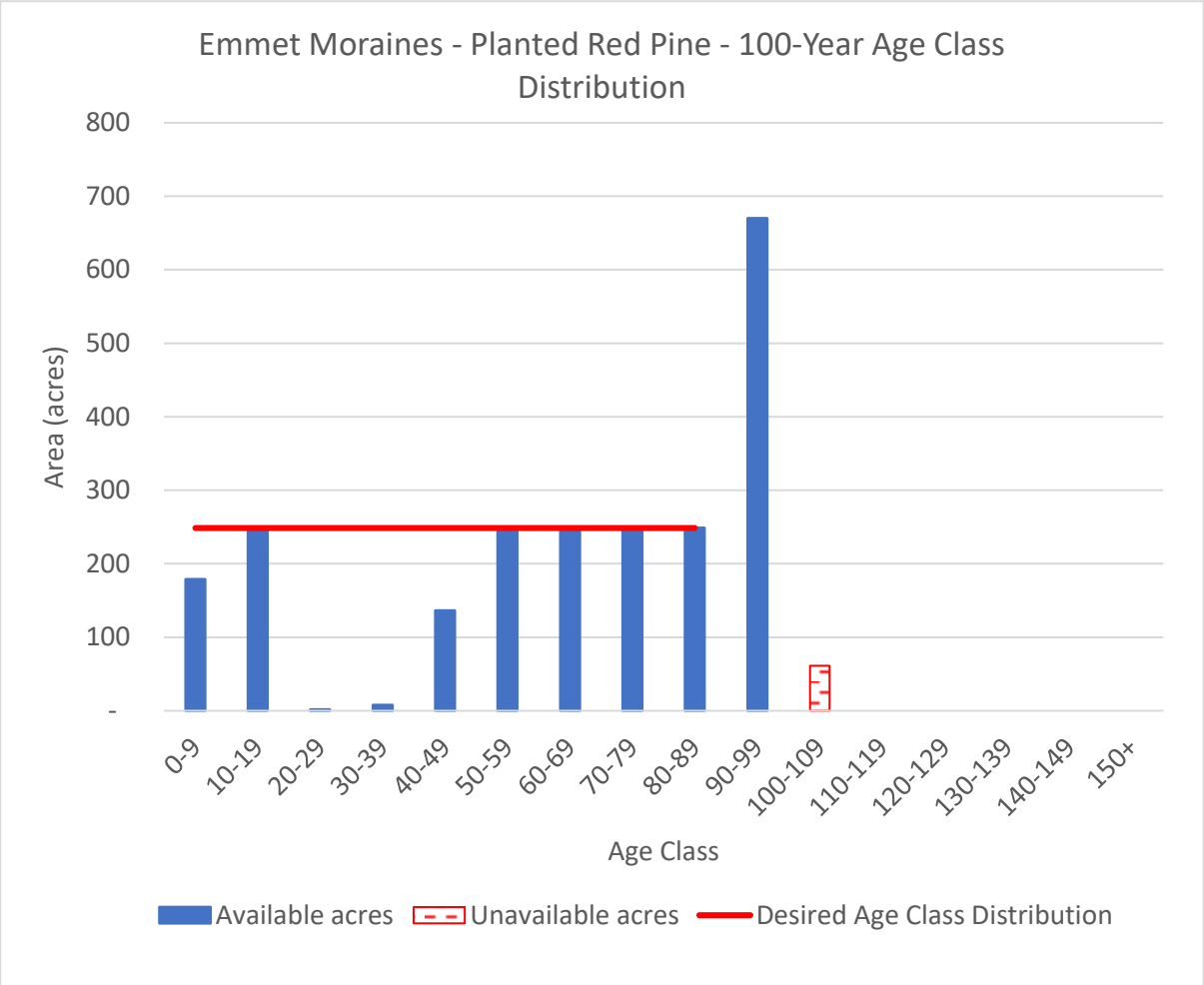


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

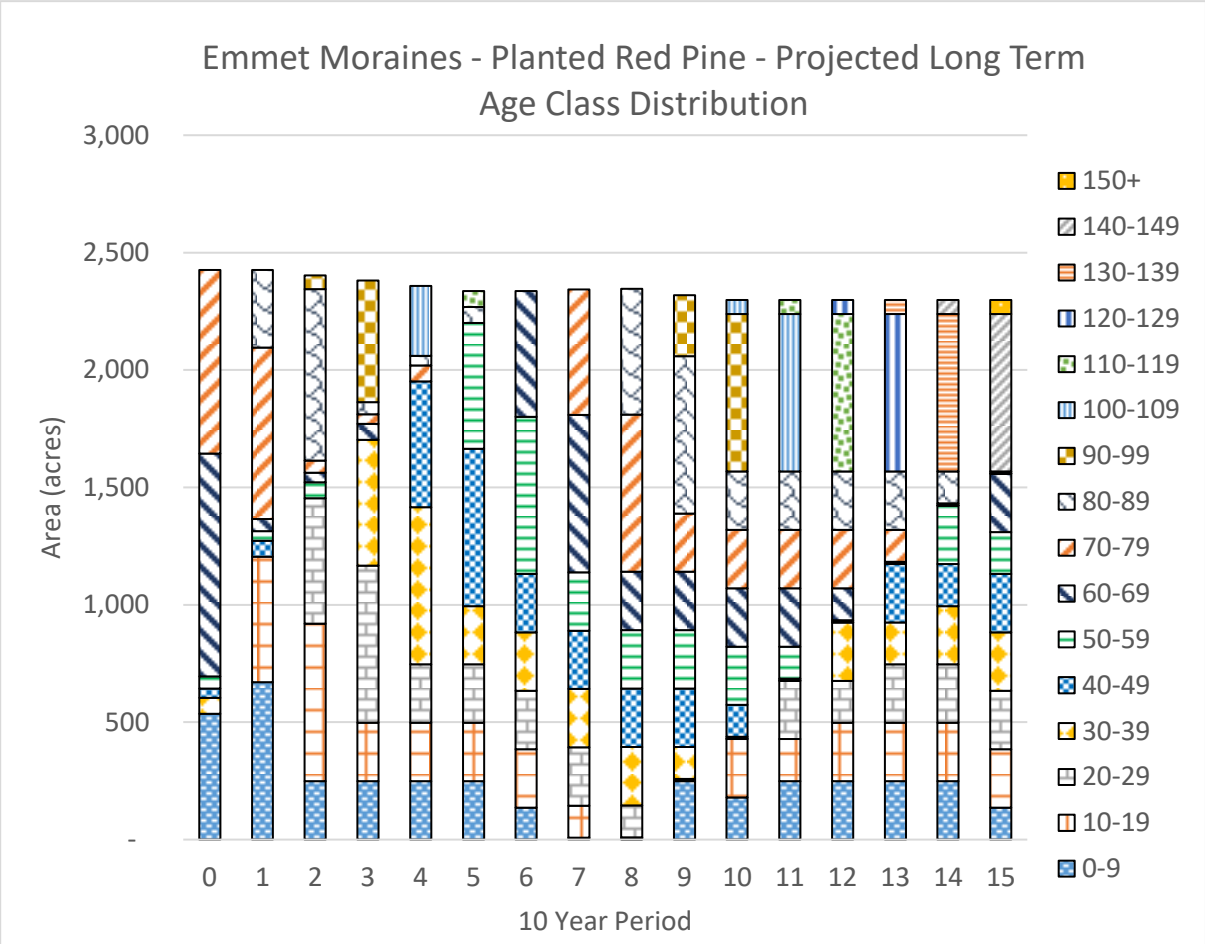


Figure 15. Projected age class distribution for all acres of planted red pine over the next 150 years in the Emmet Moraines Management Area.

Management actions

There are 658 acres of projected thinning harvests in the planted red pine cover type during the planning period. This will allow some acres to be held in older age classes and provide opportunities to help balance the age classes in future planning periods. However, there are 672 acres of projected salvage clearcut and another 497 acres of salvage thinning due to the impacts of the 2025 ice storm. These salvage operations in this cover type will result in a much longer time to reach the desired age class distribution.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (see Biodiversity in Section 3 for more information). There are no current HCVAs in this management area at this time.

Ecological reference areas

ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 11. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 12. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Mesic Northern Forest	D		S3	1
Existing ERA	Mesic Northern Forest	X	G4	S3	2
Grand Total					**3**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 13) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 12) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 13. Reviewable special conservation areas within Emmet Moraines Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Habitat Area or Habitat Corridor	**79**
52101001	79
Grand Total	**79**

Table 14. Static special conservation areas within Emmet Moraines Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer		**273**
		175
Cold Creek		7
McPhee Creek		9
West Branch Maple River		83
Designated Trout and Coldwater Streams	**10.1**	
	6.4	
Cold Creek	0.3	
McPhee Creek	0.4	
West Branch Maple River	3.1	
Wood Turtle Stream 100ft Buffer		**83**
West Branch Maple River		83
Wood Turtle Stream 660ft Buffer		**482**
West Branch Maple River		482
Grand Total	**10.1**	**839**

Rare Species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 15 and Table 17) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 15. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 16. Rare animal occurrence within Emmet Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Buteo lineatus	Red-shouldered hawk	SC		10
Animal	Eacles imperialis pini	Pine imperial moth	SC		1
Animal	Erora laeta	Early hairstreak	SC		1
Animal	Haliaeetus leucocephalus	Bald eagle	SC		3
Animal	Myotis lucifugus	Little brown bat	T		1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Necturus maculosus	Mudpuppy	SC		1
Animal	Opheodrys vernalis	Smooth green snake	SC		1
Animal	Pandion haliaetus	Osprey	SC		1
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	1
Animal	Stenelmis douglasensis	Douglas stenelmis riffle beetle	SC		1
Grand Total	-	-	-	-	**21**

Table 17. Rare plant occurrence within Emmet Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Amerorchis rotundifolia	Small round-leaved orchis	E		1
Plant	Beckmannia syzigachne	Slough grass	T		1
Plant	Drosera anglica	English sundew	SC		1
Plant	Stachys pilosa	Hairy hedge-nettle	SC		1
Plant	Woodsia obtusa	Blunt-lobed woodsia	T		1
Total	-	-	-	-	**5**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly. There are no non-ERA element occurrences in this management area at this time.

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 18) and diseases (Table 19) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 18. Defoliating insects of concern in the Emmet Moraines Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young red pine for redheaded pine sawfly damage.

Table 19. Maladies of concern in the Emmet Moraines Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	

Monitor planted red pine for Heterobasidion root disease and follow guidance. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 15 miles of streams and rivers are found in the management area (Table 20). Streams/rivers classified as cold types comprise approximately 73% of the riverine mileage.

Table 20. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	1
Cold Small River	3
Cold Transitional Stream	0
Cold Transitional Small River	0
Cold Transitional Large River	0
Warm Transitional Stream	10
Warm Transitional Small River	0
Warm Transitional Large River	0
Warm Stream	1
Warm Small River	0
Warm Large River	0

Lacustrine habitat

A total of one lake of at least 1 surface acre are found in the management area (Table 21).

Table 21. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	0
100-499	0
500+	1

Wetlands

A total of 4,653 acres of wetlands are found in the management area (Table 22). Forested wetlands comprise approximately 97% of wetland types found in the management area.

Table 22. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	41
Forested	4,492
Riverine	120

Vernal pools and seeps

A total of 8 acres of vernal pools and seeps have been inventoried in the management area, and 506 acres of seeps have been identified.

Riparian vegetation cover

Northern hardwood is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 23).

Table 23. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Northern Hardwood	2,579
Lowland Shrub	615
Aspen	452
Planted Red Pine	282
Cedar	105
Lowland Conifers	97
Lowland Aspen/Balsam Poplar	53
Herbaceous Openland	52
Upland Shrub	50
Upland Spruce/Fir	37

Watershed vegetation cover

The management area includes portions of watersheds of the Maple and Crooked rivers (Table 24 and Table 25). Northern hardwood and aspen are major cover types of the state forest in each watershed.

Table 24. Largest vegetative cover types (i.e., top five) and area of the Maple River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	12,178
Aspen	3,236
Planted Red Pine	1,906
Lowland Shrub	1,782
Lowland Conifers	897

Table 25. Largest vegetative cover types (i.e., top five) and area of the Crooked River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	1,909
Aspen	867
Planted Red Pine	236
Herbaceous Openland	48
Upland Shrub	41

Recreation

Access for management and/or recreation is good throughout the Emmett Moraines Management Area, as there is very little lowland and a well-developed road/trail system.

Taking advantage of the undulating terrain and abundant snow, many miles of snowmobile trail cross the management area. The southern part of the Indian Gardens ORV Route, a 37-mile route using a combination of paved and gravel roads and two tracks, is in the west of the area. In addition, the North Country Trail and hiking route of the Iron Belle Trail bisects the entire management area from northwest to southeast.

There are no state forest campgrounds in this management area. However, DNR recreation facilities nearby include Wilderness State Park to the north and Petoskey State Park to the south.

Table 26. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types)	15.3
	Snowmobile	46.5
Nonmotorized Recreation Trails	Hiking	14.7
	Equestrian	0
	Biking	0
	Hunter Access Trails	0
Total		**76.5**

Note: Trail-use types may overlap.

There are no areas designated for hunting or boating access sites within the Emmett Moraines Management Area.

Gladwin Lake Plain

State Forest Area: 167,208 acres	Location: Gladwin, Iosco, Midland, Arenac, eastern Isabella and southeast Ogemaw counties	Population Centers: Midland, Mt. Pleasant, Gladwin and Standish
Subsection: Gladwin Silty Lake Plain, Saginaw Clay Lake and Till Plain	Landforms: Lake plain flat clay plains with broad sand channels	Landcover: Forested: 132,072 acres Nonforested: 35,135 acres

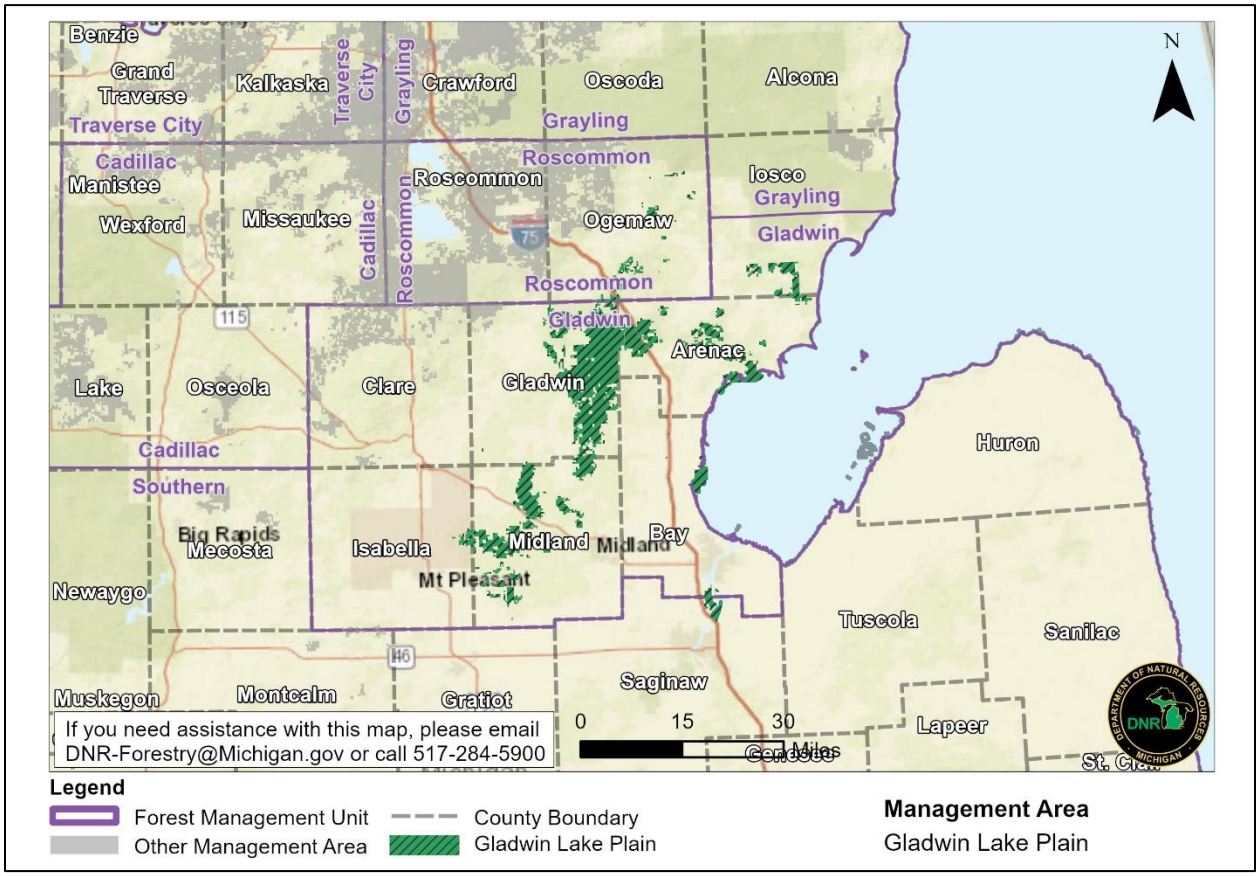


Figure 1. Gladwin Lake Plain Management Area.

Forested landscape

Current and projected future condition

The Gladwin Lake Plain management area includes a variety of shade-tolerance levels with the largest category in the intermediate and mid-aged age categories (Figure 2). The mid-tolerant unavailable lowlands make up half of the total acres in the mature age category. Intolerant cover types mostly occur on available upland in the intermediate age categories while the young and mid-aged are almost equal.

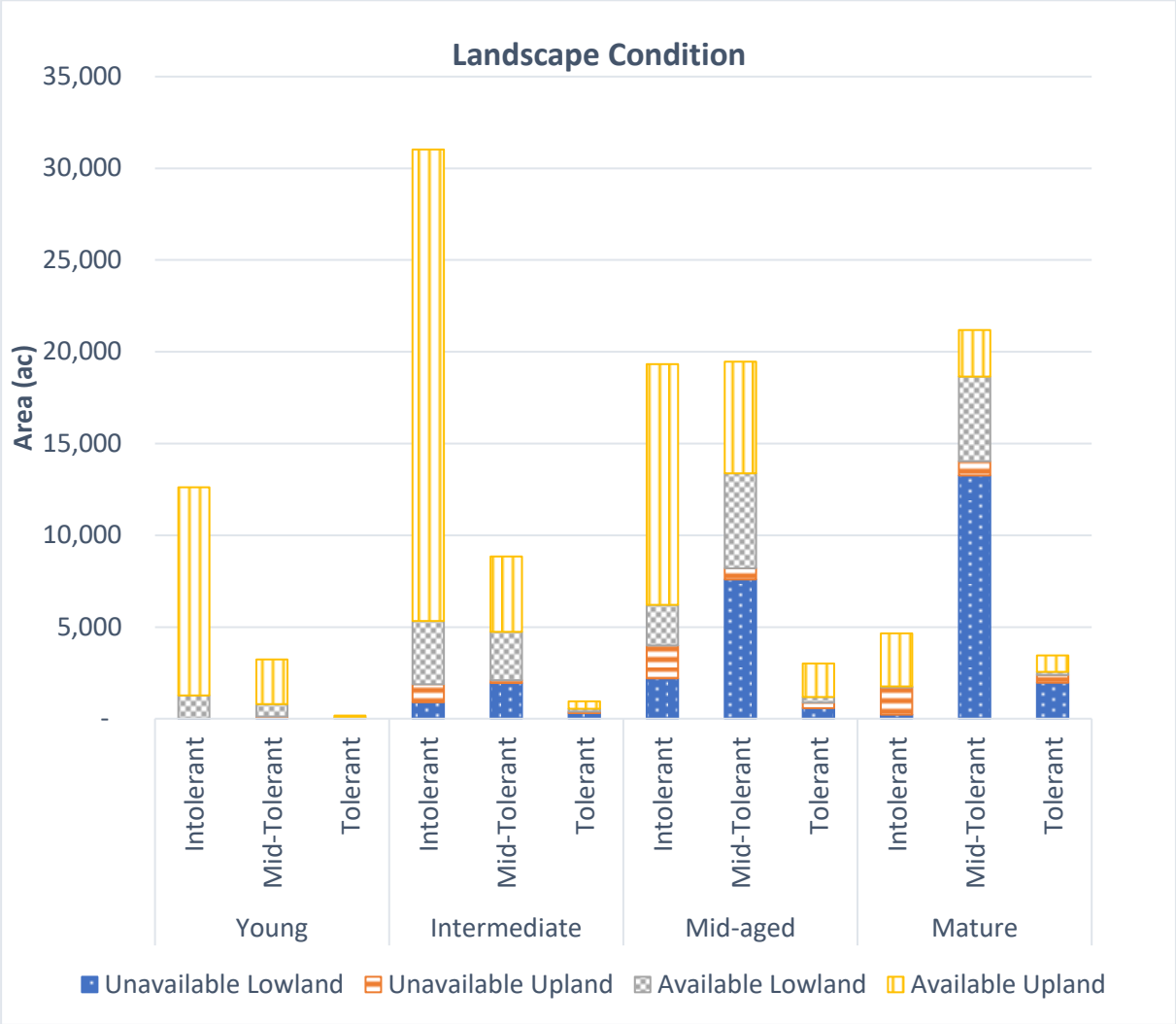


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	10,542
Mature Forest	Acres of 80+ year stands across cover types	29,304
Mature Forest	Acres of 120+ year stands across cover types	1,031
Mesic Conifer Cover types	Acres of mesic conifer cover types	4,617
Mesic Conifers in other Cover types	Average canopy occupancy	31%
Mast – Oak Cover types	Acres of oak cover types	9,014
Mast Tree Species in other Cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	82,099
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	41,713
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	2,007
Landscape Forest Matrix	Percent deciduous forest	84%
Landscape Forest Matrix	Percent coniferous forest	12%

The Gladwin Lake Plain Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management Site (GEMS) - Lame Duck Foot Access Area

The Gladwin Lake Plain Management Area is comprised of 79% forested cover types and 21% nonforested cover types (

Table 2). Of the forested cover types, the upland has 19% more area than the lowland landscape. The largest contributors to upland cover types are aspen and mixed upland deciduous. Lowland deciduous and lowland aspen/balsam poplar take up 26% of the total landscape position. Lowland shrub is the most common nonforested cover type in the management area representing 12% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	45,001	66,660	81,672	132,072
			Northern Hardwood	1,465			
			Black Red Hybrid Oak	7,133			
			Northern Red Oak	579			
			Oak Mix	2,337			
			Mixed Upland Deciduous	10,144			
		Mixed	Upland Mixed Forest	2,967	2,967		
		Coniferous	Planted Red Pine	2,360	12,046		
			Planted Jack Pine	1,268			
			Planted White Pine	2			
			Planted Mixed Pine	266			
			Natural Red Pine	551			
			Natural Jack Pine	2,983			
			Natural White Pine	2,326			
			Natural Mixed Pines	1,430			
			Upland Spruce/Fir	90			
			Upland Conifers	751			
			Hemlock	20			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	10,001	44,075	50,400	
			Lowland Deciduous	34,074			
		Mixed	Lowland Mixed Forest	2,198	2,198		
		Coniferous	Cedar	851	4,128		
			Lowland Conifers	2,692			
			Lowland Spruce/Fir	75			
			Tamarack	510			
Nonforested	Upland	N/A	Herbaceous Openland	1,197	N/A	3,594	35,135
			Upland Shrub	703			
			Low Density Trees	1,081			
			Bare/Sparsely Vegetated	103			
			Cropland	107			
			Urban	402			
			Lowland Shrub	20,463			

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
	Lowland	N/A	Marsh	5,388	N/A	31,542	
			Bog	2,087			
			Treed Bog	1,181			
			Water	2,424			
						Grand Total:	167,208

There are 96,124 acres (57.5% of the total management area and 72.8% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Gladwin Lake Plain Management Area (Table 3). Of that, over 31.8% is in the aspen cover type, 9.7% in lowland deciduous, and 6.9% in mixed upland deciduous. The remaining 22 cover types represent less than 5.5% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

GLADWIN LAKE PLAIN Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	41,998	31.8%	3,003	2.3%	45,001	34.1%
Lowland Deciduous	12,749	9.7%	21,329	16.1%	34,078	25.8%
Mixed Upland Deciduous	9,143	6.9%	1,002	0.8%	10,144	7.7%
Lowland Aspen/Balsam Poplar	7,190	5.4%	2,812	2.1%	10,002	7.6%
Black Red Hybrid Oak	6,651	5.0%	483	0.4%	7,133	5.4%
Upland Mixed Forest	2,575	1.9%	392	0.3%	2,967	2.2%
Natural Jack Pine	2,574	1.9%	409	0.3%	2,983	2.3%
Planted Red Pine	2,326	1.8%	34	0.0%	2,360	1.8%
Oak Mix	2,158	1.6%	180	0.1%	2,337	1.8%
Natural White Pine	1,822	1.4%	505	0.4%	2,327	1.8%
Planted Jack Pine	1,260	1.0%	8	0.0%	1,268	1.0%
Natural Mixed Pines	1,232	0.9%	198	0.1%	1,430	1.1%
Northern Hardwood	1,143	0.9%	323	0.2%	1,465	1.1%
Lowland Conifers	677	0.5%	2,015	1.5%	2,692	2.0%
Upland Conifers	675	0.5%	75	0.1%	751	0.6%
Lowland Mixed Forest	604	0.5%	1,594	1.2%	2,198	1.7%
Natural Red Pine	523	0.4%	28	0.0%	551	0.4%
Northern Red Oak	400	0.3%	178	0.1%	579	0.4%
Planted Mixed Pine	266	0.2%	0	0.0%	266	0.2%
Tamarack	85	0.1%	425	0.3%	510	0.4%
Cedar	24	0.0%	827	0.6%	851	0.6%
Hemlock	20	0.0%	0	0.0%	20	0.0%
Upland Spruce/Fir	18	0.0%	72	0.1%	90	0.1%
Lowland Spruce/Fir	11	0.0%	64	0.0%	75	0.1%
Planted White Pine	2	0.0%	0	0.0%	2	0.0%
Grand Total	**96,126**	**72.8%**	**35,952**	**27.2%**	**132,078**	**100%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too Wet	26,741	74.4%
Denied Access	2,982	8.3%
Blocked by Obstacle	2,703	7.5%
Best Management Practices	834	2.3%
Conservation Values	826	2.3%
Recreation/Scenic	614	1.7%
Long-Term Retention	456	1.3%
Cannot Regenerate	185	0.5%
Federal/State/Local Law	151	0.4%
Too Steep	136	0.4%
Wildlife Concerns	122	0.3%
Other Influence Zones	62	0.2%
Unproductive	46	0.1%
Blocked by Railroad	30	0.1%
Non-DNR agency concerns	18	0.1%
Non-Military Lease/Easement	17	0.0%
Neighbor / Interest Group	13	0.0%
Other Dept./Div. Processes	10	0.0%
Total Unavailable	**35,949**	**100%**

Projected 10-year cover type management actions

Each cover type in the Gladwin Lake Plain Management Area has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 250,024 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Aspen	6,943	-	-	-	-	-	-	6,943
Lowland Deciduous	910	254	-	168	1,579	-	-	2,911
Mixed Upland Deciduous	939	-	-	-	680	-	-	1,619
Lowland Aspen/Balsam Poplar	1,385	-	-	-	-	-	-	1,385
Black Red Hybrid Oak	835	-	-	-	147	-	-	982
Planted Red Pine	-	-	570	-	-	-	-	570
Upland Mixed Forest	371	-	-	-	-	-	-	371
Upland Conifers	318	-	-	-	6	-	-	324
Natural Jack Pine	224	-	-	-	-	-	-	224
Natural White Pine	-	-	110	-	91	-	-	201
Lowland Conifers	143	-	-	-	-	-	-	143
Natural Mixed Pines	-	-	62	-	70	-	-	131
Northern Hardwood	12	97	-	-	4	-	-	113
Oak Mix	73	-	5	-	-	-	-	78
Natural Red Pine	-	-	25	-	15	-	-	40
Northern Red Oak	37	-	-	-	-	-	-	37
Lowland Mixed Forest	23	-	-	-	-	-	-	23
Planted Jack Pine	14	-	-	-	-	-	-	14
Tamarack	3	-	-	-	-	-	-	3
Totals	**12,230**	**351**	**771**	**168**	**2,592**	**-**	**-**	**16,112**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Gladwin Lake Plain Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Aspen	67,766	63,700
	Mixed Hardwood	47,401	44,557
	Mixed Spruce	15,454	14,527
	Mixed Softwood	12,706	11,944
	Mixed Oak	6,106	5,740
	Jack Pine	6,041	5,678
	Red Pine	5,034	4,732
	White Pine	4,144	3,895
	Pulpwood Total	**164,652**	**154,773**
Sawtimber (MBF)	Mixed Aspen	12,460	11,712
	Red Maple	6,960	6,542
	Red Pine	5,574	5,240
	White Pine	4,504	4,233
	Red Oak	4,151	3,902
	White Oak	2,468	2,320
	Mixed Oak	2,010	1,889
	Sugar Maple	1,571	1,476
	Basswood	357	335
	Sawtimber Total	**40,054**	**37,651**
	Total Sawtimber Harvest Volume in Cords	**85,372**	**80,250**
	Grand Total Harvest Volume in Cords	**250,024**	**235,023**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are a few cover type transitions projected for the Gladwin Lake Plain Management Area (Table 7). The managed area of each cover type is projected to remain fairly stable as treatment regimes will not significantly change the amount of area in each cover type except for black red hybrid oak. The largest decrease forecasted is in the black red hybrid oak cover type where approximately 4% or 307 acres will

convert to other cover types such as mixed upland deciduous through forest management and regeneration activities. The largest increase occurs on the mixed upland deciduous cover type where 196 acres are projected to convert into this cover type increasing by 1.9%, mostly from the black red hybrid oak.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	45,001	45,164	163
Lowland Deciduous	34,074	34,102	28
Mixed Upland Deciduous	10,144	10,340	196
Lowland Aspen/Balsam Poplar	10,001	9,977	-24
Black Red Hybrid Oak	7,133	6,826	-307
Natural Jack Pine	2,983	2,895	-88
Upland Mixed Forest	2,967	3,024	58
Lowland Conifers	2,692	2,626	-66
Planted Red Pine	2,360	2,497	137
Oak Mix	2,337	2,339	2
Natural White Pine	2,326	2,326	0
Lowland Mixed Forest	2,198	2,261	63
Northern Hardwood	1,465	1,459	-6
Natural Mixed Pines	1,430	1,434	4
Planted Jack Pine	1,268	1,275	7
Cedar	851	851	0
Upland Conifers	751	605	-146
Northern Red Oak	579	558	-20
Natural Red Pine	551	551	0
Tamarack	510	510	0
Planted Mixed Pine	266	266	0
Upland Spruce/Fir	90	90	0
Lowland Spruce/Fir	75	74	-1
Hemlock	20	20	0
Planted White Pine	2	2	0
Lowland Shrub	20,463	20,463	0
Marsh	5,388	5,388	0
Water	2,424	2,424	0
Bog	2,087	2,087	0
Herbaceous Openland	1,197	1,197	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Treed Bog	1,181	1,181	0
Low Density Trees	1,081	1,081	0
Upland Shrub	703	703	0
Urban	402	402	0
Cropland	107	107	0
Bare/Sparsely Vegetated	103	103	0
Total:	**167,208**	**167,208**	**0**

Featured species current and projected habitat acres

There are nine featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be managed for or found. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model, black bear, wild turkey and black-backed woodpecker, but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	16,904	20,190	18,871	20,145
Black Bear	Mast	91,113	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black-Backed Woodpecker	Natural Disturbance	--	--	--	--
Cerulean Warbler	Northern hardwoods, mixed upland deciduous	18,579	21,789	29,795	30,070
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	14,652	16,612	14,549	15,015
Ruffed Grouse	Aspen	13,796	16,000	14,402	14,666
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	19,382	21,921	20,340	20,842
Wild Turkey	Nonforested Openings	1,304	--	--	--
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	19,775	28,155	34,410	38,763
Wood Turtle	Nonforested Openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

Most of the aspen cover type is currently between stand age 30 and 39 in the Gladwin Lake Plain Management Area (Figure 3). The age class distribution is currently unbalanced, especially in the 30- to 39-year-old age classes where the bulk of acres occur. There is a deficit in the 10-19 and the 50-59 age classes, which will lead to a deficit in the 20- to 29-year age class for the next planning period. A small number of acres that extend beyond the desired maximum age class distribution due to being unavailable.

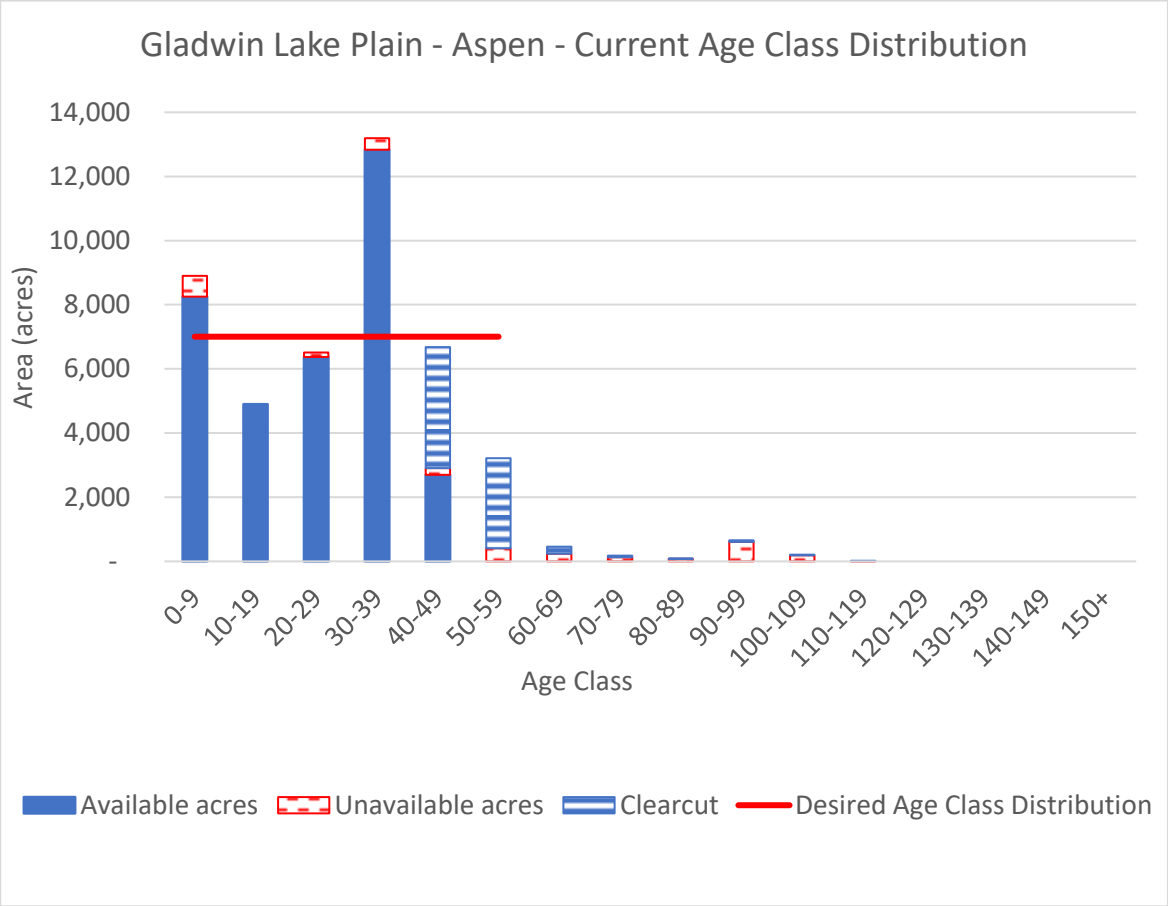


Figure 3. Current age class distribution and projected harvests in the aspen cover type.

Current conditions are a result of harvests and regeneration efforts on available aspen acres during the previous initiative of the Deer Range Improvement Program. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Class: Sapling	13,152	645
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	13,152	645
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	13,152	645
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	13,152	645

Desired future condition

The projected long-term cover type trend for aspen is increasing by less than .01% in the Gladwin Lake Plain Management Area. Much of the aspen area falls within the available category and will remain in this cover type. Habitat elements in this cover type will be preserved due to the abundance.

The long-term goal for the aspen cover type is balanced age classes between 0 and 50 years old for all available stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to maintain stand vigor for regeneration and wildlife habitat.

The end of the planning period will result in the establishment of a 7,104 which is only 104 acres more than the desirable number of acres in the 0-9 age class (Figure 4). Progress toward the long-term desired age class distribution of aspen will take a few decades of even-aged management.

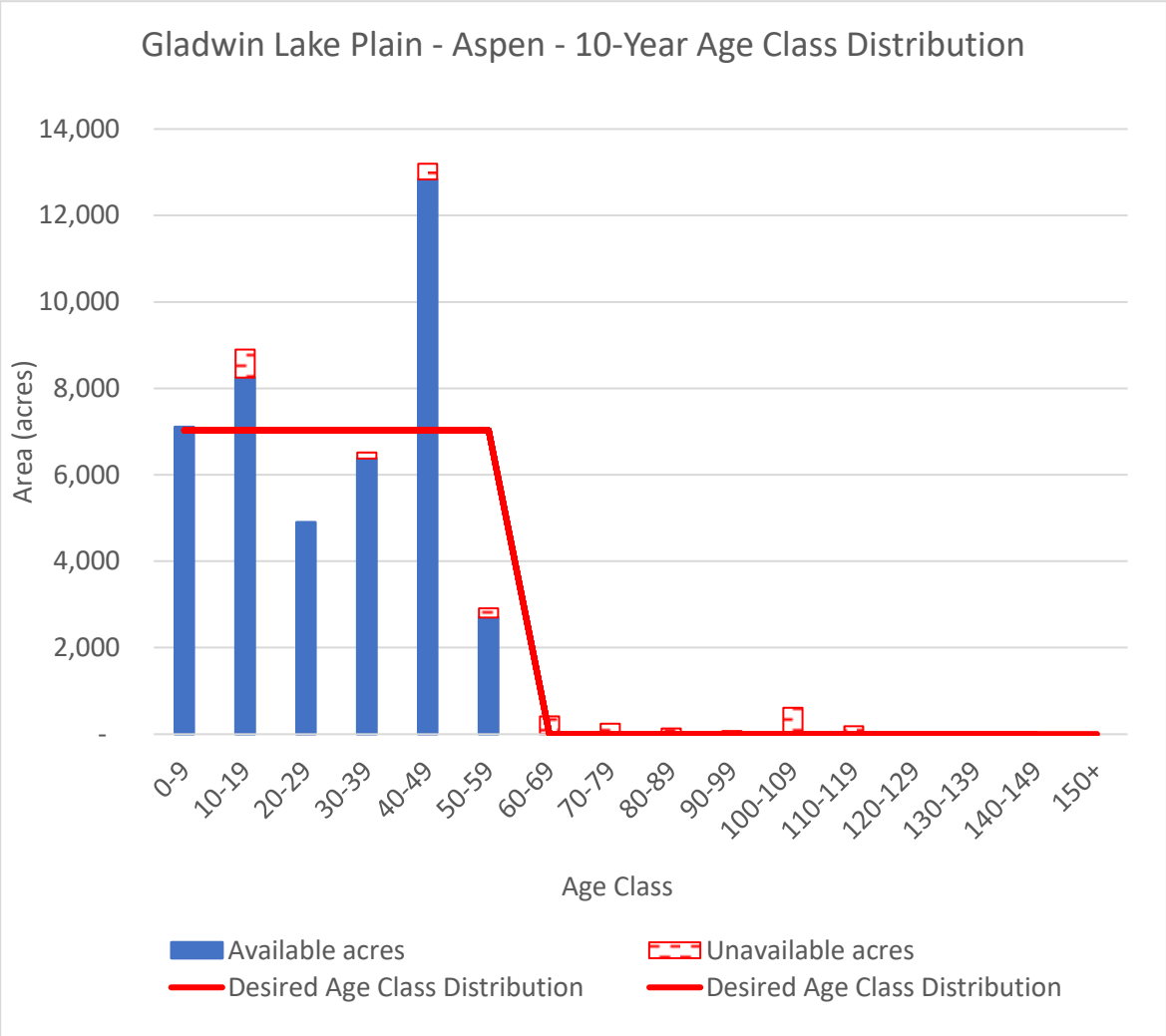


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of aspen has about reached the desired future condition for available acres (Figure 5). There is an increase in acres in the older age classes, beyond the desired age of 50 years old, due to the unavailable acres likely due to access issues in this management area.

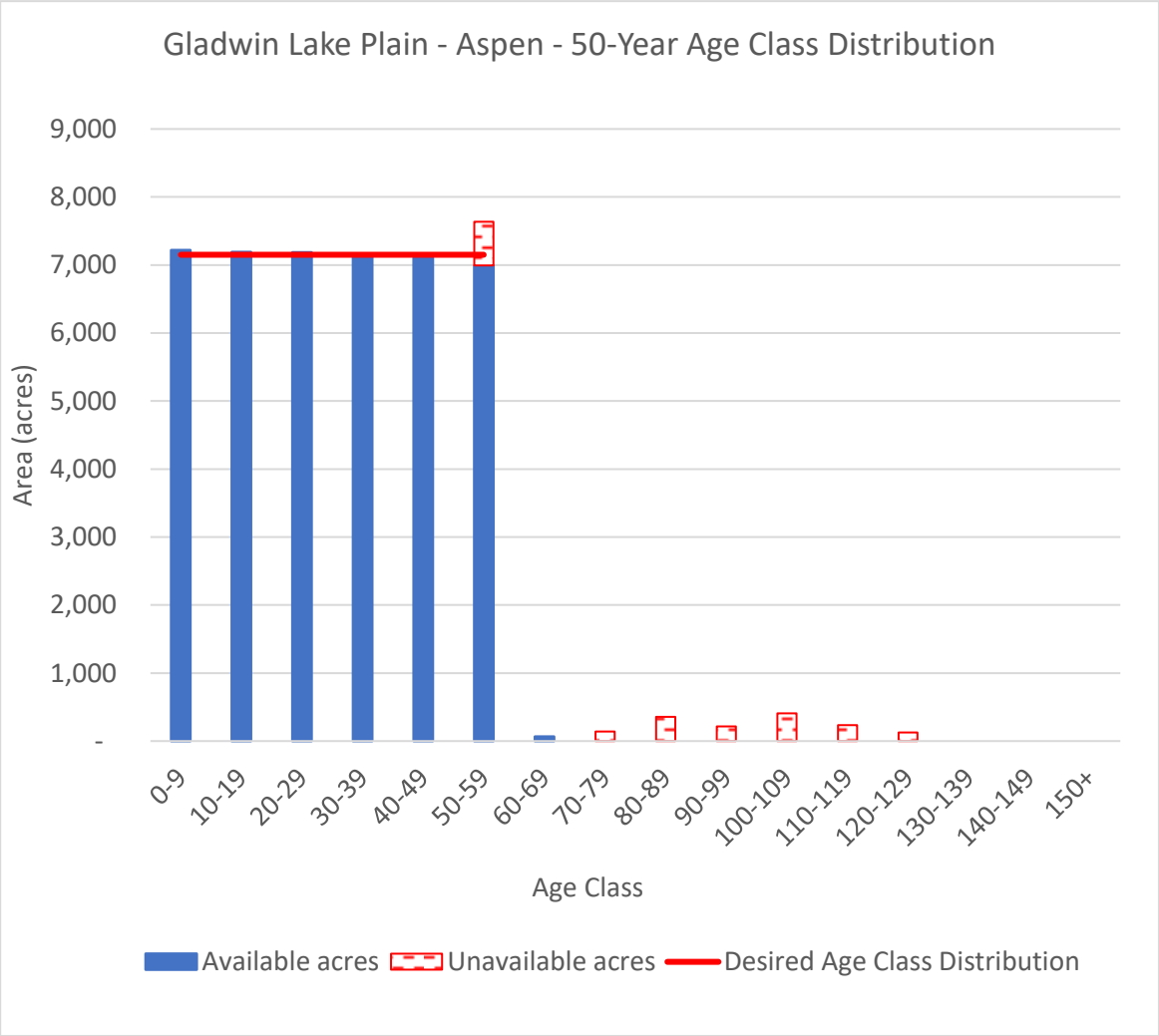


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

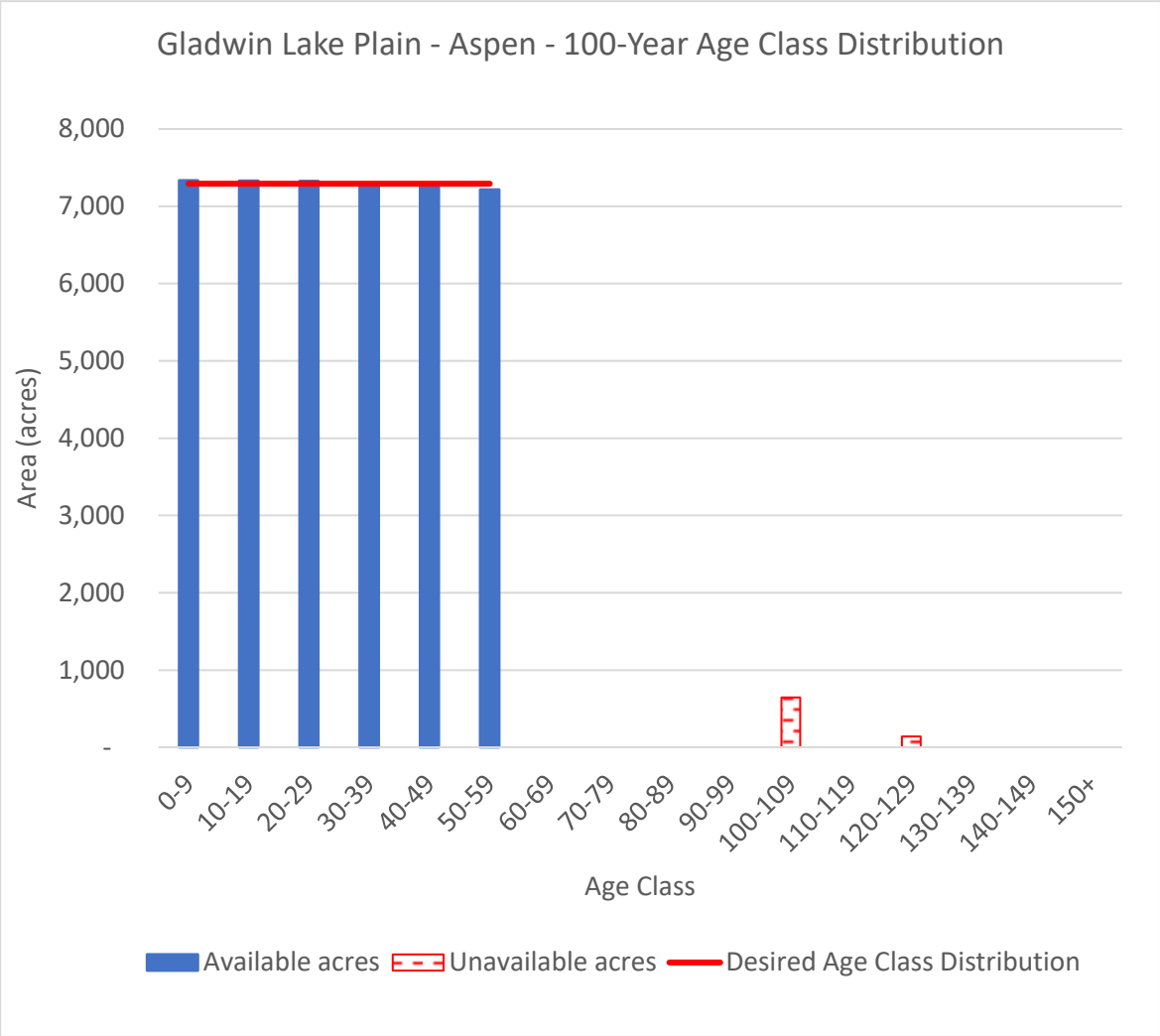


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

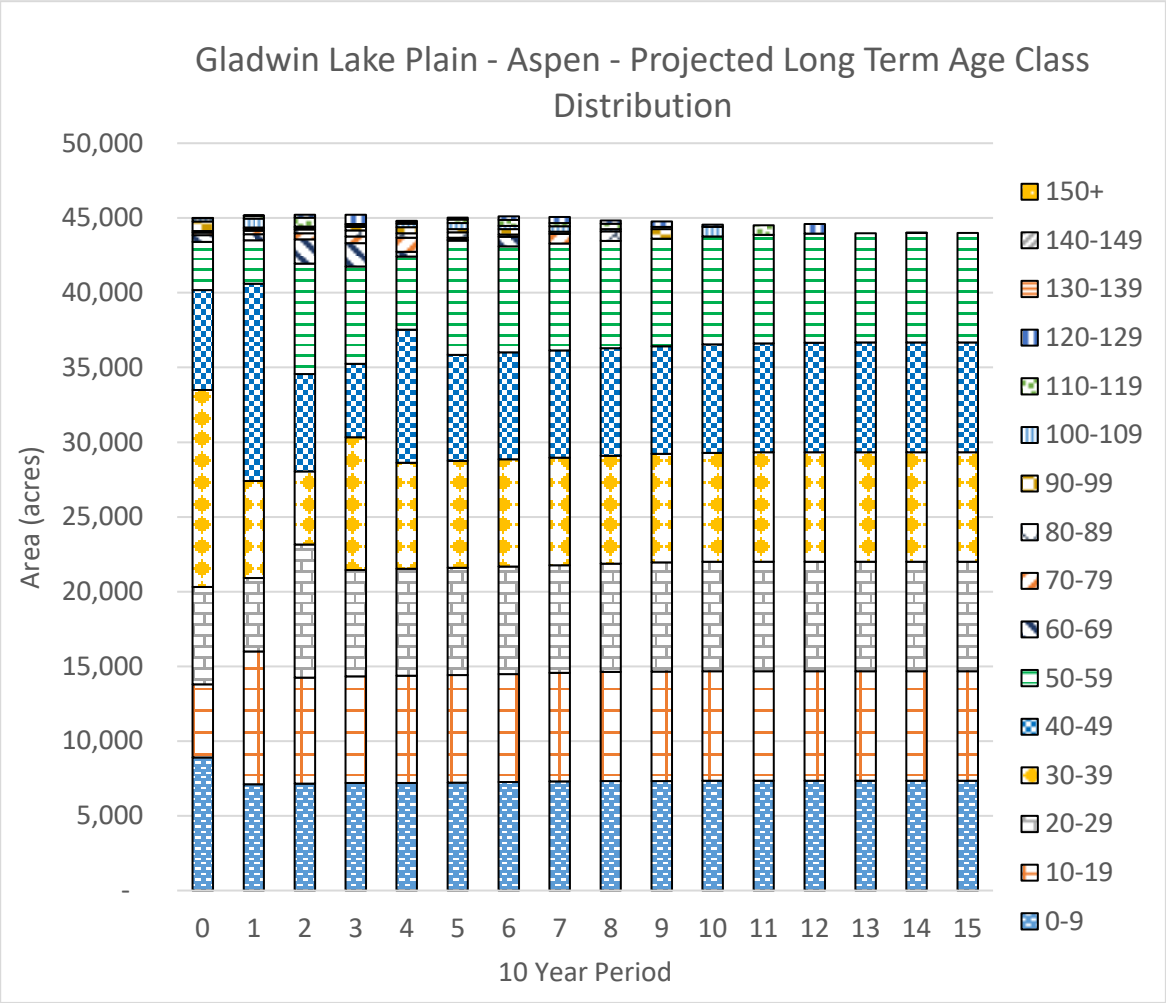


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 6,943 acres of projected clearcut harvest in the aspen cover type during the planning period. This falls very close to the desired establishment of 7,000 acres of aspen per decade.

Lowland deciduous

Current condition

The Gladwin Lake Plain Management Area has a shortage of acres in the lowland deciduous 0- to 29-year age class that was created due to the unavailability of these acres on the landscape (Figure 8). The age class distribution is currently unbalanced across almost all the age class categories. The available landscape position of which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 80 years old. Lowland deciduous and lowland aspen/balsam poplar will sometimes transition into each other's cover types post-harvest. A portion of this cover type meets the habitat requirements for American woodcock, cerulean warbler and wood thrush (Table 117).

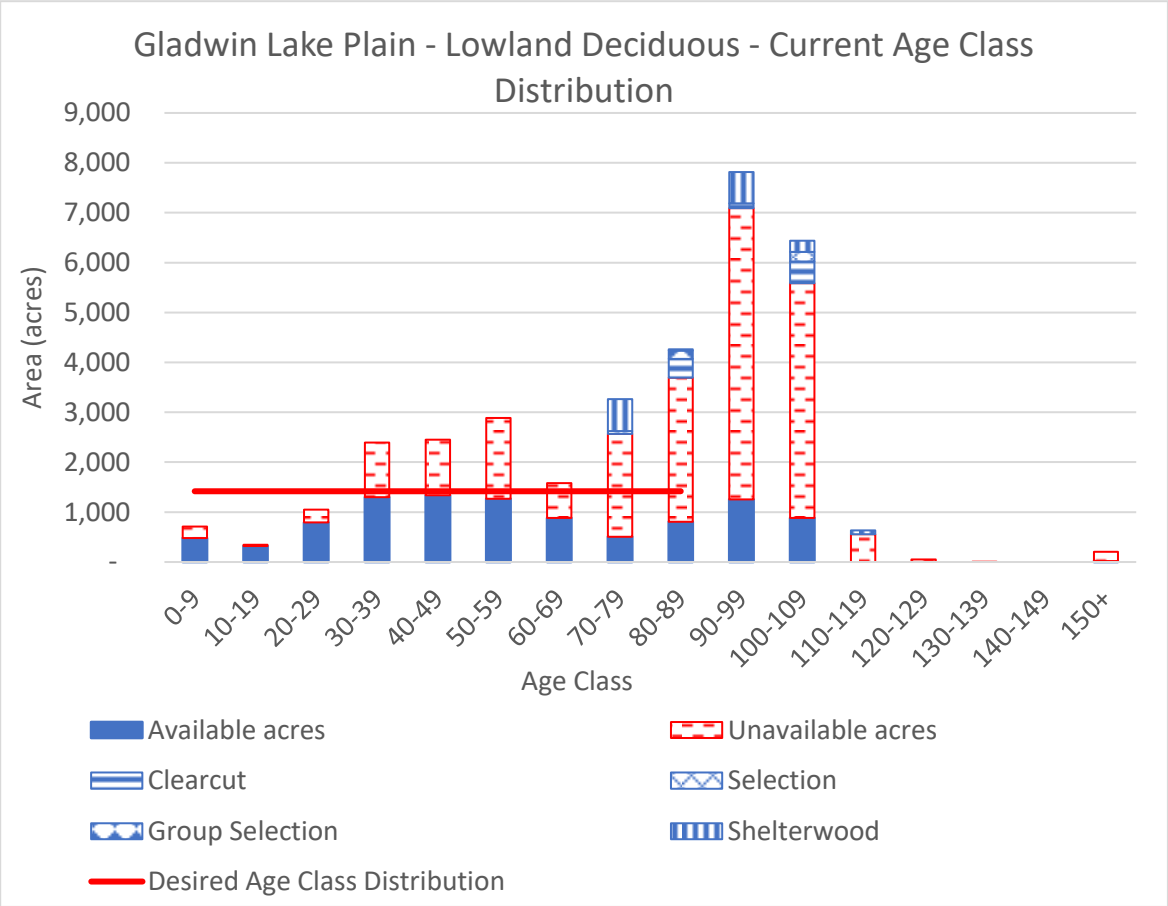


Figure 8. Current age class distribution, the desired age class distribution and the projected harvests in the lowland deciduous cover type over the 10-year planning period.

Table 10. Featured species with lowland deciduous as a selected habitat cover type habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Deciduous	Lowland Deciduous Habitat Acres-Available	Lowland Deciduous Habitat Acres-Unavailable
American Woodcock	Age Category: 0-19 Size Category: Sapling	796	258
Cerulean Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	4,081	11,997
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	4,609	11,330

Desired future condition

The projected long-term cover type trend for lowland deciduous is stable in the Gladwin Lake Plain Management Area. There are a few transitions in and out of this cover type during this planning period due to unavailability.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available lowland deciduous acres.

The end of the planning period will result in the establishment of approximately 939 acres of lowland deciduous from the available acres. Progress toward the long-term desired age class distribution of lowland deciduous will take many decades to achieve the desired balanced age class condition (Figure 9).

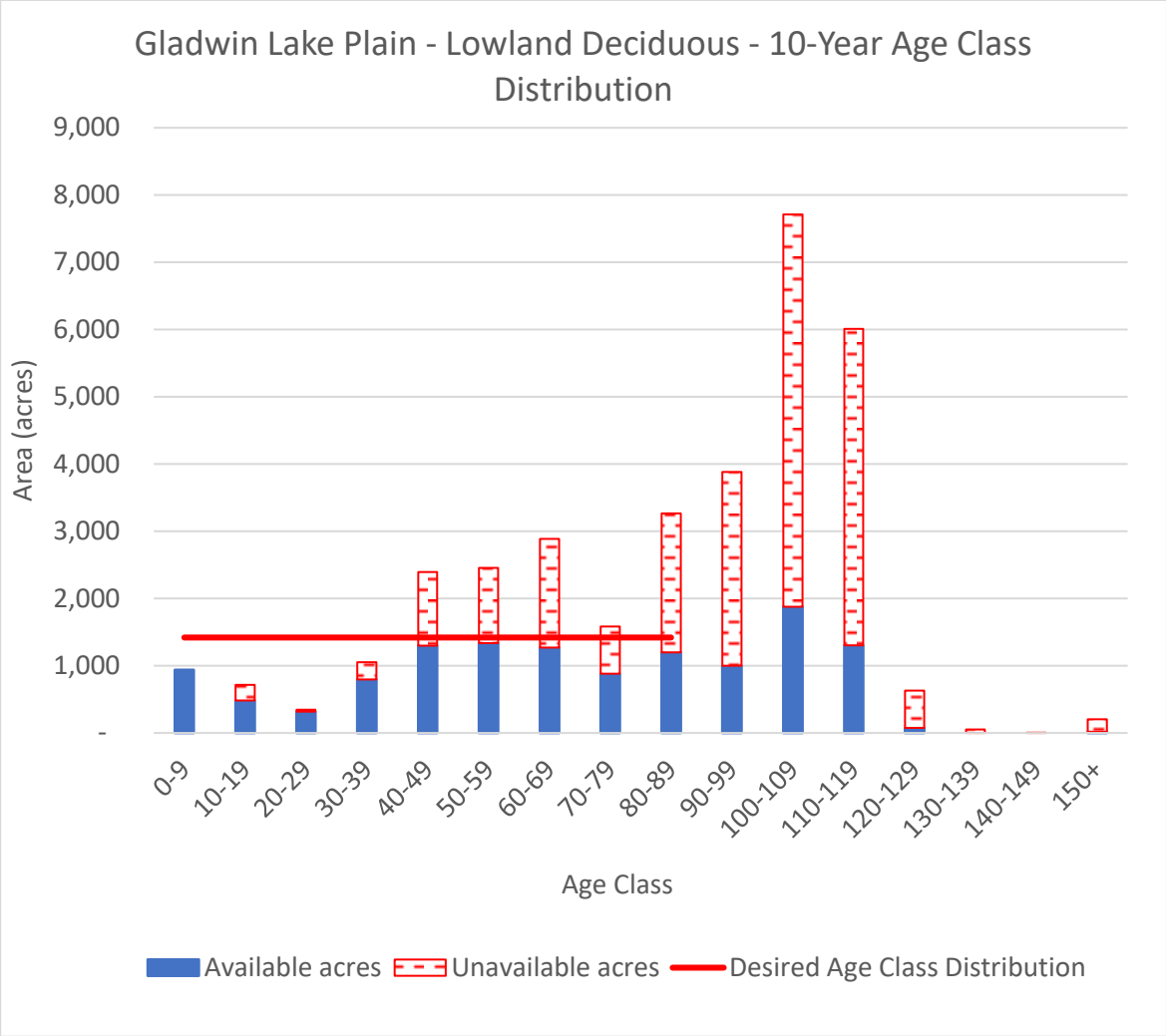


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of lowland deciduous is beginning to reach the desired future condition for available acres in the age classes between 0 and 80 years old (Figure 10). The number of

acres in the older age classes, 120 years and older, continues to increase as the unavailable acres continue to move to the older age classes.

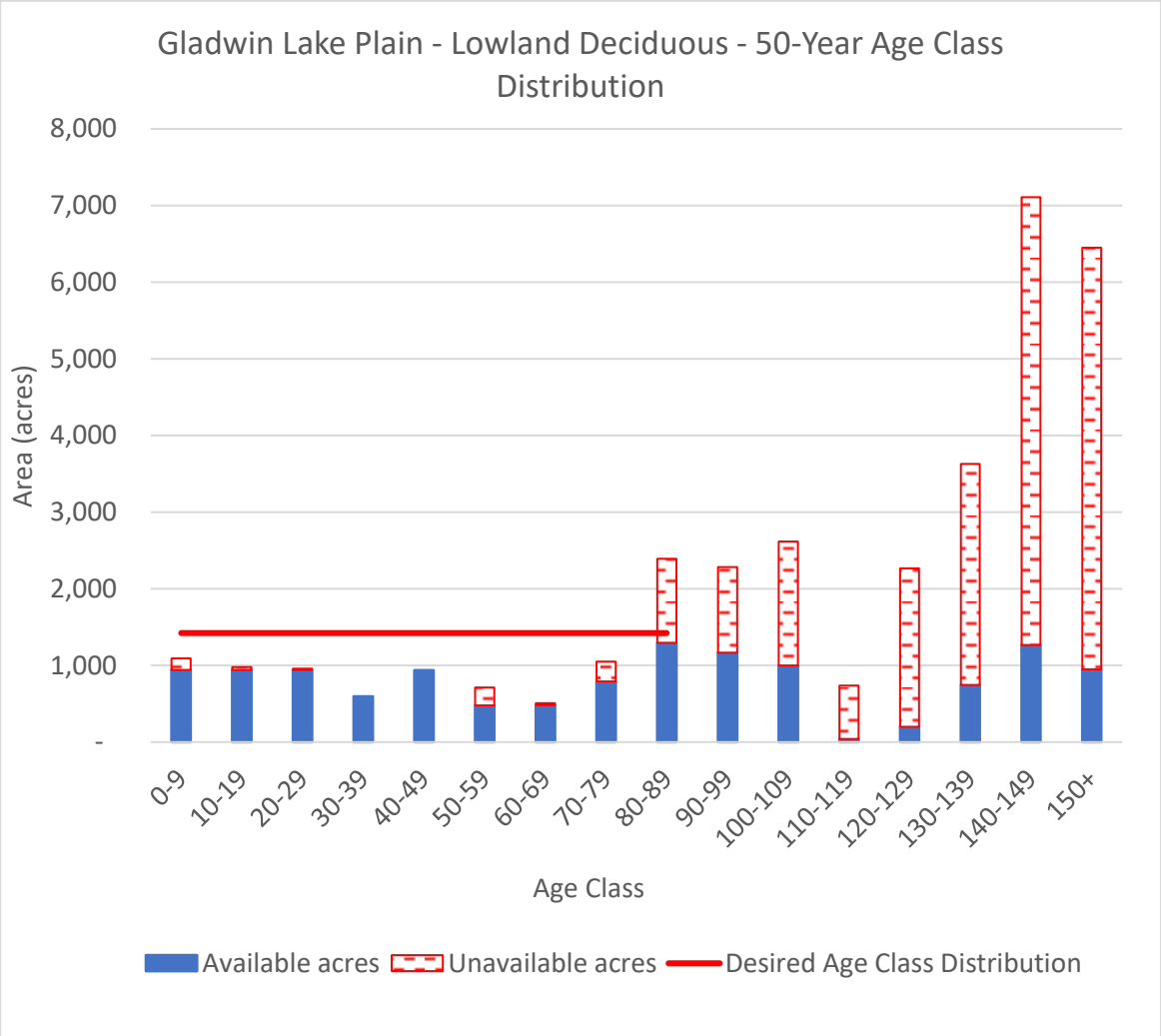


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate on the manageable acres of lowland deciduous cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 12).

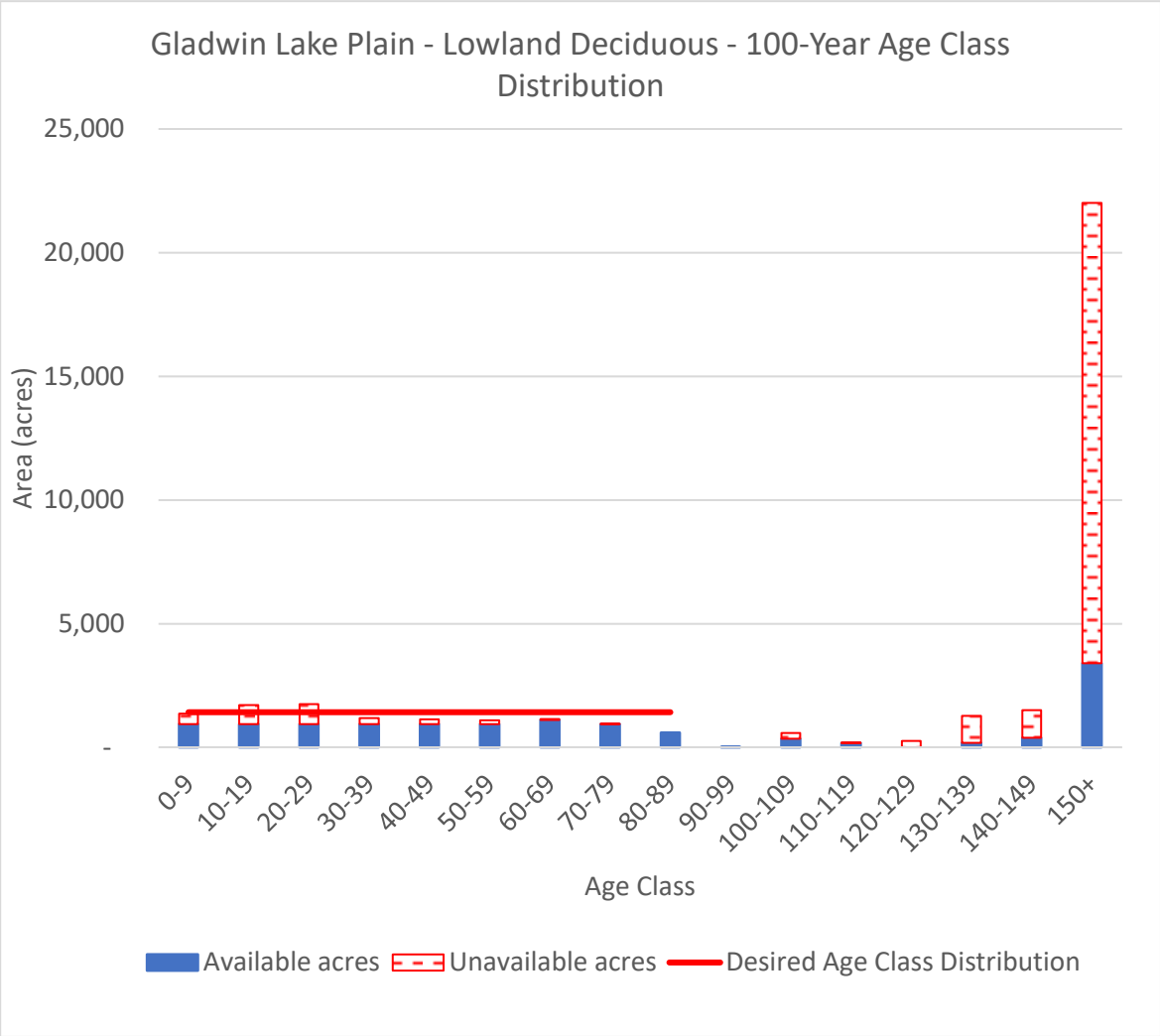


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

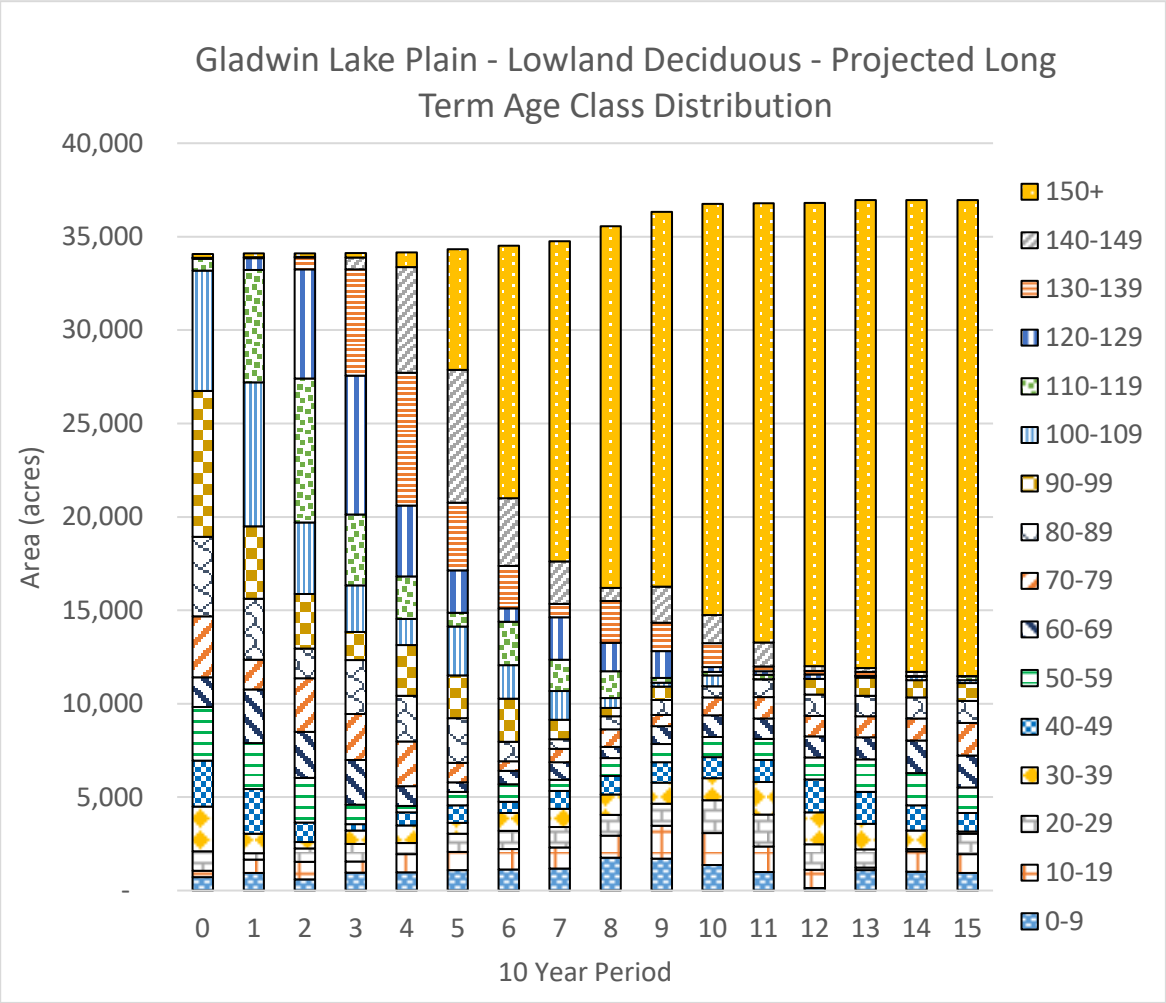


Figure 12. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

There are 910 acres of projected clearcut harvest in the lowland deciduous cover type during the planning period. This is below the desired establishment of 1,420 acres of lowland deciduous per decade because of the current unbalanced age class condition and the number of acres in the unavailable category.

Mixed upland deciduous

Current condition

The Gladwin Lake Plain Management Area has a surplus of acres in the 30- to 39-year-old age class with some of the surplus in the 90- to 109-year-old age class (

Figure 13). The age class distribution is currently approaching a balanced distribution in the 20- to 29-year-old age class. A portion of this cover type meets the habitat requirements for cerulean warbler, wood thrush and snowshoe hare (Table 11).

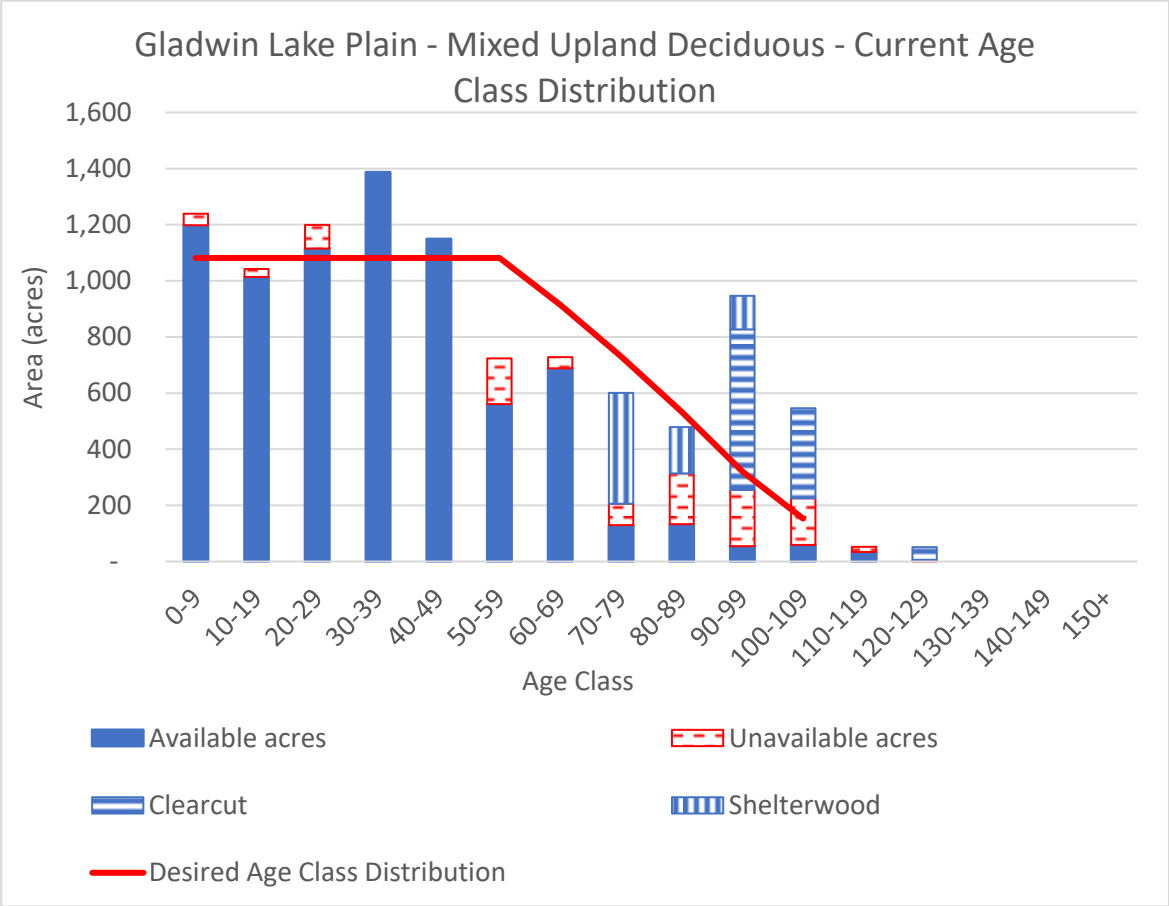


Figure 13. Current age class distribution, the desired age class distribution, and the projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

Table 11. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres - Available	Mixed Upland Deciduous Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	2,212	69
Cerulean Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	1,191	564
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	2,130	598

Desired Future Condition

The end of the planning period will result in the establishment of approximately 1,198 acres of mixed upland deciduous to the 0- to 9-year-old age class in the available acres which is just above the desired 1,082 acres (Figure 14). Progress toward the long-term desired age class distribution of mixed upland deciduous will take many decades to achieve the desired balanced age class condition.

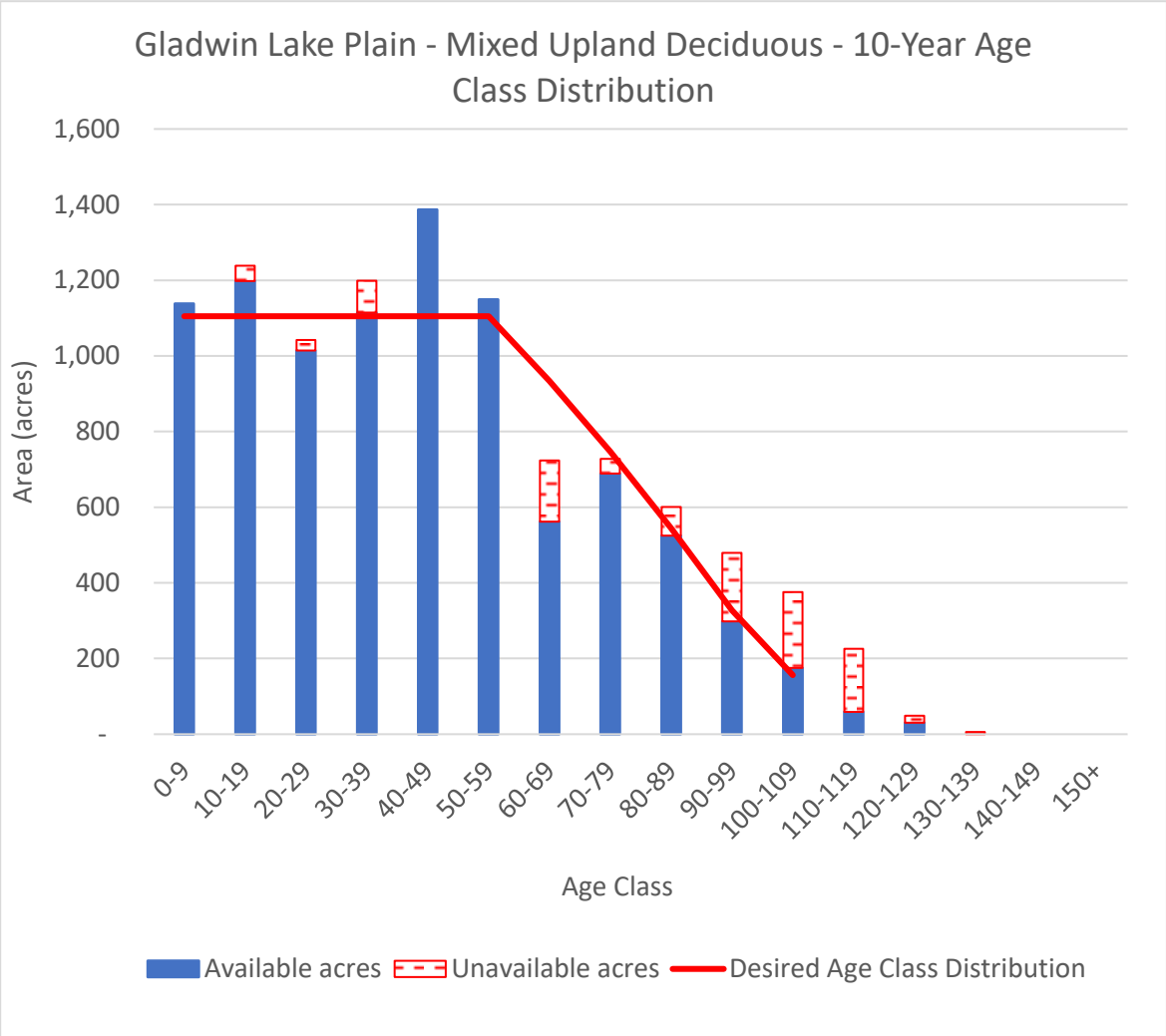


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of mixed upland deciduous is nearly at the desired future condition for available acres (Figure 15). The number of acres in the older age classes, 110 years and older, continues to increase due to unavailability.

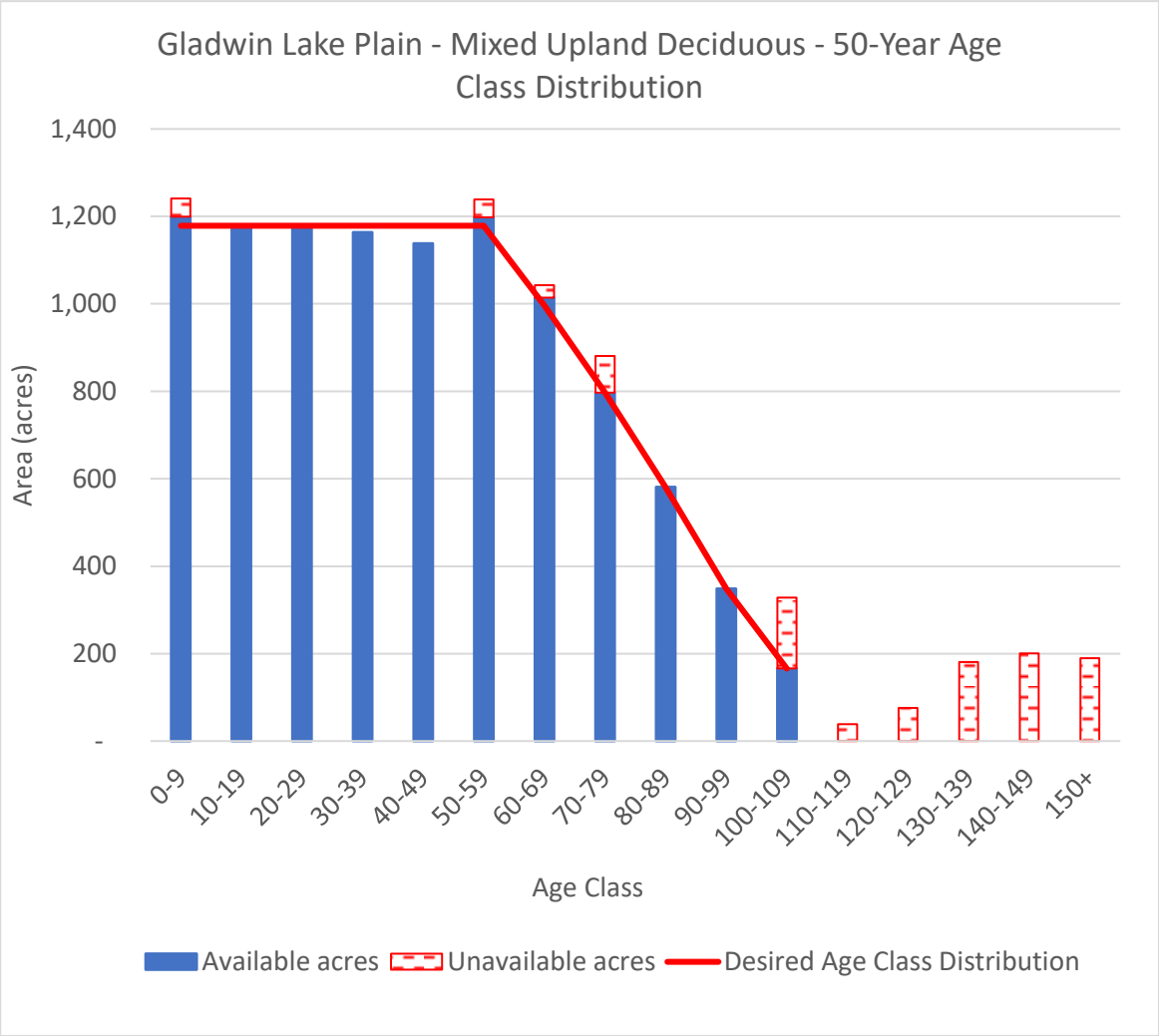


Figure 15. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate on the manageable acres of mixed upland deciduous cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 17).

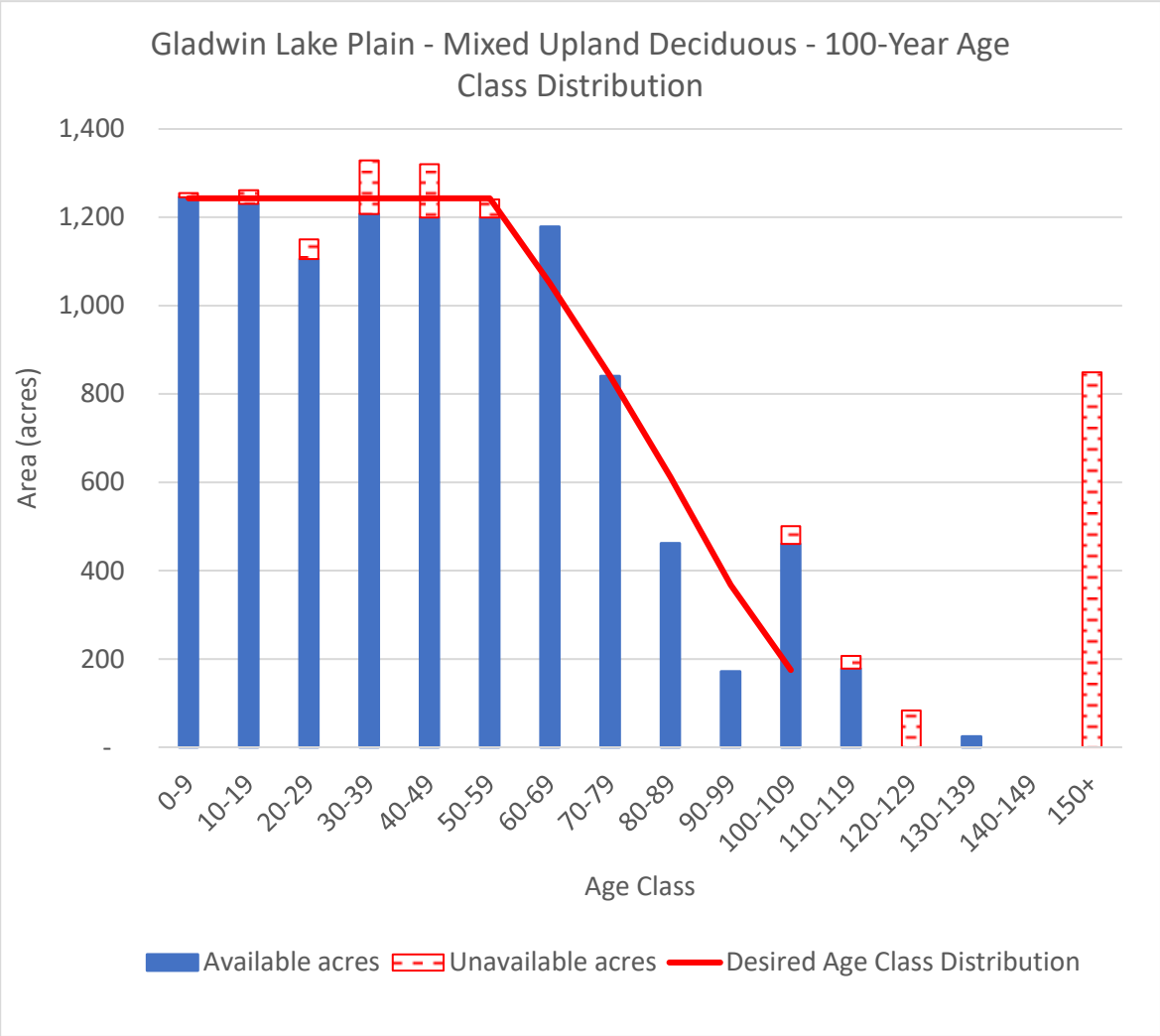


Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

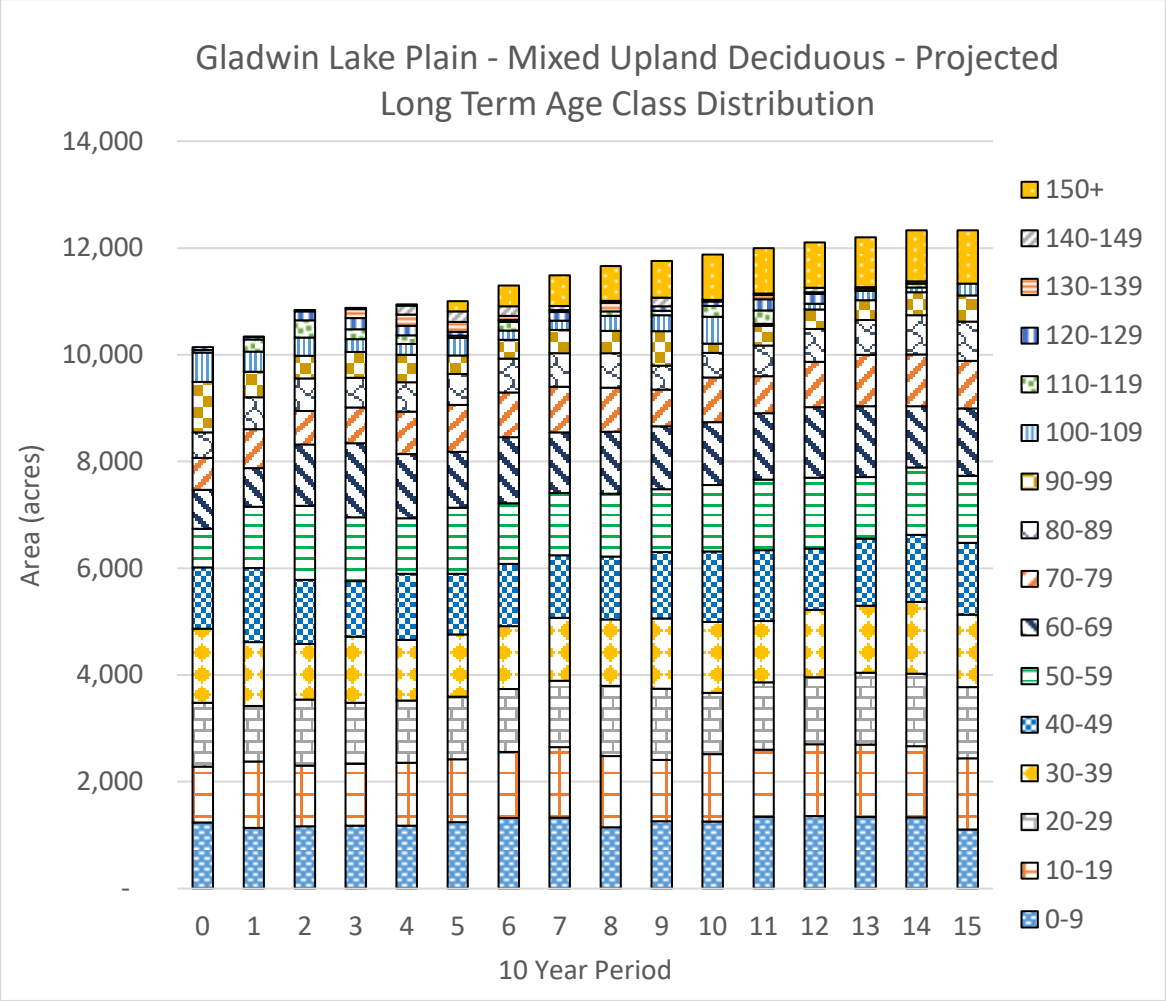


Figure 17. Projected age class distribution for all acres of mixed upland deciduous over the next 150 years.

Management actions

There are 939 acres of projected clearcut harvest and 680 acres of shelterwood in the mixed upland deciduous cover type during the planning period. There are also predicted to be 196 acres to be converted into this cover type. This is close to the desired establishment of 1,082 acres of mixed upland deciduous per decade.

Lowland aspen/balsam poplar

Current condition

The Gladwin Lake Plain Management Area has well balanced acres in the 0- to 9-year age class that was created due to the harvesting of mature and over-mature acres on the landscape during the last planning period (

Figure 18). The age class distribution is currently unbalanced across almost all the age class categories besides the 0- to 9-year age class. The surplus of acres in the 30- to 39-year-old age class is from the previous initiative of the Deer Range Improvement Program. Lowland deciduous and lowland aspen/balsam poplar will sometimes transition into each other's cover types post-harvest. The unavailable landscape position on which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 50 years old.

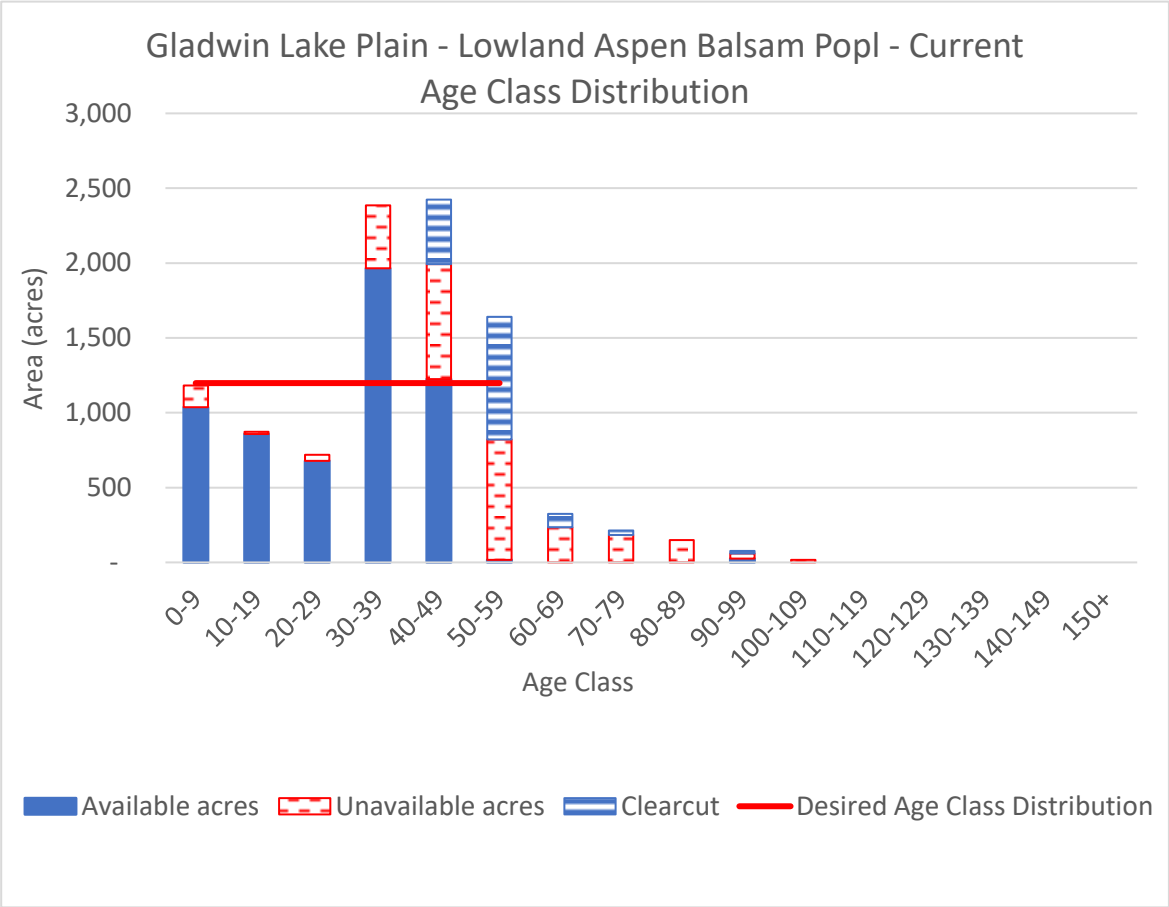


Figure 18. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Table 12. Featured species with lowland aspen/balsam poplar as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Aspen/Balsam Poplar	Lowland Aspen/Balsam Poplar Habitat Acres - Available	Lowland Aspen/Balsam Poplar Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Category: Sapling	1,895	159
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	1,895	159

Desired future condition

The projected long-term cover type trend for lowland aspen/balsam poplar is stable in the Gladwin Lake Plain Management Area. There are very few transitions in and out of this cover type during this planning period with only a projected 24-acre decrease.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available lowland aspen/balsam poplar acres.

The end of the planning period will result in the establishment of approximately 1,352 acres of lowland aspen/balsam poplar from the available acres (Figure 19). Progress toward the long-term desired age class distribution of lowland conifers will take many decades to achieve the desired balanced age class condition.

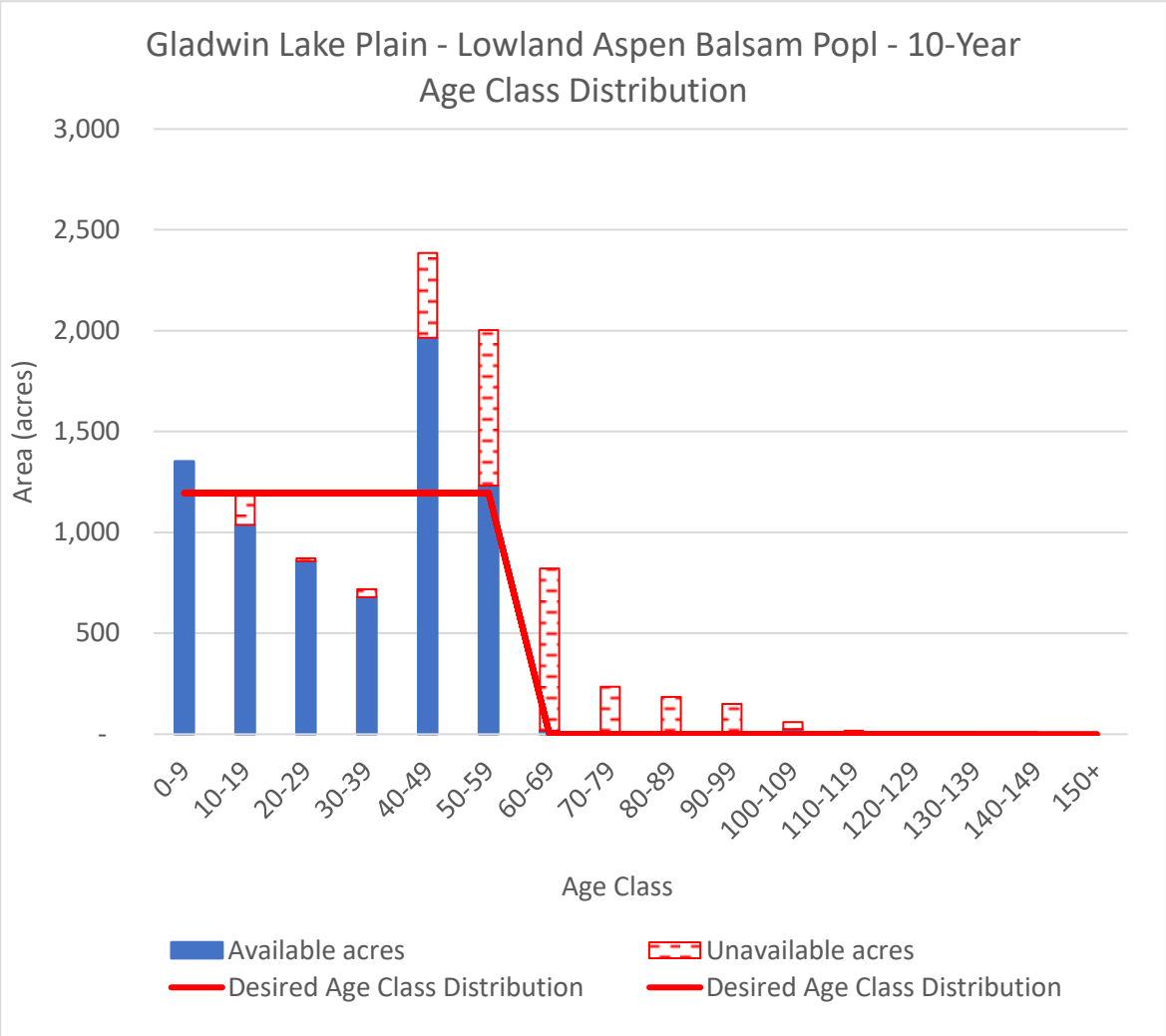


Figure 19. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of lowland aspen/balsam poplar is nearing the desired future condition for available acres in the age classes (Figure 20). The number of acres in the older age classes, 80 years and older, continues to increase as the unavailable acres continue to move to the older age classes.

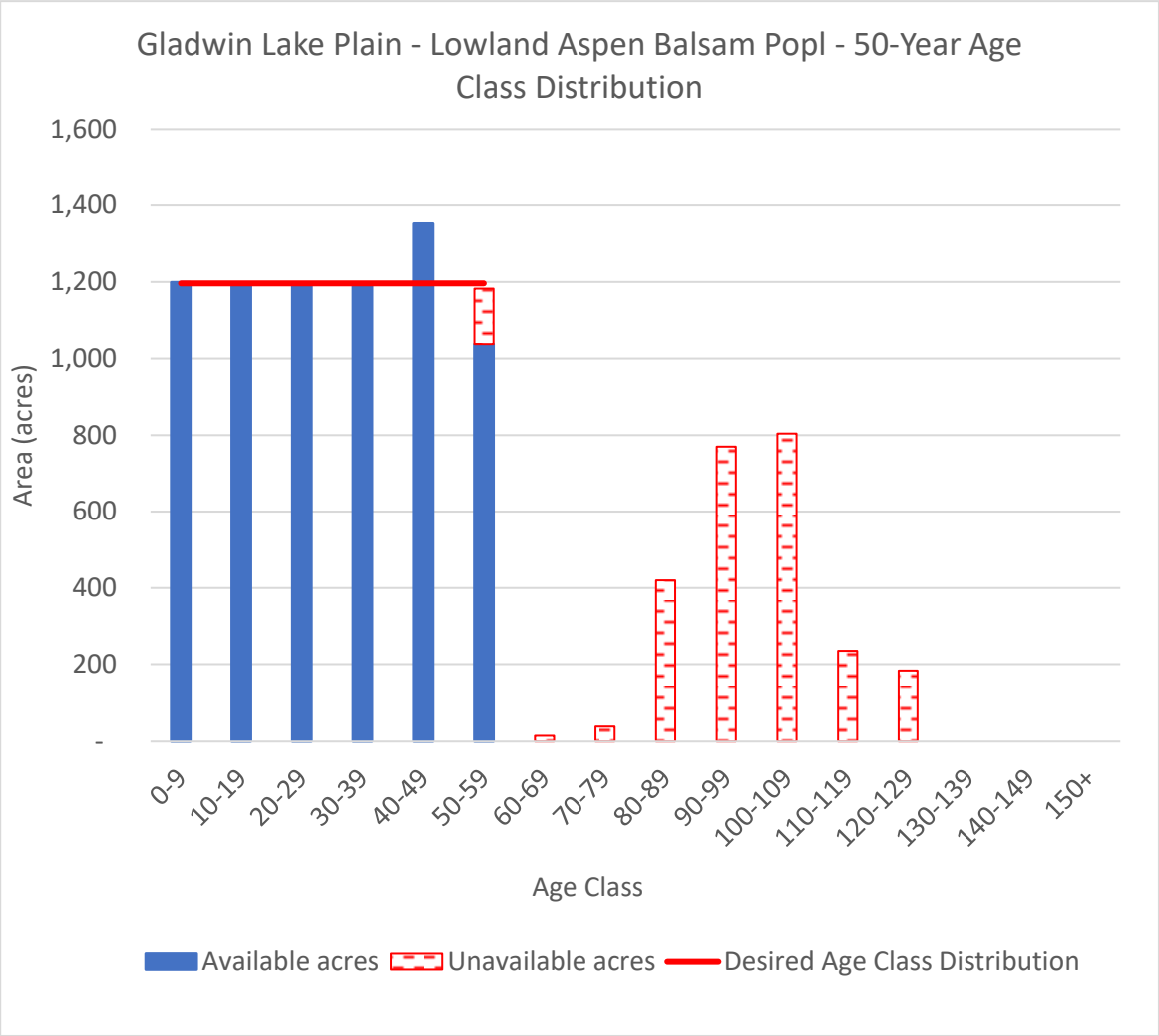


Figure 20. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 21) will concentrate on the manageable acres of lowland aspen/balsam poplar cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest (Figure 22) The older age classes will most likely be converting into the lowland deciduous cover type as the lowland aspen age out.

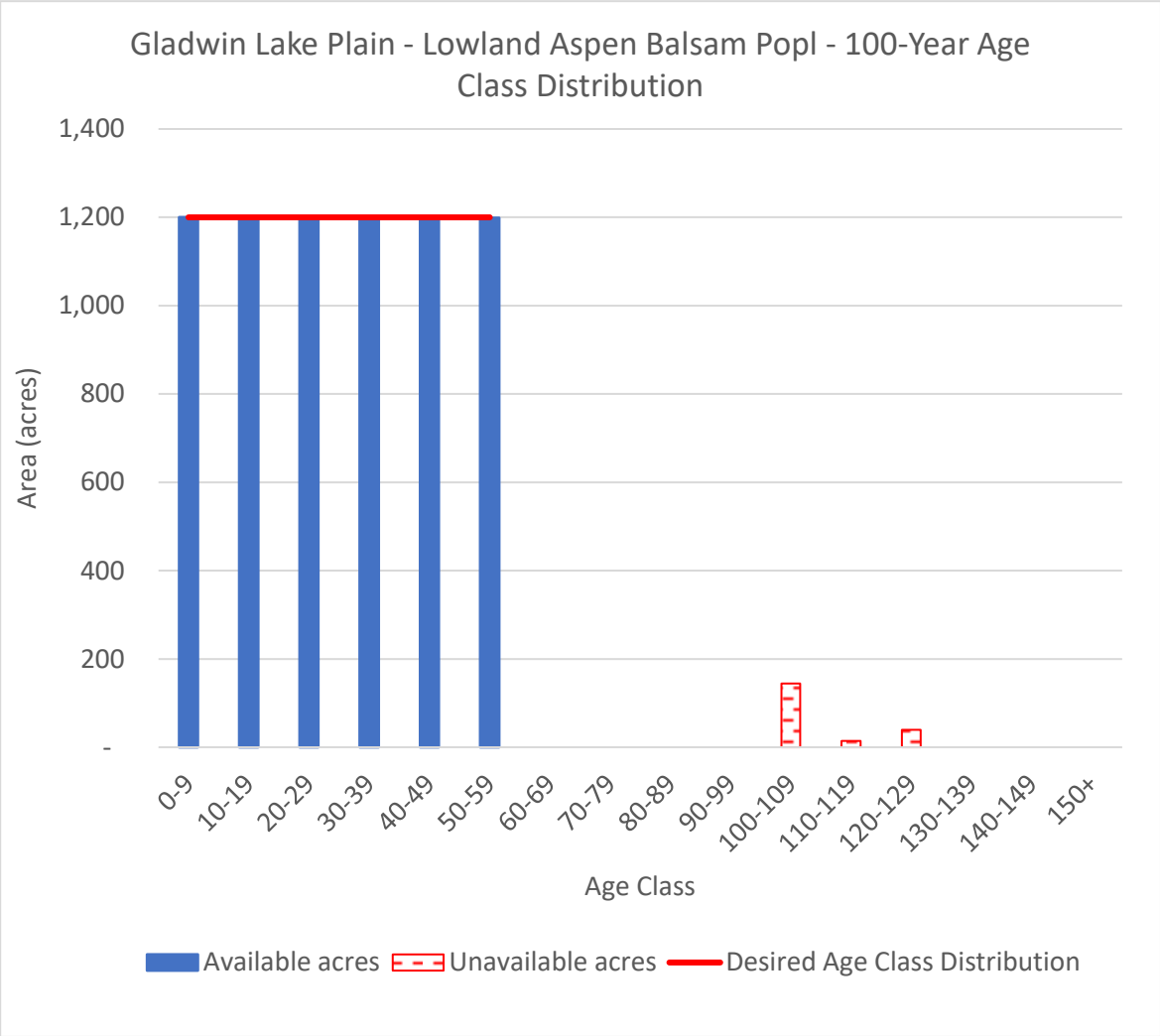


Figure 21. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

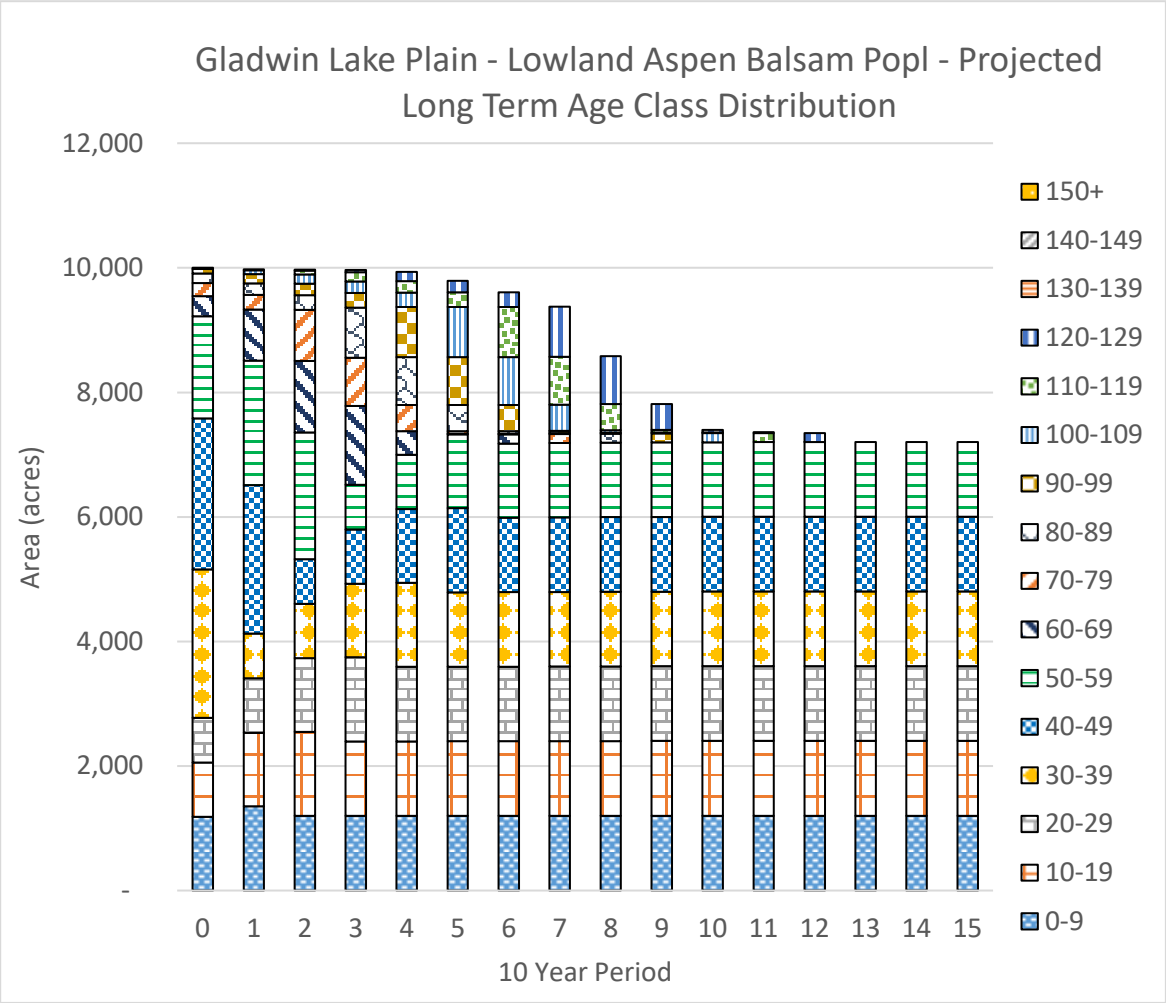


Figure 22. Projected age class distribution for all acres of lowland aspen/balsam poplar over the next 150 years.

Management actions

There are 1,385 acres of projected clearcut harvest in the lowland aspen/balsam poplar cover type during the planning period. This is just above the desired establishment of 1,194 acres of lowland aspen/balsam poplar per decade because of the current unbalanced age class condition in the older age classes of 50-plus.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas (HCVAs) within Gladwin Lake Plain Management Area.

High Conservation Value Area Type and Name	Acres
Dedicated Management Area's	**12,974**
--	12,974
Eastern Massasauga Managed Land	**2,589**
--	2,589
Natural Rivers Vegetative Buffer	**315**
--	315
Natural Rivers Zoning District	**879**
--	879
State Wildlife Management Areas	**7,909**
Bentley Marsh Flooding SWMA	1,474
Molasses Impoundments 4 Flooding SWMA Un	1,801
Molasses Impoundments 5 Flooding SWMA Un	1,481
Molasses River Flooding No.1 SWMA	1,642
Molasses River Flooding No.2 SWMA	1,510
GEMS	**11,335**
Lame Duck Foot Access Area	11,335
Grand Total	**36,000**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 15. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Floodplain Forest	BC	G3?	S3	1
Existing ERA	Rich Conifer Swamp	C	-	-	1
Grand Total	**-**	**-**	**-**	**-**	**2**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 16) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within Gladwin Lake Plain Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer		**526**
--		333
Bear Creek		13
Big Creek		21
Cursten Creek		18
Harwood Creek		2
Hettinger Creek		21
Klacking Creek		20
Mayhue Creek		4
Parmalee Creek		17
Prior Creek		21
Rifle River		44
Spring Creek		12
Designated Trout and Coldwater Streams	**19.1**	
--	12.0	-
Bear Creek	0.5	-
Big Creek	0.8	-
Cursten Creek	0.7	-
Harwood Creek	0.1	-
Hettinger Creek	0.8	-
Klacking Creek	0.7	-
Mayhue Creek	0.2	-
Parmalee Creek	0.6	-

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Prior Creek	0.8	-
Rifle River	1.6	-
Spring Creek	0.4	-
Important Bird Areas	**-**	**143,020**
Gladwin Lake Plain	-	143,020
Mussel Stream Group 1 - State special concern	**6.6**	**-**
Dice Drain-Chippewa River	3.8	-
Molasses River	2.8	-
Mussel Stream Group 2 - State threatened or endangered	**2.1**	**-**
Bluff Creek	0.1	-
East Branch Tittabawassee River	0.5	-
Klacking Creek-Rifle River	1.1	-
Molasses River	0.4	-
Mussel Stream Group 3 - Federally threatened or endangered	**2.0**	**-**
Black Creek-Tittabawassee River	0.1	-
East Branch Tittabawassee River	0.3	-
Middle Branch Tittabawassee River	1.6	-
Wood Turtle Stream 100ft Buffer		**212**
Au Gres River	-	13
Chippewa River	-	60
Johnson Creek	-	8
Middle Branch Tittabawassee River	-	35
Mud Creek	-	17
Rifle River	-	8
Salt Creek	-	53
Salt River	-	18
Wood Turtle Stream 660ft Buffer	**-**	**1,293**
--	-	34
Au Gres River	-	109
Chippewa River	-	335
Johnson Creek	-	37
Middle Branch Tittabawassee River	-	236
Mud Creek	-	115
Rifle River	-	50
Salt Creek	-	279
Salt River	-	99
Grand Total	**29.8**	**145,051**

Table 17. Static special conservation areas within Gladwin Lake Plain Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer	**-**	**526**
<Null>	-	333
Bear Creek	-	13
Big Creek	-	21
Cursten Creek	-	18
Harwood Creek	-	2
Hettinger Creek	-	21
Klacking Creek	-	20
Mayhue Creek	-	4
Parmalee Creek	-	17
Prior Creek	-	21
Rifle River	-	44
Spring Creek	-	12
Designated Trout and Coldwater Streams	**19.1**	**-**
<Null>	12.0	-
Bear Creek	0.5	-
Big Creek	0.8	-
Cursten Creek	0.7	-
Harwood Creek	0.1	-
Hettinger Creek	0.8	-
Klacking Creek	0.7	-
Mayhue Creek	0.2	-
Parmalee Creek	0.6	-
Prior Creek	0.8	-
Rifle River	1.6	-
Spring Creek	0.4	-
Important Bird Areas	**-**	**143,020**
Gladwin Lake Plain	-	143,020
Mussel Stream Group 1 - State special concern	**6.6**	**-**
Dice Drain-Chippewa River	3.8	-
Molasses River	2.8	-
Mussel Stream Group 2 - State threatened or endangered	**2.1**	**-**
Bluff Creek	0.1	-
East Branch Tittabawassee River	0.5	-
Klacking Creek-Rifle River	1.1	-
Molasses River	0.4	-

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Mussel Stream Group 3 - Federally threatened or endangered	**2.0**	**-**
Black Creek-Tittabawassee River	0.1	-
East Branch Tittabawassee River	0.3	-
Middle Branch Tittabawassee River	1.6	-
Wood Turtle Stream 100ft Buffer	**-**	**212**
Au Gres River	-	13
Chippewa River	-	60
Johnson Creek	-	8
Middle Branch Tittabawassee River	-	35
Mud Creek	-	17
Rifle River	-	8
Salt Creek	-	53
Salt River	-	18
Wood Turtle Stream 660ft Buffer	**-**	**1,293**
--	-	34
Au Gres River	-	109
Chippewa River	-	335
Johnson Creek	-	37
Middle Branch Tittabawassee River	-	236
Mud Creek	-	115
Rifle River	-	50
Salt Creek	-	279
Salt River	-	99
Grand Total	**29.8**	**145,051**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 18, Table 20 and Table 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal occurrence within Gladwin Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	-	1
Animal	Alasmidonta viridis	Slippershell	T	-	3
Animal	Bombus affinis	Rusty-patched bumble bee	E	LE	1
Animal	Bombus pensylvanicus	American bumble bee	E	-	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	-	4
Animal	Cambarus robustus	Big water crayfish	SC	-	3
Animal	Chlidonias niger	Black tern	T	-	1
Animal	Emydoidea blandingii	Blanding's turtle	SC	-	6
Animal	Gavia immer	Common loon	T	-	2
Animal	Glaucomys sabrinus	Northern flying squirrel	SC	-	1
Animal	Glyptemys insculpta	Wood turtle	T	-	9
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	14
Animal	Lasmigona compressa	Creek heelsplitter	SC	-	1
Animal	Lasmigona costata	Flutedshell	SC	-	1
Animal	Lithobates palustris	Pickerel frog	SC	-	1
Animal	Merolonche dolli	Doll's merolonche	SC	-	2
Animal	Moxostoma duquesnei	Black redhorse	SC	-	1
Animal	Myotis lucifugus	Little brown bat	T	-	1
Animal	Necturus maculosus	Mudpuppy	SC	-	6
Animal	Opheodrys vernalis	Smooth green snake	SC	-	1
Animal	Percina copelandi	Channel darter	E	-	4
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	1
Animal	Venustaconcha ellipsiformis	Ellipse	SC	-	2
Total	-	-	-	-	**67**

Table 20. Rare plant occurrence within Gladwin Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Aristida longespica	Three-awned grass	SC	-	1
Plant	Carex haydenii	Hayden's sedge	X	-	1
Plant	Carex seorsa	Sedge	T	-	1
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC	-	1
Plant	Juncus dichotomus	Forked rush	SC	-	1
Plant	Lithospermum latifolium	Broad-leaved puccoon	SC	-	2
Plant	Lycopus virginicus	Virginia water-horehound	SC	-	1
Total	-	-	-	-	**8**

Table 21. Other rare occurrences within Gladwin Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	-	Great blue heron rookery	-	-	4
Total	-	-	-	-	**4**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 22).

Table 22. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non-ecological reference area natural communities within Gladwin Lake Plain Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Floodplain Forest	BC	S3	G3?	1
Rich Conifer Swamp	C	S3	G4	1
Total	-	-	-	**2**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Gladwin Lake Plain management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	-

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 25. Maladies of concern in the Gladwin Lake Plain management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	-
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 181 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as warm types comprise approximately 96% of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	2
Cold Small River	0
Cold Transitional Stream	5
Cold Transitional Small River	0
Cold Transitional Large River	0
Warm Transitional Stream	70
Warm Transitional Small River	7
Warm Transitional Large River	6
Warm Stream	85
Warm Small River	3
Warm Large River	3

Lacustrine habitat

A total of 32 lakes and ponds of at least 1 surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	26
100-499	4
500+	2

Wetlands

A total of 75,103 acres of wetlands are found in the management area (Table 28). Forested wetlands comprise approximately 94% of wetland types found in the management area.

Table 28. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	4,230
Forested	70,618
Riverine	255

Vernal pools and seeps

A total of 874 acres of vernal pools and seeps have been inventoried in the management area and 333 acres of seeps have been identified.

Riparian vegetation cover

Aspen and lowland deciduous are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 29).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Aspen	5,649
Lowland Deciduous	5,128
Lowland Shrub	3,705
Marsh	1,741
Mixed Upland Deciduous	1,457
Lowland Aspen/Balsam Poplar	1,313
Black-Red Hybrid Oak	808
Lowland Conifers	603
Northern Hardwood	380
Natural White Pine	377

Watershed vegetation cover

The management area includes portions of important watersheds of the Maple Crooked rivers (Table 30 & Table 31). Aspen and lowland deciduous are major cover types of the state forest in each watershed.

Table 30. Largest vegetative cover types (i.e., top five) and area of the Maple River watershed located within the management area.

Cover Type	Acres
Aspen	8,131
Lowland Deciduous	7,881
Lowland Shrub	2,502
Mixed Upland Deciduous	2,295
Lowland Aspen/Balsam Fir	1,795

Table 31. Largest vegetative cover types (i.e., top five) and area of the Crooked River watershed located within the management area.

Cover type	Acres
Aspen	34,110
Lowland Deciduous	23,815
Lowland Shrub	15,644
Lowland Aspen/Balsam Fir	7,442
Mixed Upland Deciduous	7,104

Recreation

Access in the Gladwin Lake Plain Management Area is primarily by dirt road, two-tracks and the Gladwin Trail. Seasonal flooding due to a high-water table may limit access in some areas. This management area is near the communities of Midland, Mount Pleasant and Gladwin and accessible from the population centers of southern Michigan. The high level of use results in some illegal ORV activities and trash dumping.

Off-road vehicle trails in this management area are extensive and include the Gladwin Route and Trail, M-30 North Gladwin MCCCT and the M-30 to St. Helen #3 MCCCT. Nonmotorized trails include 32.7 miles of the Midland to Mackinaw Boy Scout trail (hiking) and the Pine Haven Pathway which is designated for bike and hike use.

There is one state forest campground (rustic) within the management area, with access to Black Creek.

Table 32. Designated Recreation Trails by type

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types)	35.2
	Snowmobile	0
Nonmotorized Recreation Trails	Hiking	41.3
	Equestrian	0
	Biking	8.6
	Hunter Access Trails	15.2
-	-	**100.3**

Note: Trail-use types may overlap.

Table 33. State forest campgrounds.

State Forest Campground	# of sites
Black Creek	23

This area is popular for hunting, with several floodings managed for wildlife. The Lame Duck Foot Access Area is one of the largest Grouse Enhanced Management Site in the state, with several access points and over 15 miles of hunter walking trails providing access to thousands of acres of land managed primarily for bird hunting.

The Rifle River, a designated natural river, flows through the area with three boating access sites on state forest land and additional access in the nearby Rifle River Recreation Area. The river is popular for canoeing and kayaking. It also provides access to Secord Lake/Tittabawassee River and several smaller inland lakes.

Table 34. Areas managed for hunting

Type	Name	# of Acres
State Wildlife Management Area	Bentley Marsh Flooding	1,473.20
--	Molasses Impoundments 4 Flooding	1,800.20
--	Molasses Impoundments 5 Flooding	1,480.40
--	Molasses River Flooding No.1	1,641.80
--	Molasses River Flooding No.1	1,508.90
--	Kawkawlin Creek Flooding	2,933.00
Grouse Enhanced Management Site	Lame Duck Foot Access Area	11,323.60
Total	**Six locations**	**22,161.10**

Table 35. Boating access sites.

Name	Waterbody
Bass Lake	Bass Lake
Big & Little Williams Lake	Big & Little Williams Lake
Bougner Lake	Bougner Lake
Henderson Lake	Henderson Lake
Kenneth Road Rifle River	Rifle River
Klacking Creek	Rifle River
Moffatt Bridge	Rifle River
Sandford Lake	Sandford Lake
Secord Lake - East	Secord Lake (Tittabawassee River)
Secord Lake - North	Secord Lake (Tittabawassee River)

Grand Traverse Moraine

State Forest Area: 95,850 acres	Location: Benzie, Grand Traverse, Leelanau and Manistee counties	Population Centers: Traverse City, Copemish, Benzonia, Frankfort, Kingsley and Honor
Subsection: Grand Traverse Ground Moraine, Manistee Sandy Outwash Plain and Kalskaska Sandy Moraines	Landforms: High outwash plain, Moraine ridges, Lake plain	Landcover: Forested: 84,186 acres Nonforested: 11,664 acres

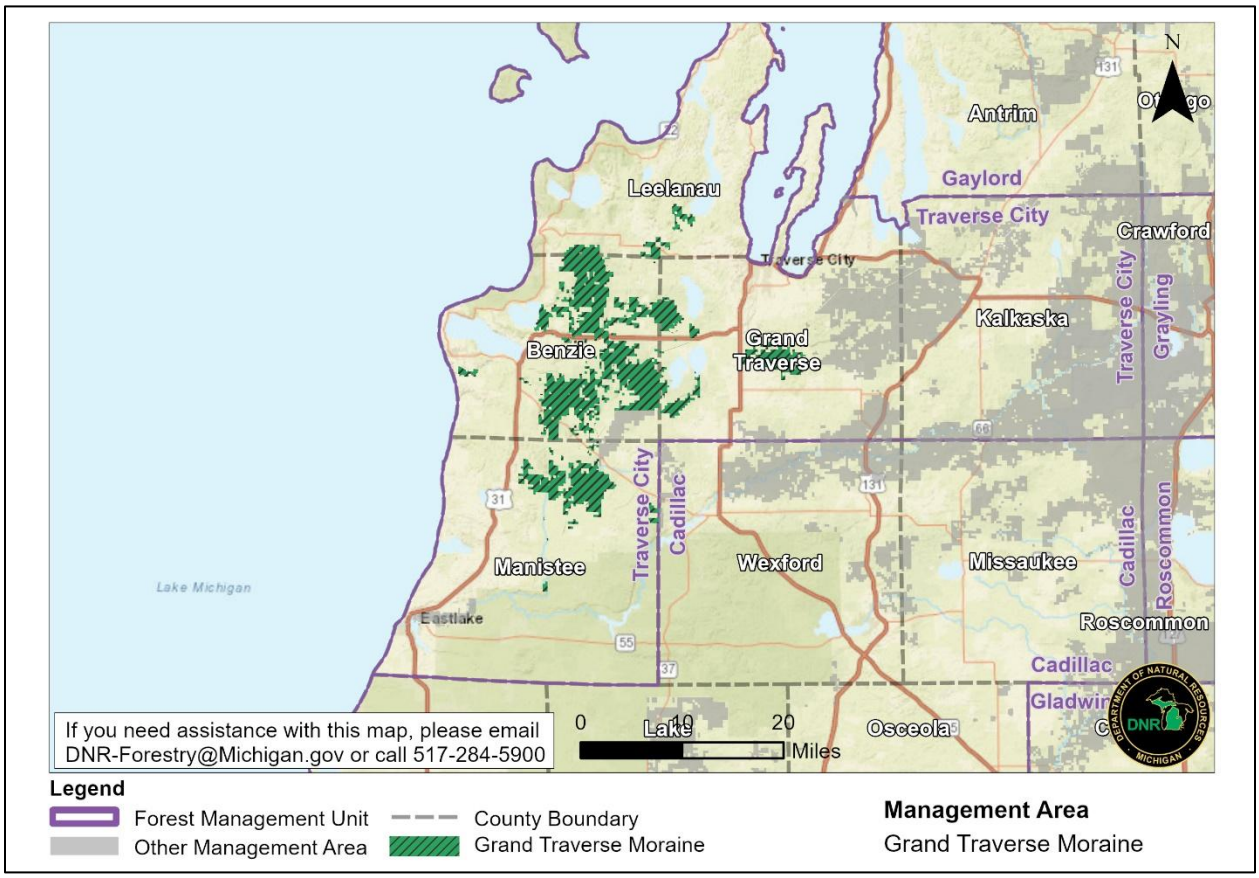


Figure 1. Grand Traverse Moraine Management Area.

Forested landscape

Current and projected future condition

The Grand Traverse Moraine Management Area is dominated by aspen, northern hardwood, planted red pine and lowland deciduous cover types that are largely upland and available. The Forest Diversity Matrix (Figure 2) provides a coarse representation of how forested acres are distributed across the landscape. Shade intolerant available upland cover types are relatively evenly distributed across the young, intermediate and mid-aged categories. The unavailable lowland acres are more prevalent in the mature age category. Mid-tolerant are mostly located in the mid-aged and mature age categories.

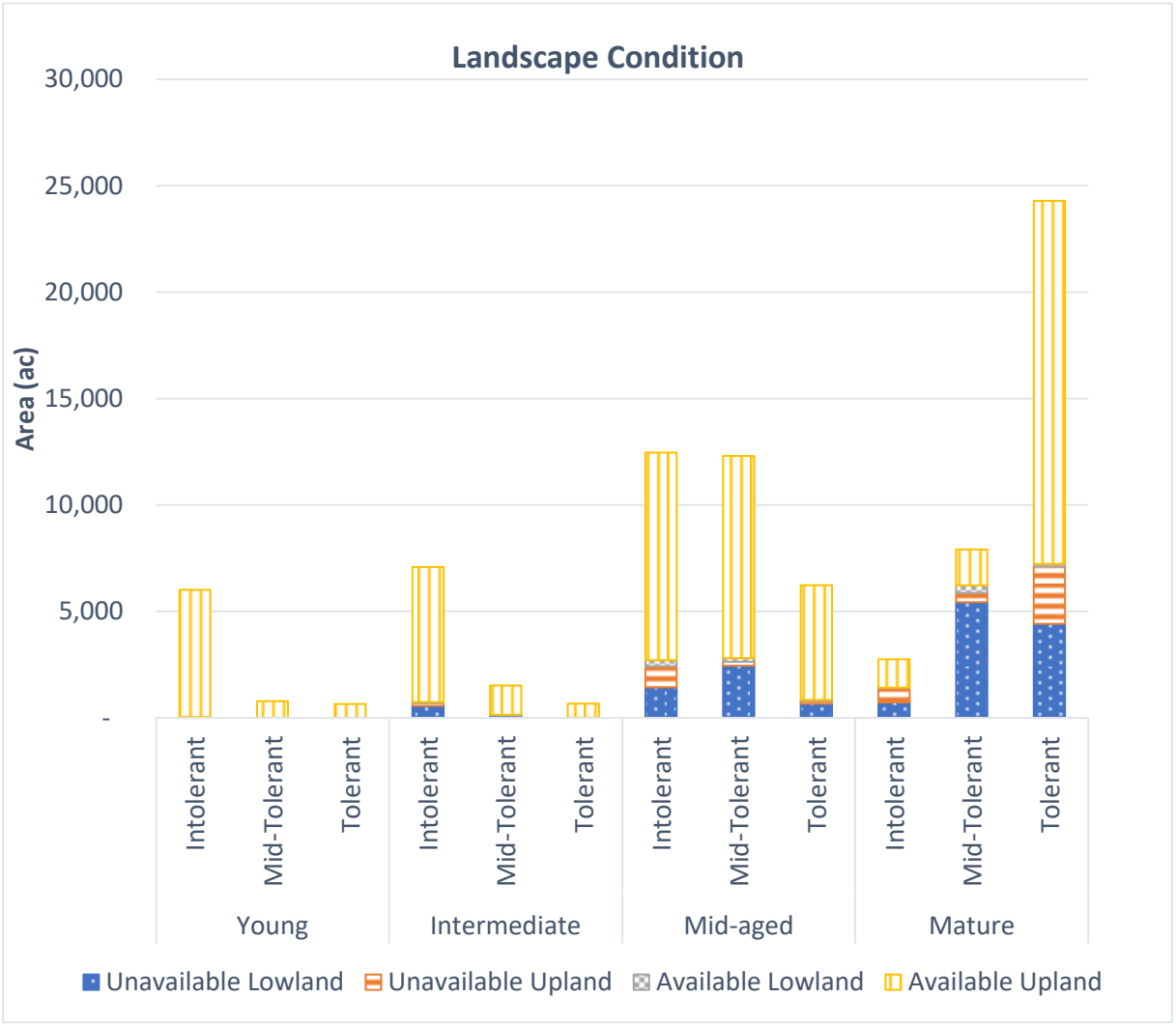


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	6,009
Mature Forest	Acres of 80+ year stands across cover types	34,966
Mature Forest	Acres of 120+ year stands across cover types	962
Mesic Conifer Cover types	Acres of mesic conifer cover types	2,387
Mesic Conifers in other Cover types	Average canopy occupancy	14%
Mast – Oak Cover types	Acres of oak cover types	1,579
Mast Tree Species in other Cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	56,362
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	50,724
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	3,409
Landscape Forest Matrix	Percent deciduous forest	71%
Landscape Forest Matrix	Percent coniferous forest	24%

The Grand Traverse Moraine Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management Site (GEMS) – Little Betsie

The Grand Traverse Moraine Management Area is dominated by forested cover types with 88% of the area covered in forested stands (

Table 2). The upland deciduous portion of that is 53% of the management area and comprised mostly of northern hardwood and aspen. Low density trees and herbaceous openland are the most common nonforested cover type in this management area representing 4% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	24,648	50,470	67,228	84,186
			Northern Hardwood	22,040			
			Black Red Hybrid Oak	167			
			Northern Red Oak	1,138			
			Oak Mix	274			
			Mixed Upland Deciduous	2,204			
		Mixed	Upland Mixed Forest	2,207	2,207		
		Coniferous	Planted Red Pine	8,708	14,551		
			Planted Jack Pine	340			
			Planted White Pine	1,771			
			Planted Mixed Pine	530			
			Natural Red Pine	118			
			Natural Jack Pine	696			
			Natural White Pine	1,581			
			Natural Mixed Pines	372			
			Upland Spruce/Fir	326			
			Upland Conifers	93			
			Hemlock	15			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	2,398	9,244	16,958	
			Lowland Deciduous	6,847			
		Mixed	Lowland Mixed Forest	1,705	1,705		
		Coniferous	Cedar	3,182	6,009		
			Lowland Conifers	2,092			
			Lowland Spruce/Fir	17			
			Tamarack	718			
Nonforested	Upland	N/A	Herbaceous Openland	2,354	N/A	6,588	11,664
			Upland Shrub	965			
			Low Density Trees	2,334			
			Bare/Sparsely Vegetated	300			
			Cropland	90			
			Urban	545			
			Lowland Shrub	1,585			
			Marsh	1,790			

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Nonforested	Lowland	N/A	Bog	286	N/A	5,076	11,664
			Treed Bog	124			
			Water	1,291			
						Grand Total:	95,850

There are 63,059 acres (65.7% of the total management area and 74.9% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Grand Traverse Moraine Management Area (Table 3). Of that, almost 28% is in the aspen cover type, 23.2% in northern hardwood, and 10.2% in planted red pine. The remaining 22 cover types represent less than 3% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	23,315	27.7%	1,333	1.6%	24,648	29.3%
Northern Hardwood	19,546	23.2%	2,494	3.0%	22,040	26.2%
Planted Red Pine	8,602	10.2%	106	0.1%	8,708	10.3%
Lowland Deciduous	491	0.6%	6,356	7.6%	6,847	8.1%
Cedar	43	0.1%	3,139	3.7%	3,182	3.8%
Lowland Aspen Balsam Poplar	362	0.4%	2,035	2.4%	2,398	2.8%
Upland Mixed Forest	2,035	2.4%	172	0.2%	2,207	2.6%
Mixed Upland Deciduous	1,995	2.4%	209	0.2%	2,204	2.6%
Lowland Conifers	127	0.2%	1,965	2.3%	2,092	2.5%
Planted White Pine	1,738	2.1%	33	0.0%	1,771	2.1%
Lowland Mixed Forest	72	0.1%	1,633	1.9%	1,705	2.0%
Natural White Pine	1,288	1.5%	293	0.3%	1,581	1.9%
Northern Red Oak	728	0.9%	410	0.5%	1,138	1.4%
Tamarack	18	0.0%	700	0.8%	718	0.9%
Natural Jack Pine	691	0.8%	5	0.0%	696	0.8%
Planted Mixed Pine	516	0.6%	13	0.0%	530	0.6%
Natural Mixed Pines	371	0.4%	2	0.0%	372	0.4%
Planted Jack Pine	310	0.4%	30	0.0%	340	0.4%
Upland Spruce Fir	244	0.3%	82	0.1%	326	0.4%
Oak Mix	243	0.3%	31	0.0%	274	0.3%
Black Red Hybrid Oak	153	0.2%	14	0.0%	167	0.2%
Natural Red Pine	112	0.1%	7	0.0%	118	0.1%
Upland Conifers	61	0.1%	32	0.0%	93	0.1%
Lowland Spruce Fir	0	0.0%	17	0.0%	17	0.0%
Hemlock	0	0.0%	15	0.0%	15	0.0%
Total	**63,059**	**74.9%**	**21,126**	**25.1%**	**84,186**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason Area is Unavailable for Commercial Harvest)	Acres	% of Unavailable Area
Too Wet	12,761	60.4%
Conservation Values	2,905	13.8%
Too Steep	1,522	7.2%
Recreation/Scenic	790	3.7%
Best Management Practices	738	3.5%
Other Influence Zones	585	2.8%
Long-Term Retention	429	2.0%
Blocked by Obstacle	393	1.9%
Other Dept./Div. Processes	243	1.2%
Species of special concern or T&E	162	0.8%
Denied Access	158	0.7%
Wildlife Concerns	154	0.7%
Deer Wintering Area	92	0.4%
Cannot Regenerate	84	0.4%
Federal/State/Local Law	83	0.4%
Non-DNR agency concerns	21	0.1%
Rare Landforms	3	0.0%
Non-Military Lease/Easement	1	0.0%
Total Unavailable	**21,126**	**100%**

Projected 10-year cover type management actions

Each cover type in the Grand Traverse Moraine Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvest levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 326,734 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern Hardwood	157	5,494	-	294	151	-	-	6,097
Planted Red Pine	245	-	3,873	-	-	-	-	4,118
Aspen	2,813	-	-	-	-	-	-	2,813
Mixed Upland Deciduous	1,032	255	-	-	-	-	-	1,287
Planted White Pine	-	-	878	-	-	-	-	878
Upland Mixed Forest	825	-	-	-	-	-	-	825
Natural White Pine	-	-	111	-	120	-	-	231
Upland Spruce/Fir	206	-	-	-	-	-	-	206
Northern Red Oak	146	-	-	-	-	-	-	146
Planted Mixed Pine	13	-	116	-	-	-	-	129
Black Red Hybrid Oak	129	-	-	-	-	-	-	129
Lowland Aspen/Balsam Poplar	86	-	-	-	-	-	-	86
Planted Jack Pine	71	-	-	-	-	-	-	71
Lowland Deciduous	47	3	-	-	-	-	-	50
Upland Conifers	37	-	-	-	3	-	-	40
Natural Jack Pine	26	-	-	-	-	-	-	26
Lowland Conifers	25	-	-	-	-	-	-	25
Natural Mixed Pines	-	-	10	-	10	-	-	20
Oak Mix	-	-	8	-	-	-	-	8
Lowland Mixed Forest	7	-	-	-	-	-	-	7
Totals	**5,865**	**5,752**	**4,995**	**294**	**285**	**-**	**-**	**17,190**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Grand Traverse Moraine Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared** ***
Pulpwood (cords)	Mixed Hardwood	47,614	44,757
	Red Pine	32,576	30,621
	Mixed Aspen	25,411	23,886
	Mixed Softwood	11,980	11,261
	Mixed Spruce	10,842	10,191
	White Pine	10,659	10,019
	Mixed Oak	3,626	3,408
	Jack Pine	2,073	1,949
	Pulpwood Total	**144,779**	**136,092**
Sawtimber (MBF)	Red Pine	31,327	29,448
	Sugar Maple	17,777	16,711
	Mixed Aspen	10,781	10,134
	White Pine	8,701	8,179
	Red Maple	6,348	5,967
	Red Oak	4,748	4,463
	Basswood	2,545	2,392
	Mixed Oak	1,047	984
	White Oak	1,007	947
	Sawtimber Total	**84,282**	**79,225**
	Total Sawtimber Harvest Volume in Cords	**181,955**	**171,038**
	Grand Total Harvest Volume in Cords	**326,734**	**307,130**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are a few cover type transitions projected in the Grand Traverse Moraine Management Area (Table 7). The managed area of each cover type is projected to remain relatively stable as treatment regimes will not change the amount of area in each cover type more than 3% except for upland mixed forest, mixed upland deciduous, northern red oak, planted jack pine upland spruce/fir, oak mix, black

red hybrid oak, and upland conifers. Many of the species listed above is due to being smaller in number of total acres in those cover types inflating the percentage change. The largest acreage decrease forecasted is in the mixed upland deciduous cover type where 414 acres are forecasted to convert to other cover types through forest management activities. The largest increase in acres is the aspen cover type where 526 acres are expected to convert into it, increasing by 2%.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	24,648	25,174	526
Northern Hardwood	22,040	22,189	149
Planted Red Pine	8,708	8,961	253
Lowland Deciduous	6,847	6,848	1
Cedar	3,182	3,182	0
Lowland Aspen/Balsam Poplar	2,398	2,399	2
Upland Mixed Forest	2,207	1,880	-327
Mixed Upland Deciduous	2,204	1,790	-414
Lowland Conifers	2,092	2,080	-12
Planted White Pine	1,771	1,771	0
Lowland Mixed Forest	1,705	1,714	9
Natural White Pine	1,581	1,581	0
Northern Red Oak	1,138	1,042	-96
Tamarack	718	718	0
Natural Jack Pine	696	698	2
Planted Mixed Pine	530	516	-13
Natural Mixed Pines	372	376	4
Planted Jack Pine	340	321	-19
Upland Spruce/Fir	326	141	-185
Oak Mix	274	448	174
Black Red Hybrid Oak	167	140	-27
Natural Red Pine	118	118	0
Upland Conifers	93	66	-27
Lowland Spruce/Fir	17	17	0
Hemlock	15	15	0
Herbaceous Openland	2,354	2,354	0
Low Density Trees	2,334	2,334	0
Marsh	1,790	1,790	0
Lowland Shrub	1,585	1,585	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Water	1,291	1,291	0
Upland Shrub	965	965	0
Urban	545	545	0
Bare/Sparsely Vegetated	300	300	0
Bog	286	286	0
Treed Bog	124	124	0
Cropland	90	90	0
Total:	**95,850**	**95,850**	**0**

Featured species current and projected habitat acres

There are eight featured species in this management area that span various cover types, age classes, and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black Bear	Mast	57,941	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Black-Throated Blue Warbler	Northern hardwoods, mixed upland deciduous	16,388	18,365	10,687	21,219
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	11,628	11,484	6,728	6,785
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	27,208	29,624	23,560	33,623
Ruffed Grouse	Aspen	11,550	11,201	6,661	6,663
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	12,530	12,670	7,613	7,912
Wild Turkey	Nonforested openings	2,444	--	--	--
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	24,551	27,067	20,561	31,288
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

The current age class distribution is quite unbalanced with a deficit of acres in ages 20-29, 40-year-old-age classes to 70-year-old age classes (Figure 3). The younger age class of 0-9 has a surplus of 4,264

acres. To balance the age class will take multiple planning periods with a surplus of acres in the 0-9 age class.

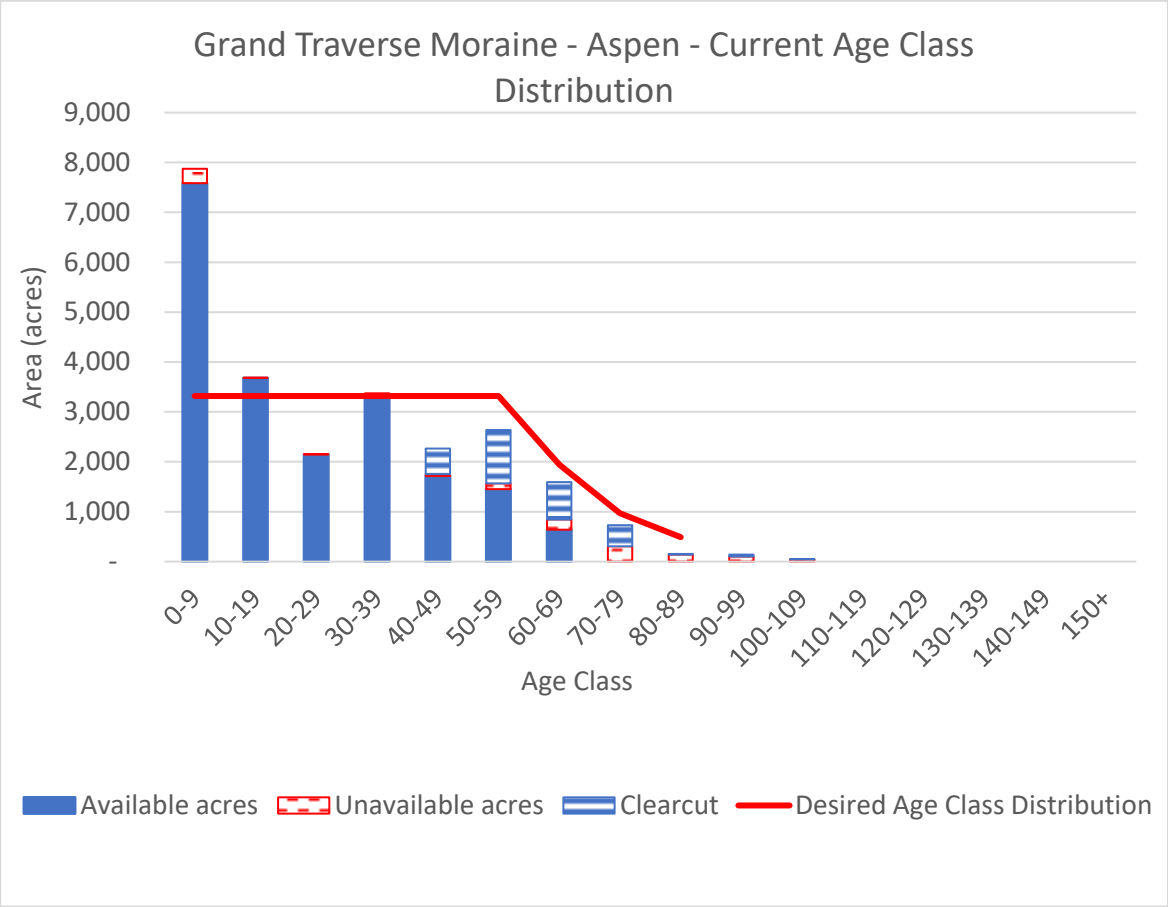


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat)..

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	11,261	289
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	11,261	289
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	11,261	289

Desired future condition

The projected long-term cover type trend for aspen is stable in the Grand Traverse Moraine Management Area with only a 2% increase. There are a few transitions into this cover type from other cover types forecasted in this management area and fewer transitions from aspen to other cover types.

The long-term goal for this cover type is balanced age classes between 0 and 50-years-old with a tail extending to 80- to 89-year-old age class for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to keep vigor in these stands promoting probability of regeneration levels to be higher.

The end of the planning period will result in the establishment of 3,330 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take many decades in this management area (Figure 4).

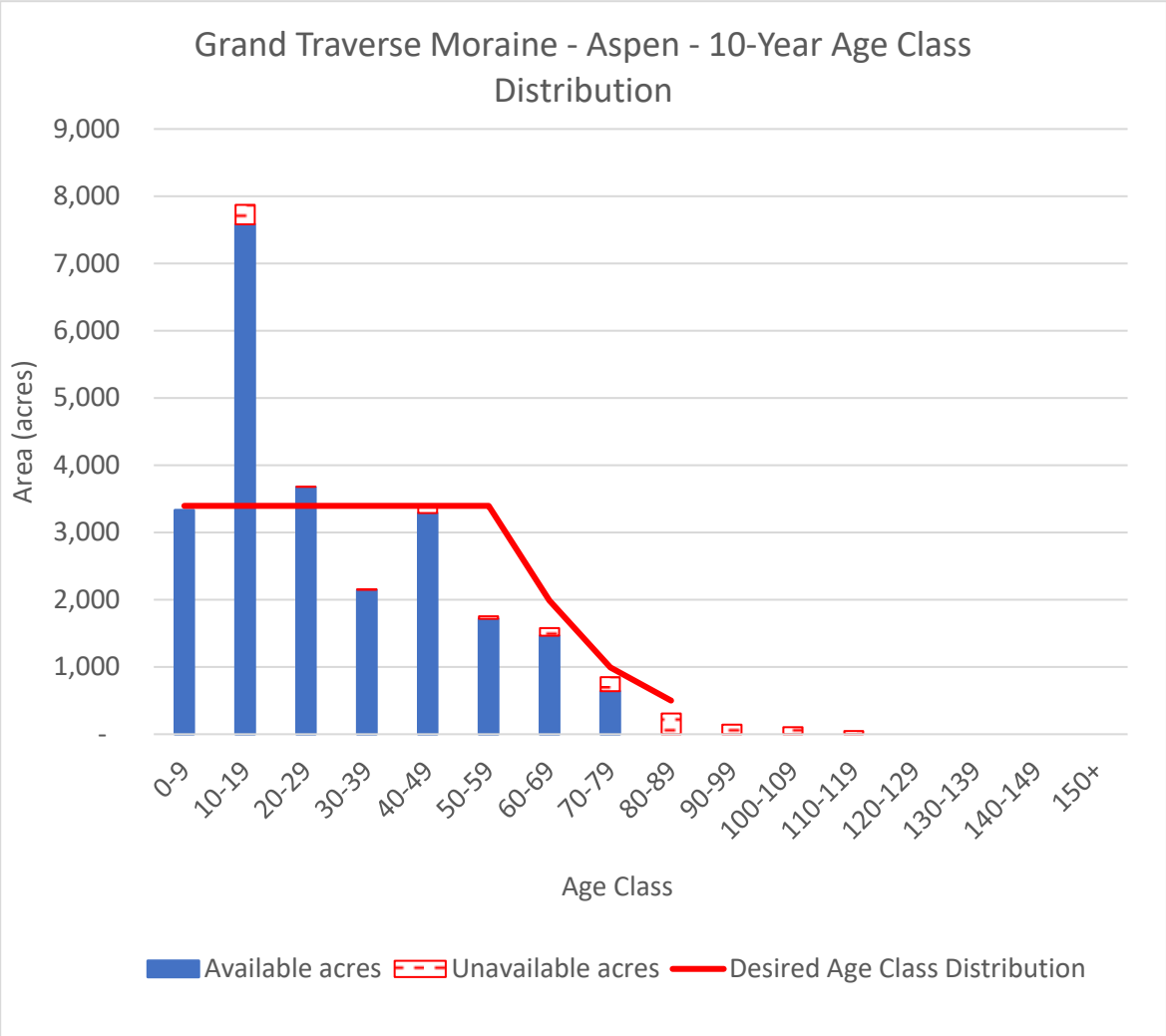


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres nearly reaching the desired future condition with only the older age classes with unavailable acres and the 50- to 59-year-old age class deviating from the target proportions (Figure 5). As is often the case, an extremely unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer above the desired age class distribution as seen in Figure 4.

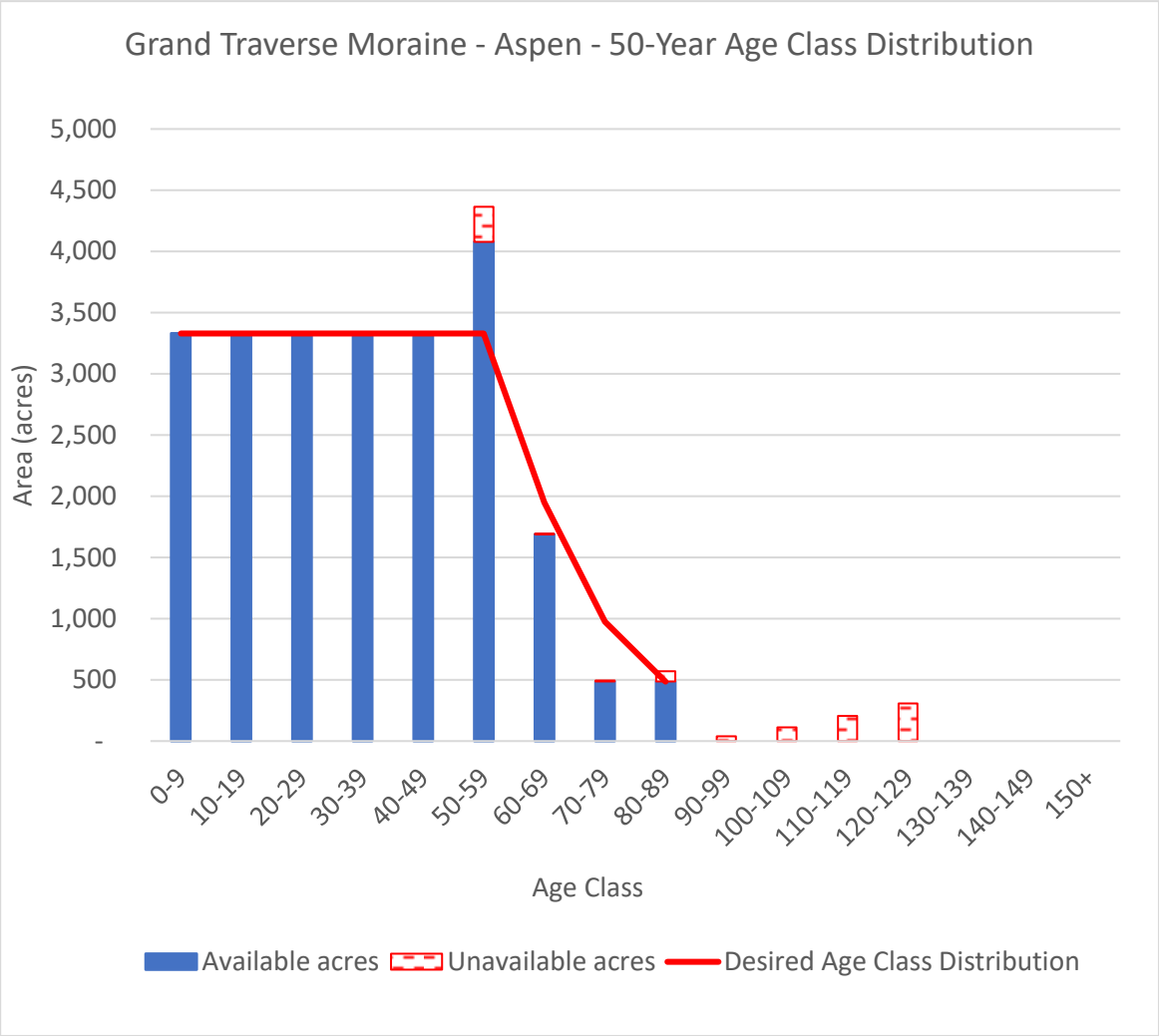


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

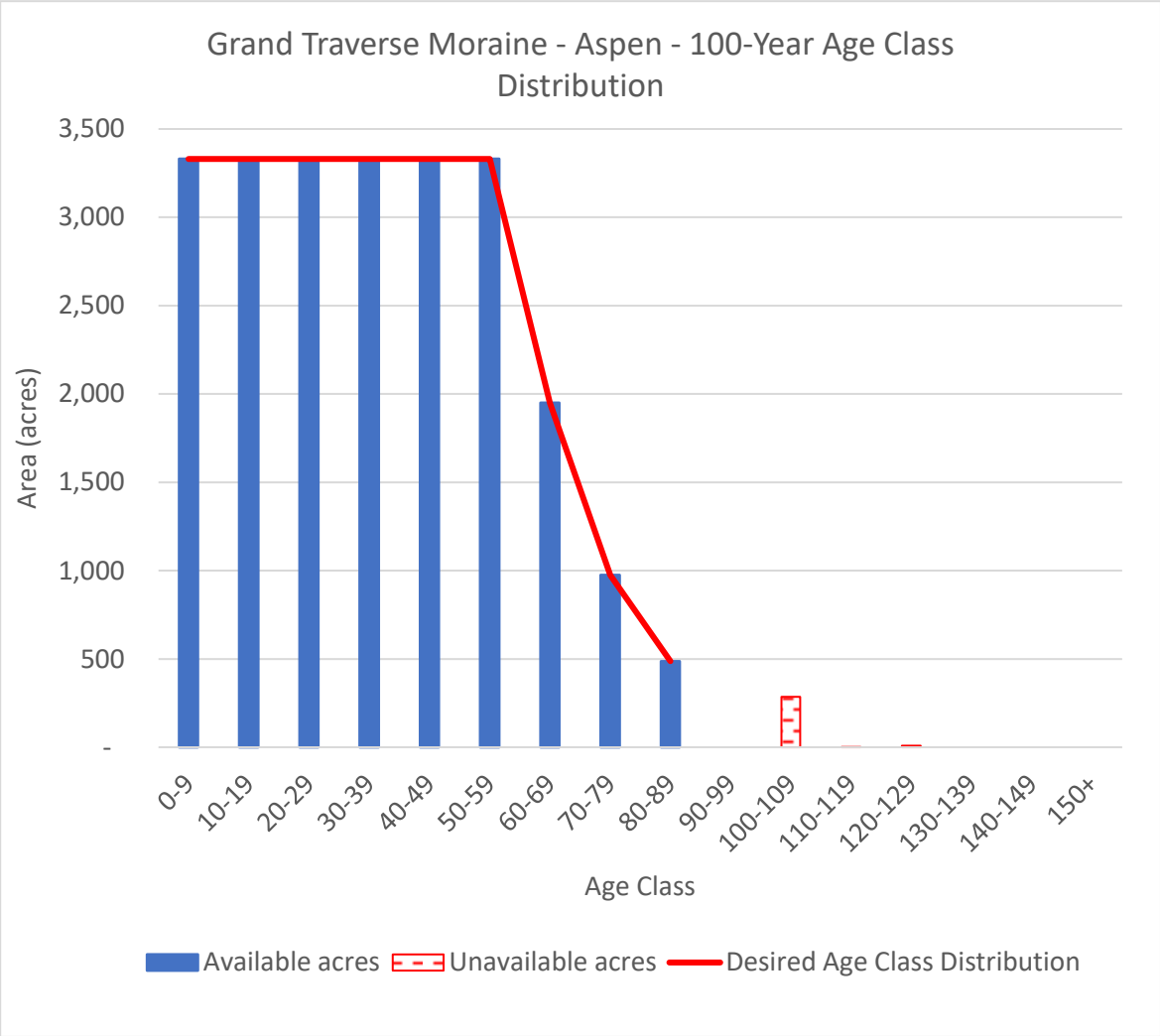


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

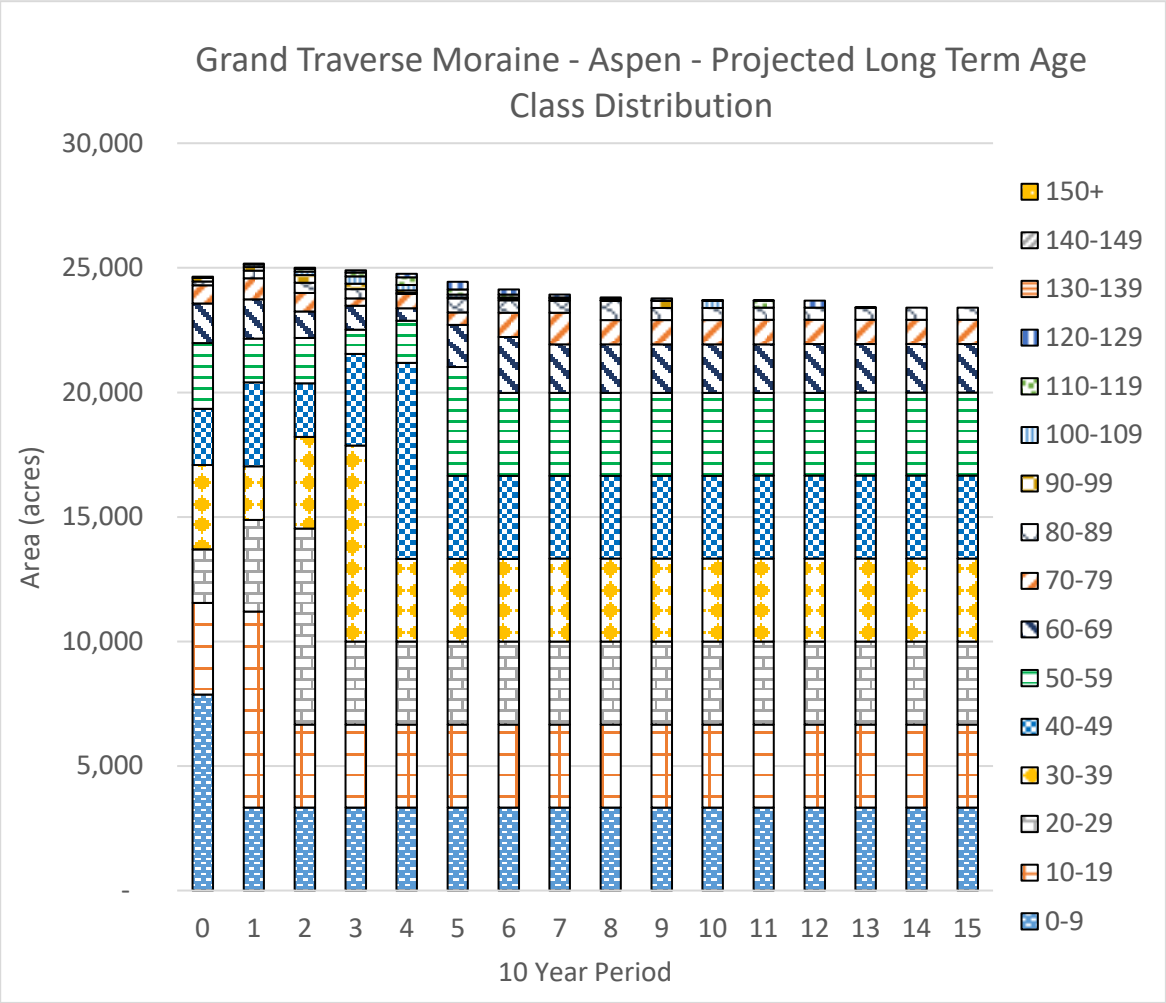


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 2,813 acres of projected clearcut harvest in the aspen cover type and an additional 526 acres that will be converting into aspen from other cover types. These total to an expected 3,339 acres of regeneration in the aspen cover type over the next 10 years. This falls very close the desired establishment of 3,394 acres per decade.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 119 years old in the Grand Traverse Moraine Management Area (Figure 8). The past management regime has been primarily single tree selection which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands.

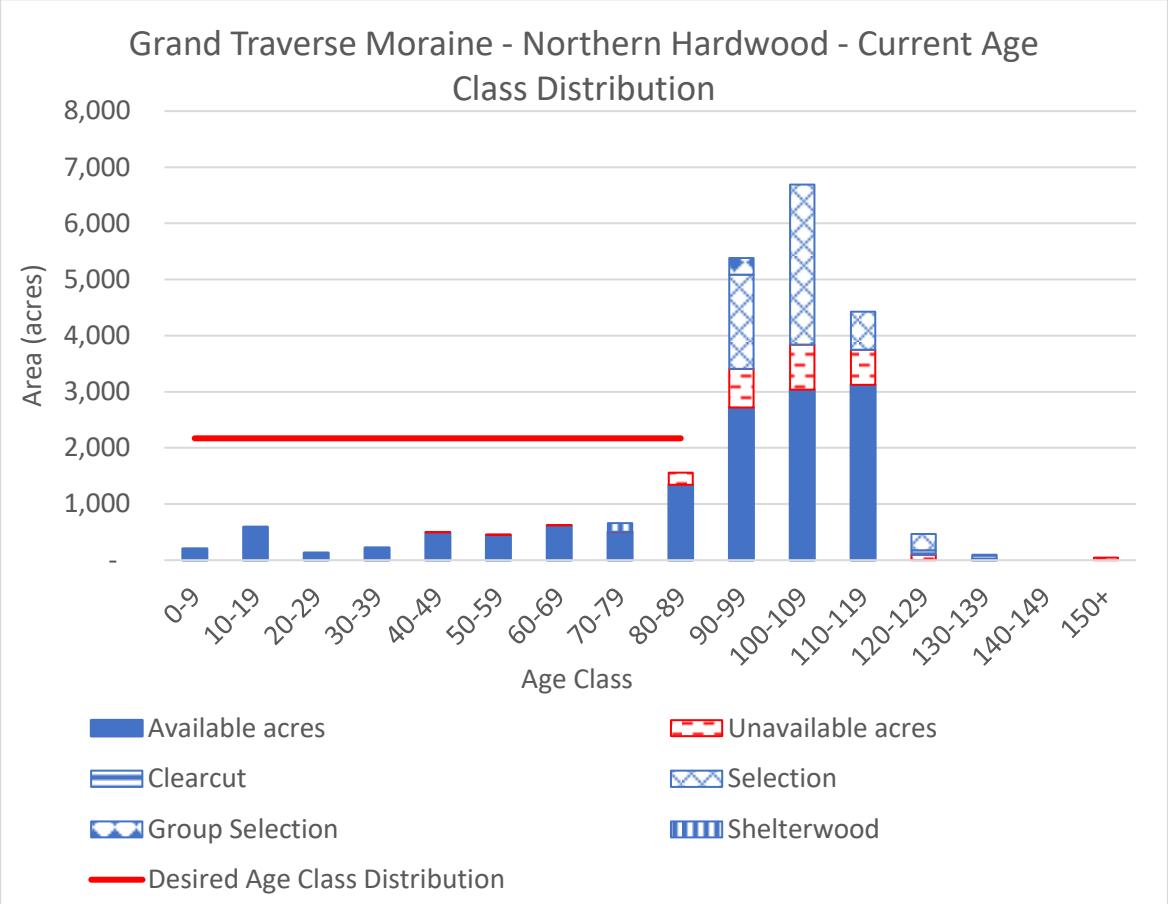


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Grand Traverse Moraine Management Area (Figure 9). Current conditions are a result of a selection harvest regime that has been in place in this management area for decades.

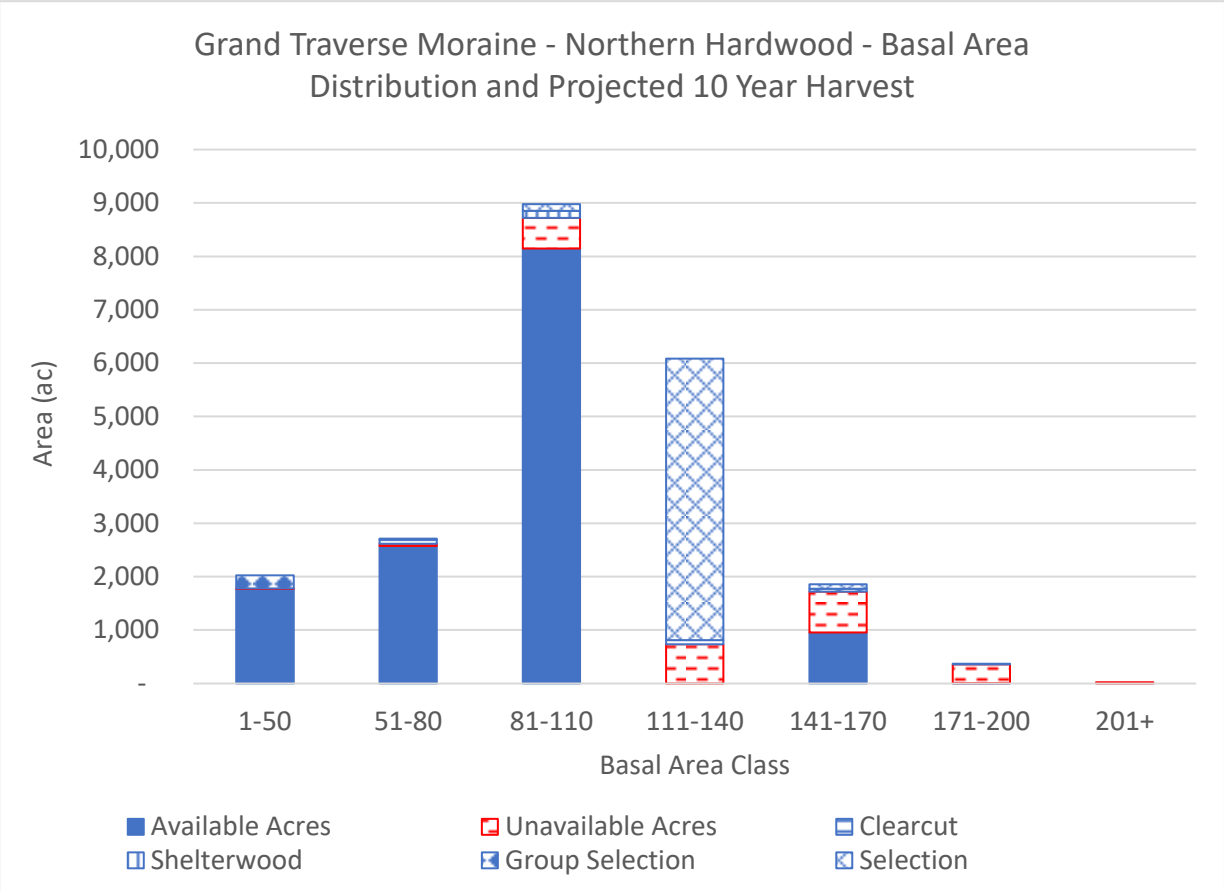


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Only 3% of the acres in northern hardwoods in the Grand Traverse Moraine Management Area are unavailable for commercial harvest. Opportunities to utilize a proportion of a stand to include in gaps will vary based on the age and condition of a stand, but the guidance for a typical log-sized hardwood stand will be 10-20% of the area, with the remaining 80-90% subject to thinning or no harvesting. Small group selection is the primary silvicultural treatment projected during this 10-year planning period. A portion of this cover type meets the habitat requirements for black-throated blue warbler and marten (Table 10).

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	13,423	2,437
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	14,778	2,447

Desired future condition

The projected long-term cover type trend for northern hardwood is stable in the Grand Traverse Moraine Management Area (Table 7). There are only about 149 projected acres transitioning into this cover type from other cover types forecasted in this management area.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. The Grand Traverse Moraine Management Area will take several decades to reach the desired future condition.

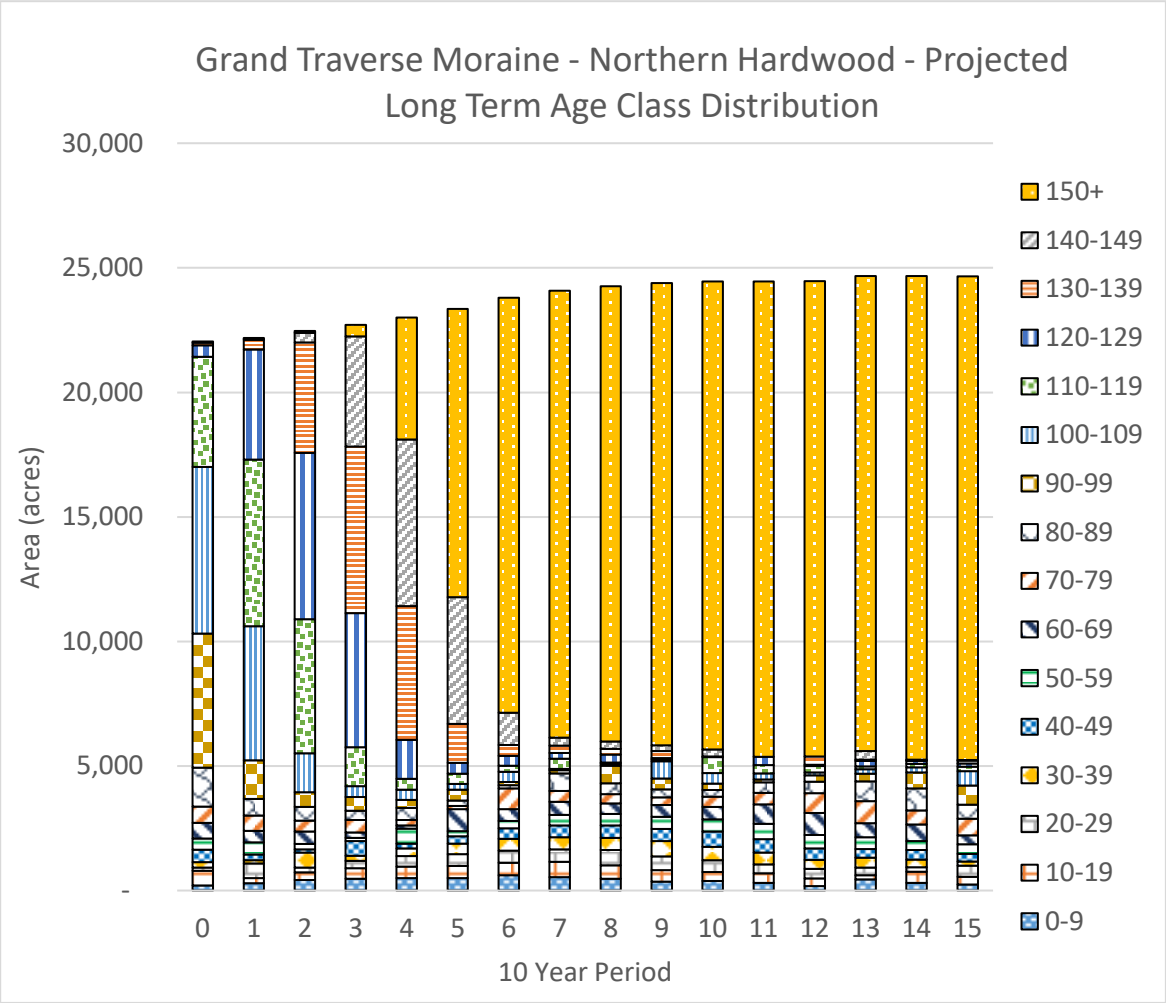


Figure 10. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected harvest regimes. It includes 5,494 acres of selection, 294 acres of group selection, 151 acres of shelterwood and 157 acres of clearcut harvest methods (Table 3). Canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Planted red pine

Current condition

The largest amount of the planted red pine cover type is currently between a stand age of 60 and 79 years old in the Grand Traverse Moraine Management Area (Figure 11). Nearly all the acres are available for commercial management; only 0.1% of the cover type is considered unavailable (Table 3). The past management regime has been primarily thinning every 10 to 20 years to achieve an approximate residual basal area of 120 square feet. The age class distribution in this cover type is in a very unbalanced condition.

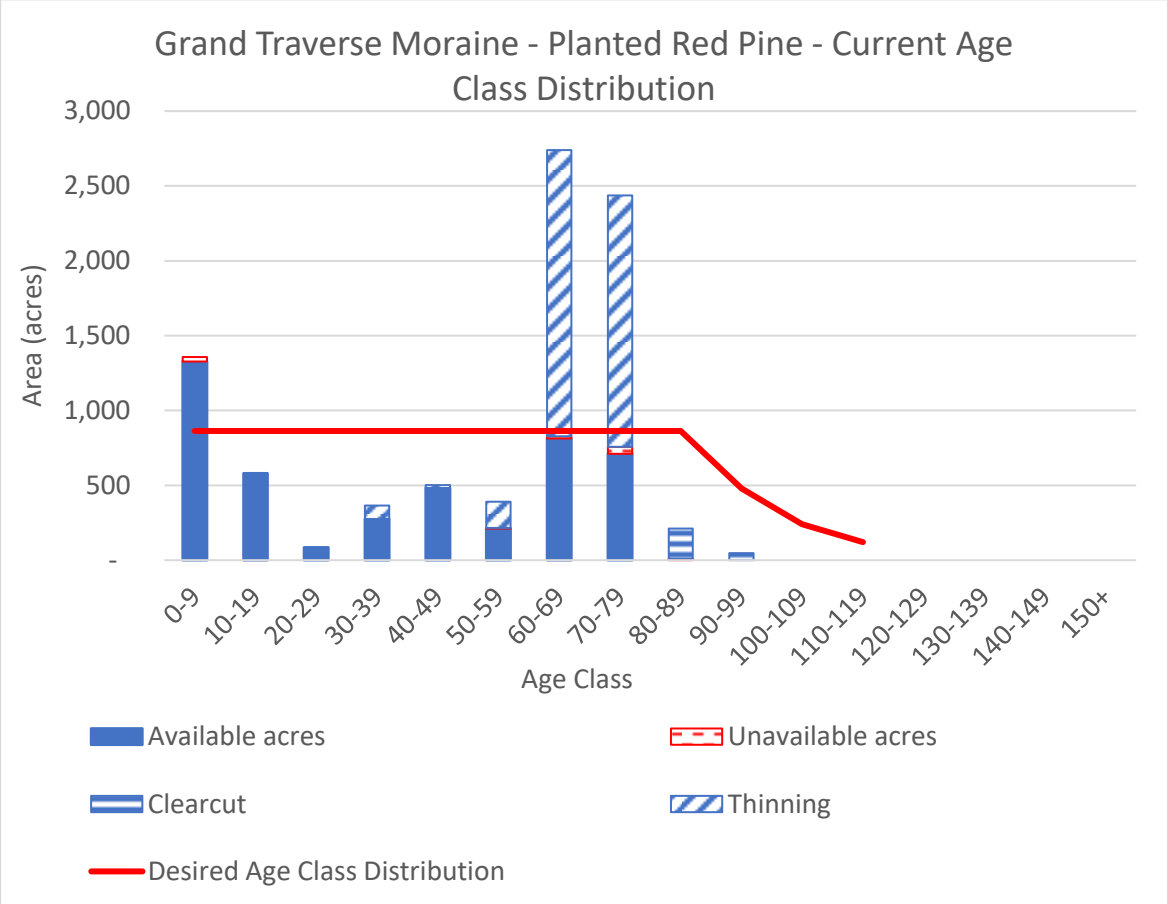


Figure 11. Current age class distribution and projected harvests in the red pine cover type.

Current conditions are a result of plantations established during the 1930s by the Civilian Conservation Corps, most of which reached maturity during the previous two planning periods. Additionally, there have been consistent commercial harvests and regeneration efforts on available planted red pine acres during the previous planning period.

Desired future condition

The projected long-term cover type trend for planted red pine is stable in the Grand Traverse Moraine Management Area with only a 2.9% increase in acres. There are very few transitions into this cover type

from other cover types forecasted in this management area and fewer transitions from planted red pine to other cover types.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old with a tail out to 110 years old for all available planted red pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of diseases and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of about 498 acres of regeneration in the upcoming 0-9 age class given the amount of merchantable and available acres in the older age classes (Figure 12). Progress toward the long-term age class distribution of planted red pine will take many decades in the management area.

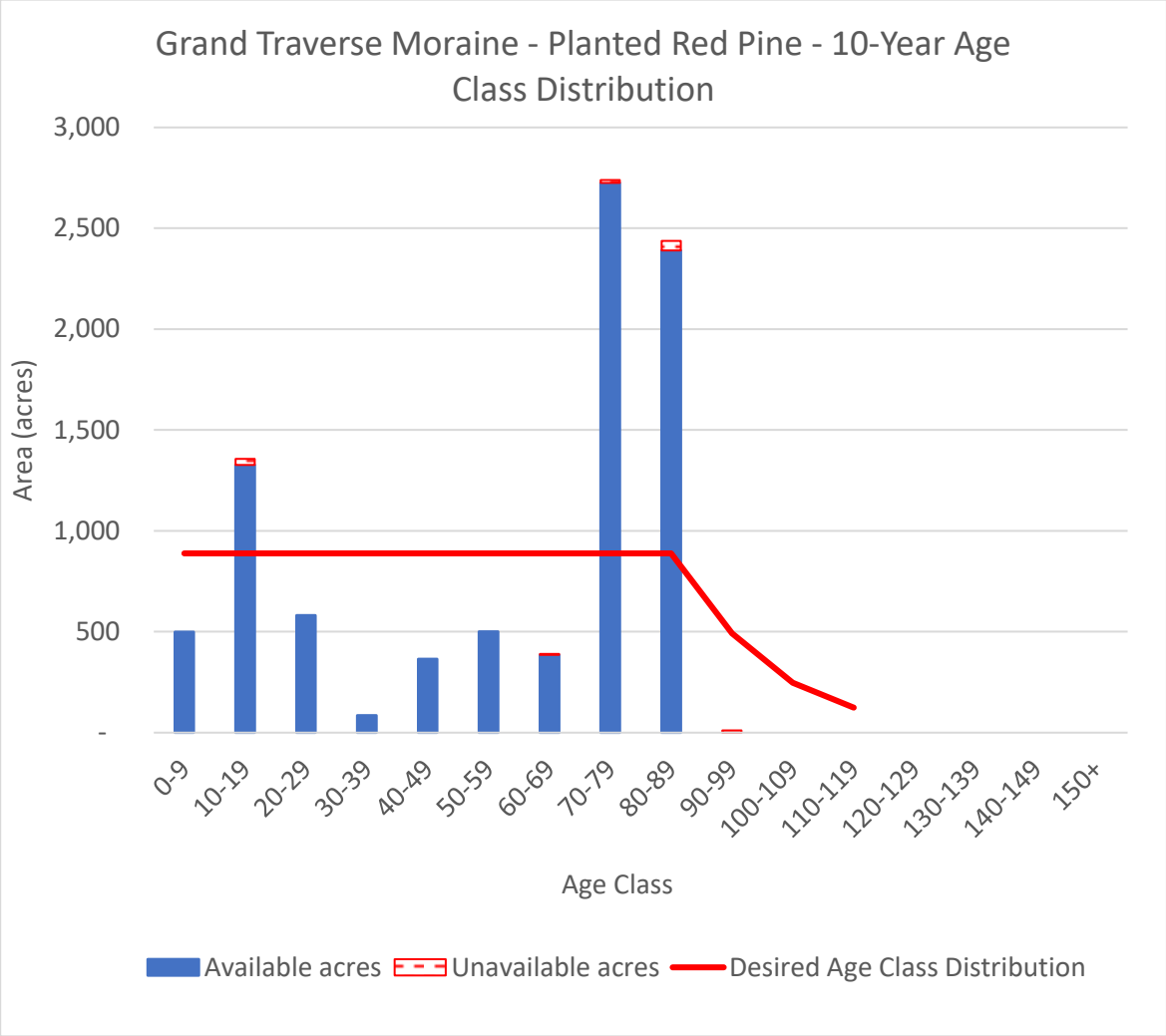


Figure 12. Short-term future age class distribution of the planted red pine cover type after planned harvests have taken place.

The mid-term age class distribution of planted red pine is beginning to reach the desired future condition for available acres (Figure 13) but still has a deficit in the 40- to 49-year-old and 60- to 89-year-

old age class. There is an increase in acres in the older age classes, beyond the desired age of 80 years old, due to the number of acres already at 70 years old in this management area. As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

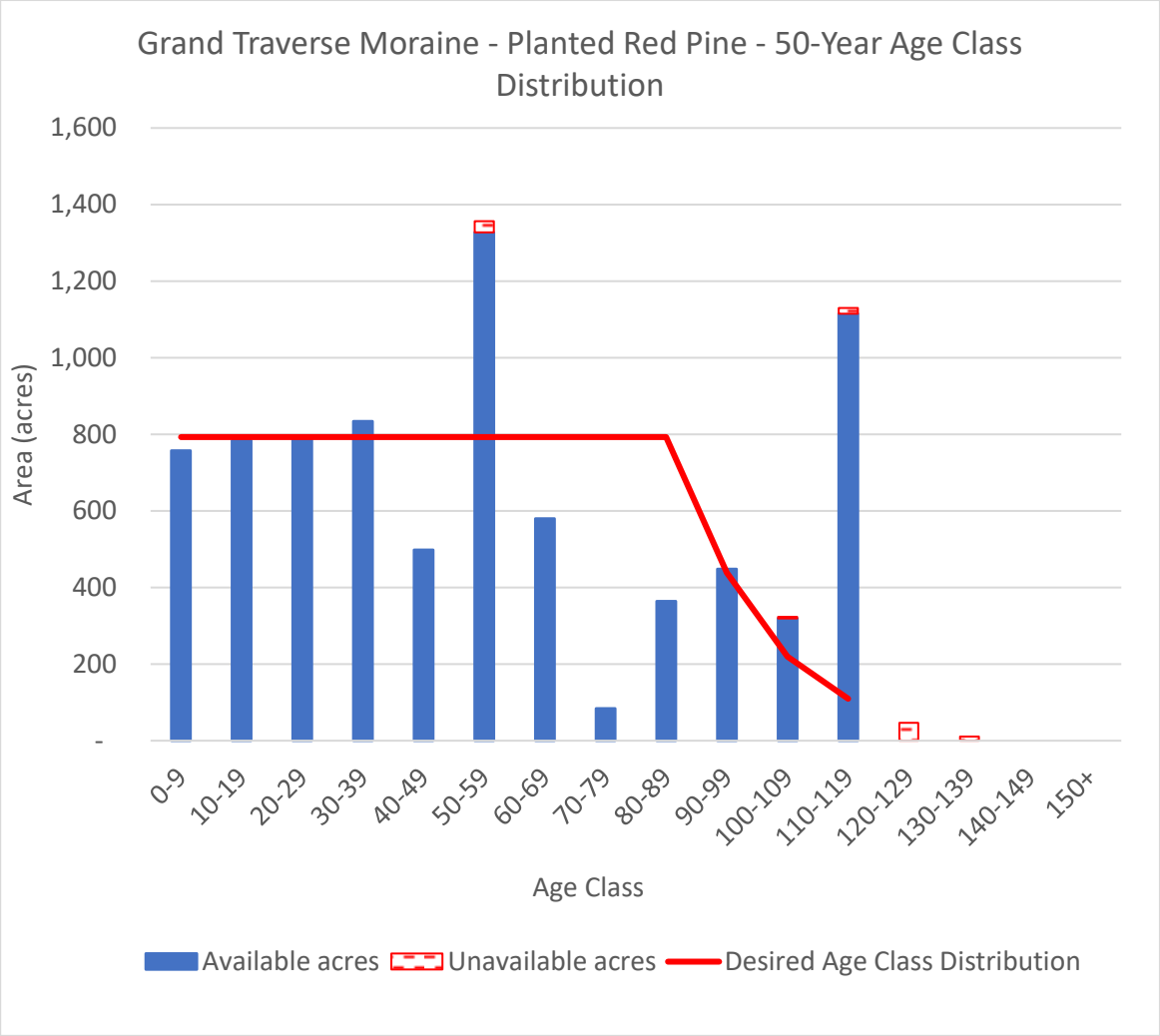


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution of 888 acres (Figure 14) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

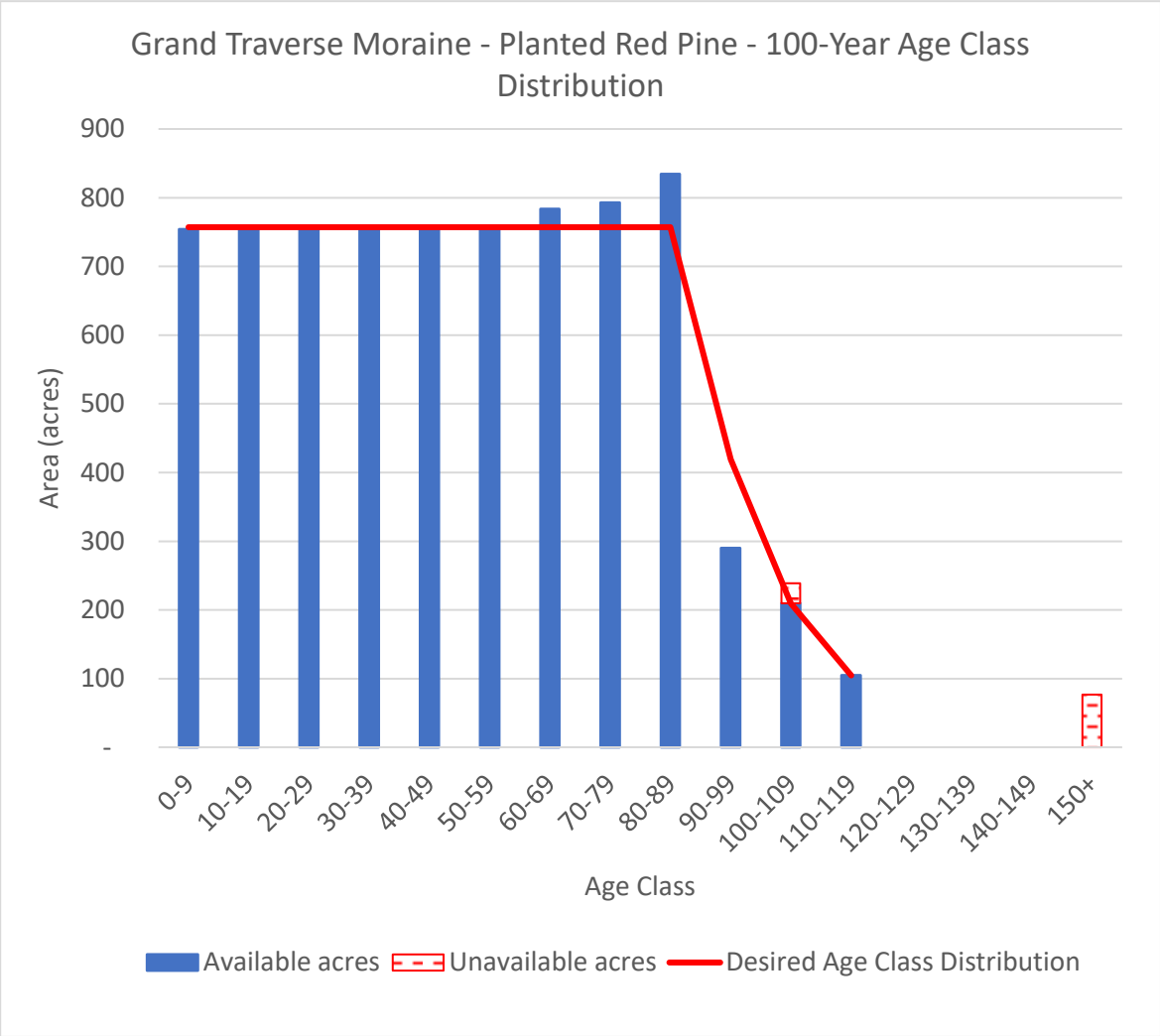


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

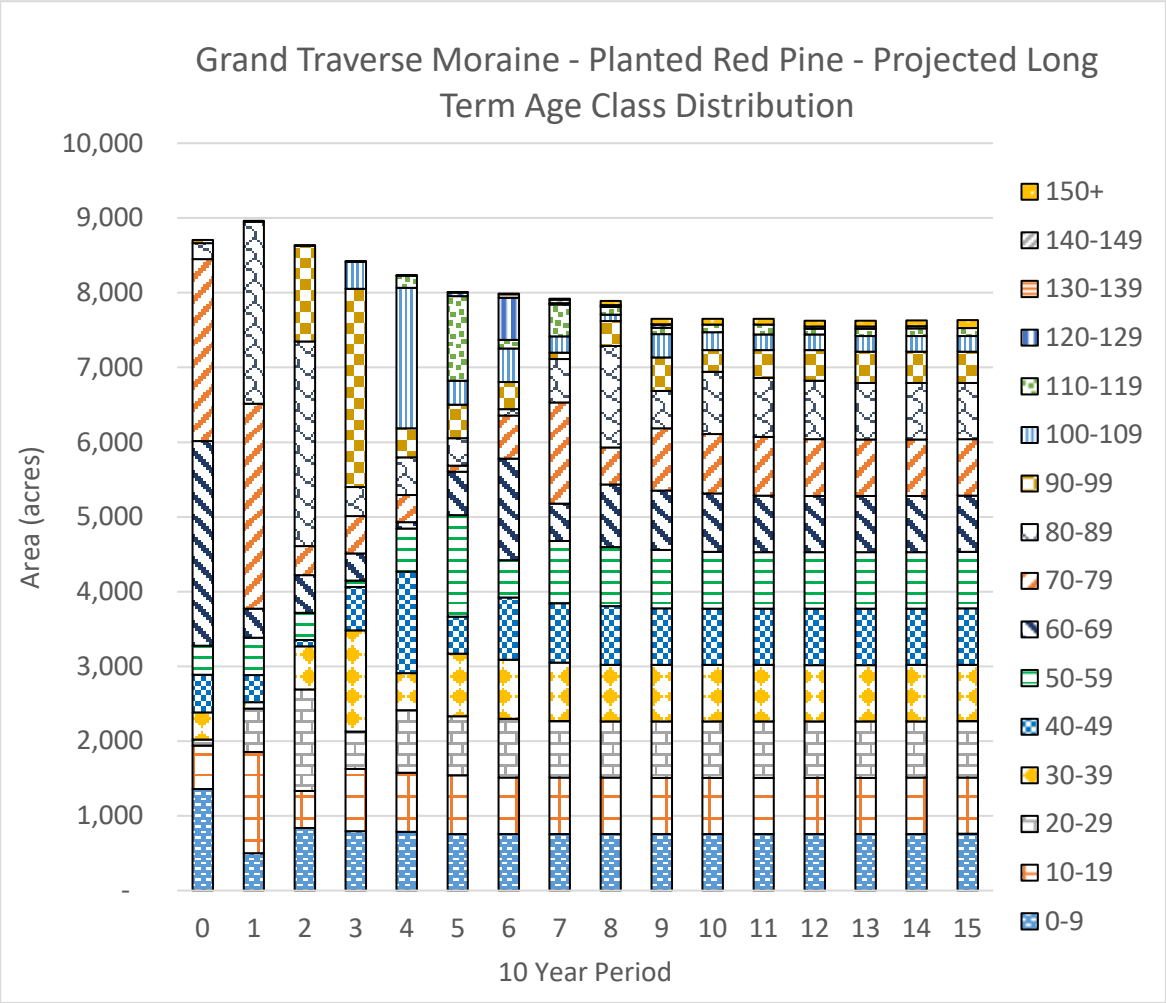


Figure 15. Projected age class distribution for all acres of planted red pine over the next 150 years.

Management actions

There are 245 acres of projected clearcut harvest in the planted red pine cover type during this planning period and 253 acres converting into the planted red pine cover type. This is well below the desired establishment of 889 acres per decade because of the current unbalanced condition residing in mostly three different age classes. In addition to clearcut acres, there are 3,873 acres projected for thinning in this cover type.

Lowland deciduous

Current condition

The largest amount of the lowland deciduous cover type is currently between a stand age of 70 and 119 years old in the Grand Traverse Moraine management area (Figure 16). Due to much of the cover type being unavailable there are not many acres outside of this age group giving it almost a bell-shaped curve.

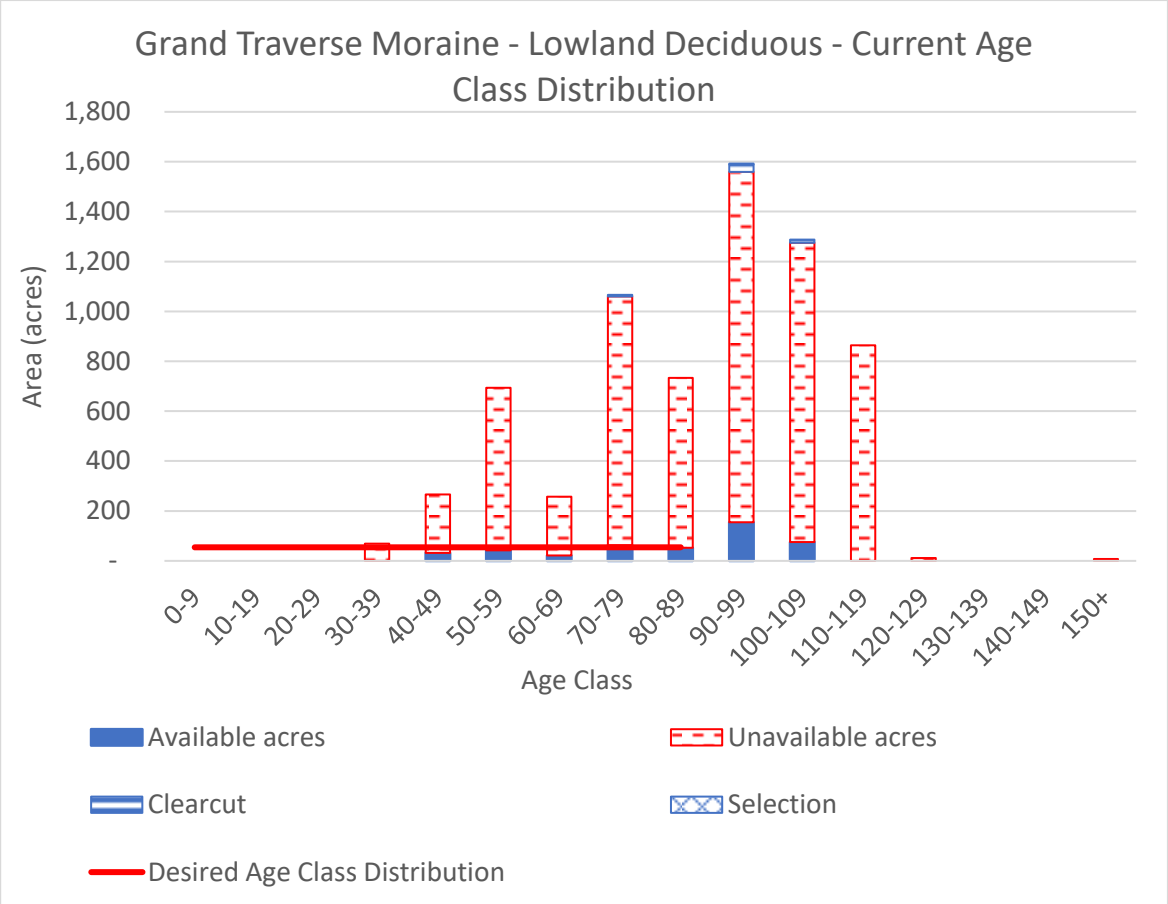


Figure 16. Current age class distribution and projected harvests in the lowland deciduous cover type.

Current conditions are a result of the lowland deciduous being largely unavailable for harvesting. With that, the majority of the lowland deciduous is distributed in the 80-140 basal area classes (Figure 17). The majority of this is not available due to landscape conditions being too wet. A portion of this cover type meets the habitat requirements for wood thrush (Table 144).

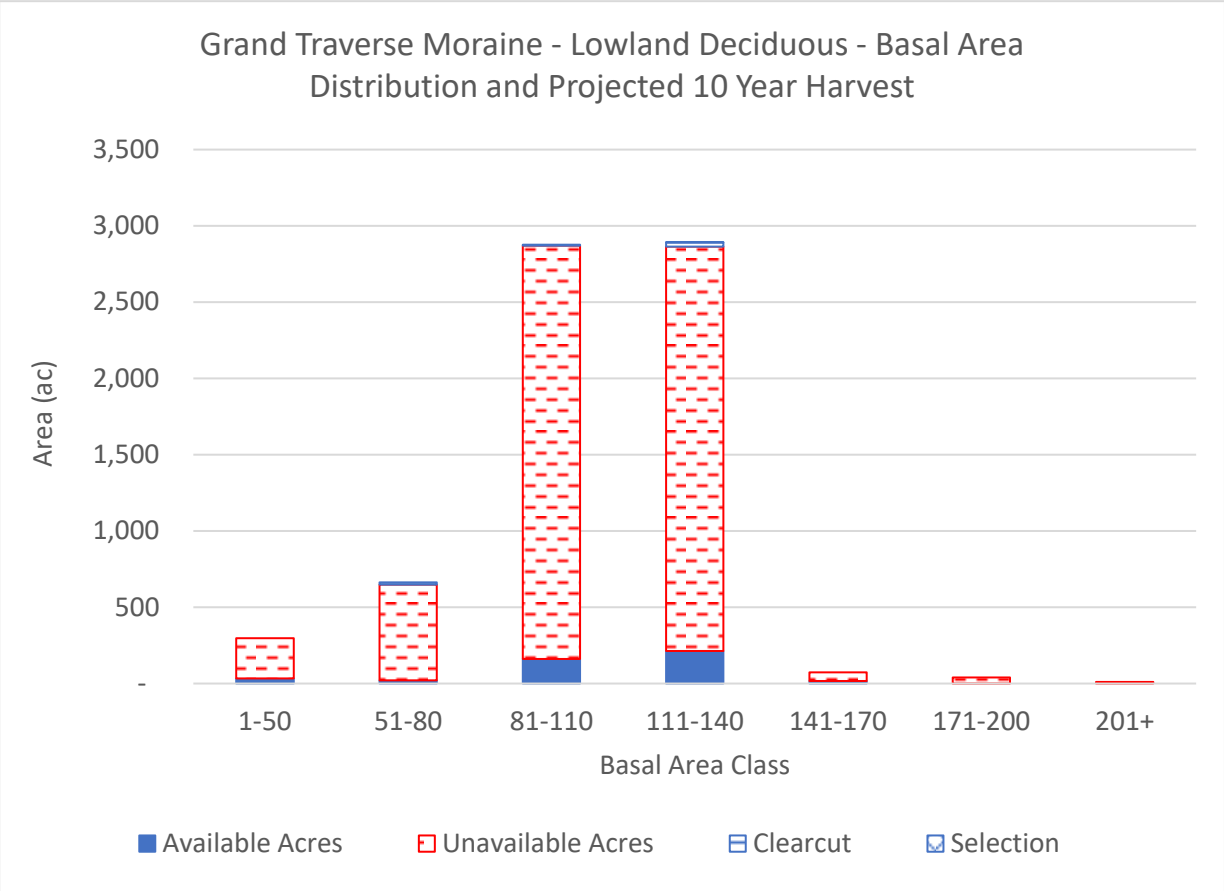


Figure 17. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 11. Featured species with lowland deciduous as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Deciduous	Lowland Deciduous Habitat Acres - Available	Lowland Deciduous Habitat Acres - Unavailable
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	392	5,007

Desired future condition

The projected long-term cover type trend for lowland deciduous is stable in the Grand Traverse Moraine Management Area. There are no transitions into this cover type from other cover types forecasted in this management area and no transitions from lowland deciduous to other cover types due to being mostly unavailable for harvesting.

The long-term goal for this cover type is to maintain this cover type on the landscape. Due to much of it being unavailable for harvest this cover type will continue to age and eventually make it to the older age classes of 150-plus (Figure 18).

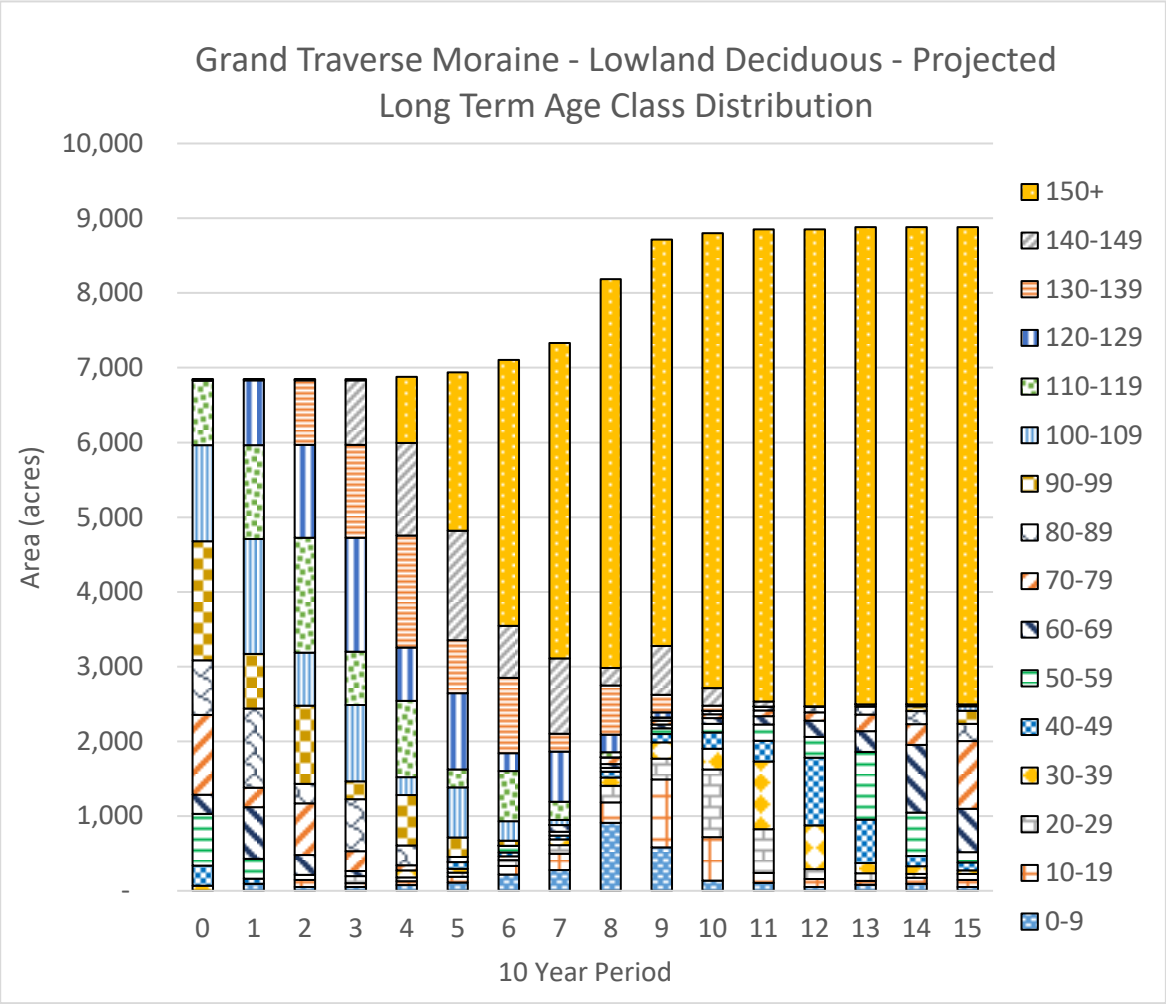


Figure 18. Projected age class distribution for all acres of planted red pine over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected restart harvest regime on 491 available acres (Table 3). This will be approximately 47 acres per decade (Table 5).

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 12; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within the Grand Traverse Moraine Management Area.

High Conservation Value Area Type and Name	Acres
Forest Habitat Core Interior	**3,316**
--	3,316
GEM	**1,484**
Little Betsie	1,484
Natural Rivers Vegetative Buffer	**384**
--	384
Natural Rivers Zoning District	**1,497**
--	1,497
State Wildlife Management Areas	**1,101**
Grass Lake Flooding SWMA	469
Lake DuBonnet / Mud Lake Flooding SWMA	632
GEMS	**1,484**
Little Betsie	1,484
Grand Total	**9,267**

Ecological reference areas

Ecological reference areas are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 13. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 14. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	AB	G3G5	S4	1

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	B	G3G5	S4	1
Existing ERA	Hardwood-Conifer Swamp	BC	G4	S3	1
Existing ERA	Northern Fen	AB	G3	S3	2
Existing ERA	Northern Fen	B	G3	S3	2
Existing ERA	Northern Hardwood Swamp	C	G4	S3?	1
Existing ERA	Rich Conifer Swamp	B	G4	S3	1
Existing ERA	Rich Conifer Swamp	BC	G4	S3	1
Grand Total	-	-	-	-	**10**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 15) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within the Grand Traverse Moraine Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**33**
Unspecified	33
Habitat Area or Habitat Corridor	**8,700**
61004041	762
Deadstream Swamp	1,342
Little Betsie GEMS	4,135
Solon Swamp	1,516
Unspecified	800
Walters Loop	144
Possible Type 1 or Type 2 Old Growth	**180**
--	180
Spring, Wetlands, or Riparian Areas	**1,905**
61015024	240
Unspecified	606
Grand Total	**9,758**

Table 16. Static special conservation areas within the Grand Traverse Moraine Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer	-	**2,001**

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
--	-	515
Bear Creek	-	209
Beaver Creek	-	16
Betsie River	-	122
Boardman River	-	35
Brundage Creek	-	73
Carter Creek	-	19
Cedar Run	-	31
Collison Creek	-	17
Dair Creek	-	116
Dutchman Creek	-	38
First Creek	-	3
Greens Creek	-	32
Jaxon Creek	-	85
Kinney Creek	-	66
Lemon Creek	-	123
Mason Creek	-	19
North Branch Platte River	-	37
Pickerel Creek	-	41
Platte River	-	204
Second Creek	-	66
Stanley Creek	-	14
Swainston Creek	-	17
Third Creek	-	66
Victoria Creek	-	38
Designated Trout and Coldwater Streams	**74.8**	**-**
--	19.6	-
Bear Creek	8.1	-
Beaver Creek	0.6	-
Betsie River	4.4	-
Boardman River	1.3	-
Brundage Creek	2.7	-
Carter Creek	0.7	-
Cedar Run	1.2	-
Collison Creek	0.6	-
Dair Creek	4.3	-
Dutchman Creek	1.4	-
First Creek	0.1	-
Greens Creek	1.2	-
Jaxon Creek	3.1	-

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Kinney Creek	2.4	-
Lemon Creek	4.5	-
Mason Creek	0.7	-
North Branch Platte River	1.6	-
Pickerel Creek	1.5	-
Platte River	7.4	-
Second Creek	2.4	-
Stanley Creek	0.5	-
Swainston Creek	0.6	-
Third Creek	2.4	-
Victoria Creek	1.5	-
Important Bird Areas	**-**	**77,575**
Grand Traverse Bay basin (Albert Ecoregion Vii.5.2)	-	1,424
Manistee National Forest Red-shouldered Hawk IBA	-	76,151
Mussel Stream Group 2 - State threatened or endangered	**3.2**	**-**
Collison Creek-Platte River	3.2	-
Wild and Scenic Rivers	**1.2**	**-**
Bear Creek Wild and Scenic River	1.2	-
Wood Turtle Stream 100ft Buffer	**-**	**597**
Bear Creek	-	92
Betsie River	-	230
Boardman River	-	14
Platte River	-	195
Third Creek	-	66
Wood Turtle Stream 660ft Buffer	**-**	**3,541**
Bear Creek	-	576
Betsie River	-	1,167
Boardman River	-	88
Platte River	-	1,285
Third Creek	-	424
Grand Total	**79.1**	**83,714**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 18, Table 18, Table 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 17. *Rare animal and plant species conservation status key.*

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal occurrence within the Grand Traverse Moraine Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	-	1
Animal	Alasmidonta viridis	Slippershell	T	-	1
Animal	Bombus borealis	Northern amber bumble bee	SC	-	1
Animal	Bombus terricola	Yellow banded bumble bee	SC	-	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	-	25
Animal	Coregonus artedi	Lake herring or Cisco	T	-	4
Animal	Cygnus buccinator	Trumpeter swan	SC	-	1
Animal	Emydoidea blandingii	Blanding's turtle	SC	-	1
Animal	Gavia immer	Common loon	T	-	9
Animal	Glyptemys insculpta	Wood turtle	T	-	7
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	11
Animal	Lasmigona compressa	Creek heelsplitter	SC	-	1
Animal	Lasmigona costata	Flutedshell	SC	-	1
Animal	Lithobates palustris	Pickerel frog	SC	-	1
Animal	Necturus maculosus	Mudpuppy	SC	-	2
Animal	Notropis anogenus	Pugnose shiner	E	-	1
Animal	Pandion haliaetus	Osprey	SC	-	3
Animal	Sagittunio nasutus	Eastern pondmussel	E	-	1
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	1
Animal	Terrapene carolina carolina	Eastern box turtle	T	-	1
Animal	Utterbackia imbecillis	Paper pondshell	SC	-	1
Animal	Vermivora chrysoptera	Golden-winged warbler	T	-	2
Total	-	-	-	-	**77**

Table 19. Rare plant occurrence within the Grand Traverse Moraine Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Panax quinquefolius	Ginseng	T	-	2
Total	**-**	**-**	**-**	**-**	**2**

Table 20. Other rare occurrence within the Grand Traverse Moraine Management Area.

Non-ecological reference area natural communities

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	**-**	Great blue heron rookery	-	-	2
Total	**-**	**-**	**-**	**-**	**2**

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 21).

Table 21. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non-ecological reference area natural communities within the Grand Traverse Moraine Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Rich Conifer Swamp	CD	S3	-	2
Grand Total	**-**	**-**	**-**	**2**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Grand Traverse Moraine Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Hemlock wooly adelgid	Adelges tsugae	Non-native	-

Watch for and retain lingering ash with potential resistance to emerald ash borer. Monitor hemlock for hemlock wooly adelgid infestations.

Table 24. Maladies of concern in the Grand Traverse Moraine Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	-
Oak decline	Various	Various	Yes
Heterobasidon root disease	Heterobasidion irregulare	Native	-
Beech bark disease	Cryptococcus fagisuga	Non-native	Yes

Monitor oak for signs of oak wilt and follow statewide guidance. Monitor planted red pine for Heterobasidion root disease and follow the guidance. Monitor and report any surviving beech for possible beech bark disease resistance. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 88 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as cold types comprise approximately 70% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	40
Cold Small River	10
Cold Transitional Stream	6
Cold Transitional Small River	6
Cold Transitional Large River	0
Warm Transitional Stream	17

Type	Length (miles)
Warm Transitional Small River	9
Warm Transitional Large River	0
Warm Stream	0
Warm Small River	0
Warm Large River	0

Lacustrine habitat

A total of 28 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	18
100-499	4
500+	6

Wetlands

A total of 20,186 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 95% of wetland types found in the management area.

Table 27. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	812
Forested	19,221
Riverine	153

Vernal pools and seeps

A total of 706 acres of vernal pools and seeps have been inventoried in the management area, and 2,918 acres of seeps have been identified.

Riparian vegetation cover

Aspen and lowland deciduous are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Aspen	1,816

Cover Type	Acres
Lowland Deciduous	1,421
Northern Hardwood	947
Marsh	920
Lowland Shrub	890
Lowland Conifers	768
Cedar	755
Lowland Mixed Forest	544
Tamarack	239
Upland Mixed Forest	223

Watershed vegetation cover

The management area includes portions of important watersheds of the Platte and Betsie rivers (Table 29 & Table 30). Aspen is a major cover type of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top five) and area of the Platte River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	13,488
Aspen	9,782
Planted Red Pine	3,224
Mixed Upland Deciduous	1,537
Upland Mixed Forest	1,286

Table 30. Largest vegetative cover types (i.e., top five) and area of the Betsie River watershed located within the management area.

Cover Type	Acres
Aspen	7,643
Northern Hardwood	6,313
Planted Red Pine	2,948
Lowland Deciduous	1,749
Cedar	1,326

Recreation

Access in the Grand Traverse Moraines Management Area for public recreation and management is generally good and there is a well-developed road/trail system. This management area is southwest of Traverse City and east of Frankfort and sees high levels of public recreation use.

An extensive network of snowmobile trails traverses this management area. Nonmotorized trails include nearly 10 miles of the Betsie Valley State Trail, which stretches 22 miles from Frankfort to Mesick along

the former Ann Arbor Railroad. Hiking trails include the Betsie River Pathway (7.9 miles), Lake Ann Trail (5.4 miles) and the Lost Lake Pathway (6.4 miles). The Shore-to-Shore equestrian trail, which is also open to hiking, passes through the north of the management area.

There are nine state forest campgrounds (rustic) within the management area, all providing access to water. Grass Lake and Healy Lake state forest campgrounds are under township management. The two trail camps provide equestrian camping opportunities for those riding the Shore-to-Shore trail and are maintained with the help of the Michigan Trail Riders Association.

Table 31. Designated recreation trails by type

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	Off-Road Vehicle (All Types)	0
Motorized Recreation Trails	Snowmobile	81.6
Nonmotorized Recreation Trails	Hiking	55.1
Nonmotorized Recreation Trails	Equestrian	25.5
Nonmotorized Recreation Trails	Biking	29.7
Nonmotorized Recreation Trails	Hunter Access Trails	0.8
Total	-	**192.7**

Note: Trail-use types may overlap.

Table 32. State forest campgrounds.

Name	# of sites	Eq.	ORV Access
Lake Dubonnet Trail Camp	-	200 (group)	-
Grass Lake State Forest Campground	15		-
Garey Lake Trail Camp	-	200 (group)	-
Lake Ann State Forest Campground	30	-	Yes
Lake Dubonnet State Forest Campground	50	-	Yes
Garey Lake State Forest Campground	12	-	Yes
Platte River State Forest Campground	26	-	Yes
Veterans Memorial State Forest Campground	24	-	-
Healy Lake State Forest Campground	24	-	-

Grass Lake Flooding State Wildlife Management Area is in eastern Benzie County, adjacent to Grass Lake State Forest Campground. The Little Betsie Grouse Enhanced Management Site, 1 mile east of Thompsonville, covers over 4,000 in Benzie County with approximately half in the Grand Traverse Moraine Management Area. It provides high quality habitat for grouse and woodcock with access via hunter walking trails.

Boating access sites provide access to the Boardman, Betsie and Platte rivers, Bear Creek and numerous inland lakes. The Betsie and Boardman rivers are designated natural rivers and are popular for fishing and paddling.

Dispersed recreation such as camping, hunting and mushrooming are also popular in the management area.

Table 33. Areas managed for hunting.

Type	Name	# of Acres
State Wildlife Management Area	Grass Lake Flooding	468.4
Grouse Enhanced Management Site	Little Betsie	1,483.3
Total	-	**1,951.7**

Table 34. Boating access sites.

Name	Waterbody
Bass Lake North	Bass Lake
Bass Lake South	Bass Lake
Bear Creek	Bear Creek
Cedar Hedge Lake	Cedar Hedge Lake
Ellis Lake	Ellis Lake
Garey Lake State Forest Campground	Garey Lake
Grass Lake State Forest Campground	Grass Lake
Green Lake	Green Lake
Hayes Bridge	Platte River
Homestead Dam	Betsie River
Homestead Pond	Homestead Pond
Lake Dubonnet State Forest Campground	Lake Dubonnet
Platte River State Forest Campground	Platte River
Potter Bridge	Bear Creek
River Road	Boardman River
State Road - Bear Creek	Bear Creek
Turtle Lake	Turtle Lake
US 31	Betsie River
Veterans Memorial Park	Platte River

High Sand Plains

State Forest Area: 633,253 acres	Location: Northcentral Lower Penninsula	Population Centers: Gaylord, Grayling, Roscommon, Harrison, Houghton Lake and West Branch
Subsection: Kirtland's Warbler High Sand Plains, Alcona Gravelly Ice Contact and Clare Moraines	Landforms: Outwash channels and plains, ice-contact sands and ridges and sandy outwash plains	Landcover: Forested: 540,468 acres Nonforested: 92,785 acres

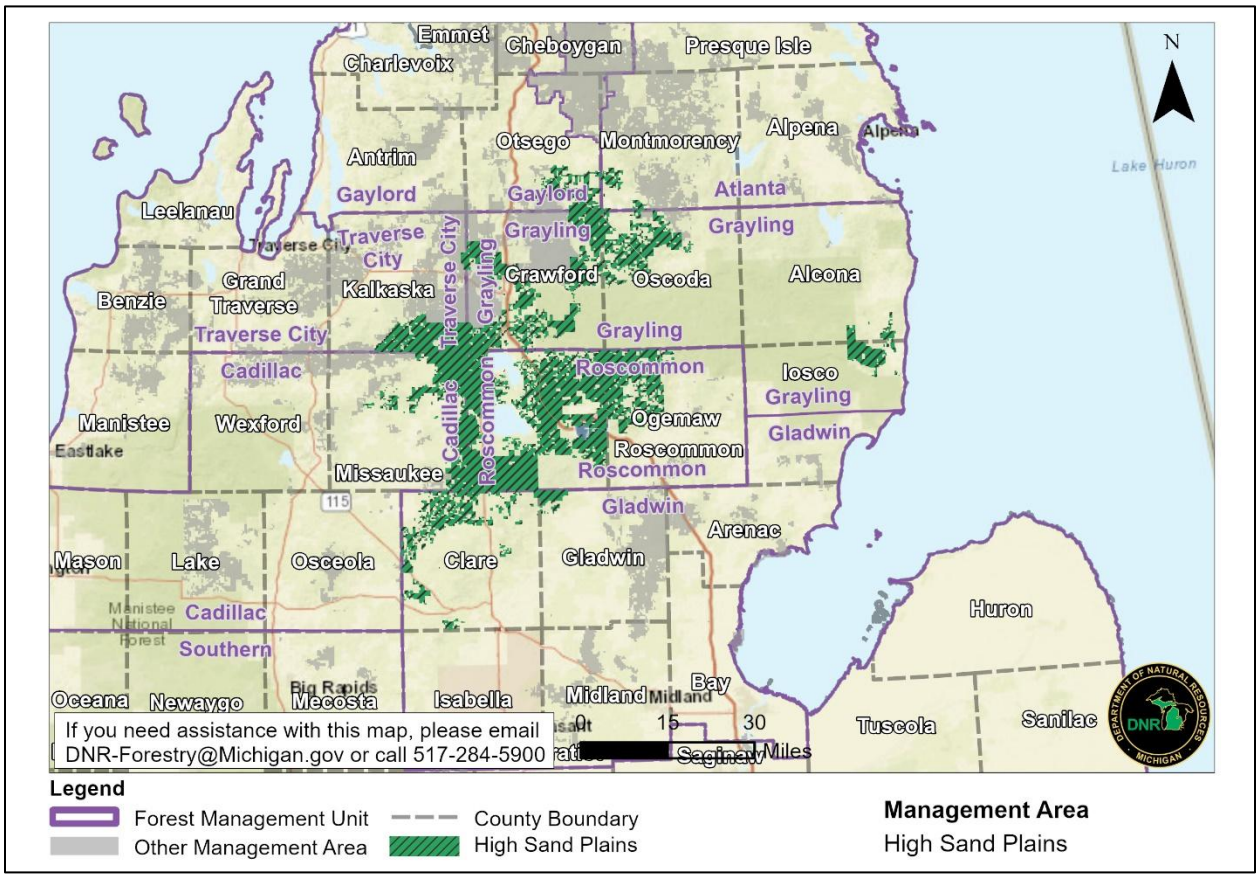


Figure 1. High Sand Plains Management Area.

Forested landscape

Current and projected future condition

The High Sand Plains Management Area includes a variety of shade tolerance levels spread out among the age categories (Figure 2). The majority of tolerant cover types occur on unavailable lowlands in the mature age category. Mid-tolerant cover types mostly occur on available uplands in the mid-aged and mature categories while most intolerant cover types occur in the intermediate, mid-aged, and young categories on available uplands.

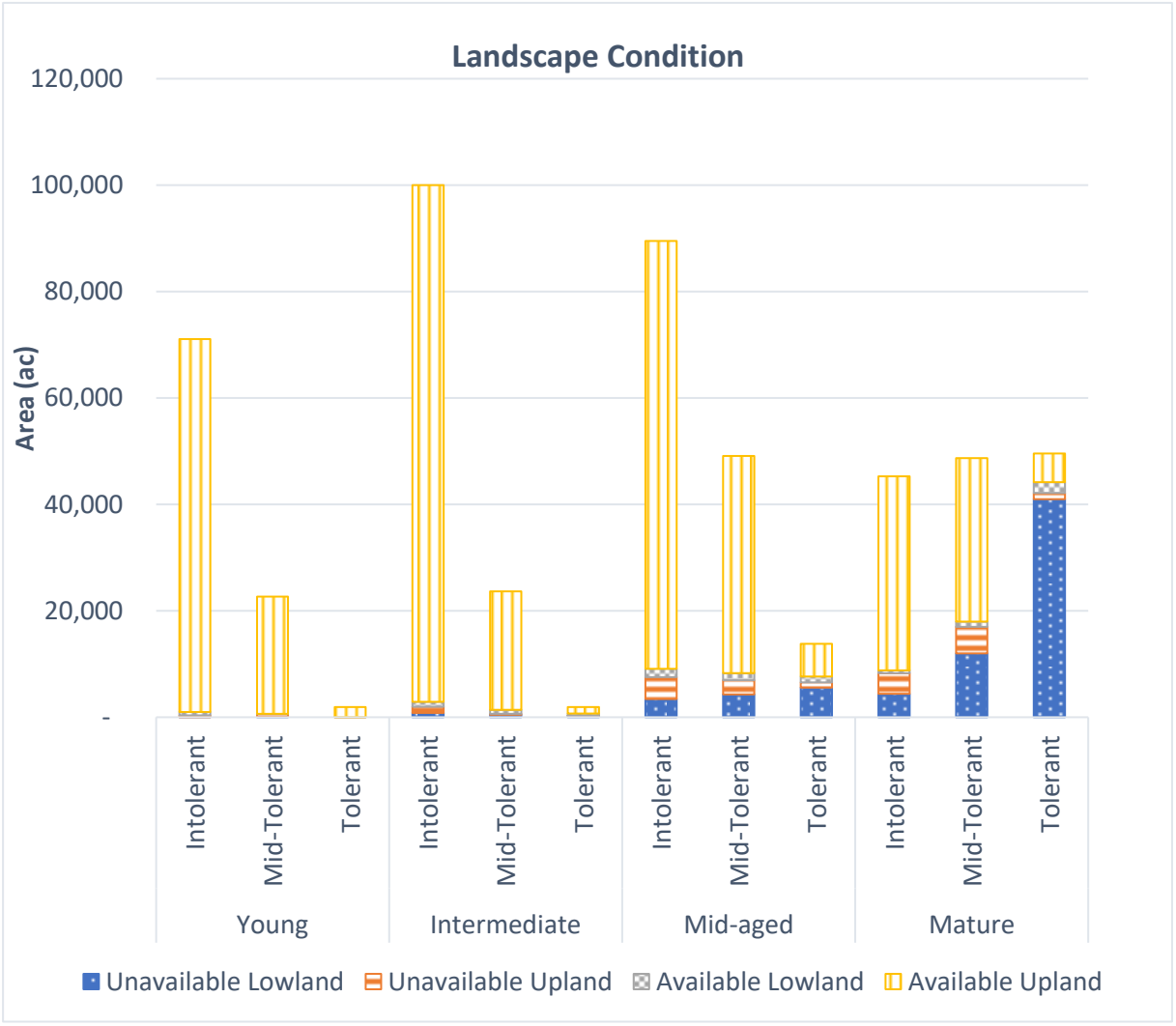


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	64,311
Mature Forest	Acres of 80+ year stands across cover types	143,327
Mature Forest	Acres of 120+ year stands across cover types	11,171
Mesic Conifer Cover Types	Acres of mesic conifer cover types	27,281
Mesic Conifers in other Cover Types	Average canopy occupancy	36%
Mast – Oak Cover Types	Acres of oak cover types	50,593
Mast Tree Species in other Cover Types	Acres of total canopy occupancy of mast tree acres (trace-100%)	312,763
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	193,374
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	20,902
Landscape Forest Matrix	Percent deciduous forest	49%
Landscape Forest Matrix	Percent coniferous forest	46%

The High Sand Plains Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management Site (GEMS) – Backus Creek
- Kirtland's warbler – Special analysis unit

The High Sand Plains Management Area is comprised of 85% forested cover types and 15% nonforested cover types (Table 2). Of the forested cover types, 72% are in the upland and only 13% are in the lowland of the total landscape positions. The largest contributors to upland cover types are aspen, natural jack pine and mixed upland deciduous. Lowland conifer, cedar and lowland spruce/fir take up 61% of the total lowland forested landscape position. Lowland shrub is the most common nonforested cover type in the management area representing 6% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	142,234	247,253	456,920	540,468
			Northern Hardwood	8,217			
			Black Red Hybrid Oak	22,703			
			Northern Red Oak	15,560			
			Oak Mix	16,577			
			Mixed Upland Deciduous	41,963			
		Mixed	Upland Mixed Forest	20,042	20,042		
		Coniferous	Planted Red Pine	38,889	189,624		
			Planted Jack Pine	74,931			
			Planted White Pine	1,114			
			Planted Mixed Pine	5,312			
			Natural Red Pine	8,696			
			Natural Jack Pine	33,406			
			Natural White Pine	6,994			
			Natural Mixed Pines	16,012			
			Upland Spruce/Fir	768			
			Upland Conifers	3,137			
			Hemlock	367			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	5,076	19,059	83,548	
			Lowland Deciduous	13,983			
		Mixed	Lowland Mixed Forest	6,263	6,263		
		Coniferous	Cedar	23,801	58,226		
			Lowland Conifers	27,081			
			Lowland Spruce/Fir	5,606			
			Tamarack	1,738			
Nonforested	Upland	N/A	Herbaceous Openland	11,779	N/A	28,913	92,785
			Upland Shrub	9,039			
			Low Density Trees	3,560			
			Bare/Sparsely Vegetated	1,070			
			Cropland	84			
			Urban	3,380			
	Lowland	N/A	Lowland Shrub	34,938	N/A	63,872	
			Marsh	12,919			
			Bog	4,665			
			Treed Bog	4,077			
			Water	7,272			
						Grand Total:	**633,253**

There are 445,012 acres (70.3% of the total management area and 82.8% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the High Sand Plains Management Area (Table 3). Of that, 25.5% is in the aspen cover type; 13.7% in planted jack pine; 7.4% in mixed upland deciduous; 7.1% in planted red pine; and 5.7% in natural jack pine. The remaining 20 cover types represent less than 4% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

HIGH SAND PLAINS Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	137,240	25.5%	4,579	0.9%	141,819	26.4%
Black Red Hybrid Oak	21,962	4.1%	745	0.1%	22,708	4.2%
Cedar	932	0.2%	22,870	4.3%	23,802	4.4%
Hemlock	136	0.0%	232	0.0%	367	0.1%
Lowland Aspen/Balsam Poplar	2,540	0.5%	2,537	0.5%	5,078	0.9%
Lowland Conifers	3,045	0.6%	24,024	4.5%	27,069	5.0%
Lowland Deciduous	1,891	0.4%	12,094	2.2%	13,985	2.6%
Lowland Mixed Forest	1,281	0.2%	4,982	0.9%	6,263	1.2%
Lowland Spruce/Fir	877	0.2%	4,616	0.9%	5,493	1.0%
Mixed Upland Deciduous	39,938	7.4%	1,861	0.3%	41,799	7.8%
Natural Jack Pine	30,749	5.7%	1,847	0.3%	32,596	6.1%
Natural Mixed Pines	14,273	2.7%	1,732	0.3%	16,005	3.0%
Natural Red Pine	7,471	1.4%	1,185	0.2%	8,656	1.6%
Natural White Pine	5,870	1.1%	1,125	0.2%	6,995	1.3%
Northern Hardwood	7,450	1.4%	769	0.1%	8,218	1.5%
Northern Red Oak	15,018	2.8%	523	0.1%	15,541	2.9%
Oak Mix	15,449	2.9%	1,123	0.2%	16,572	3.1%
Planted Jack Pine	73,391	13.7%	436	0.1%	73,827	13.7%
Planted Mixed Pine	5,115	1.0%	163	0.0%	5,277	1.0%
Planted Red Pine	38,259	7.1%	498	0.1%	38,758	7.2%
Planted White Pine	1,097	0.2%	18	0.0%	1,115	0.2%
Tamarack	180	0.0%	1,522	0.3%	1,701	0.3%
Upland Conifers	2,139	0.4%	1,000	0.2%	3,138	0.6%
Upland Mixed Forest	18,258	3.4%	1,755	0.3%	20,013	3.7%
Upland Spruce/Fir	454	0.1%	314	0.1%	768	0.1%
Grand Total	**445,012**	**82.8%**	**92,548**	**17.2%**	**537,560**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too Wet	58,417	63.1%
Blocked by Obstacle	5,374	5.8%
BMPs	4,803	5.2%
Federal/State/Local Law	4,068	4.4%
Other Influence Zones	3,789	4.1%
Conservation Values	3,650	3.9%
Cannot Regenerate	2,558	2.8%
Denied Access	1,773	1.9%
Long-Term Retention	1,712	1.8%
Recreational/Scenic	1,224	1.3%
Too Steep	1,125	1.2%
Species of special concern or T&E	1,049	1.1%
Other Dept./Div. Processes	1,039	1.1%
Rare Landforms	493	0.5%
Blocked by Railroad	391	0.4%
Deer Wintering Area	340	0.4%
Unproductive	338	0.4%
Wildlife Concerns	139	0.1%
Military Lease/Easement	104	0.1%
Non-Military Lease/Easement	65	0.1%
Historical/Archaeological	53	0.1%
Neighbor / Interest Group	44	0.0%
Total Unavailable	**92,548**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the High Sand Plains Management Area has a unique age class and basal-area-class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 1,472,940 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Aspen	18,914	-	-	-	-	2,653	-	21,567
Planted Red Pine	1,285	-	11,451	-	-	1,460	1,710	15,905
Natural Jack Pine	5,055	-	-	-	-	940	-	5,994
Planted Jack Pine	3,935	-	-	-	-	1,946	-	5,881
Northern Red Oak	4,309	-	343	177	88	-	-	4,918
Black Red Hybrid Oak	4,201	-	509	-	106	33	-	4,849
Oak Mix	2,691	-	201	-	48	-	-	2,940
Mixed Upland Deciduous	2,188	129	-	-	166	144	-	2,627
Natural Mixed Pines	-	-	777	-	1,158	-	390	2,324
Northern Hardwood	-	1,023	-	74	-	368	117	1,583
Natural White Pine	-	-	362	-	774	-	412	1,548
Natural Red Pine	-	-	310	-	334	-	14	659
Planted White Pine	442	-	212	-	-	-	-	654
Upland Conifers	451	-	-	-	113	-	-	564
Lowland Aspen/Balsam Poplar	407	-	-	-	-	-	-	407
Lowland Conifers	402	-	-	-	-	-	-	402
Planted Mixed Pine	-	-	393	-	-	-	-	393
Lowland Deciduous	332	24	-	-	10	-	-	366
Lowland Mixed Forest	307	-	-	-	-	-	-	307
Lowland Spruce/Fir	208	-	-	-	-	-	-	208
Upland Mixed Forest	-	-	-	-	-	110	-	110
Hemlock	-	87	-	-	-	-	-	87
Tamarack	18	-	-	-	-	-	-	18
Totals	**45,144**	**1,263**	**14,557**	**252**	**2,797**	**7,654**	**2,643**	**74,310**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection High Sand Plains Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Aspen	202,321	190,182
	Mixed Hardwood	130,373	122,550
	Red Pine	103,600	97,384
	Jack Pine	90,802	85,354
	Mixed Oak	51,851	48,740
	Mixed Spruce	33,685	31,664
	White Pine	25,878	24,326
	Mixed Softwood	18,208	17,116
	Pulpwood Total	**656,718**	**617,315**
Sawtimber (MBF)	Red Pine	99,733	93,749
	Red Oak	67,297	63,259
	Mixed Aspen	50,947	47,890
	White Pine	37,633	35,375
	White Oak	20,438	19,211
	Mixed Oak	17,000	15,980
	Red Maple	14,440	13,574
	Sugar Maple	4,864	4,572
	Basswood	437	411
	Sawtimber Total	**312,788**	**294,020**
	Total Sawtimber Harvest Volume in Cords	**816,222**	**767,248**
	Grand Total Harvest Volume in Cords	**1,472,940**	**1,384,564**
* Volume estimates based on 100% of the projected harvests for the 10-year planning period. ** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are a few cover type transitions projected for the High Sand Plains Management Area (Table 7). The managed area of each cover type is projected to remain fairly stable with only a few exceptions as treatment regimes generally will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the northern red oak cover type where 3,276 acres will convert to other cover types such as mixed upland deciduous and upland mixed forest through forest management and

regeneration activities. The largest increase occurs on the mixed upland deciduous forest cover type where 2,803 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	142,234	143,532	1,297
Mixed Upland Deciduous	41,963	44,766	2,803
Planted Red Pine	38,889	39,699	810
Lowland Conifers	27,081	26,981	-100
Cedar	23,801	23,801	0
Black Red Hybrid Oak	22,703	20,729	-1,974
Upland Mixed Forest	20,042	21,962	1,920
Lowland Deciduous	13,983	14,005	22
Lowland Mixed Forest	6,263	6,428	165
Lowland Spruce/Fir	5,606	5,499	-107
Planted Mixed Pine	5,312	5,312	0
Lowland Aspen/Balsam Poplar	5,076	5,097	21
Upland Conifers	3,137	2,730	-407
Tamarack	1,738	1,738	0
Planted White Pine	1,114	672	-442
Hemlock	367	367	0
Lowland Shrub	34,938	34,938	0
Natural Jack Pine	33,406	33,645	239
Natural Mixed Pines	16,012	16,177	166
Natural Red Pine	8,696	8,696	0
Natural White Pine	6,994	7,259	265
Northern Hardwood	8,217	8,331	115
Northern Red Oak	15,560	12,283	-3,276
Oak Mix	16,577	15,246	-1,331
Planted Jack Pine	74,931	74,746	-185
Marsh	12,919	12,919	0
Herbaceous Openland	11,779	11,779	0
Upland Shrub	9,039	9,039	0
Water	7,272	7,272	0
Bog	4,665	4,665	0
Treed Bog	4,077	4,077	0
Low Density Trees	3,560	3,560	0
Bare/Sparsely Vegetated	1,070	1,070	0
Upland Spruce/Fir	768	768	0
Urban	3,380	3,380	0
Cropland	84	84	0
Total:	**633,253**	**633,253**	**0**

Featured species current and projected habitat acres

There are 11 featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model, black bear, wild turkey and black-backed woodpecker, but are included here to inform management decisions over the decade. Kirtland's warbler habitat is described in the Kirtland's warbler special analysis unit (Section 5).

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	44,656	48,661	50,812	51,634
Black Bear	Mast	363,356	---	--	--
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Blackburnian Warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	20,060	26,029	33,788	45,372
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	51,848	55,823	51,614	52,344
Kirtland's Warbler	Jack pine	--	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	102,861	104,849	116,591	118,885
Ruffed Grouse	Aspen	43,339	46,953	49,287	49,929
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	92,653	96,547	93,470	93,870
Wild Turkey	Nonforested openings	11,863	--	--	--
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	32,847	34,383	38,956	41,809
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

Most of the aspen cover type is currently evenly distributed. The 30- to 39-year-old age class has the largest spike in acres. (Figure 3). The past management regime has been primarily clearcut for this cover type. With this cover type being fairly evenly distributed out the age of 50 and tail to the age of 80, it should not take very long to achieve a balanced age class distribution.

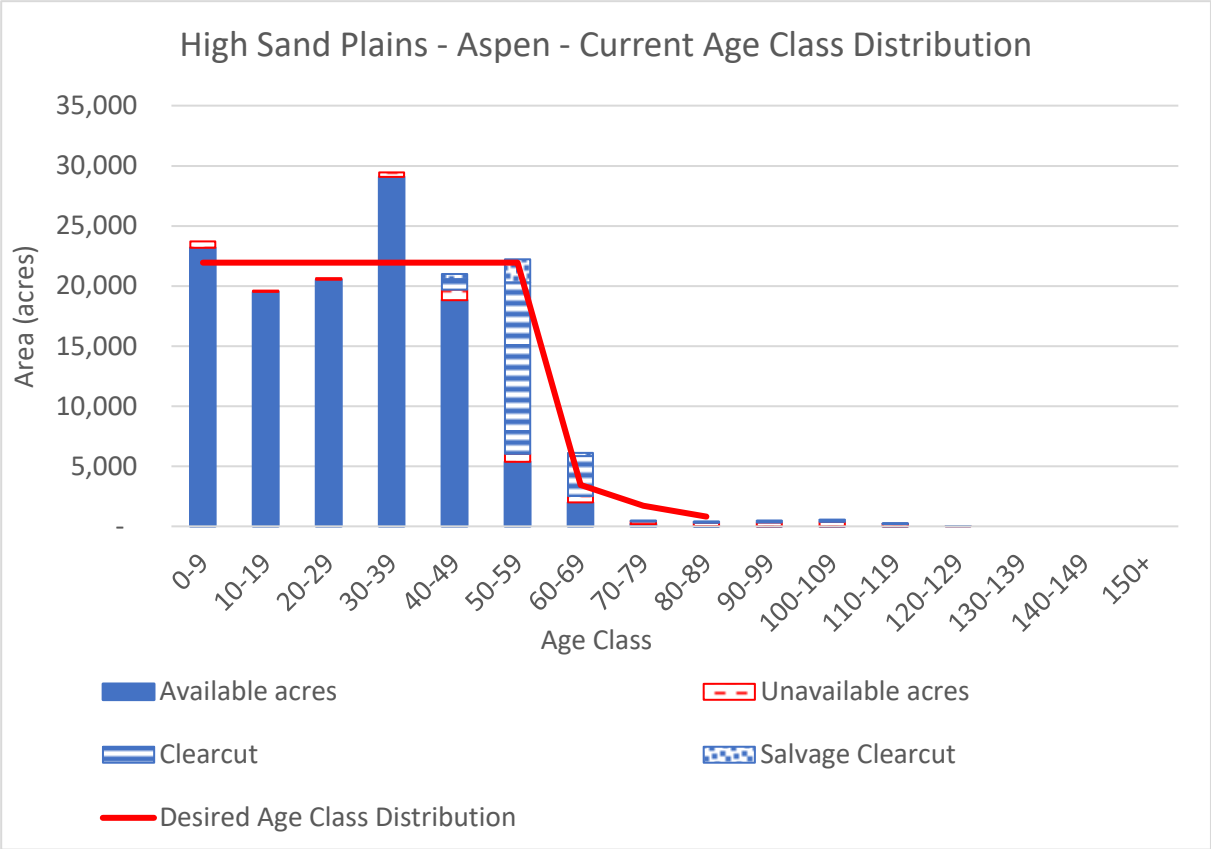


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods as well as previous initiative of the Deer Range Improvement Program. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Class: Sapling	42,708	631
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	42,708	631
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	42,708	631
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	42,708	631

Desired future condition

The projected long-term cover type trend for aspen is fairly stable in the High Sand Plains Management Area with only a 0.9% increase in acres from other cover types forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old and a tail out to 80 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of 23,203 acres which is just above desired amount of regeneration in in the upcoming 0-9 age class (Figure 4). Given the distribution of available acres progress toward the long-term age class distribution of aspen will only take a couple decades in the management area.

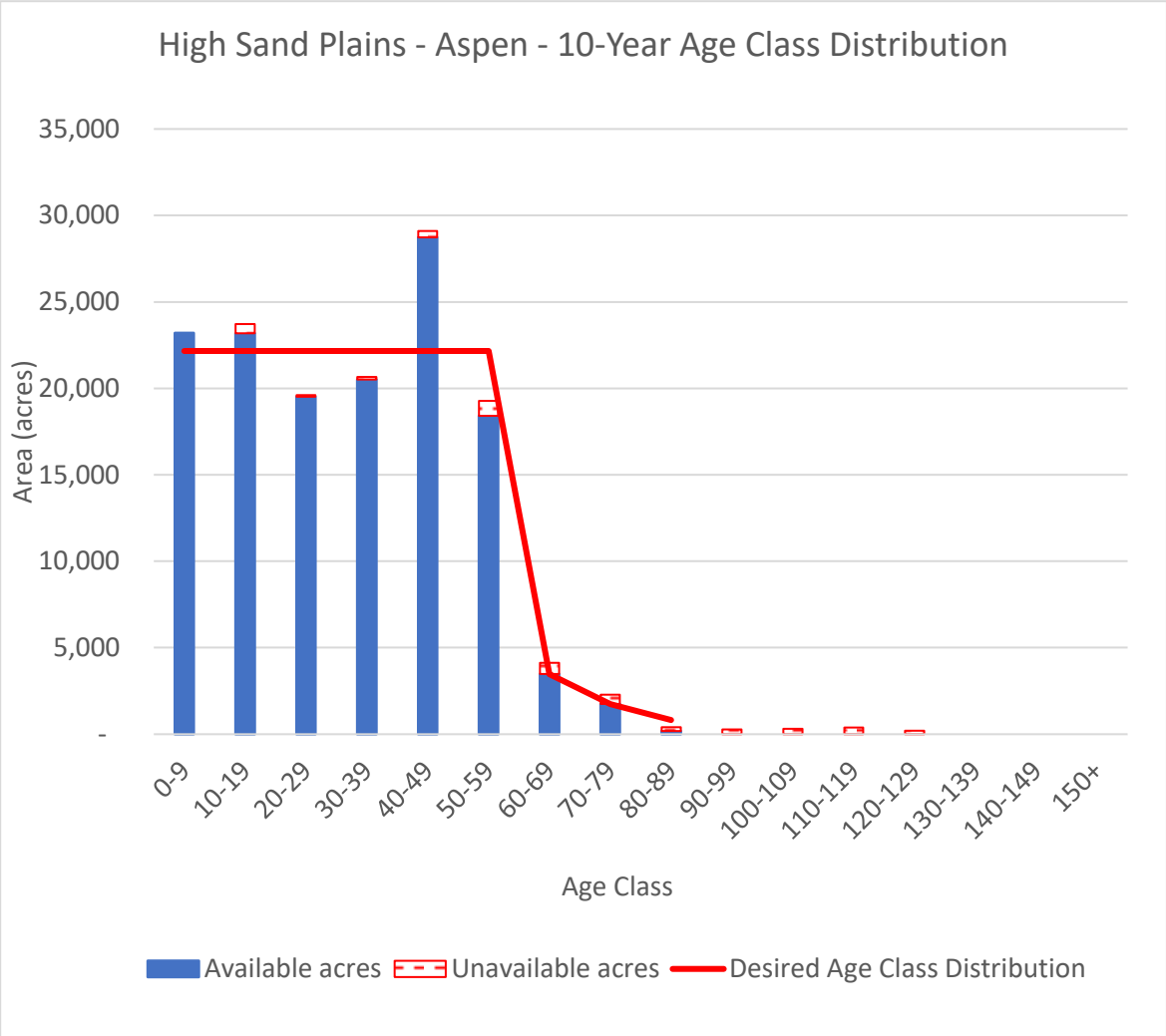


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres has essentially reached the desired future condition (Figure 5). As is often the case, an unbalanced condition in the first planning period can result in the need to work at it for multiple decades until the deficit or surplus in an age class has reached the max tail age.

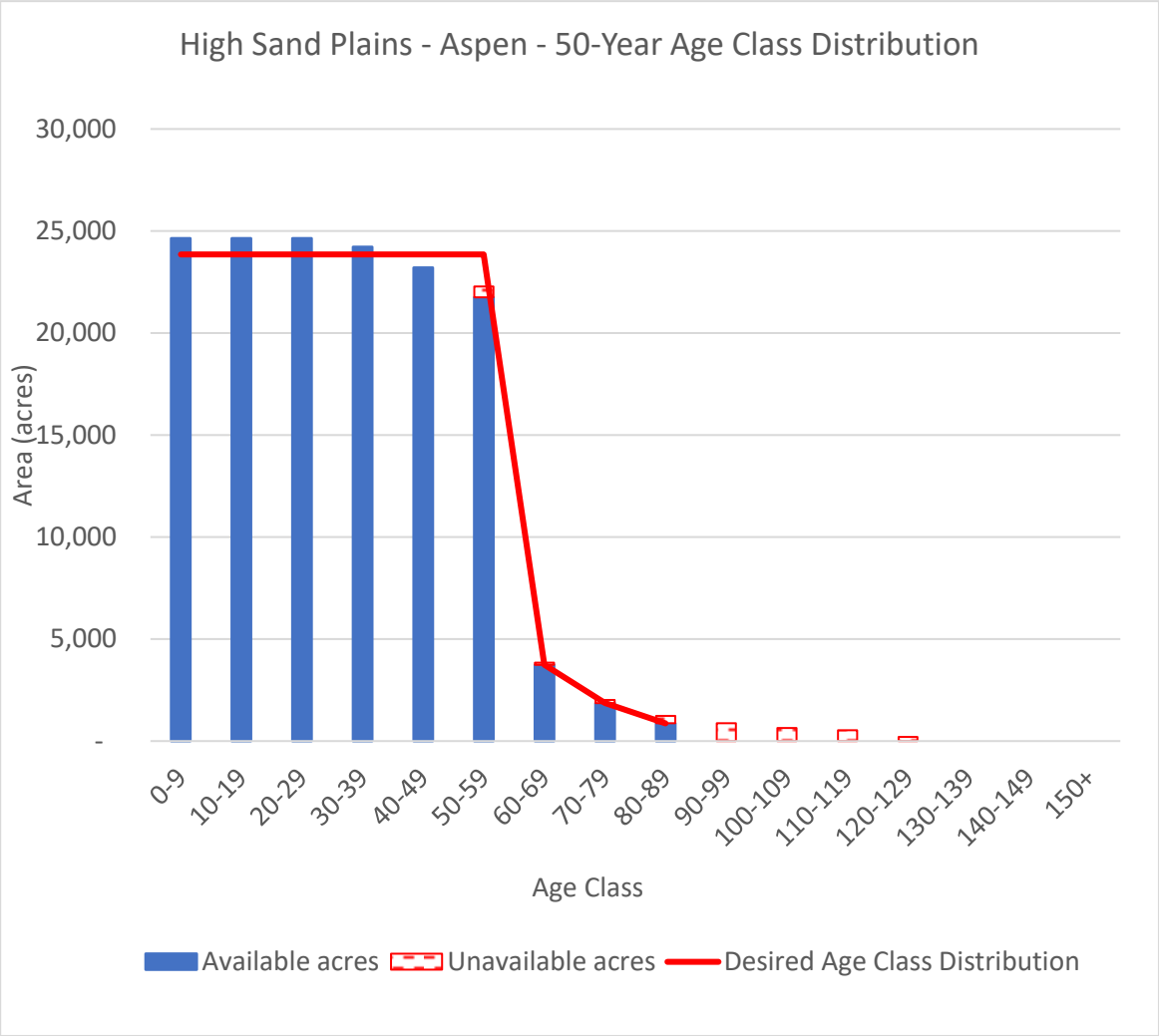


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

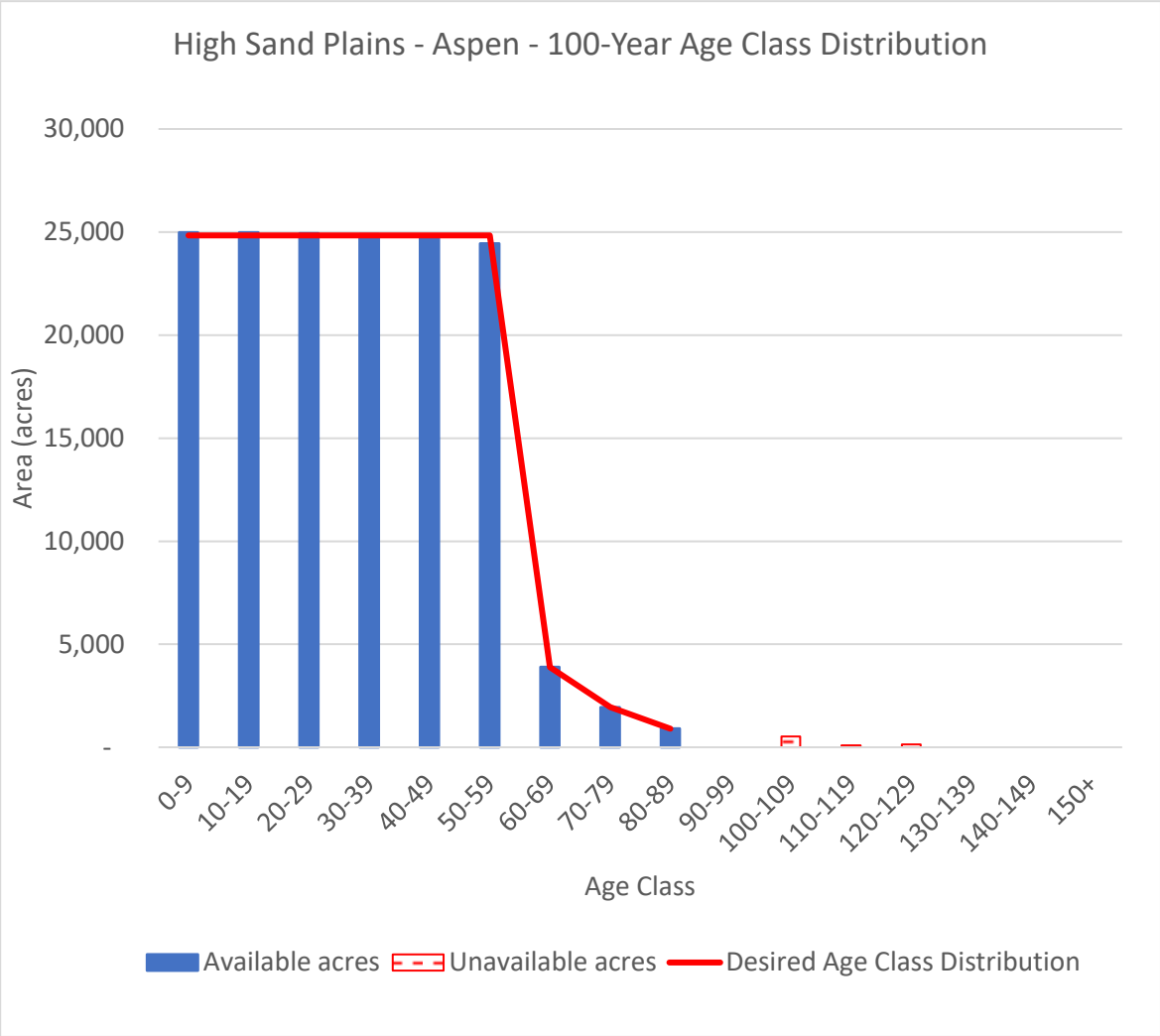


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

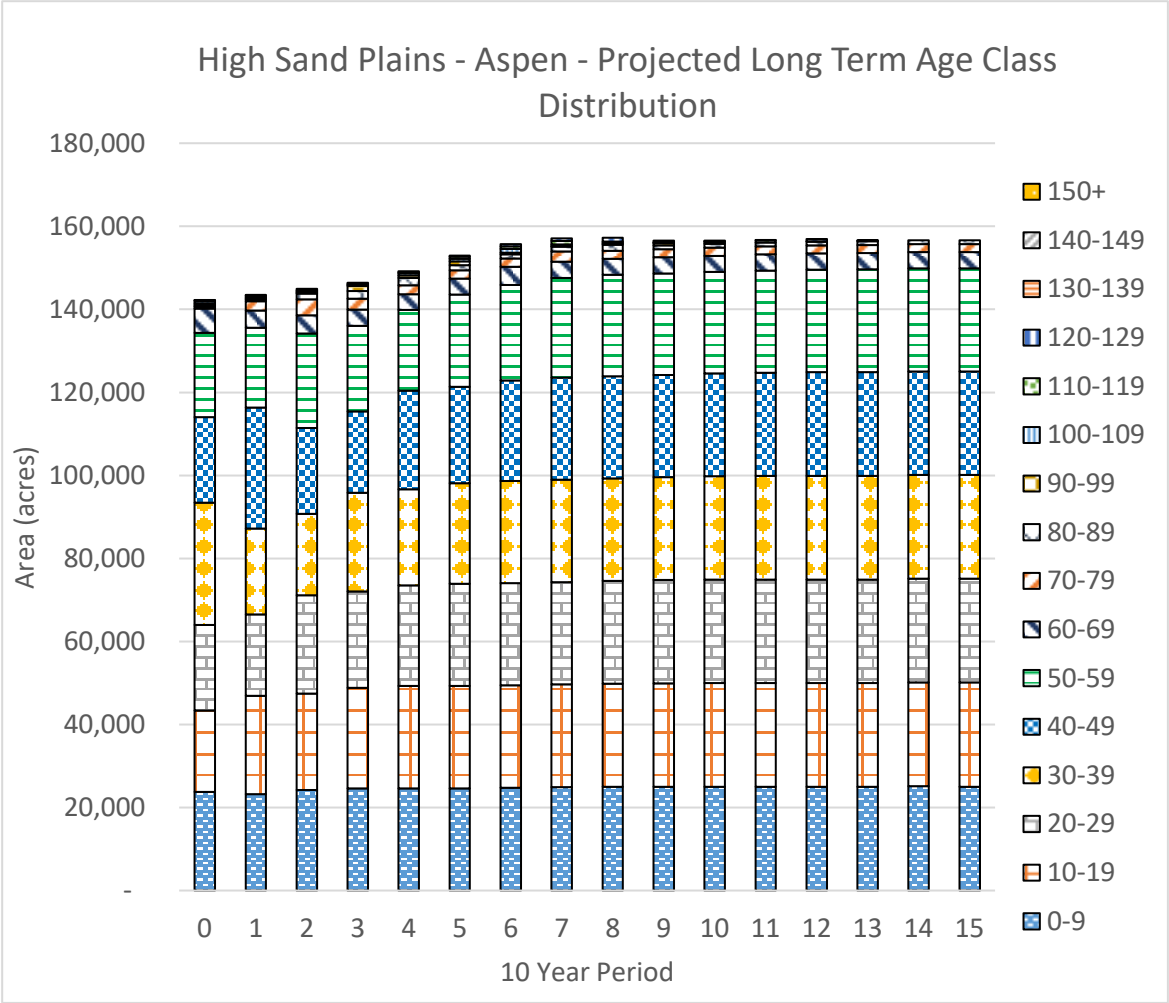


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 18,914 acres of projected clearcut harvest and 2,653 acres of salvage clearcut from the 2025 ice storm damage in the aspen cover type during this planning period. There are an additional 338 acres forecasted to regenerate naturally from severe ice storm damage that are not salvage harvested. There are also 1,297 acres projected to transition into this cover type over the planning period. This totals 23,202 acres that will regenerate into the 0-9 age class and is slightly higher than the desired establishment of 21,950 acres per decade. This is due in part to the 1,297 acres from other cover types transitioning into aspen.

Planted jack pine

Current condition

Most of the planted jack pine cover type is currently in the 20- to 39-year-old age classes and nearly all of the acres are available for commercial management; less than 1% of the cover type is considered unavailable (Figure 8). The past management regime has been primarily clearcut. Planted jack pine was managed on a 60-year rotation to provide pulpwood products and occasional sawlogs with the objective of balancing the age class distribution and managing jack pine on suitable sites. Jack pine also provides habitat for many wildlife species. The age class distribution in this cover type is in an unbalanced condition.

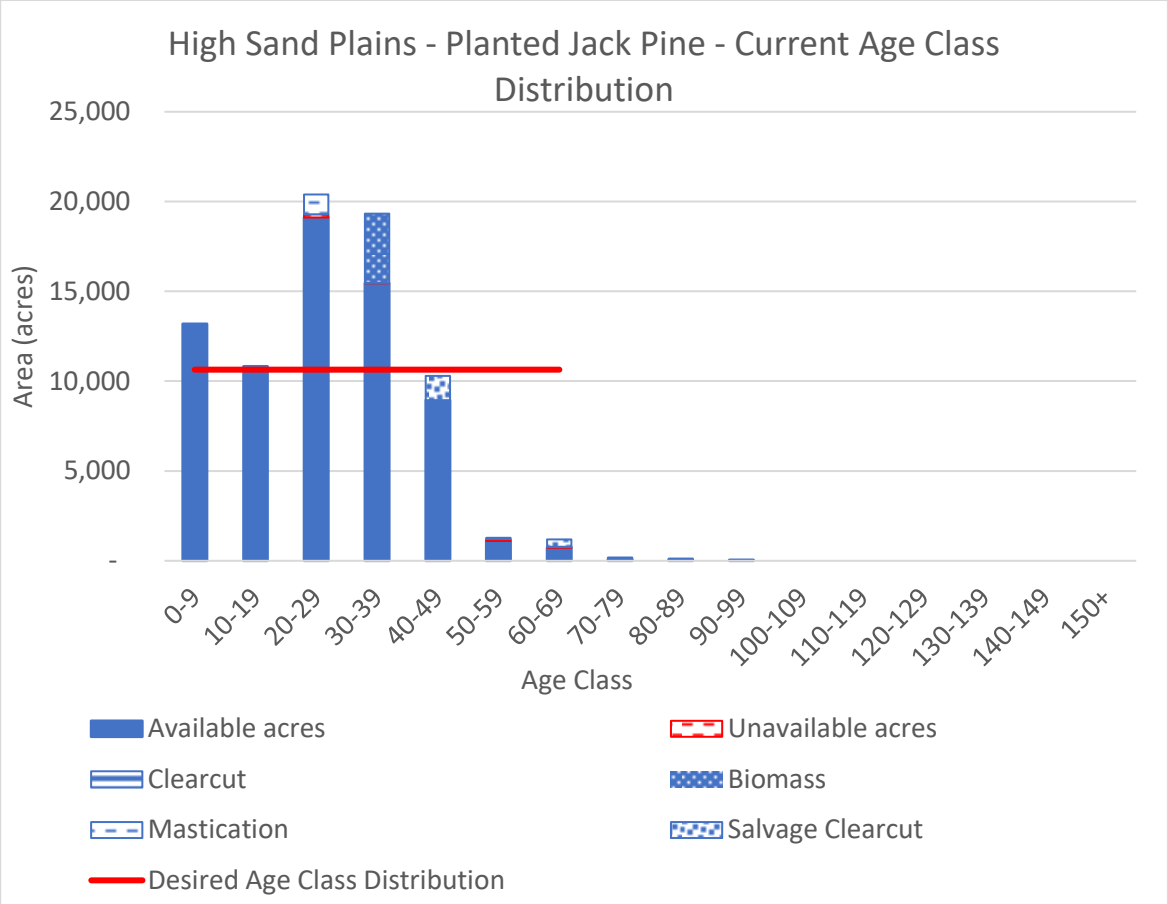


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the planted jack pine cover type over the 10-year planning period.

Current conditions are a result of plantations established during the same few decades. Additionally, there have been consistent commercial harvests and regeneration efforts on available jack pine acres planted during the previous planning periods. A portion of this cover type meets the habitat requirements for Kirtland's warbler (Section 5) and snowshoe hare (Table 10). No data is provided for Kirtland's warbler, because the jack pine acres in this management area that have relevance are those within designated essential habitat. Because essential habitat was represented in the SAU, and the SAU provides unit-level management actions, it is best to refer to Section 5 for more information.

Table 10. Featured species with planted jack pine as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Planted Jack Pine	Planted Jack Pine Habitat Acres - Available	Planted Jack Pine Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	24,009	0
Kirtland's Warbler	Age Category: 0-19 Size Category: Sapling, Pole	NA	NA

Desired future condition

The projected long-term cover type trend for planted jack pine is stable in the High Sand Plains Management Area. There are a few transitions from planted jack pine to other cover types such as natural jack pine with only a 0.2% decrease in cover type acreage.

The long-term goal for this cover type is balanced age classes between 0 and 60-years-old for all available planted jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of diseases and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of 8,426 acres in the upcoming 0-9 age class (Figure 9). Progress toward the long-term age class distribution of planted jack pine will take many decades in the management area due to its unbalanced distribution.

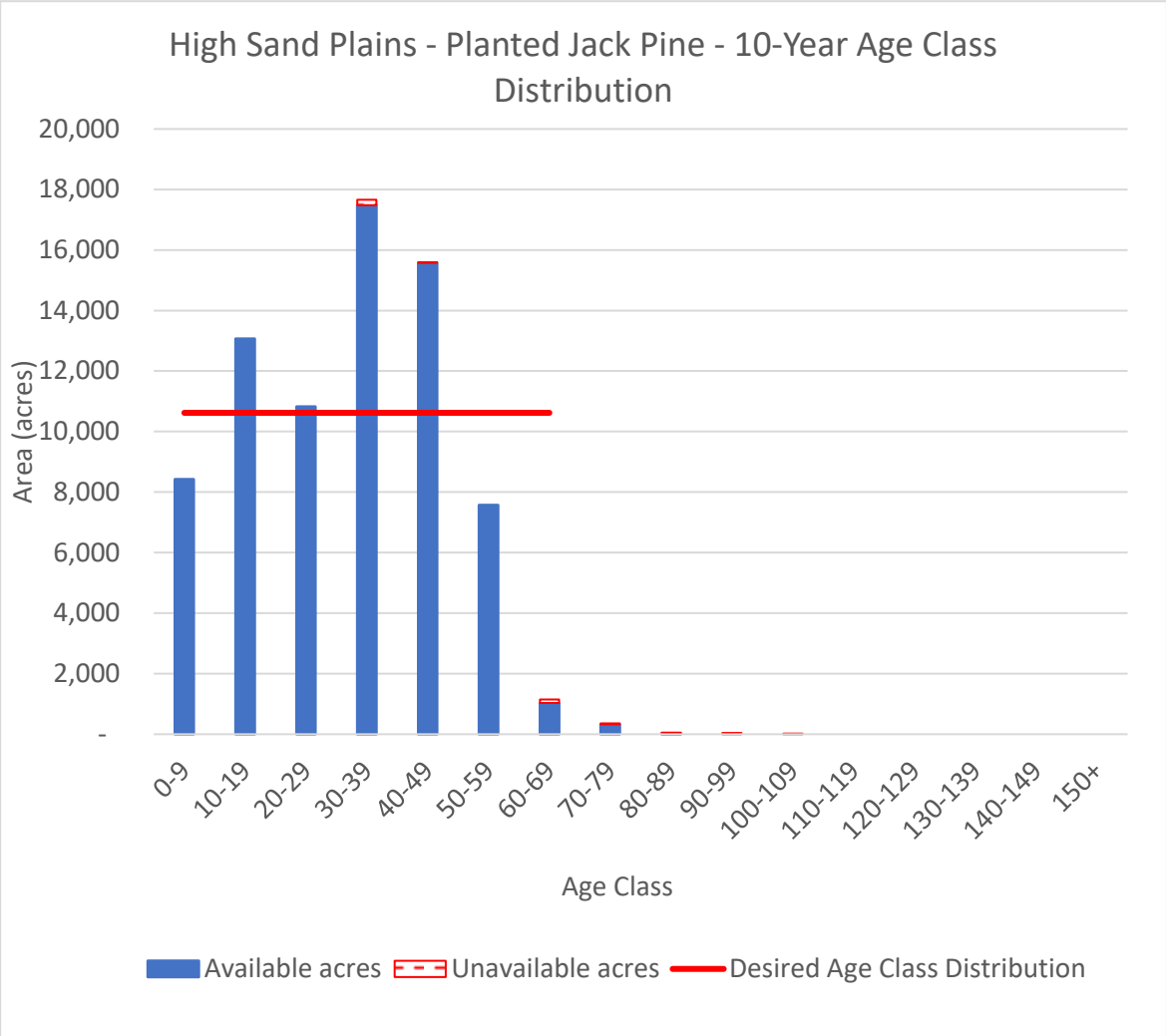


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of planted jack pine still working toward the balanced desired future condition (Figure 10). With this case, an extremely unbalanced condition in the first planning period can often result in taking more time to achieve the desired age class goals.

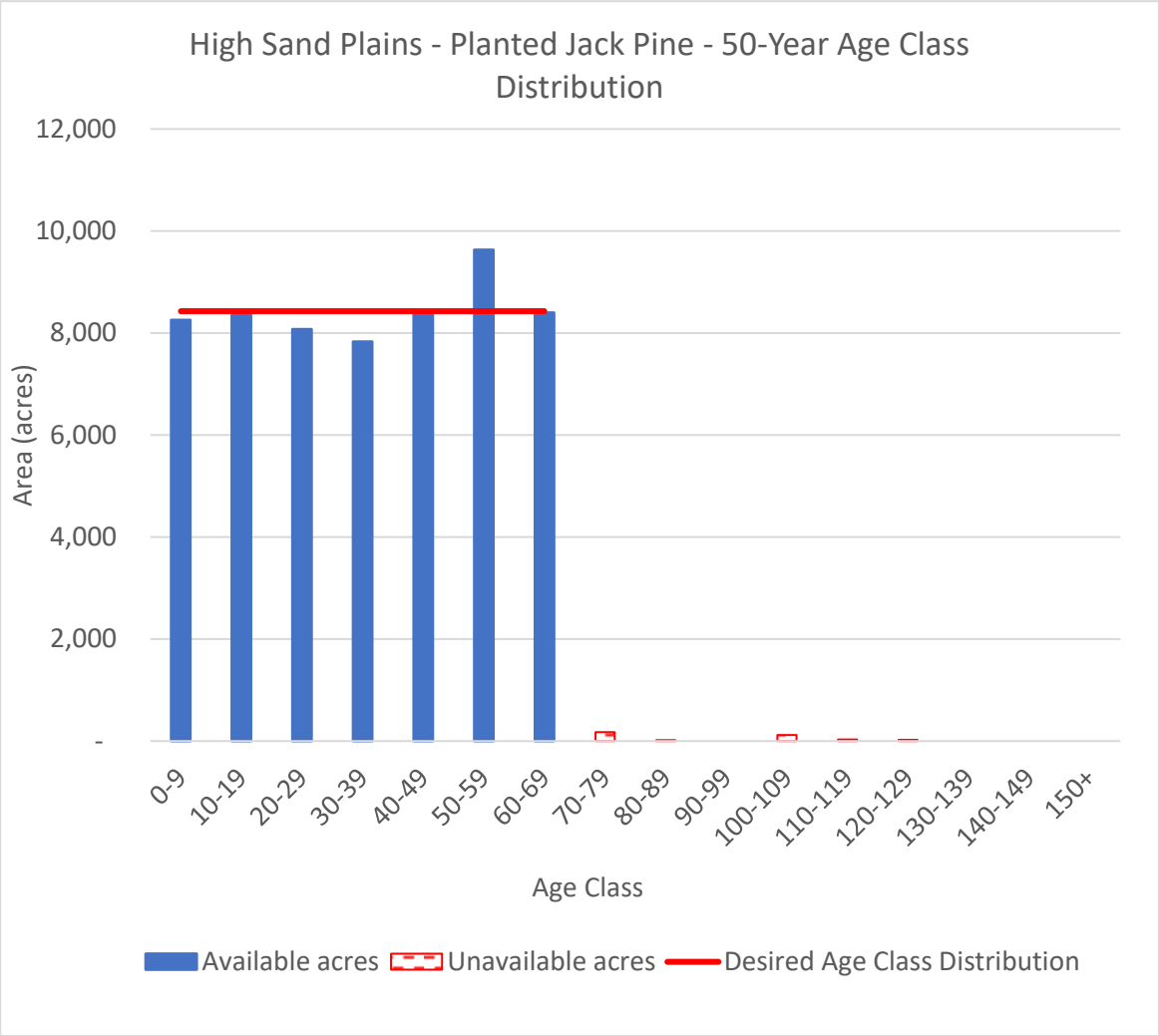


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate the manageable acres of planted in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 12).

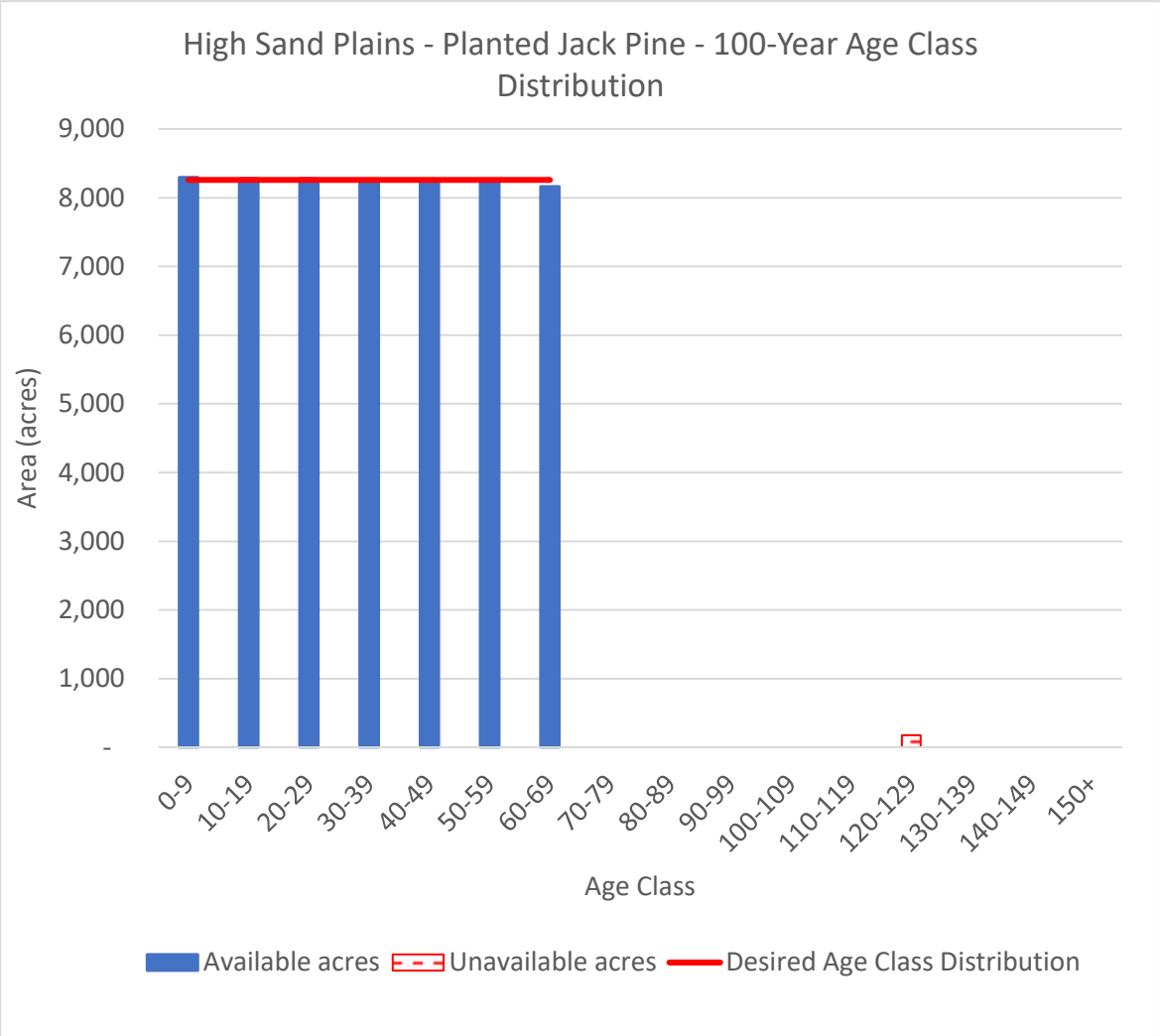


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

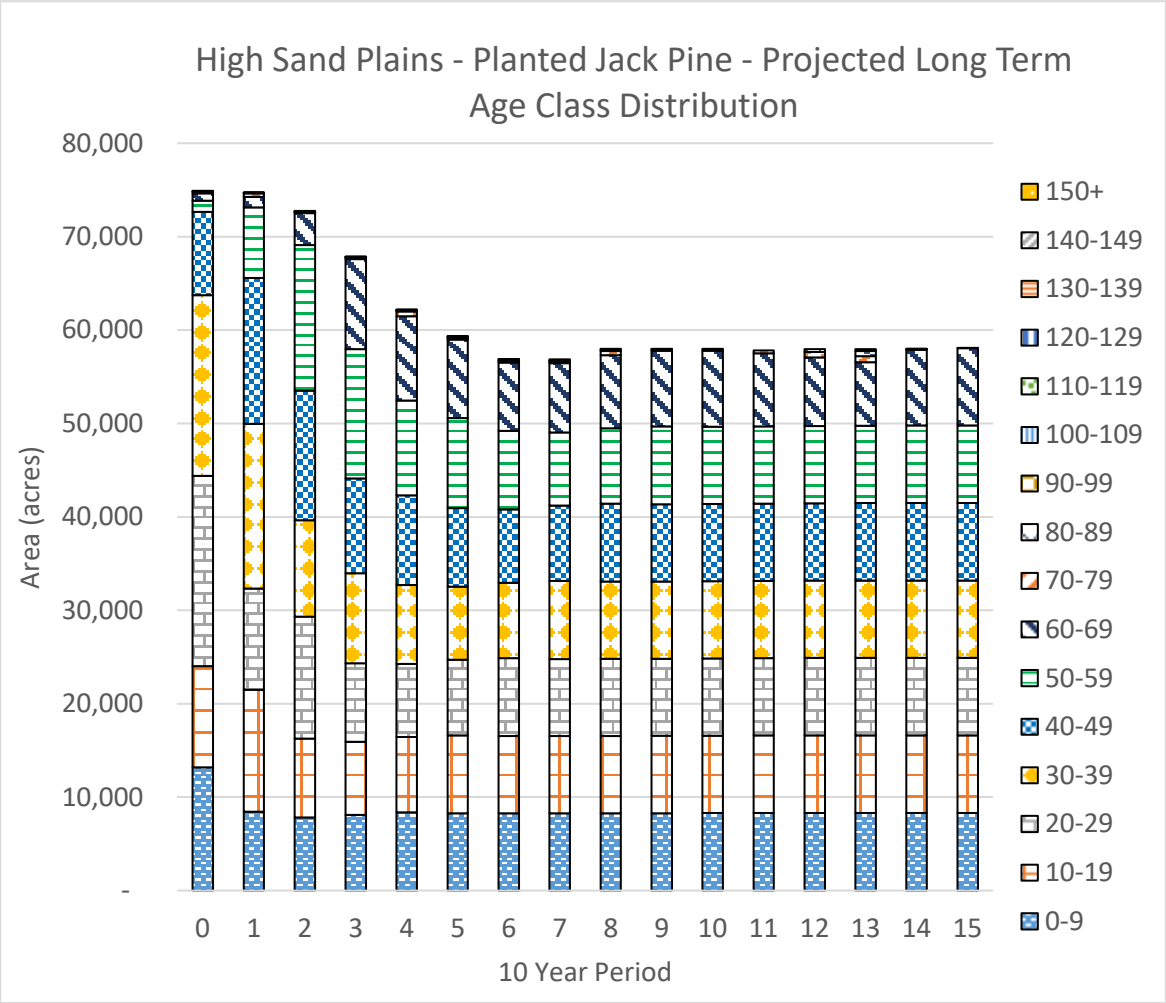


Figure 12. Projected age class distribution for all acres of planted jack pine over the next 150 years.

Management actions

There are 3,935 acres of projected clearcut and 1,946 acres of salvage clearcut harvest along with 1,327 acres of mastication treatments and 1,436 acres of stands that have severe damage from the ice storm that will be planted in the jack pine cover type during this planning period. Approximately 180 acres are forecasted to transition into other cover types resulting in the 8,643 acres in the 0-9 age class. This is well below the desired establishment of 10,616 acres per decade because of the current unbalanced condition.

Mixed upland deciduous

Current condition

The age class distribution of mixed upland deciduous is currently unbalanced in this management area (Figure 13). There are deficits in several of the age class categories from 40 to 79 years old. With that, several acres are beyond the tail of the age class distribution of 80 years old and older.

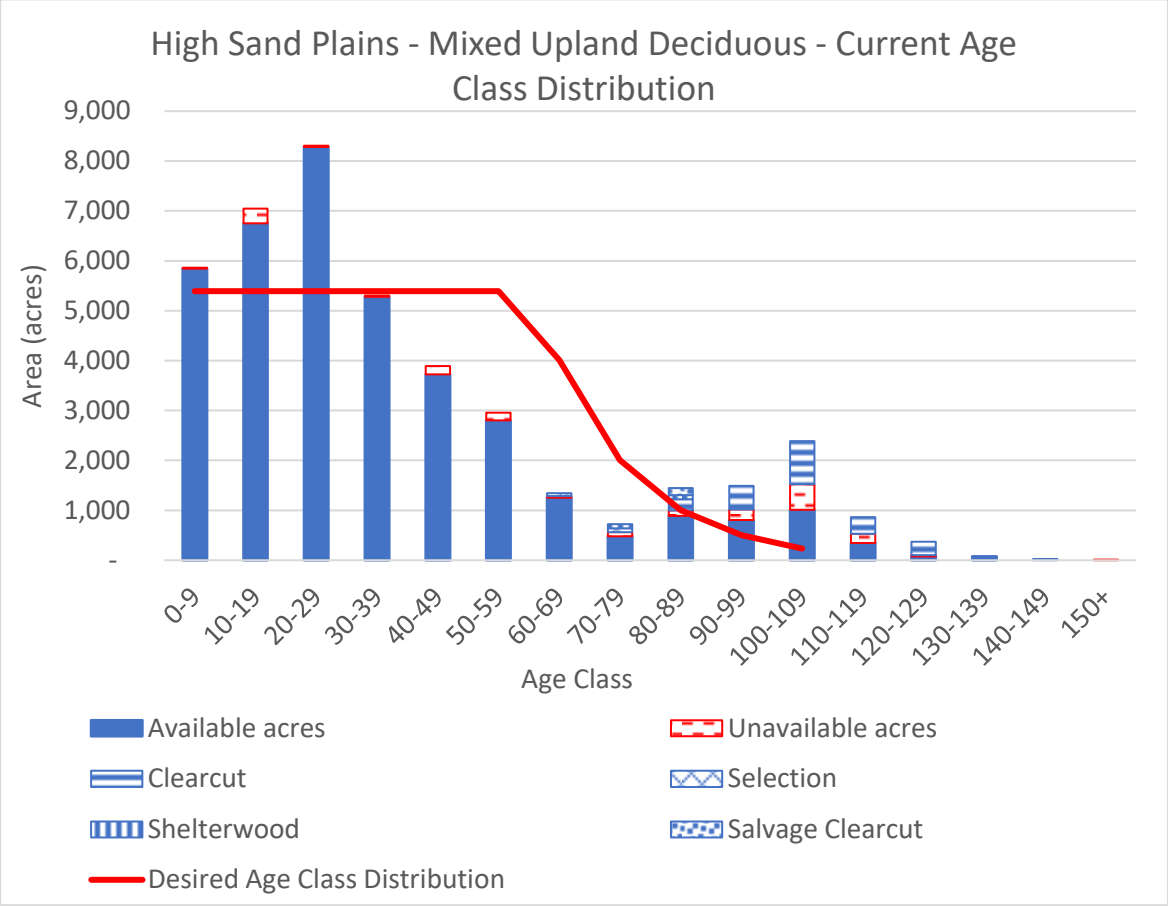


Figure 13. Current age class distribution and projected harvests in the mixed upland deciduous cover type.

Current conditions are a result of successful commercial harvests and natural regeneration efforts that have been in place in this management area for decades. A portion of this cover type meets the habitat requirements for snowshoe hare, marten and wood thrush (Table 11).

Table 11. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres - Available	Mixed Upland Deciduous Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19	12,595	315

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres - Available	Mixed Upland Deciduous Habitat Acres - Unavailable
	Size Category: Sapling		
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	8,694	1,236
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	8,694	1,236

Desired future condition

The projected long-term cover type trend for mixed upland deciduous is fairly stable in the High Sand Plains Management Area. There are projected transitions into this cover type from other cover types forecasted with an increase of 3.8% in acres. There are very few transitions out of mixed upland deciduous.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old and a max tail age of 100 years old for all available mixed upland deciduous stands in this management area.

The end of the planning period will result in the establishment of 5,133 acres of regeneration in the upcoming 0-9 age class given the amount of merchantable and available acres in the older age classes (Figure 14). Progress toward the long-term age class distribution of mixed upland deciduous will take many decades in the management area.

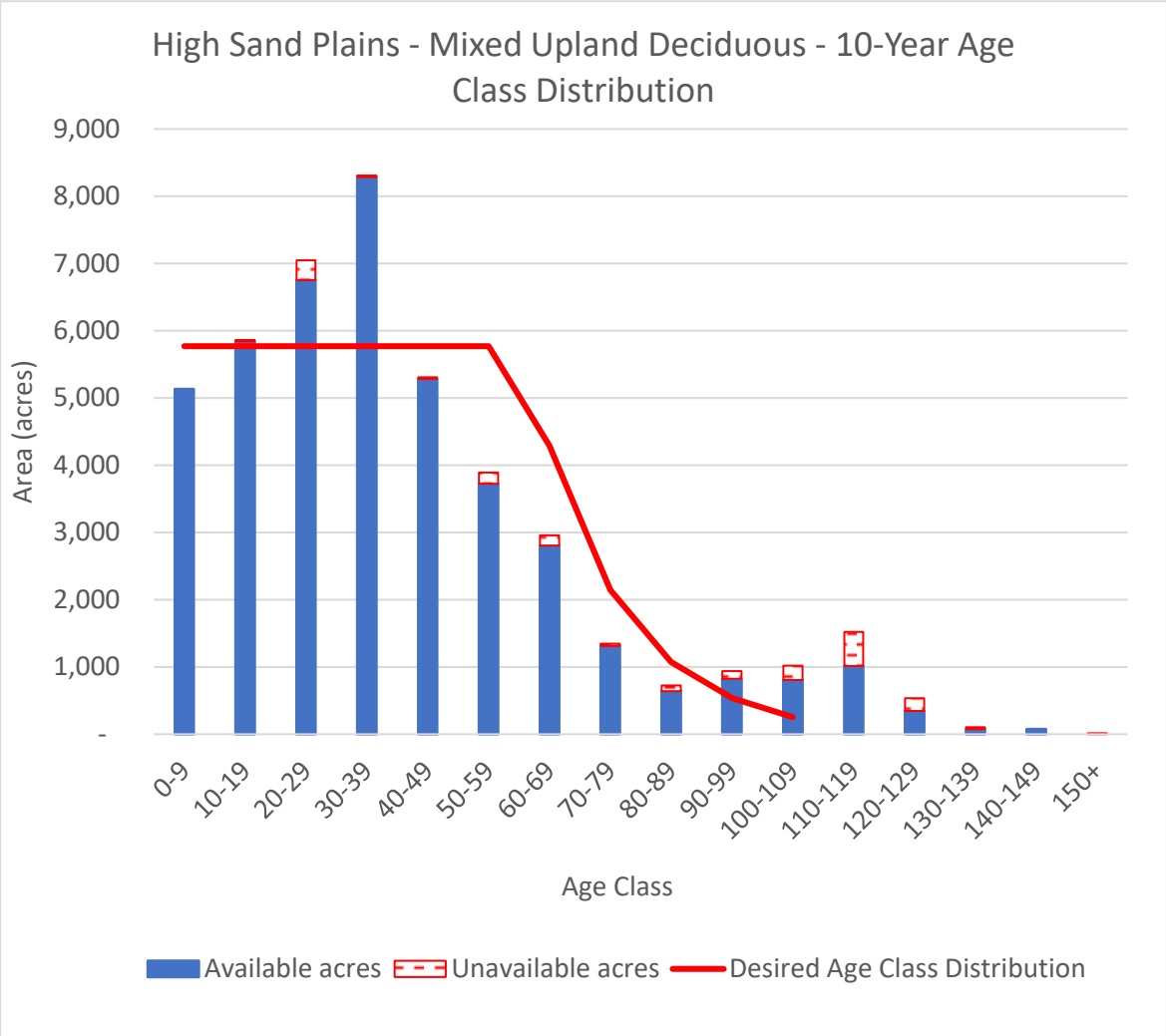


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed upland deciduous acres begins to reach the desired future condition especially in the younger age classes (Figure 15). There continues to show a deficit in the 10- to 49-year-old age classes due to the unbalanced condition during the first planning period. As is often the case, an extremely unbalanced condition in the first planning period can result in the need to carry some acres slightly longer into older age classes in future years in order to meet the desired distribution and achieve age class goals as seen in Figure 14 in age class 60-69.

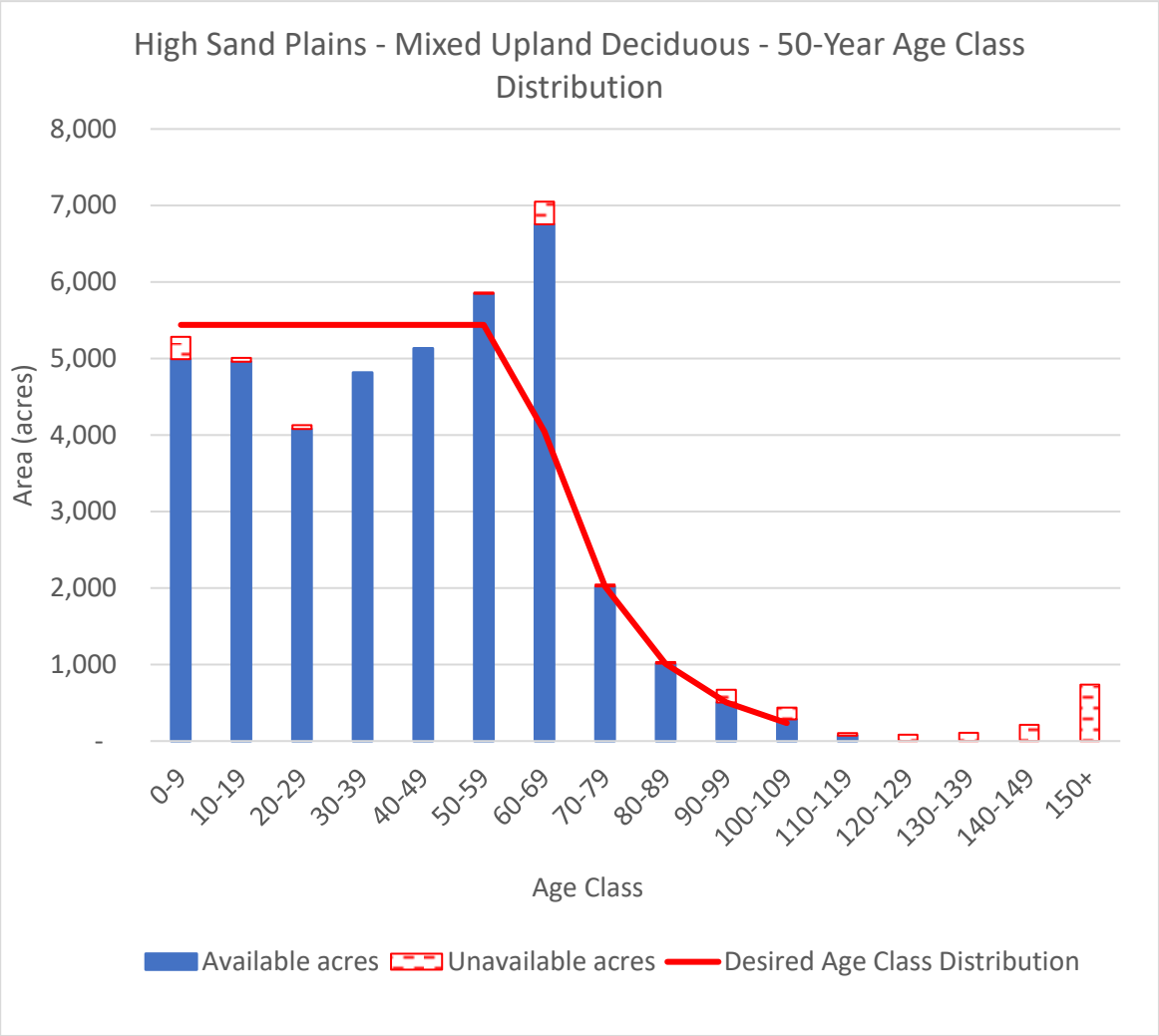


Figure 15. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 17).



Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

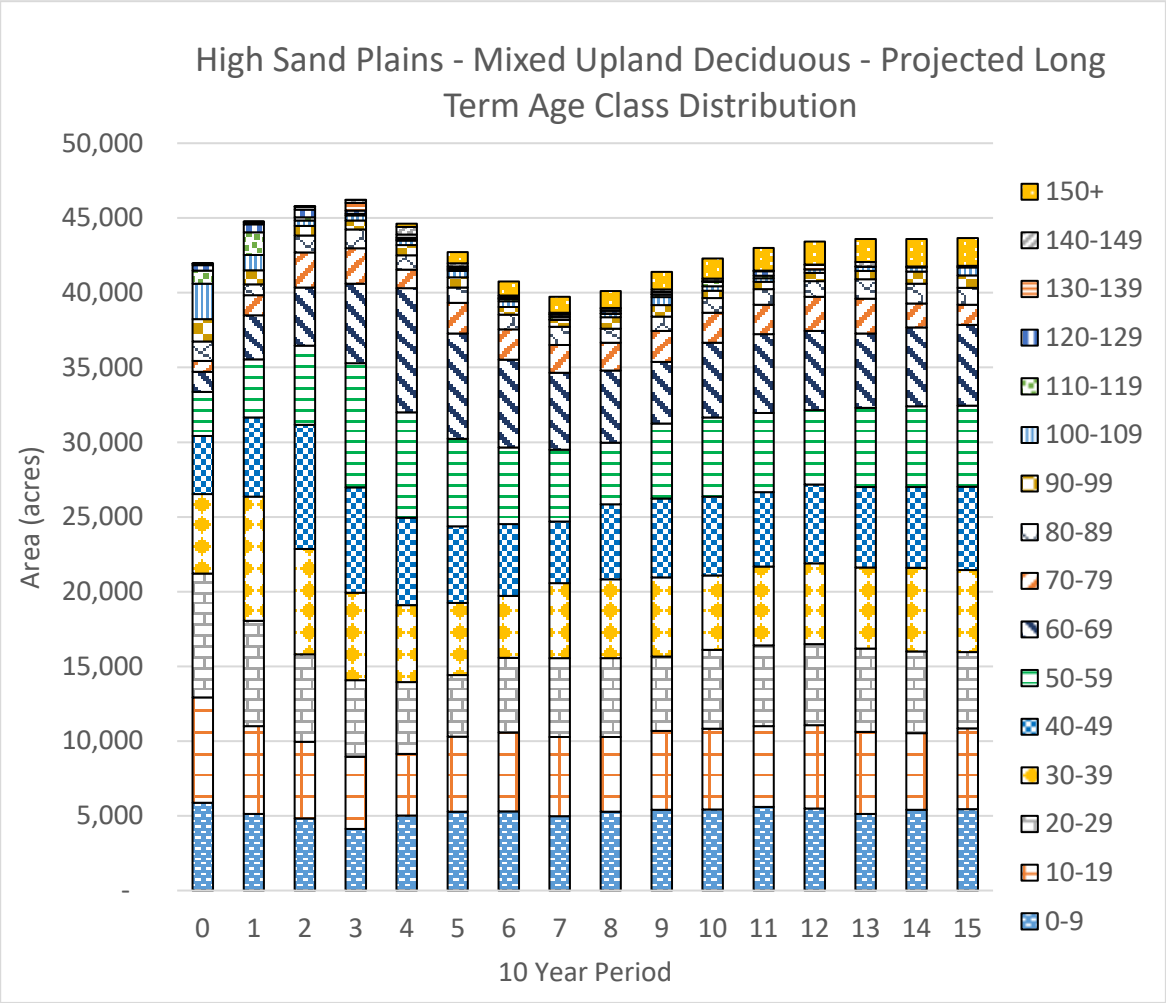


Figure 17. Projected age class distribution for all acres of mixed upland deciduous over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected clearcut harvest regime on 2,188 acres, salvage clearcut on 144 acres, an additional 129 acres in selection, and 166 acres of shelterwood harvest regime. There are also approximately 2,803 acres forecasted to transition into this cover type over this planning period. These actions will encourage a healthy and productive forested mix in the mixed upland deciduous cover type.

Planted red pine

Current condition

Most of the planted red pine cover type is currently in the 0- to 9-year-old age class and nearly all the acres are available for commercial management; only 1% of the cover type is considered unavailable (Figure 18). The past management regime has been primarily thinning every 10 to 20 years to achieve an approximate residual basal area of 120 square feet. The age class distribution in this cover type is in a very unbalanced condition.

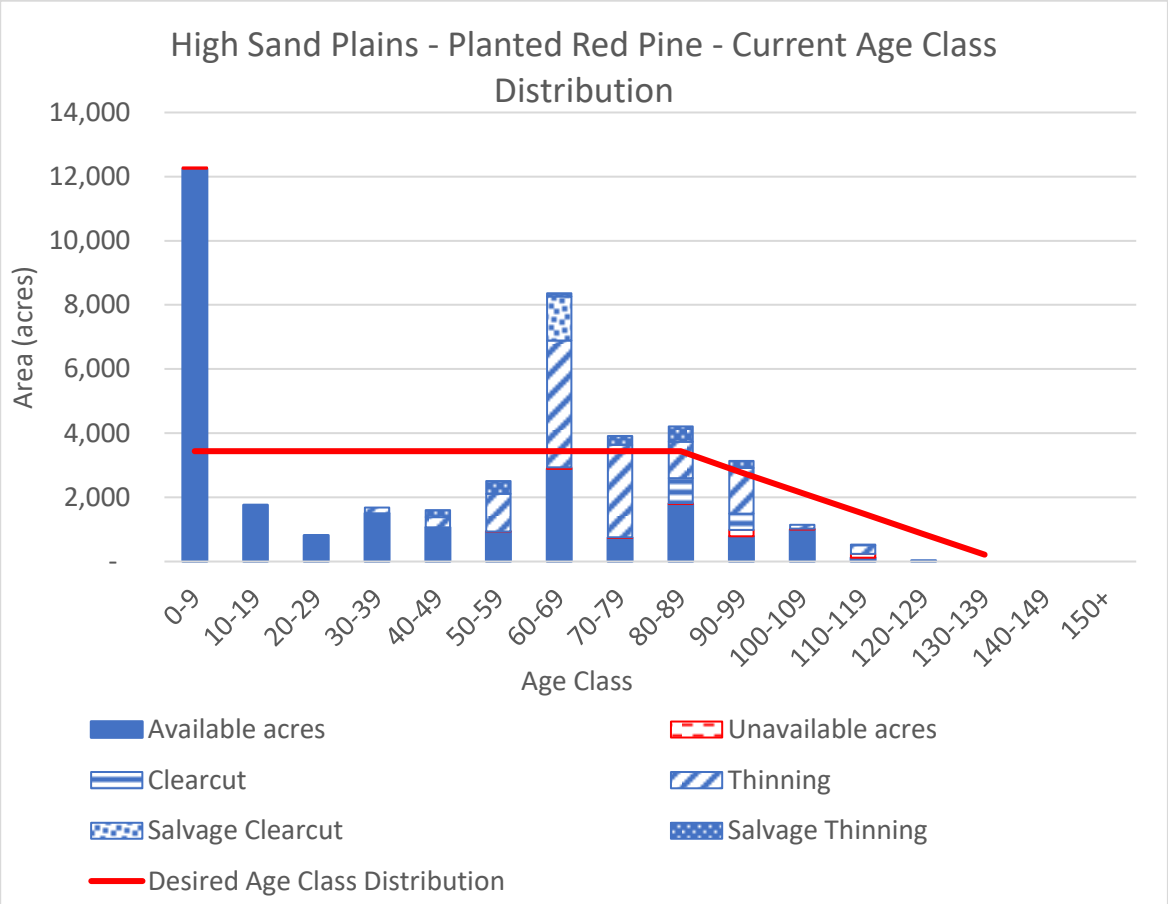


Figure 18. Current age class distribution, the desired age class distribution, and the projected harvests in the planted red pine cover type over the 10-year planning period.

Current conditions are a result of plantations established during the 1930s by the Civilian Conservation Corps, most of which reached maturity during the previous two planning periods. Additionally, there have been consistent commercial harvests regeneration efforts on available planted red pine acres during the previous planning period.

Desired future condition

The projected long-term cover type trend for planted red pine is increasing in the High Sand Plains Management Area. There are a few transitions into this cover type from other cover types forecasted in this management area with an increase of about 2.1%.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old with a tail out to 130 years old for all available planted red pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of diseases and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of 3,555 acres in the upcoming 0-9 age class which is just over the desired 3,509 acres (Figure 19). Progress toward the long-term age class distribution of planted red pine will take many decades in the management area.

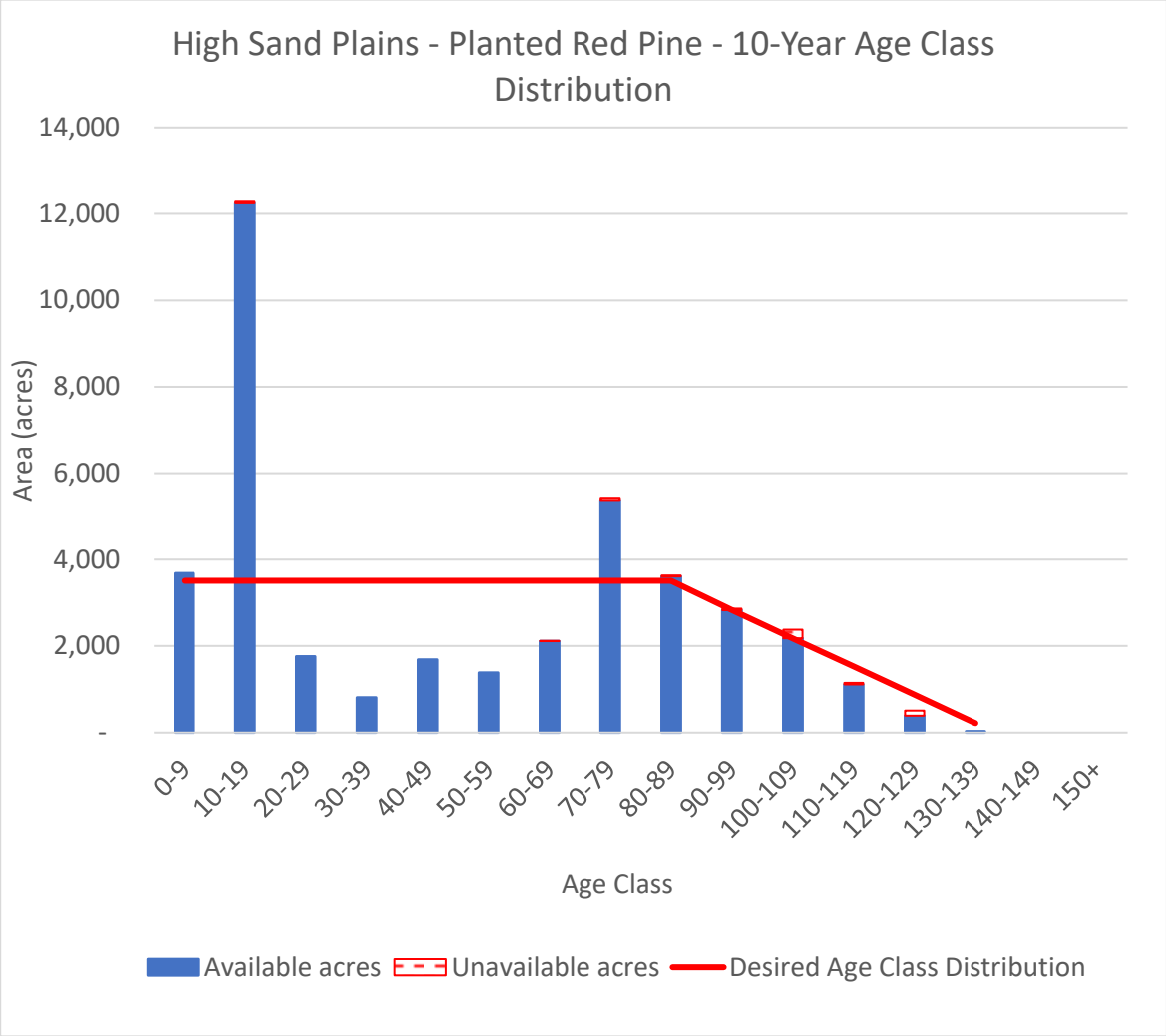


Figure 19. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of planted red pine beginning to improve with a few age classes nearing the desired future condition (Figure 20). As is often the case, extremely un-

balanced conditions in the first planning period can often result in the need to carry some acres higher in certain age classes to achieve the desired age class goals.

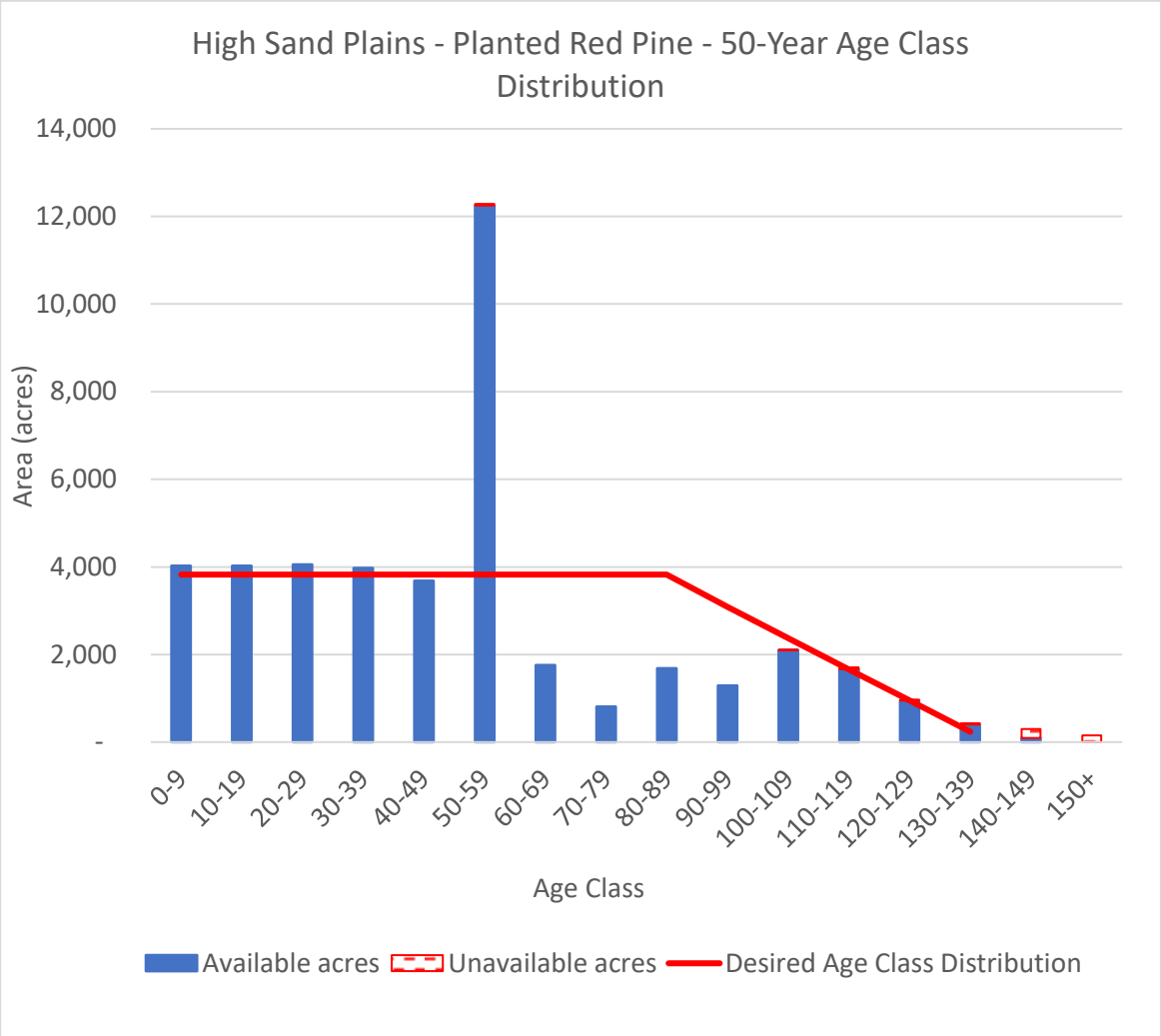


Figure 20. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 21) will concentrate the manageable acres of planted in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 22).

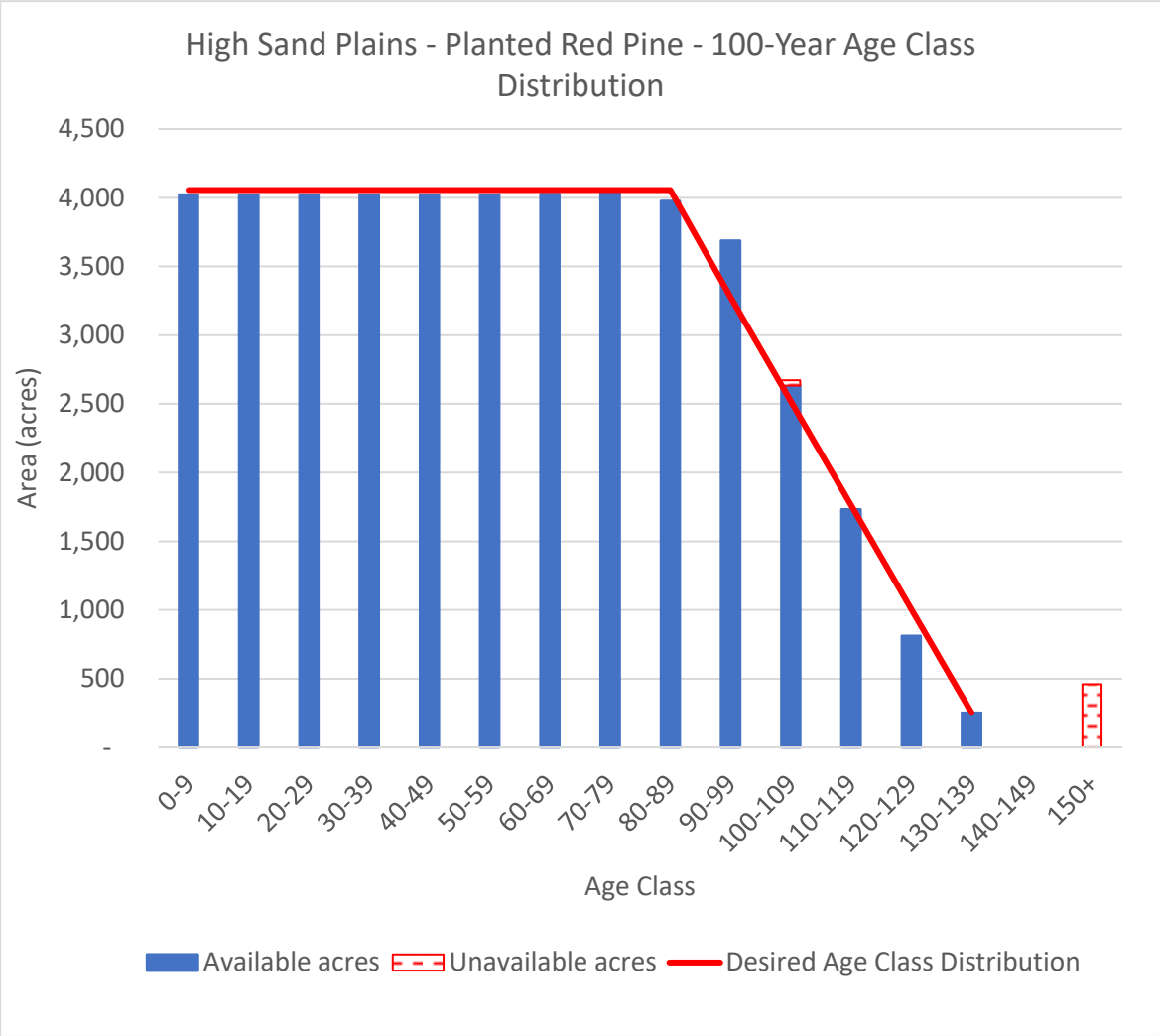


Figure 21. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

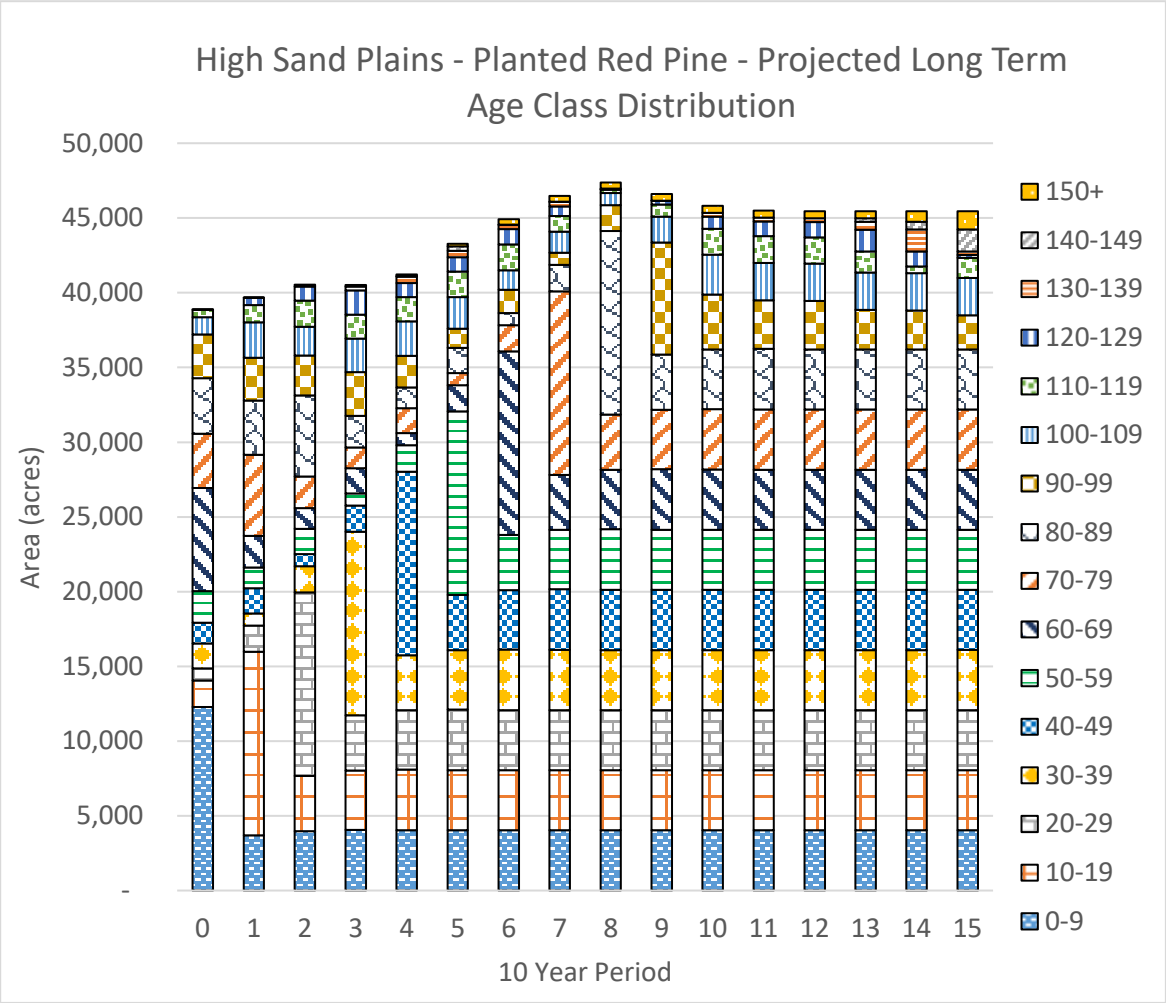


Figure 22. Projected age class distribution for all acres of planted red pine over the next 150 years.

Management actions

There are 1,285 acres of projected clearcut harvest and 1,460 salvage clearcut in the planted red pine cover type during this planning period. There are also 810 acres forecasted to transition into planted red pine. This is close to the desired establishment of 3,509 acres per decade. In addition to clearcut acres, there are 11,451 acres projected for thinning and 1,710 acres of salvage thinning in this cover type.

Natural jack pine

Current condition

Most of the natural jack pine cover type is currently between stand ages of 0 and 9 years old and 30 and 49 years old in the High Sand Plains Management Area (Figure 23). The age class distribution is currently unbalanced, especially in the 10- to 29-year-old age classes where the bulk of deficit acres occur. There is also a smaller deficit in the 60- to 69-year-old age class. A small number of acres that extend beyond the desired maximum age class distribution due to unavailability.

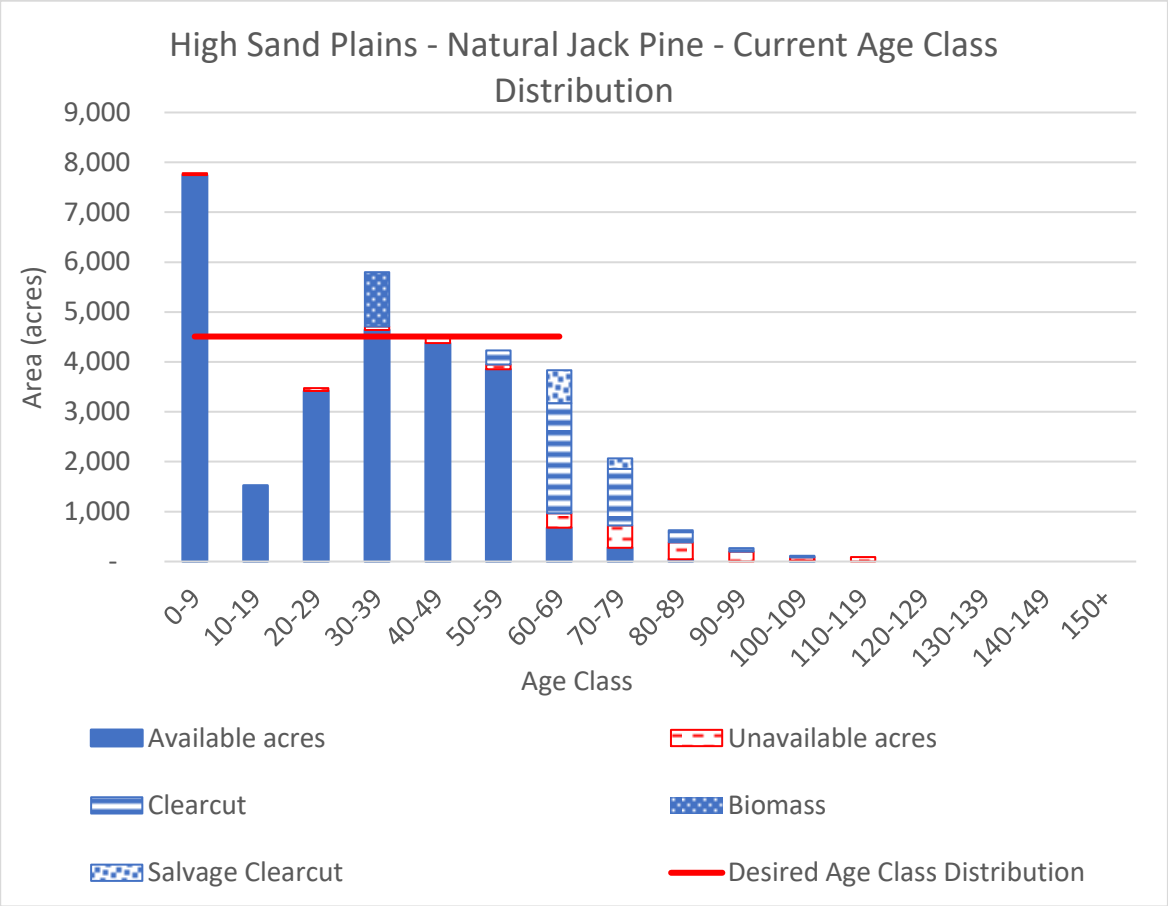


Figure 23. Current age class distribution and projected harvests in natural jack pine cover type.

Current conditions are a result of inconsistent commercial harvests and regeneration efforts on available natural jack pine acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for Kirtland's warbler (Section 5) and snowshoe hare (Table 12). No data is provided for Kirtland's warbler, because the jack pine acres in this management area that have relevance are those within designated essential habitat. Because essential habitat was represented in the SAU, and the SAU provides unit-level management actions, it is best to refer to Section 5 for more information.

Table 12. Featured species with natural jack pine as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Natural Jack Pine	Natural Jack Pine Habitat Acres - Available	Natural Jack Pine Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	9,264	43
Kirtland's Warbler	Age Category: 0-19 Size Category: Sapling, Pole	NA	NA

Desired future condition

The projected long-term cover type trend for natural jack pine is increasing in the High Sand Plains Management Area. Much of the increase in acres will be coming from the planted jack pine.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old for all available jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of jack pine budworm outbreaks and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of 6,734 acres which is slightly more than desirable number of acres in the 0-9 age class due to the surplus of acres in the older age classes (Figure 24). Progress toward the long-term desired age class distribution of jack pine will take many decades of even-aged management in this management area.

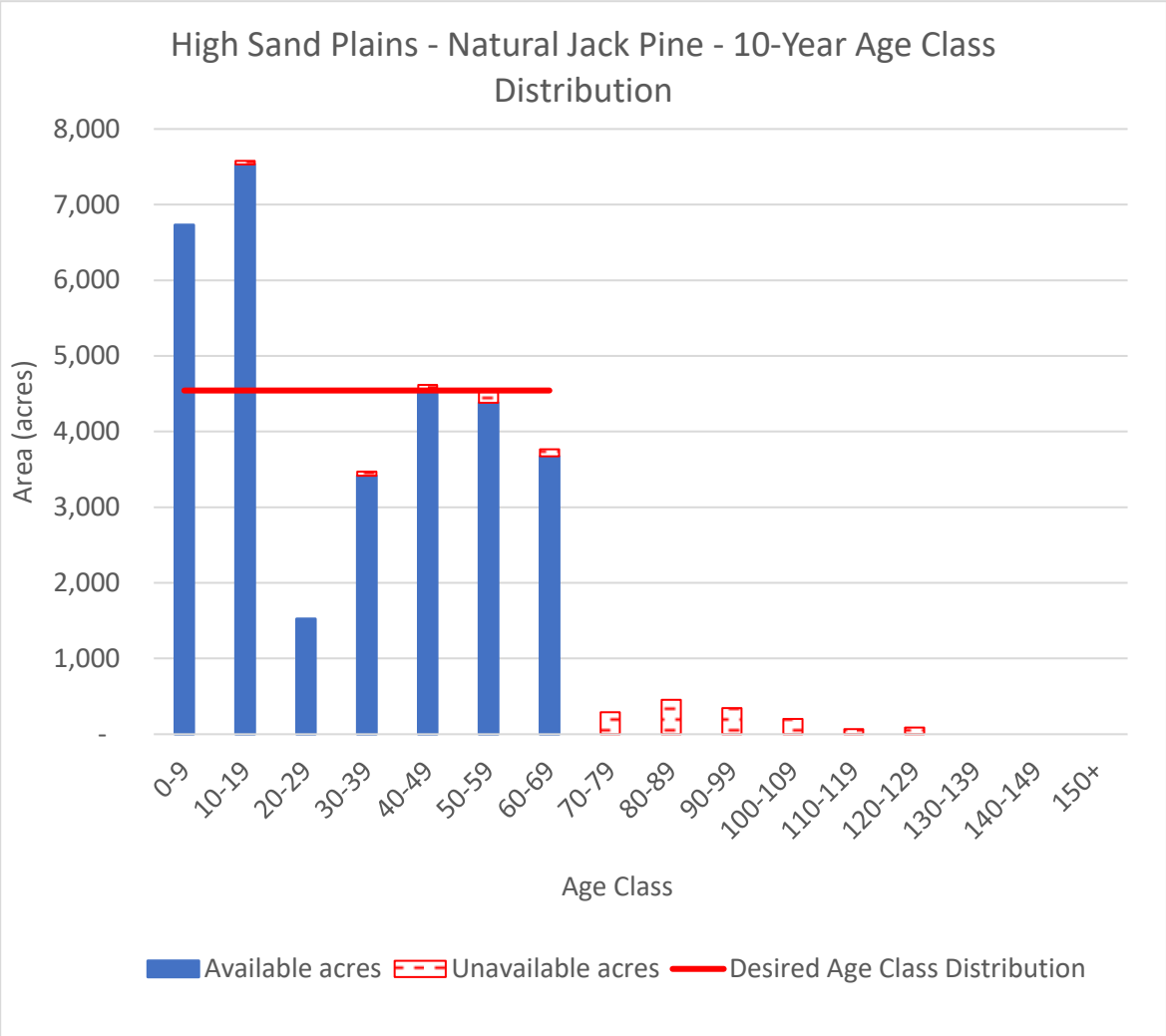


Figure 24. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of jack pine is beginning to reach the desired future condition for available acres (Figure 25). There is an increase in acres in the older age classes, beyond the desired age of 60, due to the unbalanced nature of this cover type in this management area. As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

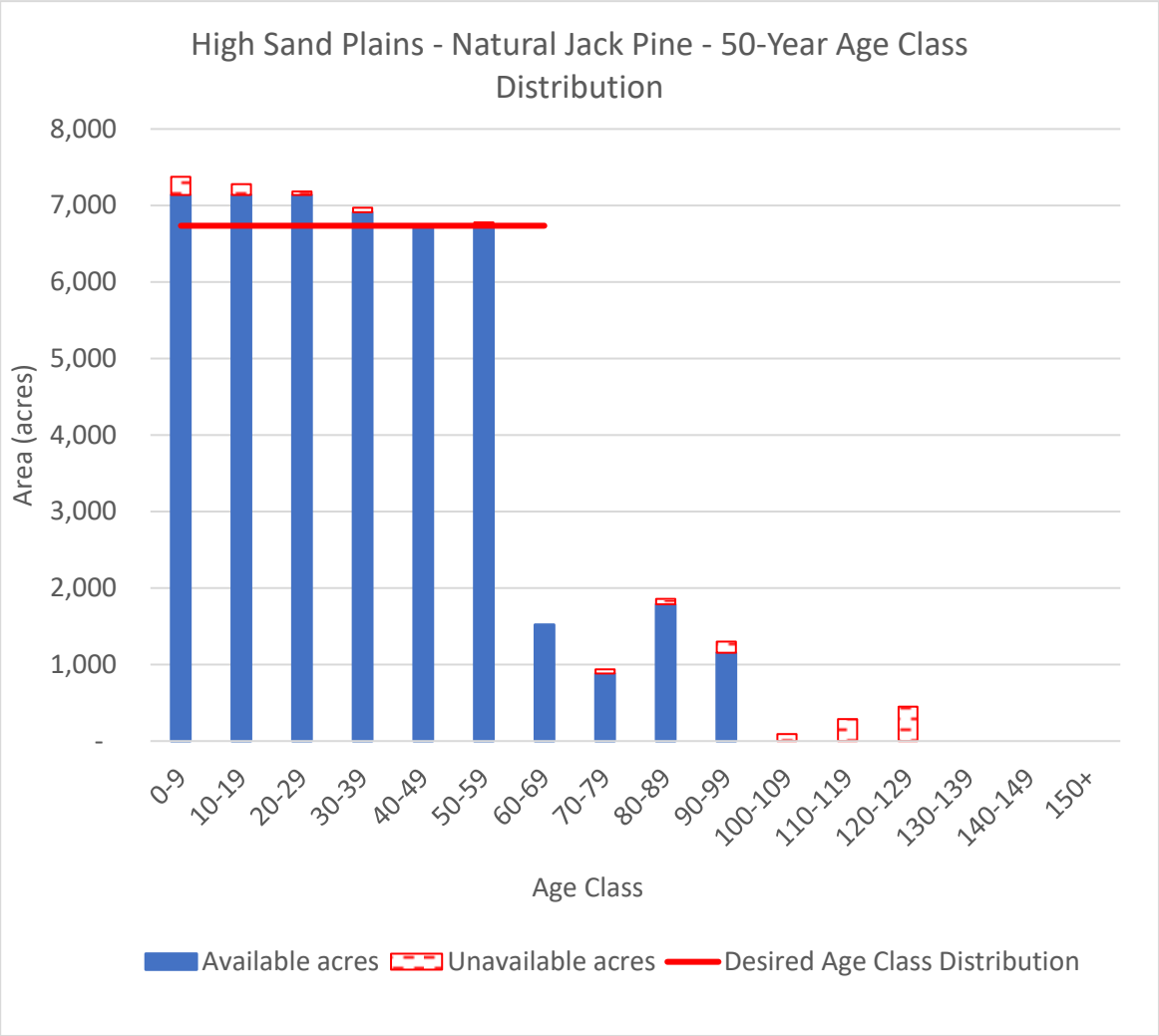


Figure 25. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 26) will concentrate the manageable acres of natural jack pine in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest (Figure 27).

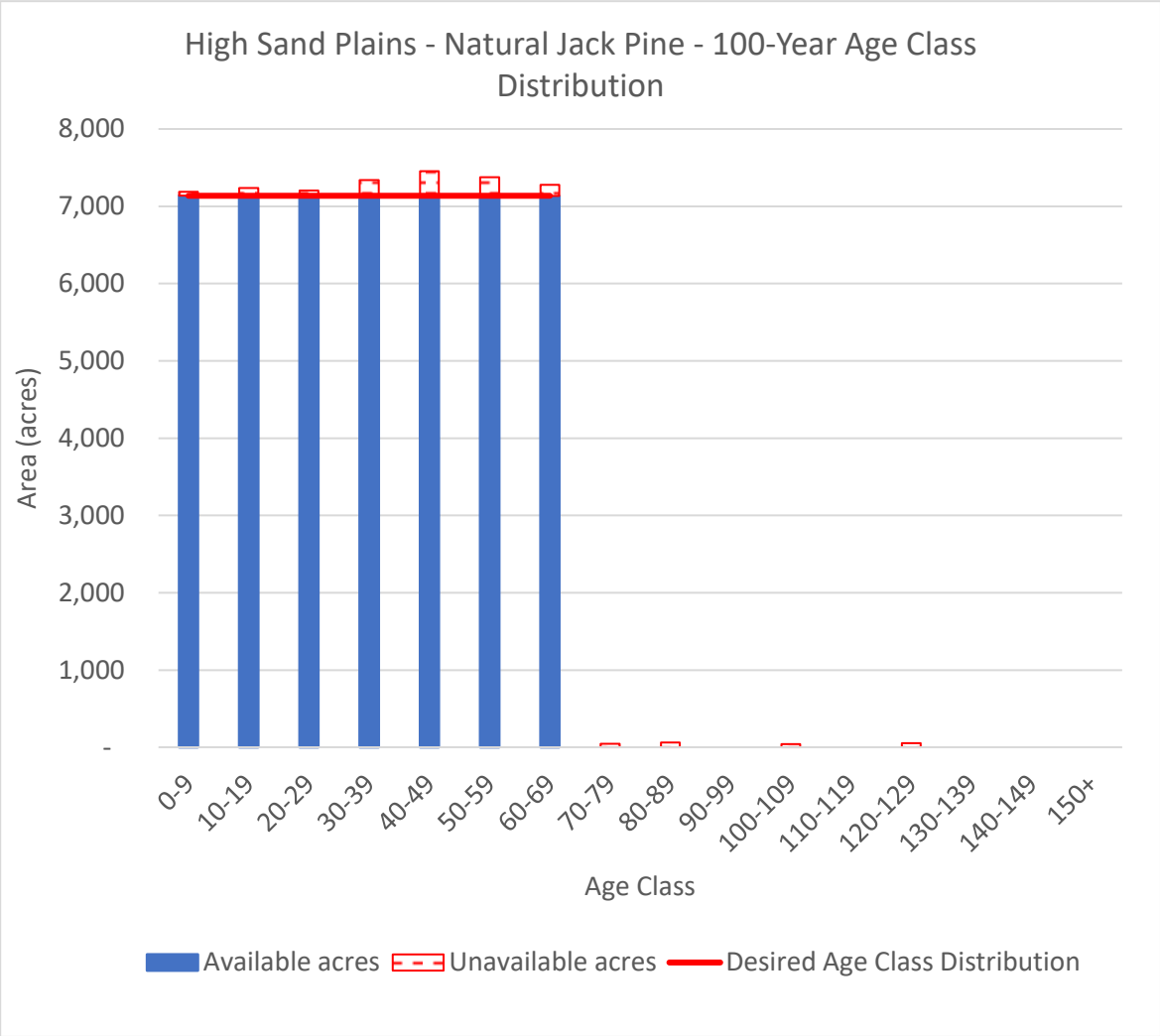


Figure 26. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

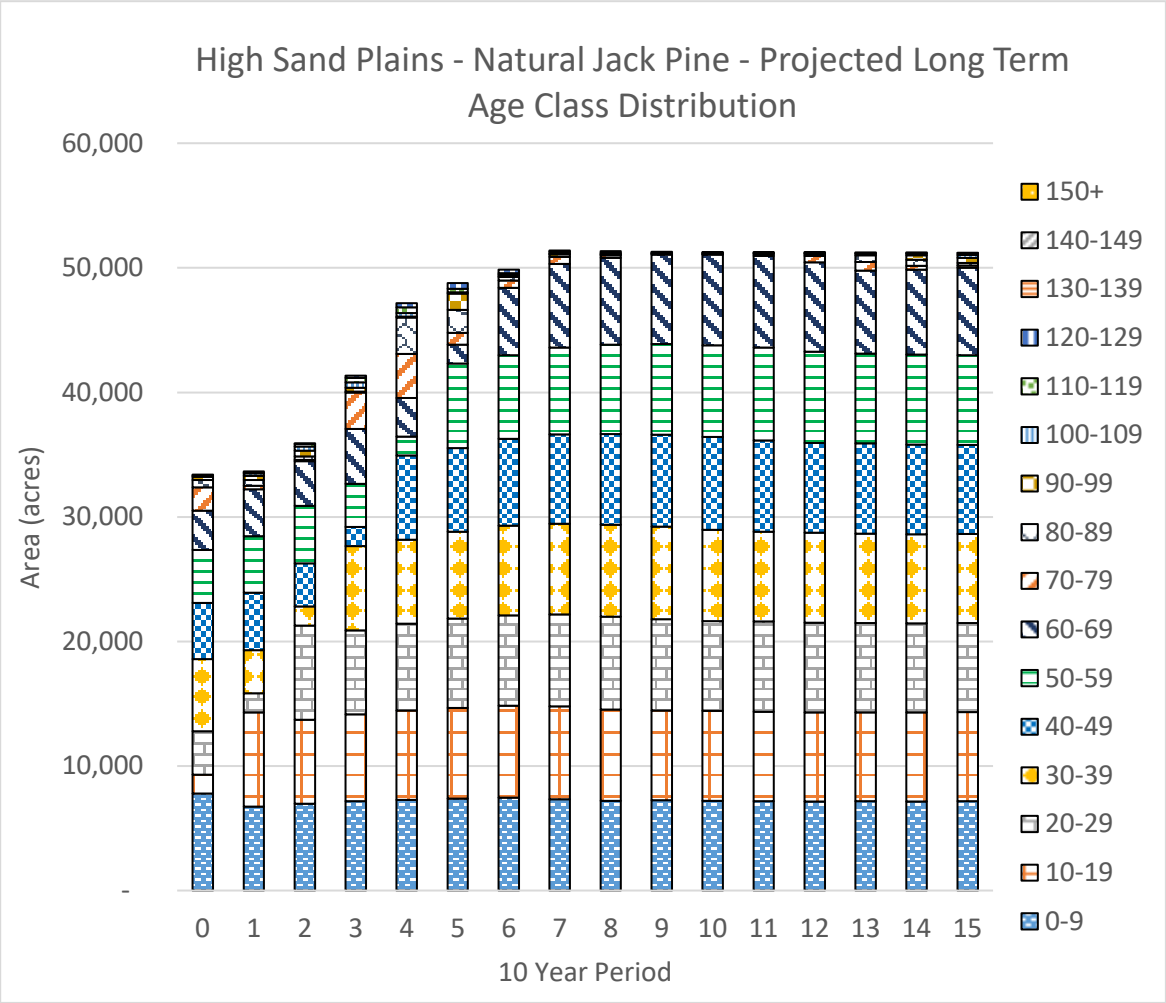


Figure 27. Projected age class distribution for all acres of natural jack pine over the next 150 years.

Management actions

There are 5,055 acres of projected clearcut harvest plus 940 acres of salvage clearcut in the natural jack pine cover type during the planning period. This, plus an additional 207 acres expected to regenerate due to severe ice storm damage and 239 acres transitioning into this cover type, falls above the desired establishment of 4,543 acres of natural jack pine per decade because of the current unbalanced age class condition.

Lowland conifers

Current condition

The High Sand Plains Management Area has a surplus of acres above the max tail of 80- to 89-year-old age class that was created due to unavailability of those acres on the landscape (Figure 28). The age class distribution is currently unbalanced across almost all the age class categories. Additionally, a deficit of available acres occurs in 10- to 59-year-old age classes. The landscape position of which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 80 years old. A portion of this cover type meets the habitat requirements for snowshoe hare and marten (Table 13).

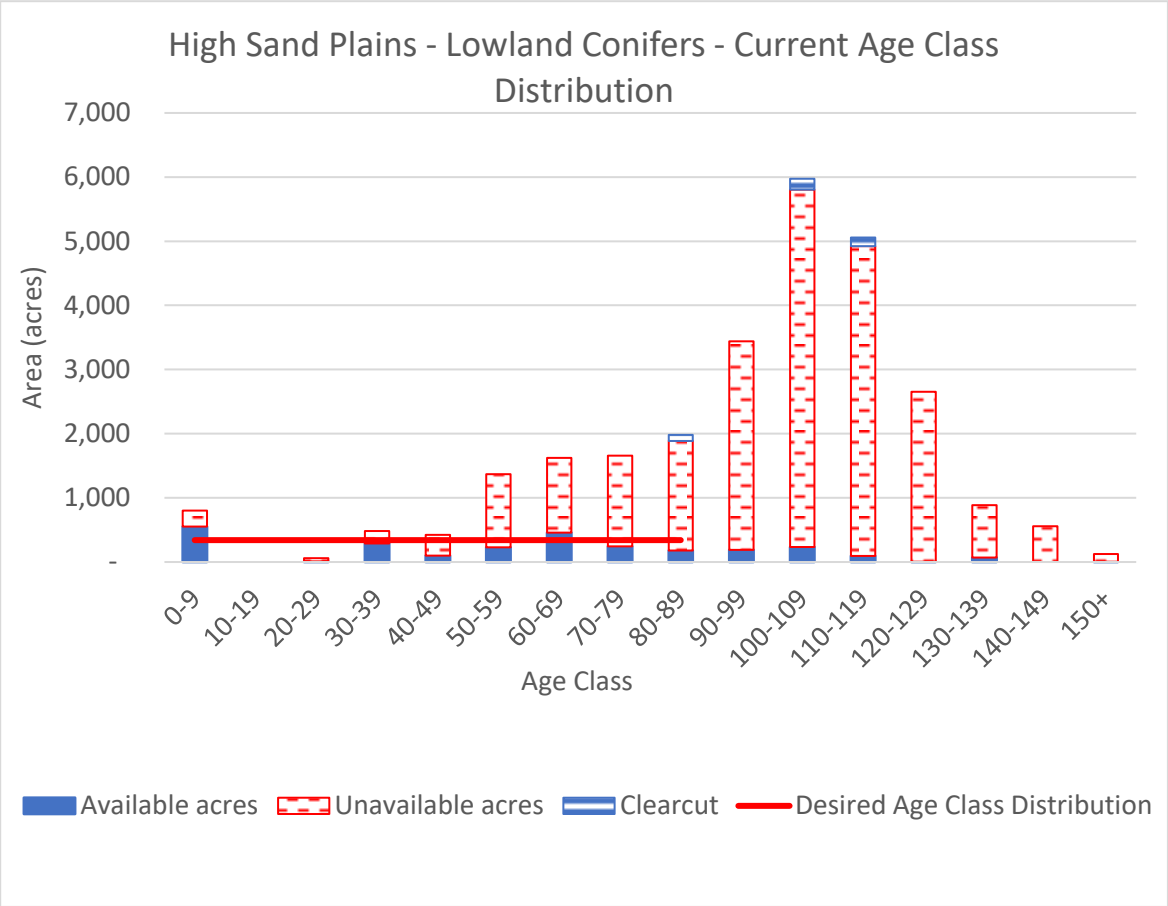


Figure 28. Current age class distribution, the desired age class distribution, and the projected harvests in the lowland conifer cover type over the 10-year planning period.

Table 13. Featured species with lowland conifers as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Conifers	Lowland Conifers Habitat Acres - Available	Lowland Conifers Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	550	252
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	1,185	16,793

Desired future condition

The projected long-term cover type trend for lowland conifers is fairly stable in the High Sand Plains Management Area with less than a 0.4% decrease in acres. There are a few transitions in and out of this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available lowland conifer acres. Much of the cover type will grow into the older age classes due to being unavailable for commercial harvest.

The end of the planning period will result in the establishment of approximately 302 acres of lowland conifers from the available acres (Figure 29). Progress toward the long-term desired age class distribution of lowland conifers will take many decades to achieve the desired balanced age class condition.

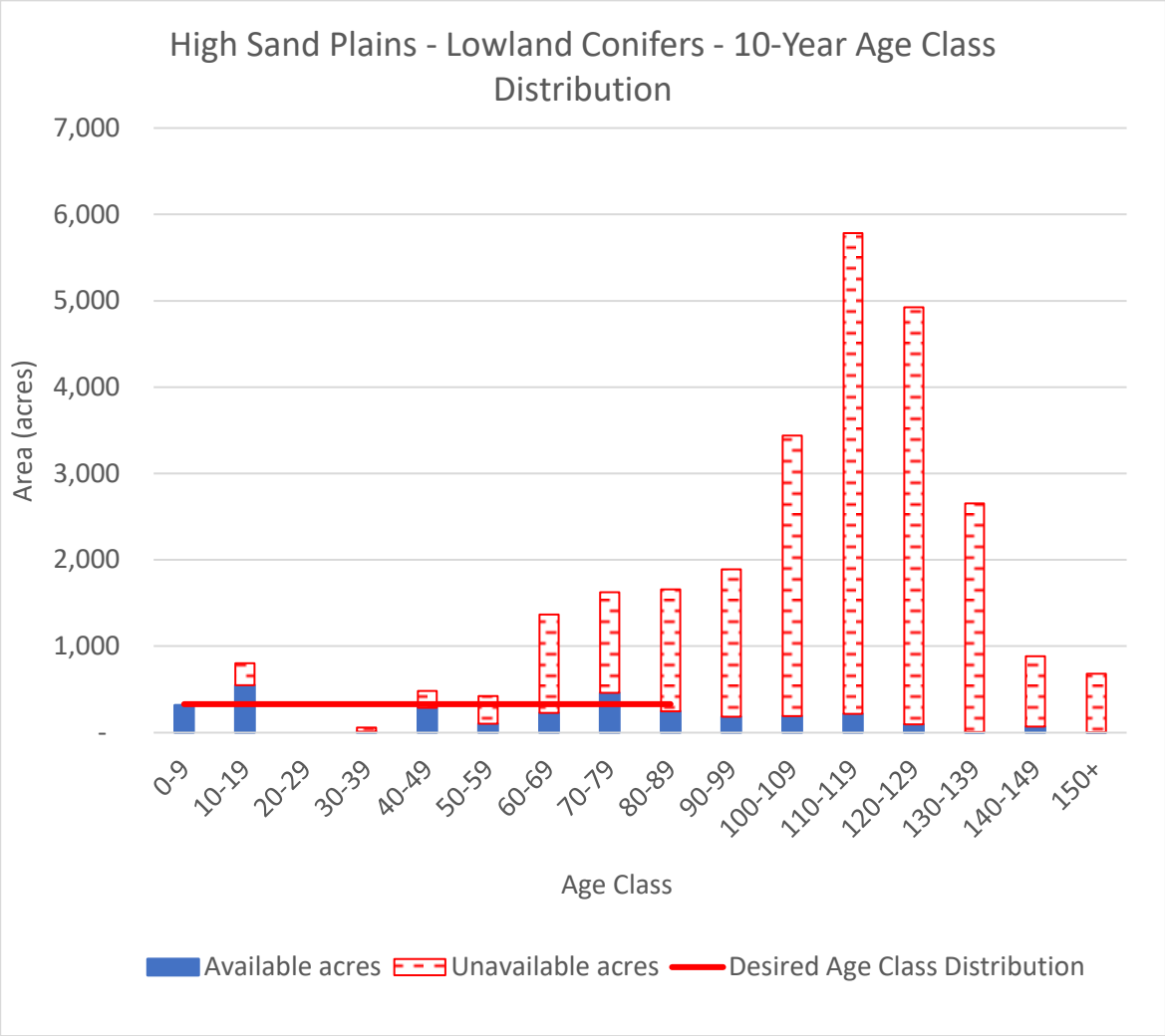


Figure 29. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of lowland conifers is beginning to reach the desired future condition for available acres in the age classes between 0 and 40-year-old age classes and between the 80 and 89-year age classes (Figure 30). The number of acres in the older age classes, 90 years and older, continues to increase as the unavailable acres continue to move to the older age classes.

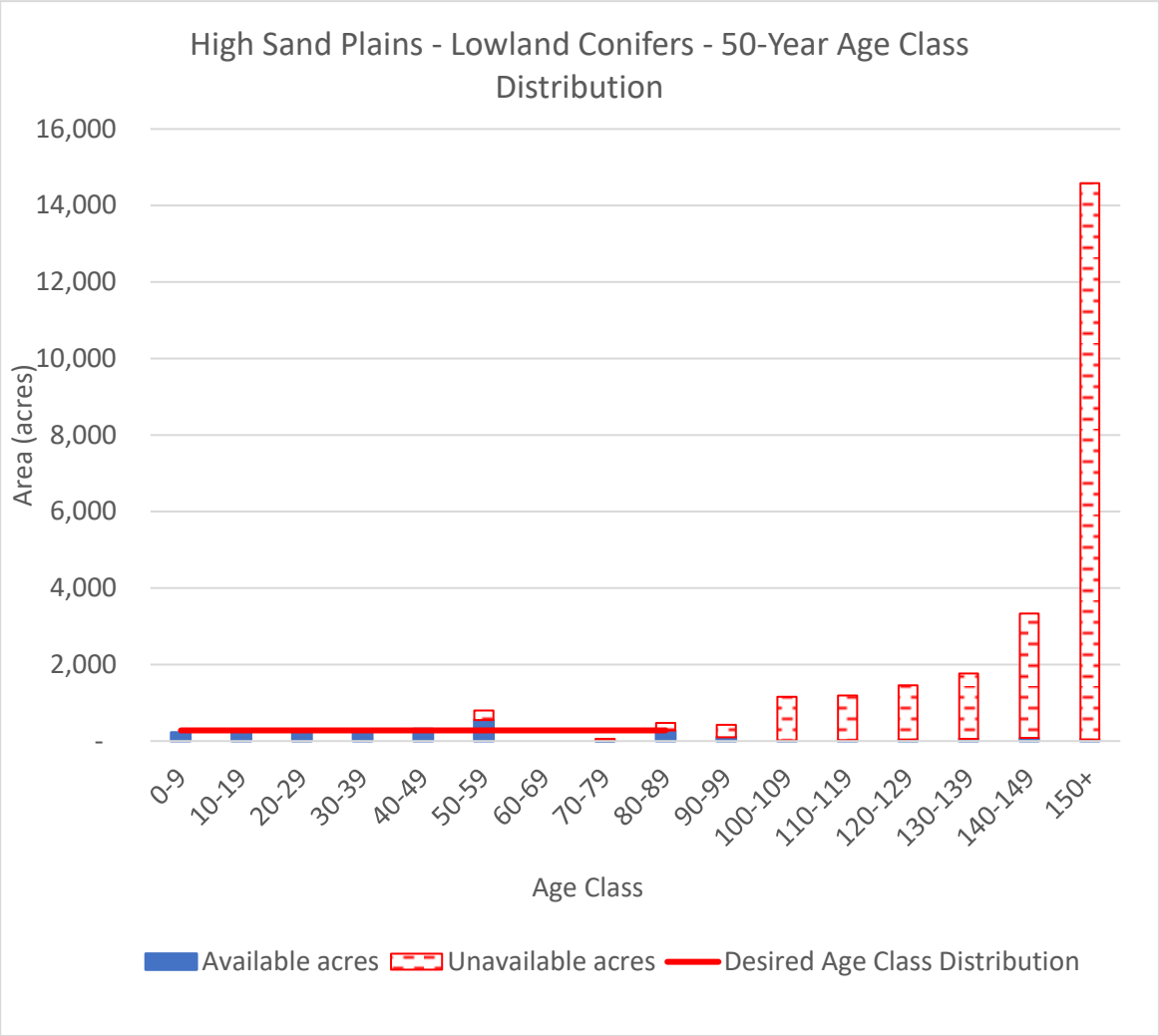


Figure 30. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 31) will concentrate on the manageable acres of lowland conifer cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 32).



Figure 31. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

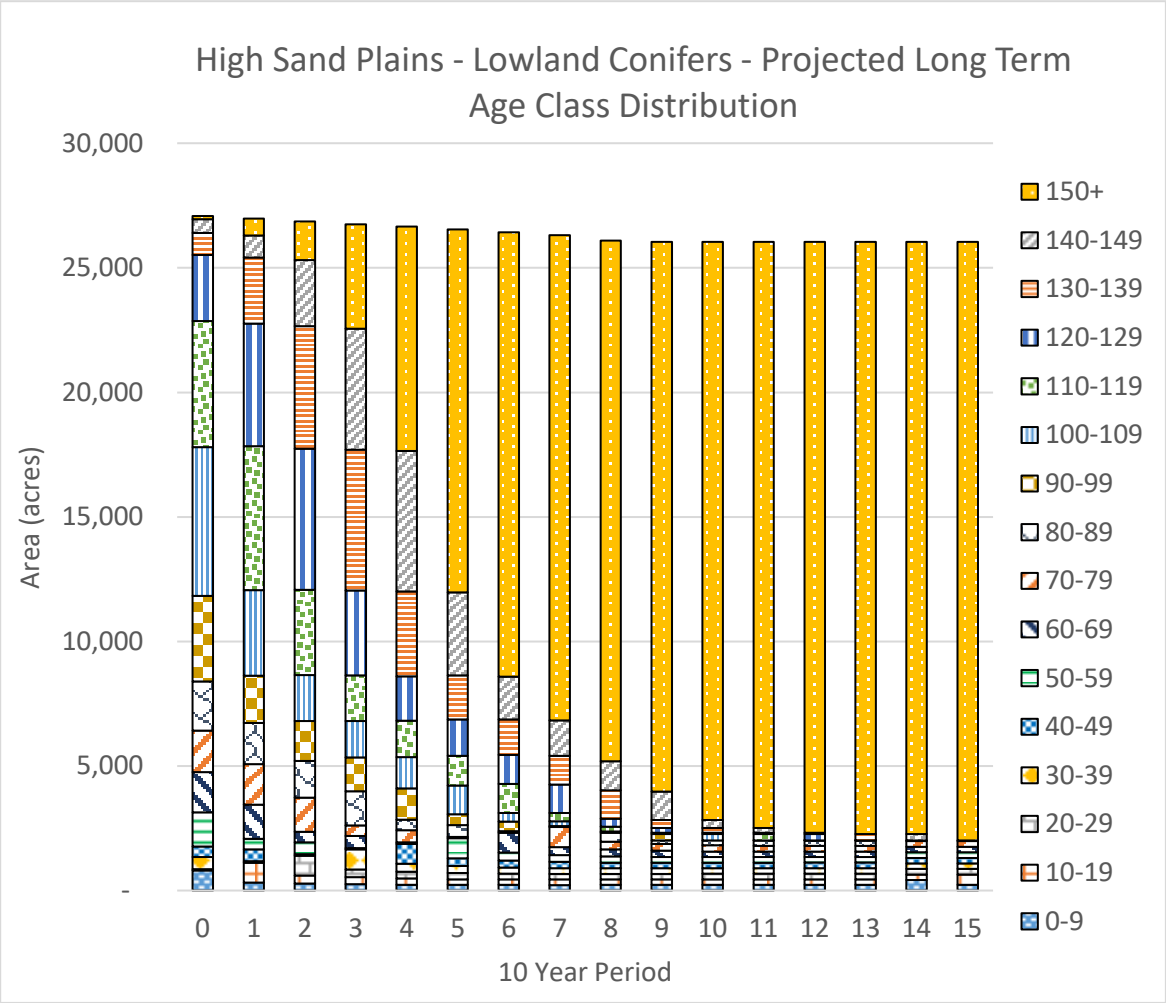


Figure 32. Projected age class distribution for all acres of lowland conifers over the next 150 years.

Management actions

There are 402 acres of projected clearcut harvest in the lowland conifer cover type during the planning period. 100 acres are projected to transition into other cover types resulting in about 302 acres of regeneration which is very close to the desired establishment of 328 acres of lowland conifer per decade.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 14; see Biodiversity in Section 3 for more information).

Table 14. High conservation value areas within the High Sand Plains Management Area.

High Conservation Value Area Type and Name	Acres
Dedicated Management Area's	**7,554**

High Conservation Value Area Type and Name	Acres
--	7,554
Eastern Massasauga Managed Land	**11,588**
--	11,588
Forest Habitat Core Interior	**1,292**
--	1,292
Kirtland's Warbler Habitat	**76,959**
Big Creek	2,594
Crapo Lk	4,259
Damon	17,533
Down River	3,457
Fletcher	4,176
Leota	6,736
Lovells	7,426
Manistee	2,555
Monument	701
Muskrat	4,850
N Branch	645
Ogemaw	6,142
Pere Chene	4,024
Sharon	5,018
St Helen	3,519
Staley Lk	3,323
Natural Area's Legally Dedicated	**159**
(blank)	159
Natural Rivers Vegetative Buffer	**2,866**
(blank)	2,866
Natural Rivers Zoning District	**9,316**
(blank)	9,316
State Wildlife Management Areas	**11,877**
Backus Lake Flooding SWMA	1,658
Bear Creek Flooding SWMA	986
Beaver Lake Flooding SWMA	475
Cannon Creek 1 and 2 Floodings SWMA	475
Connors Marsh Flooding SWMA	1,057
Denton Creek Flooding SWMA	805
Houghton Lake Flats (North and South) Fl	857
Old Fur Farm Flooding SWMA	1,975
Reedsburg Damn Flooding SWMA	1,024
Robinson Creek Flooding SWMA	2,566
State Wildlife Research Areas	**13,802**
Houghton Lake SWRA	10,986
Pere Marquette SF	2,816

High Conservation Value Area Type and Name	Acres
Verified Type 1 and Type 2 Old Growth	**374**
Type 1 Old Growth	282
Type 2 Old Growth	92
GEMS	**4,329**
Backus Creek	4,329
Grand Total	**140,116**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 15. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 16. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	B	G3G5	S4	1
Existing ERA	Bog	BC	G3G5	S4	1
Existing ERA	Bog	C	<Null>	<Null>	1
Existing ERA	Cirsium hillii	E	G3	S3	1
Existing ERA	Dry Northern Forest	BC	-	-	1
Existing ERA	Dry Northern Forest	C	<Null>	<Null>	1
Existing ERA	Dry Northern Forest	D	G3?	S3	1
Existing ERA	Dry-mesic Northern Forest	BC	-	-	3
Existing ERA	Dry-mesic Northern Forest	BC	<Null>	<Null>	1
Existing ERA	Dry-mesic Northern Forest	BC	<Null>	S3	1
Existing ERA	Dry-mesic Northern Forest	C	<Null>	<Null>	2

Existing ERA	Floodplain Forest	B	G3?	S3	1
Existing ERA	Floodplain Forest	BC	G3?	S3	2
Existing ERA	Intermittent Wetland	B	G2	S3	1
Existing ERA	Mesic Northern Forest	BC	G4	S3	2
Existing ERA	Mesic Northern Forest	CD	G4	S3	1
Existing ERA	Muskeg	AB	<Null>	S3	1
Existing ERA	Northern Fen	B	G3	S3	1
Existing ERA	Northern Fen	BC	G3	S3	1
Existing ERA	Northern Shrub Thicket	A	G4	S5	1
Existing ERA	Northern Shrub Thicket	B	G4	S5	1
Existing ERA	Northern Shrub Thicket	BC	G4	S5	2
Existing ERA	Northern Wet Meadow	B	-	-	1
Existing ERA	Northern Wet Meadow	BC	G4G5	S4	1
Existing ERA	Oak-Pine Barrens	C	G3	S2	1
Existing ERA	Pine Barrens	B	-	-	1
Existing ERA	Pine Barrens	BC	G3	S2	1
Existing ERA	Pine Barrens	C	-	-	1
Existing ERA	Pine Barrens	C	G3	S2	1
Existing ERA	Pine Barrens	CD	<Null>	<Null>	1
Existing ERA	Pine Barrens	D	G3	S2	4
Existing ERA	Poor Conifer Swamp	B	-	-	1
Existing ERA	Poor Fen	AB	<Null>	S3	3
Existing ERA	Poor Fen	B	G3	S3	1
Existing ERA	Rich Conifer Swamp	BC	G4	S3	1
Existing ERA	Rich Conifer Swamp	C	<Null>	<Null>	2
Existing ERA	Rich Conifer Swamp	C	G4	S3	4
Proposed ERA	Dry Northern Forest	C	G3?	S3	-
Proposed ERA	Intermittent Wetland	C	G2	S3	1
Proposed ERA	Northern Fen	B	G3	S3	1
Proposed ERA	Pine Barrens	AB	G3	S2	1
Proposed ERA	Pine Barrens	BC	G3	S2	3
Proposed ERA	Pine Barrens	C	G3	S2	2
Proposed ERA	Pine Barrens	CD	G3	S2	1
Proposed ERA	Pine Barrens	C?	G3	S2	1
Proposed ERA	Pine Barrens	D?	G3	S2	1
Grand Total	**-**	**-**	**-**	**-**	**63**

Special Conservation Areas

Reviewable special conservation areas (SCAs; Table 17) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 18) refers to those

SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 17. Reviewable special conservation areas within the High Sand Plains Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**2,129**
Au Sable River Canoe Camp Campground	9
Bear Lake Campground	8
Big Bear Lake Campground	19
Burton's Landing Campground	16
Buttles Road Pathway	1
Canoe Harbor Campground	32
Goose Creek Trail Camp Campground	45
High Banks Overlook	4
Hudson Creek Swamp SCA	1,772
Keystone Landing Campground	28
Parmelee Bridge Campground	14
Rainbow Bend Campground	41
Reedsburg Dam Campground	23
Sheep Pasture Access Site	11
Unspecified	69
Upper Manistee River Campground	34
White Pine Canoe Camp Campground	4
Cultural or Customary Area	**-**
--	-
Habitat Area or Habitat Corridor	**1,749**
71137 Habitat Area	5
Bear Creek Flooding	1,279
C149 Pinery	320
Fletcher Barrens Complex	-
Little Devil Creek Pine	144
Mineral Resource Area	**207**
Crawford County Road Commission	5
Rieth-Riley Construction Co.	175
Roscommon County Road Commission	28
Possible Type 1 or Type 2 Old Growth	**117**
--	117
Spring, Wetlands, or Riparian Areas	**987**
71145013	4
Muskegon River Floodplain	849
Roscommon County Road Commission	28
Wolf and Pup Creek Stream Corridor	106
Visual Management Areas	**328**

Reviewable Special Conservation Area Type and Name	Acres
Lost Twin Lakes Pathway	308
Unspecified	20
Grand Total	**5,623**

Table 18. Static special conservation areas within the High Sand Plains Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**1,526**
Bog	-	26
Dry-mesic Northern Forest	-	61
Muskeg	-	43
Northern Shrub Thicket	-	176
Northern Wet Meadow	-	303
Poor Conifer Swamp	-	917
Designated Trout and Cold Water Stream Buffer	**-**	**5,713**
<Null>	-	2,861
Asum Creek	-	15
Au Sable River	-	216
Barker Creek	-	44
Beaver Creek	-	70
Big Cannon Creek	-	229
Big Creek	-	27
Big Devil Creek	-	76
Crane Creek	-	22
Dead Stream	-	16
Douglas Creek	-	17
Duval Creek	-	3
East Branch Big Creek	-	8
East Branch Wolf Creek	-	58
East Creek	-	107
Elm Creek	-	5
Filer Creek	-	8
Giss-I-Was Creek	-	69
Goose Creek	-	50
Hickey Creek	-	1
Hudson Creek	-	132
Klacking Creek	-	35
Little Cannon Creek	-	142
Little Devil Creek	-	5
Manistee River	-	180
Middle Branch Big Creek	-	74
Middle Branch Cedar River	-	7

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Mostellar Creek	-	25
North Branch Au Sable River	-	39
North Branch Cedar River	-	116
North Branch Chippewa River	-	5
Ogemaw Creek	-	16
Overton Creek	-	5
Phelan Creek	-	6
Popple Creek	-	24
Prior Creek	-	26
Pup Creek	-	14
Robinson Creek	-	159
Sauger Creek	-	4
Silver Creek	-	37
Simpson Creek	-	7
Sohn Creek	-	101
South Branch Au Sable River	-	264
South Branch Tobacco River	-	59
Thayer Creek	-	98
Townline Creek	-	20
West Branch Big Creek	-	78
West Branch Muskegon River	-	84
Whisky Creek	-	49
Designated Trout and Coldwater Streams	**211.1**	**-**
<Null>	105.0	-
Asum Creek	0.5	-
Au Sable River	7.3	-
Barker Creek	1.6	-
Beaver Creek	2.6	-
Big Cannon Creek	8.4	-
Big Creek	1.1	-
Big Devil Creek	2.8	-
Crane Creek	0.8	-
Dead Stream	0.6	-
Douglas Creek	0.7	-
Duval Creek	0.1	-
East Branch Big Creek	0.3	-
East Branch Wolf Creek	2.2	-
East Creek	4.0	-
Elm Creek	0.2	-
Filer Creek	0.4	-
Giss-I-Was Creek	2.5	-
Goose Creek	1.9	-

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Hickey Creek	0.1	-
Hudson Creek	5.1	-
Klacking Creek	1.3	-
Little Cannon Creek	5.5	-
Little Devil Creek	0.2	-
Manistee River	6.6	-
Middle Branch Big Creek	2.7	-
Middle Branch Cedar River	0.3	-
Mostellar Creek	0.9	-
North Branch Au Sable River	1.5	-
North Branch Cedar River	4.2	-
North Branch Chippewa River	0.2	-
Ogemaw Creek	0.6	-
Overton Creek	0.2	-
Phelan Creek	0.3	-
Popple Creek	0.9	-
Prior Creek	1.0	-
Pup Creek	0.5	-
Robinson Creek	6.0	-
Sauger Creek	0.1	-
Silver Creek	1.5	-
Simpson Creek	0.2	-
Sohn Creek	4.0	-
South Branch Au Sable River	9.9	-
South Branch Tobacco River	2.2	-
Thayer Creek	3.6	-
Townline Creek	0.7	-
West Branch Big Creek	3.0	-
West Branch Muskegon River	3.2	-
Whisky Creek	1.8	-
Important Bird Areas	**-**	**138,395**
Kirtland's Warbler Management Units & Guide's Rest	-	126,470
Lower Au Sable River and Iosco Co. Northern Goshawk IBA	-	11,408
Pigeon Country moraines	-	517
Military Lease Land	**-**	**5,590**
Board Purchases	-	201
Deeded to Board	-	693
Federal Land	-	95
Long Term Lease	-	4,601
Military Research Areas	**-**	**39,746**

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Camp Grayling	-	33,937
Hunt Creek Fish Research Station	-	0
Roscommon Forest Fire Experiment Station	-	5,809
Mussel Stream Group 1 - State special concern	**6.8**	**-**
Backus Creek	5.1	-
Cranberry Creek-Muskegon River	0.1	-
Dead Stream Flooding-Muskegon River	1.1	-
Dishwash Creek-Muskegon River	0.6	-
Mussel Stream Group 2 - State threatened or endangered	**10.4**	**-**
Backus Creek	3.6	-
Dead Stream Flooding-Muskegon River	2.1	-
Dishwash Creek-Muskegon River	0.8	-
Dyer Lake-Clam River	1.5	-
Middle Branch River	0.1	-
West Branch Clam River	0.5	-
Wolf Creek	1.8	-
Non-dedicated Natural Areas	**-**	**14,607**
Natural Area Crawford Red Pines	-	120
Natural Area Dead Stream Swamp	-	11,547
Natural Area South Branch AuSable River Area	-	300
Natural Area South Branch AuSable River Proposed	-	2,640
Wood Turtle Stream 100ft Buffer	**-**	**572**
Au Sable River	-	71
Bear Creek	-	32
Big Cannon Creek	-	103
Muskegon River	-	273
North Branch Au Sable River	-	12
Pine River	-	2
South Branch Au Sable River	-	26
Wolf Creek	-	53
Wood Turtle Stream 660ft Buffer	**-**	**3,663**
Au Sable River	-	689
Bear Creek	-	190
Big Cannon Creek	-	682
Muskegon River	-	1,479
North Branch Au Sable River	-	79
Pine River	-	35
South Branch Au Sable River	-	197
Wolf Creek	-	312
Grand Total	**228.3**	**209,811**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (*Table* 19, Table 21 and Table 22) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 19*. Rare animal and plant species conservation status key.*

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 20. Rare animal occurrence within the High Sand Plains Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	-	3
Animal	Acipenser fulvescens	Lake sturgeon	T	-	1
Animal	Alasmidonta viridis	Slippershell	T	-	5
Animal	Antrostomus vociferus	Eastern whip-poor-will	T	-	1
Animal	Appalachia arcana	Secretive locust	SC	-	29
Animal	Atrytonopsis hianna	Dusted skipper	SC	-	6
Animal	Bombus borealis	Northern amber bumble bee	SC	-	2
Animal	Bombus terricola	Yellow banded bumble bee	SC	-	12
Animal	Botaurus lentiginosus	American bittern	SC	-	1
Animal	Brachionycha borealis	Boreal brachionyncha	SC	-	7
Animal	Brychius hungerfordi	Hungerford's crawling water beetle	E	LE	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	-	5
Animal	Cambarunio iris	Rainbow	SC	-	4
Animal	Cambarus robustus	Big water crayfish	SC	-	2
Animal	Canachites canadensis	Spruce grouse	T	-	1
Animal	Centronyx henslowii	Henslow's sparrow	E	-	1
Animal	Chlidonias niger	Black tern	T	-	2
Animal	Circus hudsonius	Northern harrier	SC	-	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Cistothorus palustris	Marsh wren	SC	-	1
Animal	Cistothorus platensis	Sedge wren	SC	-	1
Animal	Clemmys guttata	Spotted turtle	T	-	2
Animal	Coturnicops noveboracensis	Yellow rail	T	-	1
Animal	Cygnus buccinator	Trumpeter swan	SC	-	2
Animal	Emydoidea blandingii	Blanding's turtle	SC	-	14
Animal	Faxonius immunis	Calico crayfish	SC	-	1
Animal	Fontigens nickliniana	Watercress snail	SC	-	1
Animal	Gallinula galeata	Common gallinule	T	-	1
Animal	Gavia immer	Common loon	T	-	11
Animal	Glyptemys insculpta	Wood turtle	T	-	12
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	38
Animal	Hesperia metea	Cobweb skipper	SC	-	3
Animal	Ixobrychus exilis	Least bittern	T	-	2
Animal	Lasmigona compressa	Creek heelsplitter	SC	-	1
Animal	Lasmigona costata	Flutedshell	SC	-	2
Animal	Ligumia recta	Black sandshell	T	-	2
Animal	Lithobates palustris	Pickerel frog	SC	-	6
Animal	Merolonche dolli	Doll's merolonche	SC	-	4
Animal	Moxostoma carinatum	River redhorse	T	-	1
Animal	Myotis lucifugus	Little brown bat	T	-	2
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	2
Animal	Necturus maculosus	Mudpuppy	SC	-	4
Animal	Notropis dorsalis	Bigmouth shiner	T	-	2
Animal	Opheodrys vernalis	Smooth green snake	SC	-	12
Animal	Pandion haliaetus	Osprey	SC	-	26
Animal	Papaipema beeriana	Blazing star borer	SC	-	4
Animal	Percina copelandi	Channel darter	E	-	2
Animal	Percina shumardi	River darter	E	-	1
Animal	Physella parkeri	Broadshoulder physa	SC	-	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Pisidium idahoense	Giant northern pea clam	SC	-	1
Animal	Pleurobema sintoxia	Round pigtoe	SC	-	1
Animal	Pyrgus centaureae wyandot	Grizzled skipper	T	-	4
Animal	Rallus elegans	King rail	E	-	1
Animal	Sagittunio nasutus	Eastern pondmussel	E	-	1
Animal	Setophaga discolor	Prairie warbler	SC	-	1
Animal	Setophaga kirtlandii	Kirtland's warbler	E	-	9
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	12
Animal	Stagnicola contracta	Deepwater pondsnail	SC	-	1
Animal	Terrapene carolina carolina	Eastern box turtle	T	-	1
Animal	Vermivora chrysoptera	Golden-winged warbler	T	-	3
Grand Total	-	-	-	-	**281**

Table 21. Rare plant occurrence within the High Sand Plains Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Agoseris glauca	Prairie or pale agoseris	T	-	11
Plant	Calypso bulbosa	Calypso or fairy-slipper	T	-	1
Plant	Cirsium hillii	Hill's thistle	SC	-	55
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC	-	3
Plant	Dalibarda repens	False violet	T	-	1
Plant	Festuca altaica	Rough fescue	SC	-	32
Plant	Isotria verticillata	Whorled pogonia	T	-	1
Plant	Lycopodiella subappressa	Northern appressed clubmoss	SC	-	1
Plant	Opuntia fragilis	Fragile prickly pear	E	-	1
Plant	Panax quinquefolius	Ginseng	T	-	1
Plant	Potamogeton hillii	Hill's pondweed	T	-	1
Plant	Prunus umbellata	Alleghany or Sloe plum	SC	-	13
Grand Total	-	-	-	-	**121**

Table 22. Other rare occurrence within High Sand Plains Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	-	Great blue heron rookery	-	-	12
Total	-	-	-	-	**12**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 23).

Table 23. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 24. Non-ecological reference area natural communities within the High Sand Plains Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Bog	B	S4	G3G5	2
Bog	BC	S4	G3G5	1
Bog	C	S4	G3G5	1
Dry Northern Forest	BC	S3	G3?	1
Dry Northern Forest	C	S3	G3?	1
Dry Northern Forest	D	S3	G3?	1
Dry-mesic Northern Forest	BC	S3	G4	3
Dry-mesic Northern Forest	C	S3	G4	2
Floodplain Forest	B	S3	G3?	1
Floodplain Forest	BC	S3	G3?	2

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Intermittent Wetland	B	S3	G2	1
Mesic Northern Forest	BC	S3	G4	1
Mesic Northern Forest	CD	S3	G4	1
Muskeg	AB	S3	G4G5	1
Muskeg	BC	S3	G4G5	1
Muskeg	C	S3	G4G5	1
Northern Fen	B	S3	G3	2
Northern Fen	BC	S3	G3	1
Northern Shrub Thicket	AB	S5	G4	1
Northern Shrub Thicket	B	S5	G4	2
Northern Shrub Thicket	BC	S5	G4	3
Northern Wet Meadow	B	S4	G4G5	2
Northern Wet Meadow	BC	S4	G4G5	4
Oak-Pine Barrens	C	S2	G3	1
Pine Barrens	B	S2	G3	2
Pine Barrens	BC	S2	G3	3
Pine Barrens	C	S2	G3	2
Pine Barrens	CD	S2	G3	1
Pine Barrens	D	S2	G3	4
Poor Conifer Swamp	AB	S4	G4	1
Poor Conifer Swamp	B	S4	G4	2
Poor Conifer Swamp	BC	S4	G4	1
Poor Fen	AB	S3	G3	1
Poor Fen	B	S3	G3	1
Rich Conifer Swamp	BC	S3	G4	1
Rich Conifer Swamp	C	S3	G4	6
Total	**-**	**-**	**-**	**62**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 25) and diseases (Table 26) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 25. Defoliating insects of concern in the High Sand Plains management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 26. Maladies of concern in the High Sand Plains management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow guidance. In areas where beech has been lost due to beech bark disease report surviving mature beech trees that may be resistant to the disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 413 miles of streams and rivers are found in the management area (Table 27). Streams/rivers classified as warm types comprise approximately 67% of the riverine mileage.

Table 27. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	53
Cold Small River	11
Cold Transitional Stream	56
Cold Transitional Small River	2
Cold Transitional Large River	15
Warm Transitional Stream	184
Warm Transitional Small River	7
Warm Transitional Large River	43
Warm Stream	27
Warm Small River	13
Warm Large River	2

Lacustrine habitat

A total of 68 lakes and ponds of at least 1 surface acre are found in the management area (Table 28).

Table 28. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	52

Lake Size Class (acres)	Number
100-499	13
500+	3

Wetlands

A total of 142,017 acres of wetlands are found in the management area (Table 29). Forested wetlands comprise approximately 92% of wetland types found in the management area.

Table 29. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	10,129
Forested	130,534
Riverine	1,354

Vernal pools and seeps

A total of 2,791 acres of vernal pools and seeps have been inventoried in the management area, and 1,194 acres of seeps have been identified.

Riparian vegetation cover

Lowland shrub is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 30).

Table 30. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover type	Acres
Lowland Shrub	11,274
Aspen	6,465
Marsh	5,818
Lowland Deciduous	5,209
Lowland Conifers	3,495
Cedar	2,994
Mixed Upland Deciduous	2,088
Natural Mixed Pines	1,529
Upland Mixed Forest	1,245
Natural Jack Pine	1,217

Watershed vegetation cover

The management area includes portions of important watersheds of the Au Sable and Muskegon rivers (Table 31 & Table 32). Aspen is a major cover type of the state forest in each watershed.

Table 31. Largest vegetative cover types (i.e., top 5) and area of the Au Sable River watershed located within the management area.

Cover Type	Acres
Aspen	63,077
Planted Jack Pine	57,593
Natural Jack Pine	23,994
Planted Red Pine	21,546
Mixed Upland Deciduous	20,379

Table 32. Largest vegetative cover types (i.e., top five) and area of the Muskegon River watershed located within the management area.

Cover Type	Acres
Aspen	47,273
Lowland Shrub	20,602
Cedar	12,483
Planted Red Pine	10,547
Lowland Deciduous	10,289

Recreation

Access for management and public recreation is good within the expansive High Sand Plains Management Area, with a well-developed road and trail system. However, there are some areas of limited accessibility due to lowland, and use restrictions to protect Kirtland's warbler habitat or lands with former military use.

Recreation opportunities within the management area are diverse, plentiful and well-used, serving the communities of Grayling, Harrison, Houghton Lake, Roscommon, Lake City and West Branch, as well as visitors to this area attracted by its outdoor recreation offerings.

Numerous motorized recreation trails traverse and wind through this management area offering a variety of options for ORV enthusiasts, including ORV Routes, ORV Trails and motorcycle/MCCCT trails. Winter offers numerous snowmobile trail options. The Pere Marquette State Trail (rail trail) passes through the extreme south of the area.

Nonmotorized trails include several long-distance routes. Nearly 50 miles of the Shore-To-Shore equestrian trail and over 29 miles of the Midland to Mackinaw Boy Scout trail pass through the High Sand Plains Management Area. Pathways designated for hiking and biking use include Ogemaw Hills, which is groomed in the winter for cross-country skiing, Tisdale Triangle, Green Pine Lake and the Mason Tract Pathways. The Mason Tract is a special management area along the South Branch of the Au Sable River, preserved for wildlife and quiet recreation. Use is restricted to foot traffic with no dispersed camping. The Gladwin Field Trial Area is located in this management area.

There are 21 state forest campgrounds within the management area, all providing access to water. All are rustic, except for Houghton Lake state forest campground which is considered semi-modern with modern restrooms (but no showers or electric). Several of the state forest campground are canoe camps, providing canoe-in or hike-in sites only. Others are designated for equestrian use on the Shore-to-Shore trail. Ambrose Lake state forest campground was designed specifically with the ORV enthusiast in mind, with large sites and access to the many off-road vehicle trails. House and Trout Lake state forest campgrounds are located within the Gladwin Field Trial Area and are heavily used by field trial participants who come to train their dogs.

Table 33. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types) Snowmobile	660.1 373.2
Nonmotorized Recreation Trails	Hiking Equestrian Biking Hunter Access Trails	144.7 51.1 65.1 11.2
-	-	**1,313.1**

Note: Trail-use types may overlap.

Table 34. State forest campgrounds.

State Forest Campgrounds	# of sites	Eq.	ORV Access
4 Mile Trail Camp	-	Group (200)	-
Ambrose Lake	25	-	X
AuSable River and Canoe Camp	15 (Group)	-	-
Big Bear Lake	30	-	-
Big Bear Pointe	14	-	-
Burton's Landing	12	-	-
Canoe Harbor and Canoe Camp	45	-	-
Goose Creek	30	-	-
Goose Creek Trail Camp		Group (200)	-
Houghton Lake	50	-	-
House Lake	41	-	-
Keystone Landing	18	-	-
Mud Lake	8	-	-
Muskrat Lake	13	-	X
Parmalee Bridge and Canoe Camp	7 (Group)	-	-
Rainbow Bend and Canoe Camp	7	-	-
Reedsburg Dam	47	-	-
Trout Lake	35	-	-
Upper Manistee River and Canoe Camp	30	Group (40)	-
Walsh Road Equestrian and Trail Camp	9	-	-
White Pine Canoe Camp (canoe access only)	5	-	-

There are numerous floodings within High Sand Plains Management Area, managed specifically for wildlife and offering opportunities for wildlife viewing and hunting. The Backus Creek Grouse Enhanced Management Site provides high quality habitat for grouse and woodcock and over 11 miles of hunter walking trails to facilitate access.

High Sand Plains also has many opportunities for water recreation, including paddling and fishing, on the Au Sable, Manistee and the Muskegon rivers, as well as numerous inland lakes.

Dispersed recreation such as camping, hunting, fishing, paddling and mushrooming are popular in the management area. The Kirtland's warbler area is popular with birders, although occupied habitat may be closed to the public during breeding season. The proximity of the Huron National Forest and several state parks and recreation areas adds to the attraction of the area.

Table 35. Areas managed for hunting.

Type	Name	# of Acres
State Wildlife Management Area	Bear Creek Flooding	925
	Denton Creek Flooding	804.7
	Backus Lake Flooding	1,656.40
	Beaver Lake Flooding	475
	Connors Marsh Flooding	1056.1
	Gladwin State Forest	3,350.40
	Pere Marquette State Forest	5,860.50
	Reedsburg Dam Flooding	1,023.50
	Robinson Creek Flooding	2,563.90
	Old Fur Farm Flooding	1,973.30
	Backus Creek State Game Area	3,348.40
	Houghton Lake Flats	872.8
	Houghton Lake State Wildlife Management Area	10,977.40
	Cannon Creek 1 and 2 Flooding State Wildlife Management Area	474.4
	Gladwin State Forest Gladwin Game Refuge Unit	4,711.20
Grouse Enhanced Management Site	Backus Creek	4,325.60

Table 36. Boating access sites

Name	Waterbody
Ambrose Lake State Forest Campground	Ambrose Lake
Au Sable River Canoe Camp	Au Sable River
Big Bear Point State Forest Campground	Big Bear Lake
Bourne Lake	Bourne Lake
Burtons Landing State Forest Campground	Au Sable River

Canoe Harbor State Forest Campground	South Branch Au Sable River
Chase Bridge	South Branch Au Sable River
Connors Flats	Au Sable River
Dead Stream Flooding	Dead Stream Flooding
Emerald Lake	Emerald Lake
Hoister Lake	Hoister Lake
Little Crapo Lake	Little Crapo Lake
Loggers Landing	Manistee River
Muskrat Lake State Forest Campground	Muskrat Lake
Parmalee Bridge State Forest Campground	Au Sable River
Reedsburg Dam State Forest Campground	Dead Stream Flooding
Sand Banks	Manistee River
Sheep Pasture	North Branch Au Sable River
Smith Bridge	South Branch Au Sable River
Steckert Bridge	South Branch Au Sable River
Three Mile Bend	Manistee River
Tin Can	Manistee River
Trout Lake State Forest Campground	Trout Lake
West Sharon Road	Manistee River
White Pine Canoe Camp	Au Sable River

Huron Sandy Lake Plain

State Forest Area: 86,663 acres	Location: Northeastern Lower Peninsula	Population Centers: Mackinaw City, Cheboygan, Rogers City and Alpena
Subsection: Huron Sandy Lake Plain	Landforms: Sandy lake plain Exposed and semi-exposed limestone bedrock Dune and Swale complexes Cobble beaches	Landcover: Forested: 72,767 acres Nonforested: 13,895 acres

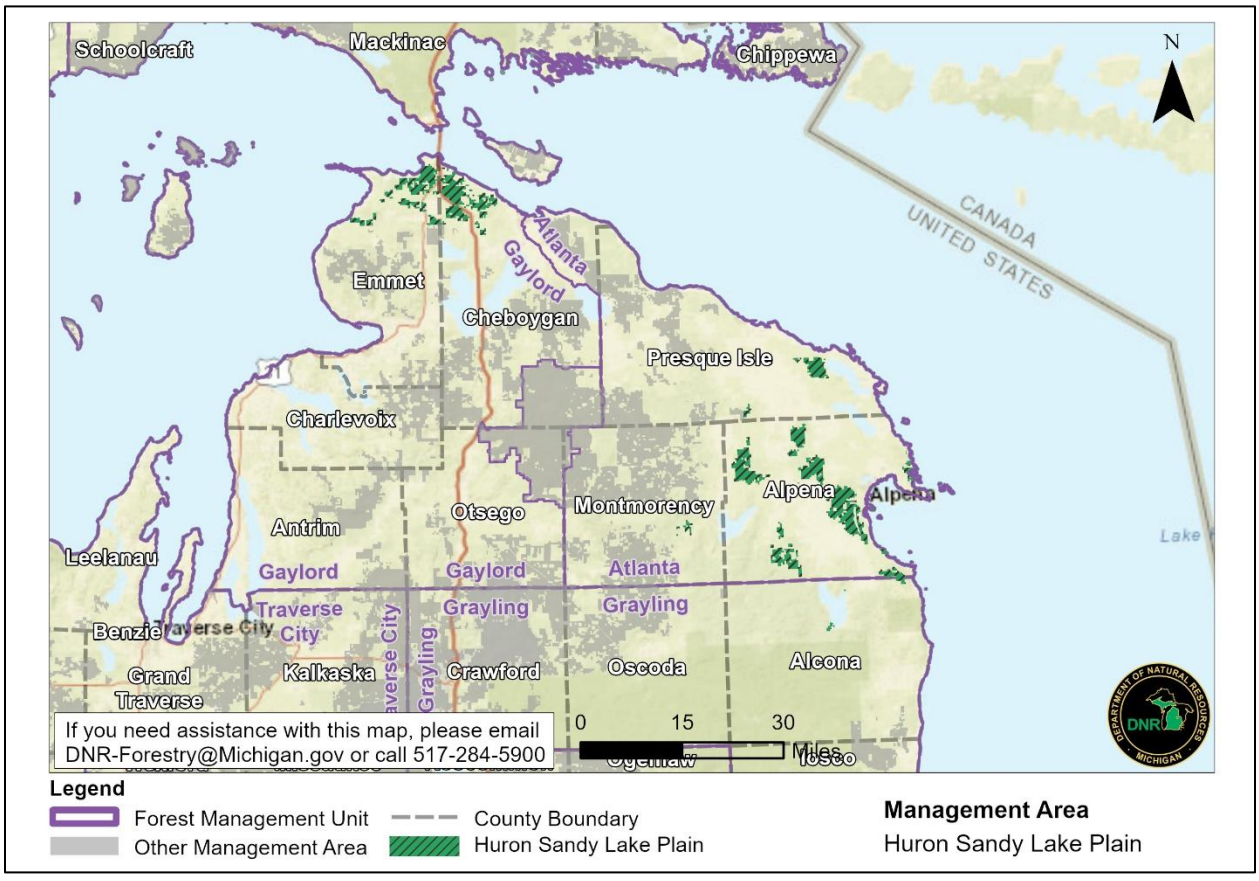


Figure 1. Huron Sandy Lake Plain Management Area.

Forested landscape

Current and projected future condition

The Huron Sandy Lake Plain Management Area includes a variety of shade tolerance levels. The lowland unavailable acres contain the whole range of tolerances and are mostly in the mature and old age groups. The upland available acres contain more intolerant species in the mid-aged and mature categories (Figure 2).

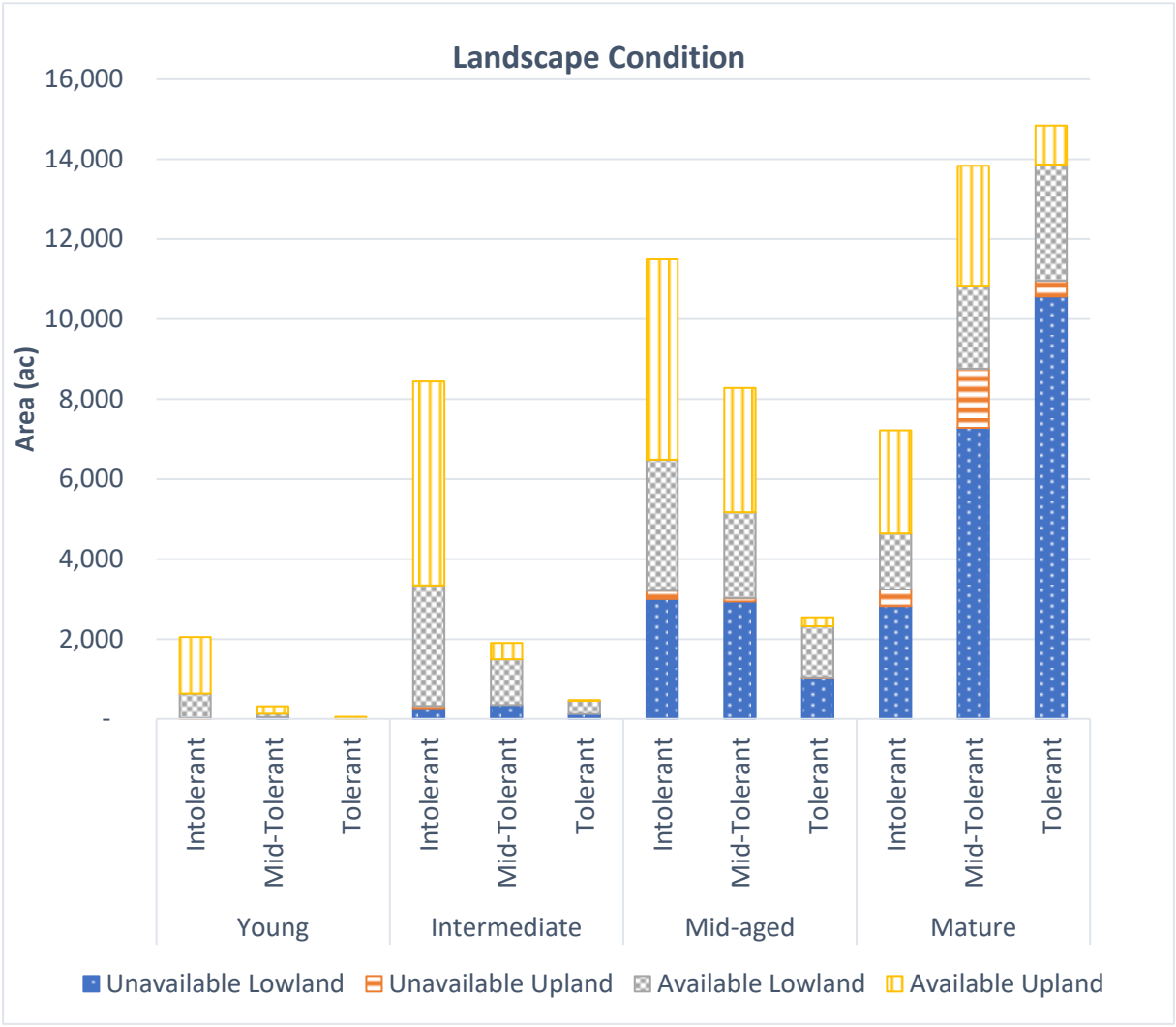


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	2,024
Mature Forest	Acres of 80+ year stands across cover types	35,892
Mature Forest	Acres of 120+ year stands across cover types	4,536
Mesic Conifer Cover types	Acres of mesic conifer cover types	2,124
Mesic Conifers in Other Cover Types	Average canopy occupancy	42%
Mast – Oak Cover types	Acres of oak cover types	1,271
Mast Tree Species in Other Cover Types	Acres of total canopy occupancy of mast tree acres (trace-100%)	13,758
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	31,874
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	1,005
Landscape Forest Matrix	Percent deciduous forest	53%
Landscape Forest Matrix	Percent coniferous forest	37%

The Huron Sandy Lake Plain Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

The Huron Sandy Lake Plain Management Area is comprised of 84% forested cover types and 16% nonforested cover types. Of the forested cover types, 35% are upland and 65% are lowland. The largest contributors to upland cover types are aspen and mixed upland deciduous. Lowland deciduous, lowland aspen, cedar and lowland conifer are the largest contributors to lowland cover types. Lowland shrub is the most common nonforested cover type in the management area representing 9% of the landscape (Table 2).

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
			Aspen	12,194			
			Northern Hardwood	1,256			

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Black Red Hybrid Oak	109	17,561	25,743	72,767
			Northern Red Oak	1,076			
			Oak Mix	254			
			Mixed Upland Deciduous	2,673			
		Mixed	Upland Mixed Forest	1,965	1,965		
		Coniferous	Planted Red Pine	1,758	6,217		
			Planted Jack Pine	279			
			Planted White Pine	8			
			Planted Mixed Pine	12			
			Natural Red Pine	1,160			
			Natural Jack Pine	883			
			Natural White Pine	344			
			Natural Mixed Pines	471			
			Upland Spruce/Fir	518			
			Upland Conifers	766			
			Hemlock	18			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	9,482	20,751	47,024	
			Lowland Deciduous	11,269			
		Mixed	Lowland Mixed Forest	5,310	5,310		
		Coniferous	Cedar	9,258	20,964		
			Lowland Conifers	6,991			
			Lowland Spruce/Fir	1,227			
			Tamarack	3,488			
Nonforested	Upland	N/A	Herbaceous Openland	598	N/A	1,971	13,895
			Upland Shrub	396			
			Low Density Trees	332			
			Bare/Sparsely Vegetated	203			
			Cropland	11			
			Urban	431			
	Lowland	N/A	Lowland Shrub	7,671	N/A	11,924	
			Marsh	1,665			
			Bog	963			
			Treed Bog	43			
			Water	1,583			
						Grand Total:	86,663

There are 41,691 acres (48% of the total management area and 57% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Huron Sandy Lake Plain Management Area (Table 3). Of that, 16% is in the aspen cover type, 10.5% in lowland aspen, and 5.2% in lowland deciduous. The remaining 22 cover types represent less than 4% each of the forested and

available land in the management area. Acres unavailable for management are categorized by site condition (

Table 4).

Table 3. Current cover type composition by management availability.

HURON SANDY LAKE PLAIN						
Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	11,620	16.0%	578	0.8%	12,197	16.8%
Black Red Hybrid Oak	104	0.1%	6	0.0%	109	0.2%
Cedar	2,547	3.5%	6,711	9.2%	9,259	12.7%
Hemlock	5	0.0%	12	0.0%	18	0.0%
Lowland Aspen/Balsam Poplar	7,653	10.5%	1,832	2.5%	9,484	13.0%
Lowland Conifers	2,016	2.8%	4,976	6.8%	6,992	9.6%
Lowland Deciduous	3,793	5.2%	7,484	10.3%	11,276	15.5%
Lowland Mixed Forest	2,259	3.1%	3,051	4.2%	5,310	7.3%
Lowland Spruce/Fir	227	0.3%	1,000	1.4%	1,227	1.7%
Mixed Upland Deciduous	2,213	3.0%	463	0.6%	2,676	3.7%
Natural Jack Pine	824	1.1%	59	0.1%	883	1.2%
Natural Mixed Pines	422	0.6%	50	0.1%	472	0.6%
Natural Red Pine	884	1.2%	279	0.4%	1,163	1.6%
Natural White Pine	321	0.4%	23	0.0%	344	0.5%
Northern Hardwood	890	1.2%	366	0.5%	1,256	1.7%
Northern Red Oak	1,035	1.4%	42	0.1%	1,077	1.5%
Oak Mix	236	0.3%	18	0.0%	254	0.3%
Planted Jack Pine	268	0.4%	11	0.0%	279	0.4%
Planted Mixed Pine	7	0.0%	5	0.0%	12	0.0%
Planted Red Pine	1,727	2.4%	31	0.0%	1,758	2.4%
Planted White Pine	8	0.0%	0	0.0%	8	0.0%
Tamarack	87	0.1%	3,401	4.7%	3,488	4.8%
Upland Conifers	591	0.8%	178	0.2%	770	1.1%
Upland Mixed Forest	1,479	2.0%	486	0.7%	1,965	2.7%
Upland Spruce/Fir	476	0.7%	45	0.1%	521	0.7%
Grand Total	**41,691**	**57.3%**	**31,107**	**42.7%**	**72,798**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too Wet	24,270	78.0%
Blocked by Obstacle	1,456	4.7%
Conservation Values	1,311	4.2%
BMPs	1,072	3.4%
Federal/State/Local Law	809	2.6%
Cannot Regenerate	550	1.8%
Recreational/Scenic	463	1.5%
Denied Access	279	0.9%
Other Dept./Div. Processes	236	0.8%
Other Influence Zones	218	0.7%
Rare Landforms	137	0.4%
Unproductive	102	0.3%
Long-Term Retention	72	0.2%
Too Steep	70	0.2%
Neighbor / Interest Group	39	0.1%
Species of special concern or T&E	12	0.0%
Wildlife Concerns	11	0.0%
Total Unavailable	**31,107**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Huron Sandy Lake Plain Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. It will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 105,438 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Aspen	1,467	-	-	-	-	13	-	1,479

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Lowland Aspen/Balsam Poplar	1,178	-	-	-	-	-	-	1,178
Planted Red Pine	-	-	-	-	-	-	1,039	1,039
Mixed Upland Deciduous	626	107	-	-	-	-	-	733
Upland Mixed Forest	432	-	-	-	-	6	-	438
Lowland Conifers	371	-	-	-	-	-	-	371
Lowland Deciduous	349	-	-	-	-	-	-	349
Natural Red Pine	-	-	26	-	115	-	114	255
Natural Jack Pine	255	-	-	-	-	-	-	255
Upland Spruce/Fir	242	-	-	-	-	-	-	242
Northern Hardwood	-	-	-	-	-	-	171	171
Lowland Mixed Forest	84	-	-	-	-	-	-	84
Natural Mixed Pines	-	-	23	-	33	-	-	55
Lowland Spruce/Fir	47	-	-	-	-	-	-	47
Upland Conifers	25	-	-	-	7	-	-	31
Natural White Pine	-	-	26	-	-	-	-	26
Tamarack	13	-	-	-	-	-	-	13
Planted Jack Pine	12	-	-	-	-	-	-	12
Planted White Pine	-	-	7	-	-	-	-	7
Hemlock	-	4	-	-	-	-	-	4
Totals	**5,100**	**112**	**81**	**-**	**155**	**19**	**1,324**	**6,790**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Huron Sandy Lake Plain Management Area			
Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Hardwood	18,276	17,180
	Mixed Aspen	17,559	16,505
	Mixed Spruce	9,342	8,782
	Mixed Softwood	9,271	8,715
	Jack Pine	5,180	4,869
	Red Pine	4,965	4,667
	White Pine	1,643	1,545
	Mixed Oak	1,377	1,294
	Pulpwood Total	**67,613**	**63,556**
	Red Pine	3,841	3,610
	Mixed Aspen	3,527	3,315
	White Pine	2,826	2,657

10-Year Estimated Harvest Volume Projection Huron Sandy Lake Plain Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Sawtimber (MBF)	Red Maple	2,195	2,064
	Red Oak	1,791	1,684
	Sugar Maple	699	657
	White Oak	585	550
	Mixed Oak	152	143
	Basswood	151	142
	Sawtimber Total	**15,767**	**14,821**
	Total Sawtimber Harvest Volume in Cords	**76,701**	**72,099**
	Grand Total Harvest Volume in Cords	**144,314**	**135,655**
* Volume estimates based on 100% of the projected harvests for the 10-year planning period. ** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are a few cover type transitions projected for the Huron Sandy Lake Plain Management Area (Table 7). The largest increases occur in aspen, lowland mixed forest and planted red pine at 250, 186 and 356 acres respectively. The largest decreases are forecasted in the lowland conifers, mixed upland deciduous, upland mixed forest, and the upland spruce/fir cover types at 166, 247, 109 and 209 acres respectively.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	12,194	12,443	250
Lowland Deciduous	11,269	11,273	3
Lowland Aspen/Balsam Poplar	9,482	9,478	-3
Cedar	9,258	9,258	0
Lowland Conifers	6,991	6,825	-166
Lowland Mixed Forest	5,310	5,496	186
Tamarack	3,488	3,488	0
Mixed Upland Deciduous	2,673	2,425	-247

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Upland Mixed Forest	1,965	1,856	-109
Planted Red Pine	1,758	2,113	356
Northern Hardwood	1,256	1,256	0
Lowland Spruce/Fir	1,227	1,207	-20
Natural Red Pine	1,160	1,160	0
Northern Red Oak	1,076	1,072	-4
Natural Jack Pine	883	799	-84
Upland Conifers	766	720	-46
Upland Spruce/Fir	518	310	-209
Natural Mixed Pines	471	471	0
Natural White Pine	344	344	0
Planted Jack Pine	279	285	6
Oak Mix	254	348	93
Black Red Hybrid Oak	109	103	-6
Hemlock	18	18	0
Planted Mixed Pine	12	12	0
Planted White Pine	8	8	0
Lowland Shrub	7,671	7,671	0
Marsh	1,665	1,665	0
Water	1,583	1,583	0
Bog	963	963	0
Herbaceous Openland	598	598	0
Urban	431	431	0
Upland Shrub	396	396	0
Low Density Trees	332	332	0
Bare/Sparsely Vegetated	203	203	0
Treed Bog	43	43	0
Cropland	11	11	0
Total:	**86,663**	**86,663**	**0**

Featured species current and projected habitat acres

There are seven featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including

the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground.

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	8,394	10,290	6,913	6,976
Cerulean Warbler	Northern hardwoods, mixed upland deciduous	7,449	8,036	9,747	10,252
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	4,962	5,896	3,643	3,671
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	21,718	21,942	21,828	22,695
Ruffed Grouse	Aspen	4,900	5,729	3,531	3,555
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	9,593	12,064	7,464	7,569
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	8,954	10,181	11,825	13,574
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

The largest age class of the aspen cover type represented is currently in the 0- to 9-year-old age class (Figure 3). The past management regime has been primarily clearcut for this cover type. The 10- to 19 and 20- to 29 age classes have a deficit of acres. The age class spike in the 0-9 class will compensate for the small deficits in the 10- to 19 and 20- to 29 age classes. This current planning period will continue to smooth out the distribution of the aspen in this management area.

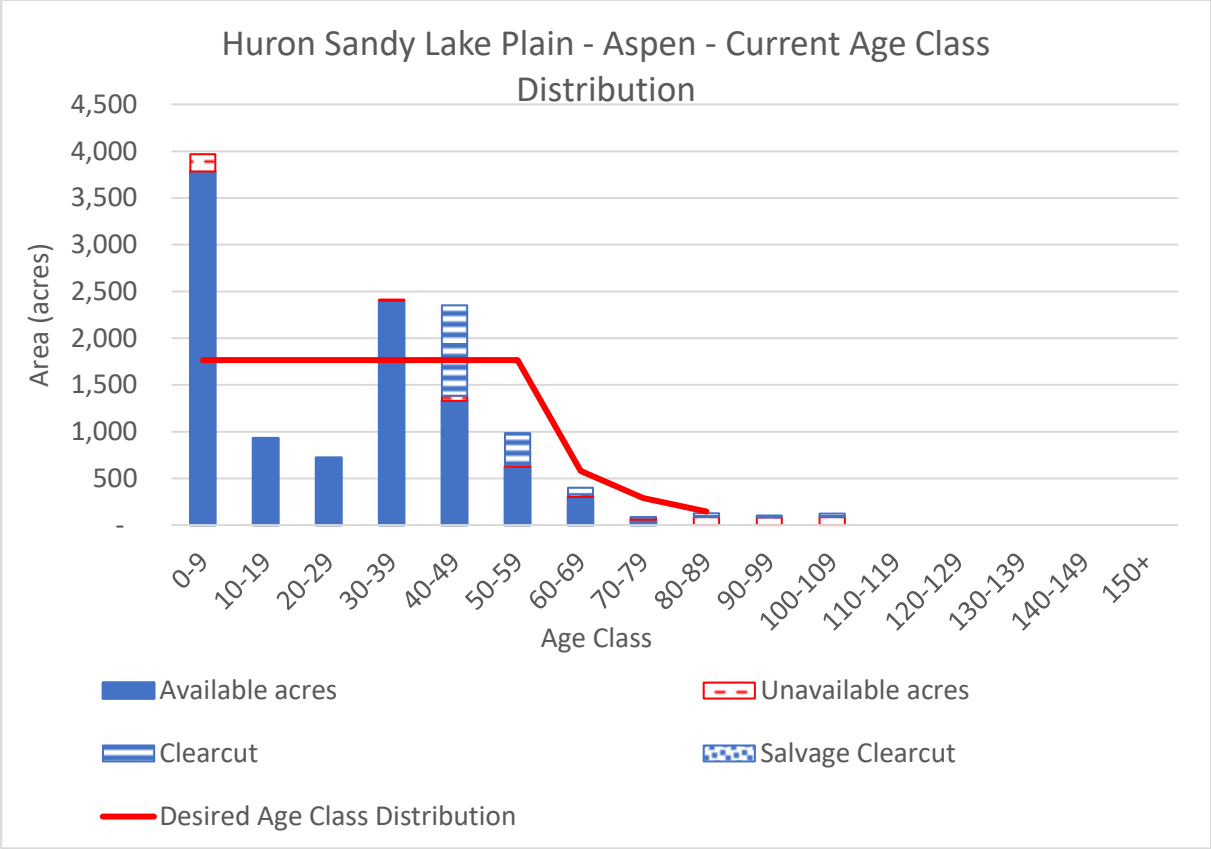


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Class: Sapling	42,708	631
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	42,708	631
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	42,708	631
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	42,708	631

Desired future condition

The projected long-term cover type trend for aspen is stable in the Huron Sandy Lake Plain Management Area. There are a few transitions into this cover type from other cover types forecasted in this management area increasing the aspen cover type acreage by approximately 250 acres in the first 10-year planning period, then dropping off in the planning periods following.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old and carry a percentage of acres into the older ages classes for all available aspen stands in this management area.

The end of the planning period will result in the establishment of the desired amount of regeneration in in the upcoming 0-9 age class (Figure 4). Progress toward the long-term age class distribution of aspen will take several decades in the management area.

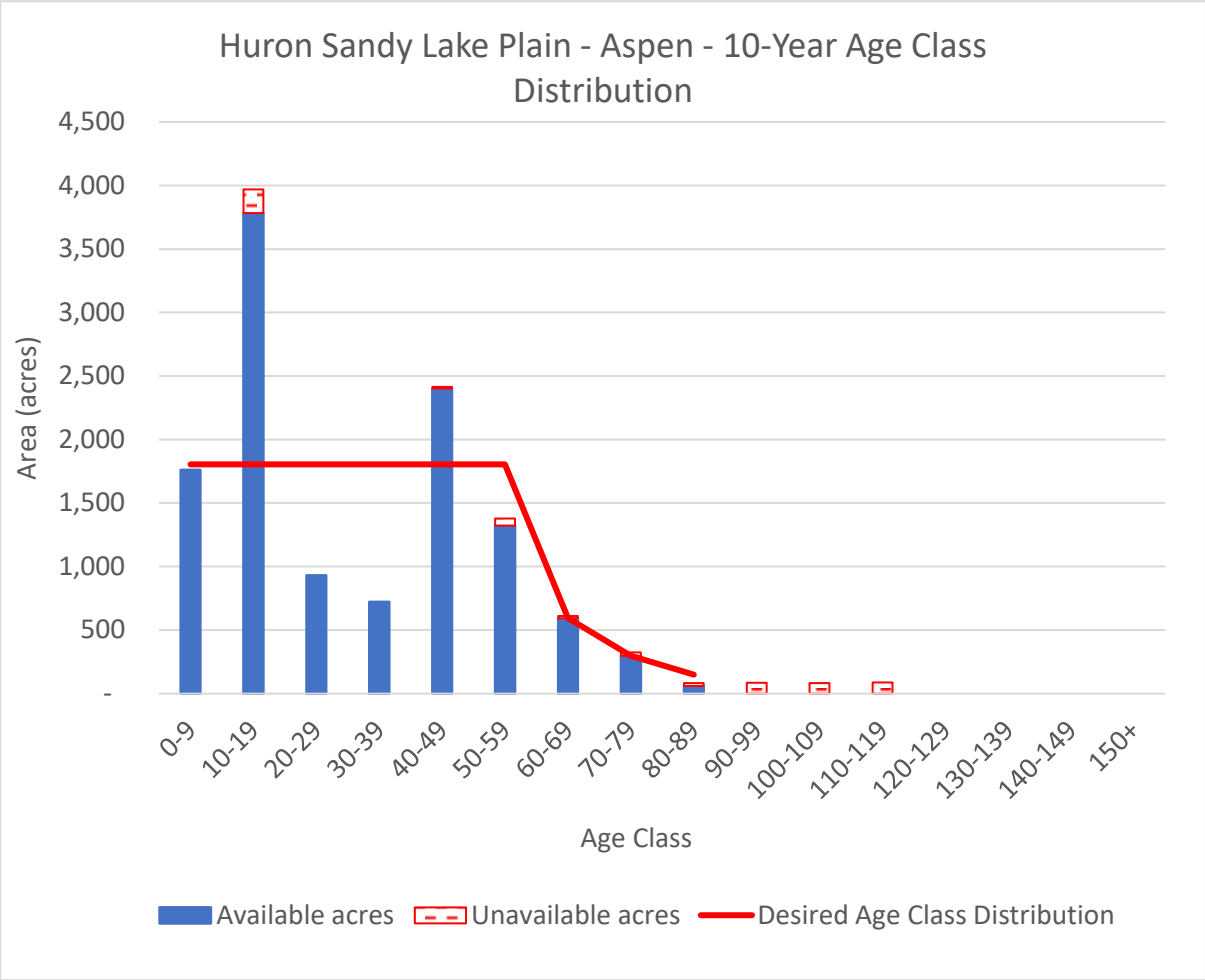


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres has reached the desired future condition (Figure 5).

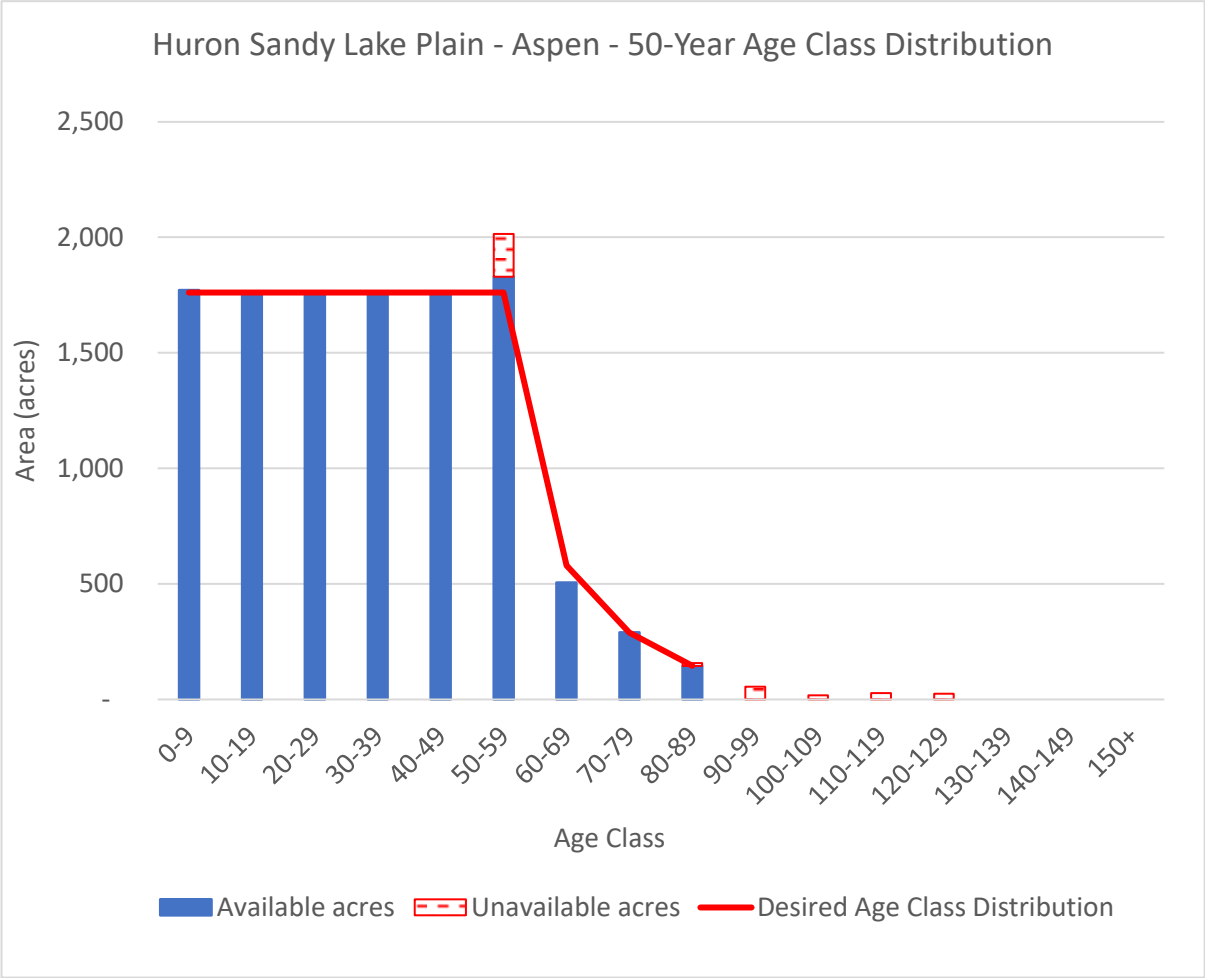


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

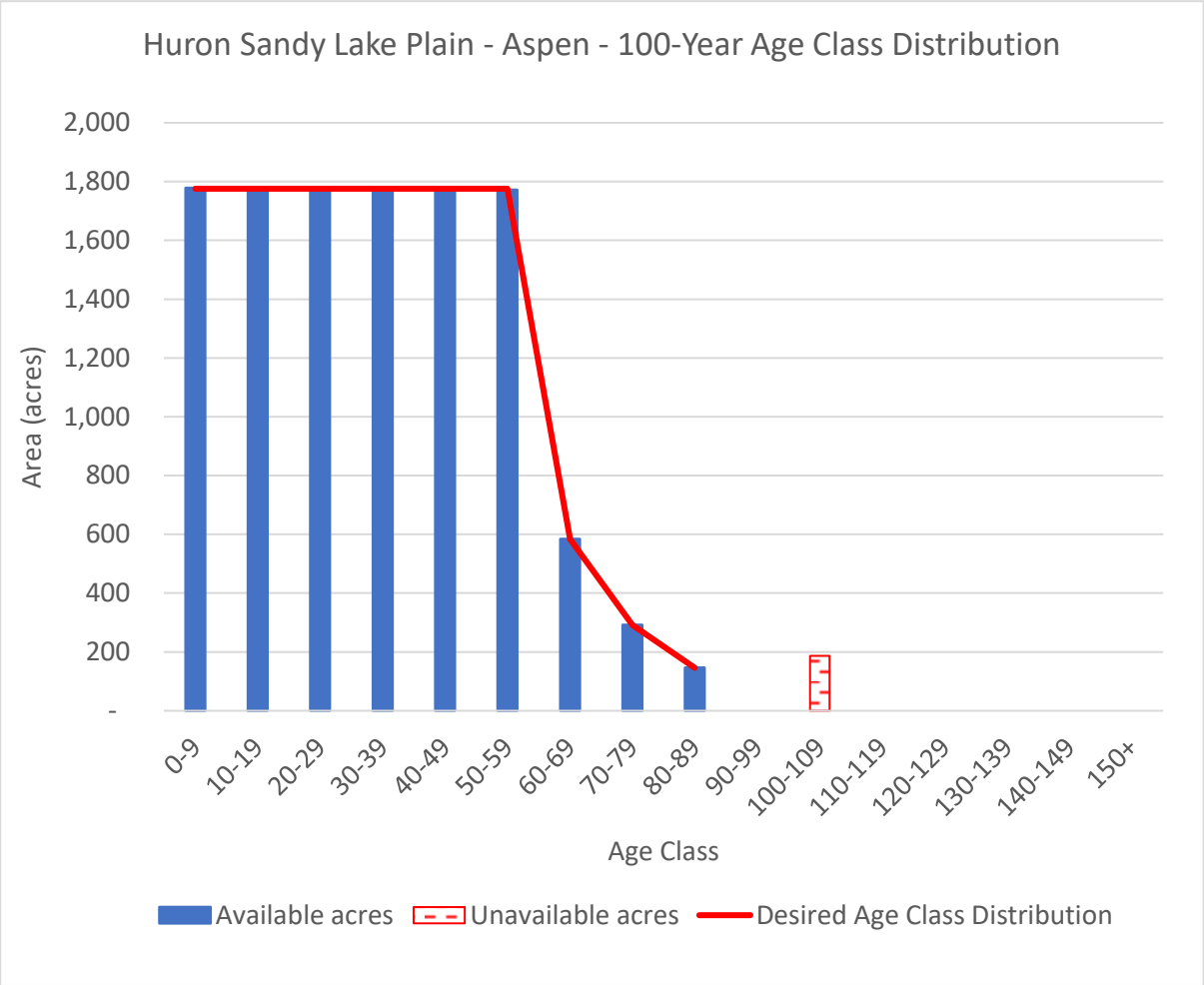


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

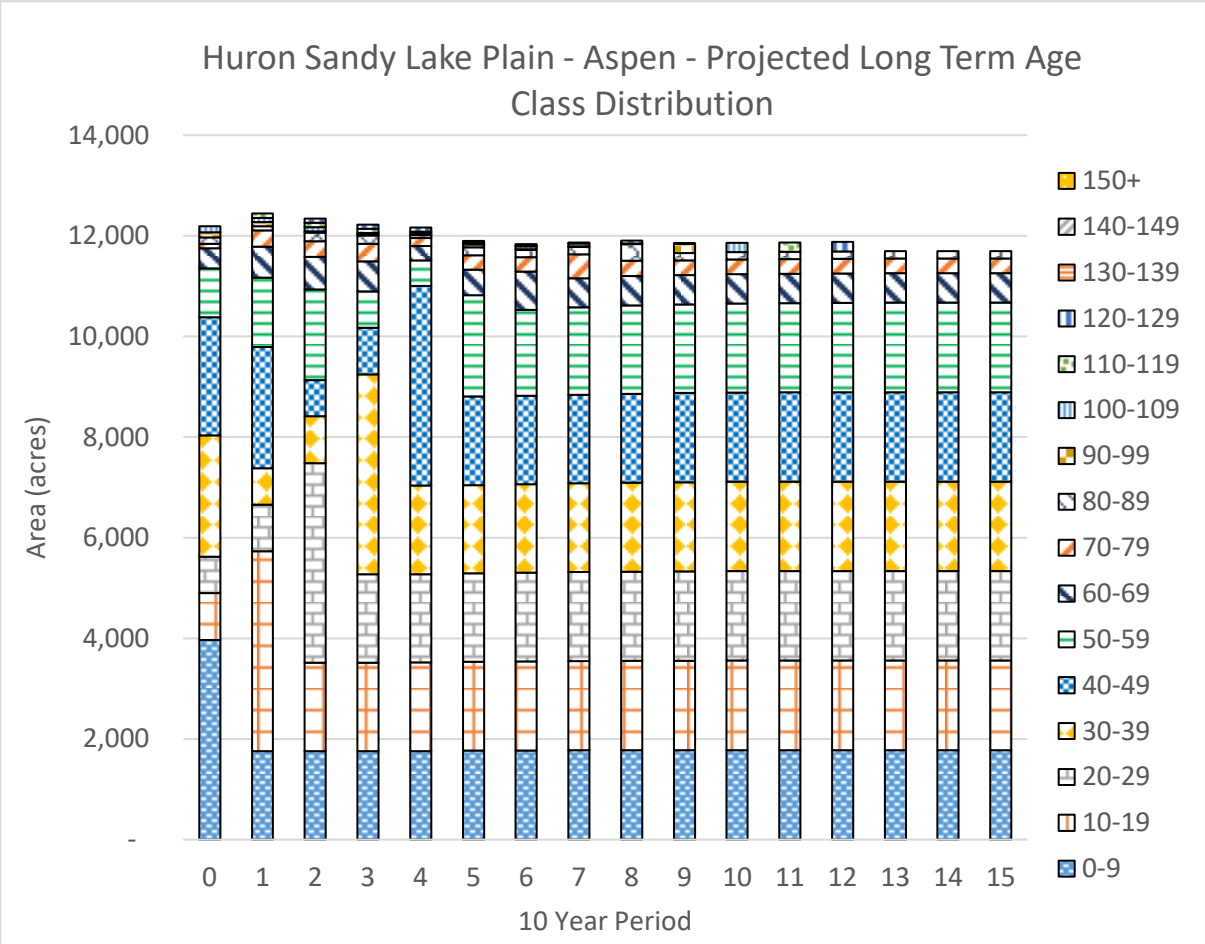


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 1,467 acres of projected clearcut harvest and 13 acres of salvage clearcut in the aspen cover type during this planning period. This coupled with the 250 acres that are projected to transition into aspen creates the desired number of aspen acres in the 0-9-year-old age class. This amount is just shy of the nearly 1,800-acre distribution line.

Lowland aspen/balsam poplar

Current condition

Similar to the upland aspen, the lowland aspen/balsam poplar cover type has deficits in the 10- to 19 and 20- to 29-year-old age classes and spikes in the 0-9 as well as in the older age classes, 30-59 (Figure 8). The past management regime has been primarily clearcut for this cover type. The 0-9 age class spike will help to compensate for the deficits in the 10-19 and 20-29 classes. This current planning period will continue to smooth out the distribution of the lowland aspen/balsam poplar in this management area.

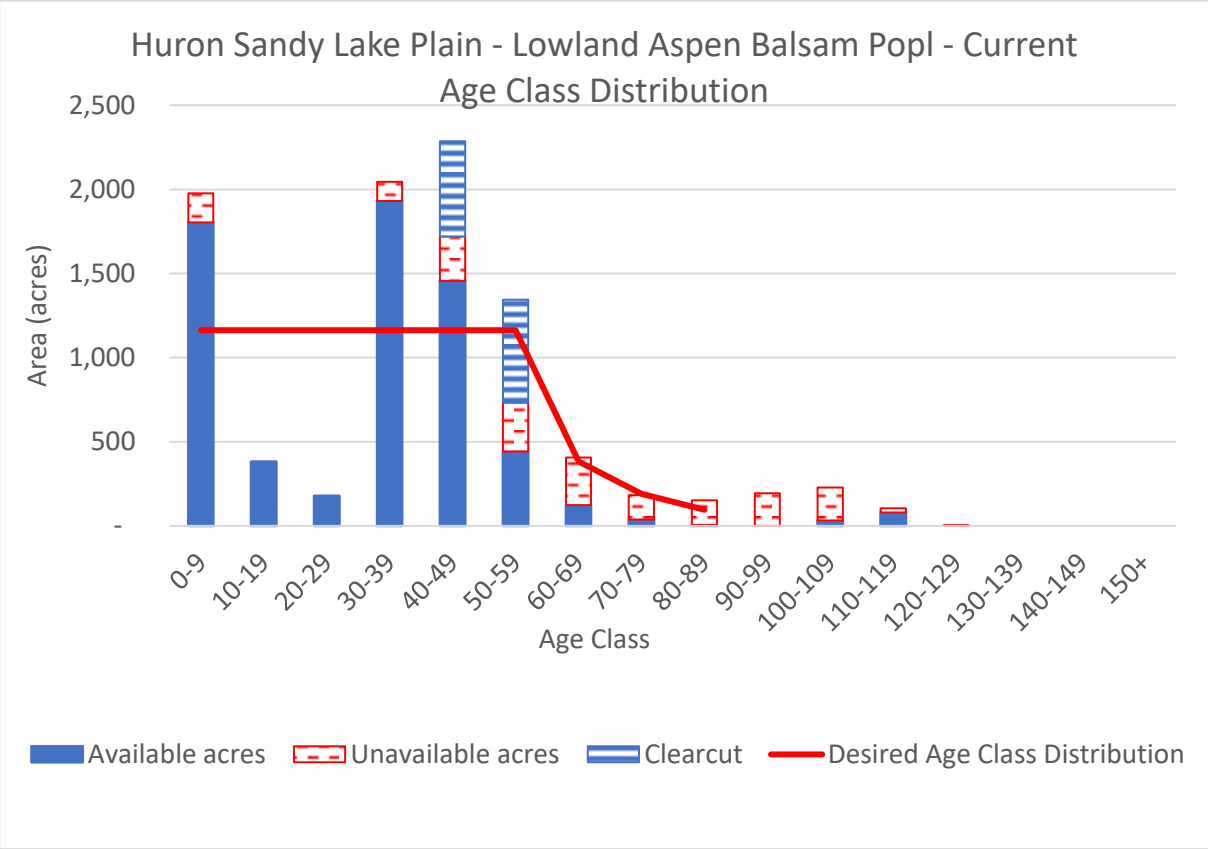


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the lowland aspen/balsam poplar cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available lowland aspen/balsam poplar acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock and snowshoe hare (Table 10).

Table 10. Featured species with lowland aspen/balsam poplar as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Aspen/Balsam Poplar	Lowland Aspen/Balsam Poplar Habitat Acres - Available	Lowland Aspen/Balsam Poplar Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Category: Sapling	914	65
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	914	65

Desired future condition

The projected long-term cover type trend for lowland aspen/balsam poplar is stable in the Huron Sandy Lake Plain Management Area. There are very few transitions into or out of this cover type forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 60 and carry a percentage of acres into the older age classes for all available lowland aspen/balsam poplar stands.

The end of the planning period will result in the establishment of the desired amount of regeneration in the upcoming 0-9 age class (Figure 9). Progress toward the long-term age class distribution of lowland aspen/balsam poplar will take several decades in the management area.

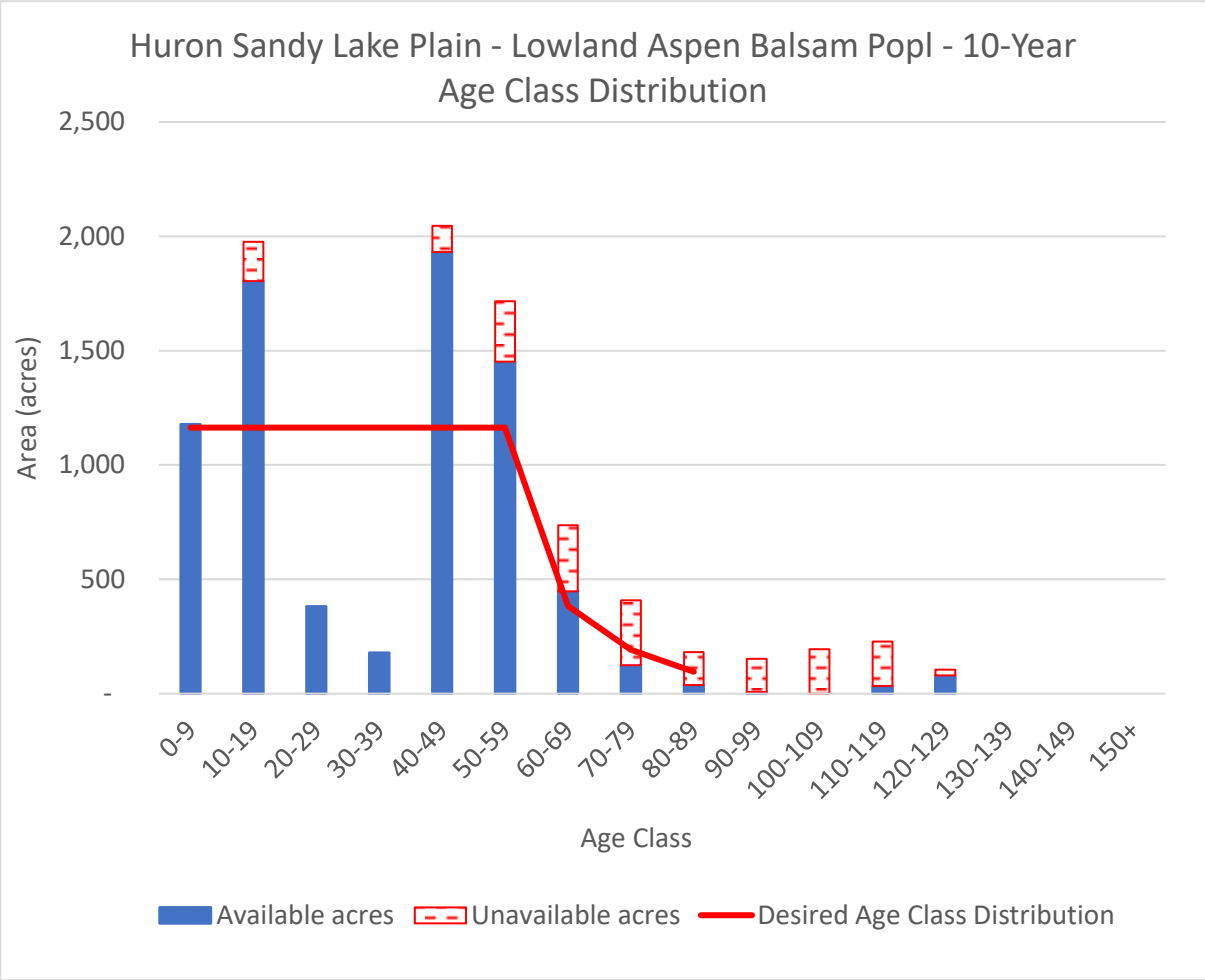


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of lowland aspen/balsam poplar acres has reached the desired future condition (Figure 10).

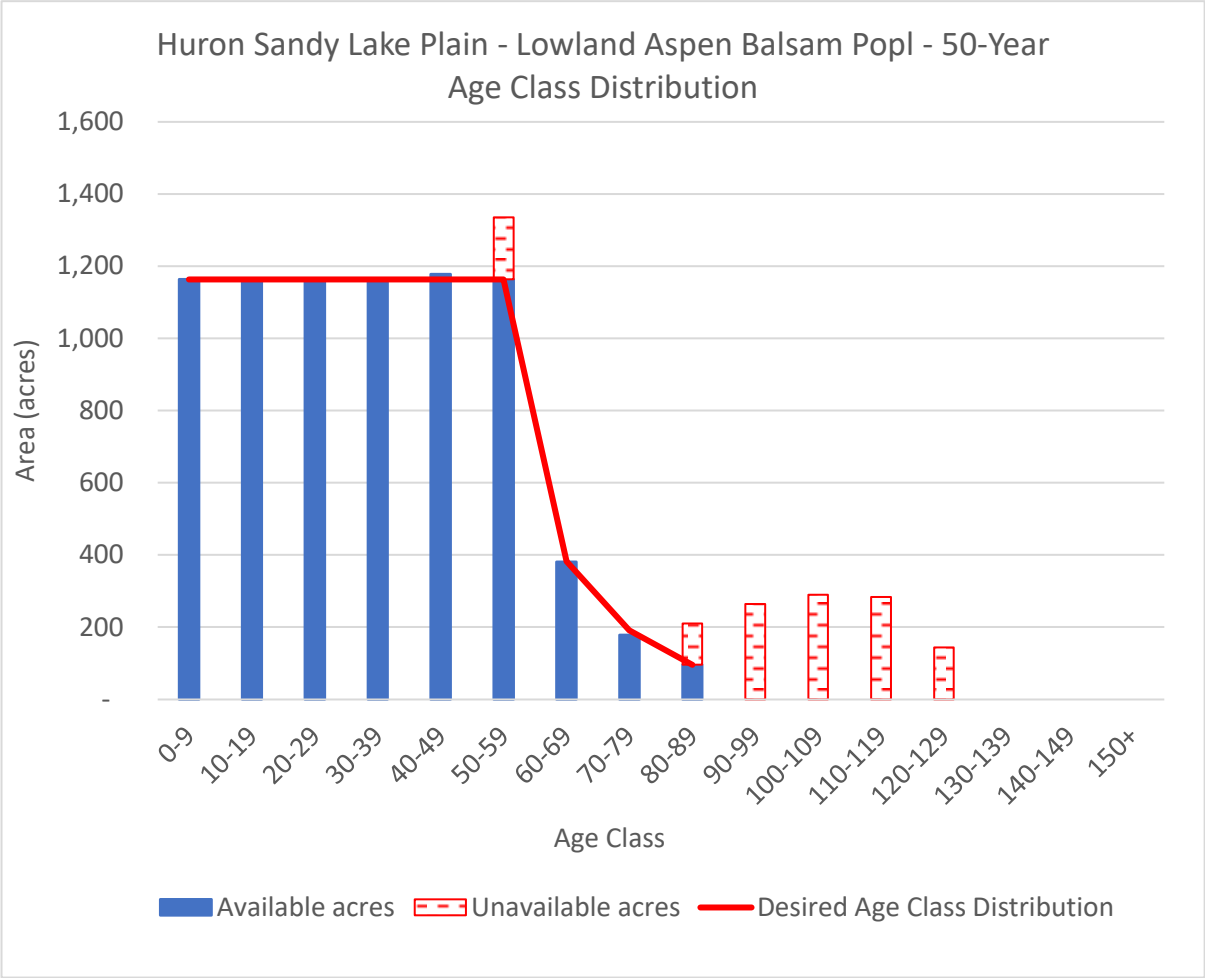


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate the manageable acres of lowland aspen/balsam poplar in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 12).

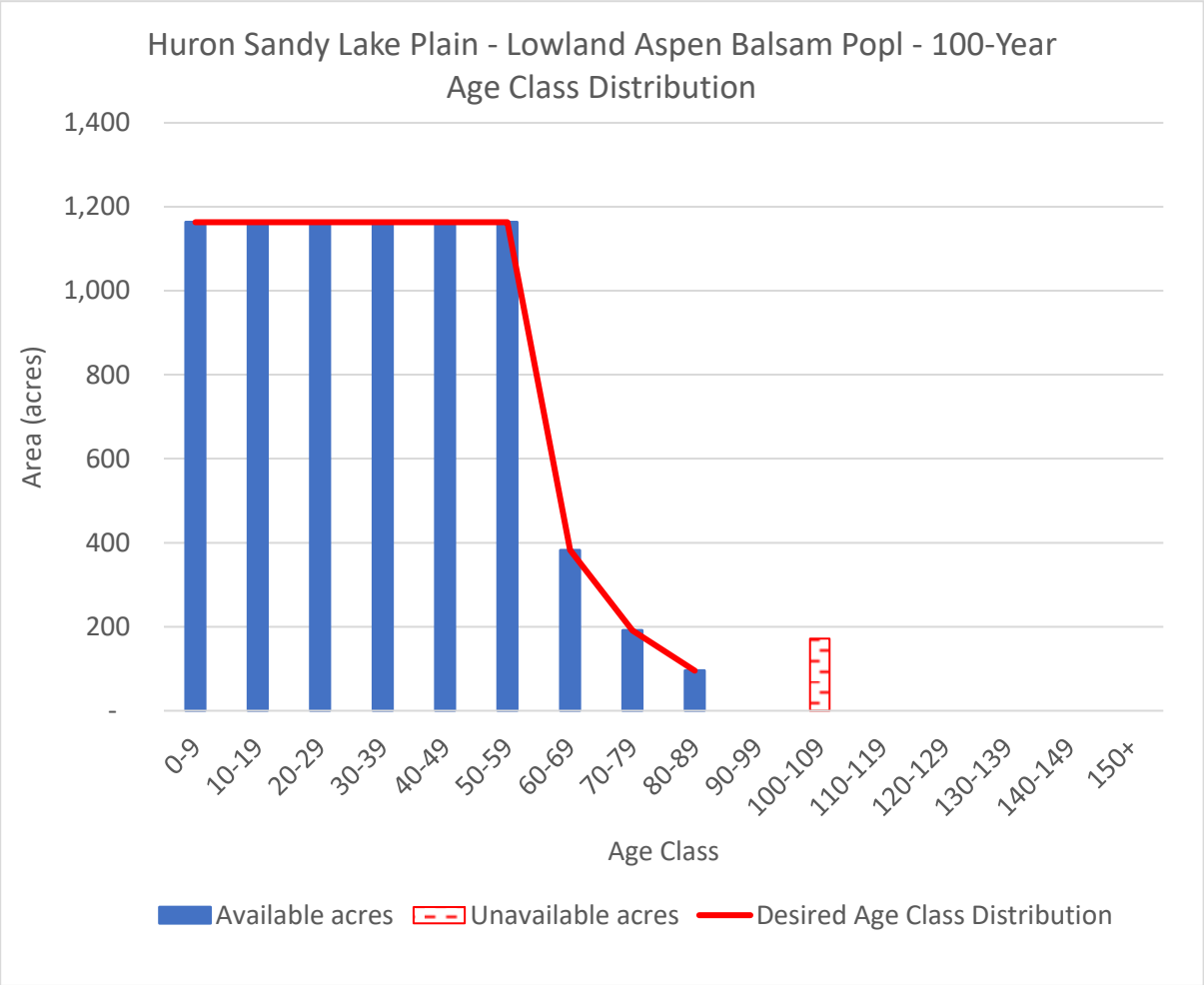


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

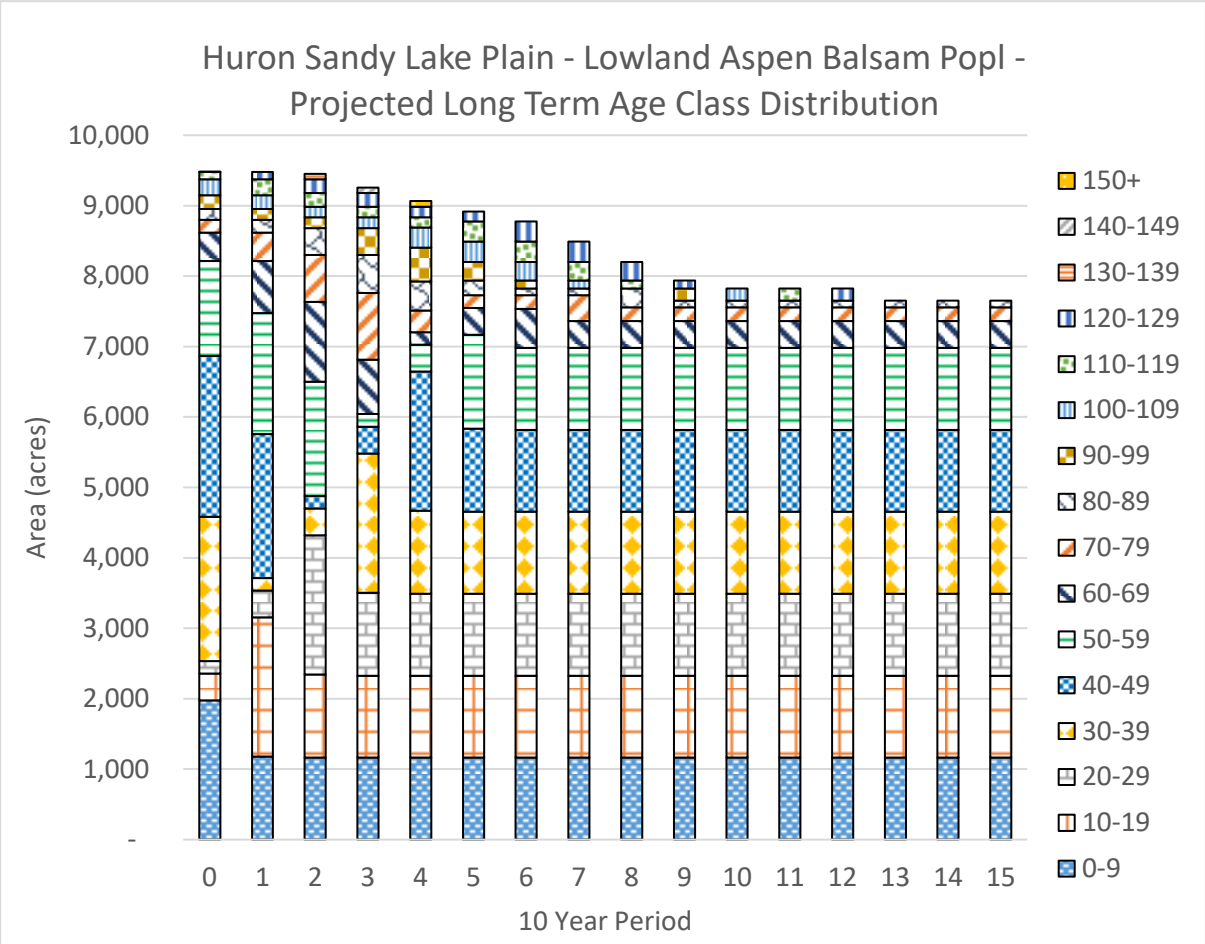


Figure 12. Projected age class distribution for all acres of lowland aspen/balsam poplar over the next 150.

Management actions

There is 1,178 acres of projected clearcut harvest in the lowland aspen/balsam poplar cover type during this planning period. This is very close to the planning period goal of 1,164 desirable acres in the 0-9-year-old age class.

Lowland deciduous

Current condition

The lowland deciduous cover type has a well distributed age class distribution except for large deficits in the 10- to 19 and 20- to 29-year-old age classes (Figure 13). The past management regime has been primarily clearcut for this cover type. The age class spike in the 0-9 age class will help to compensate for the deficits in the 10-19 and 20-29. This current planning period will continue to smooth out the distribution of the lowland deciduous in this management area.

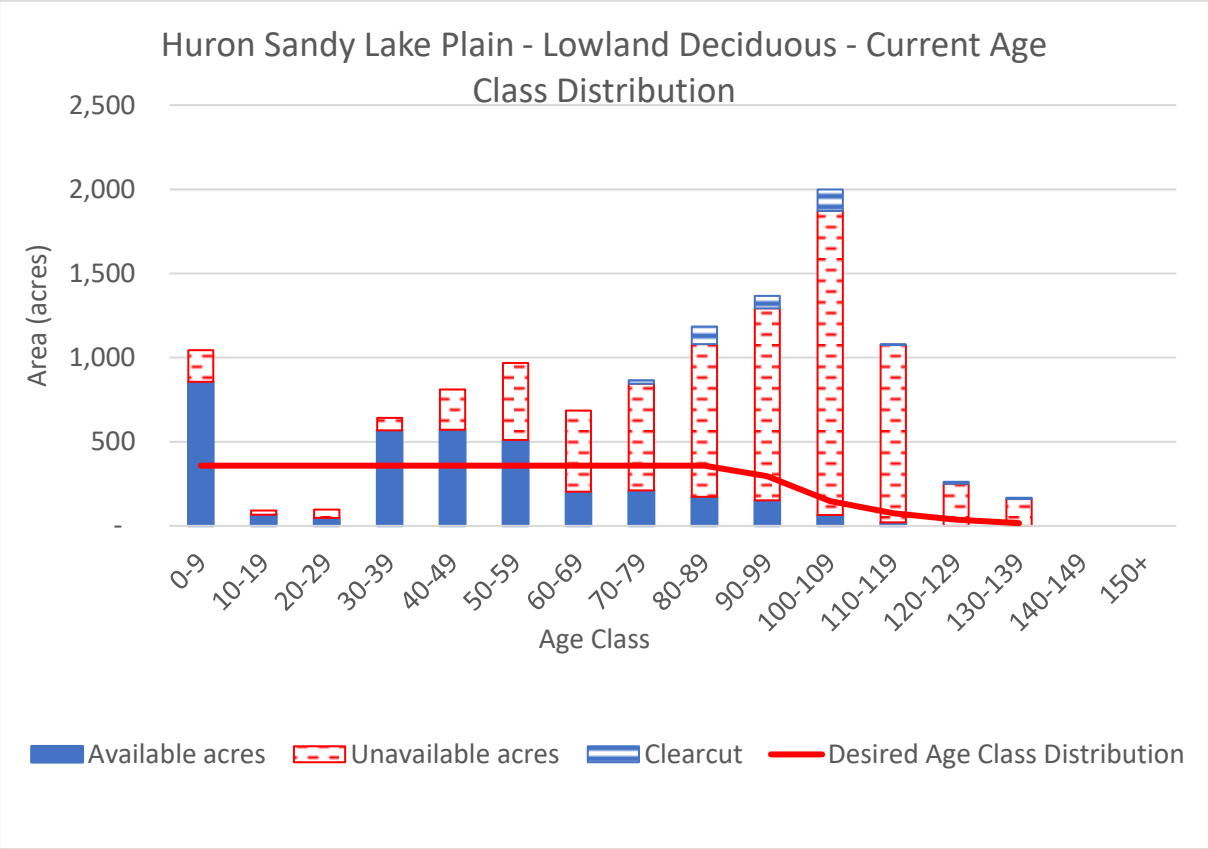


Figure 13. Current age class distribution, the desired age class distribution, and the projected harvests in the lowland deciduous cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available lowland deciduous acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock, cerulean warbler and wood thrush (Table 11).

Table 11. Featured species with lowland deciduous as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Deciduous	Lowland Deciduous Habitat Acres - Available	Lowland Deciduous Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Category: Sapling	291	47
Cerulean Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	476	8,253
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	596	7,935

Desired future condition

The projected long-term cover type trend for lowland deciduous is steady over the next planning period and increasing in the decades to follow. There are very few transitions into or out of this cover type forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 90 years old and carry a decreasing percentage of acres into the older age classes out to 140 years old for all available lowland deciduous stands in this management area.

The end of the planning period will result in the establishment of the desired amount of regeneration in the upcoming 0-9 age class (Figure 14). Progress toward the long-term age class distribution of lowland deciduous will take several decades in the management area.

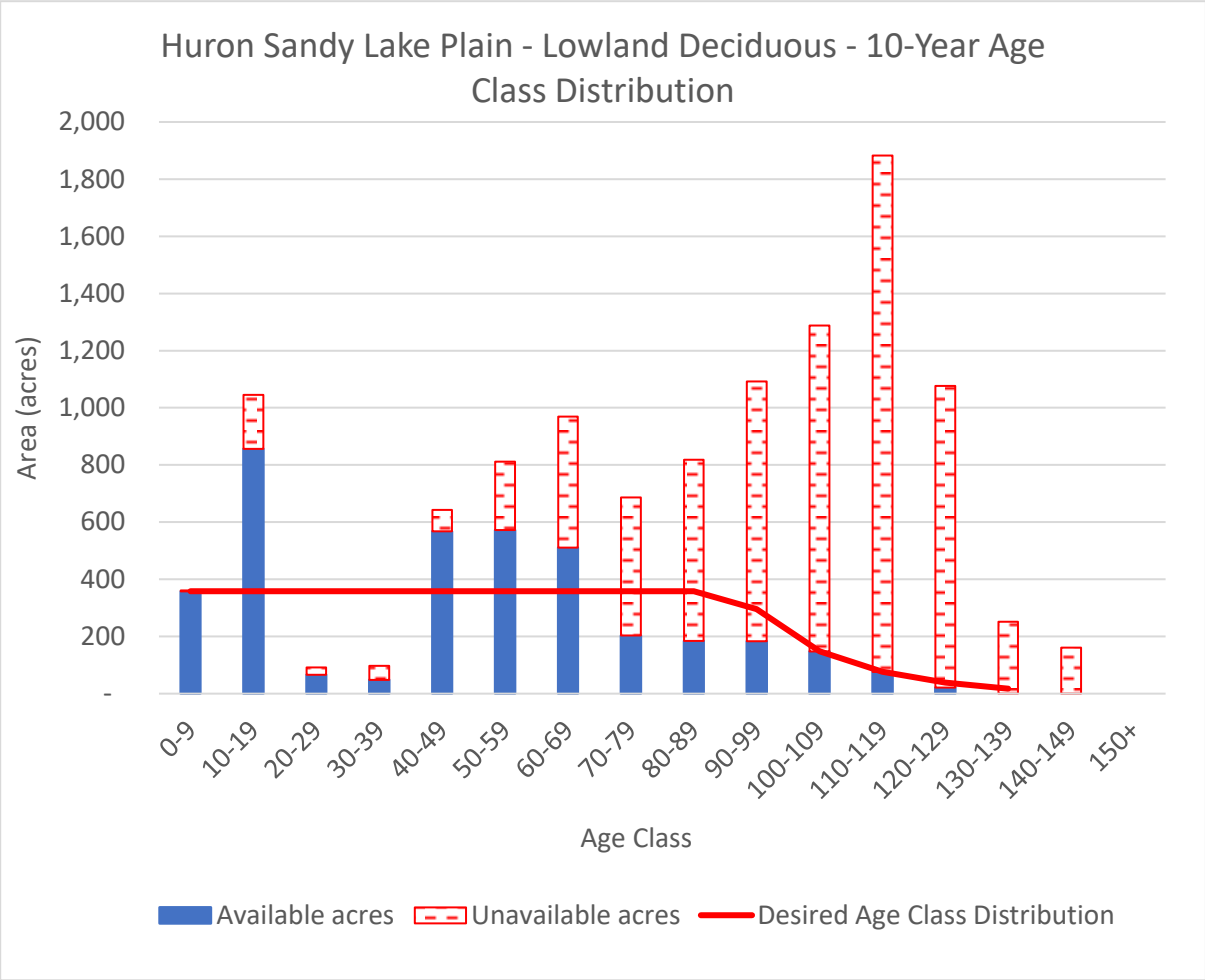


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of lowland deciduous acres has reached the desired future condition (Figure 15).

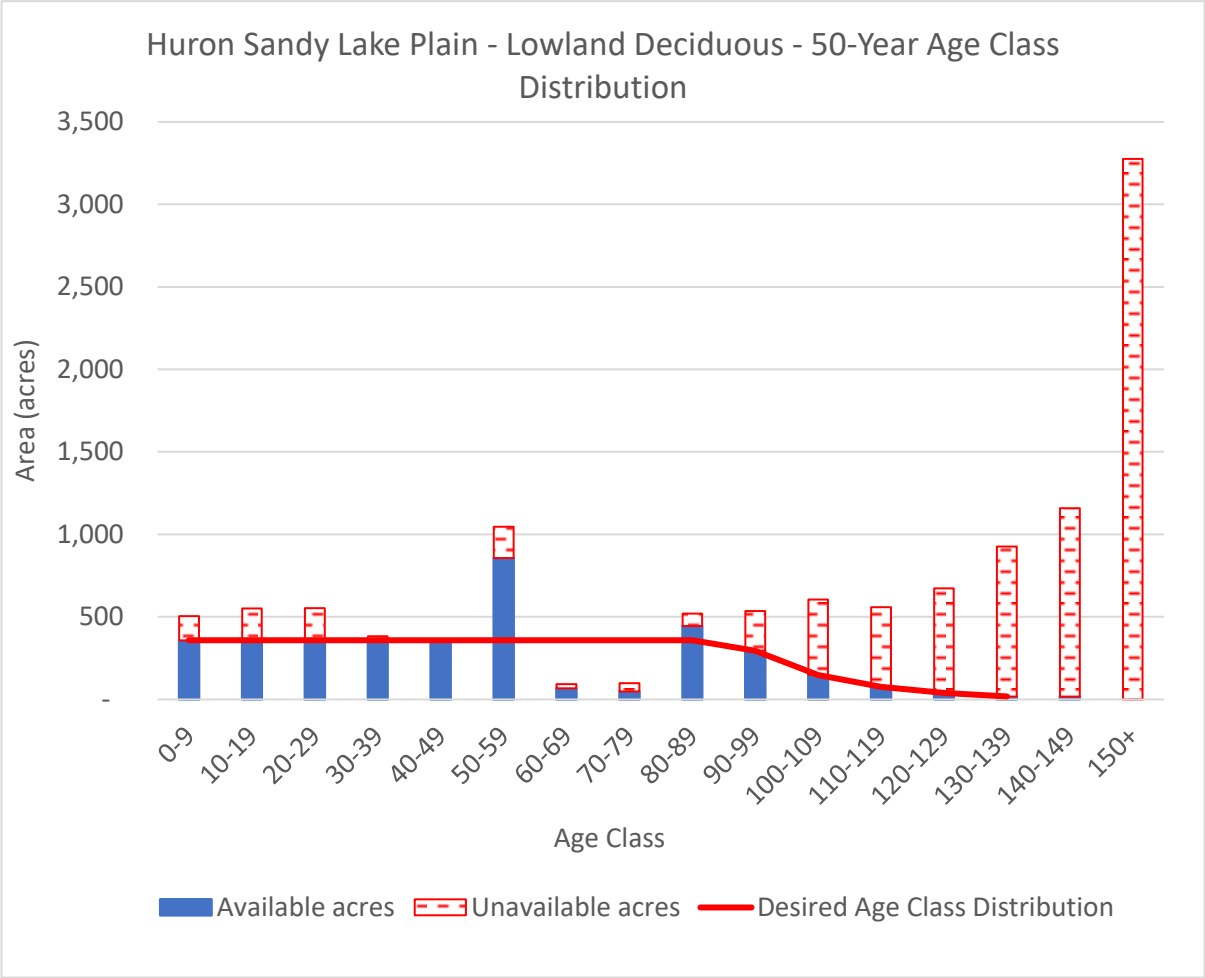


Figure 15. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate the manageable acres of lowland deciduous in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest (Figure 17).

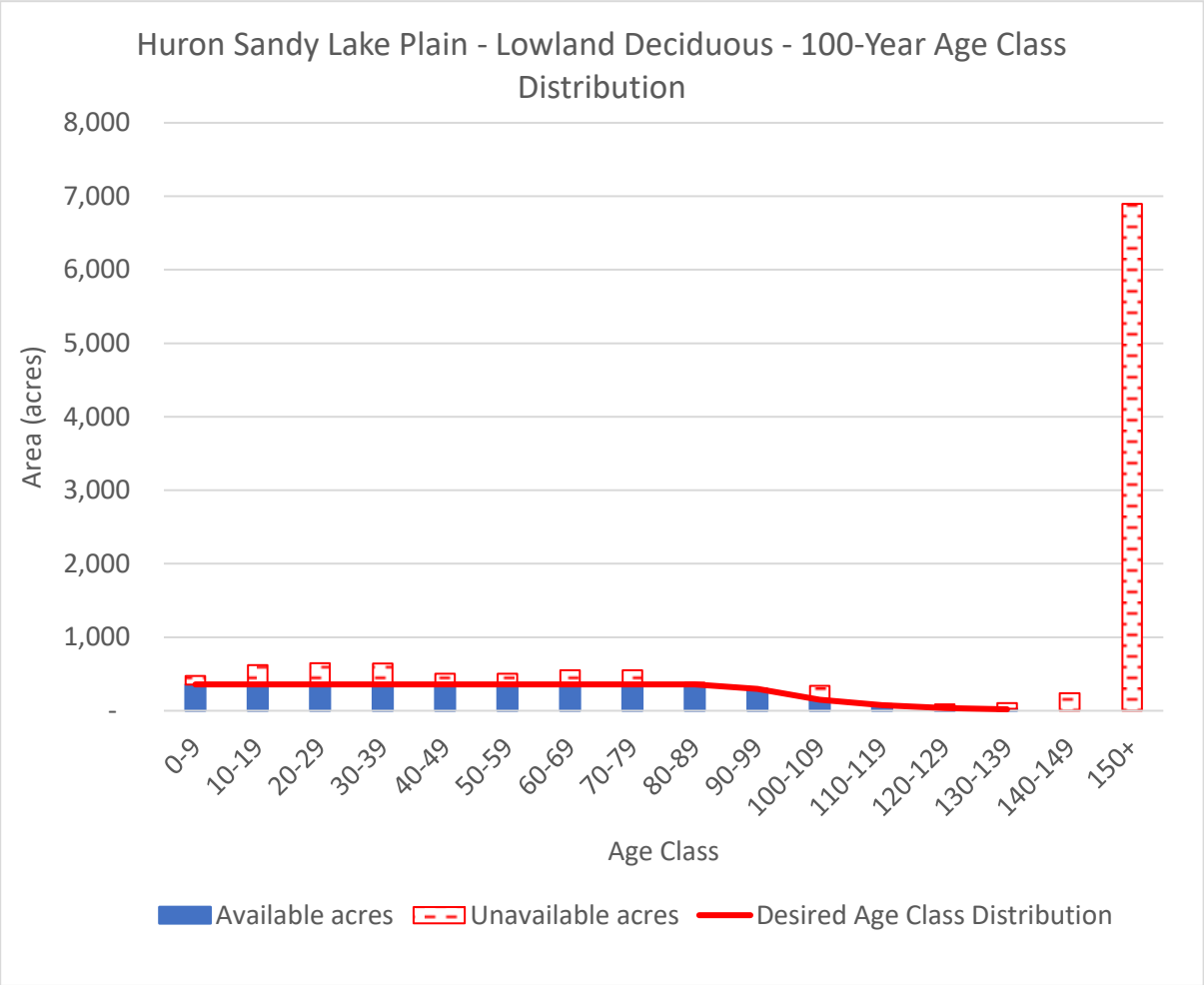

Huron Sandy Lake Plain - Lowland Deciduous - 100-Year Age Class Distribution
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
Area (acres)
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
90-99
100-109
110-119
120-129
130-139
140-149
150+
Age Class
Available acres
Unavailable acres
Desired Age Class Distribution

Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

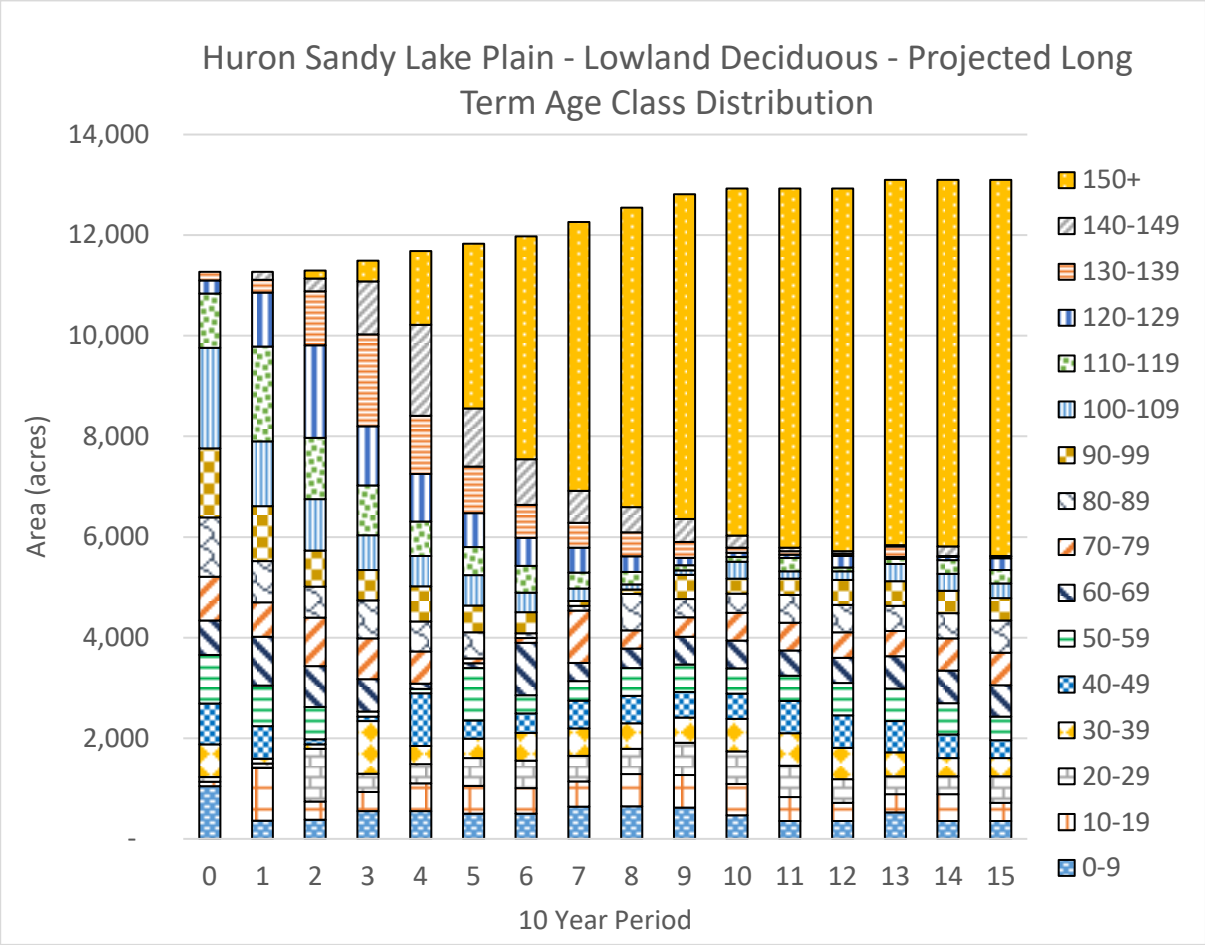


Figure 17. Projected age class distribution for all acres of lowland deciduous over the next 150 years in the Huron Sandy Lake Plain Management Area.

Management actions

There are 349 acres of projected clearcut harvest in the lowland deciduous cover type during this planning period. This is very close to the goal for the desirable number of acres in the 0- to 9-year-old age class.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 12; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within Huron Sandy Lake Plain Management Area.

High Conservation Value Area Type and Name	Acres
Coastal Environmental Areas	**105**
	105
Critical Coastal Habitat (Piping Plover)	**18**
	18
Critical Dunes	**191**
	191
Eastern Massasauga Managed Land	**1,720**
	1,720
Forest Habitat Core Interior	**9**
	9
State Wildlife Management Areas	**7,620**
Dingman Marsh Flooding SWMA	4,580
French Farm Lake Flooding SWMA	2,927
O'Neal Lake Flooding SWMA	112
Grand Total	**9,663**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 13. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 14. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Coastal Fen	AB			2
Existing ERA	Dry Northern Forest	C	G3?	S3	1
Existing ERA	Dry-mesic Northern Forest	BC			1
Existing ERA	Emergent Marsh	BC			1
Existing ERA	Floodplain Forest	C	G3?	S3	1
Existing ERA	Great Lakes Marsh	AB			1
Existing ERA	Great Lakes Marsh	BC	G2	S3	1
Existing ERA	Interdunal Wetland	BC	G2?	S2	1
Existing ERA	Intermittent Wetland	BC	G2	S3	1
Existing ERA	Limestone Bedrock Glade	C	G2G4	S2	1
Existing ERA	Limestone Cliff	B			1
Existing ERA	Northern Fen	B			1
Existing ERA	Northern Fen	B	G3	S3	2
Existing ERA	Poor Fen	C	G3	S3	1
Existing ERA	Rich Conifer Swamp	B			2
Existing ERA	Rich Conifer Swamp	BC	G4	S3	1
Existing ERA	Rich Conifer Swamp	C	G4	S3	1
Existing ERA	Wooded Dune and Swale Complex	B	G3	S3	1
Existing ERA	Wooded Dune and Swale Complex	C	G3	S3	3
Proposed ERA	Patterned Fen	C	GU	S2	1
Grand Total					**25**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 15) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within Huron Sandy Lake Plain Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**454**
Ossineke Campground	35
Unspecified	418
Habitat Area or Habitat Corridor	**652**
52106013	125

52106015	5
52106017	27
Hubbard Lake State Game Area	495
Mineral Resource Area	**76**
H&D Inc.	76
Spring, Wetlands, or Riparian Areas	**87**
H&D Inc.	76
Long Rapids Road Vernal Pool	1
Vernal Pool A	7
Vernal Pool B	3
Grand Total	**1,716**

Table 16. Static special conservation areas within Huron Sandy Lake Plain Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**26**
Northern Wet Meadow		26
Designated Trout and Cold Water Stream Buffer		**484**
		332
Carp Lake River		117
Gilchrist Creek		5
Weber Creek		19
Widner Creek		11
Designated Trout and Coldwater Streams	**17.5**	
<Null>	12.0	
Carp Lake River	4.3	
Gilchrist Creek	0.2	
Weber Creek	0.7	
Widner Creek	0.4	
Important Bird Areas		**572**
Mackinac Straits Hawk Watch		4
North Point		316
Scarecrow Island		251
Mussel Stream Group 1 - State special concern	**7.7**	
Erskine Creek-North Branch Thunder Bay River	1.6	
Fletcher Pond-Upper South Branch Thunder Bay River	0.5	
Gaffney Creek-Thunder Bay River	2.4	
Jewett Creek-Thunder Bay River	1.3	
Lost Lake-North Branch Thunder Bay River	1.5	
Sunken Lake-North Branch Thunder Bay River	0.5	
Mussel Stream Group 2 - State threatened or endangered	**4.2**	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Carp Lake River	2.2	
Gaffney Creek-Thunder Bay River	0.9	
King Creek-Lower South Branch Thunder Bay River	0.3	
Sunken Lake-North Branch Thunder Bay River	1.0	
Non-dedicated Natural Areas		**1**
Natural Area Hardwood State Forest Wilderness Area		1
Wood Turtle Stream 100ft Buffer		**36**
Thunder Bay River		27
Upper South Branch Thunder Bay River		9
Wood Turtle Stream 660ft Buffer		**213**
Thunder Bay River		150
Upper South Branch Thunder Bay River		63
Grand Total	**29.5**	**1,332**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (*Table* 17, Table 19 and Table 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 17. *Rare animal and plant species conservation status key.*

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal occurrence within Huron Sandy Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Bombus affinis	Rusty-patched bumble bee	E	LE	1
Animal	Bombus borealis	Northern amber bumble bee	SC		6
Animal	Bombus terricola	Yellow banded bumble bee	SC		5
Animal	Buteo lineatus	Red-shouldered hawk	SC		7
Animal	Cambarunio iris	Rainbow	SC		1
Animal	Chlidonias niger	Black tern	T		2
Animal	Cincinnatia cincinnatiensis	Campeloma spire snail	SC		1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Coregonus artedi	Lake herring or Cisco	T		1
Animal	Dorydiella kansana	Leafhopper	SC		1
Animal	Emydoidea blandingii	Blanding's turtle	SC		3
Animal	Gavia immer	Common loon	T		11
Animal	Haliaeetus leucocephalus	Bald eagle	SC		14
Animal	Lanius ludovicianus migrans	Migrant loggerhead shrike	E		2
Animal	Lasmigona compressa	Creek heelsplitter	SC		1
Animal	Lasmigona costata	Flutedshell	SC		1
Animal	Microtus pinetorum	Woodland vole	SC		1
Animal	Myotis lucifugus	Little brown bat	T		3
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC		3
Animal	Notropis anogenus	Pugnose shiner	E		1
Animal	Opheodrys vernalis	Smooth green snake	SC		3
Animal	Pandion haliaetus	Osprey	SC		3
Animal	Pisidium idahoense	Giant northern pea clam	SC		1
Animal	Pygarctia spraguei	Sprague's pygarctia	SC		1
Animal	Pyrgus centaureae wyandot	Grizzled skipper	T		3
Animal	Sagittunio nasutus	Eastern pondmussel	E		1
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	3
Animal	Sphaerium fabale	River fingernail clam	SC		1
Animal	Sterna hirundo	Common tern	T		1
Animal	Thamnophis butleri	Butler's garter snake	SC		1
Animal	Trimerotropis huroniana	Lake Huron locust	T		1
Total	-	-	-	-	**85**

Table 19. Rare plant occurrence within Huron Sandy Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Astragalus neglectus	Cooper's milk vetch	SC		3
Plant	Calypso bulbosa	Calypso or fairy-slipper	T		1
Plant	Crataegus douglasii	Douglas's hawthorn	SC		1
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		8
Plant	Dryopteris filix-mas	Male fern	SC		1
Plant	Eleocharis compressa	Flattened spike rush	T		1
Plant	Graphephorum melicoides	Purple false oats	SC		2
Plant	Iris lacustris	Dwarf lake iris	T	LT	5
Plant	Poa interior	Inland bluegrass	SC		1
Plant	Potamogeton pulcher	Spotted pondweed	T		1
Plant	Pterospora andromedea	Pine-drops	T		3
Plant	Salix pellita	Satiny willow	T		1
Plant	Schoenoplectus torreyi	Torrey's bulrush	SC		2
Plant	Solidago houghtonii	Houghton's goldenrod	T	LT	1
Plant	Stachys pilosa	Hairy hedge-nettle	SC		2
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC		2
Plant	Thalictrum pubescens	Tall meadowrue	SC		1
Total	-	-	-	-	**36**

Table 20. Other rare occurrence within Huron Sandy Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery			3
Total	-	-	-	-	**3**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 21).

Table 21. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non-ecological reference area natural communities within Huron Sandy Lake Plain Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Northern Wet Meadow	**BC**	S4	G4G5	1
Dry Northern Forest	**D**	S3		2
Grand Total				**3**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Huron Sandy Plains Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes

Watch for and retain lingering ash with potential resistance to emerald ash borer.

Table 24. Maladies of concern in the Huron Sandy Plains Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 59 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as warm types comprise approximately 95% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	2
Cold Small River	0
Cold Transitional Stream	1
Cold Transitional Small River	0
Cold Transitional Large River	0
Warm Transitional Stream	24
Warm Transitional Small River	4
Warm Transitional Large River	0
Warm Stream	14
Warm small river	7
Warm Large River	7

Lacustrine habitat

A total of 22 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	12
100-499	3
500+	7

Wetlands

A total of 55,398 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 93% of wetland types found in the management area.

Table 27. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	3,790
Forested	51,531
Riverine	77

Vernal pools and seeps

A total of 416 acres of vernal pools and seeps have been inventoried in the management area, and 835 acres of seeps have been identified.

Riparian vegetation cover

Lowland deciduous and lowland shrub are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland Deciduous	1,916
Lowland Shrub	1,368
Cedar	870
Aspen	775
Marsh	723
Lowland Aspen/Balsam Poplar	510
Lowland Conifers	489
Lowland Mixed Forest	248
Upland Mixed Forest	237
Bog	231

Watershed vegetation cover

The management area includes portions of important watersheds of the Little Black and Thunder Bay rivers (Table 29 & Table 30). Lowland shrub/aspen/balsam fir are major cover types of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top five) and area of the Little Black River watershed located within the management area.

Cover Type	Acres
Cedar	578
Lowland Shrub	487
Lowland Aspen/Balsam Fir	470
Lowland Conifers	390
Lowland Deciduous	237

Table 30. Largest vegetative cover types (i.e., top five) and area of the Thunder Bay River watershed located within the management area.

Cover Type	Acres
Lowland Deciduous	6,175
Lowland Aspen/Balsam Fir	4,342
Aspen	4,145
Lowland Shrub	3,172
Cedar	2,595

Recreation

Access for public recreation and management in the Huron Sandy Plains Management Area is generally limited due to wetland and adjacent private land, however, there is pressure for recreation access due to the proximity of Mackinaw City, Cheboygan and Alpena.

Motorized trails include the Devils Lake ORV Route near Alpena and the Indian Gardens ORV Route east of Cross Village. A network of snowmobile trails also traverses this management area. Portions of several state trails pass through the Huron Sandy Plain Management Area, including the Hillman-Alpena State Trail, North Central State Trail and Northwestern State Trail. These state trails are open to all nonmotorized uses year-round and snowmobiles seasonally. Other nonmotorized trails include the Chippewa and Norway Ridge pathways (hike/bike), 18.2 miles of the North Country National Scenic Trail/Iron Belle Trail and 4.6 miles of the Shore-to-Shore equestrian trail.

There are two state forest campgrounds (rustic) within the management area, located on Lake Huron and the Thunder Bay River in Alpena County.

Additional recreation facilities in this area are provided by Wilderness, Thompsons Harbor and Negwegon state parks, which are adjacent to state forest land.

Table 31. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types)	11.2

Recreation Category	Recreation Type	# of Miles
	Snowmobile	39.7
Nonmotorized Recreation Trails	Hiking Equestrian Biking Hunter Access Trails	54.3 6.8 31.6 0
Total		**154.8**

Note: Trail-use types may overlap.

Table 32. State forest campgrounds.

State Forest Campgrounds	# of sites
Ossineke	42
Thunder Bay River	10

Areas managed for hunting include Dingman Marsh Flooding, an expansive area of wetland in Cheboygan County, French Farm Lake near the shores of Lake Michigan in Emmett County, and O'Neal Flooding also in Emmett County.

Boating access sites provide access to several inland lakes, Lake Huron and the Thunder Bay River.

Dispersed recreation, such as hunting, is also popular in the management area.

Table 33. Areas managed for hunting.

Type	Name	# of Acres
State Wildlife Management Area	Dingman Marsh Flooding French Farm Lake Flooding O'Neal Lake Flooding	4,578.2 2,925.8 1,236.0
Total		**8,740**

Table 34. Boating access sites.

Name	Waterbody
O'Neal Lake	O'Neal Lake
Paradise Lake	Paradise Lake
Seven Mile Pond-Winyah Lake	Seven Mile Pond-Winyah Lake
Snug Harbor	Lake Huron
South Bay Hubbard Lake	Hubbard Lake
Thunder Bay River State Forest Campground	Thunder Bay River

Kalkaska Sandy Moraines

State Forest Area: 285,254 acres	Location: Otsego, Antrim, Crawford, Kalkaska, Grand Traverse, Wexford and Missaukee Counties	Population Centers: Gaylord, Kalkaska, Rapid City, Traverse City and Fife Lake
Subsection: Kalkaska Sandy Moraines and Wolverine Moraines	Landforms: Sandy ice-disintegration ridges and high outwash plain	Landcover: Forested: 252,893 acres Nonforested: 32,361 acres

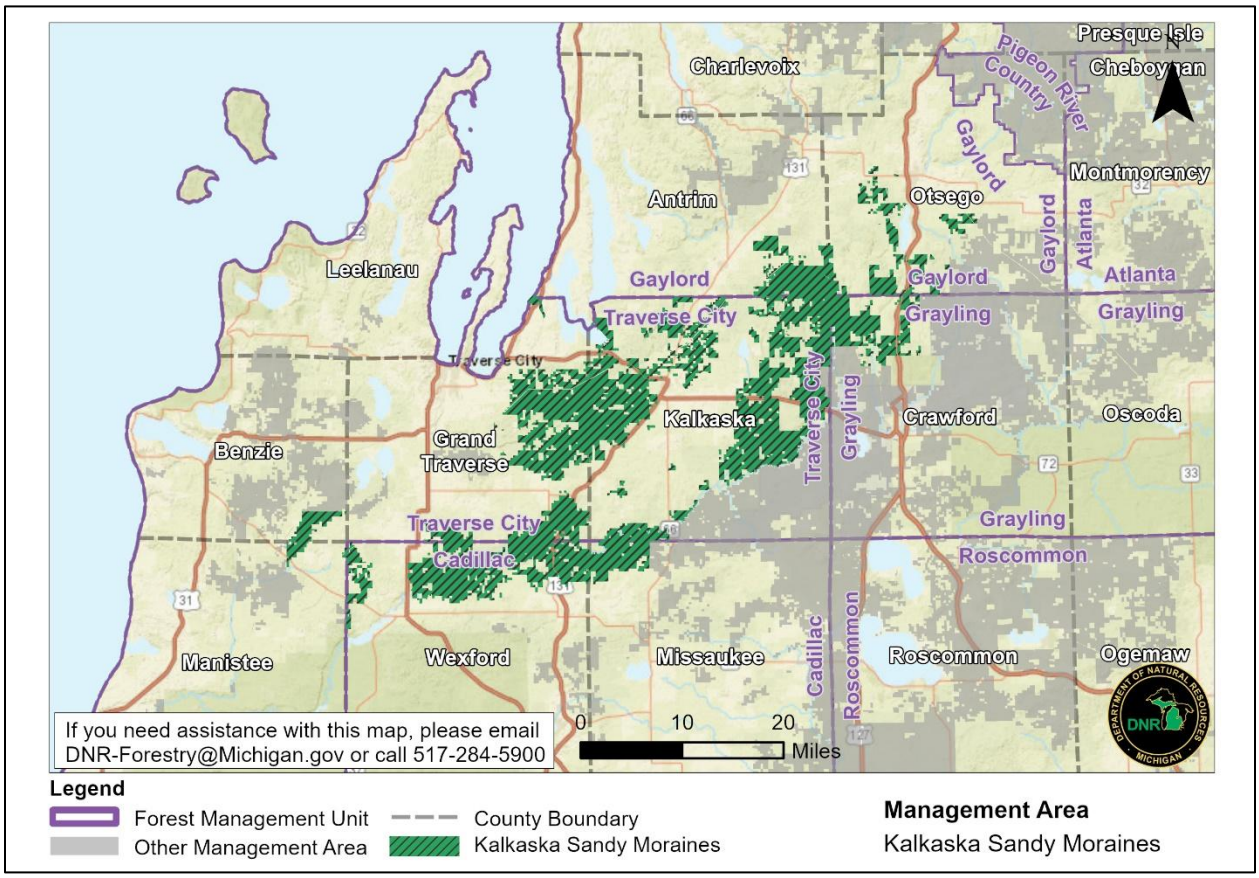


Figure 1. Kalkaska Sandy Moraines Management Area.

Forested landscape

Current and projected condition

The Kalkaska Sandy Moraine Management Area is dominated by aspen, northern hardwood and planted red pine cover types that are largely upland and available (Figure 2). Mid-tolerant available upland cover types are more prevalent in the mid-aged and mature categories, while the unavailable lowland shade tolerant acres are more prevalent in the mature age category.

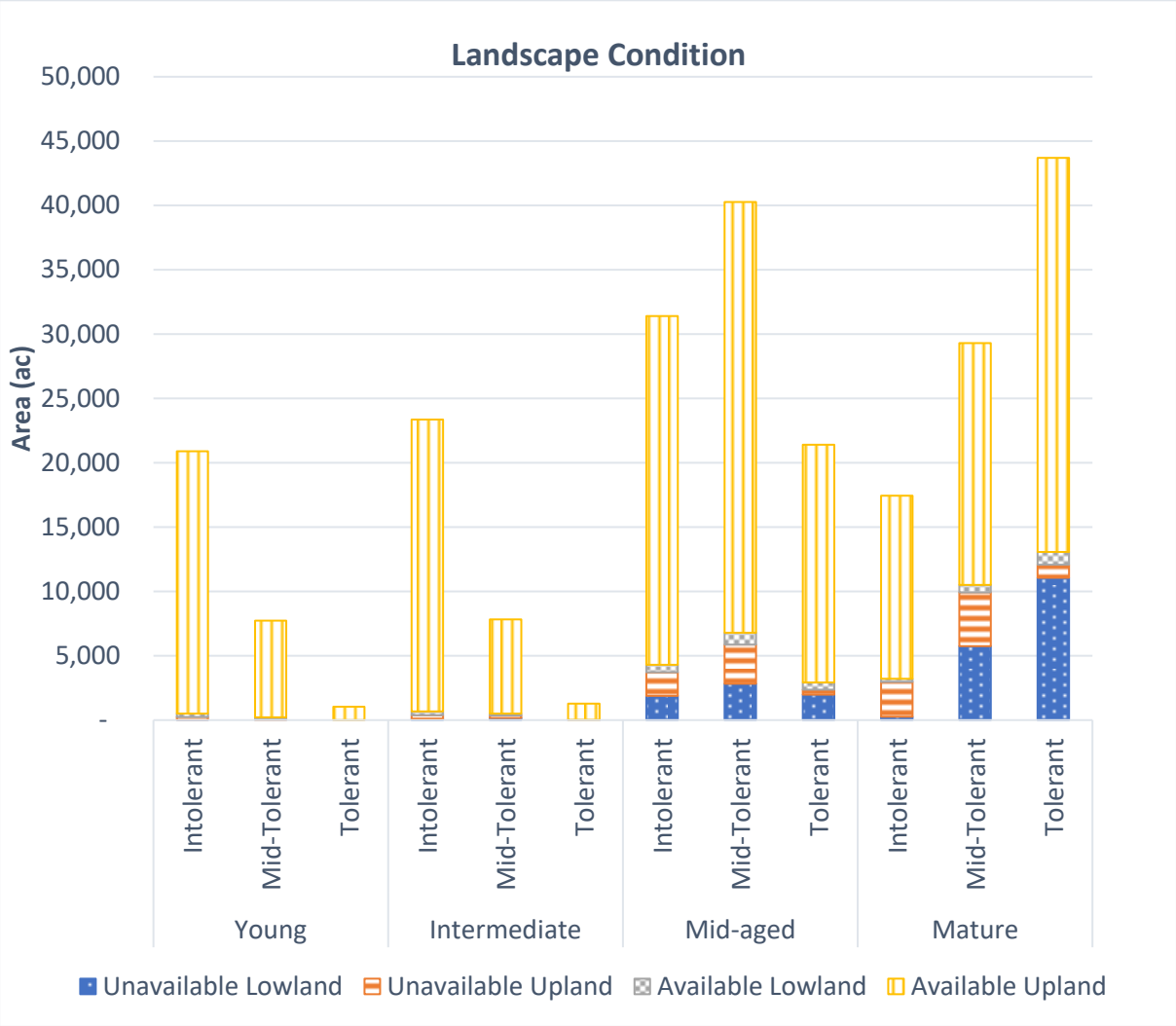


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	20,040
Mature Forest	Acres of 80+ year stands across cover types	90,437
Mature Forest	Acres of 120+ year stands across cover types	4,155
Mesic Conifer Cover Types	Acres of mesic conifer cover types	15,409
Mesic Conifers in other Cover Types	Average canopy occupancy	28%
Mast – Oak Cover types	Acres of oak cover types	17,986
Mast Tree Species in other Cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	150,307
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	132,637
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	14,096
Landscape Forest Matrix	Percent deciduous forest	59%
Landscape Forest Matrix	Percent coniferous forest	35%

The Kalkaska Sandy Moraines Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management Site (GEM) – Little Betsie

The Kalkaska Sandy Moraines Management Area is dominated by forested cover types with 89% of the area covered in forested stands (Table 2). The upland deciduous portion of that is 49% of the management area and comprised mostly of northern hardwood and aspen. Lowland shrub and upland shrub are the most common nonforested cover type in this management area representing 6% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	65,434	139,320	223,916	252,893
			Northern Hardwood	43,361			
			Black Red Hybrid Oak	6,687			
			Northern Red Oak	6,927			
			Oak Mix	4,645			
			Mixed Upland Deciduous	12,267			
		Mixed	Upland Mixed Forest	11,932	11,932		
		Coniferous	Planted Red Pine	42,134	72,664		
			Planted Jack Pine	2,443			
			Planted White Pine	2,172			
			Planted Mixed Pine	3,119			
			Natural Red Pine	3,490			
			Natural Jack Pine	3,900			
			Natural White Pine	4,496			
			Natural Mixed Pines	9,348			
			Upland Spruce/Fir	239			
			Upland Conifers	1,265			
			Hemlock	59			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	2,884	9,963	28,977	
			Lowland Deciduous	7,079			
		Mixed	Lowland Mixed Forest	3,587	3,587		
		Coniferous	Cedar	3,682	15,427		
			Lowland Conifers	10,925			
			Lowland Spruce/Fir	530			
			Tamarack	290			
Nonforested	Upland	N/A	Herbaceous Openland	5,899	N/A	19,175	32,361
			Upland Shrub	8,133			
			Low Density Trees	3,014			
			Bare/Sparsely Vegetated	514			
			Cropland	64			
			Urban	1,550			
	Lowland	N/A	Lowland Shrub	7,412	N/A	13,186	
			Marsh	2,639			
			Bog	625			
			Treed Bog	269			
			Water	2,241			
						Grand Total:	**285,254**

There are 214,690 acres (75.2% of the total management area and 84.9% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Kalkaska Sandy Moraines Management Area (Table 3). Of that, almost 25% is in the aspen cover type, 16.7% in northern hardwood, and 15.7% in planted red pine. The remaining 22 cover types represent less than 5% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current landscape context and cover type composition by management availability.

KALKASKA SANDY MORAINES Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	62,966	24.9%	2,476	1.0%	65,442	25.9%
Northern Hardwood	42,312	16.7%	1,052	0.4%	43,364	17.1%
Planted Red Pine	39,596	15.7%	2,544	1.0%	42,140	16.7%
Mixed Upland Deciduous	10,616	4.2%	1,651	0.7%	12,267	4.9%
Upland Mixed Forest	10,609	4.2%	1,323	0.5%	11,932	4.7%
Natural Mixed Pines	8,657	3.4%	691	0.3%	9,349	3.7%
Black Red Hybrid Oak	6,055	2.4%	632	0.2%	6,687	2.6%
Northern Red Oak	6,016	2.4%	911	0.4%	6,927	2.7%
Natural White Pine	4,158	1.6%	339	0.1%	4,497	1.8%
Oak Mix	3,986	1.6%	660	0.3%	4,646	1.8%
Natural Jack Pine	3,705	1.5%	197	0.1%	3,901	1.5%
Natural Red Pine	3,312	1.3%	178	0.1%	3,490	1.4%
Planted Mixed Pine	2,499	1.0%	619	0.2%	3,119	1.2%
Planted Jack Pine	2,393	0.9%	51	0.0%	2,444	1.0%
Planted White Pine	2,159	0.9%	13	0.0%	2,172	0.9%
Lowland Aspen/Balsam Poplar	992	0.4%	1,893	0.7%	2,884	1.1%
Lowland Conifers	964	0.4%	9,961	3.9%	10,925	4.3%
Lowland Deciduous	940	0.4%	6,139	2.4%	7,079	2.8%
Lowland Mixed Forest	935	0.4%	2,653	1.0%	3,588	1.4%
Upland Conifers	679	0.3%	586	0.2%	1,265	0.5%
Cedar	605	0.2%	3,078	1.2%	3,683	1.5%
Lowland Spruce/Fir	241	0.1%	291	0.1%	532	0.2%
Upland Spruce/Fir	196	0.1%	44	0.0%	239	0.1%
Tamarack	90	0.0%	200	0.1%	290	0.1%
Hemlock	27	0.0%	33	0.0%	59	0.0%
Grand Total	**214,707**	**84.9%**	**38,215**	**15.1%**	**252,922**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason Area is Unavailable for Commercial Harvest)	Area (ac)	% of Unavailable Area
Too Wet	16,372	42.9%
Best Management Practices	7,114	18.6%
Federal/State/Local Law	3,090	8.1%
Conservation Values	2,164	5.7%
Too Steep	1,782	4.7%
Non-Military Lease/Easement	1,699	4.4%
Other Influence Zones	1,558	4.1%
Recreation/Scenic	1,321	3.5%
Blocked by Obstacle	829	2.2%
Long-Term Retention	810	2.1%
Other Department/Division Processes	527	1.4%
Denied Access	525	1.4%
Species of Special Concern or Threatened and Endangered	107	0.3%
Rare Landforms	90	0.2%
Wildlife Concerns	75	0.2%
Deer Wintering Area	42	0.1%
Cannot Regenerate	39	0.1%
Unproductive	33	0.1%
Historical/Archaeological	13	0.0%
Natural/Quiet/Wilderness Area	12	0.0%
Total Unavailable	**38,202**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Kalkaska Sandy Moraines Management Area has a unique age class and basal-area class goals that describe the long-term desired future conditions. The harvest levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal-area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 1,046,708 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Planted Red Pine	3,724	-	13,697	-	-	926	1,940	20,286
Northern Hardwood	-	9,712	-	624	-	1,310	1,013	12,660
Aspen	8,389	-	-	-	-	-	-	8,389
Natural Mixed Pines	-	-	762	-	845	-	-	1,607
Planted White Pine	-	-	1,304	-	-	-	-	1,304
Natural White Pine	-	-	516	-	506	-	-	1,022
Mixed Upland Deciduous	796	208	-	-	-	-	-	1,005
Natural Jack Pine	696	-	-	-	-	-	-	696
Upland Spruce/Fir	196	-	-	-	-	-	-	196
Lowland Aspen/Balsam Poplar	170	-	-	-	-	-	-	170
Lowland Deciduous	135	22	-	-	5	-	-	162
Northern Red Oak	121	-	-	7	6	-	-	134
Lowland Mixed Forest	92	-	-	-	-	-	-	92
Lowland Conifers	80	-	-	-	-	-	-	80
Natural Red Pine	-	-	38	-	26	-	-	64
Planted Jack Pine	58	-	-	-	-	-	-	58
Lowland Spruce/Fir	45	-	-	-	-	-	-	45
Upland Mixed Forest	-	-	-	-	-	44	-	44
Planted Mixed Pine	-	-	23	-	-	-	-	23
Black Red Hybrid Oak	9	-	-	-	-	-	-	9
Hemlock	-	4	-	-	-	-	-	4
Tamarack	1	-	-	-	-	-	-	1
Totals	**14,513**	**9,946**	**16,340**	**631**	**1,387**	**2,280**	**2,953**	**48,049**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Kalkaska Sandy Moraines Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared** ***
Pulpwood (cords)	Red Pine	137,271	129,035
	Mixed Hardwood	117,447	110,400
	Mixed Aspen	88,430	83,124
	White Pine	21,764	20,458
	Mixed Spruce	21,760	20,454
	Mixed Softwood	17,949	16,872
	Jack Pine	13,960	13,122
	Mixed Oak	6,644	6,246
	Pulpwood Total	**425,224**	**399,711**
Sawtimber (MBF)	Red Pine	135,864	127,712
	Sugar Maple	29,360	27,599
	Mixed Aspen	23,129	21,741
	Red Maple	13,849	13,018
	White Pine	9,728	9,144
	Red Oak	6,996	6,576
	Basswood	3,521	3,309
	White Oak	2,234	2,100
	Mixed Oak	1,638	1,540
	Sawtimber Total	**226,320**	**212,740**
	Total Sawtimber Harvest Volume in Cords	**626,442**	**588,856**
	Grand Total Harvest Volume in Cords	**1,051,667**	**988,567**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are only a few cover type transitions projected in the Kalkaska Sandy Moraines Management Area (Table 7). The managed area of each cover type is projected to remain relatively stable as treatment regimes will not change the amount of area in each cover type except for upland mixed forest. The

largest decrease forecasted is in the planted red pine cover type where 389 acres are forecasted to convert to other cover types such as upland mixed forest through forest management activities. The largest increase is in upland mixed forest where 605 acres are expected to convert into that cover type increasing by 5.1% in acreage.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	65,434	65,588	154
Northern Hardwood	43,361	43,733	372
Planted Red Pine	42,134	41,745	-389
Mixed Upland Deciduous	12,267	11,908	-358
Upland Mixed Forest	11,932	12,537	605
Lowland Conifers	10,925	10,869	-56
Natural Mixed Pines	9,348	9,348	0
Lowland Deciduous	7,079	7,089	10
Northern Red Oak	6,927	6,852	-75
Black Red Hybrid Oak	6,687	6,683	-4
Oak Mix	4,645	4,771	125
Natural White Pine	4,496	4,496	0
Natural Jack Pine	3,900	3,633	-267
Cedar	3,682	3,682	0
Lowland Mixed Forest	3,587	3,638	50
Natural Red Pine	3,490	3,490	0
Planted Mixed Pine	3,119	3,119	0
Lowland Aspen/Balsam Poplar	2,884	2,899	15
Planted Jack Pine	2,443	2,455	12
Planted White Pine	2,172	2,172	0
Upland Conifers	1,265	1,265	0
Lowland Spruce/Fir	530	511	-19
Tamarack	290	290	0
Upland Spruce/Fir	239	63	-176
Hemlock	59	59	0
Upland Shrub	8,133	8,133	0
Lowland Shrub	7,412	7,412	0
Herbaceous Openland	5,899	5,899	0
Low Density Trees	3,014	3,014	0
Marsh	2,639	2,639	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Water	2,241	2,241	0
Urban	1,550	1,550	0
Bog	625	625	0
Bare/Sparsely Vegetated	514	514	0
Treed Bog	269	269	0
Cropland	64	64	0
Total:	**285,254**	**285,254**	**0**

Featured species current and projected habitat acres

There are 11 featured species in this management area that span various cover types, age classes, and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model, black bear, wild turkey and black-backed woodpecker, but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	28,076	25,743	22,092	23,449
Black Bear	Mast	168,293	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black-Backed Woodpecker	Natural Disturbance	--	--	--	--
Blackburnian Warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	36,523	50,336	37,367	55,532
Black-Throated Blue Warbler	Northern hardwoods, mixed upland deciduous	29,931	37,791	17,092	38,528
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	28,908	26,724	22,015	23,369
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	72,600	80,304	70,297	84,866
Ruffed Grouse	Aspen	27,353	24,864	21,469	22,525
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	33,973	30,901	27,220	27,363
Wild Turkey	Nonforested openings	5,963	--	--	--
Wood Thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	45,767	52,331	35,756	57,545
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

The current age class distribution is not very far from being balanced. There is a deficit of acres in ages 20 to 29, as well as in the 40- to 49-year-old age class (Figure 3). The younger age class of 0-9 has the largest surplus in acres. To balance out the age class distribution it will take multiple planning periods with so many acres already in the 0-9 age class.

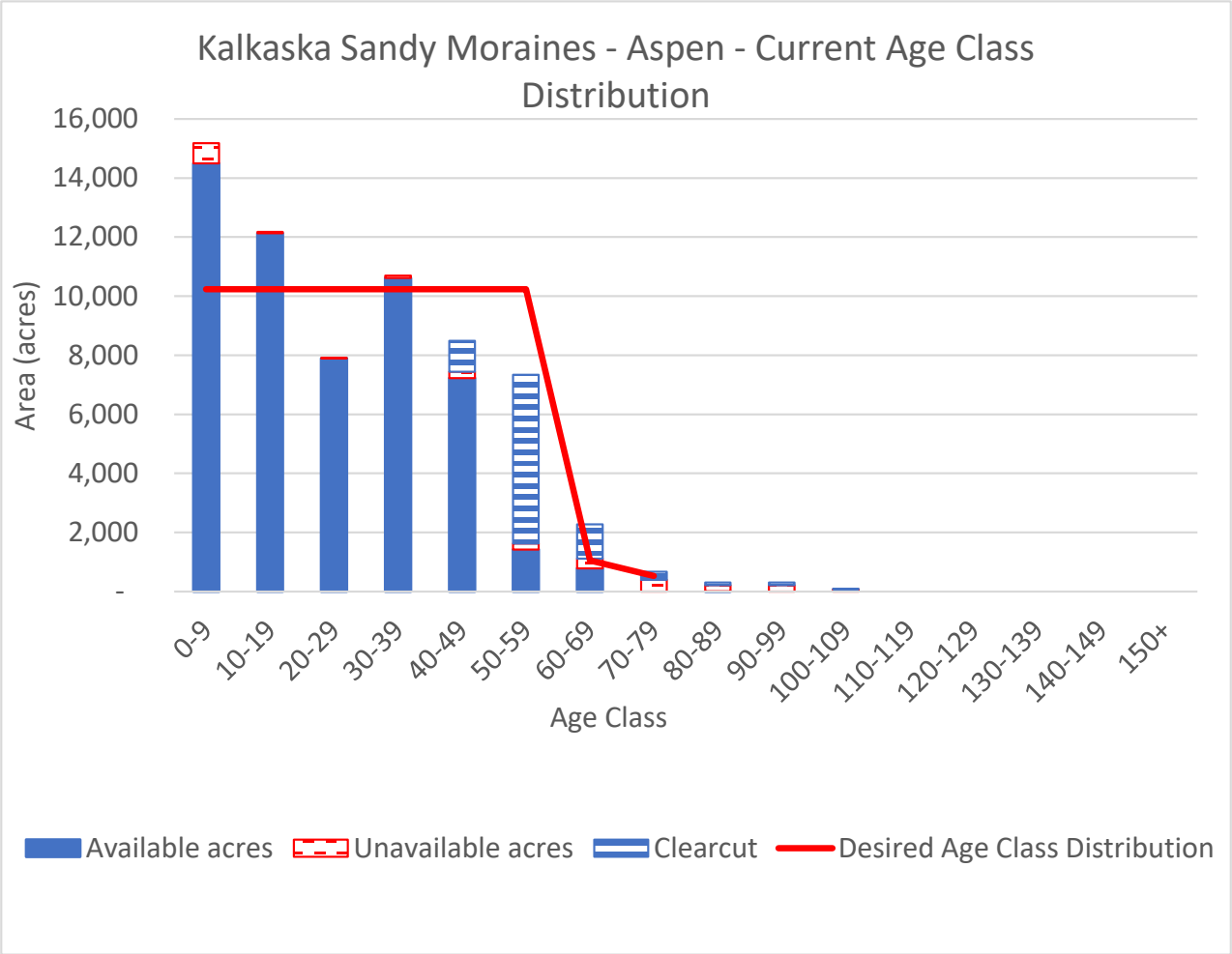


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current conditions are slightly over our desired age class distribution on harvests and regeneration efforts within available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American Woodcock	Age Category: 0-19 Size Class: Sapling	26,621	733
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	26,621	733
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	26,621	733
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	26,621	733

Desired future condition

The projected long-term cover type trend for aspen is stable in the Kalkaska Sandy Moraines Management Area with an increase of 0.2% in acres. There are a few transitions into this cover type from other cover types forecasted in this management area and equally few transitions from aspen to other cover types.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old with a tail out to 70 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to keep vigor in these stands promoting a healthier stand fostering regeneration levels to be higher.

The end of the planning period will result in the establishment of 9,676 acres in the upcoming 0-9 age class (Figure 4). It is slightly below the desired age class distribution of 10,256 due to the shortage in the 50- to 59-year-old age class. Progress toward the long-term desired age class distribution of aspen will take many decades in this management area.

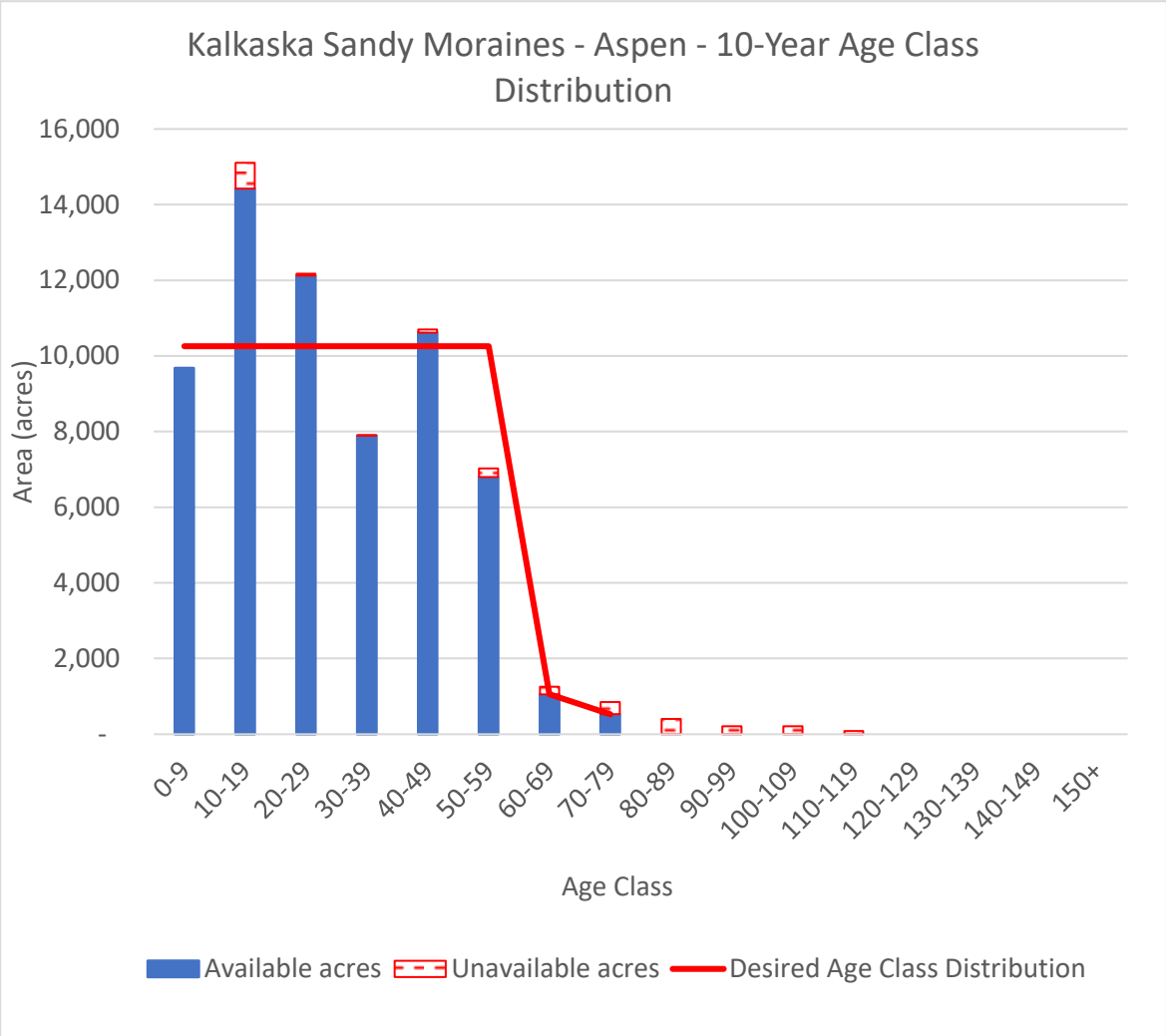


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres becoming more even distribution among age classes working toward the desired future condition with only the older age classes with unavailable acres deviating from the target proportions (Figure 5).

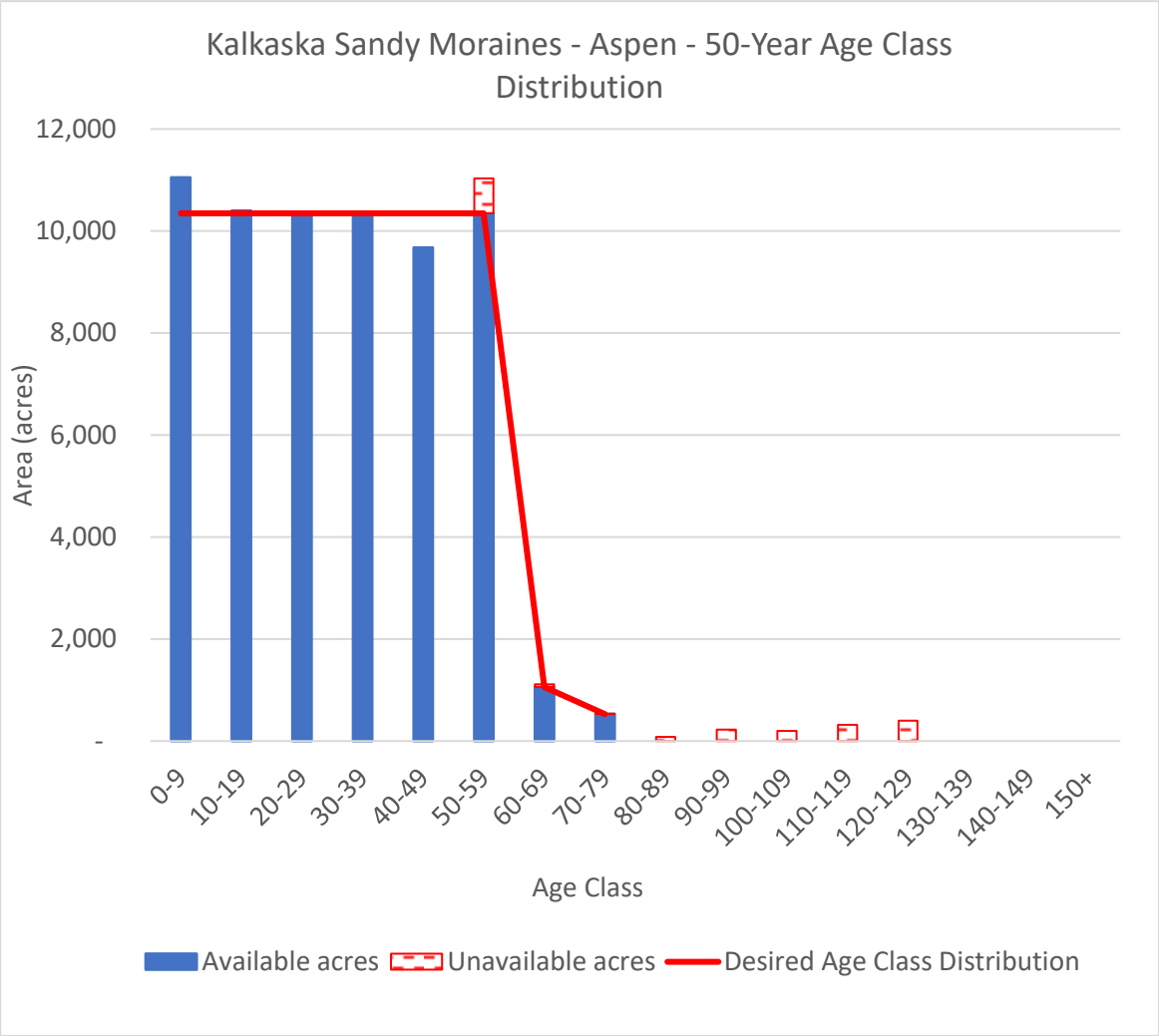


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

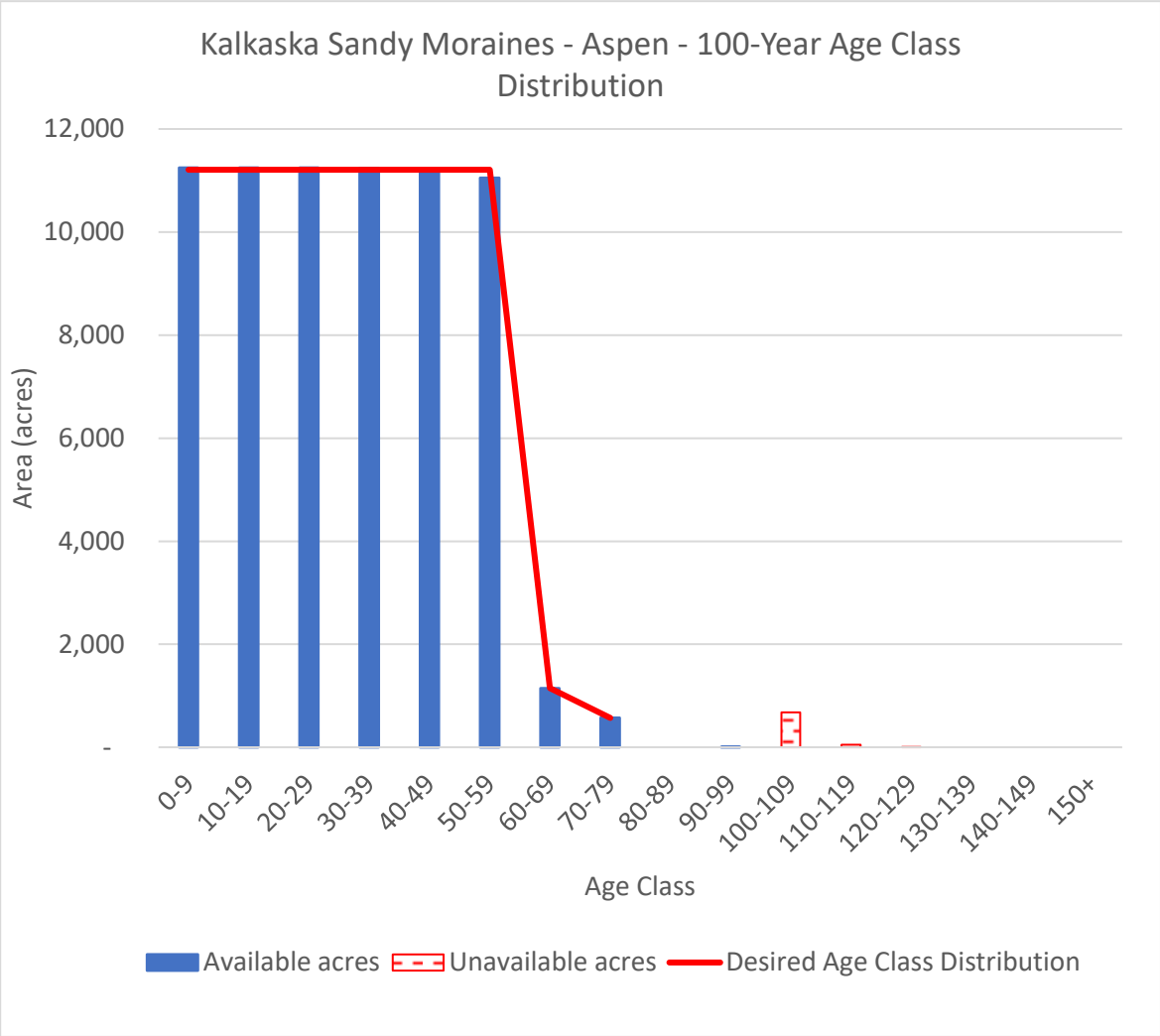


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

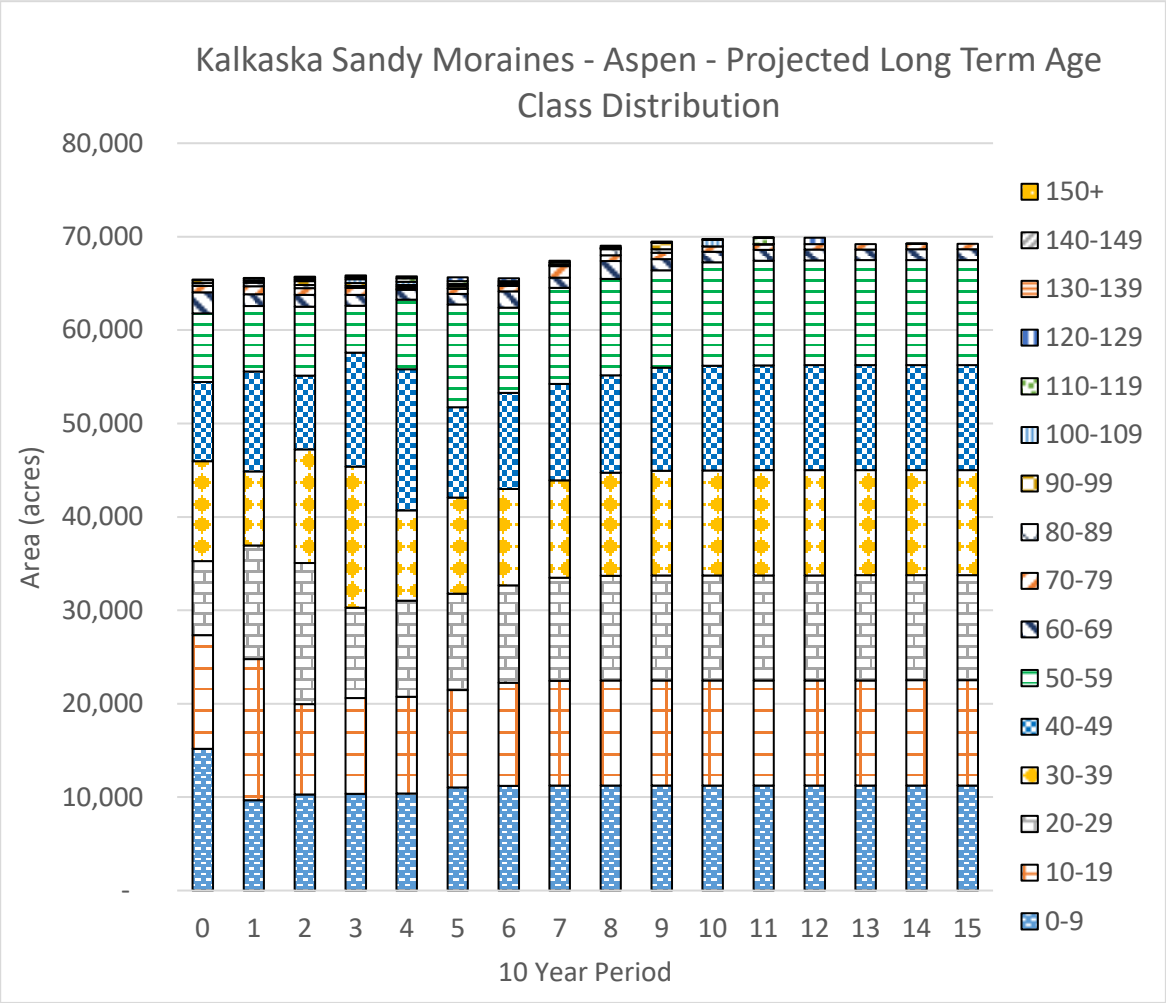


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 8,389 acres of projected clearcut harvest in the aspen cover type and an additional 154 acres that will be converted to aspen from other cover types. This falls slightly short of the desired establishment of 10,231 acres per decade because of the current unbalanced condition in the 50-59 age class.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between the stand age of 80 and 99 years old in the Kalkaska Sandy Moraines Management Area (Figure 8). The past management regime has been primarily single tree selection which allows for stand ages to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands.

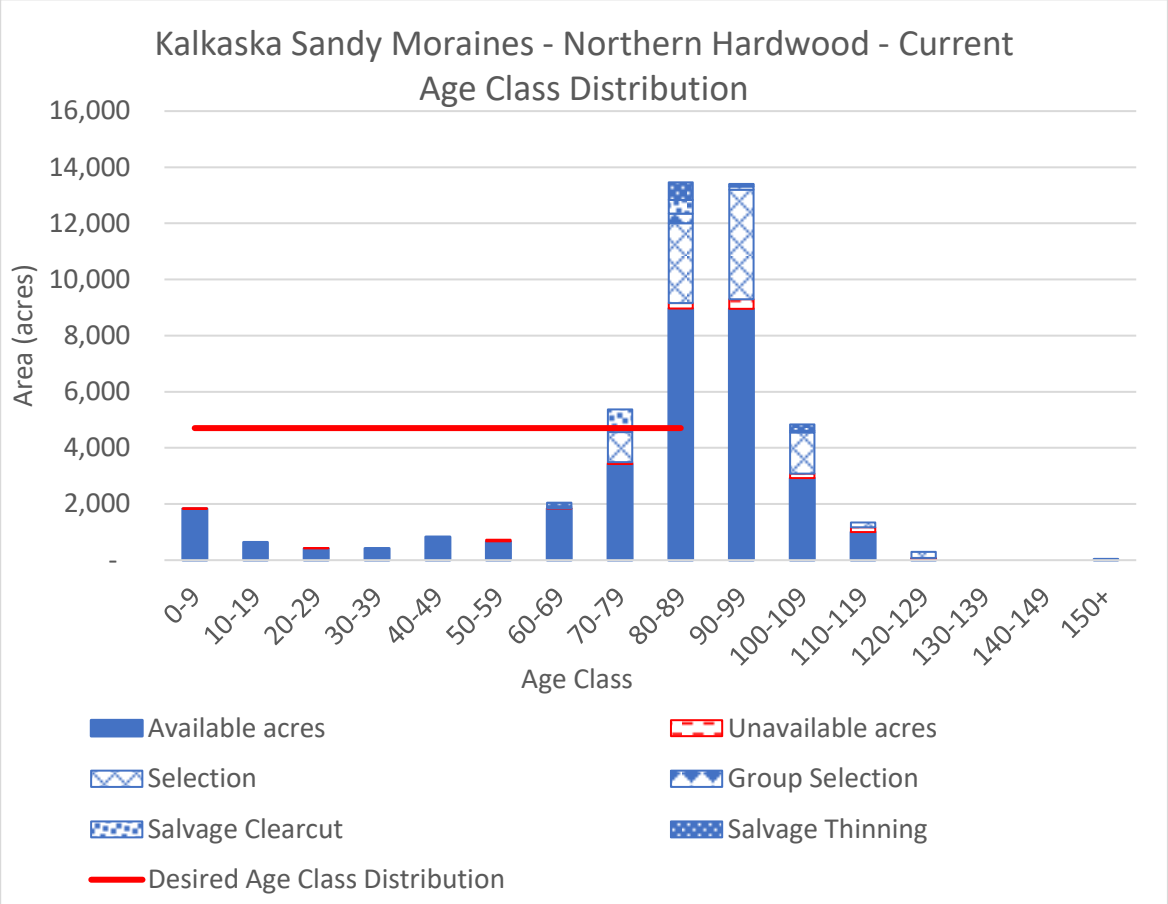


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Kalkaska Sandy Moraines Management Area (Figure 9). Current conditions are a result of a well-regulated selection harvest regime that has been in place in this management area for decades.

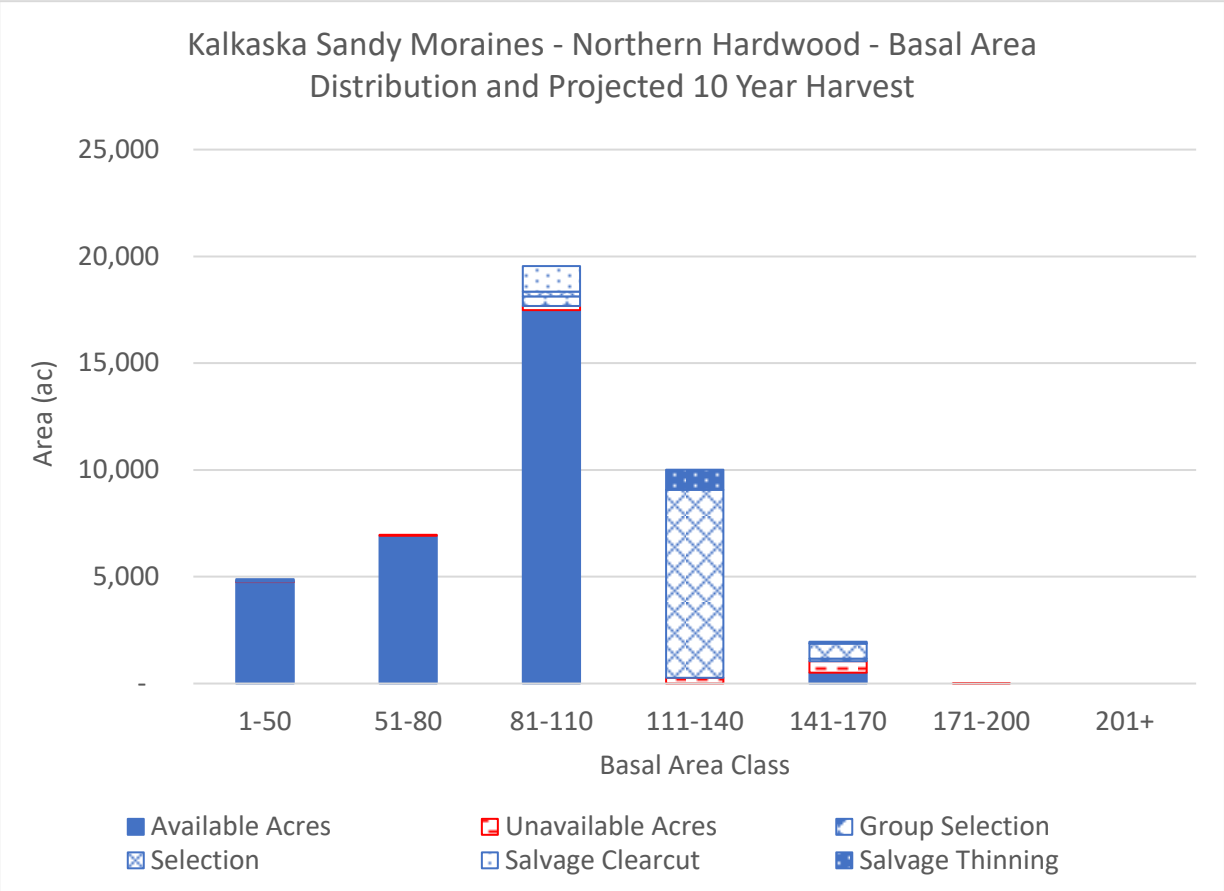


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are very few acres of unavailable northern hardwoods in the Kalkaska Sandy Moraines Management Area. Opportunities to utilize a proportion of a stand to include in gaps will vary based on the age and condition of a stand, but the guidance for a typical log-sized hardwood stand will be 10-20% of the area, with the remaining 80-90% subject to thinning or no harvesting. Small group selection is the primary silvicultural treatment projected during this 10-year planning period. A portion of this cover type meets the habitat requirements for blackburnian warbler, black-throated blue warbler, marten and wood thrush (Table 10).

Table 10. Featured species with northern hardwoods as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Blackburnian Warbler	Age Category: 80+ Size Category: Pole, Sawlog Basal Area: 81+	25,010	839
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	25,010	839
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	30,524	984
Wood Thrush	Age Category: 40+ Size Category: Sawlog Basal Area: 81+	30,524	984

Desired future condition

The projected long-term cover type trend for northern hardwood is stable in the Kalkaska Sandy Moraines management area with only a 0.6% increase in acres (Figure 10). The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal-area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal-area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes.

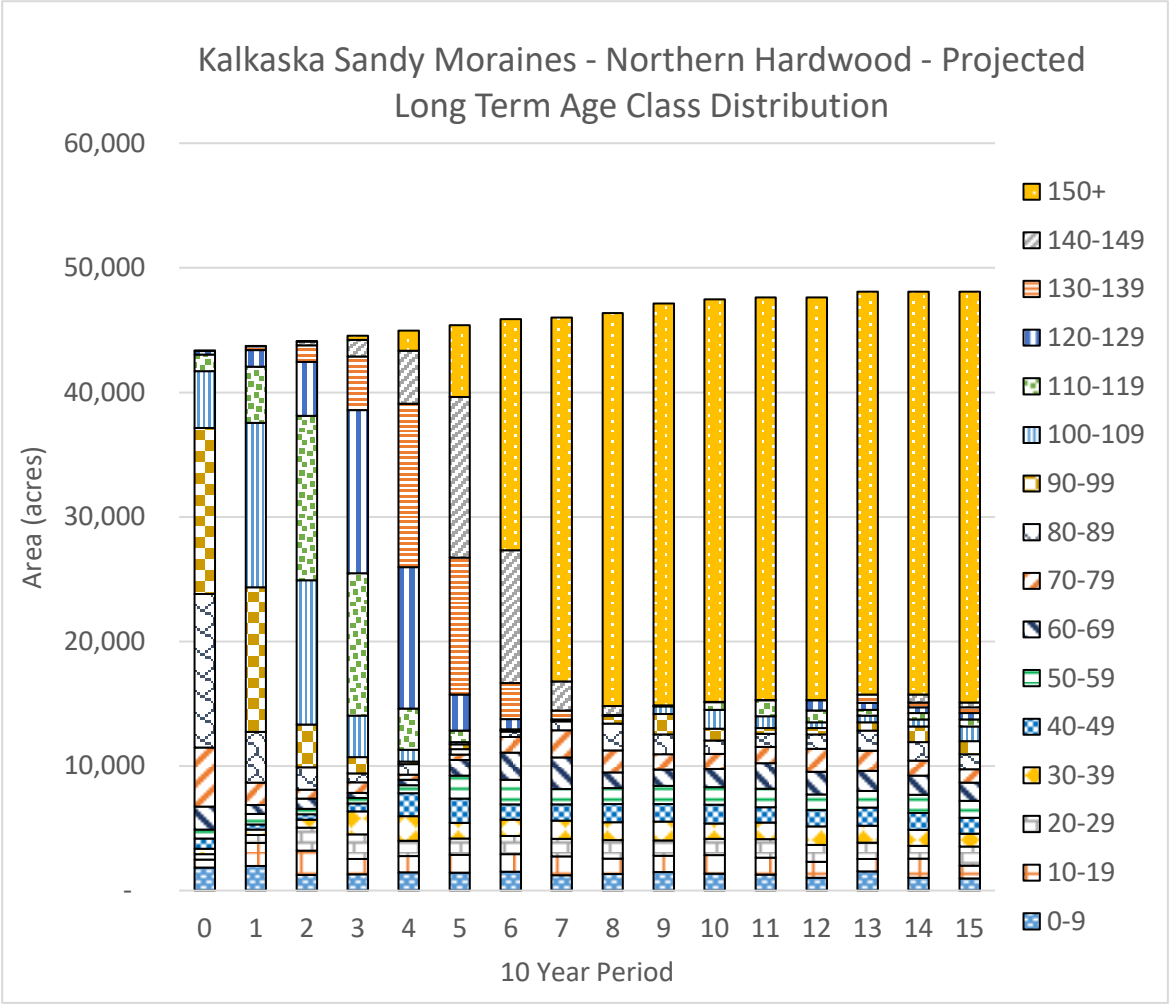


Figure 10. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 9,712 acres, group selection on 624 acres, 1,310 acres of salvage clearcut, and 1,013 acres of salvage thinning. Canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Planted red pine

Current condition

The largest amount of the red pine cover type is currently between a stand age of 0 and 9 years old and 60- to 69-year-old age class in the Kalkaska Sandy Moraines Management Area (Figure 11). Due to much of the pine being past the desired age class distribution of 80 years old much of it was restarted and replanted causing a major spike in the 0-9 age class.

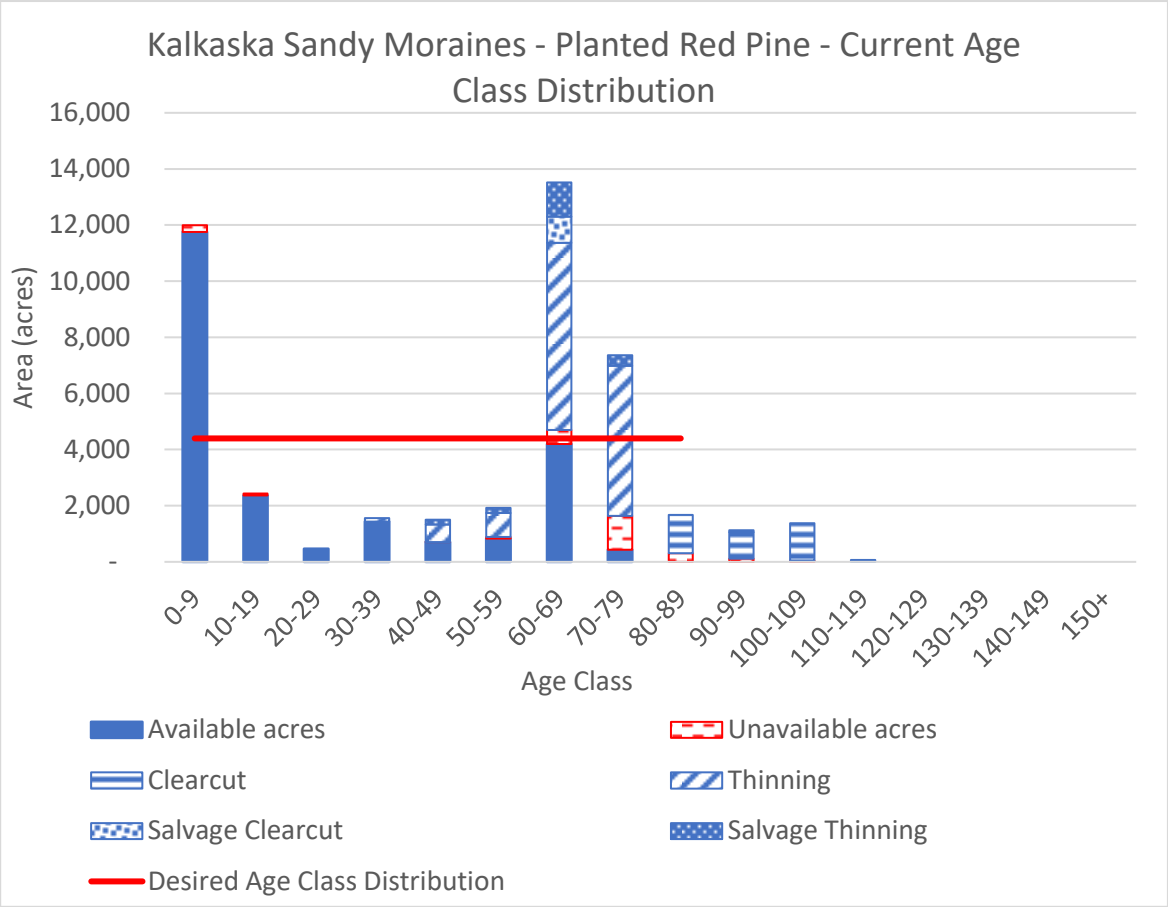


Figure 11. Current age class distribution and projected harvests in the planted red pine cover type.

Current conditions are a result of plantations established during the 1930s and 1940s by the Civilian Conservation Corps, most of which reached maturity during the previous two planning periods. There have been consistent commercial harvests and regeneration efforts on available planted red pine acres during the previous planning periods.

Desired future condition

The projected long-term cover type trend for red pine is stable in the Kalkaska Sandy Moraines Management Area. There are a few transitions out of this cover type into other cover types forecasted in this management area decreasing by 0.9%.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available planted red pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of diseases and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of 4,261 acres of regeneration in the upcoming 0-9 age class given the amount of merchantable and available acres in the older age classes (Figure 12). This is slightly below the desired distribution of 4,356 acres. Progress toward the long-term age class distribution of planted red pine will take many decades in the management area.

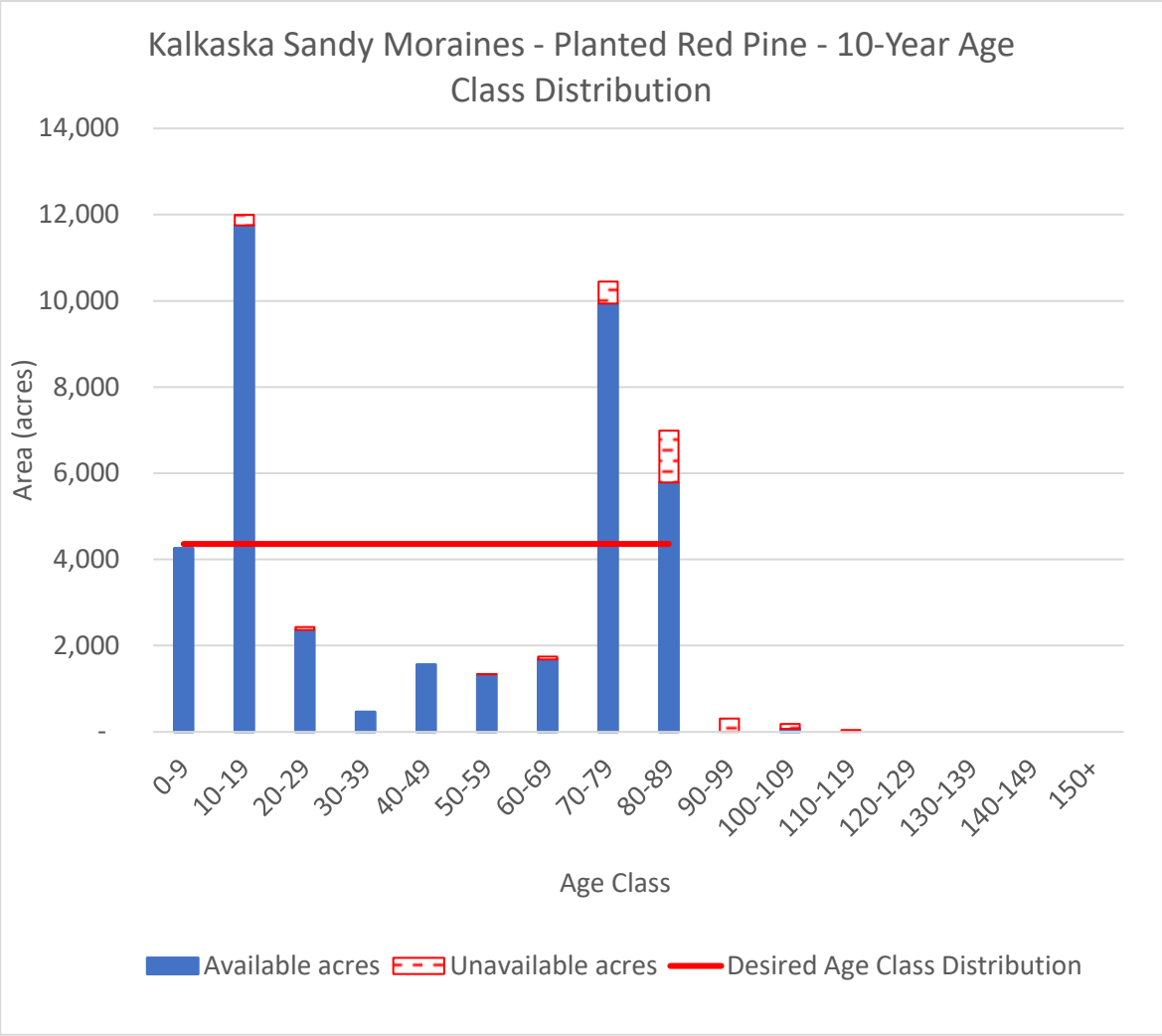


Figure 12. Short-term future age class distribution of the red pine cover type as well as the projected harvests from each age class.

The mid-term age class distribution of planted red pine is beginning to reach the desired future condition for available acres (Figure 13). There is an increase in acres in the older age classes, beyond the desired age of 80 years old, due to the number of unavailable acres in this management area. As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

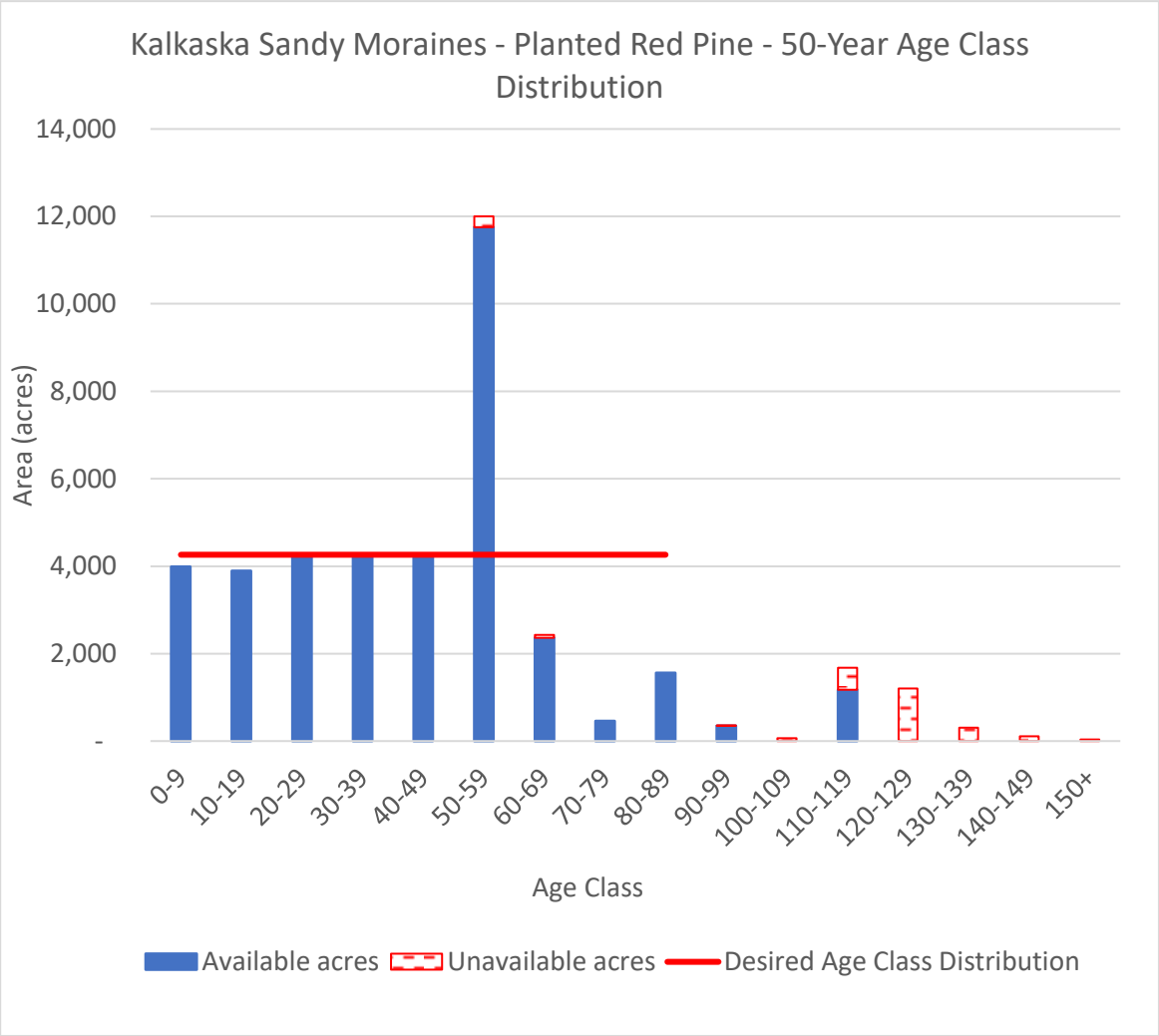


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 15).

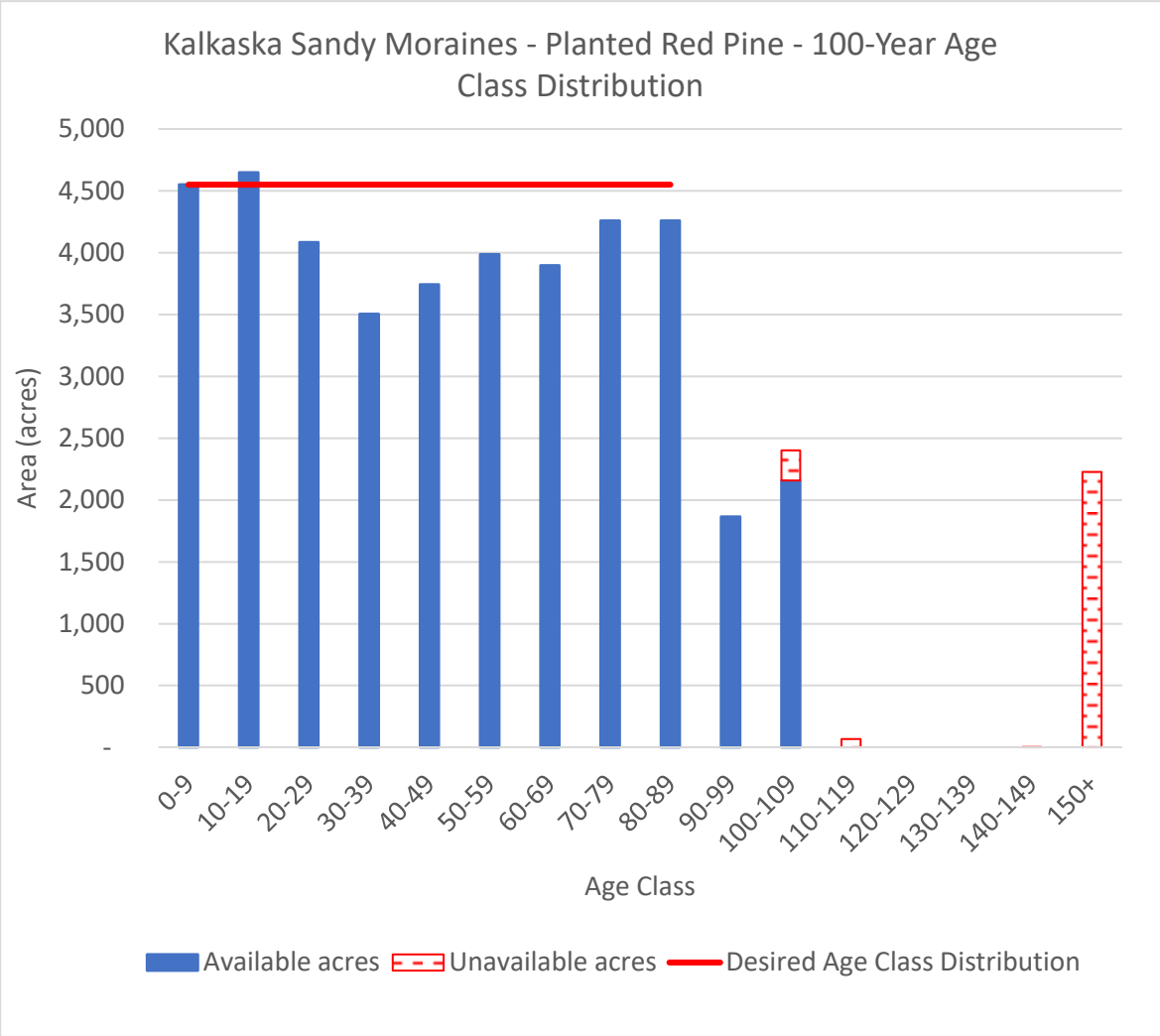


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

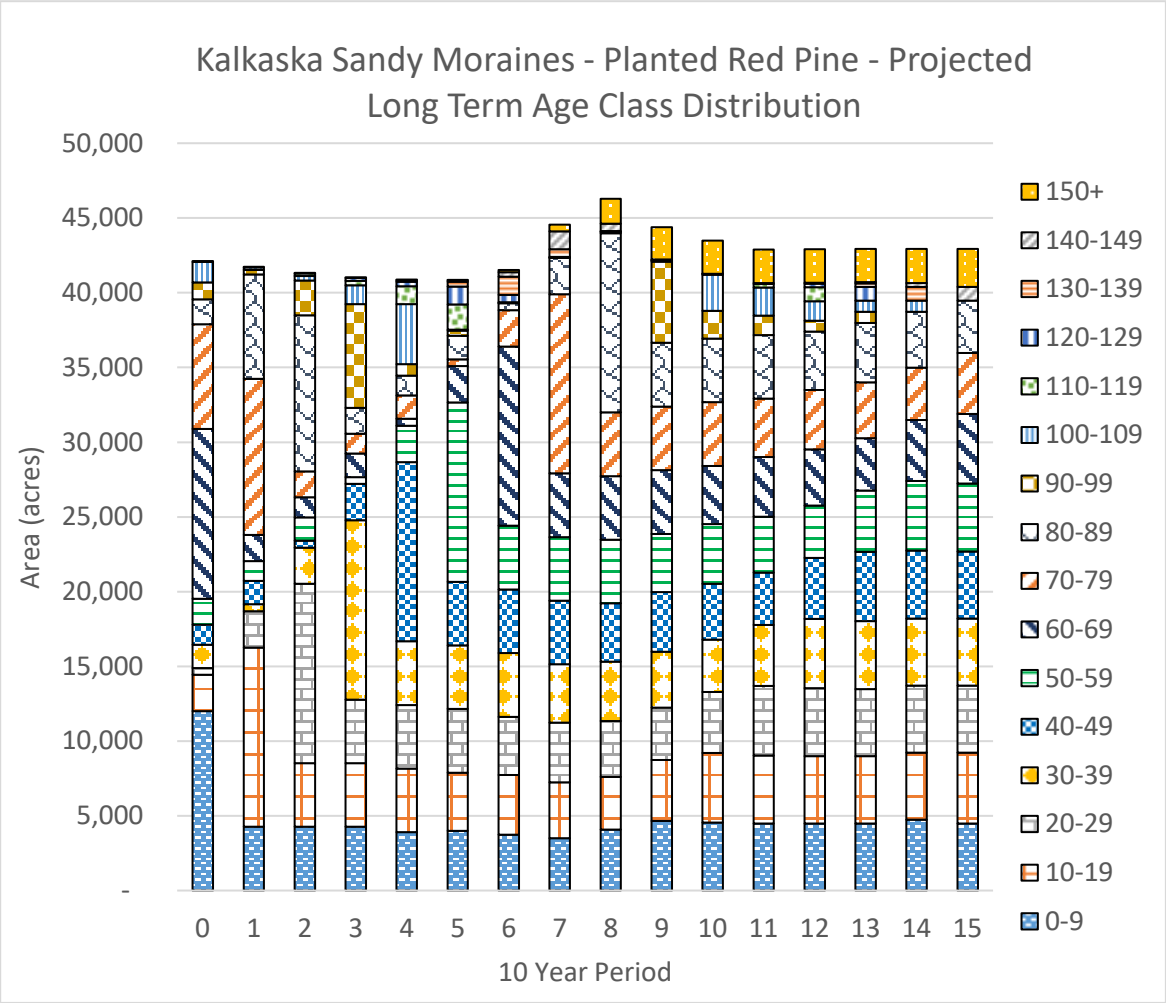


Figure 15. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

There are 3,724 acres of projected clearcut harvest in the planted red pine cover type during this planning period. This is below the desired establishment of 4,356 acres per decade because of the current unbalanced condition. In addition to clearcut acres, there are 13,697 acres project for thinning in this cover type with additional 1,940 acres of salvage thinning and 926 acres of salvage clearcut.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 11; see Biodiversity in Section 3 for more information).

Table 11. High conservation value areas within the Kalkaska Sandy Moraines Management Area.

High Conservation Value Area Type and Name	Acres
Dedicated Management Areas	**4,011**

High Conservation Value Area Type and Name	Acres
-	4,011
Eastern Massasauga Managed Land	**2,102**
-	2,102
Forest Habitat Core Interior	**4,951**
-	4,951
GEM	**4,183**
Little Betsie	4,183
Kirtland's Warbler Habitat	**24**
Manistee	24
Natural Rivers Vegetative Buffer	**3,254**
-	3,254
Natural Rivers Zoning District	**10,387**
-	10,387
State Wildlife Management Areas	**2,289**
Goose Creek Flooding SWMA	45
Headquarters Lake Flooding SWMA	293
Skegemog Lake SWA Unit of Pere Marquette	1,951
Verified Type 1 and Type 2 Old Growth	**14**
Type 2 Old Growth	14
GEMS	**2,697**
Little Betsie	2,697
Grand Total	**33,911**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVAs and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 12. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 13. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Dry-mesic Northern Forest	BC	G4	S3	1
Existing ERA	Northern Fen	AB	G3	S3	2
Existing ERA	Northern Fen	BC	G3	S3	2
Existing ERA	Northern Wet Meadow	B	G4G5	S4	1
Existing ERA	Oak-Pine Barrens	B	G3	S2	1
Existing ERA	Pine Barrens	BC	G3	S2	1
Existing ERA	Pine Barrens	C	G3	S2	2
Existing ERA	Rich Conifer Swamp	B	-	S3	1
Existing ERA	Rich Conifer Swamp	BC	G4	S3	2
Existing ERA	Rich Conifer Swamp	C	-	S3	1
Existing ERA	Rich Conifer Swamp	C	G4	S3	1
Proposed ERA	Pine Barrens	C	G3	S2	1
Grand Total	-	-	-	-	**16**

Special Conservation Areas

Reviewable special conservation areas (SCAs; Table 14) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 15) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 14. Reviewable special conservation areas within the Kalkaska Sandy Moraines Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**111**
(Closed) Chase Creek SFCG	12
131 Miss Kal Trail Head	4
Campground	4
Chippewa Landing Canoe Livery	33
Guernsey Lake Campground	27
Old US-131 Campground	19
Shooting Range	6
Unspecified	6
Yellowtrees Access Site	1
Cultural or Customary Area	**-**
--	-
Habitat Area or Habitat Corridor	**1,835**
61054126	187
113 corridor red pine SCA	12

Reviewable Special Conservation Area Type and Name	Acres
Fletcher Creek Corridor	14
Flowing well hemlock	57
Flowing well swamp	35
Highbanks Rollaways	233
Hopkins Creek	575
Old red & white pine	20
Rennie Lake Barrens	132
Sigma swamp	291
South Branch Barrens	265
Unspecified	14
Mineral Resource Area	**43**
Crawford County Road Commission	21
Kalkaska County Road Commission	22
Possible Type 1 or Type 2 Old Growth	**45**
--	45
Visual Management Areas	**-**
--	-
Grand Total	**2,034**

Table 15. Static special conservation areas in the Kalkaska Sandy Moraines Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**63**
Northern Shrub Thicket	-	24
Northern Wet Meadow	-	39
Designated Trout and Cold Water Stream Buffer	**-**	**7,274**
<Null>	-	2,049
Acme Creek	-	26
Adams Creek	-	28
Anderson Creek	-	72
Apple Creek	-	52
Au Sable River	-	51
Barker Creek	-	11
Battle Creek	-	30
Bissell Creek	-	14
Black Creek	-	5
Blind Creek	-	38
Boardman River	-	77
Bourne Creek	-	18
Bradford Creek	-	42
Buttermilk Creek	-	55

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**63**
Carpenter Creek	-	102
Chase Creek	-	32
Cole Creek	-	12
Collar Creek	-	79
Crofton Creek	-	49
Desmond Creek	-	26
Dutchman Creek	-	69
East Arm Acme Creek	-	27
East Branch Wheeler Creek	-	46
East Creek	-	4
Failing Creek	-	30
Fife Lake Outlet	-	149
Filer Creek	-	75
Fletcher Creek	-	9
Frenchman Creek	-	33
Golden Creek	-	19
Goose Creek	-	92
Ham Creek	-	109
Hauenstein Creek	-	14
Hopkins Creek	-	94
Kolke Creek	-	132
Little Betsie River	-	95
Little Rapid River	-	21
Manistee River	-	1,813
Manton Creek	-	39
Maple Creek	-	16
Morrison Creek	-	65
Morrisy Creek	-	54
Nelson Creek	-	7
North Branch Boardman River	-	280
North Branch Manistee River	-	323
Parker Creek	-	44
Pierson Creek	-	2
Rapid River	-	143
Shannon Creek	-	1
Silver Creek	-	46
Soper Creek	-	62
South Branch Boardman River	-	105
Spring Creek	-	19
Taylor Creek	-	118

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**63**
Twentytwo Creek	-	85
Walton Outlet	-	41
Waterhole Creek	-	14
West Branch Anderson Creek	-	54
Wheeler Creek	-	61
Designated Trout and Coldwater Streams	**272.5**	**-**
<Null>	76.9	-
Acme Creek	0.9	-
Adams Creek	1.0	-
Anderson Creek	2.7	-
Apple Creek	1.9	-
Au Sable River	1.9	-
Barker Creek	0.4	-
Battle Creek	1.1	-
Bissell Creek	0.5	-
Black Creek	0.2	-
Blind Creek	1.4	-
Boardman River	2.9	-
Bourne Creek	0.7	-
Bradford Creek	1.6	-
Buttermilk Creek	2.1	-
Carpenter Creek	3.7	-
Chase Creek	1.2	-
Cole Creek	0.5	-
Collar Creek	2.9	-
Crofton Creek	1.8	-
Desmond Creek	0.9	-
Dutchman Creek	2.5	-
East Arm Acme Creek	1.0	-
East Branch Wheeler Creek	1.7	-
East Creek	0.2	-
Failing Creek	1.1	-
Fife Lake Outlet	5.6	-
Filer Creek	2.9	-
Fletcher Creek	0.4	-
Frenchman Creek	1.3	-
Golden Creek	0.7	-
Goose Creek	3.4	-
Ham Creek	4.1	-
Hauenstein Creek	0.5	-

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**63**
Hopkins Creek	3.4	-
Kolke Creek	4.8	-
Little Betsie River	3.6	-
Little Rapid River	0.7	-
Manistee River	68.2	-
Manton Creek	1.5	-
Maple Creek	0.6	-
Morrison Creek	2.5	-
Morrisy Creek	2.0	-
Nelson Creek	0.3	-
North Branch Boardman River	10.4	-
North Branch Manistee River	12.8	-
Parker Creek	1.7	-
Pierson Creek	0.1	-
Rapid River	5.1	-
Silver Creek	1.8	-
Soper Creek	2.2	-
South Branch Boardman River	3.9	-
Spring Creek	0.7	-
Taylor Creek	4.4	-
Twentytwo Creek	3.1	-
Walton Outlet	1.7	-
Waterhole Creek	0.5	-
West Branch Anderson Creek	2.0	-
Wheeler Creek	2.2	-
Important Bird Areas	**-**	**16,321**
Grand Traverse Bay basin (Albert Ecoregion Vii.5.2)	-	9,614
Kirtland's Warbler Management Units & Guide's Rest	-	86
Manistee National Forest Red-shouldered Hawk IBA	-	6,621
Military Lease Land	**-**	**3**
Board Purchases	-	0
Long Term Lease	-	2
Military Research Areas	**-**	**8,713**
Camp Grayling	-	8,713
Wood Turtle Stream 100ft Buffer	**-**	**1,005**
Boardman River	-	16
Manistee River	-	988
Wood Turtle Stream 660ft Buffer	**-**	**5,872**
Boardman River	-	138
Manistee River	-	5,731

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**63**
Rapid River	-	3
Grand Total	**272.5**	**39,251**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 16, Table 17 and Table 18) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 16. Rare animal occurrence in the Kalkaska Sandy Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	-	6
Animal	Acipenser fulvescens	Lake sturgeon	T	-	1
Animal	Appalachina sayanus	Spike-lip crater	SC	-	1
Animal	Atrytonopsis hianna	Dusted skipper	SC	-	3
Animal	Bombus affinis	Rusty-patched bumble bee	E	LE	1
Animal	Bombus borealis	Northern amber bumble bee	SC	-	2
Animal	Bombus terricola	Yellow banded bumble bee	SC	-	5
Animal	Botaurus lentiginosus	American bittern	SC	-	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	-	11
Animal	Clemmys guttata	Spotted turtle	T	-	1
Animal	Coregonus artedi	Lake herring or Cisco	T	-	1
Animal	Eacles imperialis pini	Pine imperial moth	SC	-	1
Animal	Emydoidea blandingii	Blanding's turtle	SC	-	3
Animal	Faxonius immunis	Calico crayfish	SC	-	1
Animal	Gavia immer	Common loon	T	-	18
Animal	Glyptemys insculpta	Wood turtle	T	-	5
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	12
Animal	Hesperia metea	Cobweb skipper	SC	-	1
Animal	Lasmigona compressa	Creek heelsplitter	SC	-	5

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Lithobates palustris	Pickerel frog	SC	-	6
Animal	Mediappendix protracta	A land snail (no common name)	E	-	1
Animal	Melanerpes erythrocephalus	Red-headed woodpecker	SC	-	1
Animal	Microtus pinetorum	Woodland vole	SC	-	1
Animal	Myotis lucifugus	Little brown bat	T	-	3
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC	-	1
Animal	Notropis anogenus	Pugnose shiner	E	-	1
Animal	Opheodrys vernalis	Smooth green snake	SC	-	8
Animal	Pandion haliaetus	Osprey	SC	-	2
Animal	Planogyra asteriscus	Eastern flat-whorl	SC	-	1
Animal	Setophaga kirtlandii	Kirtland's warbler	E	-	2
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	3
Animal	Vermivora chrysoptera	Golden-winged warbler	T	-	1
Grand Total	-	-	-	-	111

Table 17. Rare plant occurrence in the Kalkaska Sandy Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Cirsium hillii	Hill's thistle	SC	-	8
Plant	Panax quinquefolius	Ginseng	T	-	2
Plant	Thalictrum pubescens	Tall meadowrue	SC	-	1
Total	-	**-**	**-**	**-**	**11**

Table 18. Other rare occurrence in the Kalkaska Sandy Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	**-**	Great blue heron rookery	-	-	3
Total	**-**	**-**	**-**	**-**	**3**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 19).

Table 19. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 20. Non-ecological reference area natural communities in the Kalkaska Sandy Moraines Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Poor Conifer Swamp	**BC**	S4	G4	1
Grand Total	**-**	**-**	**-**	**1**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 21) and diseases (Table 22) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 21. Defoliating insects of concern in the Kalkaska Sandy Moraines management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 22. Maladies of concern in the Kalkaska Sandy Moraines management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	-
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. In areas where most mature beech has been lost due to beech bard disease, report surviving mature beech trees that may be resistant to it. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

Approximately 254 miles of streams and rivers are found in the management area (Table 23). Streams/rivers classified as cold types comprise approximately 97% of the riverine mileage.

Table 23. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	131
Cold Small river	35
Cold Transitional Stream	17
Cold Transitional Small River	7
Cold Transitional Large River	58
Warm Transitional Stream	9
Warm Transitional Small River	0
Warm Transitional Large River	<1
Warm Stream	<1
Warm Small River	0
Warm Large River	0

Lacustrine habitat

A total of 59 lakes and ponds of at least 1 surface acre are found in the management area (Table 24).

Table 24. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	52
100-499	5
500+	2

Wetlands

A total of 36,460 acres of wetlands are found in the management area (Table 25). Forested wetlands comprise approximately 91% of wetland types found in the management area.

Table 25. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	2,095
Forested	33,264
Riverine	1,101

Vernal pools and seeps

A total of 1,828 acres of vernal pools and seeps have been inventoried in the management area, and 1,764 acres of seeps have been identified.

Riparian vegetation cover

Aspen, lowland shrub and lowland conifers are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 26).

Table 26. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover type	Acres
Aspen	4,938
Lowland Shrub	3,812
Lowland Conifers	3,479
Lowland Deciduous	1,982
Planted Red Pine	1,512
Marsh	1,448
Lowland Mixed Forest	1,442
Cedar	1,367
Northern Hardwood	1,282
Upland Mixed Forest	1,101

Watershed vegetation cover

The management area includes portions of watersheds of the Manistee and Boardman rivers (Table 27 & Table 28). Aspen and pines (i.e., mixed, red) are major cover types of the state forest in each watershed.

Table 27. Largest vegetative cover types (i.e., top five) and area of the Manistee River watershed located within the management area.

Cover Type	Acres
Aspen	41,738
Northern Hardwood	26,684
Planted Red Pine	23,999
Lowland Conifers	7,333
Lowland Shrub	5,519

Table 28. Largest vegetative cover types (i.e., top five) and area of the Boardman River watershed located within the management area.

Cover Type	Acres
Aspen	5,777
Natural Mixed Pines	5,303
Planted Red Pine	4,426
Upland Mixed Forest	3,724
Upland Mixed Deciduous	3,717

Recreation

Access for public recreation and management in the Kalkaska Sandy Moraines Management Area is generally very good with a well-developed road/trail system. This area, between Traverse City, Cadillac and Gaylord, is especially heavily used by residents and visitors due to an abundance of outdoor recreation opportunities.

Numerous off-road vehicle trails, from single track motorcycle trails to full-size ORV trails, traverse the area, including the Grand Traverse Motorcycle Trail, Kalkaska Trail and Route and North Missaukee Route and MCCCT. Being in Michigan's "snowbelt" contributes to the popularity of snowmobiling in the area on the many miles of trails.

Nonmotorized recreation opportunities include over 50 miles of the Shore-to-Shore equestrian trail, which is supported by several trail camps. The North Country National Scenic Trail/Iron Belle Trail also crosses through this management area. The Vasa trail system, maintained under a partnership with TART Trails, offers opportunities for cross-country skiing, hiking and mountain biking close to Traverse City. The Sand Lakes Quiet Area is managed specifically for quiet recreation, with nearly 8 miles of hiking and biking trails. Other nonmotorized trails in the management area include Pine Baron pathway (6.4 miles), Muncie Lakes Pathway (6.4 miles), and the Kalkaska mountain bike trail.

Wetzel Lake day use area is jointly operated by Mancelona Township and Antrim County under a lease agreement with the DNR, providing opportunities for swimming and nonmotorized boating.

There are 13 state forest campgrounds in the Kalkaska Sandy Moraines Management Area, including three equestrian trail camps along the Shore-to-Shore trail and four accessible to ORV use.

Table 29. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types)	313.4
	Snowmobile	172.3
Nonmotorized Recreation Trails	Hiking	188.7
	Equestrian	67.8
	Biking	6.5
	Hunter Access Trails	4.3
Total	-	**800.8**

Note: Trail-use types may overlap.

Table 30. State forest campgrounds.

Name	# of sites	Equestrian	ORV Access
Arbutus Lake State Forest Campground	25	-	-
Baxter Bridge State Forest Campground	25	-	-
Forks State Forest Campground	9	-	-
Guernsey Lake State Forest Campground	35	-	-
Hopkins Creek Equestrian State Forest Campground and Trail Camp		16 (group)	-
Hopkins Creek State Forest Campground	7	-	X
Lake Marjory State Forest Campground	10	-	-
Old US- 131 State Forest Campground	25	-	X
Pickerel Lake (Kalkaska) State Forest Campground	13	-	X
Rapid River Trail Camp		Group (200)	-
Scheck's Place State Forest Campground	30	-	X
Scheck's Place Trail Camp		Group (200)	-
Spring Lake State Forest Campground	30	-	-

There are three areas managed for hunting in this management area, the largest being Skegemog Lake. The state wildlife management area provides access to a variety of habitats. The Little Betsie Grouse Enhanced Management Site provides great habitat for grouse and woodcock with access via hunter walking trails.

Boating access sites are available on many of the larger lakes in the area and provide multiple access points to the Manistee River, a designated Natural River, providing excellent boating and fishing opportunities.

The Kalkaska Sandy Moraines Management Area is also a popular destination for dispersed activities such as hunting, hiking, mushroom hunting, etc.

Table 31. Areas managed for hunting.

Type	Name	# of Acres
State Wildlife Management Area	Goose Creek Flooding	44.8
	Headquarters Lake Flooding	292.8
	Skegemog Lake	1,949.7
GEMS	Little Betsie	2,694.5
Total	-	**4,981.8**

Table 32. Boating access sites.

Name	Waterbody
Big Bradford Lake	Big Bradford Lake
Bluegill Lake	Bluegill Lake
Horseshoe Lake	Horseshoe Lake
Lake Manuka	Lake Manuka
Arbutus Lake #4	Arbutus Lake #4
Baxter Bridge	Manistee River
Chase Creek	Chase Creek/ Manistee River
Cranberry Lake	Cranberry Lake
Forks SFCG	Boardman River
Guernesey Lake State Forest Campground	Guernesey Lake
Harvey River	Manistee River
Hole in the Wall	Manistee River
Indian Lake	Indian Lake
Lucas Road	Manistee River
Old US-131 State Forest Campground	Manistee River
Pickerel Lake State Forest Campground	Pickerel Lake
Rainbow Jim Bridge	Manistee River
Scheck's Place State Forest Campground	Boardman River
Smithville	Manistee River
Spider Lake	Spider Lake
Spring Lake State Forest Campground	Spring Lake
Starvation Lake	Starvation Lake
Yellow Trees Landing	Manistee River

Lake County Outwash

State Forest Area: 38,506 acres	Location: Lake County	Population Centers: Luther and Baldwin
Subsection: Lake County Outwash	Landforms: Beach ridges and depressions Sand spits Transverse sand dunes and Sand bars	Landcover: Forested: 34,752 acres Nonforested: 3,754 acres

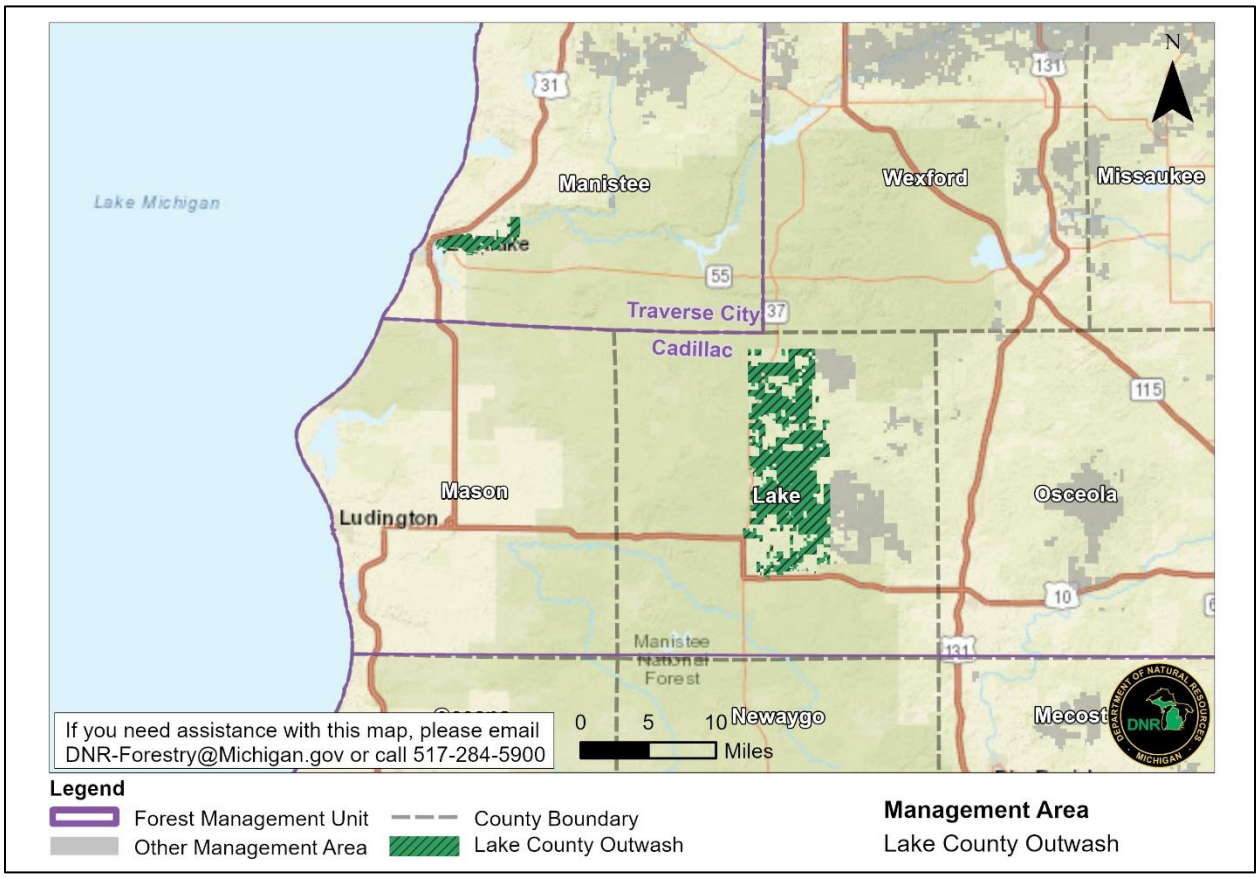


Figure 1. Lake County Outwash Management Area.

Forested landscape

Current and projected future condition

The Lake County Outwash management area includes a variety of shade tolerance levels occurring mostly in the intermediate and older age categories (Figure 2). The majority of tolerant cover types occur on unavailable lowlands in the mature age category. Mid-tolerant cover types mostly occur on available uplands in the intermediate and mid-aged age categories while the majority of the intolerant cover types occur in the intermediate age category on available uplands.

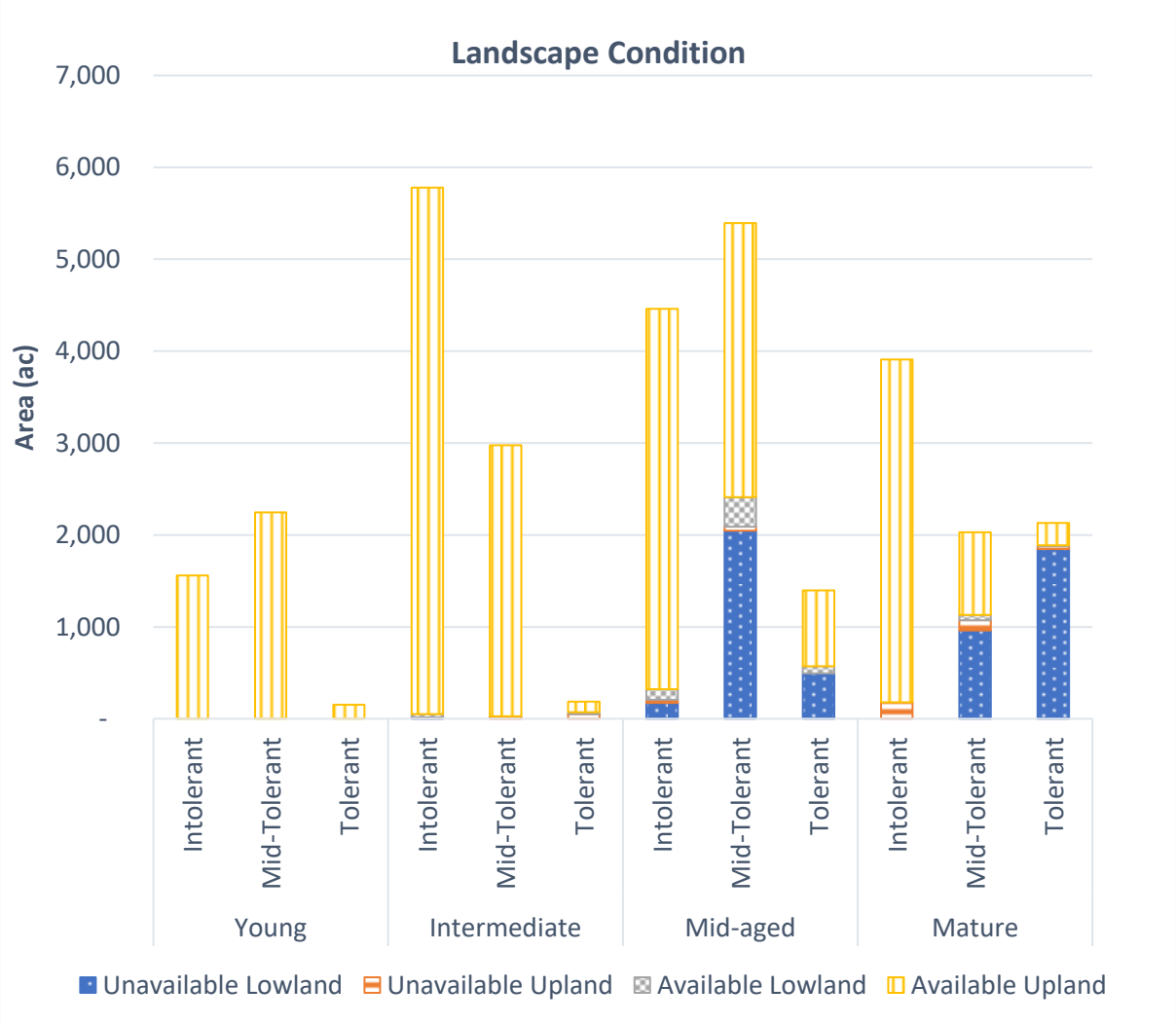


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in aspen and jack pine	1,199
Mature Forest	Acres of 80+ year stands across cover types	8,071
Mature Forest	Acres of 120+ year stands across cover types	591
Mesic Conifer Cover Types	Acres of mesic conifer cover types	3,106
Mesic Conifers in other Cover Types	Average canopy occupancy	27%
Mast – Oak Cover Types	Acres of oak cover types	6,170
Mast Tree Species in Other Cover Types	Acres of total canopy occupancy of mast tree acres (trace-100%)	19,204
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	12,898
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	466
Landscape Forest Matrix	Percent deciduous forest	49%
Landscape Forest Matrix	Percent coniferous forest	40%

The Lake County Outwash Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

The Lake County Outwash Management Area is comprised of 90% forested cover types and 10% nonforested cover types (Table 2). Of the forested cover types, there are 74% in the upland and 7% lowland total landscape positions. The largest contributors to upland cover types are black red hybrid oak, aspen and mixed upland deciduous. Lowland deciduous and lowland conifer take up 13% of the total landscape position. Lowland shrub is the most common nonforested cover type in the management area representing 4% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	3,921	14,105	28,552	34,752
			Northern Hardwood	257			
			Black Red Hybrid Oak	4,564			
			Northern Red Oak	130			
			Oak Mix	2,210			
			Mixed Upland Deciduous	3,022			
		Mixed	Upland Mixed Forest	2,827	2,827		
		Coniferous	Planted Red Pine	1,803	11,621		
			Planted Jack Pine	2,846			
			Planted White Pine	376			
			Planted Mixed Pine	653			
			Natural Red Pine	3			
			Natural Jack Pine	2,836			
			Natural White Pine	615			
			Natural Mixed Pines	2,442			
			Upland Spruce/Fir	2			
			Upland Conifers	33			
			Hemlock	14			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	354	3,040	6,200	
			Lowland Deciduous	2,686			
		Mixed	Lowland Mixed Forest	707	707		
		Coniferous	Cedar	315	2,453		
			Lowland Conifers	2,138			
			Lowland Spruce/Fir	0			
			Tamarack	0			
Nonforested	Upland	N/A	Herbaceous Openland	144	N/A	644	3,754
			Upland Shrub	128			
			Low Density Trees	100			
			Bare/Sparsely Vegetated	8			
			Cropland	194			
			Urban	70			
	Lowland	N/A	Lowland Shrub	1,667	N/A	3,110	
			Marsh	1,046			
			Bog	317			

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
			Treed Bog	13			
			Water	67			
						Grand Total:	38,506

There are 28,736 acres (74.6% of the total management area and 82.7% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Lake County Outwash management area (Table 3). Of that, over 12% is in the black red hybrid oak cover type, 10% in aspen, and 8% in mixed upland deciduous. The remaining 15 cover types represent less than 7% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (

Table 4).

Table 3. Current cover type composition by management availability.

Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Black Red Hybrid Oak	4,456	12.8%	109	0.3%	4,564	13.1%
Aspen	3,881	11.2%	40	0.1%	3,921	11.3%
Mixed Upland Deciduous	2,932	8.4%	91	0.3%	3,022	8.7%
Planted Jack Pine	2,845	8.2%	1	0.0%	2,846	8.2%
Natural Jack Pine	2,836	8.2%	0	0.0%	2,836	8.2%
Upland Mixed Forest	2,788	8.0%	39	0.1%	2,827	8.1%
Lowland Deciduous	210	0.6%	2,475	7.1%	2,686	7.7%
Natural Mixed Pines	2,391	6.9%	50	0.1%	2,442	7.0%
Oak Mix	2,138	6.2%	73	0.2%	2,210	6.4%
Lowland Conifers	110	0.3%	2,028	5.8%	2,138	6.2%
Planted Red Pine	1,803	5.2%	0	0.0%	1,803	5.2%
Lowland Mixed Forest	175	0.5%	532	1.5%	707	2.0%
Planted Mixed Pine	649	1.9%	4	0.0%	653	1.9%
Natural White Pine	587	1.7%	29	0.1%	615	1.8%
Planted White Pine	376	1.1%	0	0.0%	376	1.1%
Lowland Aspen Balsam Popl	177	0.5%	177	0.5%	354	1.0%
Cedar	0	0.0%	315	0.9%	315	0.9%
Northern Hardwood	203	0.6%	53	0.2%	257	0.7%
Northern Red Oak	130	0.4%	0	0.0%	130	0.4%
Upland Conifers	33	0.1%	0	0.0%	33	0.1%
Hemlock	14	0.0%	0	0.0%	14	0.0%
Natural Red Pine	3	0.0%	0	0.0%	3	0.0%
Upland Spruce Fir	2	0.0%	0	0.0%	2	0.0%
Grand Total	**28,736**	**82.7%**	**6,016**	**17.3%**	**34,752**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason Area is Unavailable for Commercial Harvest)	Area (ac)	% of Unavailable Area
Too Wet	5,337	88.7%
Best Management Practices	341	5.7%
Blocked by Obstacle	132	2.2%
Recreation/Scenic	92	1.5%
Cannot Regenerate	36	0.6%
Other Influence Zones	33	0.6%
Too Steep	22	0.4%
Long-Term Retention	19	0.3%
Denied Access	3	0.1%
Total Unavailable	**6,016**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Lake County Outwash Management Area has a unique age class and basal-area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period like black red hybrid oak or help to achieve desired basal area distribution among uneven-aged cover types. Implementing these silvicultural regimes will yield 76,920 cords, the planned harvest volume for the decade (**Error! Reference source not found.**).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Cover type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Grand Total
Black Red Hybrid Oak	948	-	122	-	42	1,112
Aspen	673	-	-	-	-	673
Oak Mix	362	-	124	-	-	486
Planted Jack Pine	441	-	-	-	-	441
Planted Red Pine	-	-	355	-	-	355
Natural Jack Pine	316	-	-	-	-	316
Mixed Upland Deciduous	179	-	-	-	67	246
Planted White Pine	29	-	120	-	-	149
Upland Mixed Forest	141	-	-	-	-	141
Natural White Pine	-	-	50	-	41	92
Lowland Conifers	34	-	-	-	-	34
Lowland Aspen/Balsam Poplar	28	-	-	-	-	28
Upland Conifers	27	-	-	-	-	27
Lowland Deciduous	15	7	-	-	-	21
Hemlock	-	14	-	-	-	14
Natural Mixed Pines	-	-	6	-	-	6
Totals	**3,193**	**20**	**776**	**-**	**151**	**4,139**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection **Lake County Outwash Management Area** **Product**	**Species**	**Volume Planned***	**Volume Prepared** ***
Pulpwood (cords)	Jack Pine	17,179	16,148
	Mixed Aspen	6,594	6,199
	Mixed Hardwood	5,580	5,245
	Mixed Oak	5,446	5,119
	Red Pine	3,070	2,886
	White Pine	1,857	1,746
	Mixed Spruce	1,283	1,206
	Mixed Softwood	849	798
	Pulpwood Total	**41,858**	**39,347**
	Mixed Oak	3,461	3,253
	White Oak	3,041	2,858
	Red Pine	2,803	2,635
	Red Oak	2,430	2,284
	Red Maple	1,884	1,771

Sawtimber (MBF)	White Pine	1,698	1,596
	Mixed Aspen	1,417	1,332
	Sugar Maple	81	76
	Basswood	15	14
	Sawtimber Total	**16,830**	**15,820**
	Total Sawtimber Harvest Volume in Cords	**35,062**	**32,958**
	Grand Total Harvest Volume in Cords	**76,920**	**72,305**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are a few cover type transitions projected for the Lake County Outwash management area (Table 7). The managed area of the jack pine cover type is projected to change to more natural jack pine instead of planted jack pine. The oak cover types will be transitioning into other oak types or mixed upland deciduous. The largest decrease forecasted is in the planted jack pine cover type where 454 acres will convert to other cover types such as natural jack pine through forest management and regeneration activities. The largest increase occurs on the natural jack pine forest type where 422 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Black Red Hybrid Oak	4,564	4,263	-302
Aspen	3,921	3,983	62
Mixed Upland Deciduous	3,022	3,282	260
Planted Jack Pine	2,846	2,392	-454
Natural Jack Pine	2,836	3,258	422
Upland Mixed Forest	2,827	2,954	128
Lowland Deciduous	2,686	2,686	0
Natural Mixed Pines	2,442	2,483	42
Oak Mix	2,210	2,018	-193
Lowland Conifers	2,138	2,122	-16
Planted Red Pine	1,803	1,868	65
Lowland Mixed Forest	707	724	16

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Planted Mixed Pine	653	653	0
Natural White Pine	615	633	18
Planted White Pine	376	347	-29
Lowland Aspen/Balsam Poplar	354	353	0
Cedar	315	315	0
Northern Hardwood	257	257	1
Northern Red Oak	130	124	-6
Upland Conifers	33	20	-13
Hemlock	14	14	0
Natural Red Pine	3	3	0
Upland Spruce/Fir	2	2	0
Lowland Shrub	1,667	1,667	0
Marsh	1,046	1,046	0
Bog	317	317	0
Cropland	194	194	0
Herbaceous Openland	144	144	0
Upland Shrub	128	128	0
Low Density Trees	100	100	0
Urban	70	70	0
Water	67	67	0
Treed Bog	13	13	0
Bare/Sparsely Vegetated	8	8	0
Total:	**38,506**	**38,506**	**0**

Featured species current and projected habitat acres

There are seven featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model, black bear, wild turkey and black-backed woodpecker, but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	937	1,404	1,622	1,843
Black Bear	Mast	25,374	--	--	--
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	6,183	6,462	8,355	9,710
Ruffed Grouse	Aspen	756	1,171	1,536	1,731
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	3,288	3,978	4,326	4,404
Wild Turkey	Nonforested openings	338	--	--	--
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Black red hybrid oak

Current condition

Most of the black red hybrid oak cover type is currently between stand ages of 100 and 109 years old in the Lake County Outwash Management Area (Figure 3). The age class distribution is currently unbalanced. In the 0- to 79-year-old age classes where the deficits in acres occur, which will lead to a deficit in the future planning periods. Most of the acres extend beyond the desired maximum age class distribution of 80 years old.

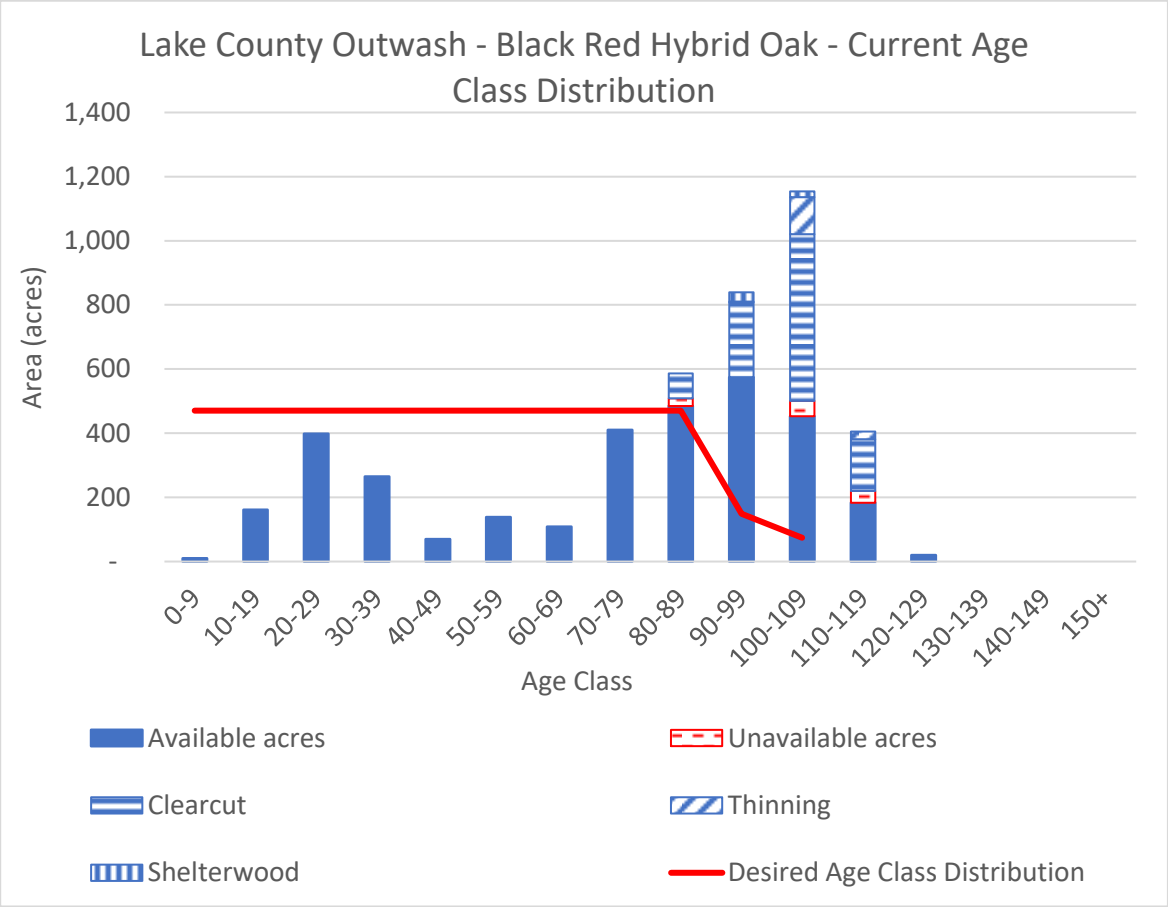


Figure 3. Current age class distribution and projected harvests in black red hybrid oak cover type.

Current conditions are a result of thinning working toward better quality stands. With that, it has now approached a time where there is a lack of regenerating black red hybrid oak in the Lake County Outwash Management Area. A portion of this cover type meets the habitat requirements for golden-winged warbler and marten (Table 9).

Table 9. Featured species with black-red hybrid oak as a selected habitat cover type, habitat variables, and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Black-red Hybrid Oak	Black-red Hybrid Oak Habitat Acres - Available	Black-red Hybrid Oak Habitat Acres - Unavailable
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	1,694	87

Desired future condition

The projected long-term cover type trend for black/red hybrid oak is projected to be decreasing by 6.6% in the Lake County Outwash Management Area. Some of the black/red hybrid oak in the area is transitioning into other cover types such as mixed upland deciduous.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old with a tail out to 100 for all available black/red hybrid oak stands in this management area. Maintaining a younger age class helps to keep a more vigorous stand.

The end of the planning period will result in the establishment of 682 acres which is more than desirable number of acres in the 0-9 age class (Figure 4). This is due to the number of acres already beyond the tail of 100 years old. Progress toward the long-term desired age class distribution of black/red hybrid oak will take many decades of even-aged management in this management area.

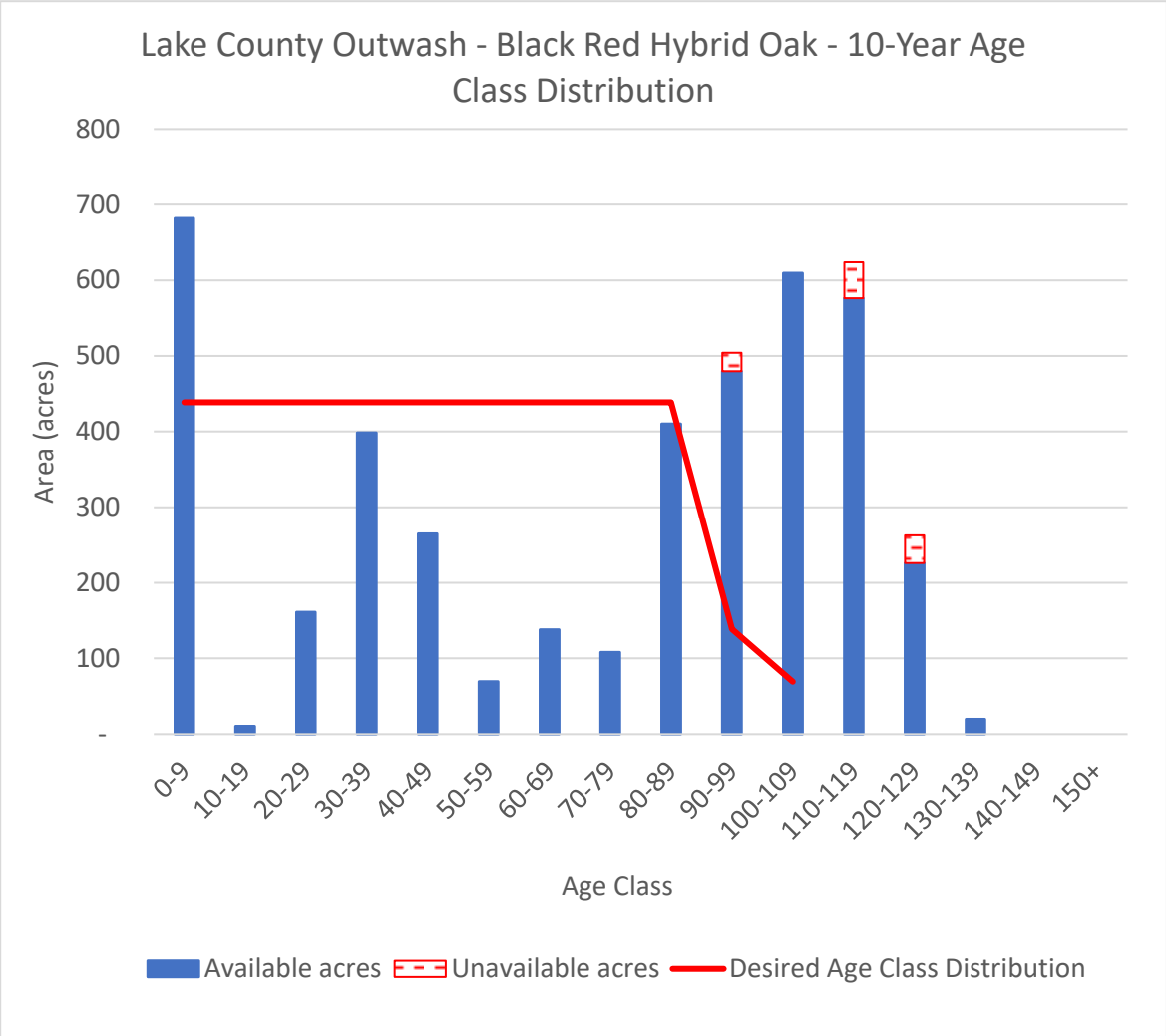


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of black red hybrid oak is beginning to reach the desired future condition for available acres (Figure 5). There is an increase in acres in the older age classes, beyond the desired age of 80 years old, due to the high number of available acres in this management area already in the older age classes. As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

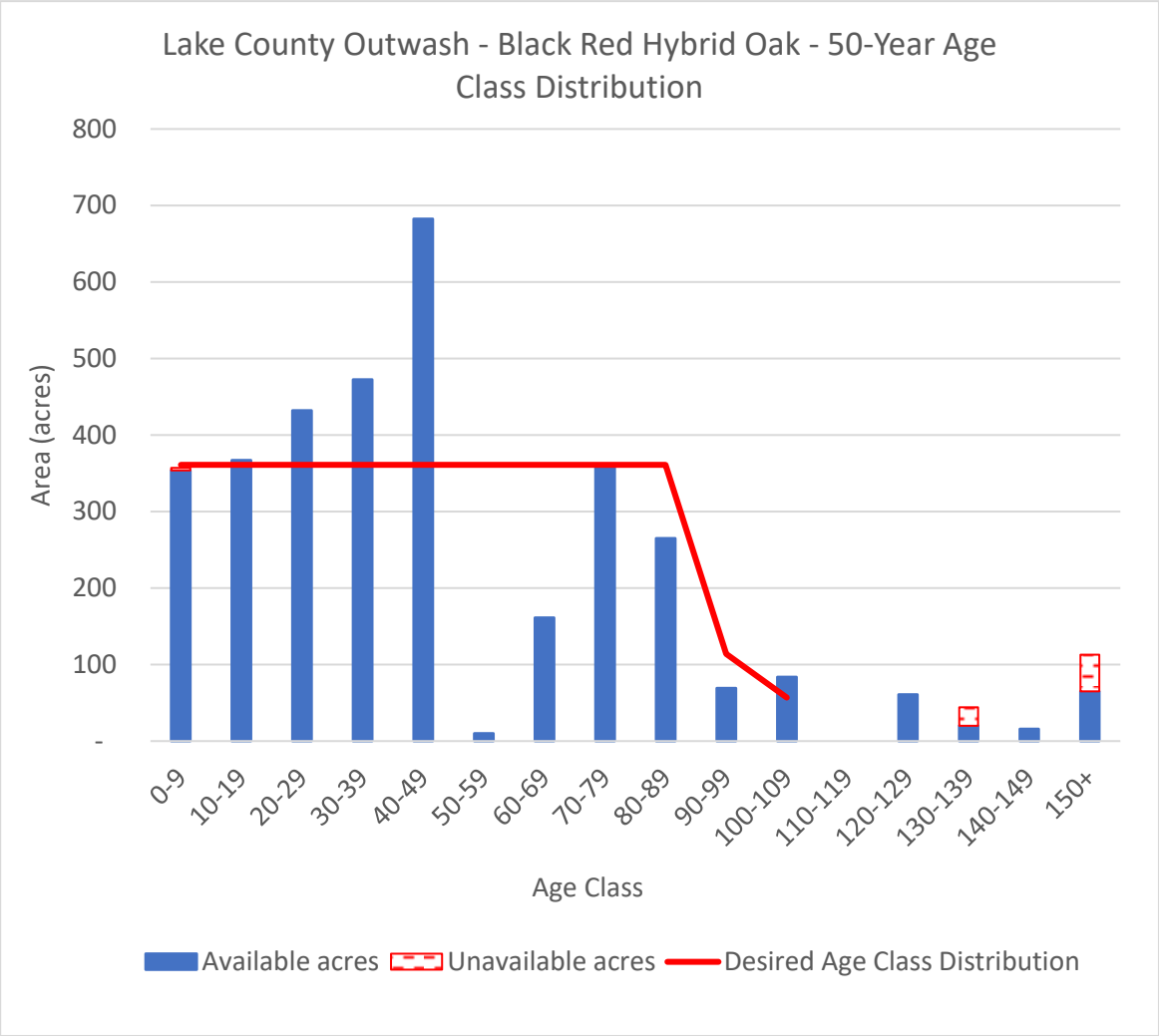


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of black red hybrid oak in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

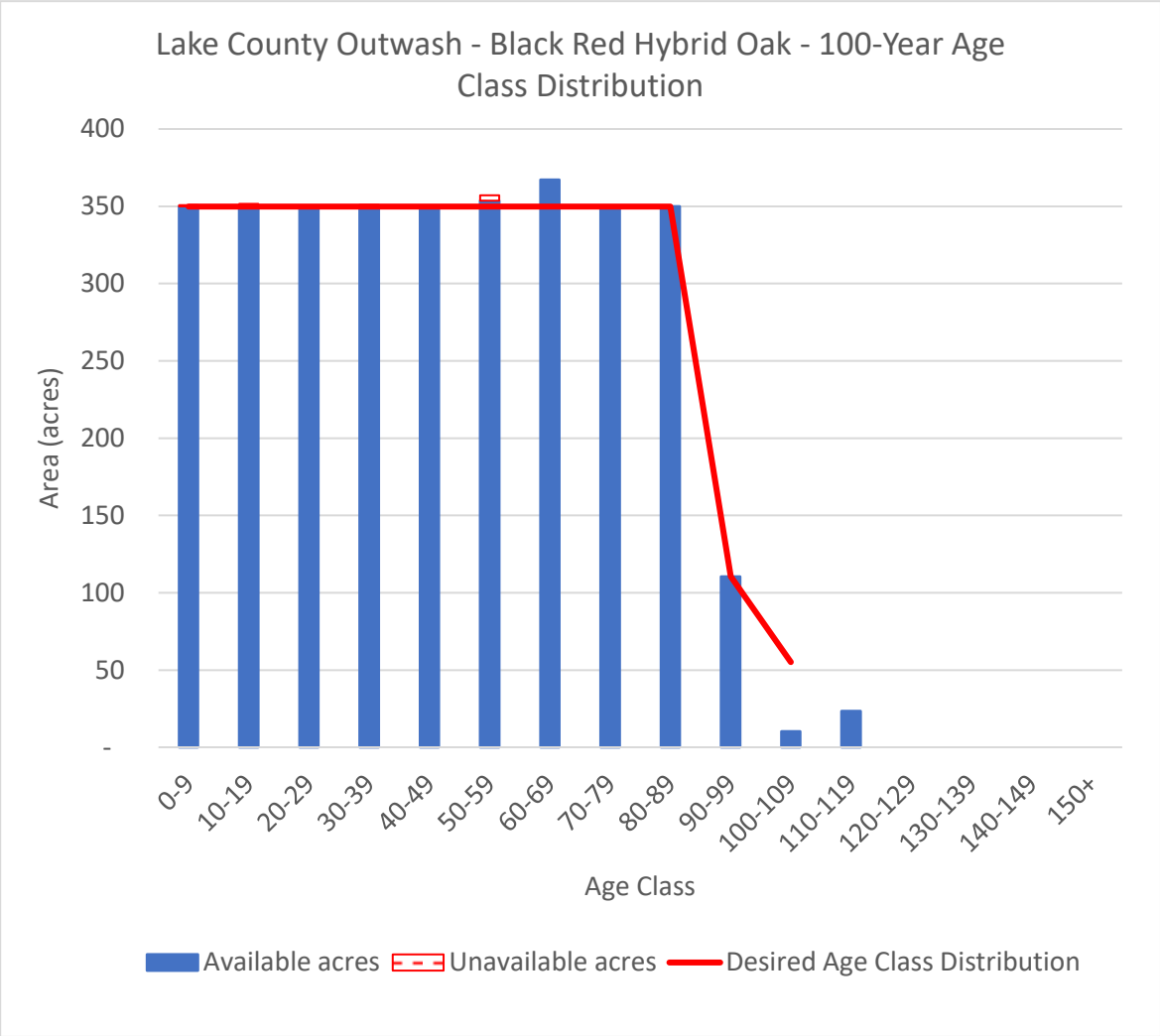


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

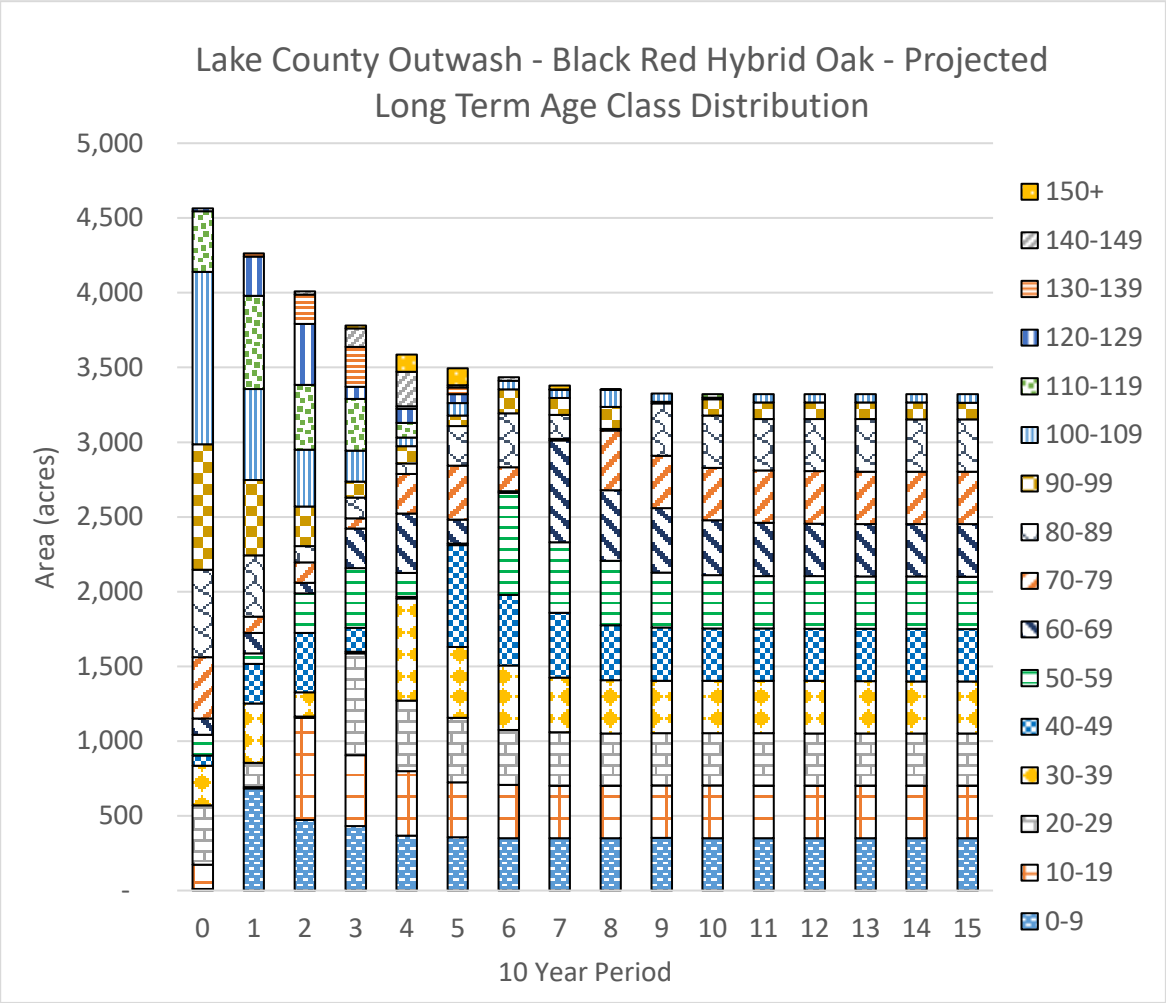


Figure 7. Projected age class distribution for all acres of black/red hybrid oak over the next 150 years.

Management actions

There are 992 acres of projected clearcut harvest in the black/red hybrid oak cover type during the planning period. This ends up above the desired establishment of 438 acres of black/red hybrid oak per decade because of the current unbalanced age class condition and a projected 302 acre decrease in this cover type converting to other cover types such as mixed upland deciduous. There are also an additional 142 acres projected to be thinned and 46 acres of shelterwood harvests.

Aspen

Current condition

The Lake County Outwash Management Area has a surplus of acres in the 30- to 59-year age classes that was created due to harvests and regeneration efforts on available aspen acres during the previous initiative of the Deer Range Improvement Program. (Figure 8). The age class distribution is currently unbalanced across almost all the age class categories. The deficit of available acres occurs in all age classes under 29 years old. A portion of this cover type meets the habitat requirements for ruffed grouse and snowshoe hare (Table 10).

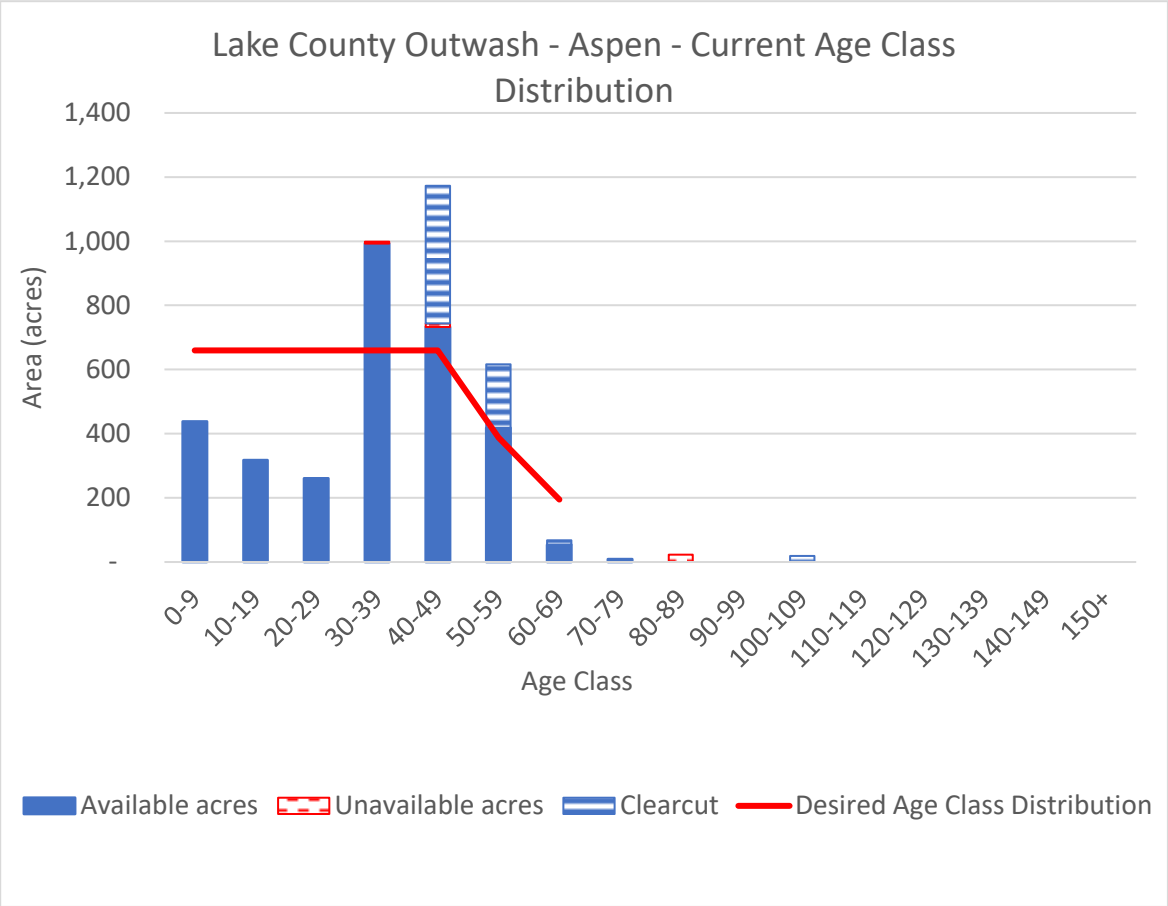


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Table 10. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	756	0
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	756	0

Desired future condition

The projected long-term cover type trend for aspen is fairly stable in the Lake County Outwash Management Area. There is a 1.6% increase for this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 40 years old with a decreasing tail out to 60 years old for all available aspen acres.

The end of the planning period will result in the establishment of approximately 734 acres of aspen from the available acres which is 64 acres over the desired age class distribution (Figure 9). Progress toward the long-term desired age class distribution of aspen will take many decades to achieve the desired balanced age class condition due to the current deficit of acres in the 0- to 29-year-old age classes.

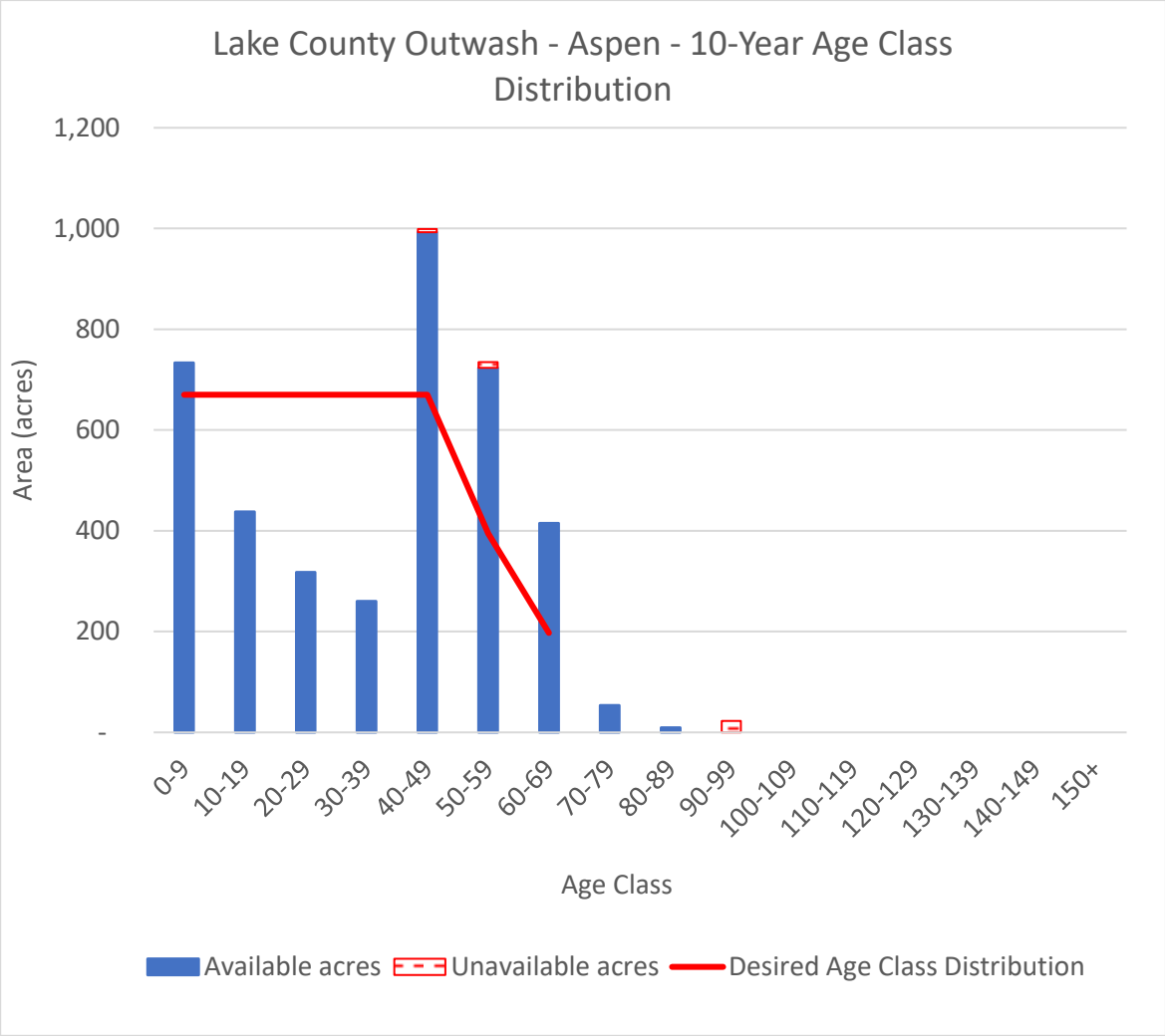


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of aspen has almost reached the desired future condition for available acres in the age classes between 0- and 40-year-old age classes with a tail out to 60 years old (Figure 10).

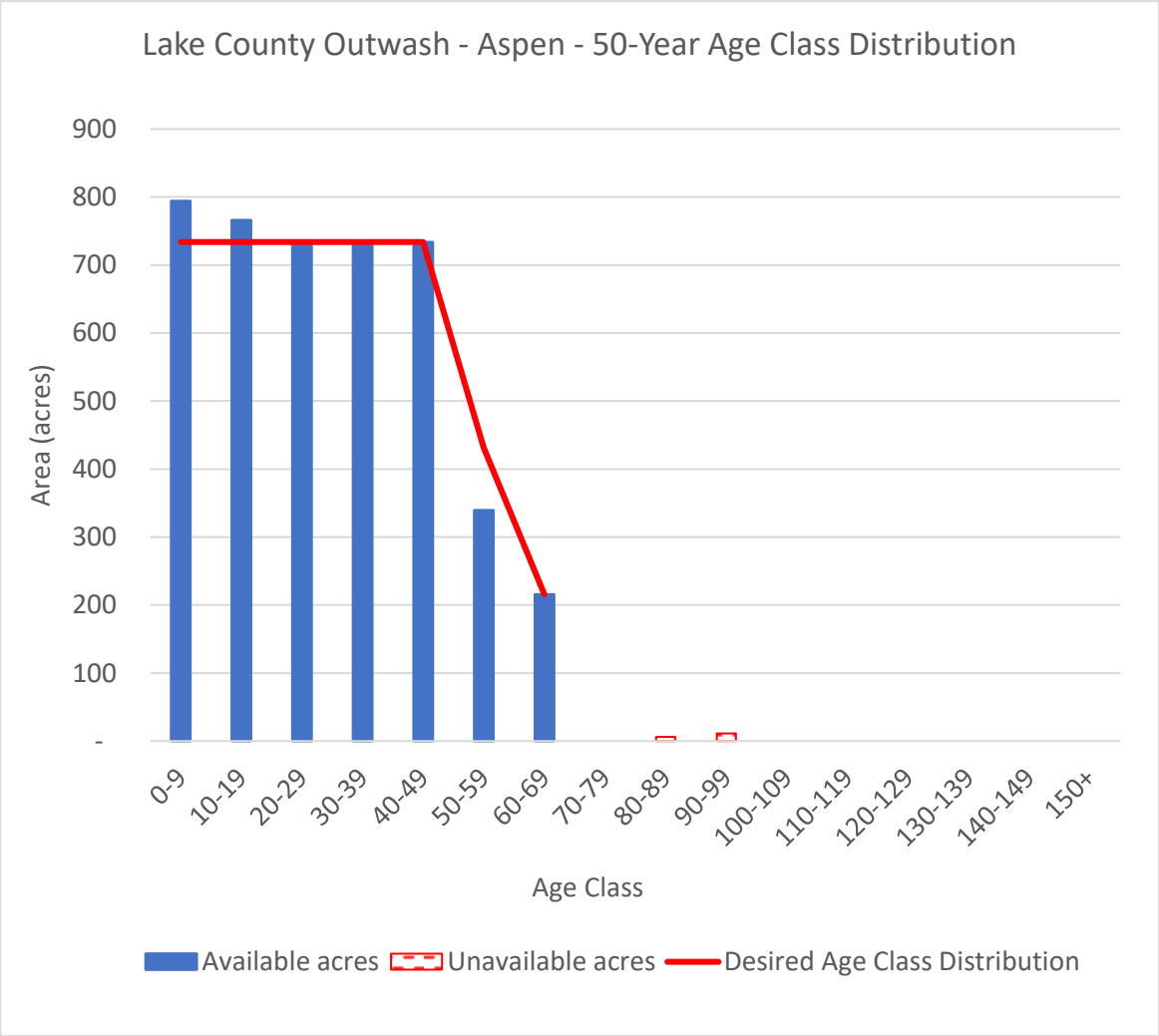


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate on the manageable acres of aspen cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 12).

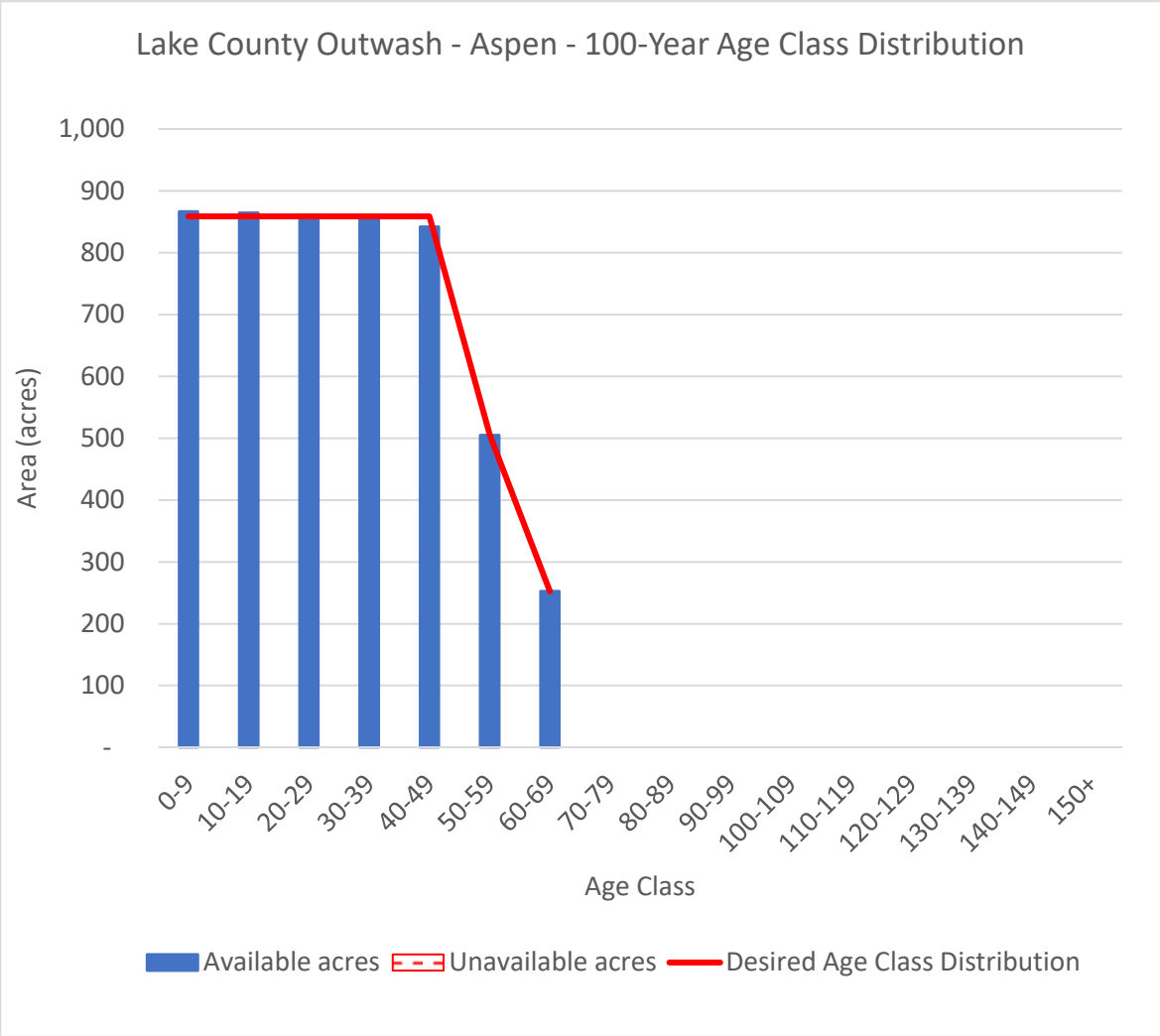


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

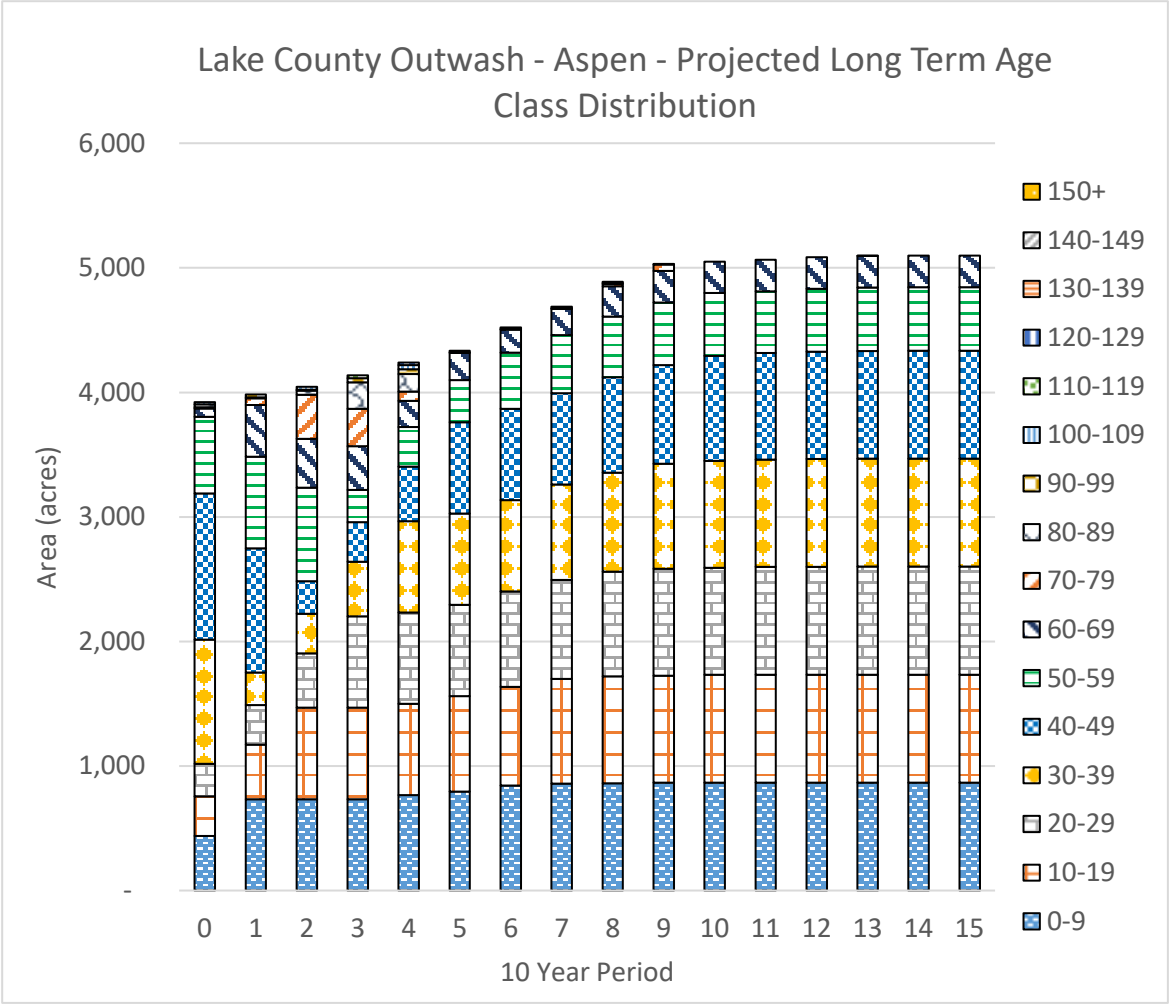


Figure 12. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 659 acres of projected clearcut harvest, and an additional 62 acres projected to transition into the aspen cover type during the planning period. This is slightly over the desired establishment of 670 acres of aspen per decade.

Mixed upland deciduous

Current condition

Most of the mixed upland deciduous cover type is currently in the 20- to 29-year-old age class. (Figure 13). The past management regime has been primarily clearcut for this cover type. The younger age classes are very close to the desired age class distribution. The spike in the 20- to 29-year-old age class will continue for many decades.

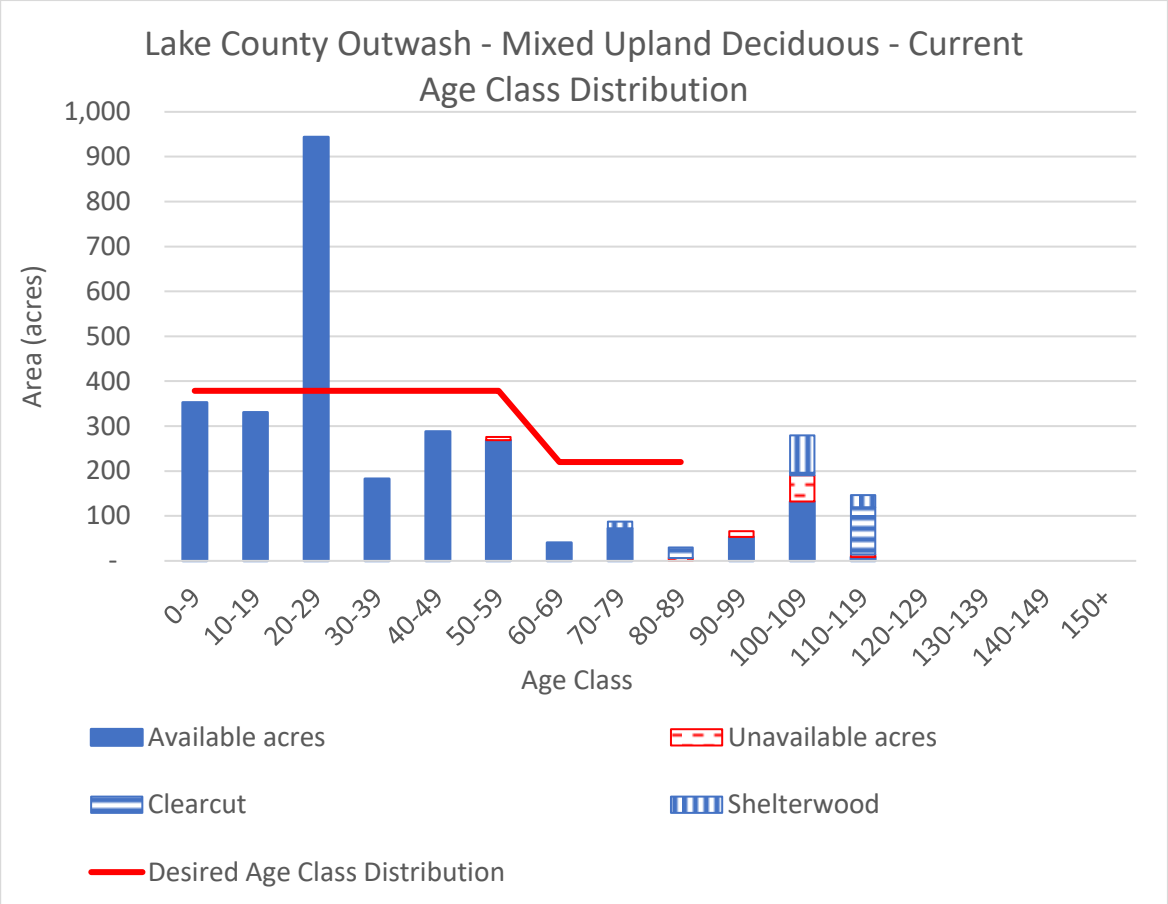


Figure 13. Current age class distribution, the desired age class distribution, and the projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for snowshoe hare and marten (Table 11).

Table 11. Featured species with mixed upland deciduous as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres - Available	Mixed Upland Deciduous Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	683	0
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	656	83

Desired future condition

The projected long-term cover type trend for mixed upland deciduous is increasing by 8.6% in the Lake County Outwash Management Area. The transitions into this cover type will mostly be from black/red hybrid oak.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old with a tail to 80 years old for all available mixed upland deciduous stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the mixed upland deciduous cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of 412 acres which is the desired amount of regeneration in the upcoming 0-9 age class given the amount of available acres (Figure 14). Progress toward the long-term age class distribution of mixed upland deciduous will take many decades in the management area.

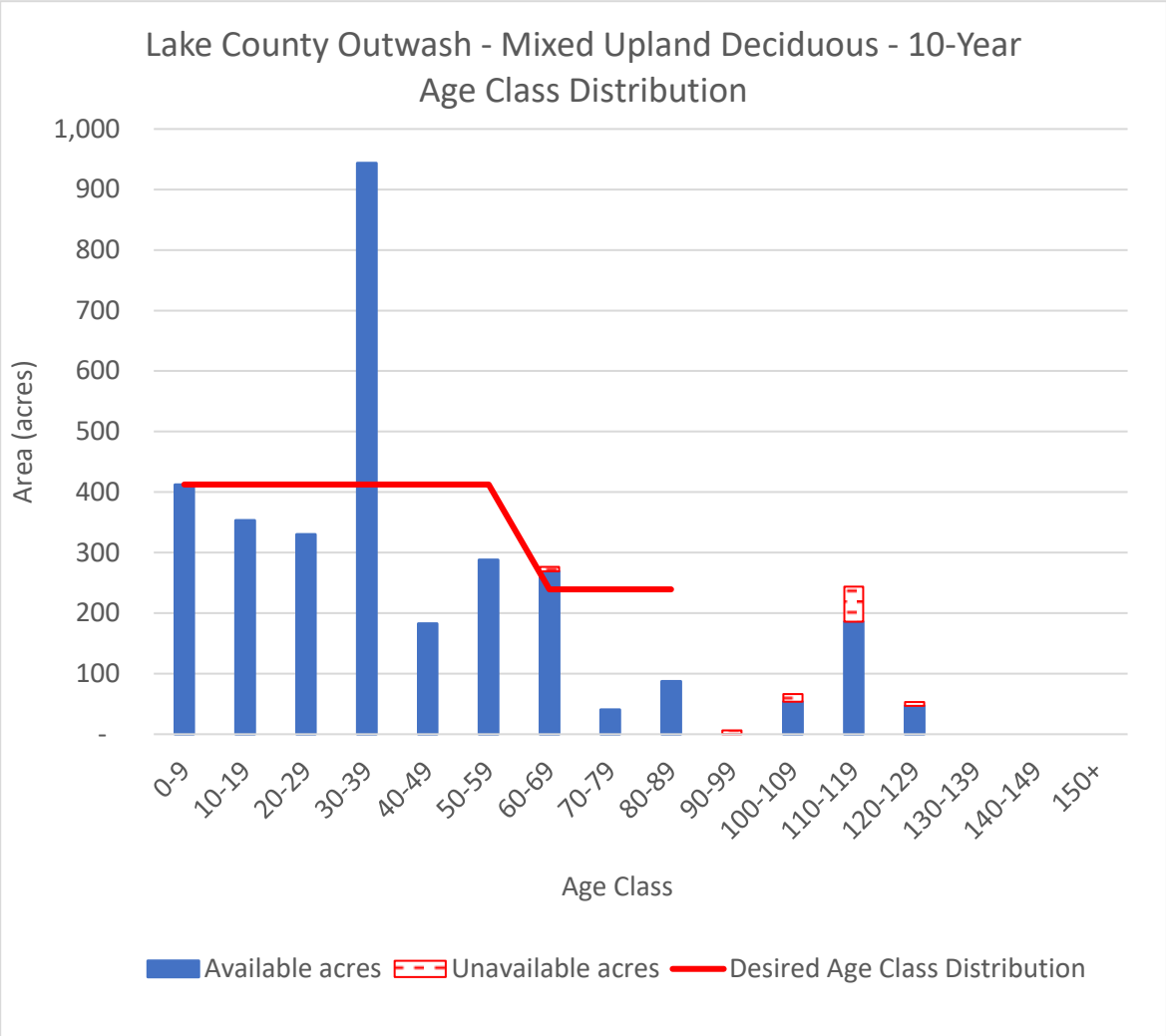


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed upland deciduous acres nearly reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 15). As is often the case, an unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals.

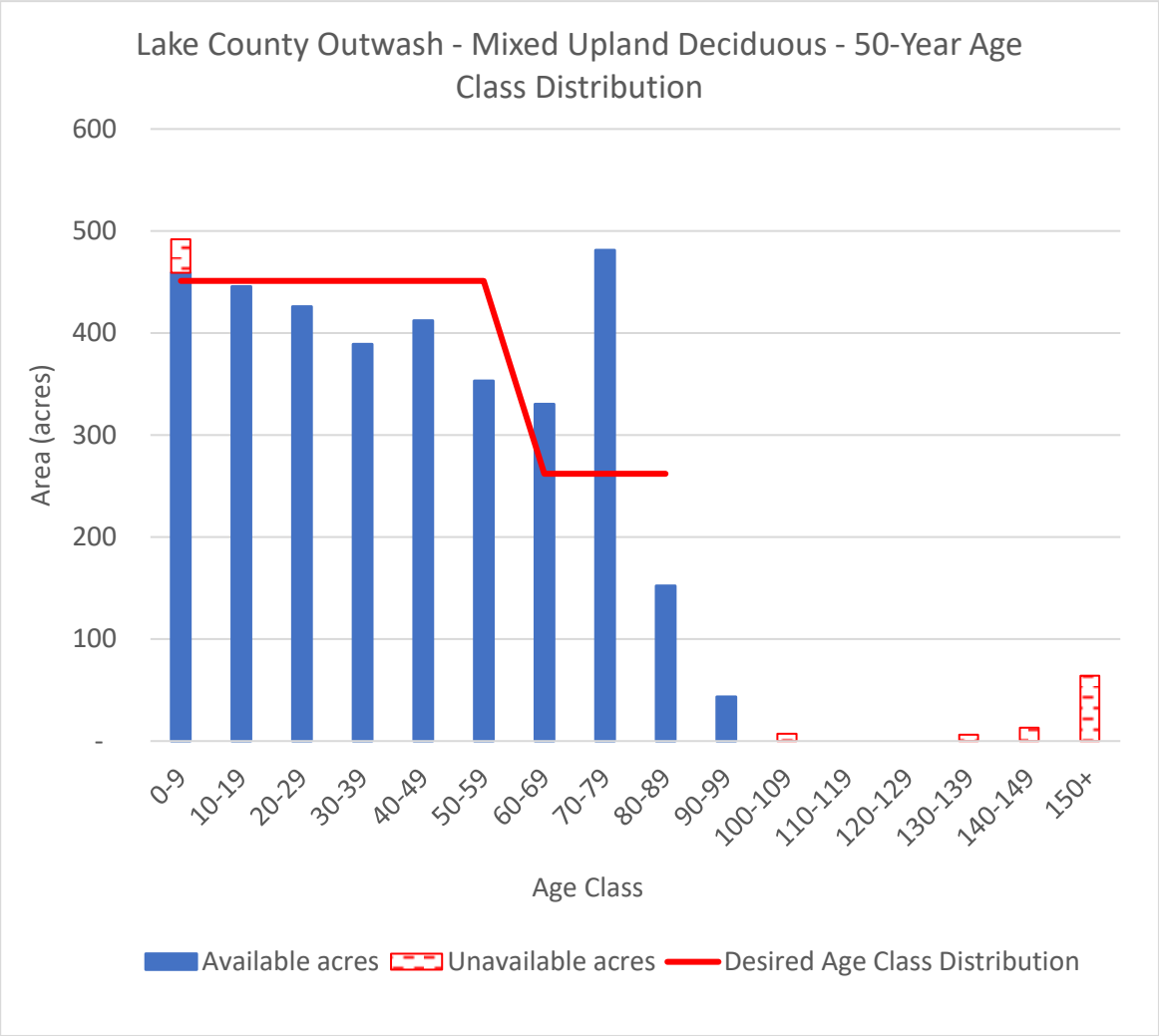


Figure 15. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 17).

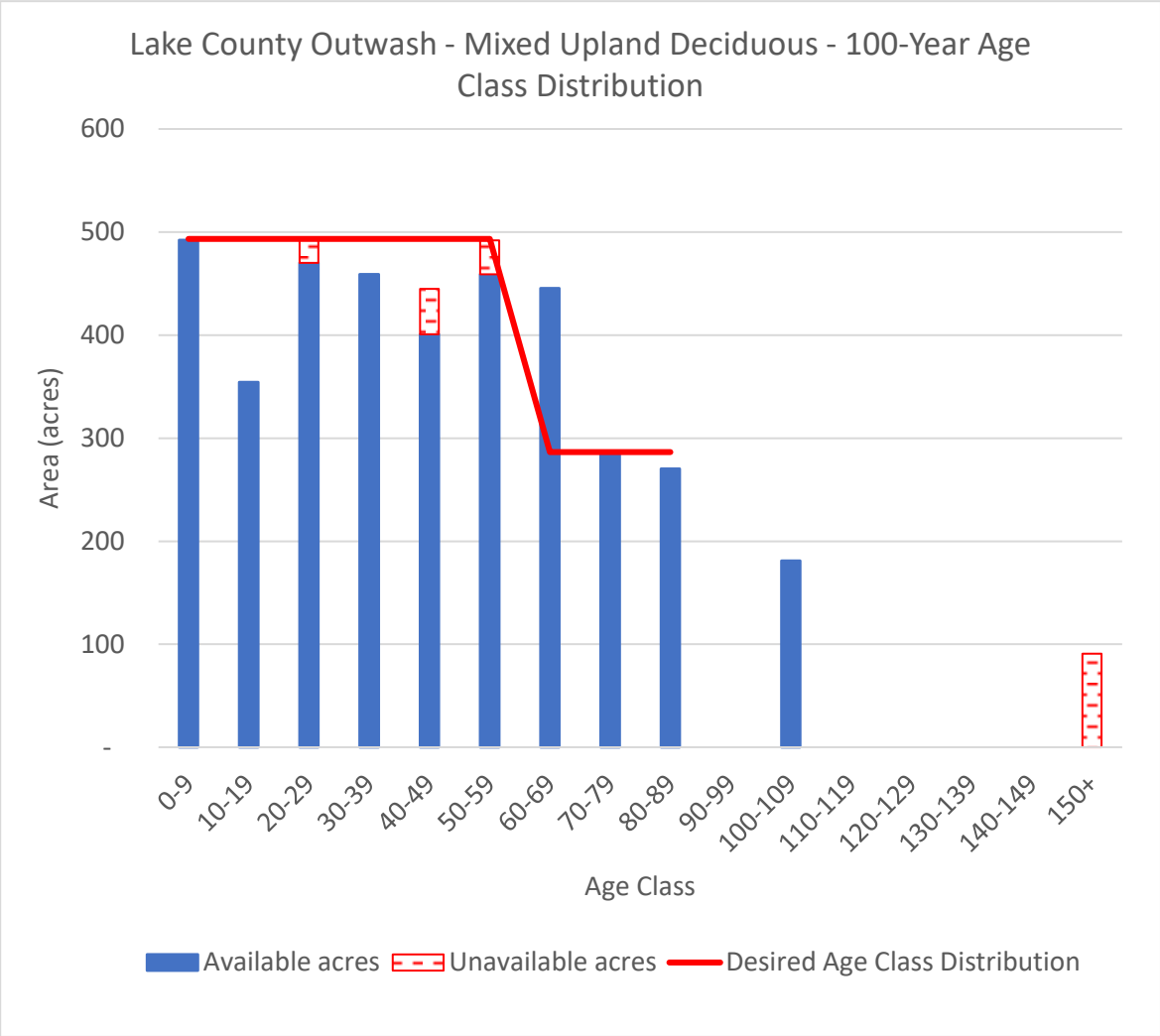


Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

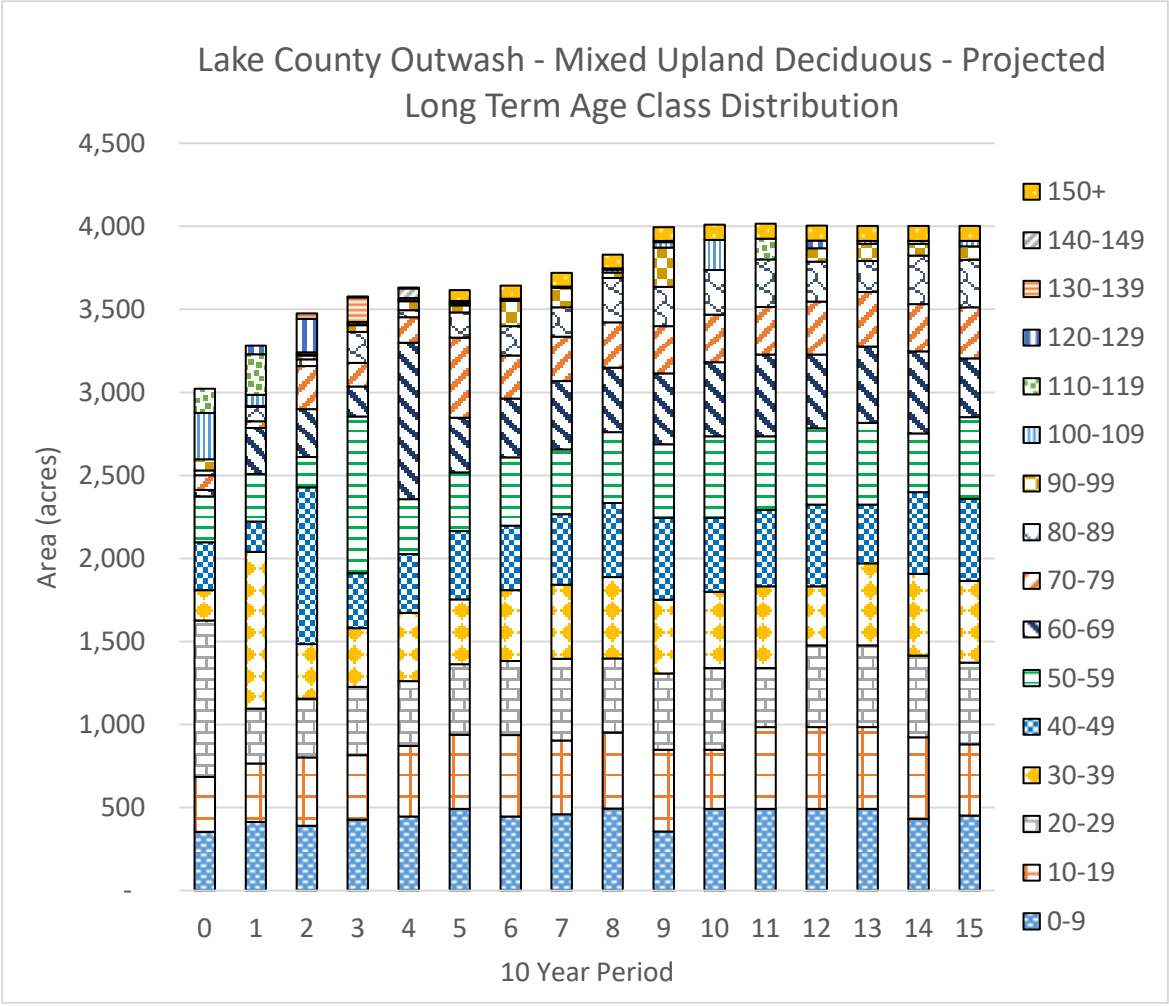


Figure 17. Projected age class distribution for all acres of mixed upland deciduous over the next 150 years.

Management actions

There are 135 acres of projected clearcut harvest and 125 acres of shelterwood in the mixed upland deciduous cover type during this planning period. This falls short of the desired establishment of 412 acres per decade because of the current unbalanced condition and a projected 260 acres converting into mixed upland deciduous from other cover types like black red hybrid oak.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 12; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within the Lake County Outwash Management Area.

High Conservation Value Area Type and Name	Acres
Eastern Massasauga Managed Land	**10,034**
--	10,034
Natural Rivers Vegetative Buffer	**232**
--	232
Natural Rivers Zoning District	**878**
--	878
State Wildlife Management Areas	**38**
Widewaters Flooding SWMA	38
Grand Total	**11,182**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes. There are no existing ERAs in the management unit.

Special conservation areas

Reviewable special conservation areas (SCAs; Table 13) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 14) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 13. Reviewable special conservation areas within the Lake County Outwash Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**50**
Bray Creek Campground	5
Leverentz Lake Campground	17
Leverentz Lake State Forest Campground	28
Little Manistee Motorcycle Trail and Route	1
Grand Total	**50**

Table 14. Static special conservation areas within the Lake County Outwash Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences	**-**	**6**
Poor Conifer Swamp	-	6
Designated Trout and Cold Water Stream Buffer	**-**	**869**
	-	422
Baldwin River	-	139
Little Manistee River	-	101
North Branch Cole Creek	-	36
North Branch Twin Creek	-	81
Sanborn Creek	-	10
South Branch Cole Creek	-	30
Syers Creek	-	25
Twin Creek	-	25
Designated Trout and Coldwater Streams	**32.7**	**-**
--	15.9	-
Baldwin River	5.2	-
Little Manistee River	3.8	-
North Branch Cole Creek	1.3	-
North Branch Twin Creek	3.1	-
Sanborn Creek	0.4	-
South Branch Cole Creek	1.1	-
Syers Creek	0.9	-
Twin Creek	0.9	-
Wood Turtle Stream 100ft Buffer	**-**	**26**
Little Manistee River	-	26
Wood Turtle Stream 660ft Buffer	**-**	**172**
Little Manistee River	-	172
Grand Total	**32.7**	**1,074**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (*Table 15*, Table 17 and Table 18) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 15. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 16. Rare animal occurrence in the Lake County Outwash Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Atrytonopsis hianna	Dusted skipper	SC	-	1
Animal	Bombus terricola	Yellow banded bumble bee	SC	-	1
Animal	Erynnis martialis	Mottled duskywing	SC	-	1
Animal	Gavia immer	Common loon	T	-	2
Animal	Glyptemys insculpta	Wood turtle	T	-	2
Animal	Haliaeetus leucocephalus	Bald eagle	SC	-	1
Animal	Hesperia metea	Cobweb skipper	SC	-	1
Animal	Lepyronia gibbosa	Great Plains spittlebug	SC	-	1
Animal	Lithobates palustris	Pickerel frog	SC	-	1
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	3
Total	-	-	-	-	**14**

Table 17. Rare plant occurrence in the Lake County Outwash Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Cirsium hillii	Hill's thistle	SC	-	3
Plant	Poa paludigena	Bog bluegrass	SC	-	1
Plant	Sisyrinchium strictum	Blue-eyed-grass	T	-	1
Total	-	-	-	-	**5**

Table 18. Other rare occurrence in the Lake County Outwash Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	-	-	1
Total	-	-	-	-	1

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 19).

Table 19. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 20. Non-ecological reference area natural communities in the Lake County Outwash Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Dry-mesic Northern Forest	C	S3	-	6
Dry-mesic Northern Forest	-	S3	-	2
Muskeg	-	S3	-	2
Northern Shrub Thicket	BC	S5	G4	1
Northern Wet Meadow	BC	S4	G4G5	2
Poor Conifer Swamp	B	S4	G4	1
Poor Conifer Swamp	C	S4	G4	2
Rich Conifer Swamp	C	S3	-	2
Rich Conifer Swamp	D	S3	-	2
Grand Total	**-**	**-**	**-**	**20**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 21) and diseases (Table 22) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 21. Defoliating insects of concern in the Lake County Outwash management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 22. Maladies of concern in the Lake County Outwash Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	-
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 25 miles of streams and rivers are found in the management area (Table 23). Streams/rivers classified as cold types comprise approximately 100% of the riverine mileage.

Table 23. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	18
Cold Small River	1
Cold Transitional Stream	6
Cold Transitional Small River	0
Cold Transitional Large River	0
Warm Transitional Stream	0
Warm Transitional Small River	0
Warm Transitional Large River	0
Warm Stream	0
Warm Small River	0
Warm Large River	0

Lacustrine habitat

Three lakes and ponds of at least 1 surface acre are found in the management area (Table 24).

Table 24. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	2

Lake Size Class (acres)	Number
100-499	1
500+	0

Wetlands

A total of 8,218 acres of wetlands are found in the management area (Table 25). Forested wetlands comprise approximately 98% of wetland types found in the management area.

Table 25. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	184
Forested	8,017
Riverine	17

Vernal pools and seeps

A total of 17 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub/deciduous/conifers are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 26).

Table 26. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland Shrub	553
Lowland Deciduous	460
Lowland Conifers	374
Marsh	334
Aspen	185
Lowland Mixed Forest	156
Mixed Upland Deciduous	132
Black-Red Hybrid Oak	126
Upland Mixed Forest	99
Oak Mix	75

Watershed vegetation cover

The management area includes portions of important watersheds of the Baldwin River and Little Manistee River (Table 27 & Table 28). Black-red hybrid oak is a major cover type of the state forest in each watershed.

Table 27. Largest vegetative cover types (i.e., top five) and area of the Baldwin River watershed located within the management area.

Cover Type	Acres
Black-Red Hybrid Oak	2,268
Aspen	2,228
Lowland Deciduous	1,660
Lowland Conifers	1,495
Mixed Upland Deciduous	1,436

Table 28. Largest vegetative cover types (i.e., top five) and area of the Little Manistee River watershed located within the management area.

Cover Type	Acres
Black-Red Hybrid Oak	1,552
Natural Jack Pine	1,346
Planted Red Pine	844
Aspen	806
Mixed Upland Deciduous	742

Recreation

Access for public recreation and management in the Lake County Outwash Management Area is very good with a well-developed road/trail system. This area, north of Baldwin, is heavily used by residents and visitors due to an abundance of outdoor recreation opportunities.

Numerous off-road vehicle trails, from single track motorcycle trails to full-size ORV trails, traverse the area, including the Little Manistee Route and Motorcycle Trail; Lincoln Hills Route and Motorcycle Trail; and a portion of the Tin Cup Route and Motorcycle Trail. Many of the ORV Routes are also snowmobile trails in winter and connect to trails in the adjacent national forest.

The Pere Marquette State Trail (rail-trail) runs parallel to U.S.-10, just south of the management area, from Baldwin to Clare. Other nonmotorized trails in the management area include Pine Valley pathway (8.4 miles), and Sheep Ranch Pathway (4 miles), both designated for hiking and biking.

There are three state forest campgrounds in the Lake County Outwash Management Area, all of which are accessible to ORV use with connections to ORV trails. Carrieville State Forest Campground was developed specifically with the ORV enthusiast in mind.

Table 29. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types) Snowmobile	108.4 51.1
Nonmotorized Recreation Trails	Hiking Equestrian Biking Hunter Access Trails	13.4 0 13.4 0
Total	-	**186.2**

Note: Trail-use types may overlap.

Table 30. State Forest Campgrounds.

State Forest Campground Name	# of sites	ORV Access
Bray Creek	9	X
Carrieville	31	X
Leverentz	18	X

Widewaters Flooding is a 38.4-acre site managed for wildlife.

Boating access sites are available on Big Leverentz Lake and the Baldwin River. There are many more sites in in the vicinity of this management area, providing multiple access points to rivers such as the Baldwin, Little Manistee, Pine and Pere Marquette which are popular for fishing and paddling.

Due to the relative proximity of the Lake County Outwash Management Area to more populated areas of southern Michigan, it is popular for dispersed recreation such as hunting and mushrooming. Because the unit is surrounded by the Manistee National Forest, it adds to the attraction of the area for outdoor recreation.

Table 31. Areas managed for hunting.

Type	State Wildlife Management Area Name	# of Acres
State Wildlife Management Area	Little Widewaters Flooding	38.4

Table 32. Boating access sites.

Name	Waterbody
Big Leverentz Lake **Rockey**	Big Leverentz Lake Baldwin River

Presque Isle Lake and Till Plains

State Forest Area: 283,238 acres	Location: Northeastern Lower Peninsula	Population Centers: Cheboygan Indian River and Atlanta
Subsection: Presque Isle Lake and Till Plains	Landforms: Drumlins Steep, sandy end moraines and Sandy glacial lake plains	Landcover: Forested: 251,067 acres Nonforested: 32,171 acres

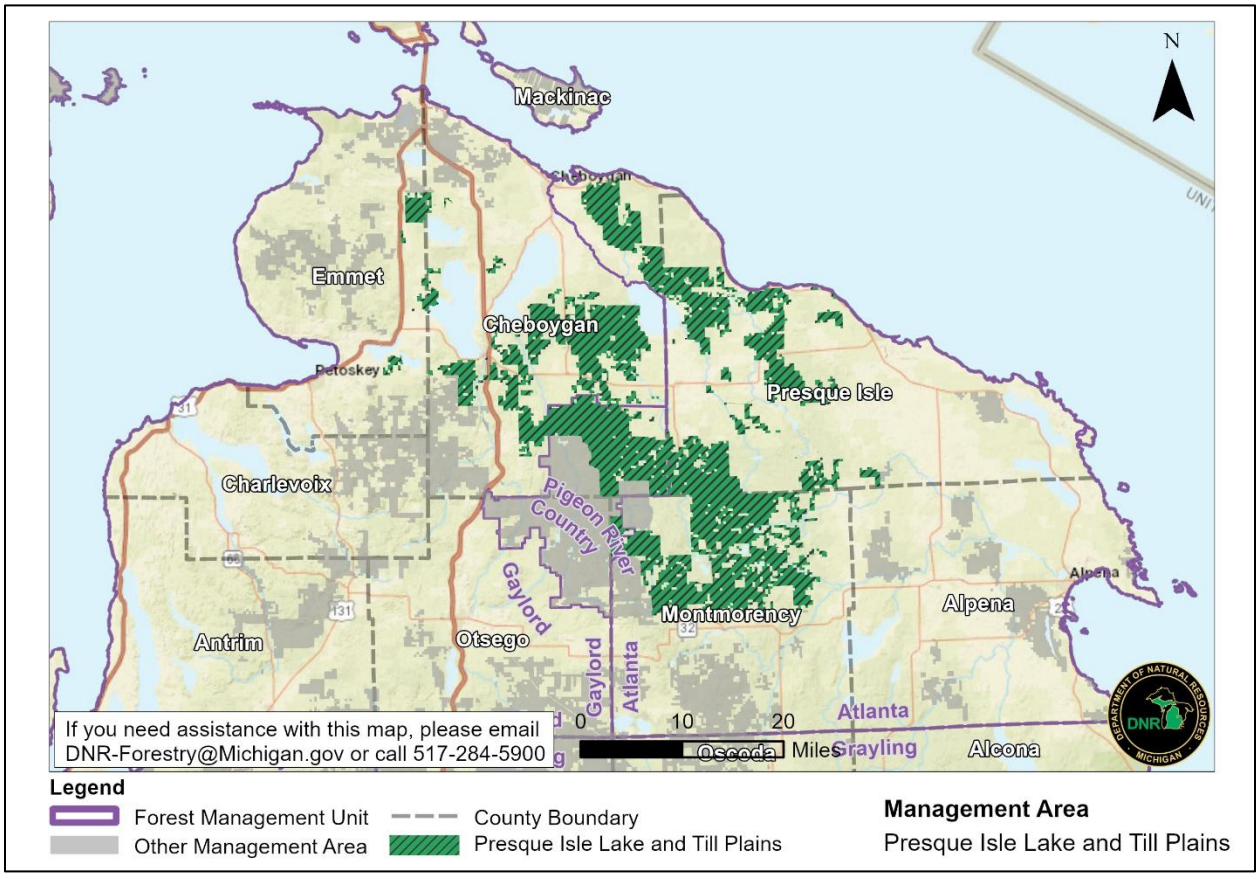


Figure 1. Presque Isle Lake and Till Plains Management Area.

Forested landscape

Current and projected future condition

The Presque Isle Lake and Till Plains Management Area includes a variety of shade tolerance levels occurring mostly in the upland cover types and in the mature age lowland categories (Figure 2). The majority of tolerant cover types occur on unavailable lowlands in the mature age category. Intolerant and mid-tolerant cover types mostly occur on available uplands in all age categories.

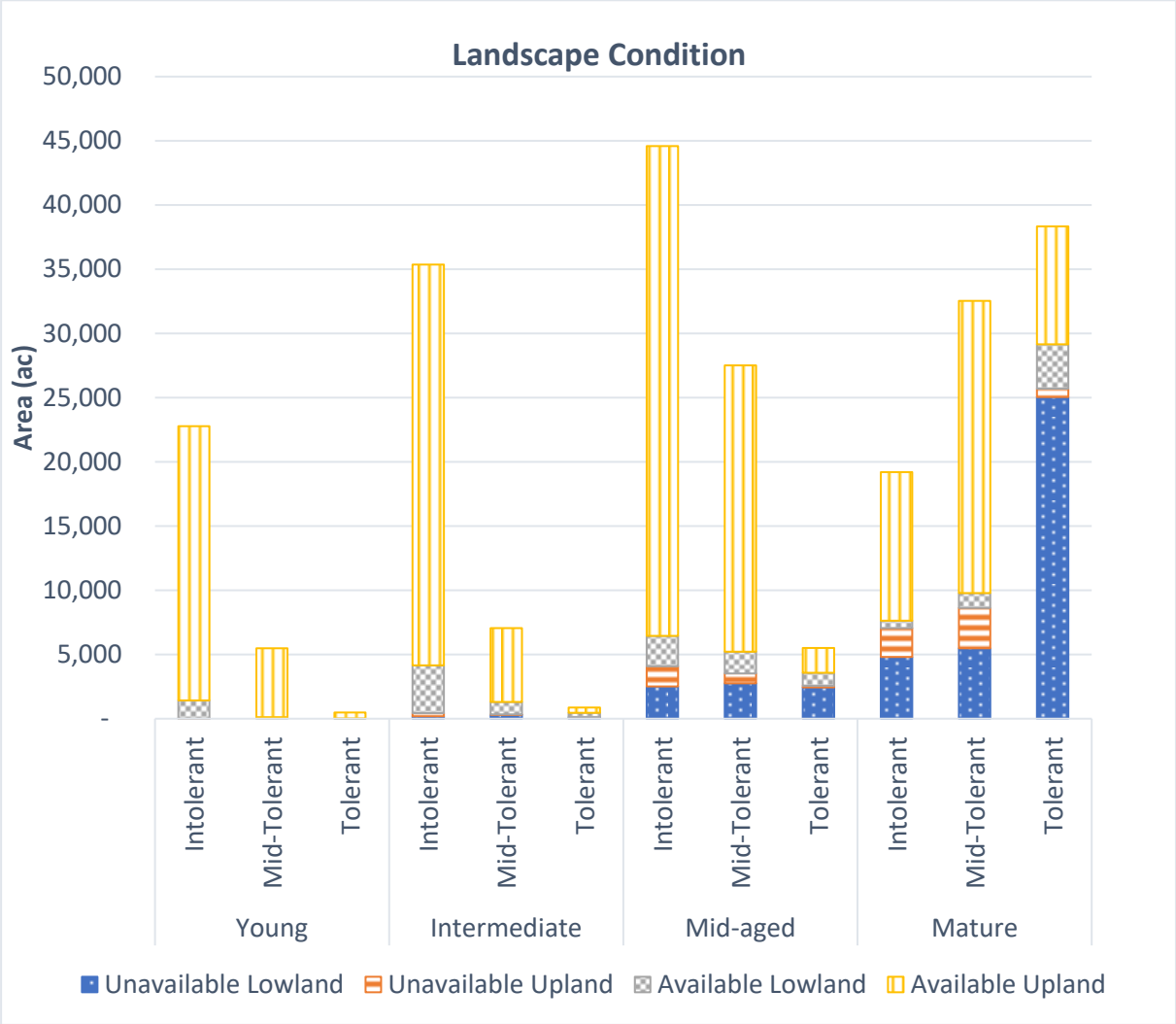


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	21,466
Mature Forest	Acres of 80+ year stands across cover types	86,420
Mature Forest	Acres of 120+ year stands across cover types	7,938
Mesic Conifer Cover types	Acres of mesic conifer cover types	12,328
Mesic Conifers in other Cover types	Average canopy occupancy	41%
Mast – Oak Cover types	Acres of oak cover types	10,915
Mast Tree Species in other Cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	121,755
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	129,251
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	7,128
Landscape Forest Matrix	Percent deciduous forest	52%
Landscape Forest Matrix	Percent coniferous forest	41%

The Presque Isle Lake and Till Plains Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Special analysis unit (SAU) – Elk
- Grouse Enhanced Management Site (GEM) – Lee Grande Ranch
- SAU – Kirtland's warbler
- SAU – Pigeon River Country

The Presque Isle Lake and Till Plains Management Area is comprised of 89% forested cover types and 11% nonforested cover types (Table 2). Of the forested cover types, upland landscape is over three times the amount of lowland landscape. The largest contributors to upland cover types are, aspen and planted red pine. Cedar and lowland conifer take up more than 50% of the lowland landscape position. Lowland shrub is the most common nonforested cover type in the management area representing 5% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	77,132	112,429	190,104	251,067
			Northern Hardwood	10,119			
			Black Red Hybrid Oak	2,790			
			Northern Red Oak	5,392			
			Oak Mix	3,270			
			Mixed Upland Deciduous	13,727			
		Mixed	Upland Mixed Forest	11,177	11,177		
		Coniferous	Planted Red Pine	24,199	66,498		
			Planted Jack Pine	14,657			
			Planted White Pine	131			
			Planted Mixed Pine	1,295			
			Natural Red Pine	5,943			
			Natural Jack Pine	7,952			
			Natural White Pine	1,979			
			Natural Mixed Pines	7,750			
			Upland Spruce/Fir	623			
			Upland Conifers	1,724			
			Hemlock	244			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	10,858	18,885	60,963	
			Lowland Deciduous	8,028			
		Mixed	Lowland Mixed Forest	4,958	4,958		
		Coniferous	Cedar	16,604	37,120		
			Lowland Conifers	15,938			
			Lowland Spruce/Fir	3,382			
			Tamarack	1,195			
Nonforested	Upland	N/A	Herbaceous Openland	4,369	N/A	10,297	32,171
			Upland Shrub	2,258			
			Low Density Trees	1,072			
			Bare/Sparsely Vegetated	770			
			Cropland	501			
			Urban	1,327			
	Lowland	N/A	Lowland Shrub	13,018	N/A	21,874	
			Marsh	3,816			
			Bog	552			
			Treed Bog	1,227			
			Water	3,260			
						Grand Total:	**283,238**

There are 198,505 acres (70% of the total management area and 79% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Presque Isle Lake and Till Plains Management Area (Table 3). Of that, over 29.8% is in the aspen cover type, 9.4% in planted red pine, 5.8% in planted jack pine, and 5% in mixed upland deciduous. The remaining 21 cover types represent less than 4% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

PRESQUE ISLE LAKE AND TILL PLAIN Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	74,844	29.8%	2,300	0.9%	77,144	30.7%
Black Red Hybrid Oak	2,559	1.0%	231	0.1%	2,790	1.1%
Cedar	2,288	0.9%	14,320	5.7%	16,608	6.6%
Hemlock	80	0.0%	164	0.1%	244	0.1%
Lowland Aspen/Balsam Poplar	7,352	2.9%	3,507	1.4%	10,859	4.3%
Lowland Conifers	2,467	1.0%	13,471	5.4%	15,939	6.3%
Lowland Deciduous	2,198	0.9%	5,832	2.3%	8,030	3.2%
Lowland Mixed Forest	2,207	0.9%	2,752	1.1%	4,959	2.0%
Lowland Spruce/Fir	452	0.2%	2,931	1.2%	3,383	1.3%
Mixed Upland Deciduous	12,484	5.0%	1,245	0.5%	13,729	5.5%
Natural Jack Pine	7,386	2.9%	568	0.2%	7,954	3.2%
Natural Mixed Pines	6,814	2.7%	940	0.4%	7,754	3.1%
Natural Red Pine	5,387	2.1%	561	0.2%	5,948	2.4%
Natural White Pine	1,785	0.7%	195	0.1%	1,980	0.8%
Northern Hardwood	9,781	3.9%	340	0.1%	10,121	4.0%
Northern Red Oak	5,012	2.0%	383	0.2%	5,394	2.1%
Oak Mix	3,195	1.3%	75	0.0%	3,270	1.3%
Planted Jack Pine	14,584	5.8%	74	0.0%	14,658	5.8%
Planted Mixed Pine	1,276	0.5%	20	0.0%	1,296	0.5%
Planted Red Pine	23,671	9.4%	539	0.2%	24,210	9.6%
Planted White Pine	122	0.0%	9	0.0%	131	0.1%
Tamarack	166	0.1%	1,030	0.4%	1,195	0.5%
Upland Conifers	1,204	0.5%	521	0.2%	1,725	0.7%
Upland Mixed Forest	10,725	4.3%	456	0.2%	11,181	4.5%
Upland Spruce/Fir	464	0.2%	161	0.1%	625	0.2%
Grand Total	**198,505**	**79.0%**	**52,622**	**21.0%**	**251,127**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of unavailable Area
Too Wet	32,152	61.1%
Conservation Values	6,111	11.6%
BMPs	4,547	8.6%
Cannot Regenerate	1,633	3.1%
Long-Term Retention	1,603	3.0%
Species of special concern or T&E	1,237	2.4%
Blocked by Obstacle	1,095	2.1%
Rare Landforms	933	1.8%
Other Dept./Div. Processes	905	1.7%
Too Steep	834	1.6%
Recreational/Scenic	727	1.4%
Denied Access	360	0.7%
Unproductive	332	0.6%
Other Influence Zones	64	0.1%
Wildlife Concerns	55	0.1%
Non-Military Lease/Easement	18	0.0%
Neighbor / Interest Group	15	0.0%
Total Unavailable	**52,622**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Presque Isle Lake and Till Plains Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 799,634 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Planted Red Pine	1,977	-	6,372	-	-	1,298	1,931	11,577
Aspen	8,181	-	-	-	-	410	-	8,592
Upland Mixed Forest	2,154	-	-	-	-	-	-	2,154
Mixed Upland Deciduous	1,765	-	-	-	-	-	-	1,765
Lowland Aspen/Balsam Poplar	1,710	-	-	-	-	-	-	1,710
Northern Hardwood	-	130	-	64	-	350	999	1,544
Northern Red Oak	951	-	-	78	-	-	-	1,029
Natural Mixed Pines	-	-	297	-	452	-	185	933
Planted Jack Pine	-	-	-	-	-	916	-	916
Natural Jack Pine	77	-	-	-	-	668	-	744
Black Red Hybrid Oak	416	-	-	-	34	-	-	451
Lowland Conifers	419	-	-	-	-	-	-	419
Natural White Pine	-	-	192	-	190	-	-	382
Lowland Deciduous	210	46	-	-	31	-	-	287
Planted Mixed Pine	-	-	235	-	-	-	-	235
Natural Red Pine	-	-	57	-	104	-	46	207
Lowland Mixed Forest	186	-	-	-	-	-	-	186
Lowland Spruce/Fir	108	-	-	-	-	-	-	108
Cedar	76	-	-	32	-	-	-	108
Planted White Pine	-	-	86	-	-	-	-	86
Upland Spruce/Fir	78	-	-	-	-	-	-	78
Tamarack	32	-	-	-	-	-	-	32
Hemlock	-	11	-	-	-	-	-	11
Totals	**18,341**	**187**	**7,237**	**173**	**811**	**3,642**	**3,161**	**33,552**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Presque Isle Lake and Till Plains Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed Aspen	83,843	78,813
	Red Pine	71,320	67,041
	Mixed Hardwood	67,317	63,278
	Mixed Spruce	24,304	22,846
	Mixed Softwood	22,822	21,452
	Jack Pine	22,619	21,262
	Mixed Oak	13,515	12,704
	White Pine	9,136	8,588
	Pulpwood Total	**314,876**	**295,984**
Sawtimber (MBF)	Red Pine	82,428	77,482
	Mixed Aspen	26,027	24,466
	Red Oak	18,369	17,267
	White Pine	15,731	14,787
	Red Maple	7,739	7,274
	Sugar Maple	5,542	5,209
	White Oak	5,499	5,169
	Mixed Oak	2,635	2,477
	Basswood	689	647
	Sawtimber Total	**164,659**	**154,780**
	Total Sawtimber Harvest Volume in Cords	**484,758**	**455,673**
	Grand Total Harvest Volume in Cords	**799,634**	**751,656**
* Volume estimates based on 100% of the projected harvests for the 10-year planning period. ** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are a few cover type transitions projected for the Presque Isle Lake and Till Plains Management Area (Table 7). The largest decreases are 1,016 acres of planted red pine and 735 acres of northern red oak will convert to other cover types like aspen and planted jack pine. The largest increase occurs in the

aspen and planted jack pine cover types where 1,498 acres are projected to convert into aspen and 513 into planted jack pine cover types.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	77,132	78,630	1,498
Planted Red Pine	24,199	23,183	-1,016
Cedar	16,604	16,604	0
Lowland Conifers	15,938	15,805	-133
Planted Jack Pine	14,657	15,170	513
Mixed Upland Deciduous	13,727	13,610	-117
Upland Mixed Forest	11,177	10,991	-186
Lowland Aspen/Balsam Poplar	10,858	10,882	25
Northern Hardwood	10,119	10,197	78
Lowland Deciduous	8,028	8,026	-1
Natural Jack Pine	7,952	8,026	74
Natural Mixed Pines	7,750	7,867	117
Natural Red Pine	5,943	5,982	39
Northern Red Oak	5,392	4,658	-735
Lowland Mixed Forest	4,958	5,114	156
Lowland Spruce/Fir	3,382	3,336	-46
Oak Mix	3,270	3,282	13
Black Red Hybrid Oak	2,790	2,582	-208
Natural White Pine	1,979	1,979	0
Upland Conifers	1,724	1,724	0
Planted Mixed Pine	1,295	1,295	0
Tamarack	1,195	1,195	0
Upland Spruce/Fir	623	553	-70
Hemlock	244	244	0
Planted White Pine	131	131	0
Lowland Shrub	13,018	13,018	0
Herbaceous Openland	4,369	4,369	0
Marsh	3,816	3,816	0
Water	3,260	3,260	0
Upland Shrub	2,258	2,258	0
Urban	1,327	1,327	0
Treed Bog	1,227	1,227	0
Low Density Trees	1,072	1,072	0
Bare/Sparsely Vegetated	770	770	0
Bog	552	552	0
Cropland	501	501	0
Total:	**283,238**	**283,238**	**0**

Featured species current and projected habitat acres

There are 10 featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (

). As noted in the Featured Species Management Priority (Section 3), it is recommended that these

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	34,600	36,417	25,991	25,806
Black Bear	Mast	132,670	--	--	--
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Elk	Aspen	--	--	--	--
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	32,994	33,700	22,138	22,834
Kirtland's Warbler	Jack pine	--	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	58,613	59,751	59,703	64,993
Ruffed Grouse	Aspen	31,319	32,194	21,730	22,529
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	47,231	48,389	35,017	35,994
Wild Turkey	Nonforested openings	4,870	--	--	--
Wood Turtle	Nonforested openings	--	--	--	--

featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors

including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model, black bear, wild turkey and black-backed woodpecker, but are included here to inform management decisions over the decade. Kirtland's warbler and elk habitat are described in the special analysis units (Section 5).

Table 8. Featured species current and projected total habitat acres (e.g., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American Woodcock	Aspen, lowland aspen, lowland deciduous	34,600	36,417	25,991	25,806
Black Bear	Mast	132,670	--	--	--
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Elk	Aspen	--	--	--	--
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	32,994	33,700	22,138	22,834
Kirtland's Warbler	Jack pine	--	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	58,613	59,751	59,703	64,993
Ruffed Grouse	Aspen	31,319	32,194	21,730	22,529
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers,	47,231	48,389	35,017	35,994

Featured Species	Priority Cover Types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
	lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir				
Wild Turkey	Nonforested openings	4,870	--	--	--
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

The largest age class of the aspen cover type is currently in the 0- to 9-year-old class (Figure 3). The past management regime has been primarily clearcut for this cover type. The 10-19 and 20-29 age classes have a deficit, and the older age classes are fairly evenly distributed. With the exception of the age class spike in the 0- to 9-year-old class that currently compensates for the small deficits in the 10-19 and 20-29, the aspen age distribution is very uniform. This current planning period will continue to smooth out the distribution of the aspen in this management area.

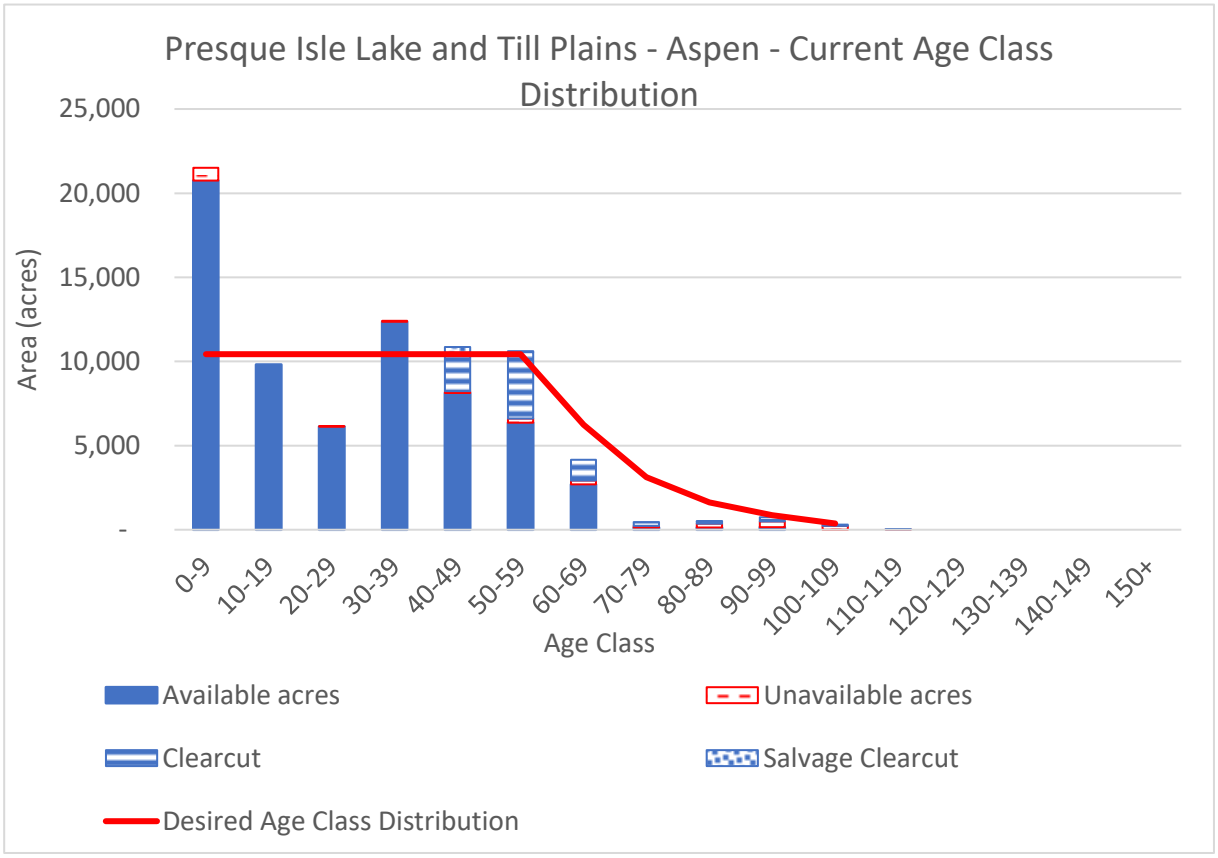


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock, golden-winged warbler, ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	30,577	742
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	30,577	742
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	30,577	742

Desired future condition

The projected long-term cover type trend for aspen is stable in the Presque Isle Lake and Till Plains Management Area. There are a few transitions totaling 1,498 acres into the aspen cover type from other cover types forecasted in the planning period. This will contribute to the 0-9 age class goal in the aspen cover type in the first 10-year planning period.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of the desired amount of regeneration in in the upcoming 0-9 age class (Figure 4). Progress toward the long-term age class distribution of aspen will take several decades in the management area.

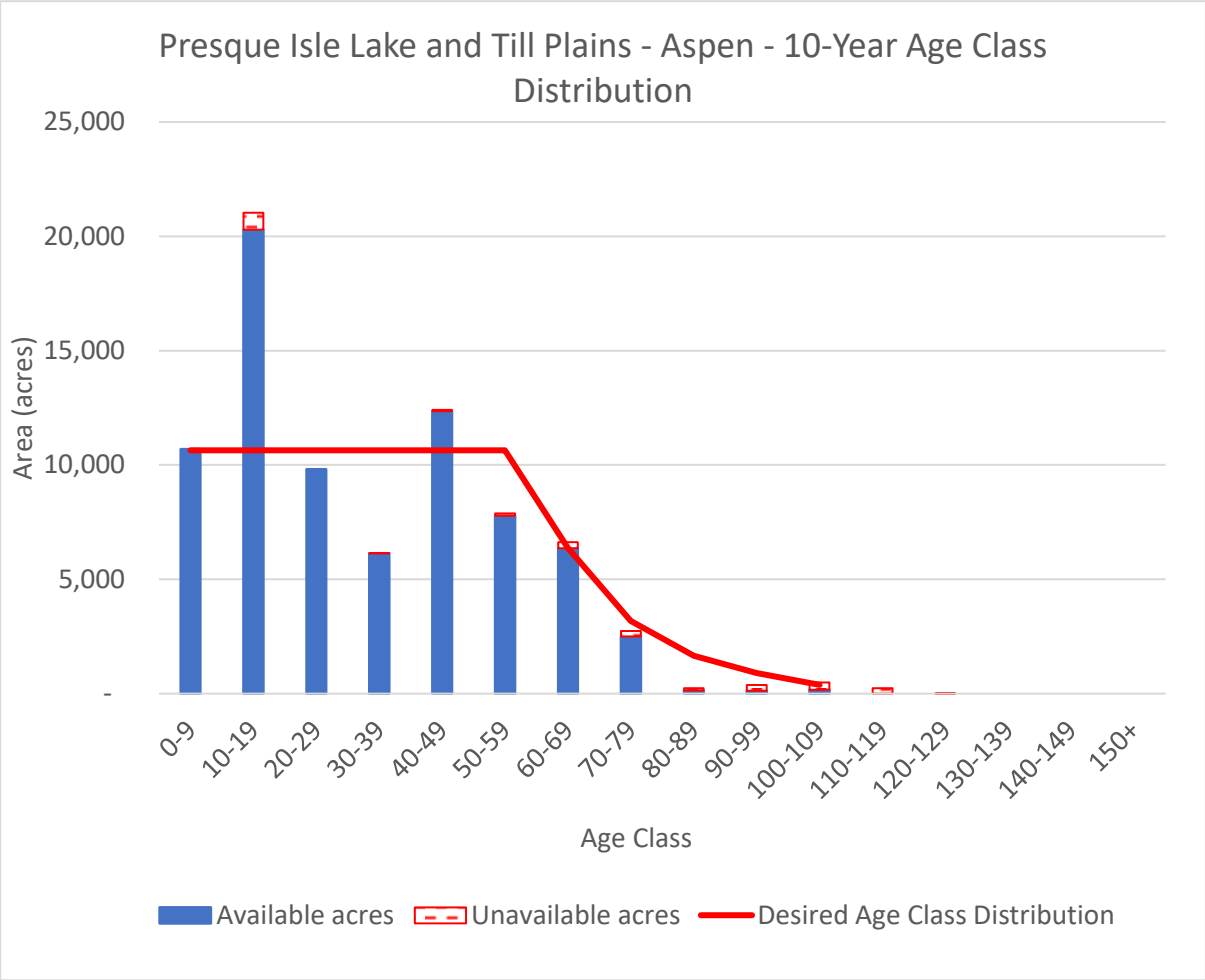


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres has reached the desired future condition (Figure 5).

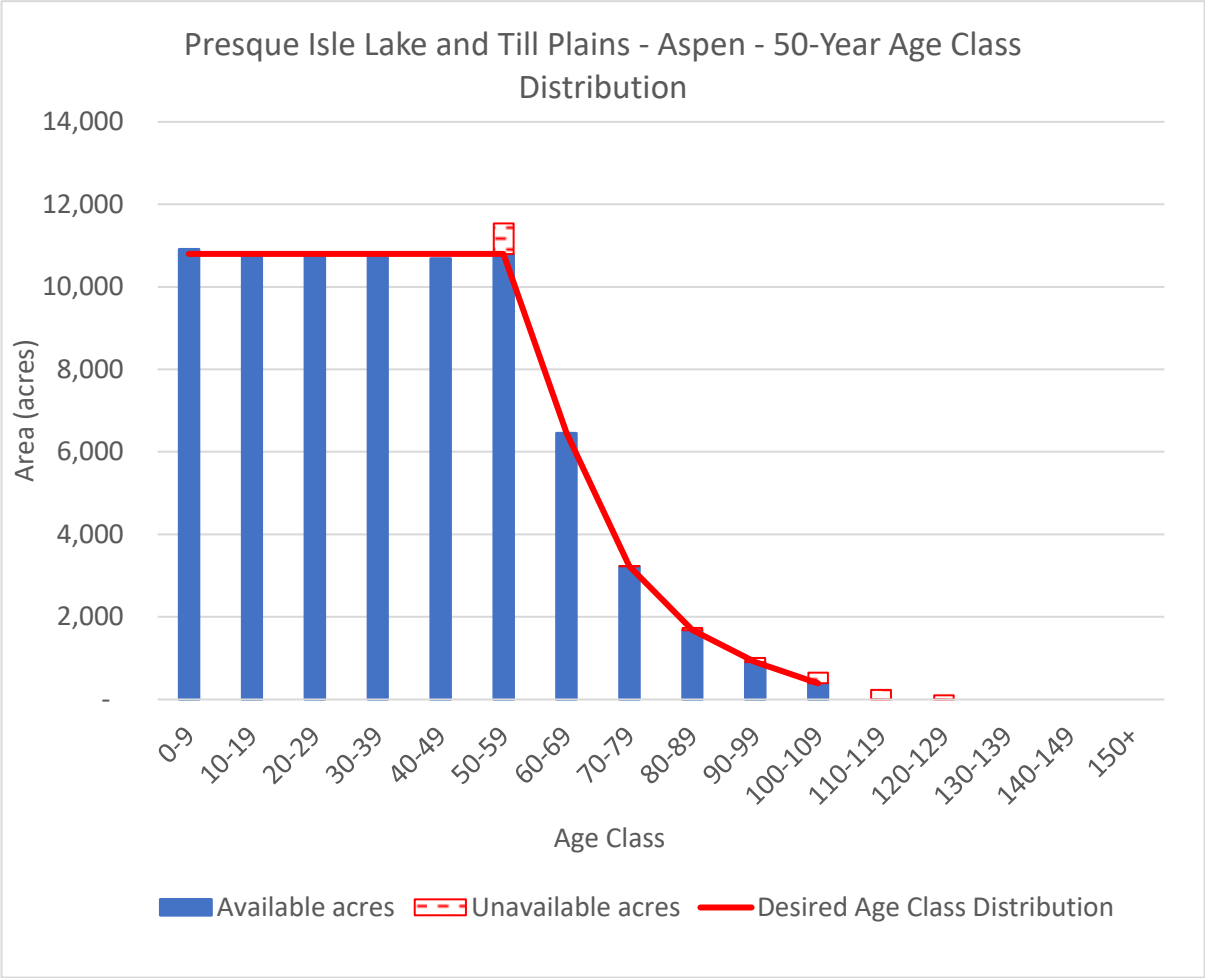


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 7).

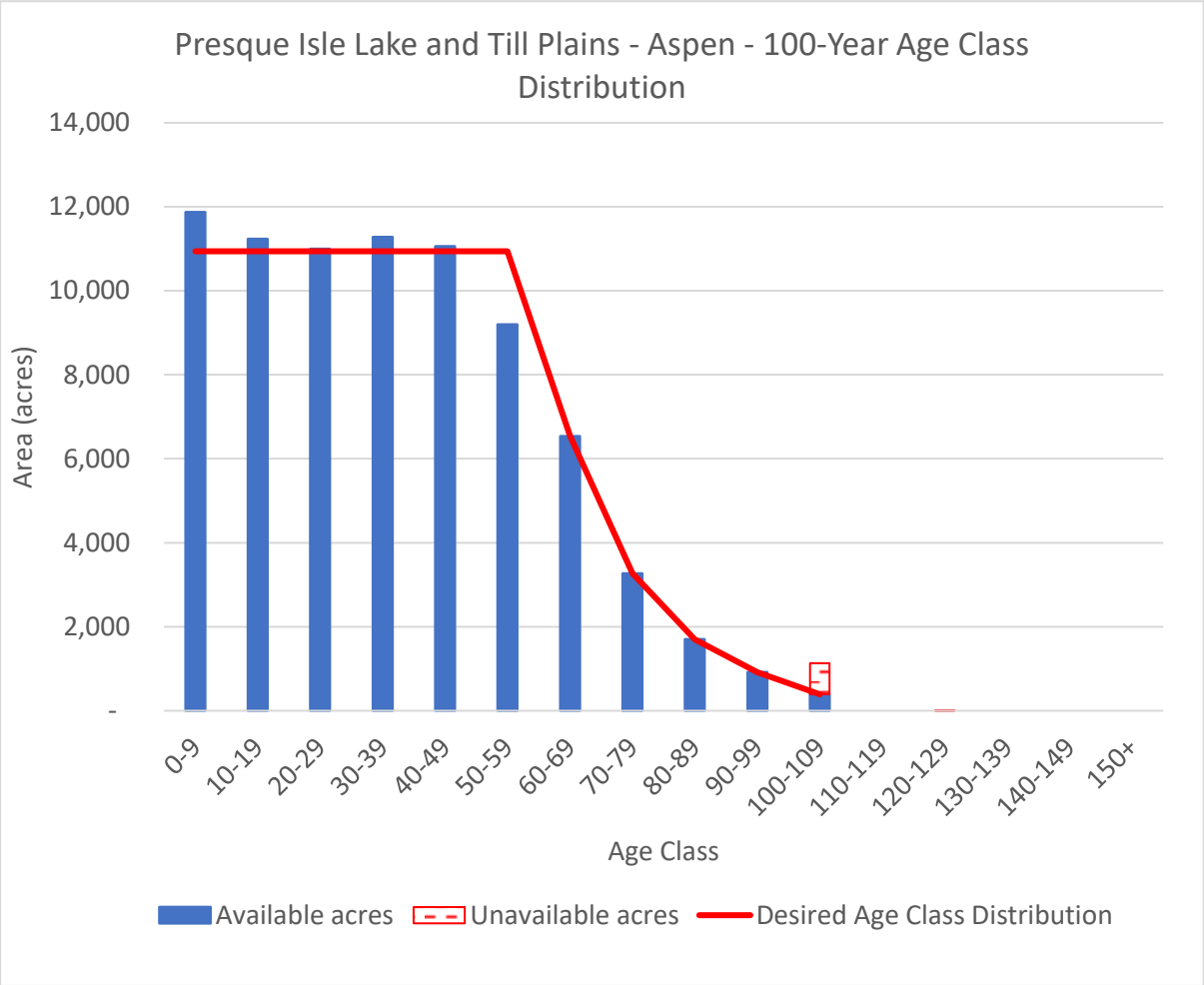


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

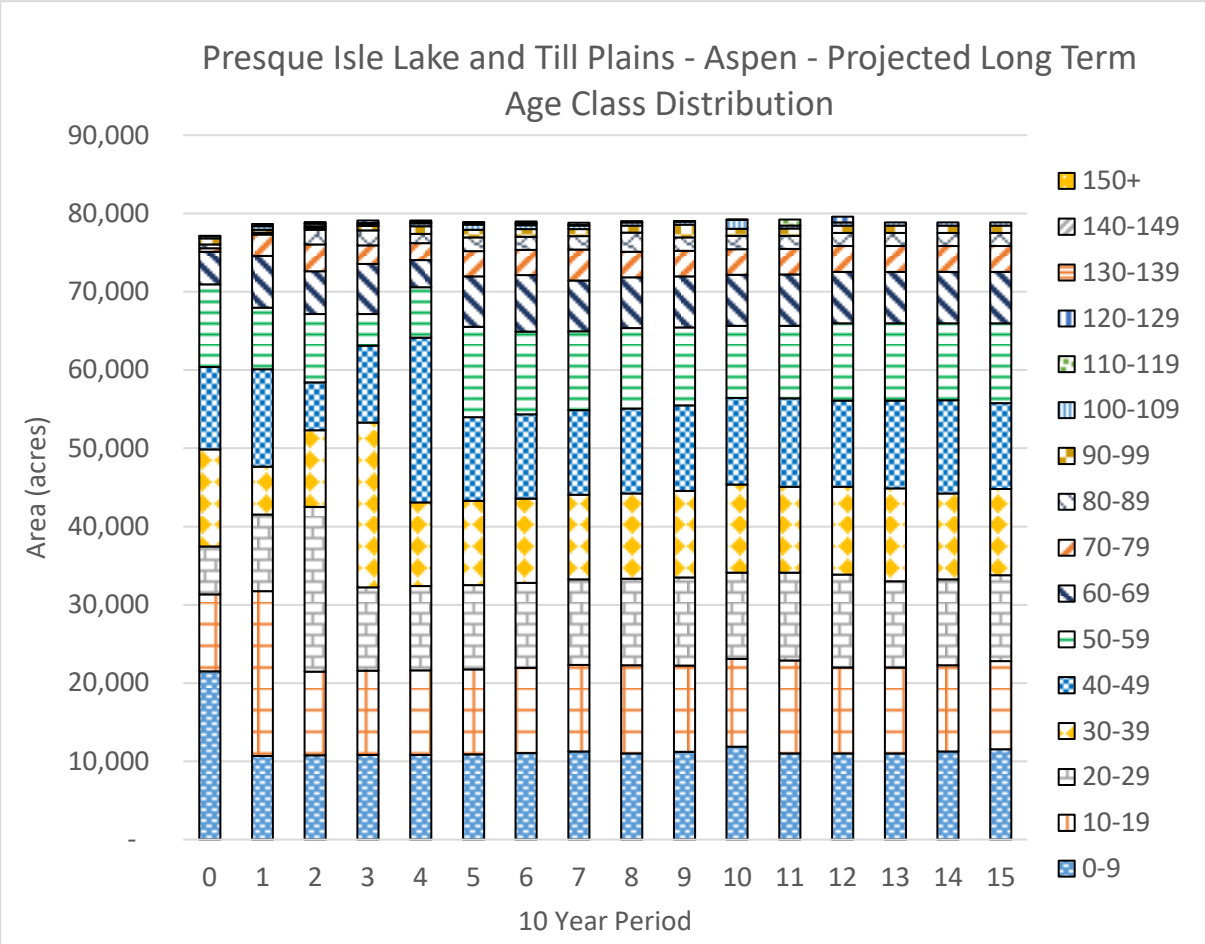


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 8,181 acres of projected clearcut harvest and 410 acres of salvage clearcut in the aspen cover type during this planning period. This plus the 1,498 acres that are projected to transition into aspen from other cover types and approximately 469 acres that are forecasted to regenerate naturally from severe ice storm damage will be close to the 10-year goal of 10,645 acres of desired establishment of aspen acres in this management area.

Planted red pine

Current condition

Most of the planted red pine cover type is currently in the 0- to 9-year-old age class and the 60- to 100-year-old age classes in the Presque Isle Lake and Till Plains Management Area (Figure 8). The age class distribution is currently unbalanced, especially in the 0-9 years old age classes where the bulk of acres occur. There is a deficit in all the five age classes from 10 to 59 years old, where the 0-9 age class will compensate for some of those deficits. Harvesting older age classes will continue to regenerate the desired amount of planted red pine over the next 10 years.

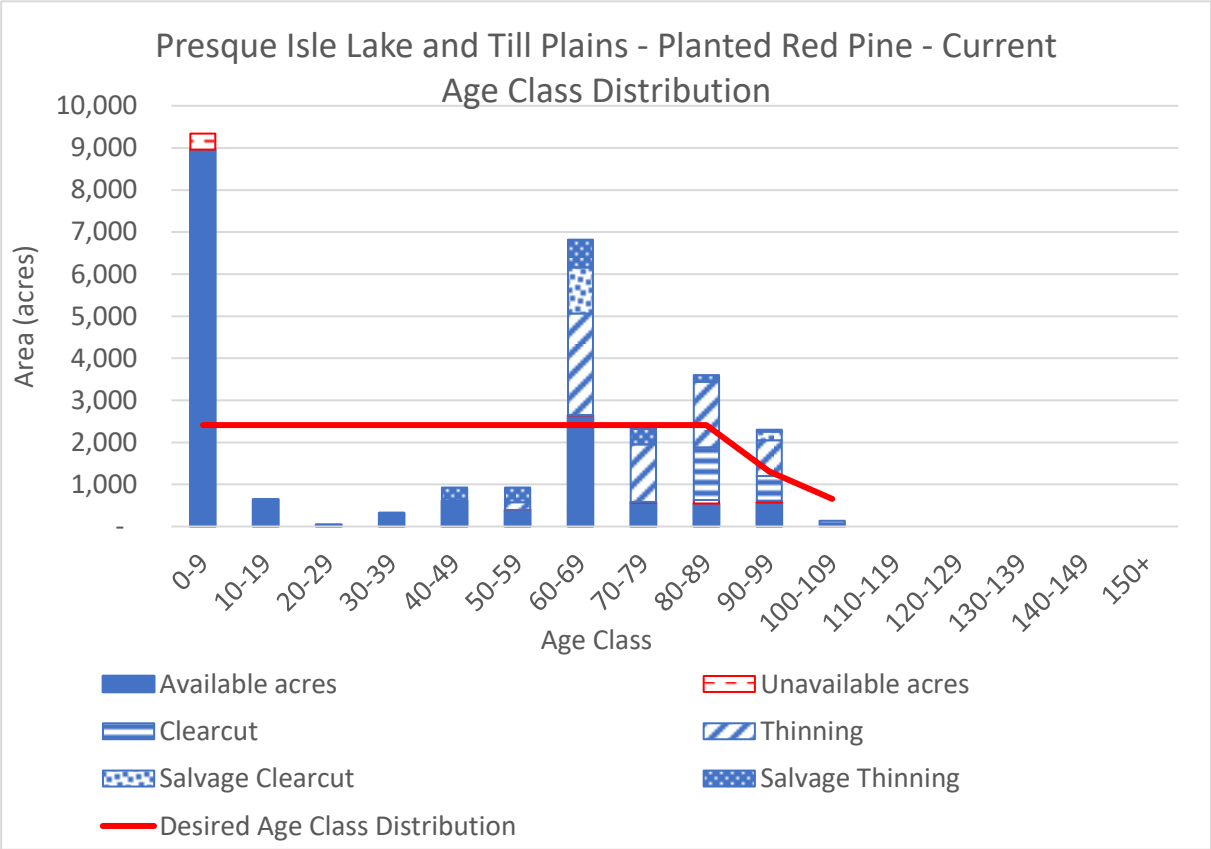


Figure 8. Current age class distribution and projected harvests in planted red pine cover type.

Desired future condition

The projected long-term cover type trend for planted red pine is decreasing initially in the first few periods before increasing to balance back out in the Presque Isle Lake and Till Plains Management Area. The long-term goal for this cover type is balanced age classes between 0 and 90 years old with tailing amounts in the 90- to 109-year-old age classes for all available red pine stands.

The end of the planning period will result in the establishment of a desirable number of acres in the 0-9 age class (Figure 9). Progress toward the long-term desired age class distribution of red pine will take many decades of even-aged management in this management area.

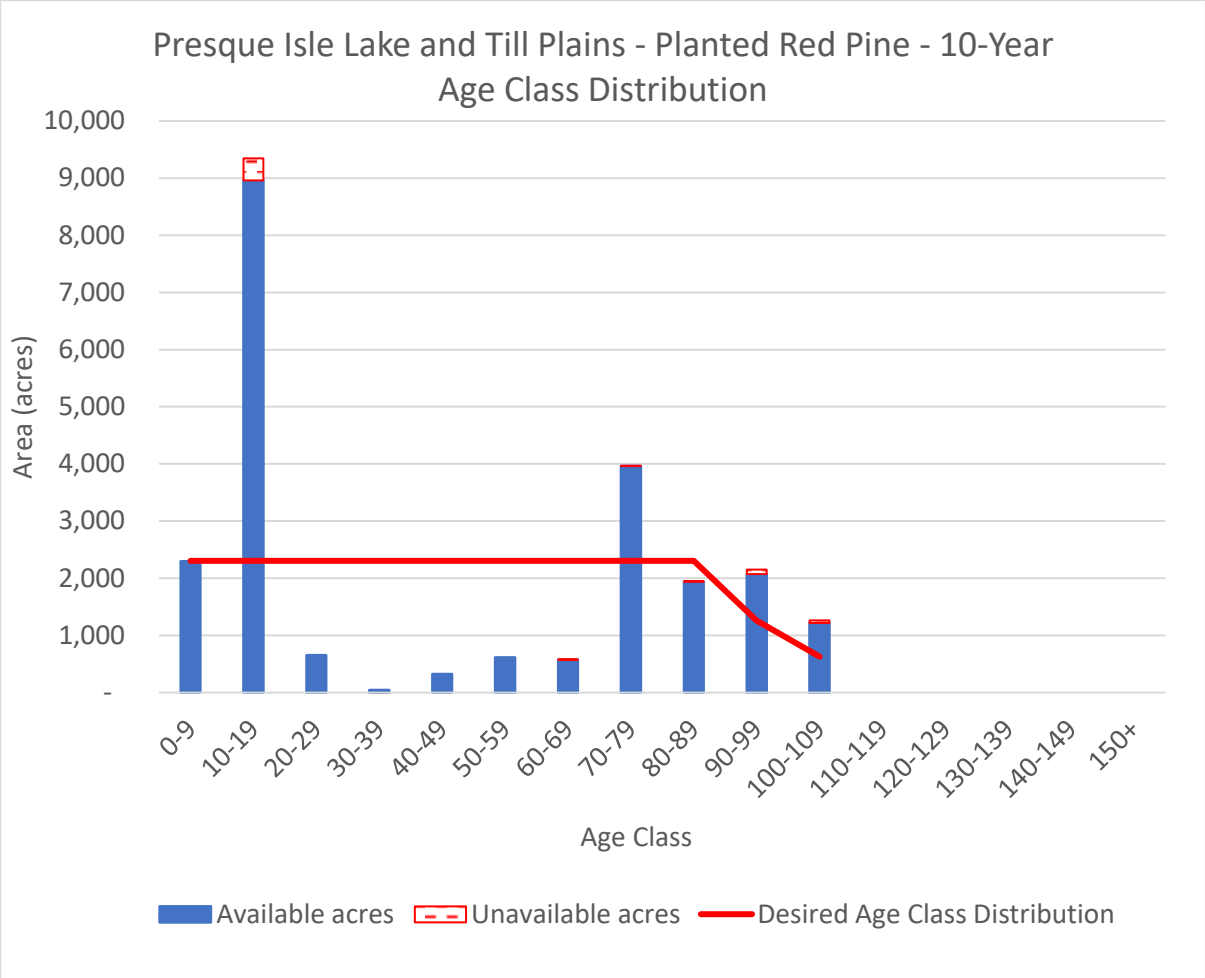


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of planted red pine is beginning to reach the desired future condition for available acres (Figure 10). As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

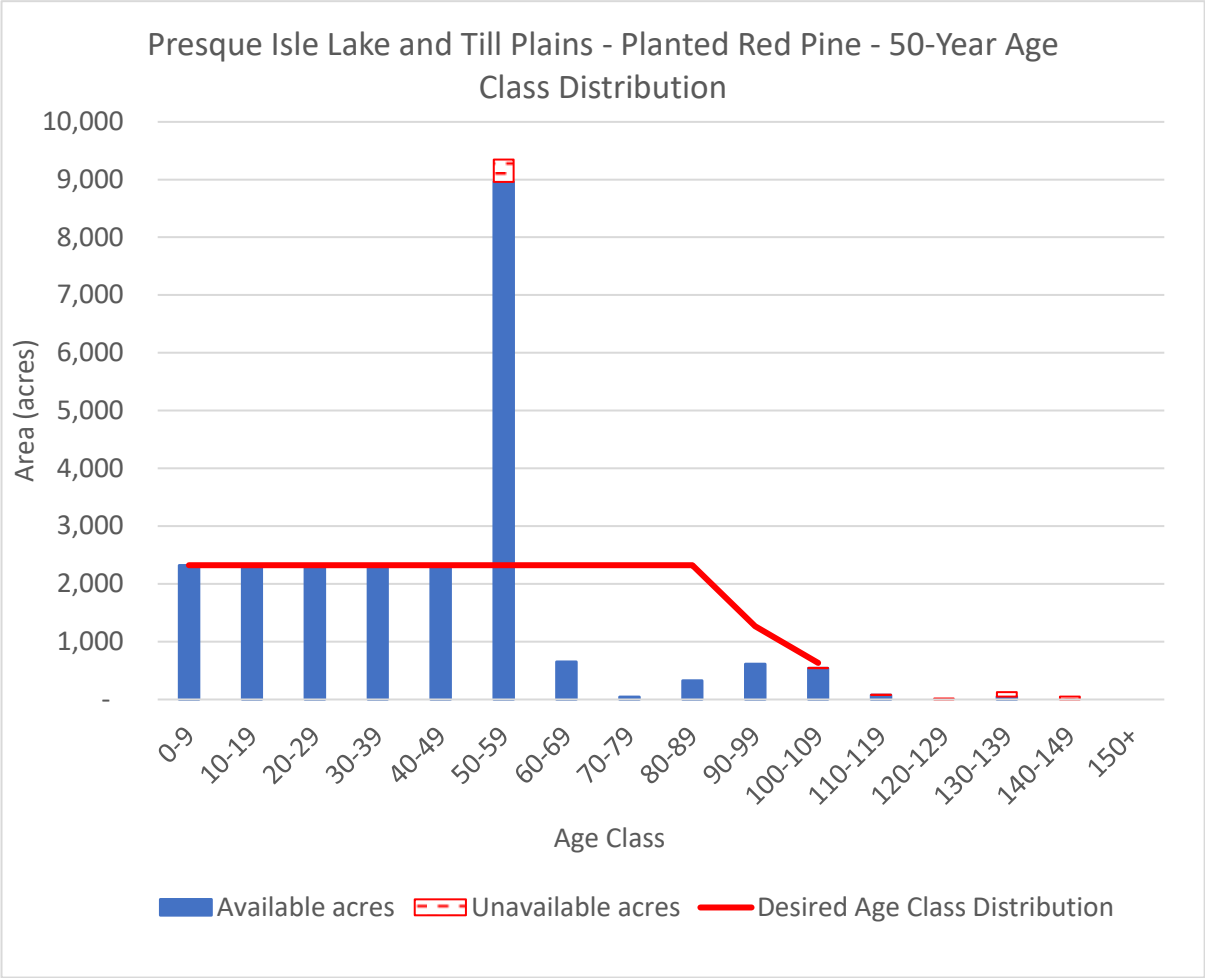


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate the manageable acres of red pine in productive growing conditions while providing an even flow of forest products (Figure 12).

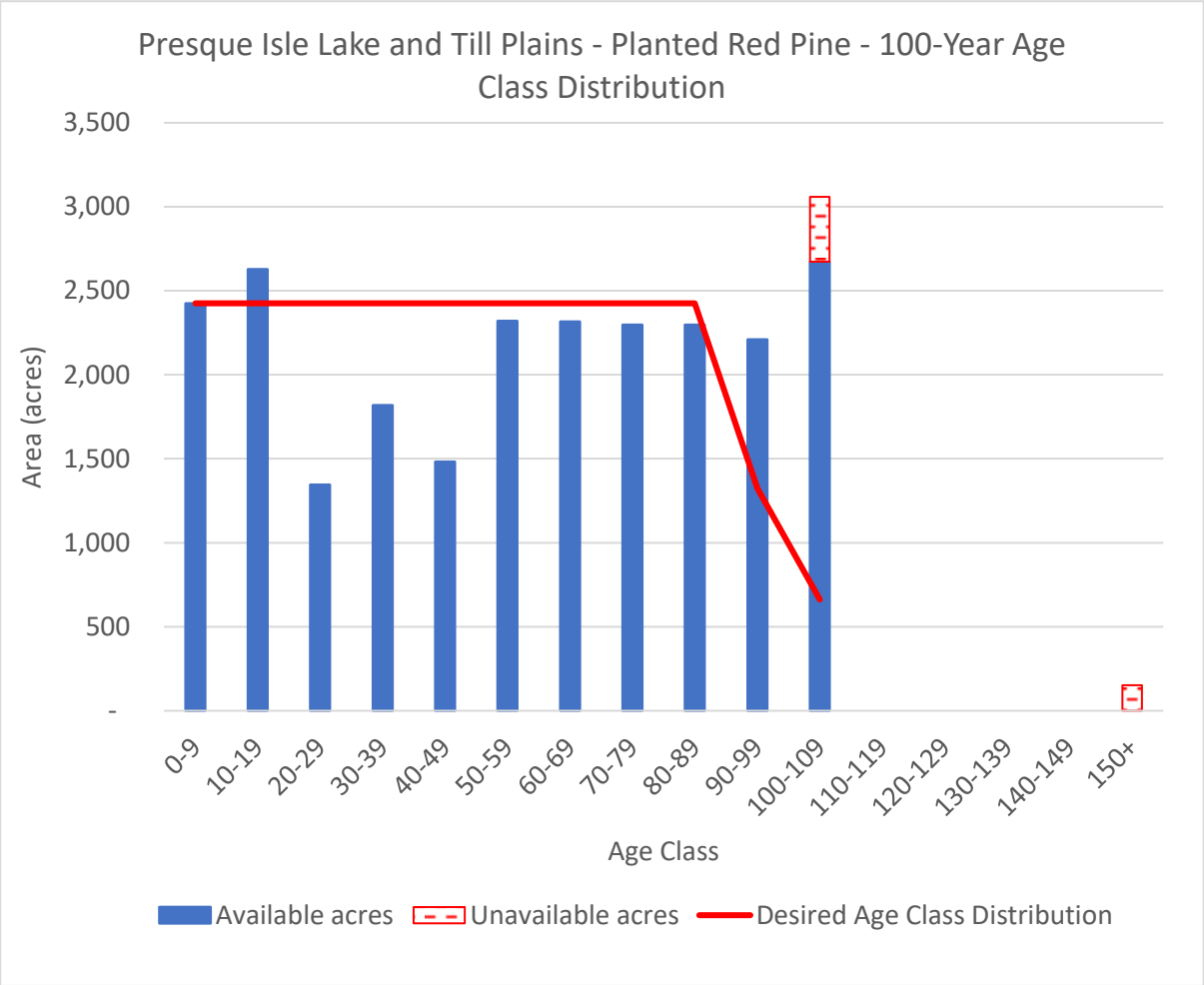


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

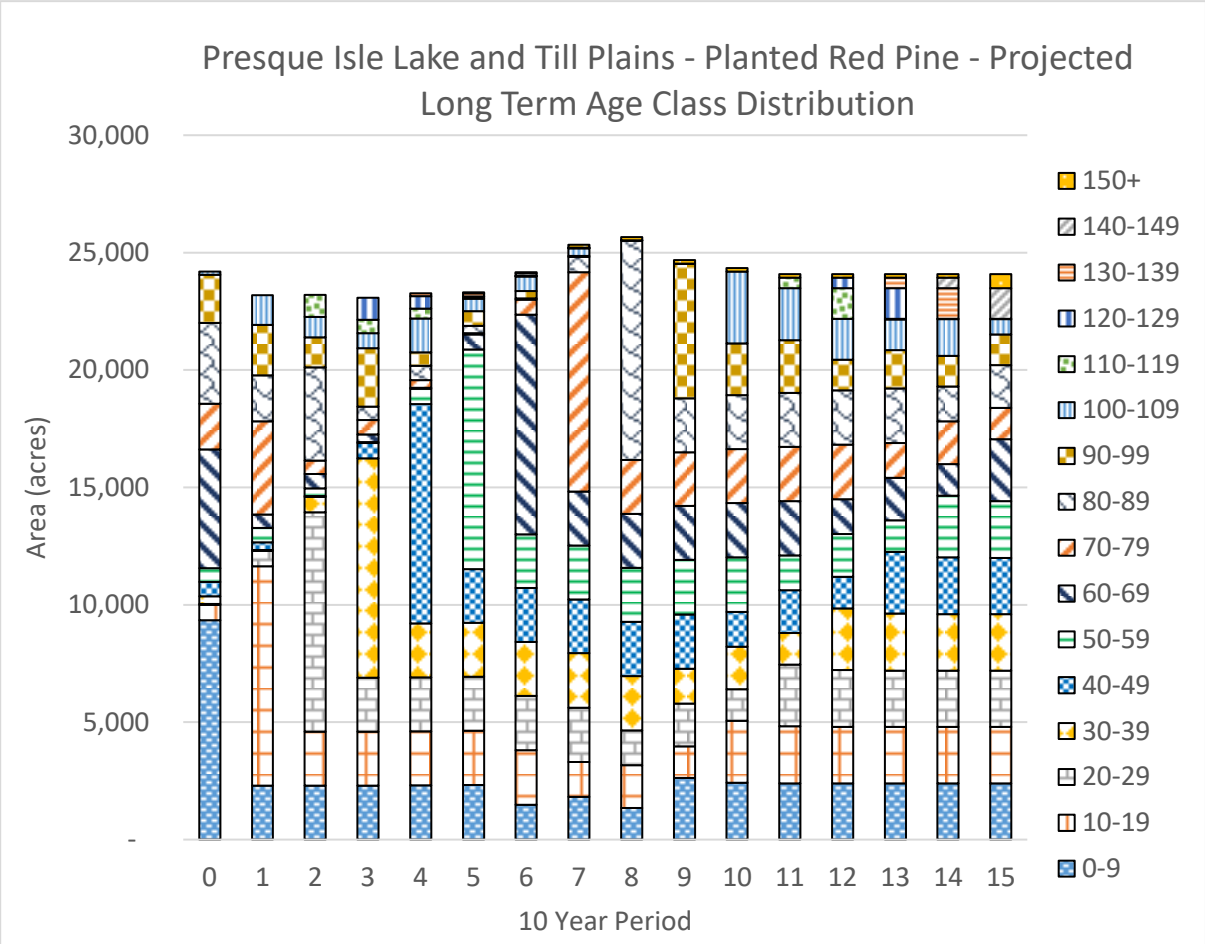


Figure 12. Projected age class distribution for all acres of planted red pine over the next 150 years.

Management actions

There are 1,977 acres of projected clearcut harvest and 1,298 acres of salvage clearcut in the planted red pine cover type during the planning period. There are 1,016 acres forecasted to transition into other cover types resulting in about 2,258 acres of established planted red pine in this 10-year period. This is very close to the desired target of 2,307 acres per decade. There are 6,372 acres of projected thinning harvests and 1,931 acres of salvage thinning in the planted red pine cover type during the planning period. This will allow some acres to be held in older age classes and provide opportunities to balance the age classes in future planning periods.

Cedar

Current condition

The Presque Isle Lake and Till Plains Management Area has a surplus of acres in age classes 90-plus years old, and very few acres in the 0- to 90-year-old age classes (Figure 13). The age class distribution is currently unbalanced across almost all the age class categories. Many of these acres are unavailable and the cedar cover type is extremely challenged in successfully regenerating in this management area. Additionally, a deficit of available acres occurs in almost all age classes. A portion of this cover type meets the habitat requirements for snowshoe hare and marten (Table 10).

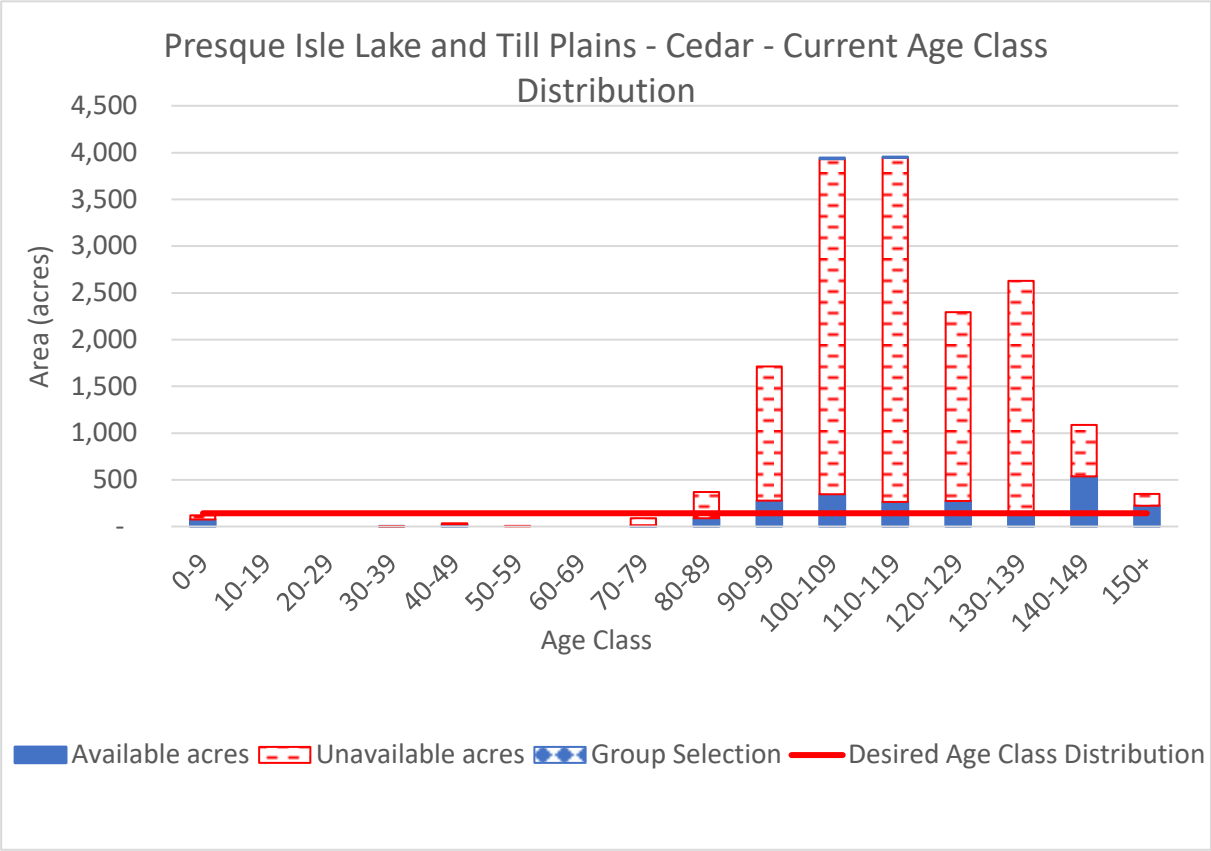


Figure 13. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Table 10. Featured species with cedar as a priority habitat cover type, habitat variables, and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Cedar	Cedar Habitat Acres - Available	Cedar Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	75	46
Marten	Age Category: 40+ Size Class: Pole, Sawlog Basal Area: 81+	1,890	13,264

Desired future condition

The projected long-term cover type trend for cedar is fairly stable in the Presque Isle Lake and Till Plains Management Area. There is a low number of available acres for distributing across age classes and most of the cedar acres are unavailable and will continue to grow into an older mature forest.

The long-term goal for this cover type is balanced age classes between 0 and 110 years old for all available cedar acres.

The end of the planning period will result in the establishment of a desirable number of acres in the 0- to 9-year-old age class (Figure 14). Progress toward the long-term desired age class distribution of cedar will take many decades to achieve the desired balanced age class condition.

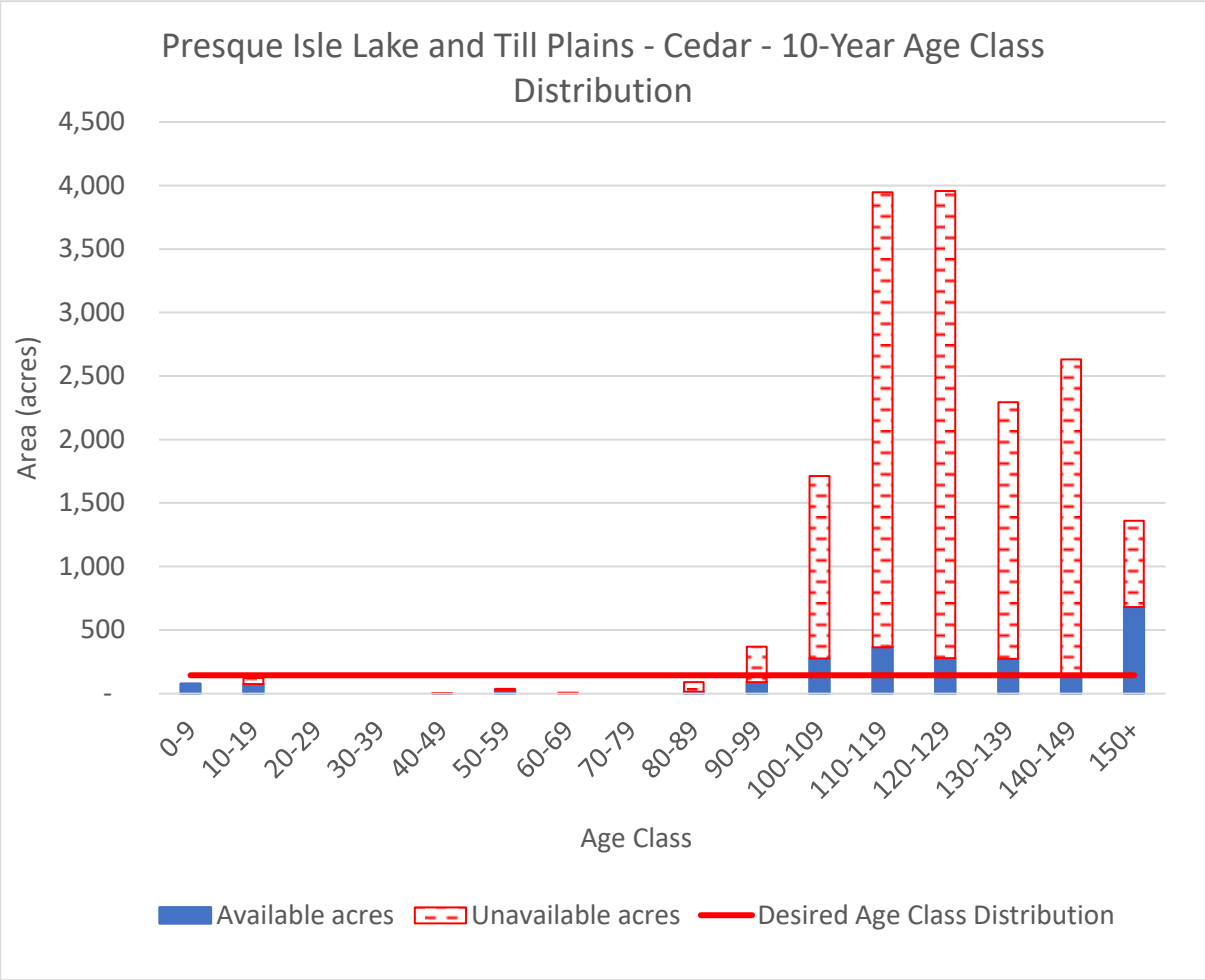


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of cedar is beginning to reach the desired future condition for available acres in the age classes between 0- and 70-year-old age classes (Figure 15). The number of acres in the older age classes, 150-plus years, continues to increase as the unavailable acres continue to move to those age classes.

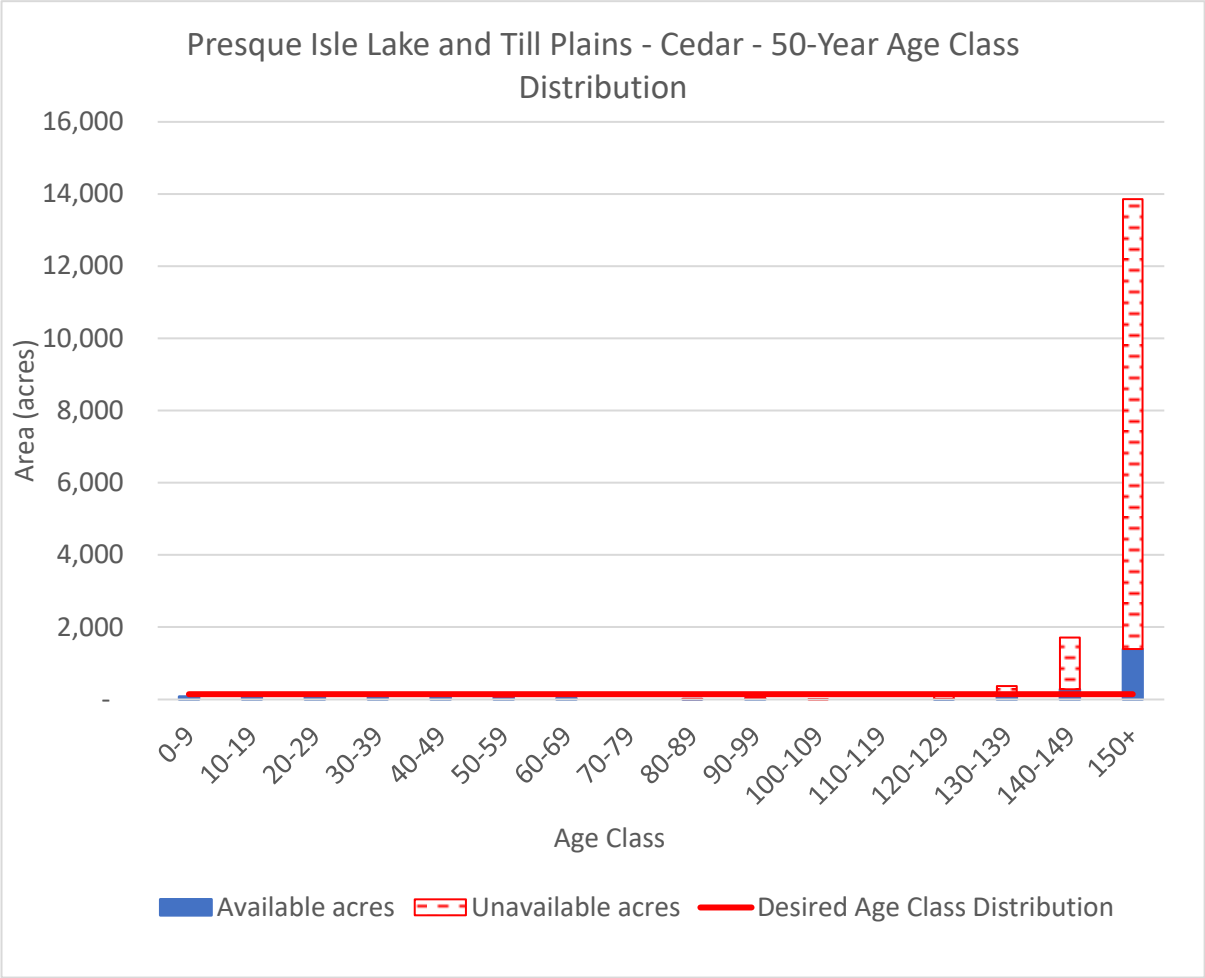


Figure 15. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate on the manageable acres of cedar cover type in productive growing conditions while providing a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 17).



Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

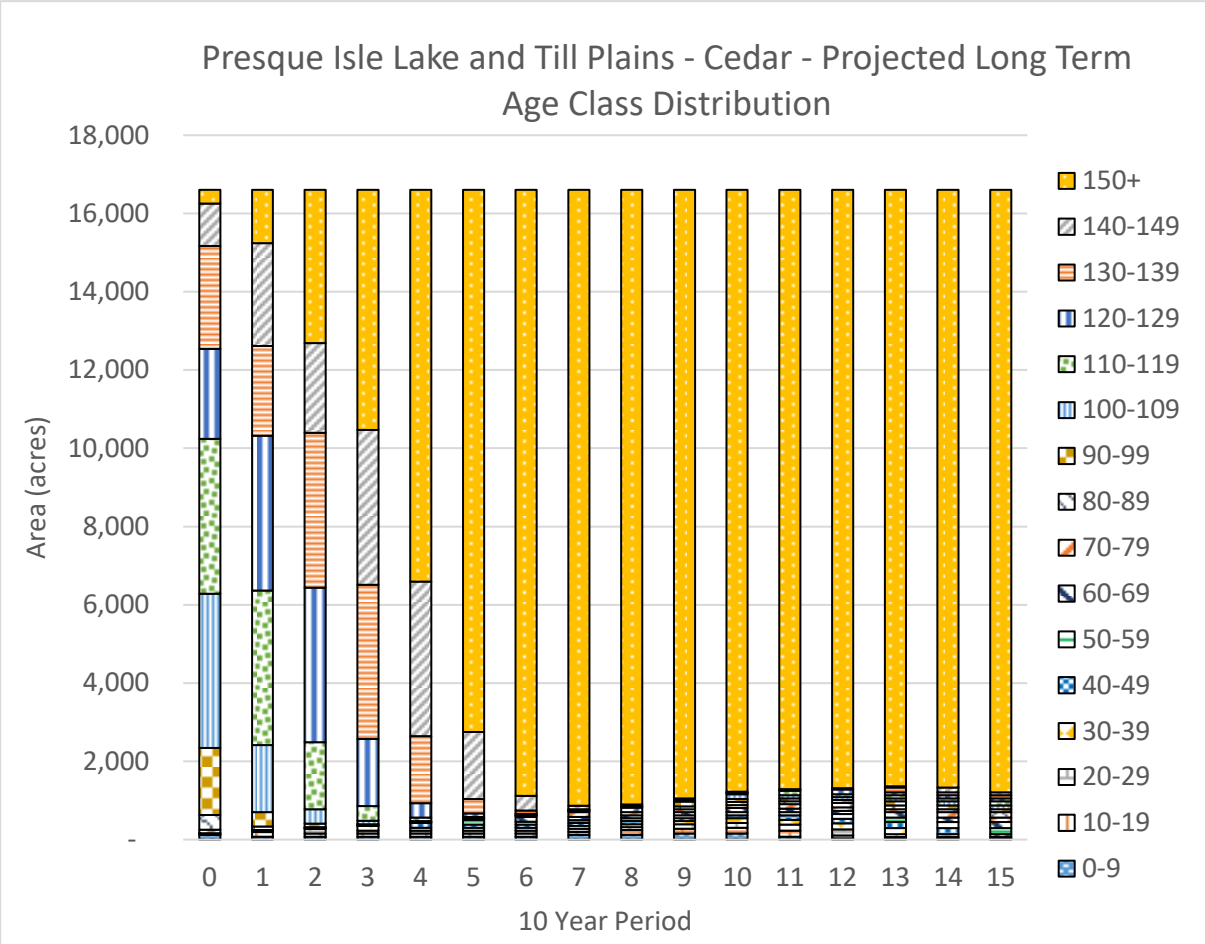


Figure 17. Projected age class distribution for all acres of cedar over the next 150 years.

Management actions

There are 76 acres of projected clearcut/seed tree and 32 acres of group selection harvests in the cedar cover type during the planning period. This is short of the desired establishment of 143 acres of cedar per decade. These slight variances are often due to the available stand sizes.

Lowland conifer

Current condition

The Presque Isle Lake and Till Plains Management Area has relatively well-balanced age classes of the available lowland conifer acres (Figure 18). The exception to this is deficit of acres in the 10- to 29-year-old age classes. Most of the acres in the lowland conifer cover type are unavailable and are in the older 60-plus age classes. A portion of this cover type meets the habitat requirements for snowshoe hare and marten (Table 11).

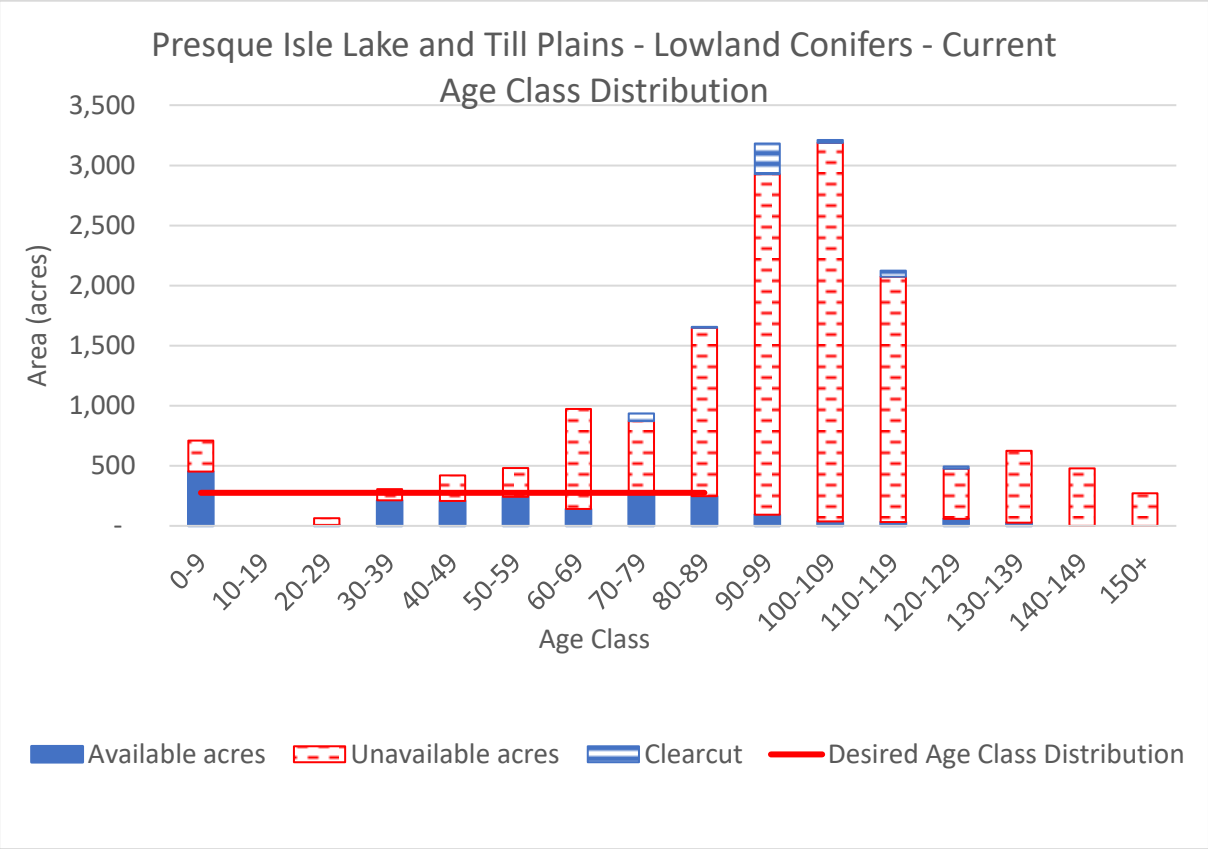


Figure 18. Current age class distribution, the desired age class distribution, and the projected harvests in the lowland conifer cover type over the 10-year planning period.

Table 11. Featured species with lowland conifers as a selected habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Lowland Conifers	Lowland Conifer Habitat Acres - Available	Lowland Conifer Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	452	258

Featured Species	Featured Species Habitat – Lowland Conifers	Lowland Conifer Habitat Acres - Available	Lowland Conifer Habitat Acres - Unavailable
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	1,055	13,264

Desired future condition

The projected long-term cover type trend for lowland conifers is fairly stable in the Presque Isle Lake and Till Plains Management Area. There are a few transitions out of this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 90 years old for all available lowland conifer acres.

The end of the planning period will result in the establishment of a desirable number of acres in the 0-9 age class (Figure 19). Progress toward the long-term desired age class distribution of lowland conifers will take many decades to achieve the desired balanced age class condition.

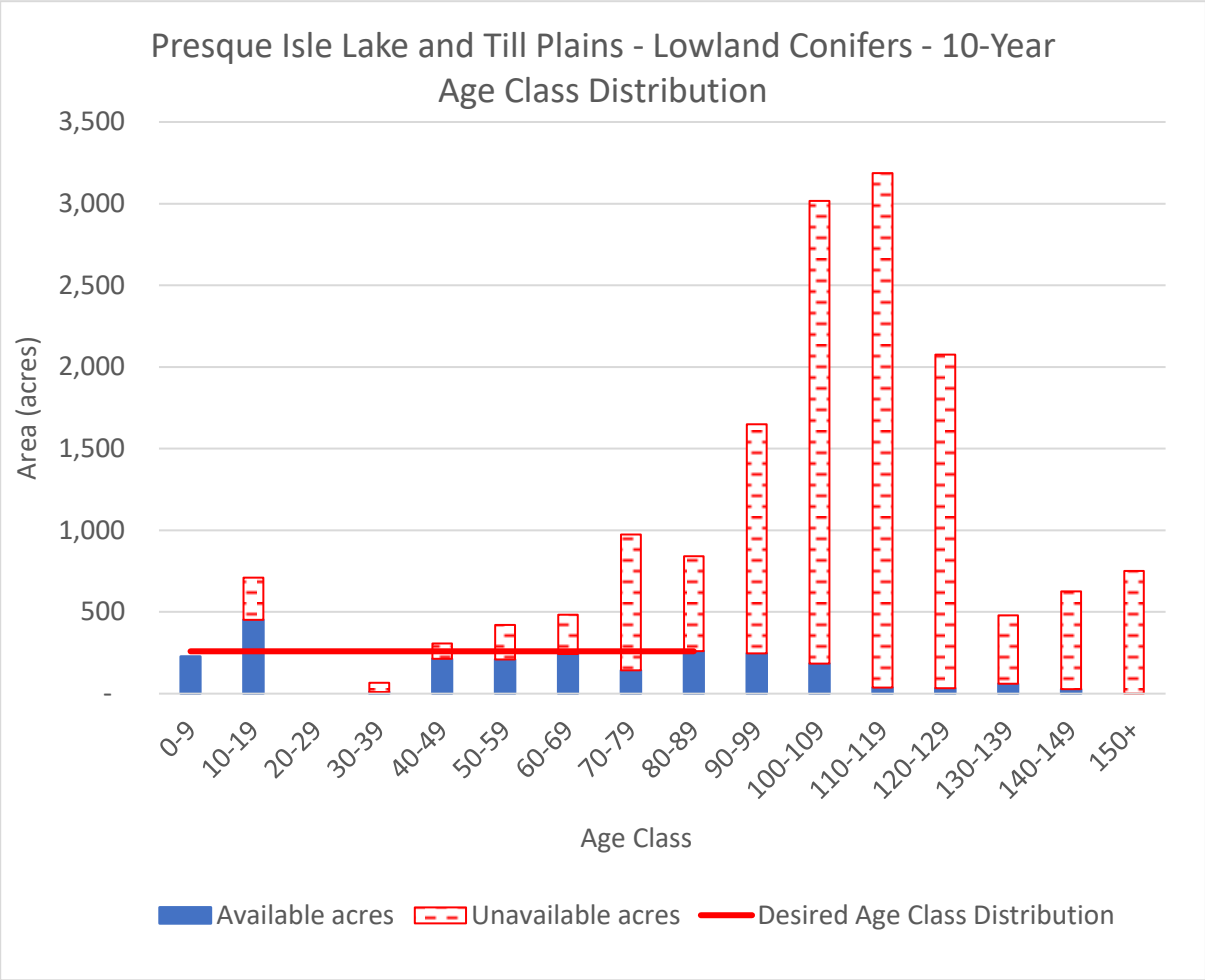


Figure 19. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of lowland conifers is beginning to reach the desired future condition for available acres in the age classes between 0- and 50-year-old age classes (Figure 20). The number of acres in the older age classes, 120-plus years, continues to increase as the unavailable acres continue to move to the older classes.

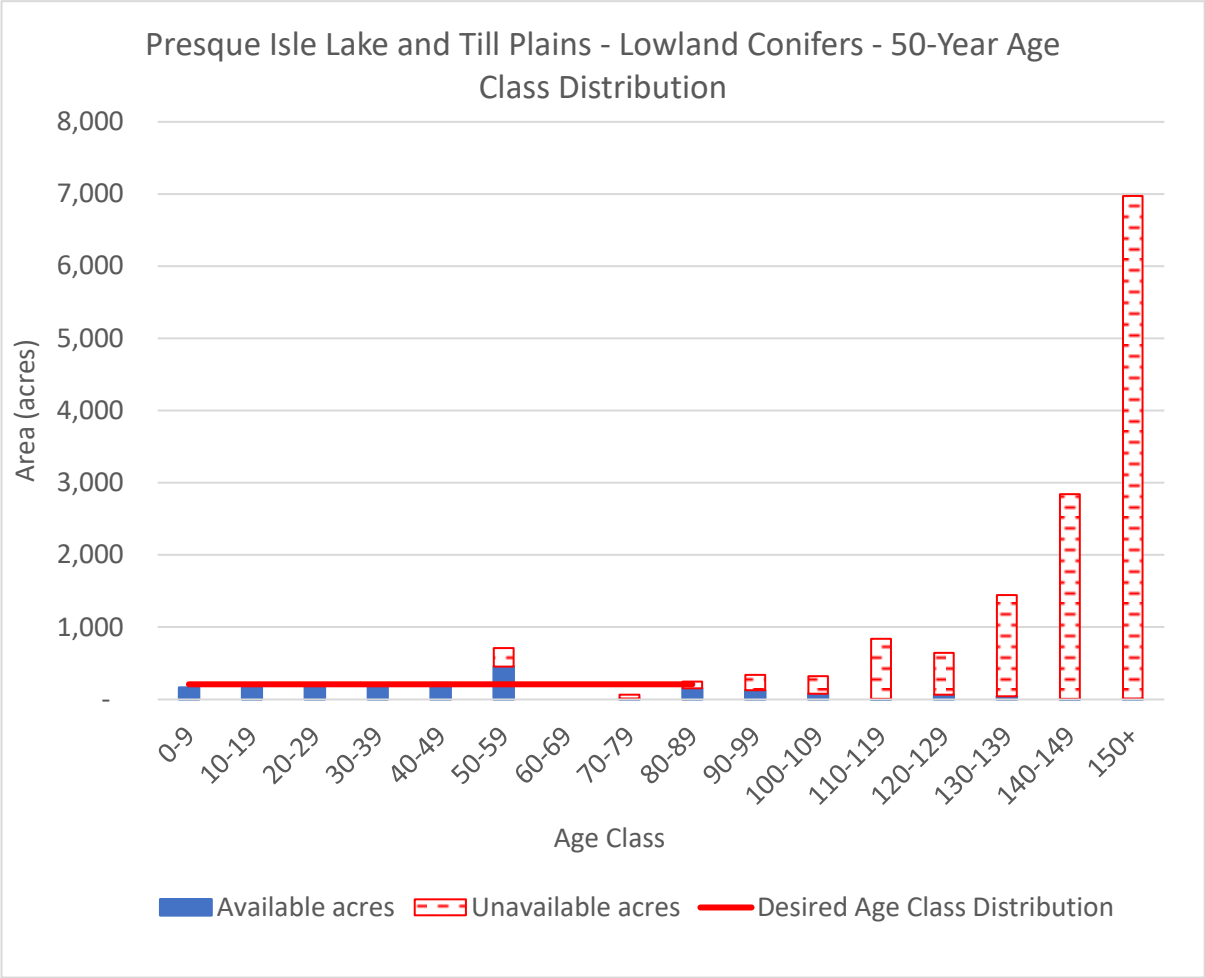


Figure 20. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 21) will concentrate on the manageable acres of lowland conifer cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 22).

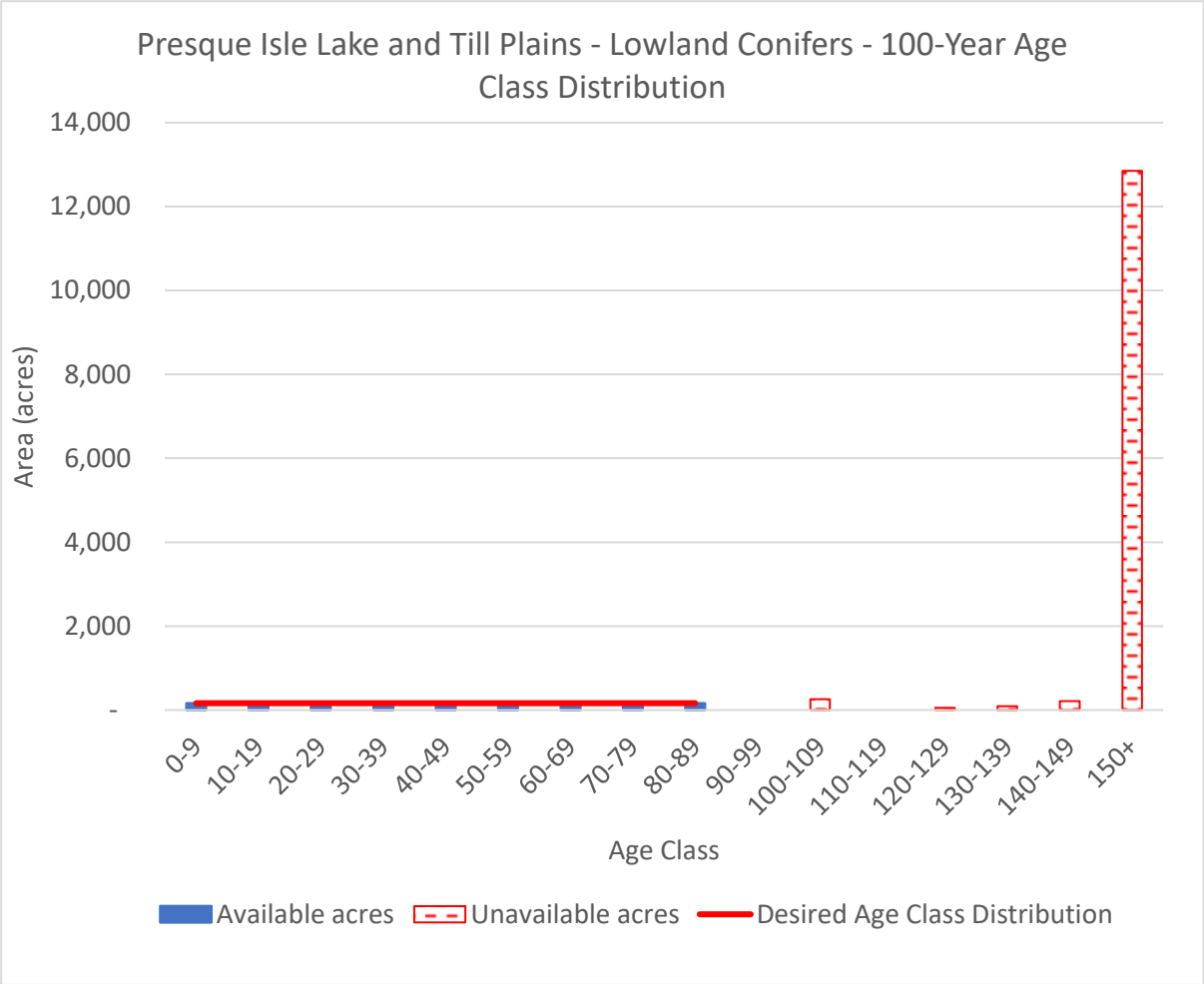


Figure 21. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

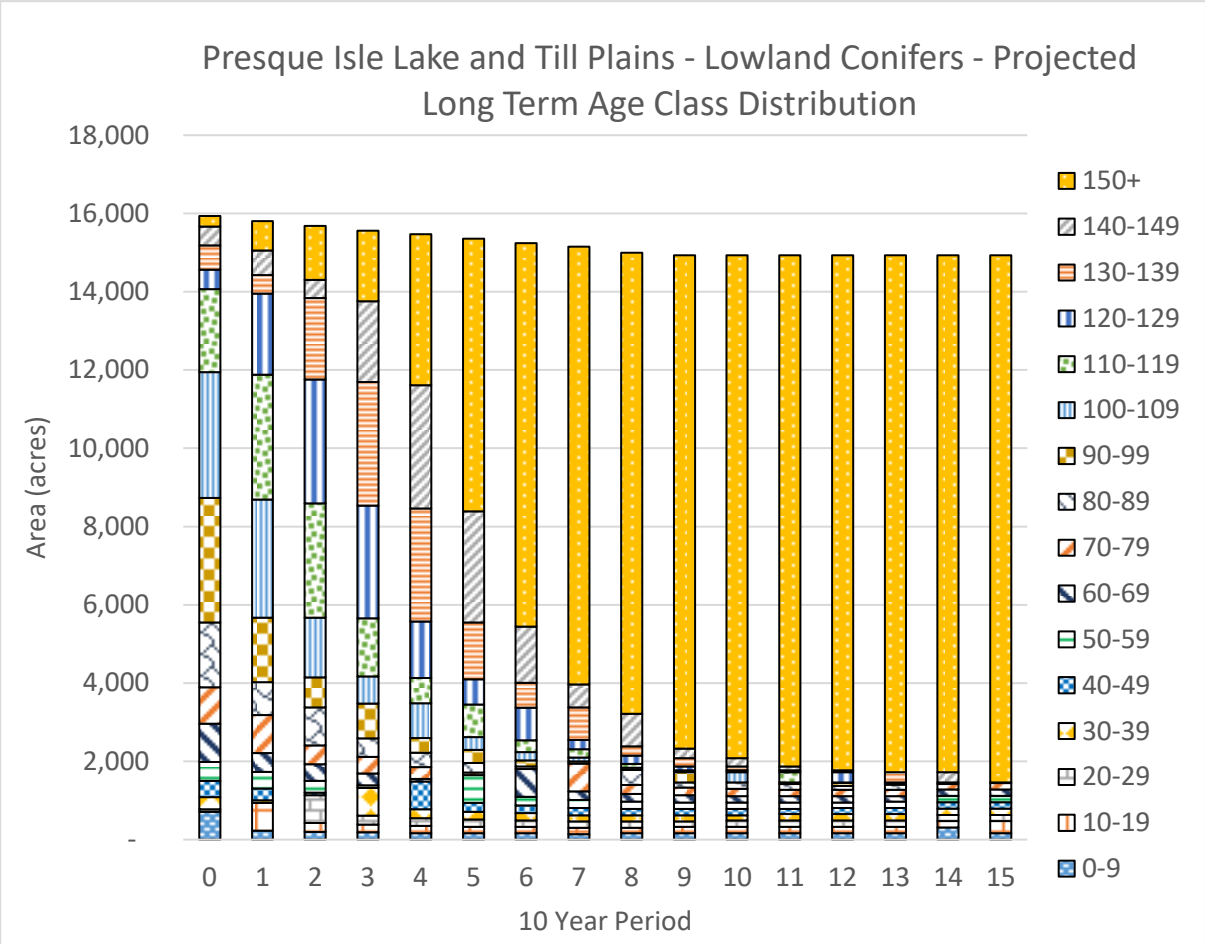


Figure 22. Projected age class distribution for all acres of lowland conifer over the next 150 years.

Management actions

There are 419 acres of projected clearcut harvest in the lowland conifer cover type during the planning period. Of those, 133 acres are projected to transition into other cover types resulting in approximately 286 acres in the 0-9 age class. This is close to the desired establishment of 259 acres of lowland conifer per decade.

Planted jack pine

Current condition

Most of the planted jack pine cover type is currently between stand ages of 0 and 49 years old in the Presque Isle Lake and Till Plains Management Area (Figure 23). The age class distribution is currently unbalanced, especially in the 0- to 49-year-old age classes where the bulk of acres occur. There is a deficit in the 0-9, 50-59 and the 60-69 age classes, which will lead to a deficit in the 0-9-year age class for the next planning period.

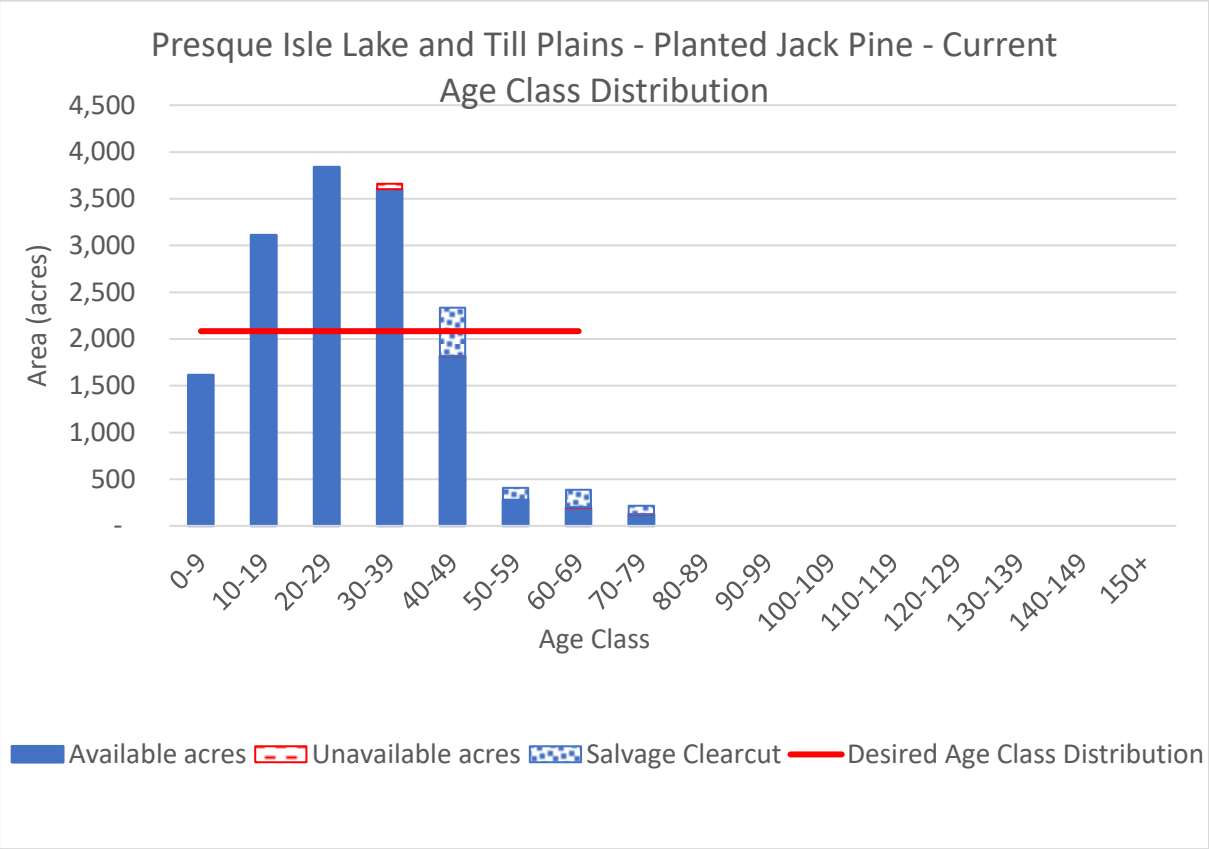


Figure 23. Current age class distribution and projected harvests in planted jack pine cover type.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available jack pine acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for Kirtland's warbler (Section 5) and snowshoe hare (Table 12). No data is provided for Kirtland's warbler, because the jack pine acres in this management area that have relevance are those within designated essential habitat. Because essential habitat was represented as a whole in the SAU, and the SAU provides unit-level management actions, refer to Section 5 for more information.

Table 12. Featured species with planted jack pine as a priority habitat cover type, habitat variables and current acres (e.g., potential habitat).

Featured Species	Featured Species Habitat – Planted Jack Pine	Planted Jack Pine Habitat Acres - Available	Planted Jack Pine Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 0-19 Size Category: Sapling	4,727	0
Kirtland's warbler	Age Category: 0-19 Size Category: Sapling	NA	NA

Desired future condition

The projected long-term cover type trend for planted jack pine is decreasing in the Presque Isle Lake and Till Plains Management Area. Some of these planted jack pine acres will convert to natural jack pine.

The long-term goal for this cover type is balanced age classes between 0 and 70 years old for all available jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of jack pine budworm outbreaks and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of a slightly less than desirable number of acres in the 0-9 age class (Figure 24). Progress toward the long-term desired age class distribution of jack pine will take many decades of even-aged management in this management area.

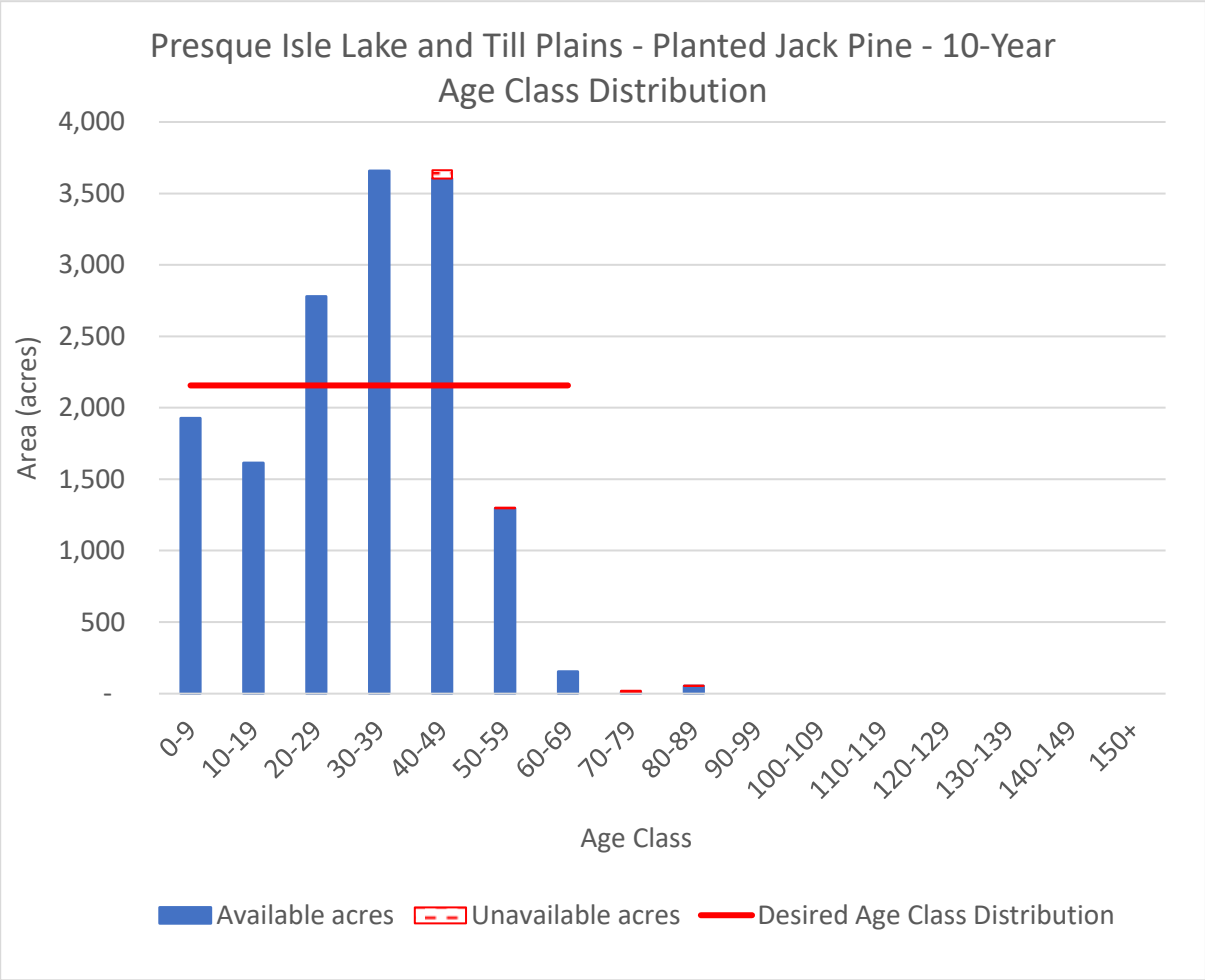


Figure 24. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of planted jack pine is beginning to reach the desired future condition for available acres (Figure 25).

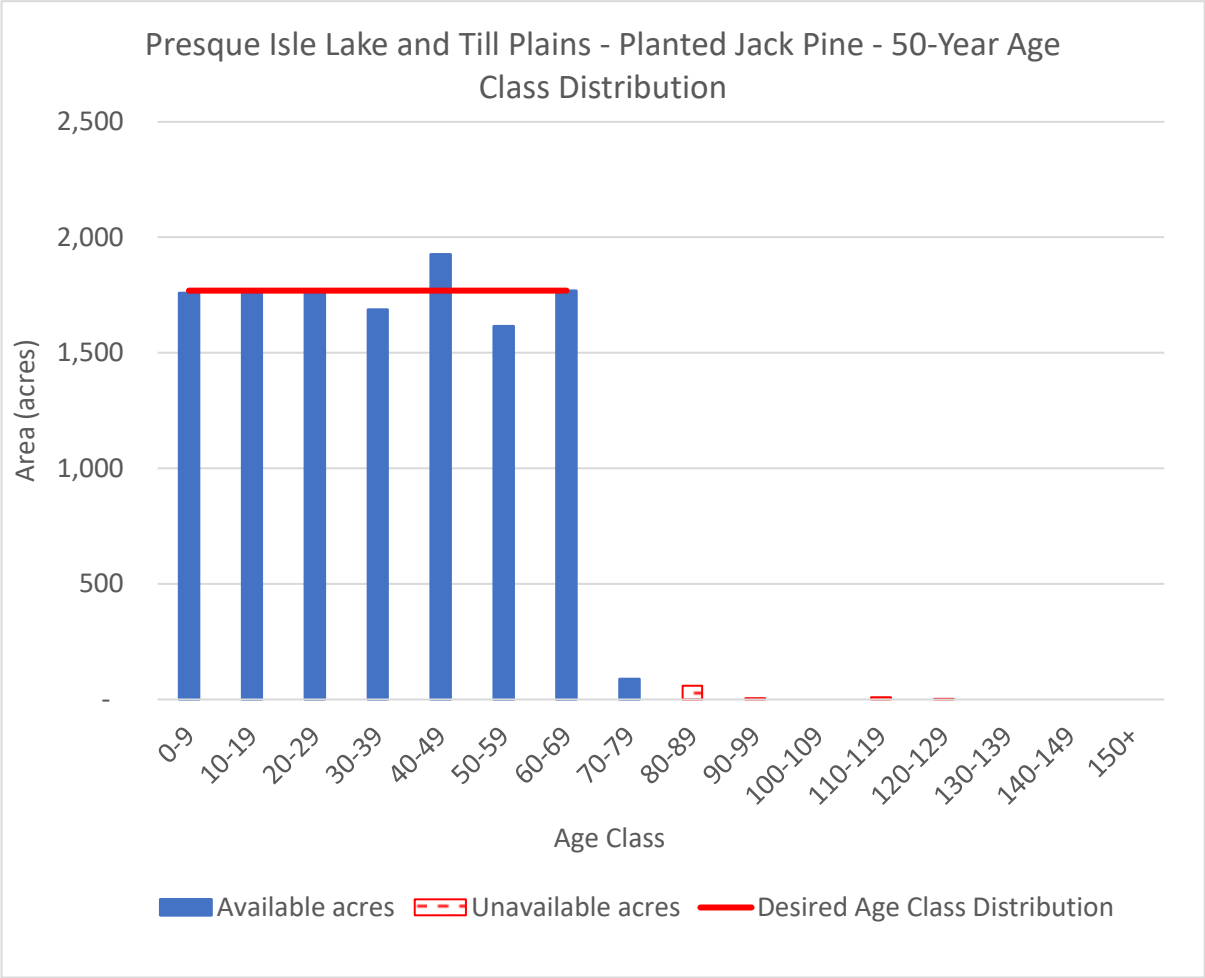


Figure 25. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 26) will concentrate the manageable acres of jack pine in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 27).

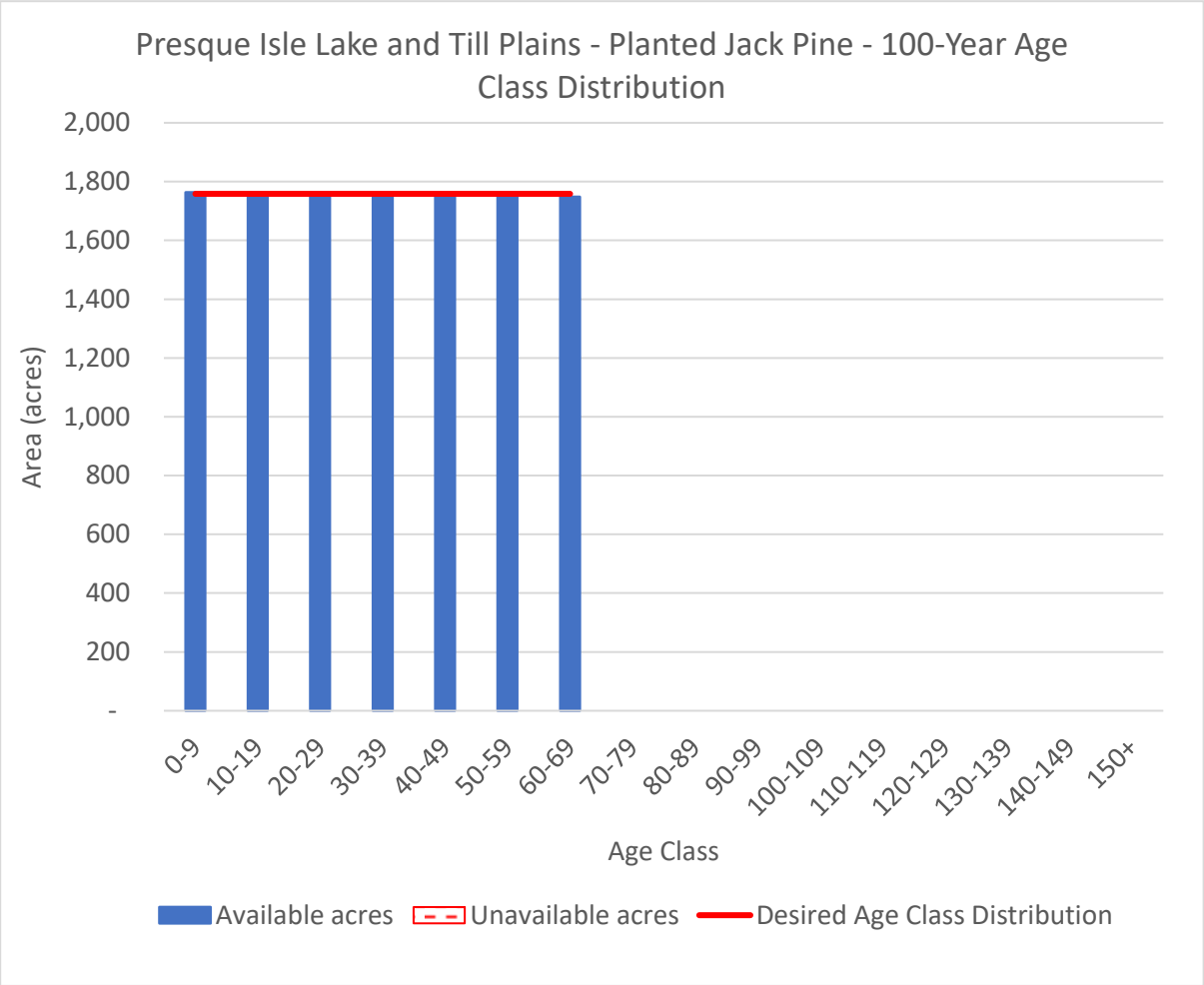


Figure 26. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

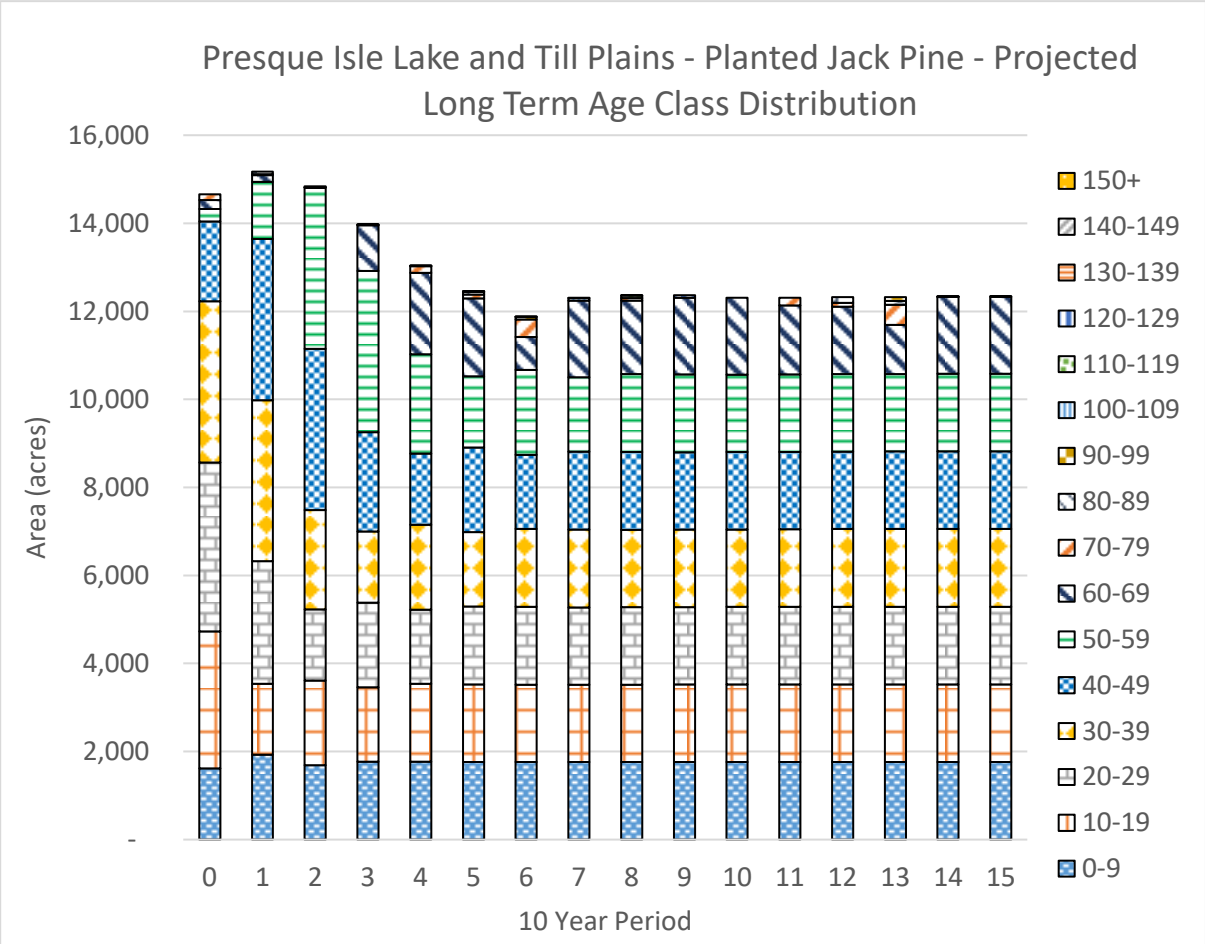


Figure 27. Projected age class distribution for all acres of planted jack pine over the next 150 years.

Management actions

There are 916 acres of projected salvage clearcut harvests in the planted jack pine cover type during the planning period. There are also another 508 acres that are severely damaged from the 2025 ice storm but may not be merchantable for commercial harvests that are projected to be replanted. These acres plus 513 acres of planted jack pine conversions from other cover types is close but still falls short of the desired establishment of 2,157 acres of planted jack pine per decade because of the current unbalanced age class condition and lack of merchantable acres.

Conservation area network

High conservation value areas

There are up to nine different high conservation value area (HCVA) types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas within the Presque Isle Lake and Till Plains Management Area.

High Conservation Value Area Type and Name	Acres
Eastern Massasauga Managed Land	**6,039**
	6,039
Elk Management Area	**86,118**
	86,118
Forest Habitat Core Interior	**3,153**
	3,153
Kirtland's Warbler Habitat	**11,762**
Black Lake	1,796
Brush Crk	1,901
Clear Lake	8,065
Natural Rivers Vegetative Buffer	**322**
	322
Natural Rivers Zoning District	**647**
(	647
State Wildlife Management Areas	**1,970**
Dog Lake Flooding SWMA	812
Stoney Creek Flooding SWMA	1,158
Verified Type 1 and Type 2 Old Growth	**51**
Type 1 Old Growth	20
Type 2 Old Growth	31
GEMS	**2,336**
Lee Grande Ranch	2,336
Grand Total	**112,398**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct

Element Occurrence Rank	State Rank	Global Rank
		?: inexact

Table 15. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	B	G3G5	S4	4
Existing ERA	Bog	BC			1
Existing ERA	Bog	C	G3G5	S4	1
Existing ERA	Dry Northern Forest	X	G3?	S3	1
Existing ERA	Dry-mesic Northern Forest	BC			3
Existing ERA	Floodplain Forest	BC		S3	1
Existing ERA	Intermittent Wetland	AB			1
Existing ERA	Intermittent Wetland	AB	G2	S3	1
Existing ERA	Intermittent Wetland	B			2
Existing ERA	Muskeg	B	G4G5	S3	2
Existing ERA	Muskeg	BC			4
Existing ERA	Muskeg	BC	G4G5	S3	1
Existing ERA	Northern Shrub Thicket	B	G4	S5	3
Existing ERA	Northern Shrub Thicket	BC		S5	1
Existing ERA	Northern Wet Meadow	B			1
Existing ERA	Pine Barrens	BC	G3	S2	2
Existing ERA	Poor Conifer Swamp	BC			2
Existing ERA	Poor Fen	B	G3	S3	3
Existing ERA	Rich Conifer Swamp	B	G4	S3	2
Existing ERA	Rich Tamarack Swamp	B			1
Existing ERA	Sinkhole	B	G3G5	S2	1
Existing ERA	Wet-mesic Sand Prairie	C	G2G3	S2	1
Existing ERA	Wooded Dune and Swale Complex	C	G3	S3	1
Proposed ERA	Poor Fen	BC	G3	S3	1
Grand Total					**41**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 16) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the Presque Isle Lake and Till Plains Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**207**
Black Mountain Non-Motorized Pathway	1
NEST	19
Red Pine stand	3
Stoney Creek Camp Sites	8
Unspecified	178
Habitat Area or Habitat Corridor	**368**
54041033	96
Floodplain Forest	241
Large Red Pine Stand	18
Lowland Natural Pine	14
Possible Type 1 or Type 2 Old Growth	**45**
--	45
Spring, Wetlands, or Riparian Areas	**17**
Seep with Spring	2
Unspecified	5
Vernal Pool A	10
Visual Management Areas	**17**
Large pine buffer stand	6
M-68 White Pine	4
Scenic Turn Off	7
Grand Total	**654**

Table 17. Static special conservation areas within the Presque Isle Lake and Till Plains Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**473**
Northern Shrub Thicket		32
Northern Wet Meadow		72
Poor Conifer Swamp		368
Designated Trout and Cold Water Stream Buffer		**4,175**
		1,897
Adair Creek		21
Berry Creek		100
Black River		44
Brush Creek		137

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Canada Creek		170
Cold Creek		76
Crumley Creek		36
East Branch Black River		199
East Branch Rainy River		27
Elliot Creek		8
Fisher Creek		62
Fox Creek		1
Gokee Creek		22
Grass Creek		36
Hardwood Creek		15
Hartwick Creek		7
Haymeadow Creek		14
Indian Creek		17
Johnson Creek		23
Lewis Branch Adair Creek		75
Little Brush Creek		10
Little McMasters Creek		56
Little Mud Creek		36
Little Ocqueoc River		67
Little Pigeon River		34
Little Sturgeon River		68
Long Lake Creek		8
Maple River		31
McIntosh Creek		31
Middle Branch Little Pigeon River		23
Miller Creek		120
Milligan Creek		16
Minnehaha Creek		9
Mud Creek		36
Mullett Creek		22
North Branch Thunder Bay River		29
Ocqueoc River		100
Packer Creek		52
Pigeon River		23
Rattlesnake Creek		58
Scott Creek		11
Silver Creek		78
Stewart Creek		11
Sturgeon River		11
Sturgis Creek		2

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Tomahawk Creek		105
Twin Lakes Creek		7
Van Hetton Creek		69
Weed Creek		17
West Branch Upper Rainy River		9
West McMasters Creek		34
Wilkes Creek		10
Designated Trout and Coldwater Streams	**152.9**	
<Null>	69.0	
Adair Creek	0.8	
Berry Creek	3.6	
Black River	1.7	
Brush Creek	5.1	
Canada Creek	6.4	
Cold Creek	2.7	
Crumley Creek	1.3	
East Branch Black River	7.5	
East Branch Rainy River	0.9	
Elliot Creek	0.2	
Fisher Creek	2.2	
Gokee Creek	0.8	
Grass Creek	1.4	
Hardwood Creek	0.6	
Hartwick Creek	0.3	
Haymeadow Creek	0.5	
Indian Creek	0.6	
Johnson Creek	0.9	
Lewis Branch Adair Creek	2.7	
Little Brush Creek	0.4	
Little McMasters Creek	2.0	
Little Mud Creek	1.3	
Little Ocqueoc River	2.4	
Little Pigeon River	1.3	
Little Sturgeon River	2.5	
Long Lake Creek	0.3	
Maple River	1.3	
McIntosh Creek	1.1	
Middle Branch Little Pigeon River	0.9	
Miller Creek	4.4	
Milligan Creek	0.5	
Minnehaha Creek	0.3	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Mud Creek	1.3	
Mullett Creek	0.8	
North Branch Thunder Bay River	1.0	
Ocqueoc River	3.7	
Packer Creek	1.9	
Pigeon River	0.9	
Rattlesnake Creek	2.1	
Scott Creek	0.4	
Silver Creek	2.9	
Stewart Creek	0.4	
Sturgeon River	0.3	
Sturgis Creek	0.1	
Tomahawk Creek	3.8	
Twin Lakes Creek	0.2	
Van Hetton Creek	2.5	
Weed Creek	0.6	
West Branch Upper Rainy River	0.3	
West McMasters Creek	1.2	
Wilkes Creek	0.4	
Important Bird Areas		**86,519**
Kirtland's Warbler Management Units & Guide's Rest		15,578
Pigeon Country moraines		70,941
Mussel Stream Group 1 - State special concern	**6.2**	
Bowen Creek-Black River	6.2	
Mussel Stream Group 2 - State threatened or endangered	**0.0**	
Mullet Lake	0.0	
Natural Beauty Roads	**1.2**	
S Ward Branch Rd	1.2	
Non-dedicated Natural Areas		**947**
Natural Area Dog Lake Wild Area, Pigeon River Coun		659
Natural Area Duck Lake-Mud Lake		236
Natural Area Lake Sixteen		52
Wood Turtle Stream 100ft Buffer		**283**
		11
Black River		68
Grass Creek		32
Indian River		17
Maple River		21

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Ocqueoc River		115
Pigeon River		10
Sturgeon River		8
Wood Turtle Stream 660ft Buffer		**1,876**
		86
Black River		484
Crumley Creek		9
Grass Creek		203
Indian River		110
Maple River		123
Ocqueoc River		688
Pigeon River		111
Sturgeon River		62
Grand Total	**160.3**	**94,273**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (*Table* 18, Table 20 and Table 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18*. Rare animal and plant species conservation status key.*

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal occurrence in the Presque Isle Lake and Till Plains Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T		7
Animal	Acipenser fulvescens	Lake sturgeon	T		4
Animal	Alasmidonta marginata	Elktoe	SC		1
Animal	Alasmidonta viridis	Slippershell	T		1
Animal	Appalachia arcana	Secretive locust	SC		6
Animal	Appalachina sayanus	Spike-lip crater	SC		2

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Atrytonopsis hianna	Dusted skipper	SC		2
Animal	Bombus affinis	Rusty-patched bumble bee	E	LE	1
Animal	Bombus borealis	Northern amber bumble bee	SC		4
Animal	Bombus terricola	Yellow banded bumble bee	SC		3
Animal	Brychius hungerfordi	Hungerford's crawling water beetle	E	LE	3
Animal	Buteo lineatus	Red-shouldered hawk	SC		44
Animal	Cambarus robustus	Big water crayfish	SC		1
Animal	Chlidonias niger	Black tern	T		1
Animal	Cincinnatia cincinnatiensis	Campeloma spire snail	SC		1
Animal	Coregonus artedi	Lake herring or Cisco	T		4
Animal	Elliptio complanata	Eastern elliptio	SC		1
Animal	Emydoidea blandingii	Blanding's turtle	SC		10
Animal	Galba galbana	Boreal fossaria	SC		1
Animal	Gavia immer	Common loon	T		19
Animal	Glaucomys sabrinus	Northern flying squirrel	SC		1
Animal	Glyptemys insculpta	Wood turtle	T		11
Animal	Haliaeetus leucocephalus	Bald eagle	SC		27
Animal	Hypocoena basistriga	Basistriga owlet moth	SC		1
Animal	Lasmigona compressa	Creek heelsplitter	SC		3
Animal	Lasmigona costata	Flutedshell	SC		1
Animal	Lithobates palustris	Pickerel frog	SC		3
Animal	Microtus pinetorum	Woodland vole	SC		1
Animal	Myotis lucifugus	Little brown bat	T		3
Animal	Necturus maculosus	Mudpuppy	SC		3
Animal	Notropis anogenus	Pugnose shiner	E		1
Animal	Opheodrys vernalis	Smooth green snake	SC		6
Animal	Pandion haliaetus	Osprey	SC		7
Animal	Planorbella smithi	An aquatic snail (no common name)	SC		1
Animal	Ptychobranchus fasciolaris	Kidney shell	SC		1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Sagittunio nasutus	Eastern pondmussel	E		4
Animal	Setophaga discolor	Prairie warbler	SC		1
Animal	Setophaga kirtlandii	Kirtland's warbler	E		2
Animal	Sideridis congermana	German cousin moth	SC		1
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	6
Animal	Stenelmis douglasensis	Douglas stenelmis riffle beetle	SC		1
Animal	Sympistis piffardi	3-striped oncocnemis	SC		2
Animal	Vertigo elatior	Tapered vertigo	SC		1
Total	-	-	-	-	**204**

Table 20. Rare plant occurrence in the Presque Isle Lake and Till Plains Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Botrychium mormo	Goblin moonwort	E		1
Plant	Callitriche heterophylla	Large water starwort	T		1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T		4
Plant	Cirsium hillii	Hill's thistle	SC		9
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		4
Plant	Drosera anglica	English sundew	SC		2
Plant	Eleocharis engelmannii	Engelmann's spike rush	SC		1
Plant	Festuca altaica	Rough fescue	SC		1
Plant	Helianthus hirsutus	Whiskered sunflower	SC		1
Plant	Juncus militaris	Bayonet rush	T		5
Plant	Mimulus michiganensis	Michigan monkey flower	E	LE	2
Plant	Potamogeton hillii	Hill's pondweed	T		1
Plant	Prunus umbellata	Alleghany or Sloe plum	SC		2
Plant	Rorippa aquatica	Lake cress	SC		3
Plant	Stachys pilosa	Hairy hedge-nettle	SC		3
Grand Total	-	-	-	-	40

Table 21. Other rare occurrence in the Presque Isle Lake and Till Plains Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	-	Great blue heron rookery			3
Total	-	-	-	-	**3**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 22).

Table 22. Non-ecological reference area natural communities in the Presque Isle Lake and Till Plains Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Bog	B	S4	G3G5	2
Bog	BC	S4	G3G5	1
Bog	C	S4	G3G5	1
Dry Northern Forest	X	S3	G3?	1
Dry-mesic Northern Forest	BC	S3	G4	1
Dry-mesic Northern Forest	C	S3	G4	3
Floodplain Forest	BC	S3	G3?	1
Intermittent Wetland	AB	S3	G2	2
Intermittent Wetland	B	S3	G2	2
Muskeg	B	S3	G4G5	2
Muskeg	BC	S3	G4G5	2
Northern Shrub Thicket	B	S5	G4	2
Northern Shrub Thicket	BC	S5	G4	2
Northern Wet Meadow	B	S4	G4G5	1
Northern Wet Meadow	BC	S4	G4G5	2
Pine Barrens	BC	S2	G3	1
Poor Conifer Swamp	B	S4	G4	1
Poor Conifer Swamp	BC	S4	G4	1
Poor Conifer Swamp	C	S4	G4	1
Poor Fen	B	S3	G3	1
Poor Fen	BC	S3	G3	1
Rich Conifer Swamp	B	S3	G4	2
Rich Conifer Swamp	C	S3	G4	1
Rich Conifer Swamp	D	S3	G4	1
Rich Tamarack Swamp	B	S3	G4	1
Sinkhole	B	S2	G3G5	1
Wet-mesic Sand Prairie	C	S2	G2G3	1
Wooded Dune and Swale Complex	C	S3	G3	1
Total	-	-	-	**39**

Forest Health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Presque Isle Lake and Till Plains management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 24. Maladies of concern in the Presque Isle Lake and Till Plains management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

A total of 200 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as warm types comprise approximately 51% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	56
Cold Small River	0
Cold Transitional Stream	35
Cold Transitional Small River	8
Cold Transitional Large River	0
Warm Transitional Stream	60
Warm Transitional Small River	17
Warm Transitional Large River	0
Warm Stream	9
Warm Small River	0
Warm Large River	15

Lacustrine habitat

A total of 76 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	58
100-499	11
500+	7

Wetlands

A total of 75,429 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 97% of wetland types found.

Table 27. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	2,157
Forested	73,067
Riverine	205

Vernal pools and seeps

A total of 183 acres of vernal pools and seeps have been inventoried in the management area, and 1,224 acres of seeps have been identified.

Riparian vegetation cover

Lowland shrub and aspen are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland Shrub	5,466
Aspen	4,792
Lowland Conifers	2,419
Cedar	2,215
Marsh	1,664
Lowland Deciduous	1,649
Lowland Aspen/Balsam Poplar	896
Mixed Upland Deciduous	863
Upland Mixed Forest	742
Natural Mixed Pines	697

Watershed vegetation cover

The management area includes portions of important watersheds of the Black and Thunder Bay rivers (Table 29 & Table 30). Aspen is a major cover type of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top five) and area of the Black River watershed located within the management area.

Cover Type	Acres
Aspen	25,084
Planted Jack Pine	6,584
Planted Red Pine	6,572
Cedar	6,087
Lowland Conifers	4,524

Table 30. Largest vegetative cover types (i.e., top 5) and area of the Thunder Bay River watershed located within the management area.

Cover Type	Acres
Aspen	11,415
Planted Red Pine	2,747
Planted Jack Pine	2,556
Mixed Upland Deciduous	2,032
Upland Mixed Forest	1,719

Recreation

Access for public recreation and management in the Presque Isle Lake and Till Plains Management Area is mixed, with access limited in some areas due to wet sites, but other areas well served by a developed road/trail system.

Opportunities for recreation on state forest lands within the management area are abundant, including unique opportunities for elk viewing and backcountry adventures in the Pigeon River Country State Forest special management unit. Motorized recreation options are generally restricted in the Pigeon River Country, but an extensive network of ORV, motorcycle and snowmobile trails can be found east of I-75. The Black Mountain state forest recreation area provides concentrated recreation opportunities for ORV, horseback and bike riding, hiking and cross-country skiing. The 32-mile Black Mountain Pathway is open to all nonmotorized uses. In addition to the trails, there is a 65-acre scramble area for motorcycles and all-terrain vehicles. Other nonmotorized recreation opportunities in the Presque Isle Lake and Till Plains Management Area include 45 miles of the High Country Pathway – an 82-mile looped hiking and biking trail, and the Ocqueoc Falls, Jackson Lake and Sinkhole Pathways. Nearly 18 miles of the Shore-to-Shore equestrian trail passes through the management area, connected to the Stoney Creek equestrian trail and campground. The North Central and Northeastern State Trails (rail trails) also cross the area, providing connections to the wider regional trail system.

There are 13 state forest campgrounds in the Presque Isle Lake and Till Plains Management Area, of which five are accessible to ORV use with connections to ORV trails and two are designated for equestrian use. Additional camping and other recreation opportunities are provided by nearby state parks, including Burt Lake, Cheboygan, Onaway, Aloha and Clear Lake.

Table 31. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types)	286.6
	Snowmobile	139.7
Nonmotorized Recreation Trails	Hiking	128.1
	Equestrian	66.3
	Biking	108.2
	Hunter Access Trails	54.3
Total		**783.3**

Note: Trail-use types may overlap.

Table 32. State forest campgrounds.

Name	# of sites	Equestrian	ORV Access
Black Lake State Forest Campground (Lower)	17		
Black Lake State Forest Campground (Upper)	35		X
Black Lake Trail Camp	8	X (group)	
Ess Lake State Forest Campground	27		X
Jackson Lake State Forest Campground	18		X
Maple Bay State Forest Campground	35		
Ocqueoc Falls State Forest Campground	13		
Shoepac Lake State Forest Campground	25		
Stoney Creek Trail Camp	9	X (group)	
Tomahawk Creek Flooding State Forest Campground	47		X
Tomahawk Lake State Forest Campground	25		X
Town Corner Lake State Forest Campground	12		
Twin Lakes State Forest Campground	11		

There are two state wildlife management areas within the management area and Lee Grande Ranch Grouse Enhanced Management Site, which is managed to provide premier grouse and woodcock hunting opportunities with 8 miles of access trails.

Boating access sites are available on many of the area inland lakes, including the larger Black and Burt lakes.

Opportunities for dispersed recreation on state forest lands within the management area are abundant, including unique opportunities for elk viewing.

Table 33. Areas managed for hunting.

Type	Name	# of Acres
State Wildlife Management Area	Dog lake Flooding Stoney Creek Flooding	811.8 1,157.7
Grouse Enhanced Management Site	Lee Grande Ranch	2,436.2
		4,405.7

Table 34. Boating access site.

Name	Waterbody
Avalon Lake	Avalon Lake
Bear Den Lake	Bear Den Lake
Black Lake State Forest Campground	Black Lake
Cochran Lake	Cochran Lake
De Cheau Lake	De Cheau Lake
Grass Lake	Grass Lake
Jackson Lake State Forest Campground	Jackson Lake
Lake Emma	Lake Emma
Lake Ferdelman	Lake Ferdelman
Lancaster Lake	Lancaster Lake
Little Tomahawk Lake	Little Tomahawk Lake
Long Lake	Long Lake
Maple Bay State Forest Campground	Burt Lake
Munro Lake	Munro Lake
Shoepac Lake State Forest Campground	Shoepac Lake
Tomahawk Creek Flooding East	Tomahawk Creek Flooding
Tomahawk Creek Flooding West	Tomahawk Creek Flooding
Tomahawk Lake State Forest Campground	Tomahawk Lake
Town Corner Lake State Forest Campground	Town Corner Lake

Wolverine Moraines

State Forest Area: 178,107 acres	Location: Northeastern Lower Peninsula	Population Centers: Boyne City Vanderbilt and Gaylord
Subsection: Wolverine Moraines	Landforms: Steep moraine ridges Outwash channels and plains	Landcover: Forested: 163,066 acres Nonforested: 15,041 acres

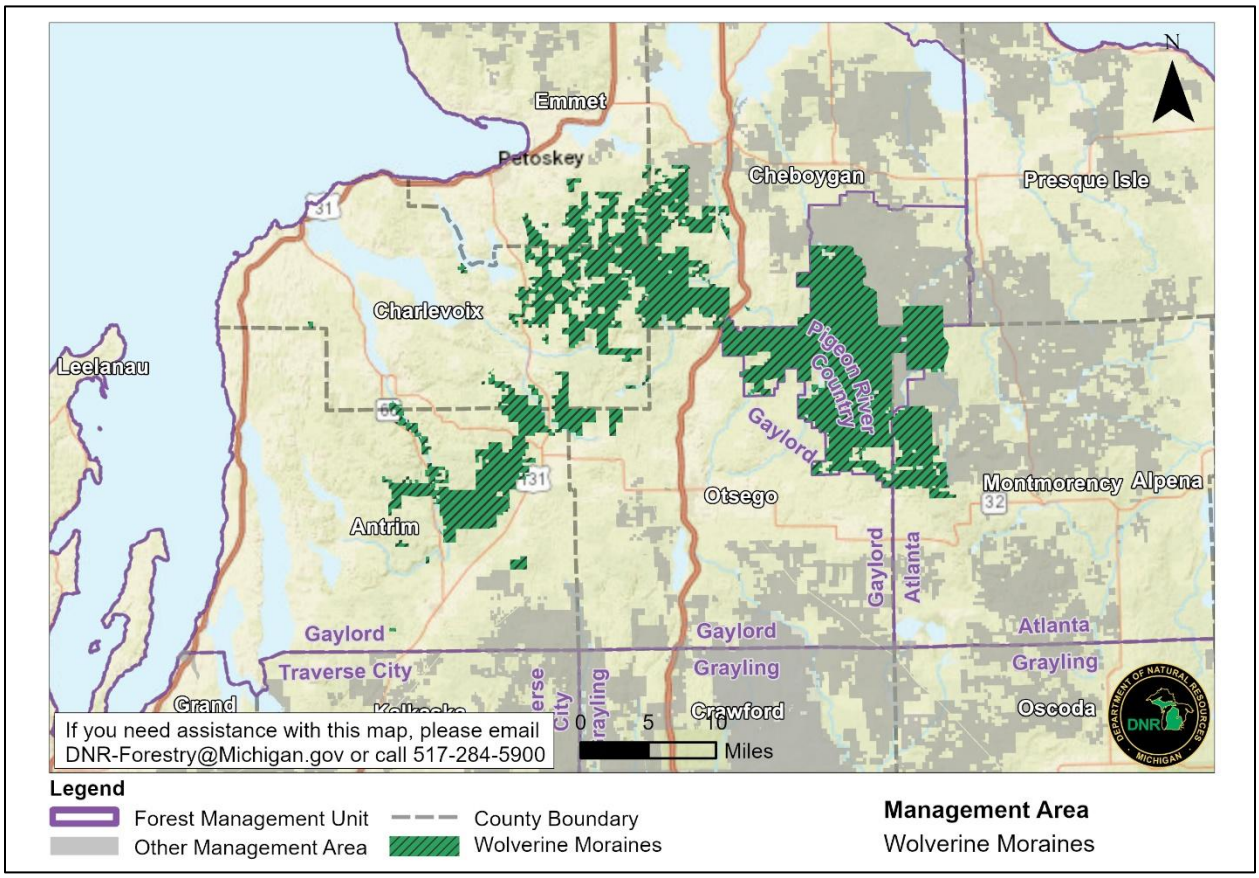


Figure 1. Wolverine Moraines Management Area.

Forested landscape

Current and projected future condition

The Wolverine Moraines Management Area includes a variety of shade tolerance levels with the most tolerant occurring mostly in the mature age category (Figure 2). The intolerant and mid-tolerant categories occur mostly in the young, intermediate and mid-aged categories.

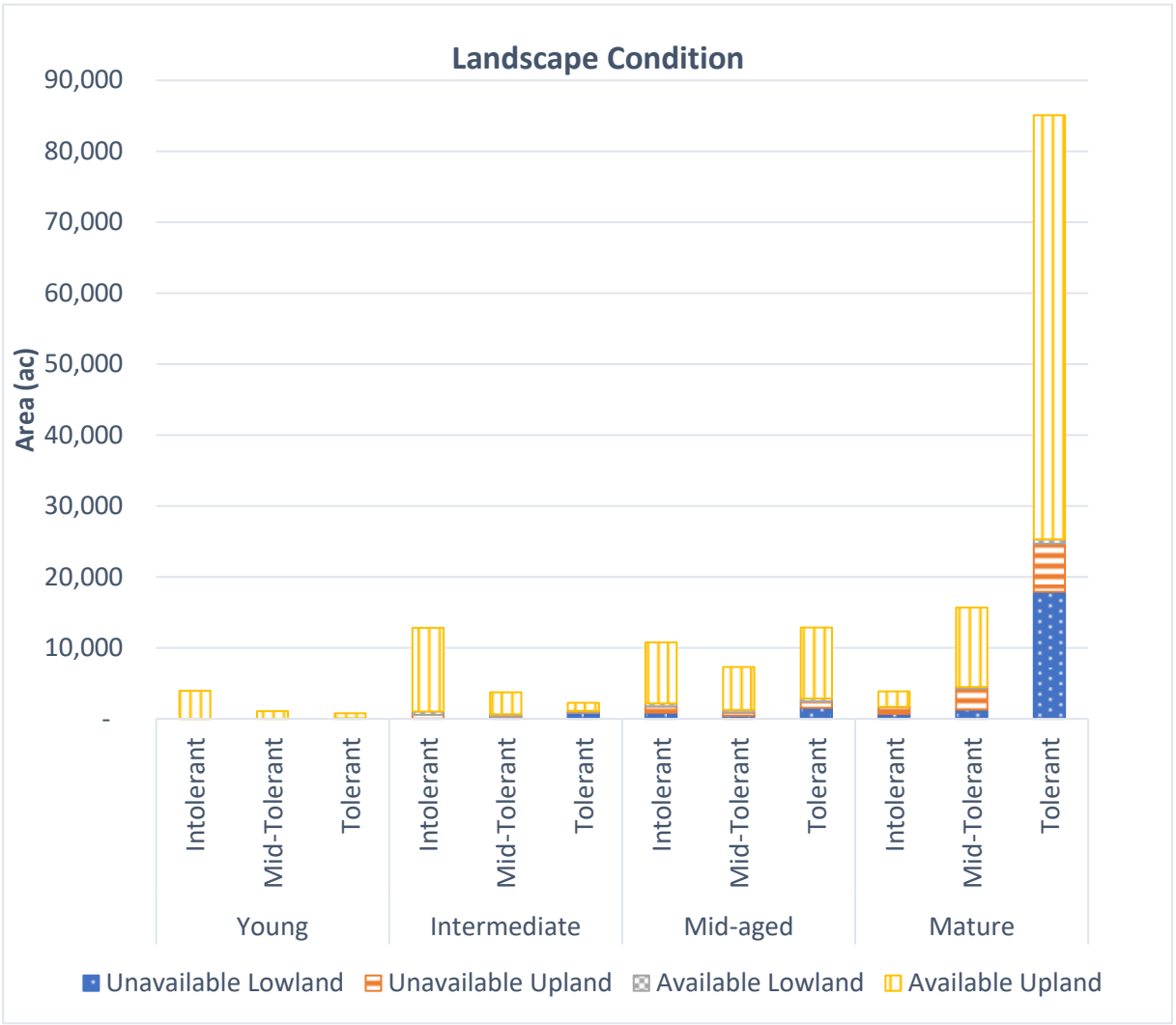


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young Forest	Acres of 0-19 stands in Aspen and Jack Pine	21,466
Mature Forest	Acres of 80+ year stands across cover types	89,946
Mature Forest	Acres of 120+ year stands across cover types	8,270
Mesic Conifer Cover types	Acres of mesic conifer cover types	20,760
Mesic Conifers in other Cover types	Average canopy occupancy	27%
Mast – Oak Cover Types	Acres of oak cover types	10,915
Mast Tree Species in other Cover Types	Acres of total canopy occupancy of mast tree acres (trace-100%)	121,755
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	116,648
Nonforested Openings	Acres of total herbaceous openland, upland shrub, and cropland	7,723
Landscape Forest Matrix	Percent deciduous forest	70%
Landscape Forest Matrix	Percent coniferous forest	26%

The Wolverine Moraines Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the area, ensuring they are met. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Special analysis unit – Elk
- Special analysis unit - Pigeon River Country State Forest

The Wolverine Moraines Management Area is comprised of 92% forested cover types and 8% nonforested cover types (Table 2). Of the forested cover types, 83% are in the upland landscape position. The largest contributors to upland cover types are northern hardwoods and aspen. Lowland conifer and cedar take up 79% of the lowland landscape position. Herbaceous openland and lowland shrub are the most common nonforested cover types in the management area representing 3% and 2% of the landscape respectively.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	26,753	111,992	135,709	163,066
			Northern Hardwood	75,747			
			Black Red Hybrid Oak	0			
			Northern Red Oak	2,130			
			Oak Mix	160			
			Mixed Upland Deciduous	7,202			
		Mixed	Upland Mixed Forest	3,361	3,361		
		Coniferous	Planted Red Pine	8,437	20,356		
			Planted Jack Pine	29			
			Planted White Pine	370			
			Planted Mixed Pine	426			
			Natural Red Pine	1,467			
			Natural Jack Pine	1,198			
			Natural White Pine	2,670			
			Natural Mixed Pines	4,101			
			Upland Spruce/Fir	317			
			Upland Conifers	1,076			
			Hemlock	266			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	1,793	2,894	27,358	
			Lowland Deciduous	1,101			
		Mixed	Lowland Mixed Forest	2,118	2,118		
		Coniferous	Cedar	10,263	22,346		
			Lowland Conifers	11,350			
			Lowland Spruce/Fir	473			
			Tamarack	261			
Nonforested	Upland	N/A	Herbaceous Openland	4,644	N/A	9,278	15,041
			Upland Shrub	2,730			
			Low Density Trees	1,026			
			Bare/Sparsely Vegetated	139			
			Cropland	349			
			Urban	390			
	Lowland	N/A	Lowland Shrub	3,789	N/A	5,763	
			Marsh	1,035			
			Bog	29			
			Treed Bog	19			
			Water	891			
						Grand Total:	**178,107**

There are 125,256 acres (70% of the total management area and 77% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Wolverine Moraines Management Area (Table 3). Of that, over 42% is in the hardwood cover type, 15% in the aspen cover type and 5% in planted red pine. The remaining 21 cover types represent less than 4% each of the forested and available land in the management area. Acres unavailable for management are categorized by site condition (Table 4).

Table 3. Current cover type composition by management availability.

WOLVERINE MORAINES						
Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	24,810	15.2%	1,949	1.2%	26,759	16.4%
Cedar	172	0.1%	10,092	6.2%	10,263	6.3%
Hemlock	56	0.0%	210	0.1%	266	0.2%
Lowland Aspen/Balsam Poplar	800	0.5%	994	0.6%	1,794	1.1%
Lowland Conifers	1,088	0.7%	10,263	6.3%	11,351	7.0%
Lowland Deciduous	254	0.2%	849	0.5%	1,103	0.7%
Lowland Mixed Forest	777	0.5%	1,343	0.8%	2,120	1.3%
Lowland Spruce/Fir	51	0.0%	422	0.3%	473	0.3%
Mixed Upland Deciduous	5,810	3.6%	1,360	0.8%	7,171	4.4%
Natural Jack Pine	1,187	0.7%	12	0.0%	1,198	0.7%
Natural Mixed Pines	3,447	2.1%	655	0.4%	4,101	2.5%
Natural Red Pine	1,294	0.8%	173	0.1%	1,467	0.9%
Natural White Pine	2,355	1.4%	318	0.2%	2,673	1.6%
Northern Hardwood	68,807	42.2%	6,941	4.3%	75,748	46.5%
Northern Red Oak	1,835	1.1%	295	0.2%	2,130	1.3%
Oak Mix	160	0.1%	0	0.0%	160	0.1%
Planted Jack Pine	29	0.0%	0	0.0%	29	0.0%
Planted Mixed Pine	392	0.2%	34	0.0%	426	0.3%
Planted Red Pine	8,220	5.0%	222	0.1%	8,441	5.2%
Planted White Pine	82	0.1%	288	0.2%	370	0.2%
Tamarack	25	0.0%	237	0.1%	261	0.2%
Upland Conifers	646	0.4%	430	0.3%	1,076	0.7%
Upland Mixed Forest	2,788	1.7%	573	0.4%	3,362	2.1%
Upland Spruce/Fir	172	0.1%	145	0.1%	317	0.2%
Grand Total	**125,256**	**76.8%**	**37,802**	**23.2%**	**163,058**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of unavailable Area
Too Wet	17,719	46.9%
Conservation Values	9,193	24.3%
BMPs	3,510	9.3%
Too Steep	2,213	5.9%
Federal/State/Local Law	1,234	3.3%
Blocked by Obstacle	1,056	2.8%
Cannot Regenerate	653	1.7%
Other Dept./Div. Processes	451	1.2%
Recreational/Scenic	438	1.2%
Denied Access	329	0.9%
Other Influence Zones	302	0.8%
Wildlife Concerns	274	0.7%
Long-Term Retention	204	0.5%
Blocked by Railroad	132	0.3%
Neighbor / Interest Group	65	0.2%
Non-DNR agency concerns	12	0.0%
Species of special concern or T&E	8	0.0%
Unproductive	7	0.0%
Historical/Archaeological	3	0.0%
Total Unavailable	**37,802**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Wolverine Moraines Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 657,302 cords, the planned harvest volume for the decade (

Silvicultural Regimes

Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern Hardwood	-	632	-	591	-	3,161	9,649	14,032
Planted Red Pine	-	-	2,256	-	-	611	1,048	3,915
Aspen	1,900	-	-	-	-	1,116	-	3,016
Mixed Upland Deciduous	1,169	323	-	-	66	105	-	1,663
Northern Red Oak	35	-	-	22	-	290	493	840
Natural Mixed Pines	-	-	116	-	271	-	179	567
Natural White Pine	-	-	113	-	207	-	93	413
Natural Red Pine	-	-	13	-	119	-	138	270
Lowland Conifers	234	-	-	-	-	-	-	234
Upland Mixed Forest	200	-	-	-	-	-	-	200
Lowland Aspen/Balsam Poplar	192	-	-	-	-	-	-	192
Lowland Mixed Forest	155	-	-	-	-	-	-	155
Planted Mixed Pine	-	-	90	-	-	-	-	90
Natural Jack Pine	63	-	-	-	-	-	-	63
Upland Spruce/Fir	58	-	-	-	-	-	-	58
Hemlock	-	33	-	-	-	-	-	33
Planted White Pine	-	-	33	-	-	-	-	33
Lowland Deciduous	32	-	-	-	-	-	-	32
Cedar	8	-	-	-	-	-	-	8
Lowland Spruce/Fir	7	-	-	-	-	-	-	7
Tamarack	1	-	-	-	-	-	-	1
Totals	**4,053**	**987**	**2,620**	**613**	**663**	**5,283**	**11,600**	**25,820**

Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern Hardwood	-	632	-	591	-	3,161	9,649	14,032
Planted Red Pine	-	-	2,256	-	-	611	1,048	3,915
Aspen	1,900	-	-	-	-	1,116	-	3,016
Mixed Upland Deciduous	1,169	323	-	-	66	105	-	1,663
Northern Red Oak	35	-	-	22	-	290	493	840
Natural Mixed Pines	-	-	116	-	271	-	179	567
Natural White Pine	-	-	113	-	207	-	93	413
Natural Red Pine	-	-	13	-	119	-	138	270
Lowland Conifers	234	-	-	-	-	-	-	234
Upland Mixed Forest	200	-	-	-	-	-	-	200
Lowland Aspen/Balsam Poplar	192	-	-	-	-	-	-	192
Lowland Mixed Forest	155	-	-	-	-	-	-	155
Planted Mixed Pine	-	-	90	-	-	-	-	90
Natural Jack Pine	63	-	-	-	-	-	-	63
Upland Spruce/Fir	58	-	-	-	-	-	-	58
Hemlock	-	33	-	-	-	-	-	33
Planted White Pine	-	-	33	-	-	-	-	33
Lowland Deciduous	32	-	-	-	-	-	-	32
Cedar	8	-	-	-	-	-	-	8
Lowland Spruce/Fir	7	-	-	-	-	-	-	7
Tamarack	1	-	-	-	-	-	-	1
Totals	**4,053**	**987**	**2,620**	**613**	**663**	**5,283**	**11,600**	**25,820**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Wolverine Moraines Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed Hardwood	155,172	145,862
	Mixed Softwood	31,719	29,816
	Mixed Aspen	30,539	28,707
	Red Pine	19,958	18,761
	Mixed Spruce	9,382	8,819
	Mixed Oak	5,462	5,135
	White Pine	3,512	3,301
	Jack Pine	1,867	1,755
	Pulpwood Total	**257,612**	**242,155**
Sawtimber (MBF)	Sugar Maple	32,967	30,989
	Red Pine	17,311	16,273
	Red Maple	11,771	11,065
	Mixed Aspen	5,267	4,951
	Red Oak	4,764	4,478
	White Pine	4,343	4,082
	Basswood	3,258	3,063
	White Oak	1,631	1,534
	Mixed Oak	408	384
	Sawtimber Total	**81,722**	**76,819**
	Total Sawtimber Harvest Volume in Cords	**539,558**	**507,185**
	Grand Total Harvest Volume in Cords	**797,170**	**749,340**
* Volume estimates based on 100% of the projected harvests for the 10-year planning period. ** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are a few cover type transitions projected for the Wolverine Moraines Management Area. The largest decrease forecasted is in the mixed upland deciduous cover type where 610 acres will convert to other cover types through forest management and regeneration activities. The largest increase occurs in the aspen type where 558 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Northern Hardwood	75,747	75,747	0
Aspen	26,753	27,311	558
Lowland Conifers	11,350	11,254	-95
Cedar	10,263	10,263	0
Planted Red Pine	8,437	8,462	25
Mixed Upland Deciduous	7,202	6,592	-610
Natural Mixed Pines	4,101	4,101	0
Upland Mixed Forest	3,361	3,509	148
Natural White Pine	2,670	2,670	0
Northern Red Oak	2,130	2,086	-44
Lowland Mixed Forest	2,118	2,199	81
Lowland Aspen/Balsam Poplar	1,793	1,797	4
Natural Red Pine	1,467	1,467	0
Natural Jack Pine	1,198	1,171	-28
Lowland Deciduous	1,101	1,115	14
Upland Conifers	1,076	1,076	0
Lowland Spruce/Fir	473	469	-3
Planted Mixed Pine	426	426	0
Planted White Pine	370	370	0
Upland Spruce/Fir	317	265	-52
Hemlock	266	266	0
Tamarack	261	261	0
Oak Mix	160	160	0
Planted Jack Pine	29	32	3
Herbaceous Openland	4,644	4,644	0
Lowland Shrub	3,789	3,789	0
Upland Shrub	2,730	2,730	0
Marsh	1,035	1,035	0
Low Density Trees	1,026	1,026	0
Water	891	891	0
Urban	390	390	0
Cropland	349	349	0
Bare/Sparsely Vegetated	139	139	0
Bog	29	29	0
Treed Bog	19	19	0
Total:	**178,107**	**178,107**	**0**

Featured species current and projected habitat acres

There are 11 featured species in this management area that span various cover types, age classes and stand level conditions. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model, black bear, wild turkey and black-backed woodpecker, but are included here to inform management decisions over the decade. Elk habitat is described in the elk special analysis unit (Section 5).

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black Bear	Mast	132,670	--	--	--
Black-Backed Woodpecker	Natural disturbance	--	--	--	--
Blackburnian Warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	64,126	75,006	44,427	82,827
Black-Throated Blue Warbler	Northern hardwoods, mixed upland deciduous	61,469	70,872	38,326	75,366
Cerulean Warbler	Northern hardwoods, mixed upland deciduous, lowland deciduous	70,435	72,837	72,279	76,308
Elk	Aspen	--	--	--	--

Featured Species	Priority Cover types	Total Habitat Acres Current	Total Habitat Acres 10-year	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Golden-Winged Warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	8,642	10,720	8,112	8,424
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	91,385	100,253	76,024	110,700
Ruffed Grouse	Aspen	8,566	10,641	8,103	8,411
Snowshoe Hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	12,412	16,264	10,417	11,039
Wild Turkey	Nonforested openings	4,993	--	--	--
Wood Turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 80 and 110 years old in the Wolverine Moraines Management Area (Figure 3). The past management regime has been primarily single tree selection which allows for stand age to continue to increase over time. Group selection and clearcut harvesting were used in less amounts over the last planning period. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands.

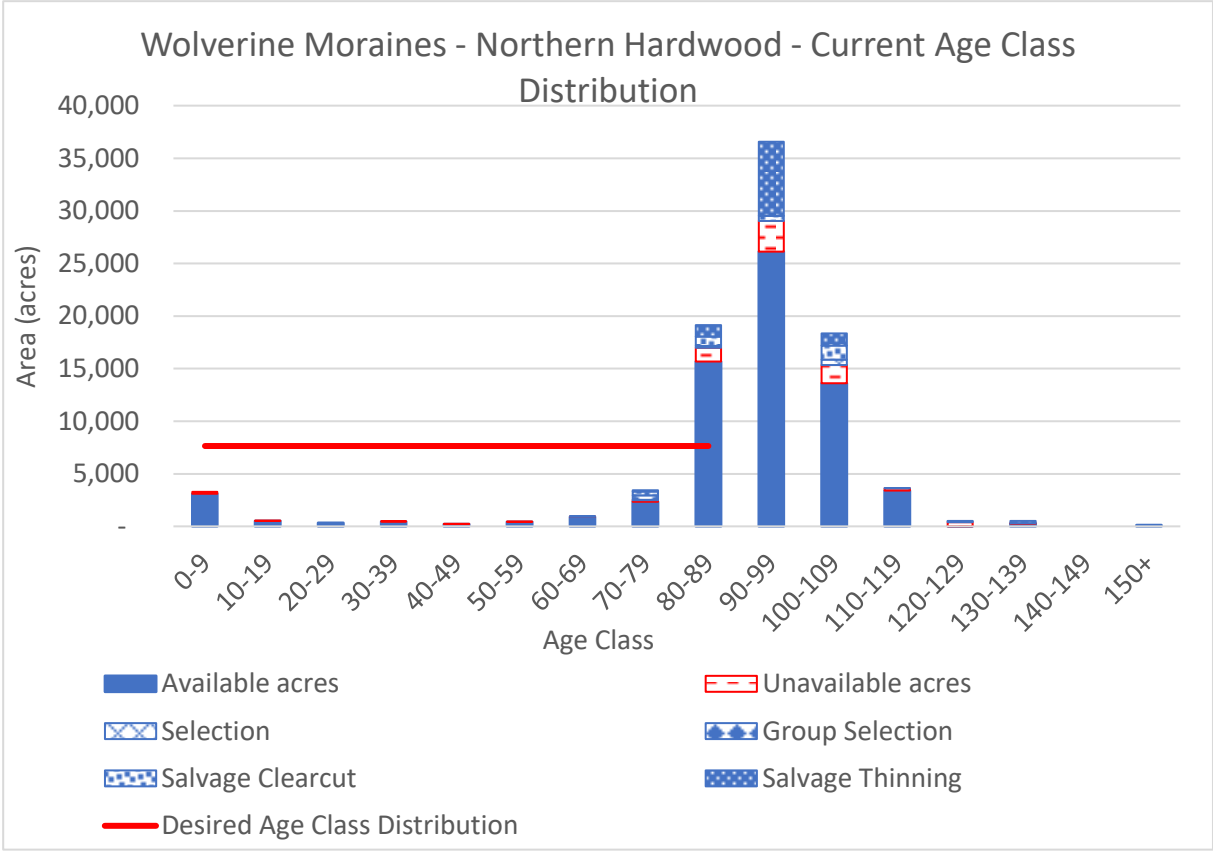


Figure 3. Current age class distribution and projected harvests in the northern hardwood cover type.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Wolverine Moraines Management Area (Figure 4). Current conditions are a result of ash and beech salvage efforts in the previous planning period and a regulated selection harvest regime that has been in place in this management area for decades.

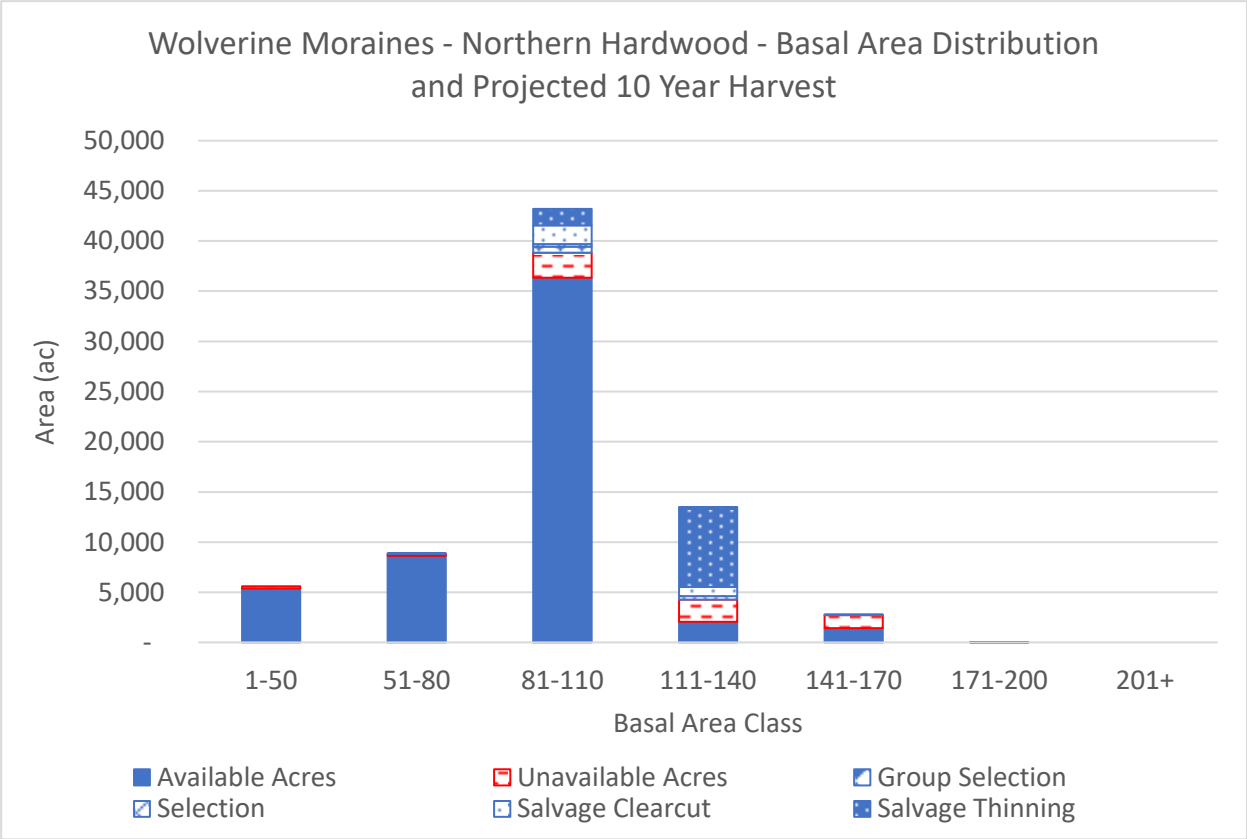


Figure 4. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are 6,941 acres of unavailable northern hardwoods in the Wolverine Moraines Management Area. Selection is the primary silvicultural treatment projected during this 10-year planning period but there may be opportunities to utilize even-aged management silvicultural regimes to increase stem density, species composition and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for cerulean warbler, black-throated blue warbler and marten (Table 9).

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
Cerulean Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	59,380	6,562
Blackburnian Warbler	Age Category: 80+ Size Category: Pole, Sawlog Basal Area: 81+	51,703	6,332
Black-Throated Blue Warbler	Age Category: 80+ Size Category: Sawlog Basal Area: 81+	51,703	6,332
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	54,827	6,492

Desired future condition

The projected long-term cover type trend for northern hardwood is slightly increasing in the Wolverine Moraines Management Area (Figure 5). There are no significant transitions into this cover type from other cover types forecasted in this management area and equally no significant transitions from northern hardwoods to other cover types.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. The Wolverine Moraines Management Area will take several decades to reach the desired future condition because of the impacts from beech bark disease and the emerald ash borer. The amount of American beech and ash that once occupied much of the northern hardwood stands have resulted in lower-than-normal residual basal area and decreased stocking levels across much of the northeastern Lower Peninsula.

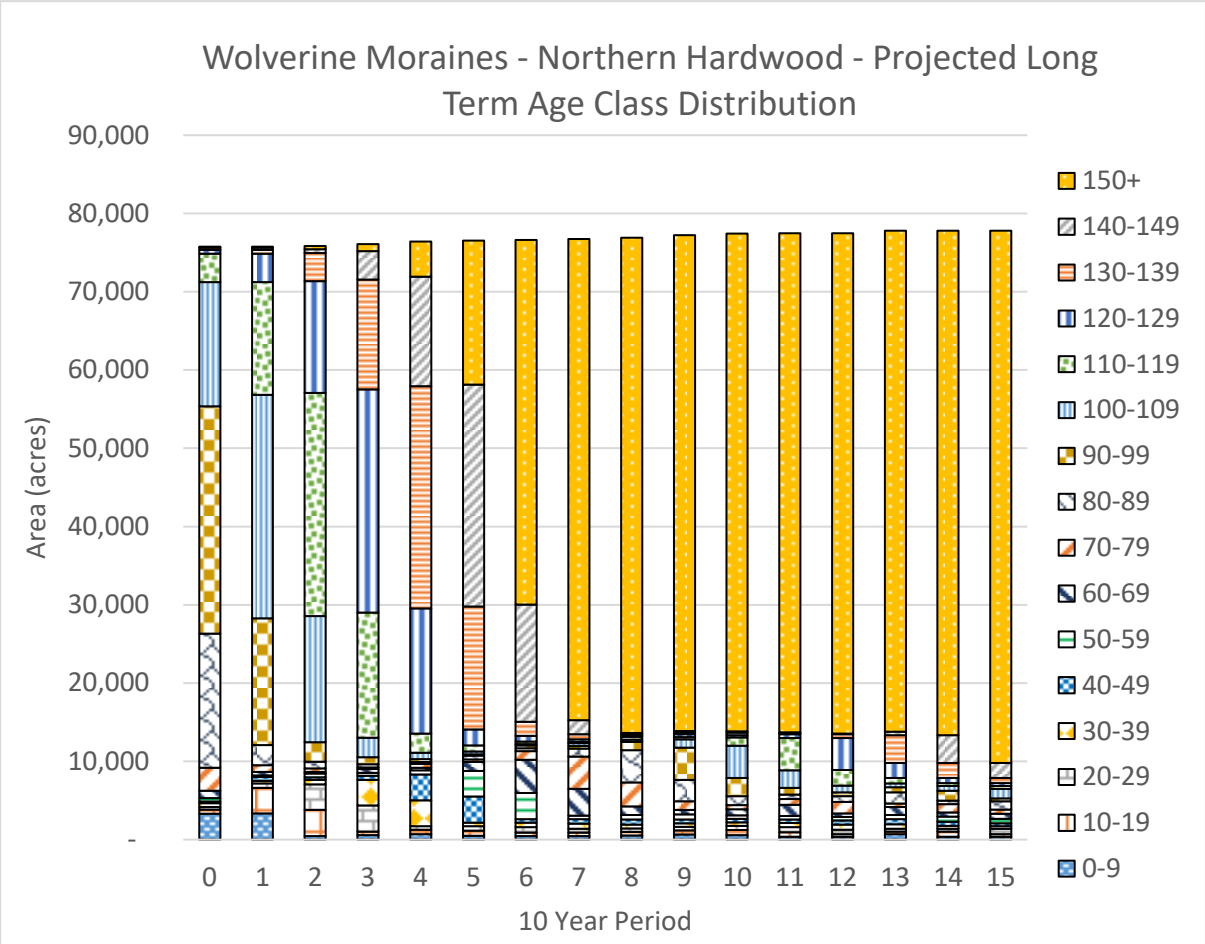


Figure 5. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected single tree selection harvest regime on 632 acres, group selection on 591 acres, salvage thinning on 9,649 acres and salvage clearcut on 3,161 acres throughout the first 10-year planning period (Table 5). Multiple silvicultural regimes should have continued consideration as emerging research results become available. Emphasis on larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Aspen

Current condition

Most of the aspen cover type is currently in the 0-9-year-old age class and the 30-49-year-old age classes. (Figure 6). The past management regime has been primarily clearcut for this cover type. The 10-19 and 20-29 age classes have a deficit. The 0-9-year-old class is much higher due to past management using the compensatory approach where the management regimes intentionally harvest more to create a short term spike in the 0-9 age class in order to compensate for the shortages in both the 10-19-and 20-29-year-old age classes. This current planning period will continue to smooth out the distribution of the aspen in this management area.

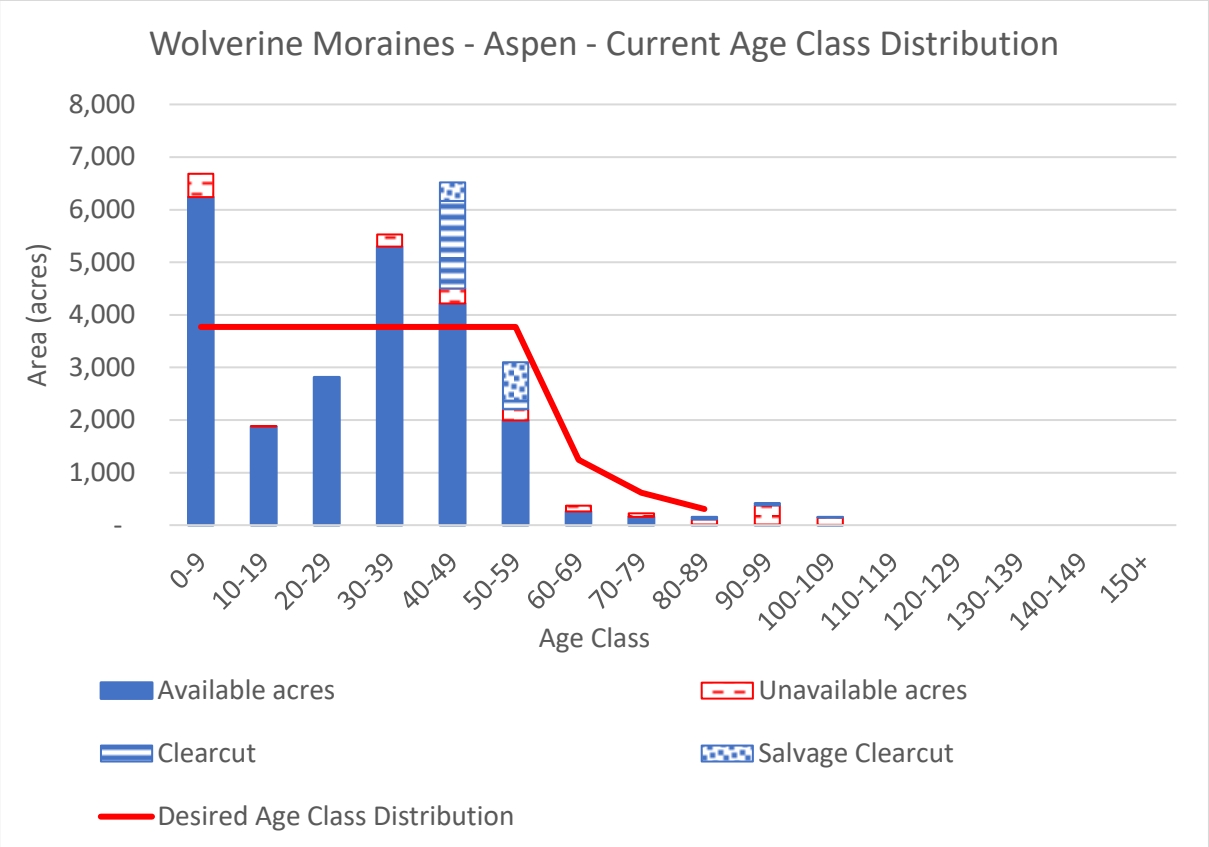


Figure 6. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse and snowshoe hare (Table 10).

Table 10. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-Winged Warbler	Age Category: 0-19 Size Class: Sapling	8,121	446
Ruffed Grouse	Age Category: 0-19 Size Class: Sapling	8,121	446
Snowshoe Hare	Age Category: 0-19 Size Class: Sapling	8,121	446

Desired future condition

The projected long-term cover type trend for aspen is stable in the Wolverine Moraines Management Area. There are a few transitions into this cover type from other cover types forecasted in this management area increasing the aspen cover type acreage by approximately 558 acres in the first 10-year planning period, then leveling out in later planning periods.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of the desired amount of regeneration in in the upcoming 0-9 age class (Figure 7). Progress toward the long-term age class distribution of aspen will take several decades in the management area.

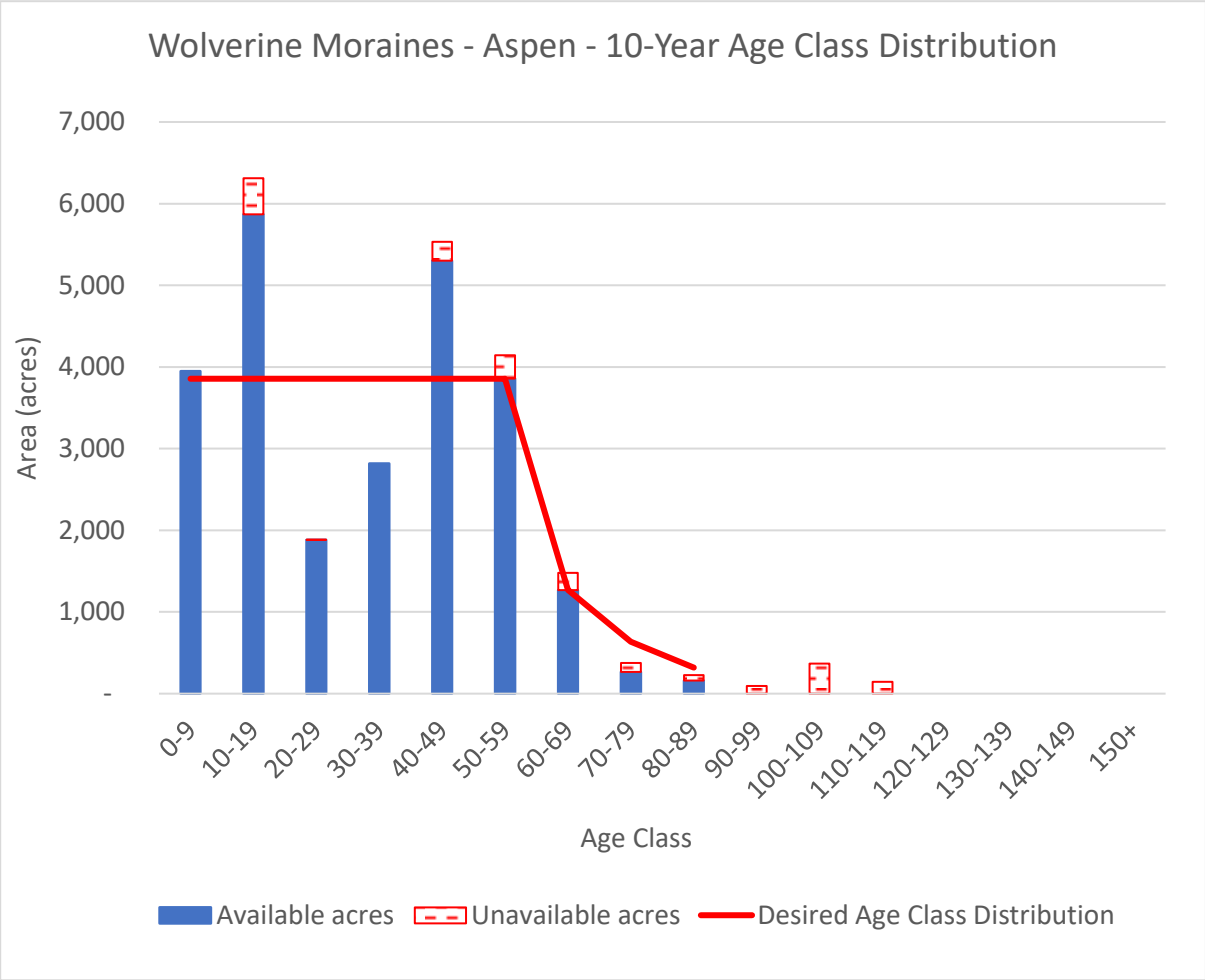


Figure 7. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres has reached the desired future condition (Figure 8).

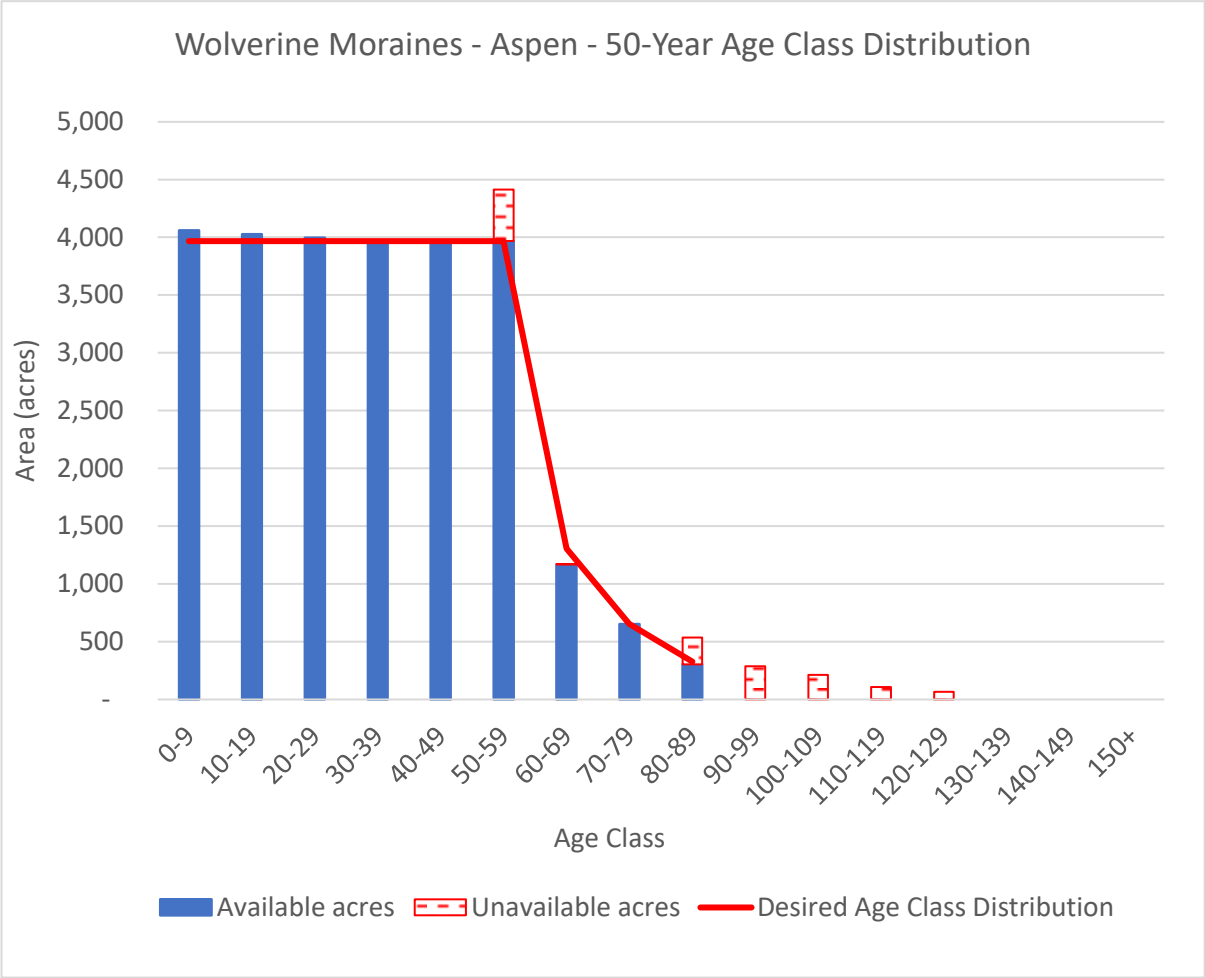


Figure 8. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 9) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 10).

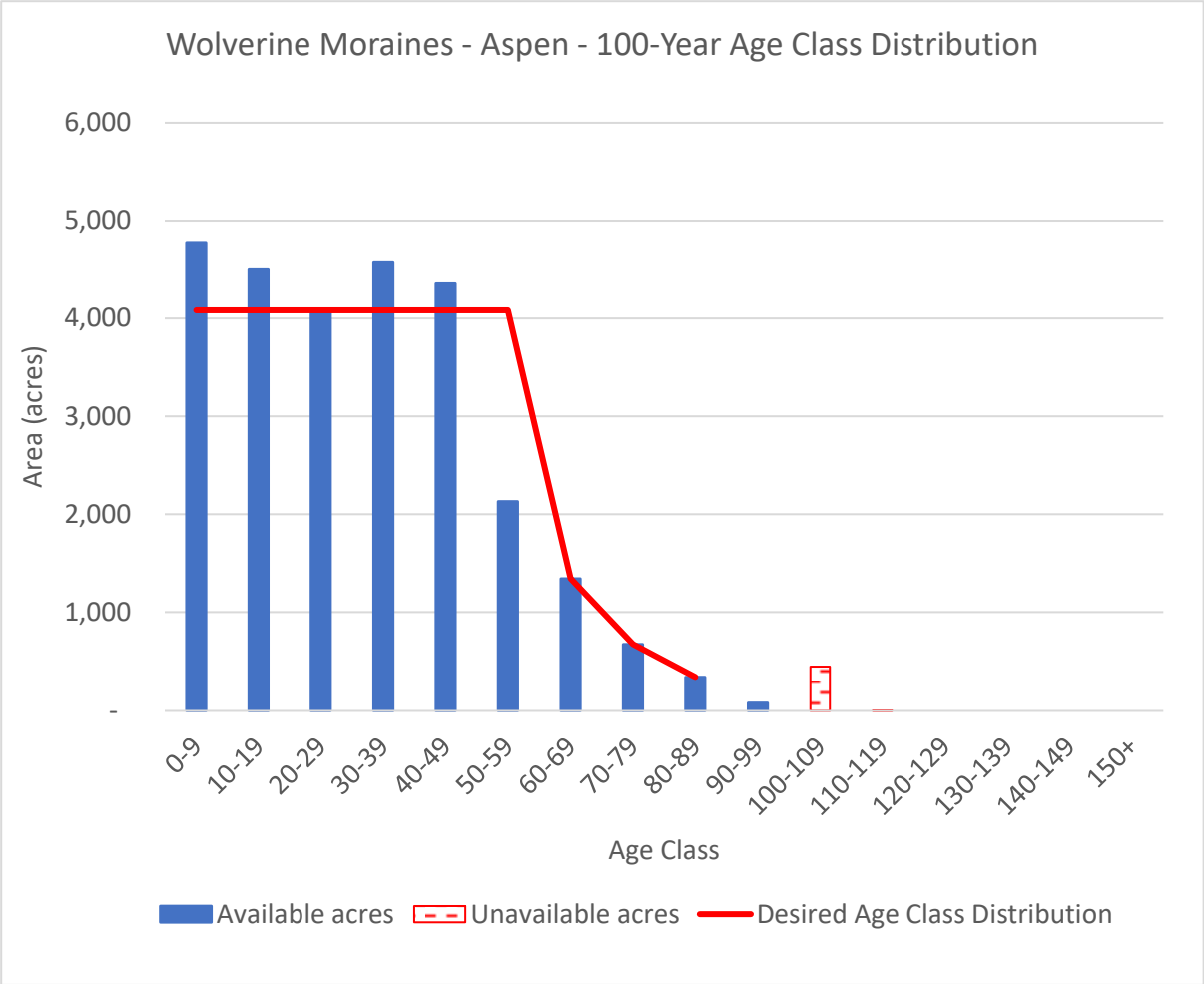


Figure 9. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

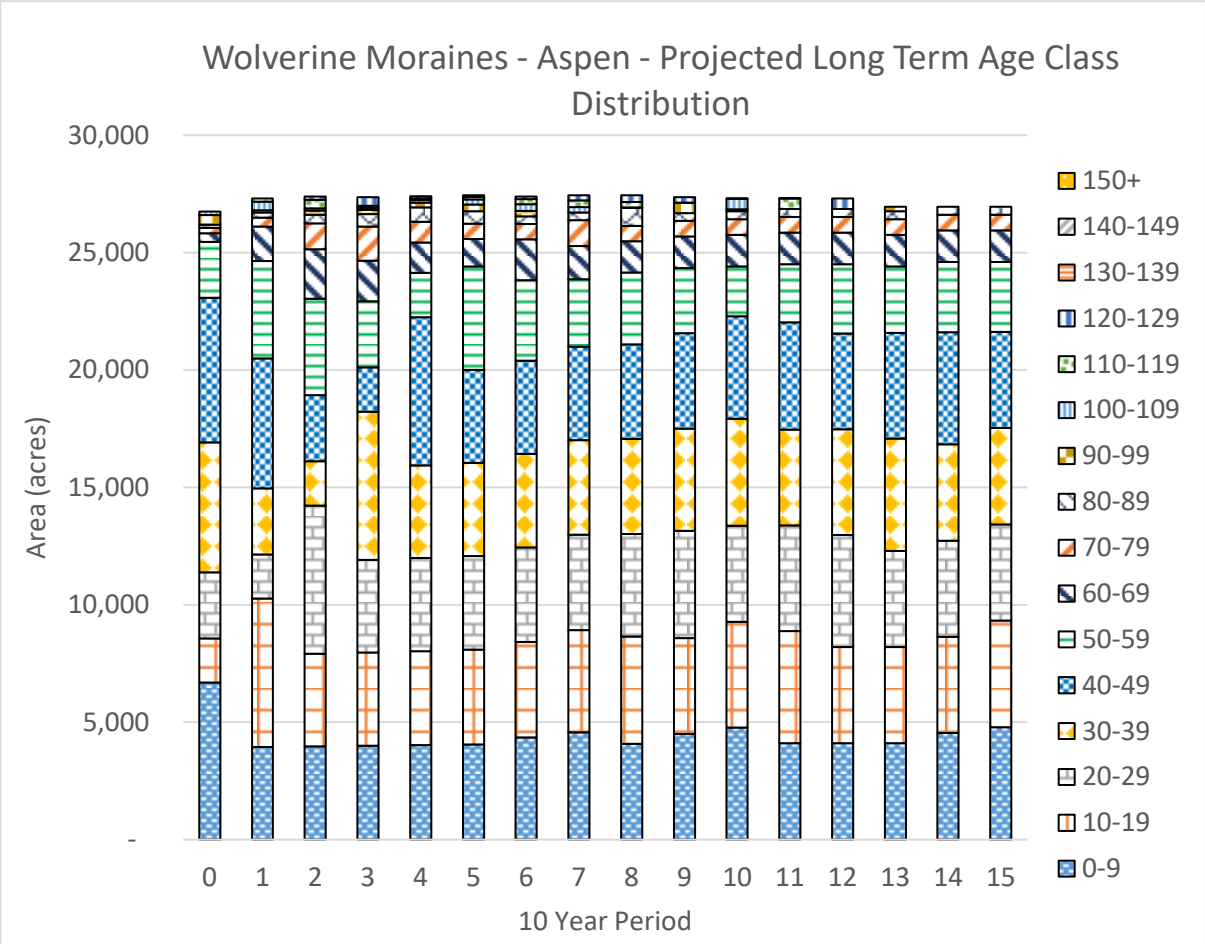


Figure 10. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 1,900 acres of projected clearcut harvest and 1,116 acres of salvage clearcut in the aspen cover type during this planning period. This plus the 558 acres that will transition from other cover types and approximately 372 acres that are expected to regenerate from severe ice storm damage will be slightly over the desired establishment of 3,857 acres per decade.

Lowland conifer

Current condition

The Wolverine Moraines management area has a very unbalanced age class distribution of the available lowland conifer acres with holes in the 10-19, 20-29, 50-59, and 70-79 age classes (Figure 11). Most of the acres in the lowland conifer cover type are unavailable and are present across most of the age classes. A portion of this cover type meets the habitat requirements for snowshoe hare and marten (Table 11).

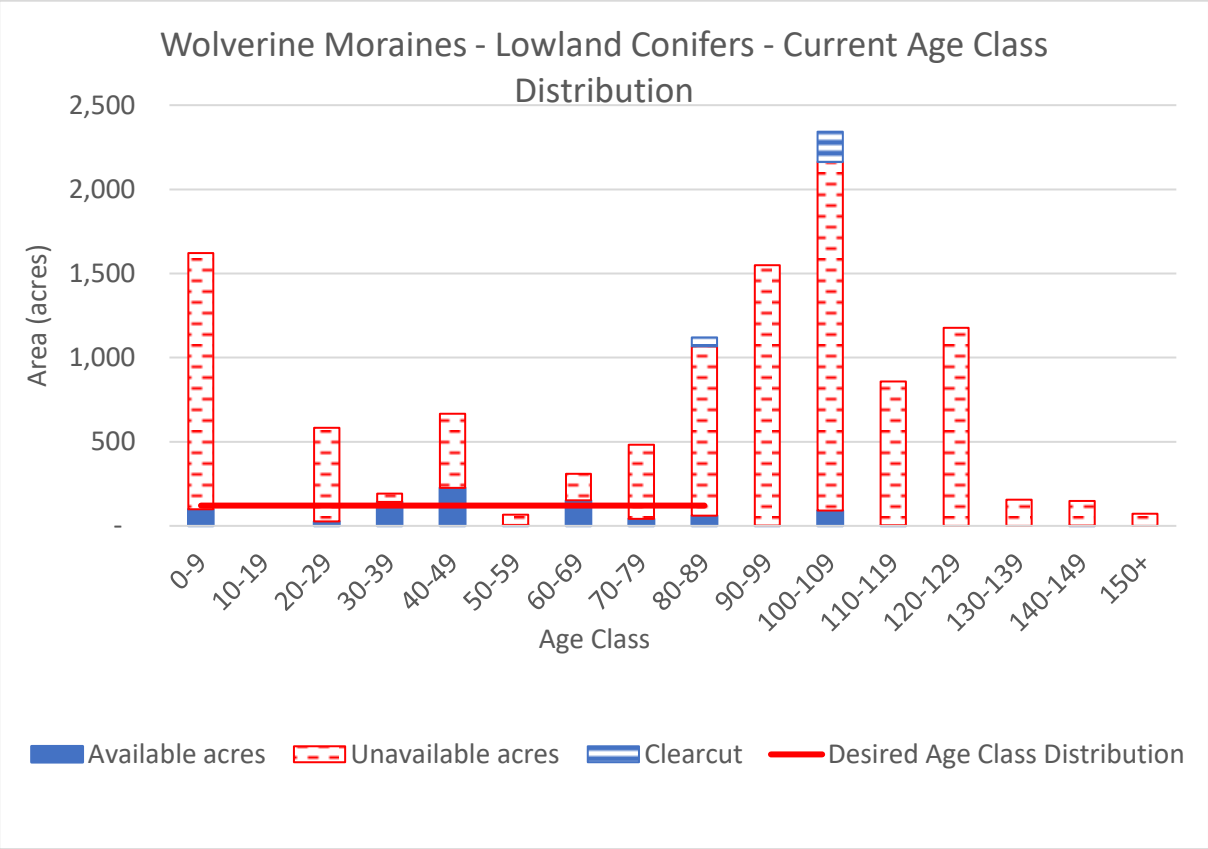


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in the lowland conifer cover type over the 10-year planning period.

Table 11. Featured species with lowland conifers as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Conifer	Lowland Conifer Habitat Acres - Available	Lowland Conifer Habitat Acres - Unavailable
Snowshoe Hare	Age Category: 80-19 Size Category: Sapling	99	1,523

Featured Species	Featured Species Habitat – Lowland Conifer	Lowland Conifer Habitat Acres - Available	Lowland Conifer Habitat Acres - Unavailable
Marten	Age Category: 40+ Size Category: Pole, Sawlog Basal Area: 81+	566	5,964

Desired future condition

The projected long-term cover type trend for lowland conifers is fairly stable in the Wolverine Moraines Management area. There are a few transitions out of this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 90 years old for all available lowland conifer acres.

The end of the planning period will result in the establishment of a desirable number of acres in the 0-9 age class (Figure 12). Progress toward the long-term desired age class distribution of lowland conifers will take many decades to achieve the desired balanced age class condition.

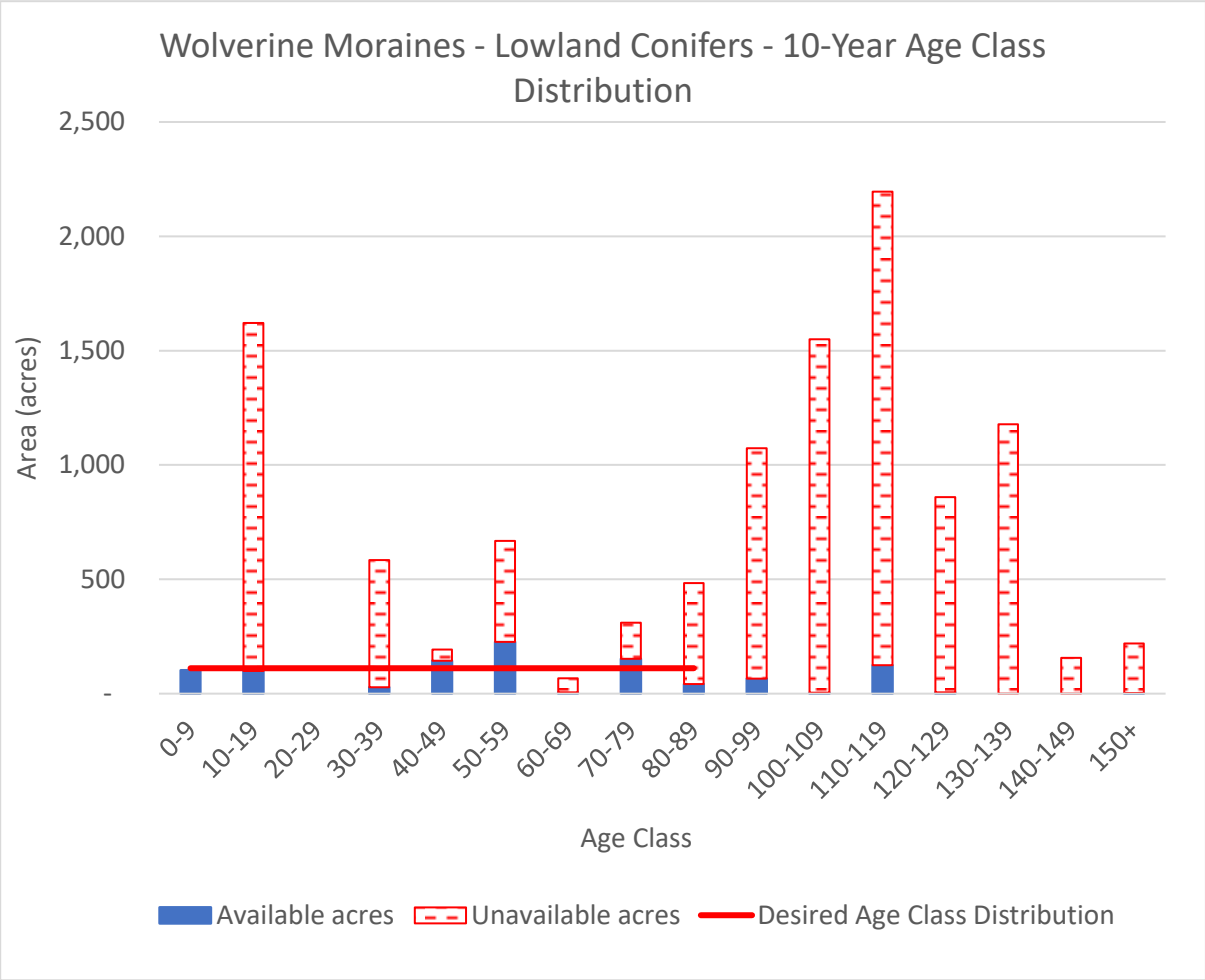


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of lowland conifers is beginning to reach the desired future condition for available acres in the age classes between 0-and 60-year-old age classes (Figure 13). The number of acres in the older age classes, 120 years and older, continues to increase as the unavailable acres continue to move to the older age classes.

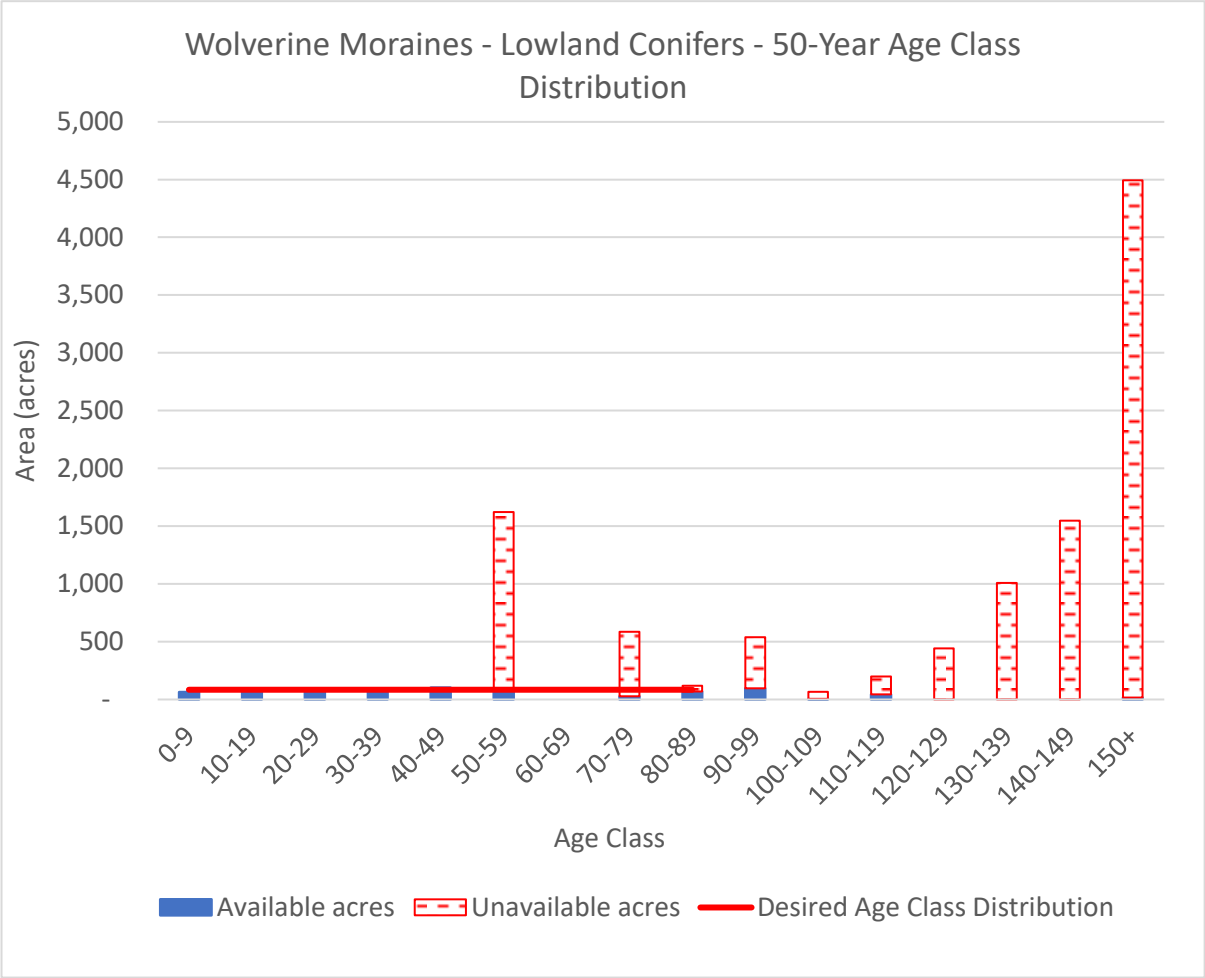


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate on the manageable acres of lowland conifer cover type in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest (Figure 15).



Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

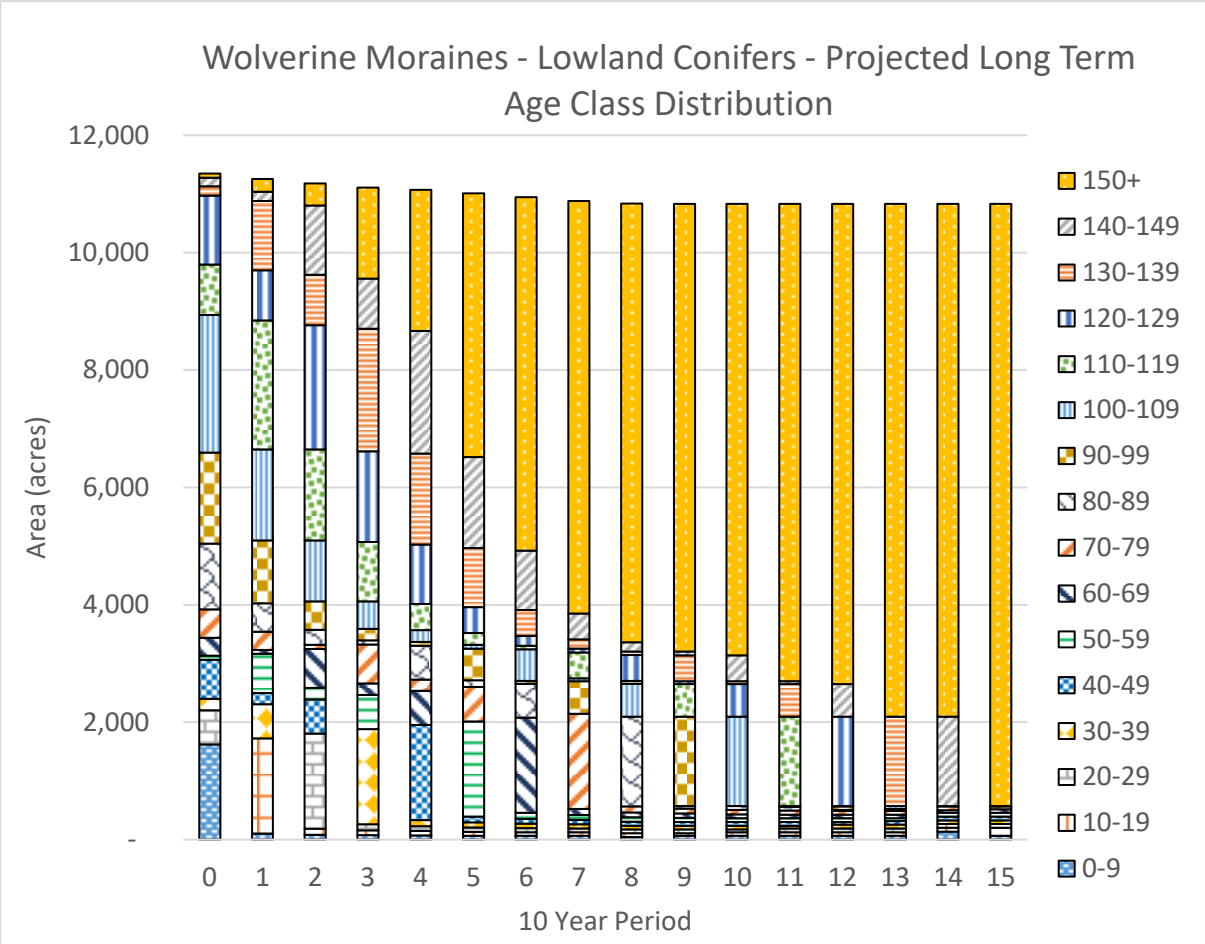


Figure 15. Projected age class distribution for all acres of lowland conifer over the next 150 years.

Management actions

There are 234 acres of projected clearcut harvest in the lowland conifer cover type during the planning period. 95 acres are projected to transition into other cover types. The resulting 139 acres is slightly higher than the desired establishment of 110 acres of lowland conifer per decade because of selected stand sizes.

Planted red pine

Current condition

Most of the planted red pine cover type is currently between stand ages of 0 and 9 years old, 60 and 69 years old, and 90 and 99 years old in the Wolverine Moraines Management Area (Figure 16). The age class distribution is currently unbalanced. There is a deficit in all the seven age classes from 10 to 59 years old and 70 to 89 years old, where the 0-9 age class will compensate for some of those deficits. Harvesting of older age classes will continue to happen to regenerate the desired amount of planted red pine over the next 10 years.

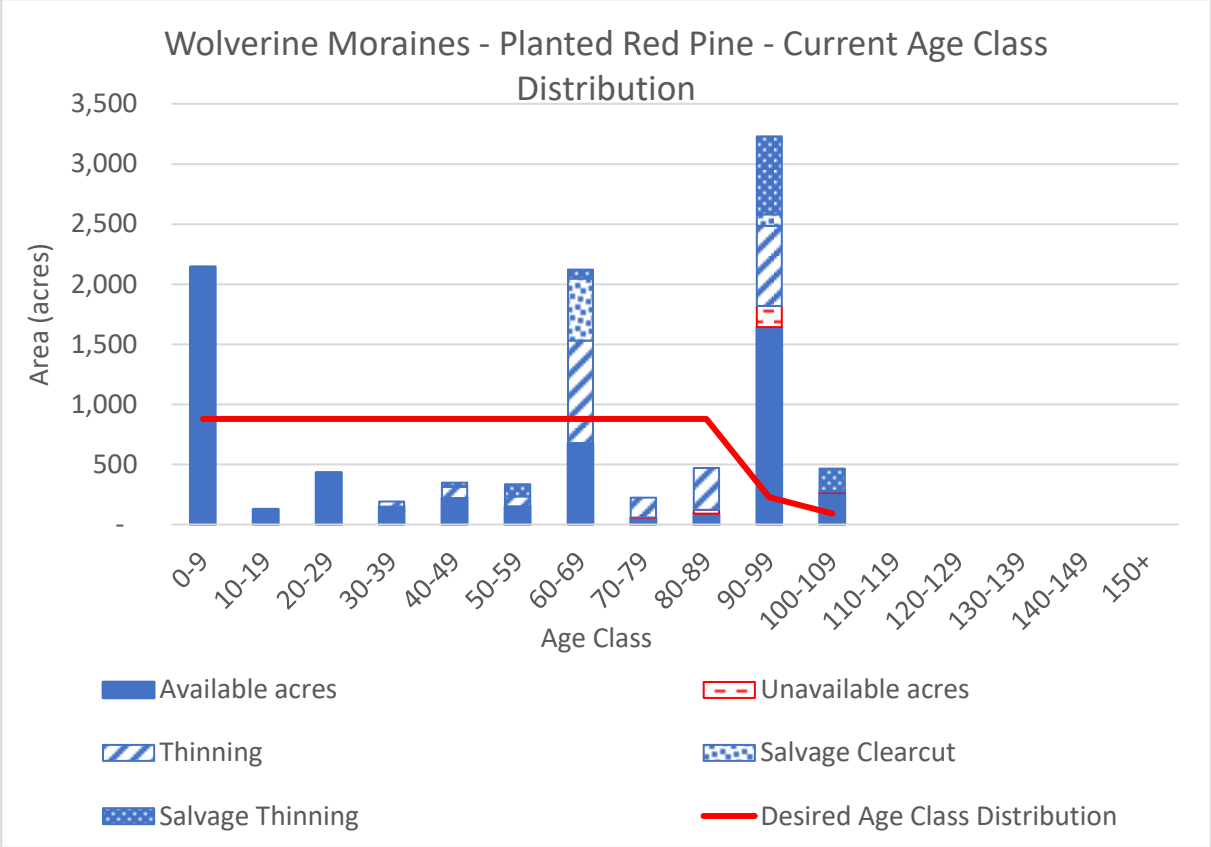


Figure 16. Current age class distribution and projected harvests in planted red pine cover type in the Wolverine Moraines Management Area.

Desired future condition

The projected long-term cover type trend for planted red pine is decreasing in the Wolverine Moraines Management Area. The long-term goal for this cover type is balanced age classes between 0 and 90 years old with a tapering of lesser amounts in the 90-109 age classes for all available red pine stands in this management area.

The end of the planning period will result in the establishment of approximately 655 acres in the 0-9 age class (Figure 17). This is slightly less than the desired age class distribution line due to the need to carry some stands out to older ages to balance the age classes in future planning periods. Progress toward the

long-term desired age class distribution of red pine will take many decades of even-aged management in this management area.

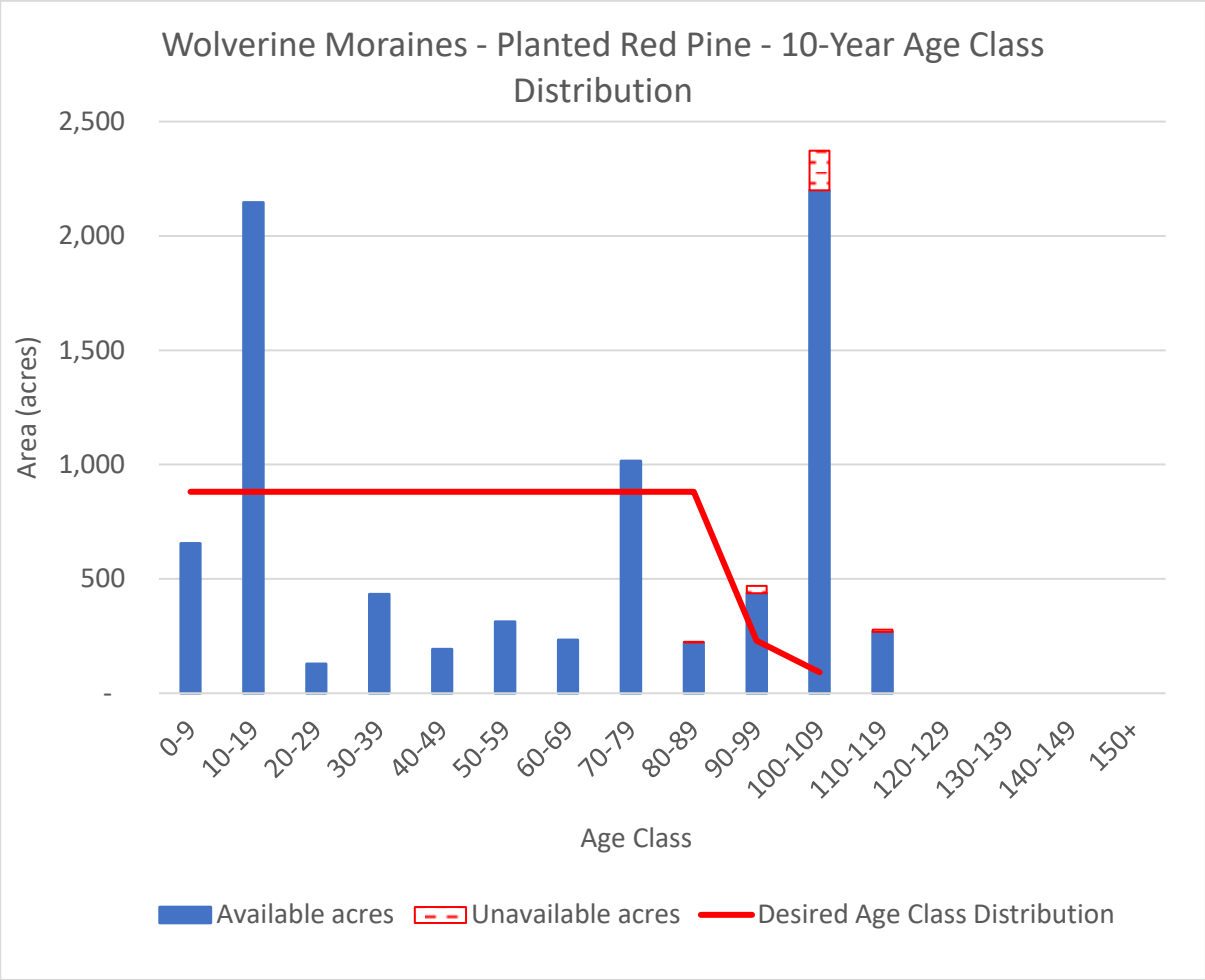


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The mid-term age class distribution of planted red pine shows a continuation of slightly lower acreage in each age class as the model carries some out further into maturity in order to provide enough acreage to continue populating the 0-9 age class (Figure 18). As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods.

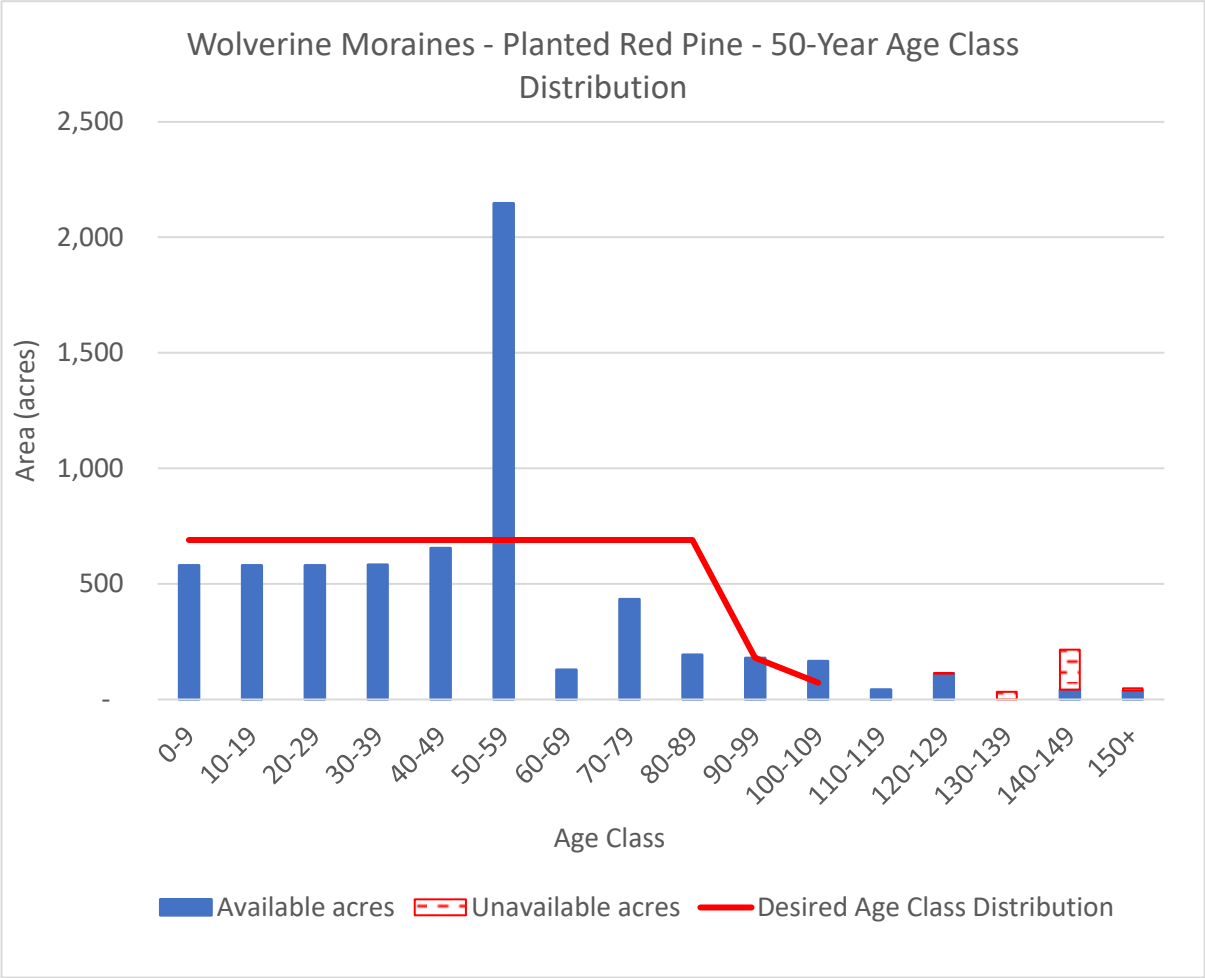


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of red pine in productive growing conditions and while providing an even flow of forest products (Figure 20).

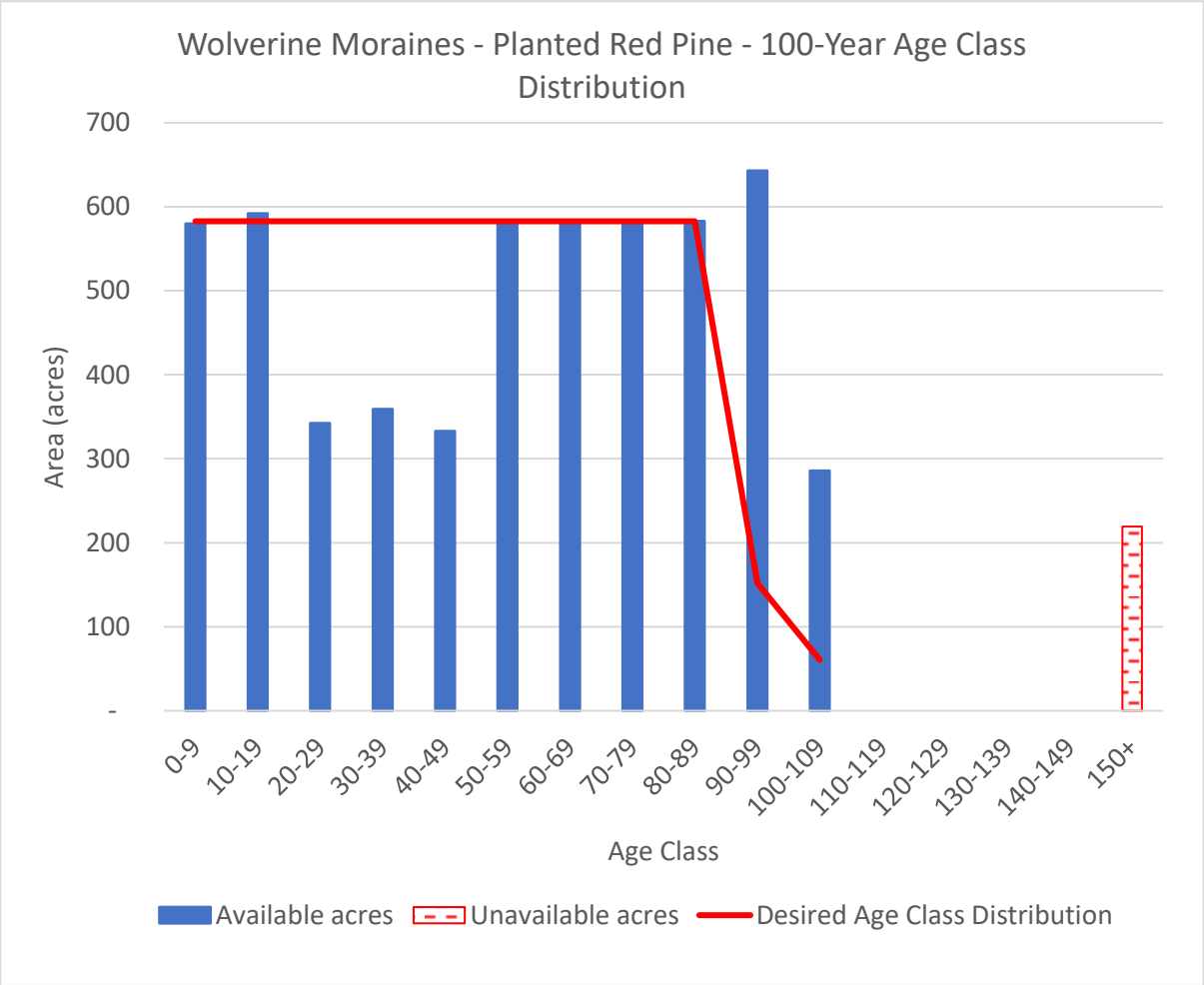


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

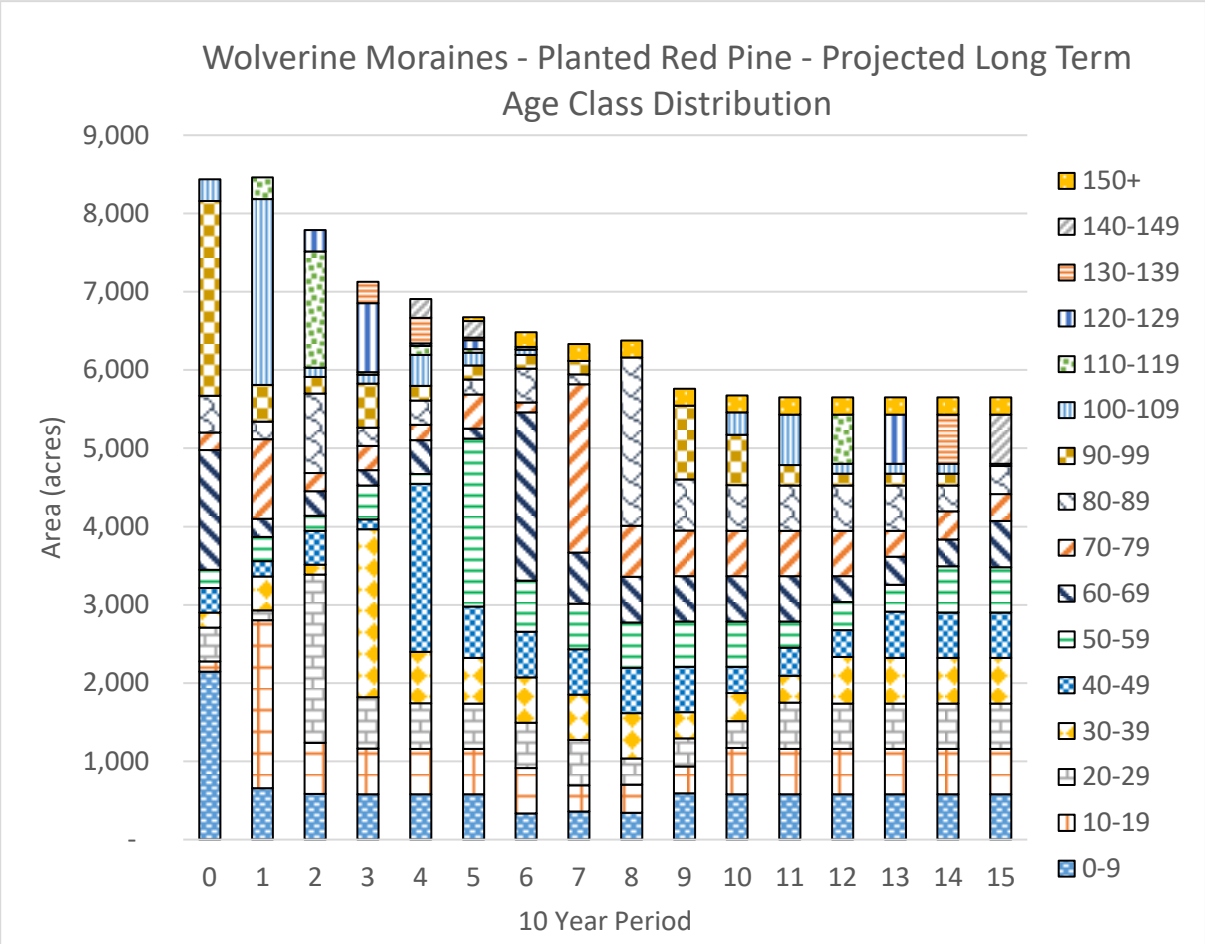


Figure 20. Projected age class distribution for all acres of planted red pine over the next 150 years in the Wolverine Moraines management area.

Management Actions

There are 611 acres of projected salvage clearcut harvest in the planted red pine cover type during the planning period. There are 25 acres that are projected to transition into planted red pine from other cover types resulting in lower acreage than the desired establishment of 880 acres of planted red pine per decade. Because of the current unbalanced age class condition, acreage lower than the desired age class distribution line will be necessary to carry enough merchantable red pine into future planning periods and balance the age classes over time spanning many decades.

There are 2,256 acres of thinning harvests and 1,048 acres of salvage thinning projected in the planted red pine cover type during the planning period. This will allow some acres to be held in older age classes and provide opportunities to balance the age classes in future planning periods.

Conservation area network

High conservation value areas

There are up to eight different high conservation value areas (HCVA) types that can be found in each management area (Table 12; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within the Wolverine Moraines Management Area.

High Conservation Value Area Type	Acres
Dedicated Management Areas	27,040
Eastern Massasauga Managed Land	6,410
Forest Habitat Core Interior	9,420
Natural Rivers Vegetative Buffer	1,936
Natural Rivers Zoning District	6,778
Total	**51,584**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 13. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 14. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	BC			1
Existing ERA	Dry-mesic Northern Forest	BC			1
Existing ERA	Mesic Northern Forest	B	G4	S3	1
Existing ERA	Mesic Northern Forest	D			1
Existing ERA	Northern Fen	BC			2
Existing ERA	Northern Fen	BC		S3	1
Existing ERA	Northern Fen	C	G3	S3	1

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	**Number of Occurrences**
Existing ERA	Rich Conifer Swamp	B			1
Existing ERA	Rich Conifer Swamp	B	G4	S3	1
Existing ERA	Rich Conifer Swamp	C			2
Existing ERA	Rich Conifer Swamp	C	G4	S3	1
Proposed ERA	Northern Fen	BC	G3	S3	1
Proposed ERA	Pine Barrens	C	G3	S2	
Proposed ERA	Rich Conifer Swamp	BC	G4	S3	1
Grand Total					**15**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 15) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within the Wolverine Moraines Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**294**
Deadman's Hill Overlook	42
North Country Trail	0
Pigeon Bridge Campground	11
Unspecified	38
Weber Lake Rec Site	202
Cultural or Customary Area	**1**
Witness Tree	1
Habitat Area or Habitat Corridor	**3,132**
52055	782
English oak planting	1
Lovejoy Pines	167
Lovejoy's Pines	628
Meridian Line Pine	69
O'Briens Pond	118
River corridor	55
Sturgeon River Valley SCA	1,311
Unspecified	2
Mineral Resource Area	**3**
Cheboygan County Road Commission	3
Possible Type 1 or Type 2 Old Growth	**215**
--	215

Reviewable Special Conservation Area Type and Name	Acres
Spring, Wetlands, or Riparian Areas	**1,464**
Black River Headwaters SCA	1,315
Pigeon River Corridor	149
Visual Management Areas	**-**
--	-
Grand Total	**5,109**

Table 16. Static special conservation areas within the Wolverine Moraines Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**103**
Northern Shrub Thicket		41
Northern Wet Meadow		62
Designated Trout and Cold Water Stream Buffer		**6,016**
		2,480
Allen Creek		55
Bartholomew Creek		13
Bennett Creek		10
Berry Creek		26
Black River		437
Blackjack Creek		49
Boyne River		1
Cascade Creek		29
Cedar Creek		9
Cedar River		13
Club Stream		32
Cokirs Creek		4
Collins Creek		38
Cornwall Creek (except Cornwall Impoundment)		111
Cramer Creek		6
East Branch Black River		210
Gimlet Creek		41
Gook Creek		10
Green River		40
Hardwood Creek		77
Hay Marsh Creek		50
Hitchcock Creek		20
Hodge Creek		24
Hog Creek		10
Intermediate River		59

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Jordan River		442
Landslide Creek		48
Licks Creek		13
Lilak Creek		4
Little McMasters Creek		6
Little Pigeon River		37
Marion Creek		13
Marl Creek		71
Martin Creek		6
Mason Creek		3
McIntosh Creek		13
Moyer Creek		31
North Branch Spring Brook		134
Pickerel Creek		25
Pigeon River		370
Saunders Creek		12
Schoolhouse Creek		22
Scott Creek		15
Section Thirteen Creek		32
Severance Creek		16
Six Tile Creek		4
South Branch Boyne River		27
South Branch Spring Brook		118
Spring Brook		34
Stevens Creek		57
Stewart Creek		97
Sturgeon River		254
Todd Creek		7
Tubbs Creek		39
Tutstone Creek		22
Warner Creek		51
Webster Creek		4
West Branch Sturgeon River		128
West McMasters Creek		1
Woolcott Creek		8
Designated Trout and Coldwater Streams	**222.7**	
<Null>	91.0	
Allen Creek	2.1	
Bartholomew Creek	0.5	
Bennett Creek	0.4	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Berry Creek	1.0	
Black River	16.3	
Blackjack Creek	1.8	
Cascade Creek	1.1	
Cedar Creek	0.3	
Cedar River	0.5	
Club Stream	1.2	
Cokirs Creek	0.2	
Collins Creek	1.4	
Cornwall Creek (except Cornwall Impoundment)	4.1	
Cramer Creek	0.3	
East Branch Black River	7.6	
Gimlet Creek	1.5	
Gook Creek	0.4	
Green River	1.6	
Hardwood Creek	2.8	
Hay Marsh Creek	1.9	
Hitchcock Creek	0.7	
Hodge Creek	0.9	
Hog Creek	0.4	
Intermediate River	2.3	
Jordan River	16.7	
Landslide Creek	1.9	
Licks Creek	0.4	
Lilak Creek	0.2	
Little McMasters Creek	0.2	
Little Pigeon River	1.3	
Marion Creek	0.5	
Marl Creek	2.6	
Martin Creek	0.2	
Mason Creek	0.1	
McIntosh Creek	0.5	
Mill Creek	0.0	
Moyer Creek	1.2	
North Branch Spring Brook	5.0	
Pickerel Creek	0.9	
Pigeon River	13.4	
Saunders Creek	0.5	
Schoolhouse Creek	0.8	
Scott Creek	0.6	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Section Thirteen Creek	1.1	
Severance Creek	0.6	
Six Tile Creek	0.1	
South Branch Boyne River	1.0	
South Branch Spring Brook	4.5	
Spring Brook	1.3	
Stevens Creek	2.2	
Stewart Creek	3.6	
Sturgeon River	9.5	
Todd Creek	0.3	
Tubbs Creek	1.5	
Tutstone Creek	0.8	
Warner Creek	1.8	
Webster Creek	0.2	
West Branch Sturgeon River	4.7	
Woolcott Creek	0.3	
Important Bird Areas		**113,216**
Grand Traverse Bay basin (Albert Ecoregion Vii.5.2)		31,322
Pigeon Country moraines		81,894
Non-dedicated Natural Areas		**1,908**
Natural Area Grindstone Creek Wild Area, Pigeon Ri		160
Natural Area Jordan River Natural Area		1,569
Natural Area Pine Tract Natural Area, Pigeon Rive		180
Wood Turtle Stream 100ft Buffer		**247**
Black River		45
Pigeon River		131
Sturgeon River		70
Wood Turtle Stream 660ft Buffer		**1,451**
Black River		294
Pigeon River		849
Sturgeon River		308
Grand Total	**222.7**	**122,942**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (*Table* 17, Table 19 and Table 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 17. *Rare animal and plant species conservation status key.*

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal occurrence within the Wolverine Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T		4
Animal	Appalachia arcana	Secretive locust	SC		2
Animal	Appalachina sayanus	Spike-lip crater	SC		1
Animal	Bombus borealis	Northern amber bumble bee	SC		2
Animal	Bombus terricola	Yellow banded bumble bee	SC		3
Animal	Brychius hungerfordi	Hungerford's crawling water beetle	E	LE	1
Animal	Buteo lineatus	Red-shouldered hawk	SC		72
Animal	Coregonus artedi	Lake herring or Cisco	T		1
Animal	Emydoidea blandingii	Blanding's turtle	SC		3
Animal	Gavia immer	Common loon	T		1
Animal	Glyptemys insculpta	Wood turtle	T		1
Animal	Haliaeetus leucocephalus	Bald eagle	SC		8
Animal	Lithobates palustris	Pickerel frog	SC		3
Animal	Microtus pinetorum	Woodland vole	SC		1
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC		1
Animal	Opheodrys vernalis	Smooth green snake	SC		4
Animal	Pandion haliaetus	Osprey	SC		2
Animal	Sistrurus catenatus	Eastern massasauga	T	LT	2
Total	-	-	-	-	**113**

Table 19. Rare plant occurrence within the Wolverine Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Cirsium hillii	Hill's thistle	SC		5
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		1
Plant	Dalibarda repens	False violet	T		1
Plant	Gymnocarpium robertianum	Limestone oak fern	T		3
Plant	Potamogeton hillii	Hill's pondweed	T		1
Plant	Stachys pilosa	Hairy hedge-nettle	SC		1
Plant	Thalictrum pubescens	Tall meadowrue	SC		1
Grand Total	-	-	-	-	**13**

Table 20. Other rare occurrence within the Wolverine Moraines Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	-	Great blue heron rookery			1
Total	-	-	-	-	**1**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 21).

Table 21. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non-ecological reference area natural communities within the Wolverine Moraines Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Hardwood-Conifer Swamp	C	S3		2
Mesic Northern Forest	C	S3		2
Northern Shrub Thicket	B	S5	G4	3
Northern Wet Meadow	B	S4	G4G5	3
Northern Wet Meadow	C	S4	G4G5	2
Rich Conifer Swamp	CD	S3		2
Grand Total				**14**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Wolverine Moraines management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer. Monitor young jack and red pine for redheaded pine sawfly damage.

Table 24. Maladies of concern in the Wolverine Moraines management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	
Oak decline	Various	Various	Yes

Monitor oak for symptoms of oak wilt and follow state land oak wilt guidance. Monitor planted red pine for Heterobasidion root disease and follow disease guidance. Report surviving mature beech trees that may be resistant to beech bark disease. Watch for symptoms of beech leaf disease.

Aquatic resources

Riparian habitat

Approximately 174 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as cold types comprise approximately 74% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold Stream	128
Cold Small River	2
Cold Transitional Stream	21
Cold Transitional Small River	17
Cold Transitional Large River	0
Warm Transitional Stream	<1
Warm Transitional Small River	6
Warm Transitional Large River	0
Warm Stream	0
Warm Small River	0
Warm Large River	0

Lacustrine habitat

A total of 14 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	11
100-499	2
500+	1

Wetlands

A total of 31,302 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 96% of wetland types found in the management area.

Table 27. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,018
Forested	30,022
Riverine	262

Vernal pools and seeps

A total of 989 acres of vernal pools and seeps have been inventoried in the management area, and 5,306 acres of seeps have been identified.

Riparian vegetation cover

Northern hardwood is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Northern Hardwood	5,139
Lowland Conifers	3,779
Cedar	3,226
Lowland Shrub	2,476
Aspen	2,345
Marsh	730
Lowland Aspen/Balsam Poplar	653
Lowland Mixed Forest	628
Mixed Upland Deciduous	562
Herbaceous Openland	443

Watershed vegetation cover

The management area includes portions of important watersheds of the Black and Boyne rivers (Table 29 and Table 30). Aspen is a major cover type of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top five) and area of the Black River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	9,268
Aspen	6,809
Cedar	5,644
Mixed Upland Deciduous	3,691
Lowland Conifers	2,392

Table 30. Largest vegetative cover types (i.e., top five) and area of the Boyne River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	5,892
Aspen	376
Lowland Conifers	335

Cover Type	Acres
Cedar	291
Herbaceous Openland	126

Recreation

Access for public recreation and management in the Wolverine Moraines Management Area is mixed, constrained in areas by steep slopes or wet areas. The Jordan Valley area is a special management area with a focus on outdoor recreation in a natural setting, while the Pigeon River Country State Forest is focused on wildlife management with limited access in some areas.

Opportunities for recreation on state forest land within the management area are abundant, including unique opportunities for elk viewing and backcountry adventures in the Pigeon River Country special management unit. Motorized recreation options are generally restricted in the Pigeon River Country, but an extensive network of ORV, motorcycle and snowmobile trails can be found east of I-75. Nonmotorized recreation opportunities in the Wolverine Moraines Management Area include nearly 30 miles of the High Country Pathway – an 82-mile looped hiking and biking trail – and the Jordan Valley, Shingle Mill and Wildwood Hills Pathways, among others. Opportunities for equestrians include over 25 miles of the Shore-to-Shore equestrian trail and the 15-mile Pigeon River Equestrian Trail. The North Country National Scenic Trail/Iron Belle Trail and the Northeastern State Trail (rail trail) also cross the area, providing connections to the wider regional trail system.

There are 12 state forest campgrounds in the Wolverine Moraines Management Area, of which three are designated for equestrian individual or group use and one is accessible to ORVs.

Table 31. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized Recreation Trails	ORV (all types) Snowmobile	128.2 96.9
Nonmotorized Recreation Trails	Hiking Equestrian Biking Hunter Access Trails	137.3 40.0 63.5 0
Total		**466.0**

Note: Trail-use types may overlap.

Table 32. State forest campgrounds.

Name	# of sites	Equestrian	ORV Access
Elk Hill Equestrian River Trail Campground	11	X	
Elk Hill Group Equestrian Campground	-	X (group)	
Graves Crossing State Forest Campground	10		
Haakwood State Forest Campground	18		
Johnson's Crossing Trail Camp	-	X (group)	

Pickerel Lake (Otsego) State Forest Campground	39		
Pigeon Bridge State Forest Campground	10		
Pigeon River State Forest Campground	19		
Pine Grove State Forest Campground	6		
Pinney Bridge State Forest Campground	15		
Round Lake State Forest Campground	10		
Weber Lake State Forest Campground	18		X

There are no areas managed specifically for hunting in this management area, although being in the core of Michigan's elk range provides unique big-game hunting opportunities.

Boating access sites are available on several inland lakes; the Jordan, a designated Natural River; and the Pigeon and Sturgeon rivers provide plentiful opportunities for paddling and fishing.

The management area is close to the communities of Petoskey, Wolverine, Vanderbilt and Boyne City and is a popular recreation destination for both residents and visitors for dispersed recreation such as hunting, fishing, hiking and mushrooming.

Table 33. Boating access sites.

Name	Waterbody
Alba Road	Jordan River
Cedar River 2	Cedar River
Chestonia Bridge	Jordan River
Cornwall Flooding	Cornwall Flooding
Deer Lake	Deer Lake
Elk Hill Equestrian State Forest Campground and Trail Camp	Pigeon River
Green Lake	Green Lake
Haakwood State Forest Campground	Sturgeon River
Henry Lake	Henry Lake
Jordan River	Jordan River
Pickerel Lake State Forest Campground	Pickerel Lake
Rondo	Sturgeon River
Sturgeon River	Sturgeon River
Town Corner Lake State Forest Campground	Town Corner Lake
Trowbridge Road	Sturgeon River
Walloon Lake	Walloon Lake
Webster Bridge	Jordan River

Ecoregion

Eastern Upper Peninsula

State forest area:
1,067,507 acres

Location:
Eastern Upper Peninsula

Population centers:
Manistique, Grand Marais Newberry, Naubinway, Sault Ste. Marie, Hessel, Drummond Township

Land cover:
Forested: 832,058 acres
Nonforested: 235,448 acres

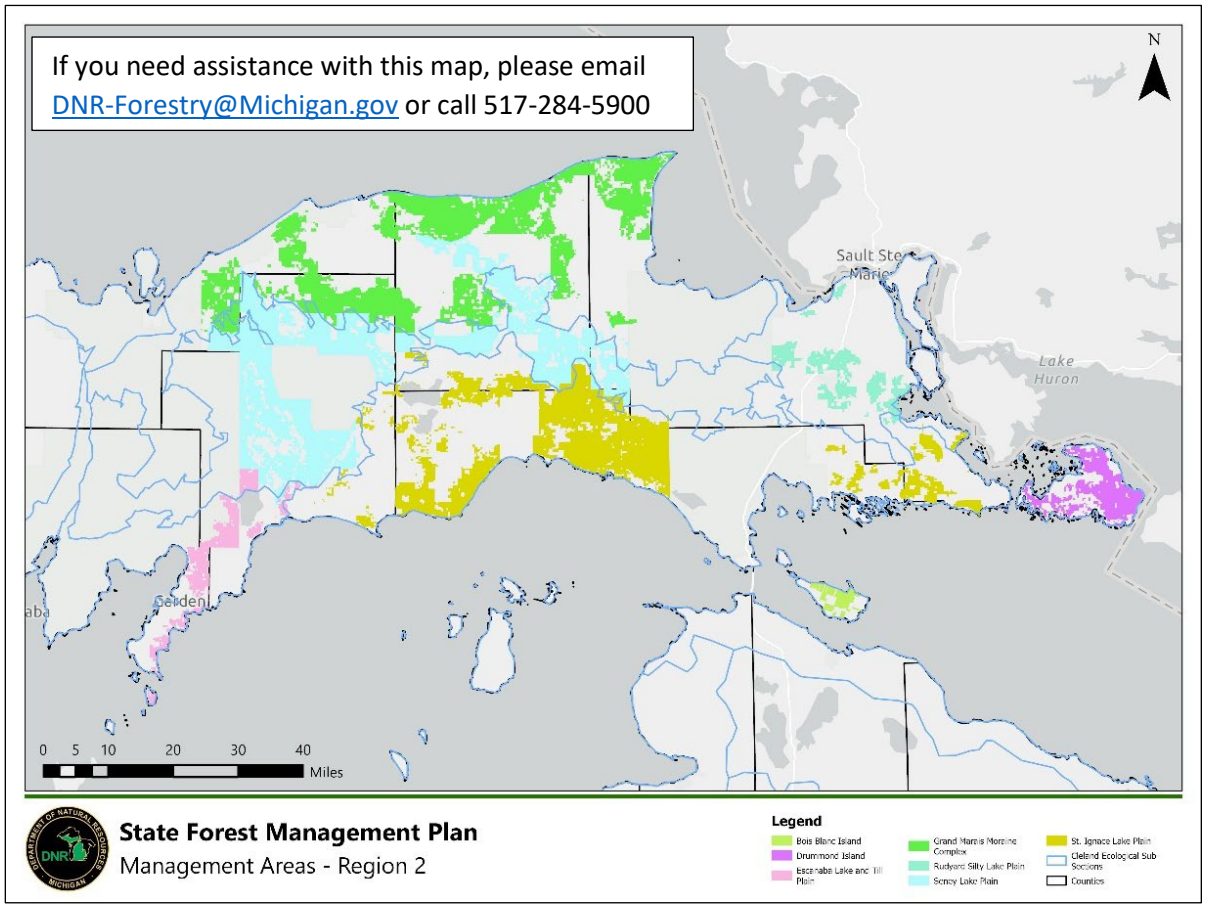


Figure 1. Eastern Upper Peninsula Ecoregion.

Forested landscape

Current and projected future condition

The Eastern Upper Peninsula Ecoregion is comprised of 78% forested cover types and 22% nonforested cover types. Of the forested cover types, 63% are in upland landscape positions and 36% are in lowland landscape positions. The largest contributors to upland cover types are aspen, northern hardwoods and natural jack pine. Cedar has the most acres for cover types in the lowland landscape position. Lowland shrub and herbaceous open land are the most common nonforested cover types in the ecoregion, representing roughly 12% of the landscape (Table 1).

Table 1. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	111,967	253,261	527,409	832,058
			Northern hardwood	114,462			
			Black/red hybrid oak	0			
			Northern red oak	1,850			
			Oak mix	1,583			
			Mixed upland deciduous	23,400			
		Mixed	Upland mixed forest	26,848	26,848		
		Coniferous	Planted red pine	46,015	247,299		
			Planted jack pine	22,815			
			Planted white pine	461			
			Planted mixed pine	1,580			
			Natural red pine	24,219			
			Natural jack pine	67,263			
			Natural white pine	19,555			
			Natural mixed pines	26,361			
			Upland spruce/fir	6,639			
			Upland conifers	28,344			
			Hemlock	4,046			
	Lowland	Deciduous	Lowland aspen/balsam poplar	19,707	43,443	304,650	
			Lowland deciduous	23,737			
		Mixed	Lowland mixed forest	19,820	19,820		
		Coniferous	Cedar	114,540	241,387		
			Lowland conifers	72,016			
			Lowland spruce/fir	44,080			
			Tamarack	10,751			
Nonforested	Upland	N/A	Herbaceous open land	20,538	N/A	38,827	235,448
			Upland shrub	8,062			
			Low density trees	4,890			
			Bare/sparsely vegetated	2,156			
			Cropland	91			
			Urban	3,090			
	Lowland	N/A	Lowland shrub	105,368	N/A	196,621	
			Marsh	40,996			
			Bog	5,965			
			Treed bog	27,309			
			Water	16,983			
						Grand Total:	**1,067,507**

There are 614,774 acres (58% of the total management area and 74% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Eastern Upper Peninsula ecoregion (Table 2). Of the area available to manage, over 17% is in the aspen cover type, 17% is in the northern hardwood cover type, almost 10% is natural jack pine, over 7% is planted red pine, and nearly 7% is lowland conifers. The remaining cover types represent 4% or less of the forested and available land in the management area.

Table 2. Current cover type composition by management availability.

GRAND MARAIS MORAINE COMPLEX Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	106,463	12.8%	5,524	0.7%	111,987	13.5%
Cedar	25,367	3.0%	89,176	10.7%	114,543	13.8%
Hemlock	2,478	0.3%	1,568	0.2%	4,046	0.5%
Lowland aspen/balsam poplar	16,457	2.0%	3,252	0.4%	19,708	2.4%
Lowland conifers	34,065	4.1%	37,960	4.6%	72,025	8.7%
Lowland deciduous	15,146	1.8%	8,593	1.0%	23,739	2.9%
Lowland mixed forest	13,829	1.7%	5,992	0.7%	19,822	2.4%
Lowland spruce/fir	24,345	2.9%	19,750	2.4%	44,095	5.3%
Mixed upland deciduous	19,668	2.4%	3,733	0.4%	23,401	2.8%
Natural jack pine	60,497	7.3%	6,802	0.8%	67,299	8.1%
Natural mixed pines	19,731	2.4%	6,641	0.8%	26,372	3.2%
Natural red pine	20,715	2.5%	3,512	0.4%	24,227	2.9%
Natural white pine	16,573	2.0%	2,987	0.4%	19,560	2.4%
Northern hardwood	106,939	12.9%	7,533	0.9%	114,471	13.8%
Northern red oak	1,768	0.2%	82	0.0%	1,850	0.2%
Oak mix	1,213	0.1%	370	0.0%	1,583	0.2%
Planted jack pine	22,476	2.7%	342	0.0%	22,818	2.7%
Planted mixed pine	1,491	0.2%	88	0.0%	1,580	0.2%
Planted red pine	45,308	5.4%	716	0.1%	46,024	5.5%

GRAND MARAIS MORAINE COMPLEX Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Planted white pine	461	0.1%	0	0.0%	461	0.1%
Tamarack	3,836	0.5%	6,915	0.8%	10,751	1.3%
Upland conifers	17,901	2.2%	10,448	1.3%	28,349	3.4%
Upland mixed forest	22,738	2.7%	4,114	0.5%	26,852	3.2%
Upland spruce/fir	4,613	0.6%	2,028	0.2%	6,641	0.8%
Grand Total	**604,077**	**72.6%**	**228,127**	**27.4%**	**832,203**	**100.0%**

Table 3. Site conditions for unavailable acres.

Site Condition	Acres	Percent of Unavailable Area
Conservation values	62,427	28.7%
Deer wintering area	52,805	24.3%
Unproductive	20,156	9.3%
Best management practices	17,257	7.9%
Blocked by obstacle	14,409	6.6%
Wildlife concerns	13,839	6.4%
Too wet	13,365	6.2%
Blocked by railroad	5,581	2.6%
Species of special concern or T&E	2,871	1.3%
Federal/state/local law	2,584	1.2%
Non-military lease/easement	2,138	1.0%
Long-term retention	1,668	0.8%
Other DNR/division processes	1,526	0.7%
Too steep	1,283	0.6%
Denied access	1,195	0.6%
Non-DNR agency concerns	1,121	0.5%
Recreational/scenic	1,052	0.5%
Rare landforms	922	0.4%
Total Unavailable	**217,284**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Eastern Upper Peninsula Ecoregion has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest goals needed during the first 10-year planning period are summarized in Table 4. These harvest goals are necessary to begin achieving long-term planning goals.

Table 4. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern hardwood	659	28,729	-	3,756	830	-	-	33,973
Aspen	15,778	-	-	-	-	-	-	15,778
Planted red pine	3,659	-	7,057	-	-	-	-	10,716
Natural jack pine	5,944	-	-	-	-	-	-	5,944
Lowland conifers	5,345	-	-	-	-	-	-	5,345
Upland conifers	4,011	-	-	-	862	-	-	4,872
Planted jack pine	4,415	-	-	-	-	-	-	4,415
Mixed upland deciduous	2,770	261	-	-	298	-	-	3,328
Lowland spruce/fir	3,251	-	-	-	-	-	-	3,251
Lowland aspen/balsam poplar	2,700	-	-	-	-	-	-	2,700
Upland mixed forest	1,985	-	-	-	-	-	-	1,985
Lowland deciduous	1,589	12	-	-	9	-	-	1,609
Natural mixed pines	-	-	804	-	803	-	-	1,607
Natural red pine	-	-	618	-	619	-	-	1,236
Lowland mixed forest	1,232	-	-	-	-	-	-	1,232
Upland spruce/fir	651	-	-	-	-	-	-	651
Totals	**54,449**	**29,120**	**8,810**	**3,856**	**3,715**	**-**	**-**	**99,949**

Cover type projections for the Eastern Upper Peninsula Ecoregion differ from cover type to cover type, mainly driven by treatment regimes within the first planning period. Most cover types remain fairly stable; however, significant transitions are forecasted for a few cover types. The largest forecasted decrease in cover type is planted jack pine, where 13% of the cover type (2,888 acres) is expected to transition to other cover types like natural jack pine (Table 5). Lowland mixed forest is forecasted to increase by 1,796 acres, or about 9%, with conversions from lowland conifers and lowland spruce/fir.

Table 5. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Cedar	114,540	114,540	0
Northern hardwood	114,462	114,781	319
Aspen	111,967	112,693	726
Lowland conifers	72,016	70,981	-1,035
Natural jack pine	67,263	68,787	1,523
Planted red pine	46,015	46,706	691
Lowland spruce/fir	44,080	43,508	-571
Upland conifers	28,344	27,801	-544
Upland mixed forest	26,848	27,430	582
Natural mixed pines	26,361	26,371	11
Natural red pine	24,219	24,219	0
Lowland deciduous	23,737	23,768	32
Mixed upland deciduous	23,400	23,336	-63
Planted jack pine	22,815	19,928	-2,888
Lowland mixed forest	19,820	21,616	1,796
Lowland aspen/balsam poplar	19,707	19,573	-133
Natural white pine	19,555	19,555	0
Tamarack	10,751	10,700	-51
Upland spruce/fir	6,639	6,303	-336
Hemlock	4,046	4,046	0
Northern red oak	1,850	1,830	-20
Oak mix	1,583	1,583	0
Planted mixed pine	1,580	1,526	-54
Planted white pine	461	461	0
Black/red hybrid oak	0	14	14
Lowland shrub	105,368	105,368	0
Marsh	40,996	40,996	0
Treed bog	27,309	27,309	0
Herbaceous open land	20,538	20,538	0
Water	16,983	16,983	0
Upland shrub	8,062	8,062	0
Bog	5,965	5,965	0
Low-density trees	4,890	4,890	0
Urban	3,090	3,090	0
Bare/sparsely vegetated	2,156	2,156	0

Cropland	91	91	0
Total:	**1,067,507**	**1,067,507**	**0**

EUP management areas

Drummond Island

State forest area: 47,802 acres	Location: Eastern Upper Peninsula	Population centers: Drummond Township
Subsection: St. Ignace Lake Plain	Landforms: Flat lake beds Dune fields Shallow embayments Exposed limestone	Land cover: Forested: 40,438 acres Nonforested: 7,364 acres

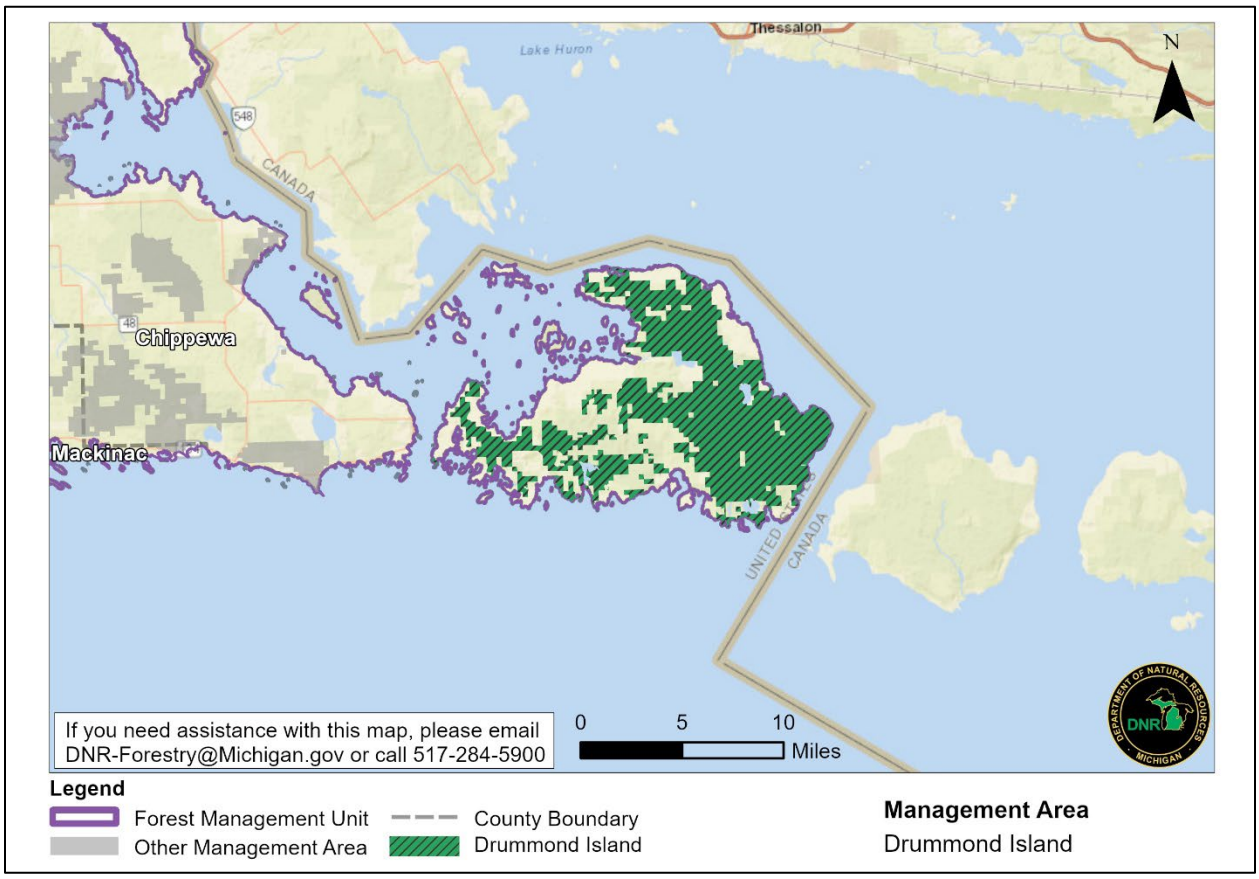


Figure 1. Drummond Island Management Area.

Forested landscape

Current and projected future condition

The Drummond Island Management Area includes a variety of tolerance levels, occurring mostly in the young and old age categories. Tolerant cover types occur on both unavailable lowlands in the old age category. Mid-tolerant cover types mostly occur on available uplands in the mature and old age categories, while most of the intolerant cover types occur in the young category on available uplands.

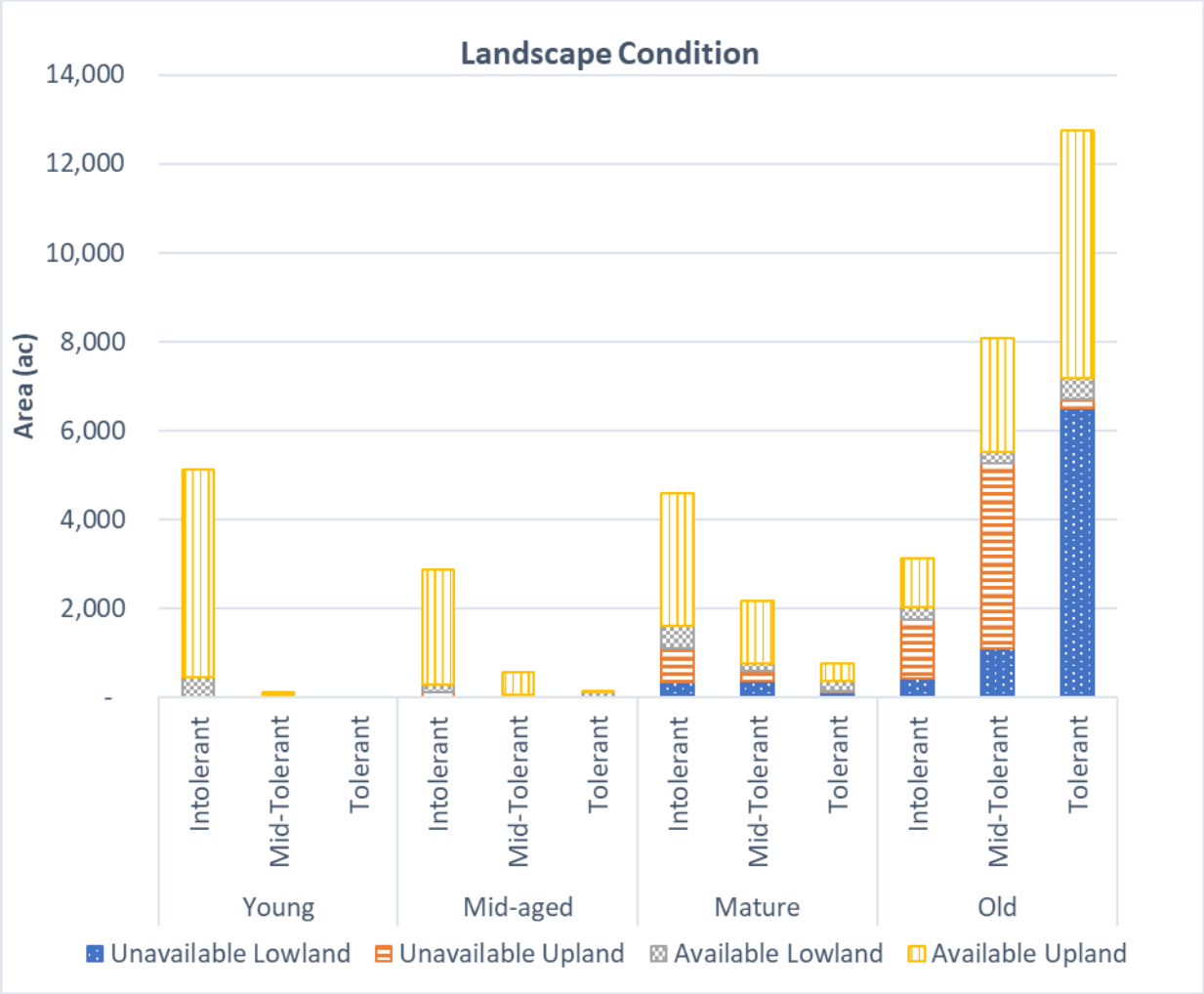


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (see Section 3) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0- to 19-year stands in aspen and jack pine	5,248
Mature forest	Acres of 80-plus-year stands across cover types	23,970
Mature forest	Acres of 120-plus-year stands across cover types	5,414
Mesic conifer cover types	Acres of mesic conifer cover types	5,175
Mesic conifers in other cover types	Average canopy occupancy	24%
Mast – oak cover types	Acres of oak cover types	--
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	8,662
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	22,665
Nonforested openings	Acres of total herbaceous open land, upland shrub and crop land	1,920
Landscape forest matrix	Percent deciduous forest	58%
Landscape forest matrix	Percent coniferous forest	32%

Another important landscape-level habitat in the management area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, land birds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provide unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas. The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Drummond Island Management Area has the following special analysis units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the State Forest Management Plan model strives to meet the cover type goals across the MA, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhancement Management (GEM) – Drummond

The Drummond Island Management Area is comprised of 85% forested cover types and 15% nonforested cover types. Of the forested cover types, 60% are in an upland landscape position and 25%

are in the lowland landscape positions. The largest contributors to upland cover types are aspen, northern hardwoods and upland conifers. Cedar has the most acres for cover types in the lowland landscape position. Herbaceous open land and marsh are the most common nonforested cover types in the management area, representing 8% of the landscape (Table 2).

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	13,334	20,592	28,717	40,438
			Northern hardwood	5,931			
			Black/red hybrid oak	0			
			Northern red oak	8			
			Oak mix	0			
			Mixed upland deciduous	1,320			
		Mixed	Upland mixed forest	2,915	2,915		
		Coniferous	Planted red pine	0	5,210		
			Planted jack pine	0			
			Planted white pine	0			
			Planted mixed pine	0			
			Natural red pine	36			
			Natural jack pine	0			
			Natural white pine	76			
			Natural mixed pines	131			
			Upland spruce/fir	458			
			Upland conifers	4,501			
			Hemlock	9			
	Lowland	Deciduous	Lowland aspen/balsam poplar	1,998	2,973	11,721	
			Lowland deciduous	975			
		Mixed	Lowland mixed forest	1,015	1,015		
		Coniferous	Cedar	6,626	7,733		
			Lowland conifers	844			
			Lowland spruce/fir	21			
			Tamarack	243			
Nonforested	Upland	N/A	Herbaceous open land	1,772	N/A	2,280	7,364
			Upland shrub	148			
			Low-density trees	153			
			Bare/sparsely vegetated	112			
			Cropland	0			
			Urban	95			
	Lowland	N/A	Lowland shrub	1,558	N/A	5,084	
			Marsh	1,830			
			Bog	20			
			Treed bog	24			
			Water	1,652			
						Grand Total:	**47,802**

There are 24,689 acres (51% of the total management area and 61% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Drummond Island

Management Area (Table 3). Of that, over 27% is in the aspen cover type, 14% is in the northern hardwood cover type and almost 5% is upland mixed forest. The remaining cover types represent less than 4% each of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

DRUMMOND ISLAND Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	11,067	27.4%	2,267	5.6%	13,334	33.0%
Cedar	532	1.3%	6,094	15.1%	6,626	16.4%
Hemlock	9	0.0%	0	0.0%	9	0.0%
Lowland aspen/balsam poplar	1,433	3.5%	565	1.4%	1,998	4.9%
Lowland conifers	291	0.7%	553	1.4%	844	2.1%
Lowland deciduous	236	0.6%	739	1.8%	975	2.4%
Lowland mixed forest	273	0.7%	742	1.8%	1,015	2.5%
Lowland spruce/fir	21	0.1%	0	0.0%	21	0.1%
Mixed upland deciduous	1,257	3.1%	63	0.2%	1,320	3.3%
Natural mixed pines	126	0.3%	5	0.0%	131	0.3%
Natural red pine	0	0.0%	36	0.1%	36	0.1%
Natural white pine	76	0.2%	0	0.0%	76	0.2%
Northern hardwood	5,727	14.2%	204	0.5%	5,931	14.7%
Northern red oak	0	0.0%	8	0.0%	8	0.0%
Tamarack	16	0.0%	227	0.6%	243	0.6%
Upland conifers	1,323	3.3%	3,178	7.9%	4,501	11.1%
Upland mixed forest	1,976	4.9%	939	2.3%	2,915	7.2%
Upland spruce/fir	327	0.8%	131	0.3%	458	1.1%
Grand Total	**24,689**	**61.1%**	**15,749**	**38.9%**	**40,439**	**100.0%**

Desired future condition

There are very few cover type transitions projected for the Drummond Island Management Area. The managed area of each cover type is projected to remain very stable, as treatment regimes will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the upland mixed forest cover type, where 117 acres will convert to other cover types through forest management and regeneration activities. The largest increase occurs in northern hardwoods, where 67 acres are projected to convert into this cover type.

Table 4. Site conditions for unavailable acres.

Site Condition	Acres	Percent of Unavailable Area
Deer wintering area	5,197	33.0%

Site Condition	Acres	Percent of Unavailable Area
Conservation values	4,210	26.7%
Species of special concern or T&E	2,805	17.8%
Wildlife concerns	1,942	12.3%
Too wet	754	4.8%
Recreational/scenic	353	2.2%
BMPs	233	1.5%
Cannot regenerate	108	0.7%
Blocked by obstacle	75	0.5%
Long-term retention	31	0.2%
Unproductive	29	0.2%
Rare landforms	11	0.1%
Other department/division processes	1	0.0%
Total	**15,749**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Drummond Island Management Area has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. Implementing these silvicultural regimes will yield 66,584 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern hardwood	-	1,391	-	-	-	-	-	1,391
Aspen	1,350	-	-	-	-	-	-	1,350
Upland conifers	484	-	-	-	-	-	-	484
Upland mixed forest	176	-	-	-	-	-	-	176
Mixed upland deciduous	139	15	-	-	14	-	-	167
Lowland aspen/balsam poplar	100	-	-	-	-	-	-	100
Lowland deciduous	92	-	-	-	-	-	-	92
Lowland conifers	37	-	-	-	-	-	-	37

Silvicultural Regimes								
Lowland mixed forest	17	-	-	-	-	-	-	17
Lowland spruce/fir	11	-	-	-	-	-	-	11
Natural mixed pines	-	-	-	-	2	-	-	2
Totals	**2,406**	**1,405**	**-**	**-**	**15**	**-**	**-**	**3,826**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection **Drummond Island Management Area**			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed hardwood	15,176	14,265
	Mixed aspen	9,252	8,697
	Mixed softwood	5,250	4,935
	Mixed spruce	3,724	3,501
	Red pine	957	900
	White pine	731	687
	Mixed oak	623	585
	Jack pine	468	440
	Pulpwood Total	**36,181**	**34,010**
Sawtimber (MBF)	Sugar maple	5,347	5,026
	Mixed aspen	3,448	3,241
	Red pine	3,215	3,022
	Red maple	1,760	1,654
	White pine	1,283	1,206
	Red oak	670	630
	Basswood	655	616
	White oak	105	98
	Mixed oak	75	71
	Sawtimber Total	**16,558**	**15,565**
	Total Sawtimber Harvest Volume in Cords	**34,653**	**32,574**
	Grand Total Harvest Volume in Cords	**70,834**	**66,584**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. There are no major projected cover type transitions within the next decade (Table 7).

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Aspen	13,334	13,390	56
Cedar	6,626	6,626	0
Northern hardwood	5,931	5,998	67
Upland conifers	4,501	4,510	9
Upland mixed forest	2,915	2,798	-117
Lowland aspen/balsam poplar	1,998	1,963	-35
Mixed upland deciduous	1,320	1,291	-29
Lowland mixed forest	1,015	1,032	17
Lowland deciduous	975	1,002	27
Lowland conifers	844	836	-8
Upland spruce/fir	458	458	0
Tamarack	243	243	0
Natural mixed pines	131	131	0
Natural white pine	76	76	0
Natural red pine	36	36	0
Lowland spruce/fir	21	19	-2
Hemlock	9	9	0
Northern red oak	8	8	0
Black/red hybrid oak	0	13	13
Marsh	1,830	1,830	0
Herbaceous open land	1,772	1,772	0
Water	1,652	1,652	0
Lowland shrub	1,558	1,558	0
Low-density trees	153	153	0
Upland shrub	148	148	0
Bare/sparsely vegetated	112	112	0
Urban	95	95	0

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Treed bog	24	24	0
Bog	20	20	0
Total	**47,802**	**47,802**	**0**

Featured species current and projected habitat acres

There are seven featured species in this management area that span various cover types, age classes and stand-level conditions.

As noted in the featured species management priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres, what is being referred to is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the featured species management priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate into any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	8,405	9,590	6,994	11,421
Black-throated blue warbler	Northern hardwoods, mixed upland deciduous	3,973	5,248	2,644	6,757

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Ruffed grouse	Aspen	5,594	3,871	3,013	3,058
Snowshoe hare forest	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	7,312	5,442	3,727	3,841
White-tailed deer (food)	Food: Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	27,495	27,495	27,415	27,346
White-tailed deer (shelter)	Shelter: hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	12,701	12,701	12,783	12,854

Cover type composition and associated featured species

Aspen

Current condition

Most of the aspen cover type is currently in the 0- to 39-year-old age classes. (Figure 3). The past management regime has been primarily clearcut for this cover type. The younger age classes have a surplus of acres, and older age classes have an even larger deficit. Most aspen stands in this management area are very open-grown or are very low site-index. Balancing of age classes has not been the focus, as this management area includes alvar natural communities and other special features.

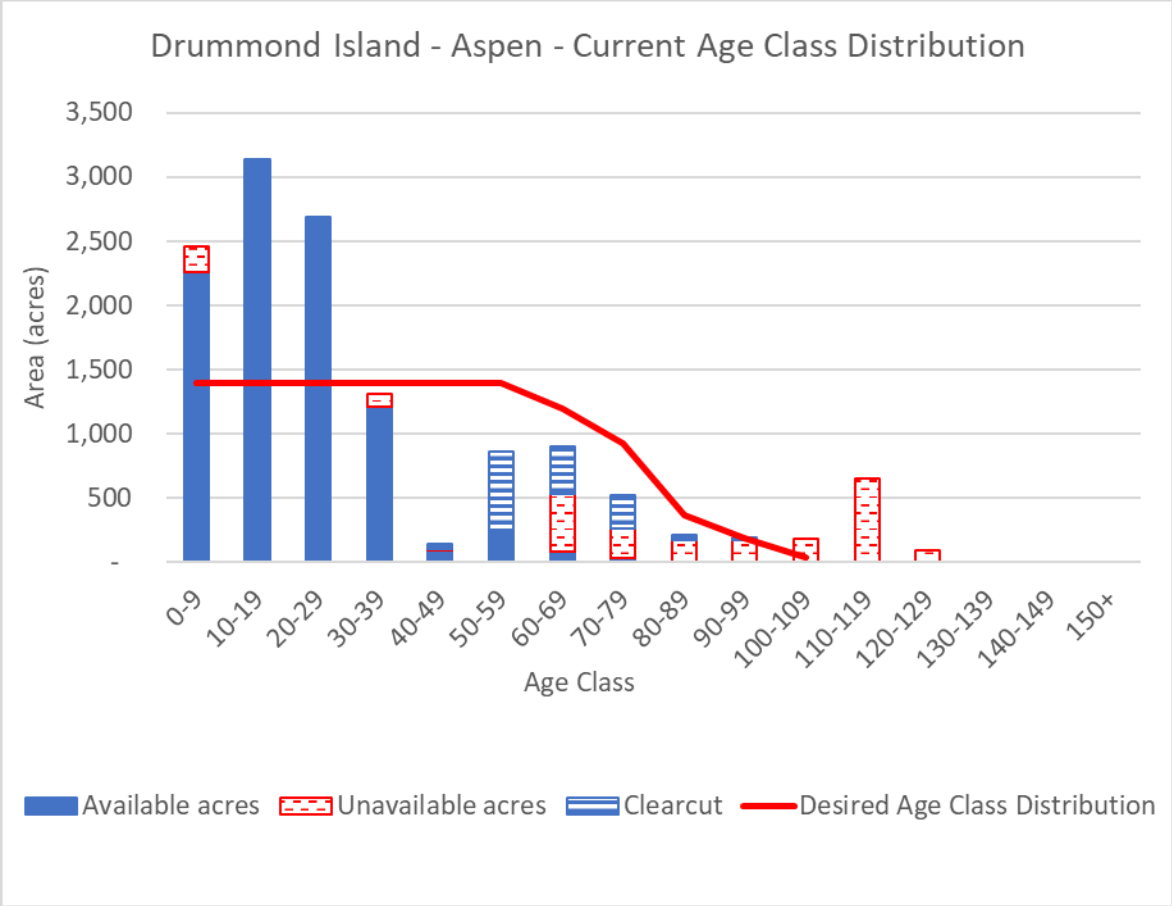


Figure 3. The current age class distribution, the desired age class distribution and the projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for ruffed grouse, snowshoe hare and white-tailed deer.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres – Unavailable
Ruffed grouse	Age category: 0-19 Size category: sapling Stocking: medium to well	5,389	204
Snowshoe hare	Age category: 0-19 Size category: sapling Stocking: well	7,108	204
White-tailed deer	All ages and size classes	13,334	--

Desired future condition

The projected long-term cover type trend for aspen is stable in the Drummond Island Management Area. There are a few transitions into this cover type from other cover types forecasted in this management area and no transitions from aspen to other cover types.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old, with a gradual tail reaching 100 years, for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of 1,411 acres of 0- to 9-year age class. Progress toward the long-term age class distribution of aspen will take many decades in the management area (Figure 4).

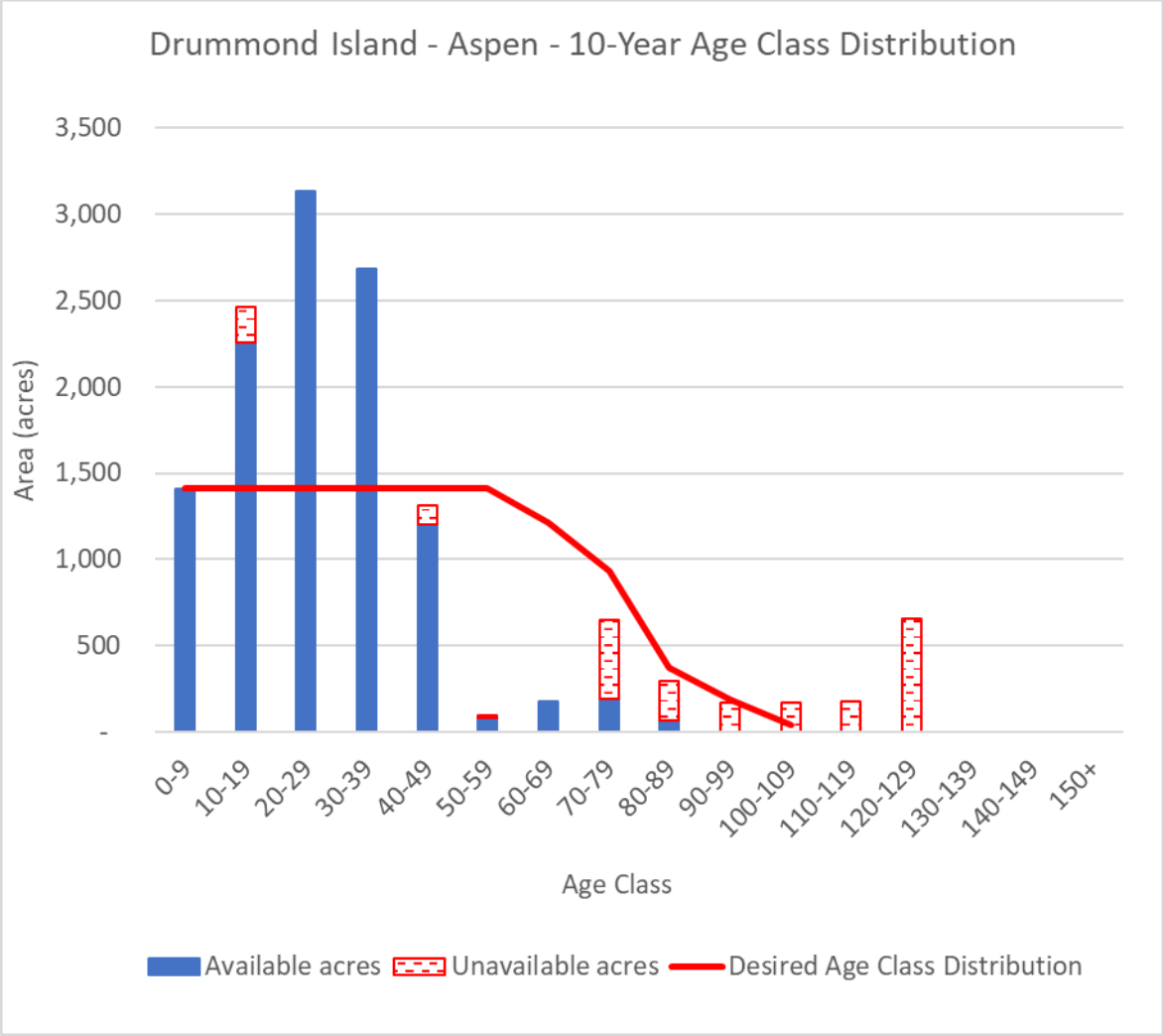


Figure 4. The short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of aspen acres nearly reaching the desired future condition, with only a few age classes deviating from the target proportions (Figure 5). As is often the case, an extremely unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals.

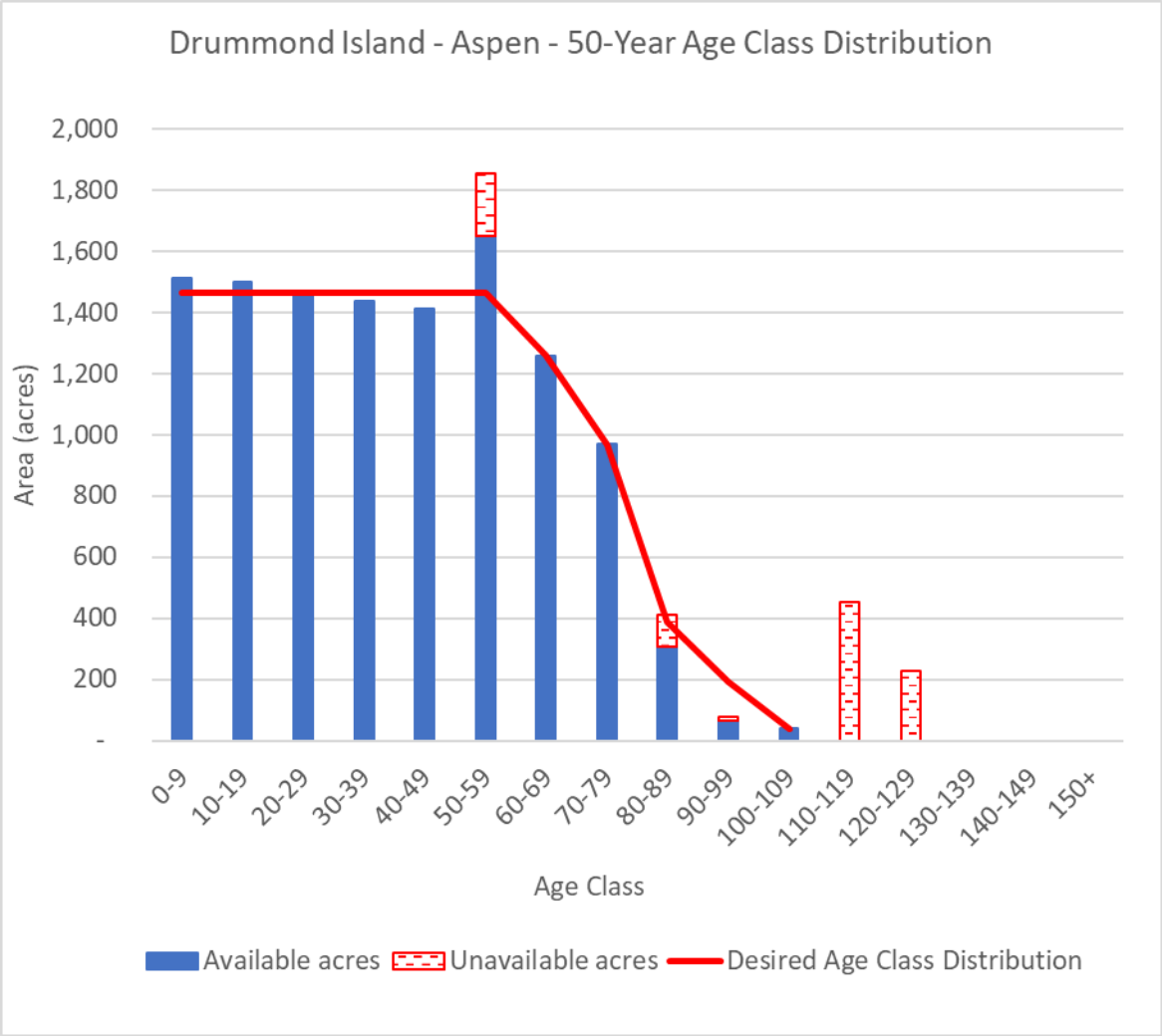


Figure 5. The projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

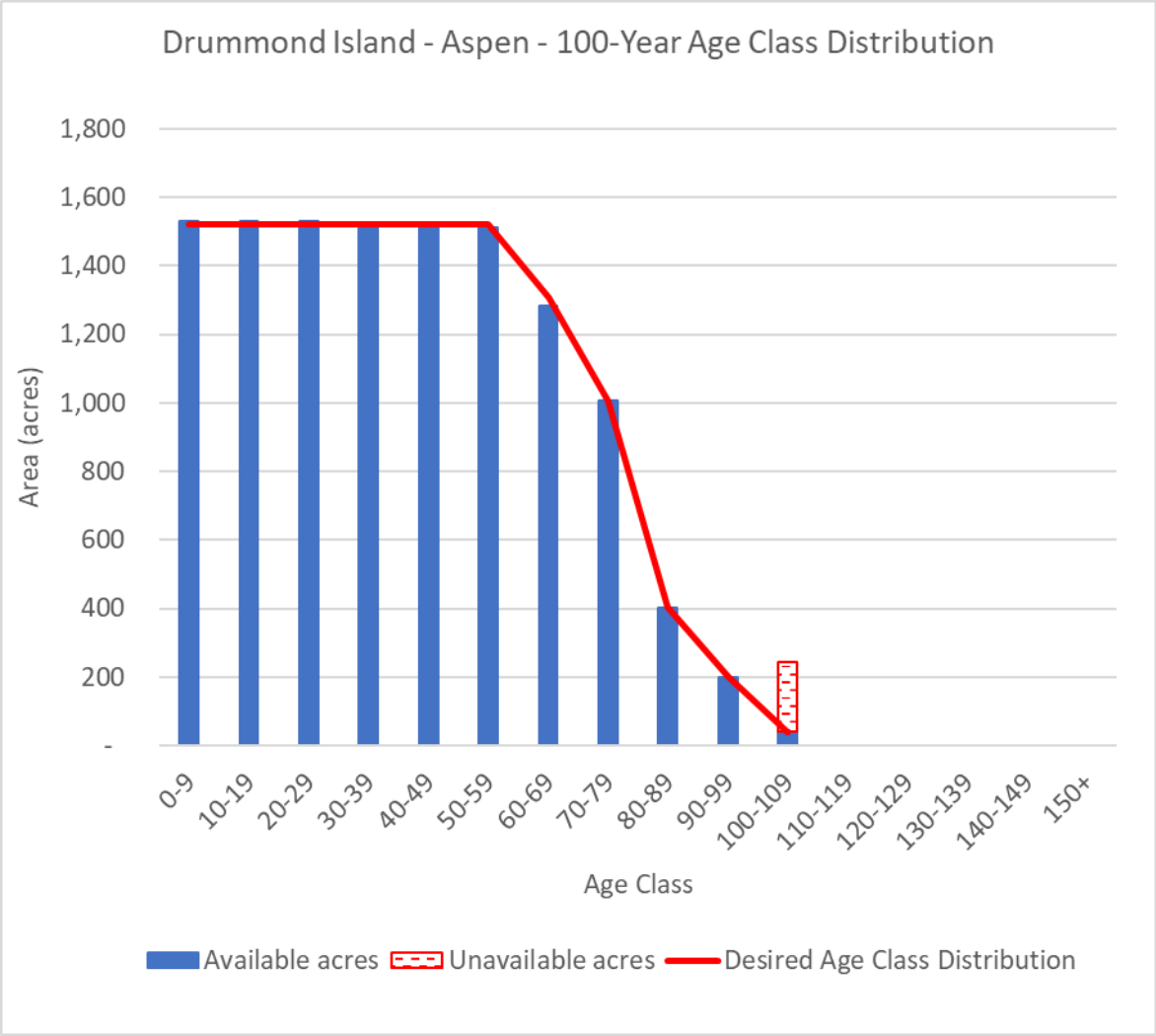


Figure 6. The projected long-term age class distribution at the end of the tenth planning period compared to the long-term desired age class distribution.

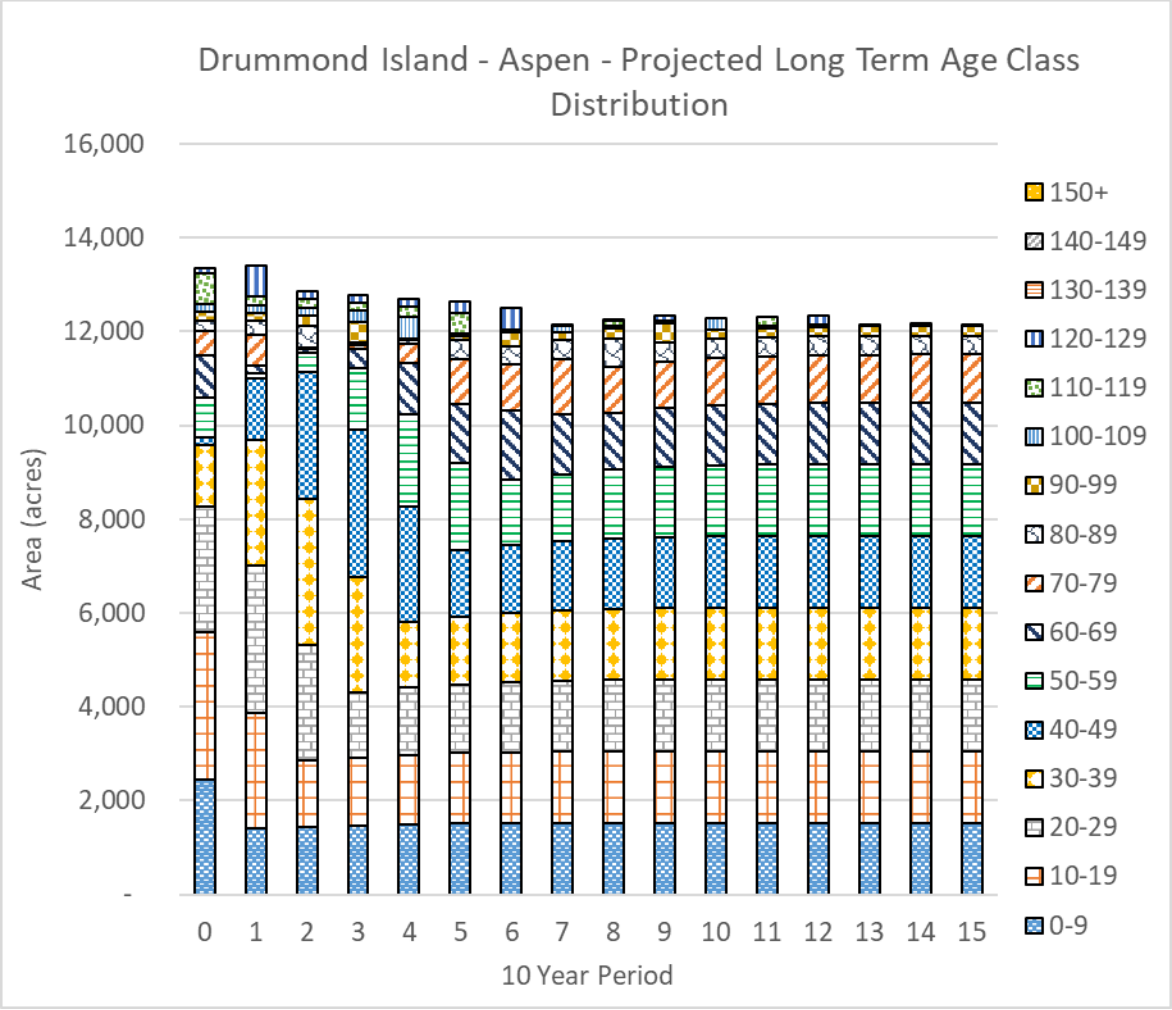


Figure 7. The projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 1,330 acres of projected clearcut harvest in the aspen cover type during this planning period, which is just under the desired establishment of 1,393 acres per decade.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 80 and 110 years old in the Drummond Island Management Area (Figure 8). The past management regime has been primarily single tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition, where a featured stand age becomes less evident, but the dominant age of these stands will likely increase beyond 150 years old prior to a younger age cohort becoming the prominent component of these stands.

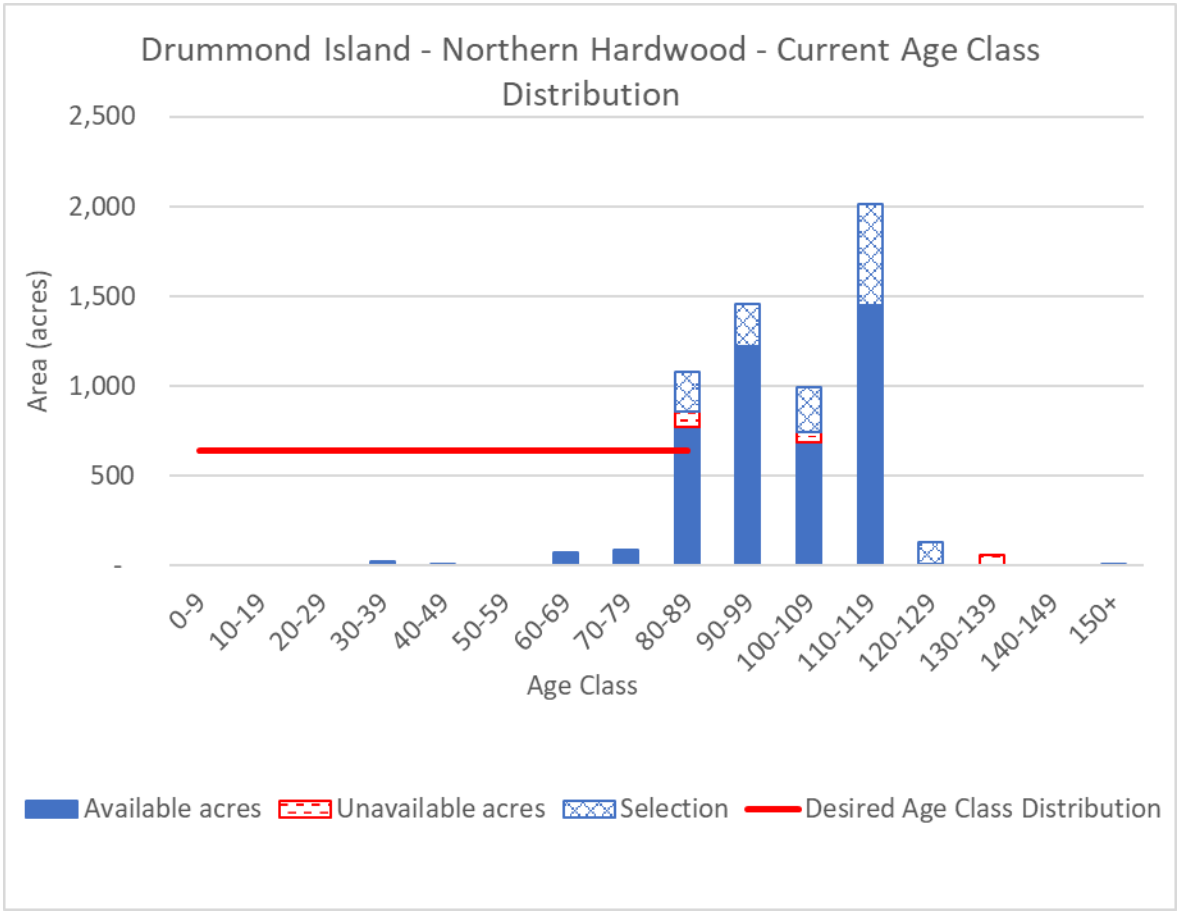


Figure 8. The current age class distribution and desired age class distribution in the northern hardwood cover type in the Drummond Island Management Area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Drummond Island Management Area (Figure 9). Current conditions are a result of beech salvage efforts in the previous planning period and a regulated-selection harvest regime that has been in place in this management area for decades.

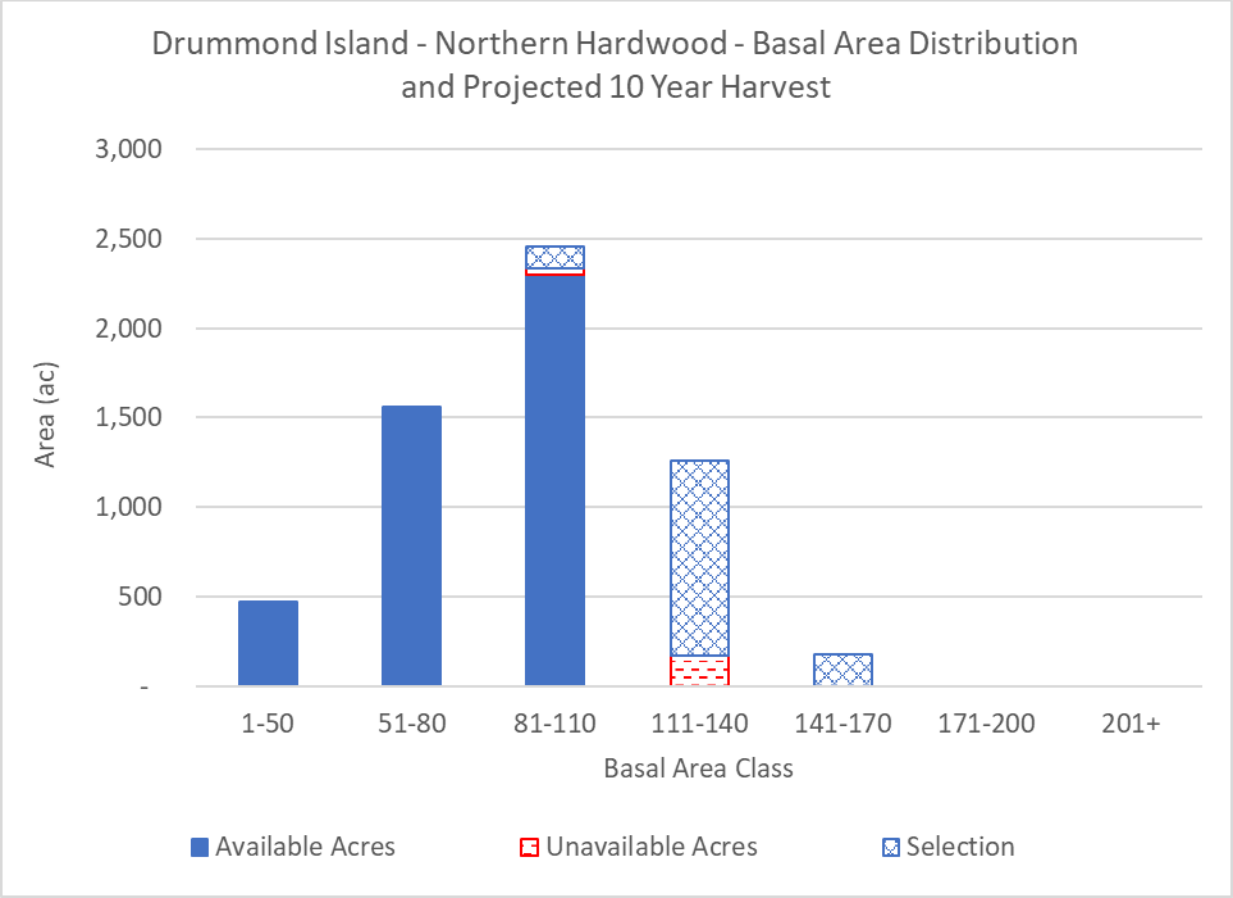


Figure 9. The current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are very few acres of unavailable northern hardwoods in the Drummond Island Management Area. Selection is the primary silvicultural treatment projected during this 10-year planning period, but there may be opportunities to utilize other harvesting regimes, including even-aged management silvicultural regimes, to increase stem density, species composition and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for blackburnian warbler, black-throated blue warbler and white-tailed deer.

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	4,823	3,577
Black-throated blue warbler	Age category: 80+ Size category: sawlog Basal area: 81+	3,762	211
White-tailed deer	All ages and size classes	5,931	--

Desired future condition

The projected long-term cover type trend for northern hardwood is slightly increasing in the Drummond Island Management Area. There are very few transitions into this cover type from other cover types and equally few transitions from northern hardwoods to other cover types forecasted in this management area.

The desired basal area distribution is a bell-shaped curve, where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupying the 111-140 class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area, which is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings and poles and eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. Shallow, sensitive soils over bedrock are an issue and influence both growth and harvest. The Drummond Island Management Area will take several decades to reach the desired future condition because of the impacts from beech bark disease. The amount of American beech that once occupied much of the northern hardwood stands has resulted in lower than normal residual basal area and decreased stocking levels across much of the eastern Upper Peninsula.

Although the State Forest Management Plan model shows an increase for featured species potential habitat, it is likely that regeneration issues within this cover type will have an impact on the amount available in the future.

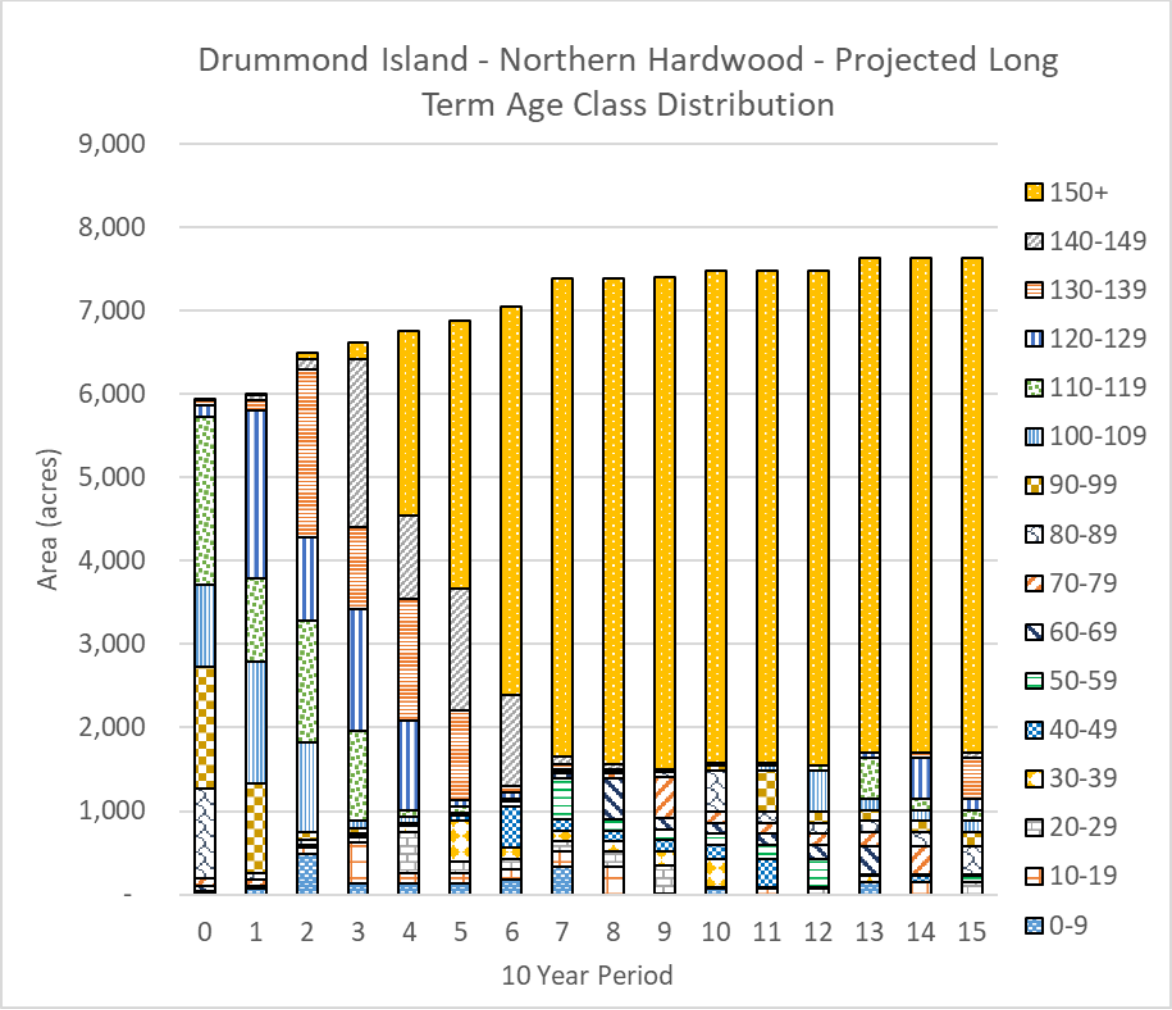


Figure 10. The projected age-class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 1,391 acres (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed canopy landscape condition, mindful of featured species habitat requirements.

Cedar

Current condition

There are several deer wintering complexes throughout this management area. The majority of this cover type is over 90 years old and unavailable for commercial harvest. The age-class distribution is unbalanced, but regulated harvests are not a priority/focus in this cover type.

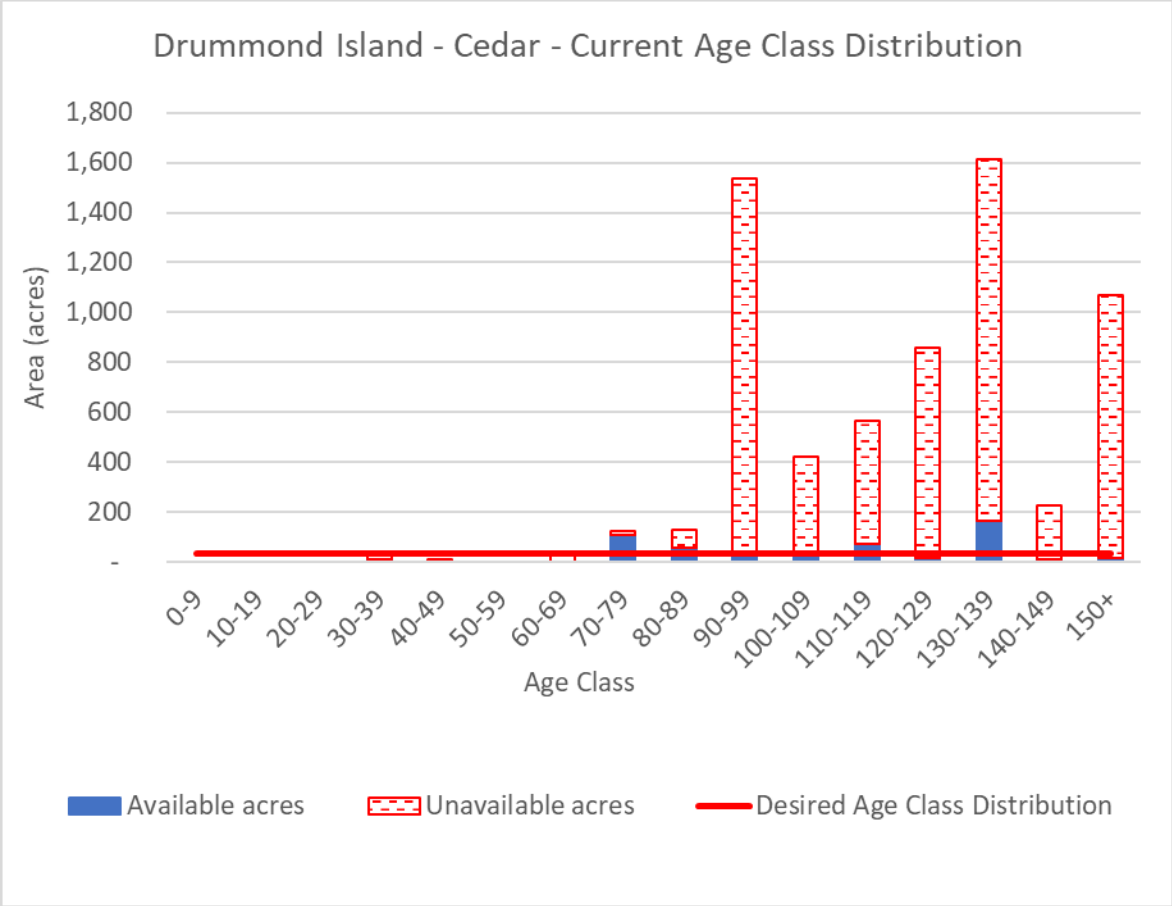


Figure 9. The current age-class distribution and projected harvests in the cedar cover type in the Drummond Island Management Area.

Table 10. Featured species with cedar as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Cedar	Cedar Habitat Acres – Available	Cedar Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling Stocking: well	0	0
White-tailed deer	All ages and size classes	--	6,626

Desired future condition

The projected long-term cover type trend for cedar is stable in the Drummond Island Management Area. There are very few projected transitions into or out of this cover type from other cover types forecasted.

The long-term goal for this cover type is to manage and maintain wildlife habitat.

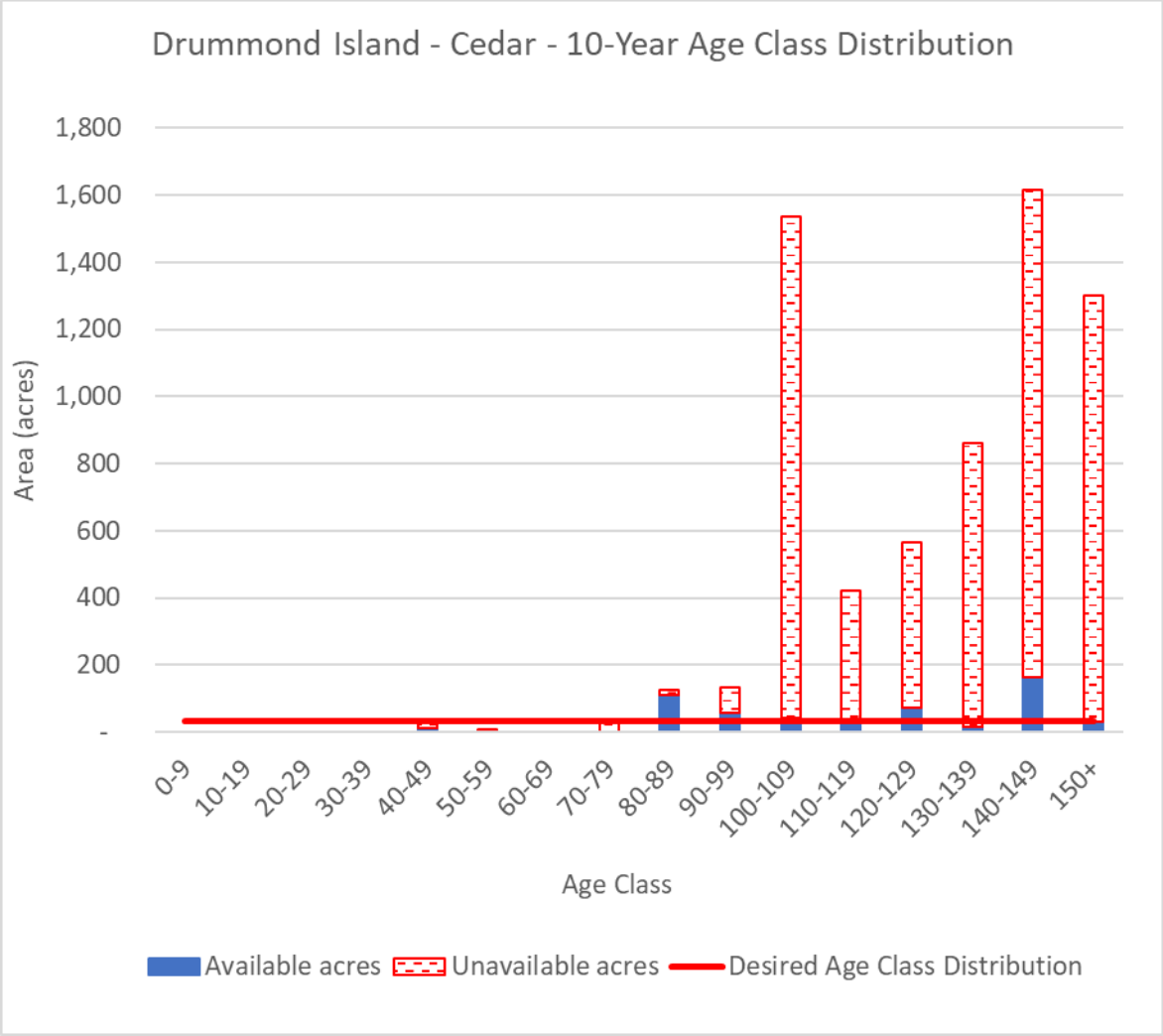


Figure 10. Short-term future age-class distribution at the end of the 10-year planning period compared to the long-term desired age-class distribution.

The midterm age-class distribution shows the population of cedar acres beginning to reach the desired future condition (Figure 11).

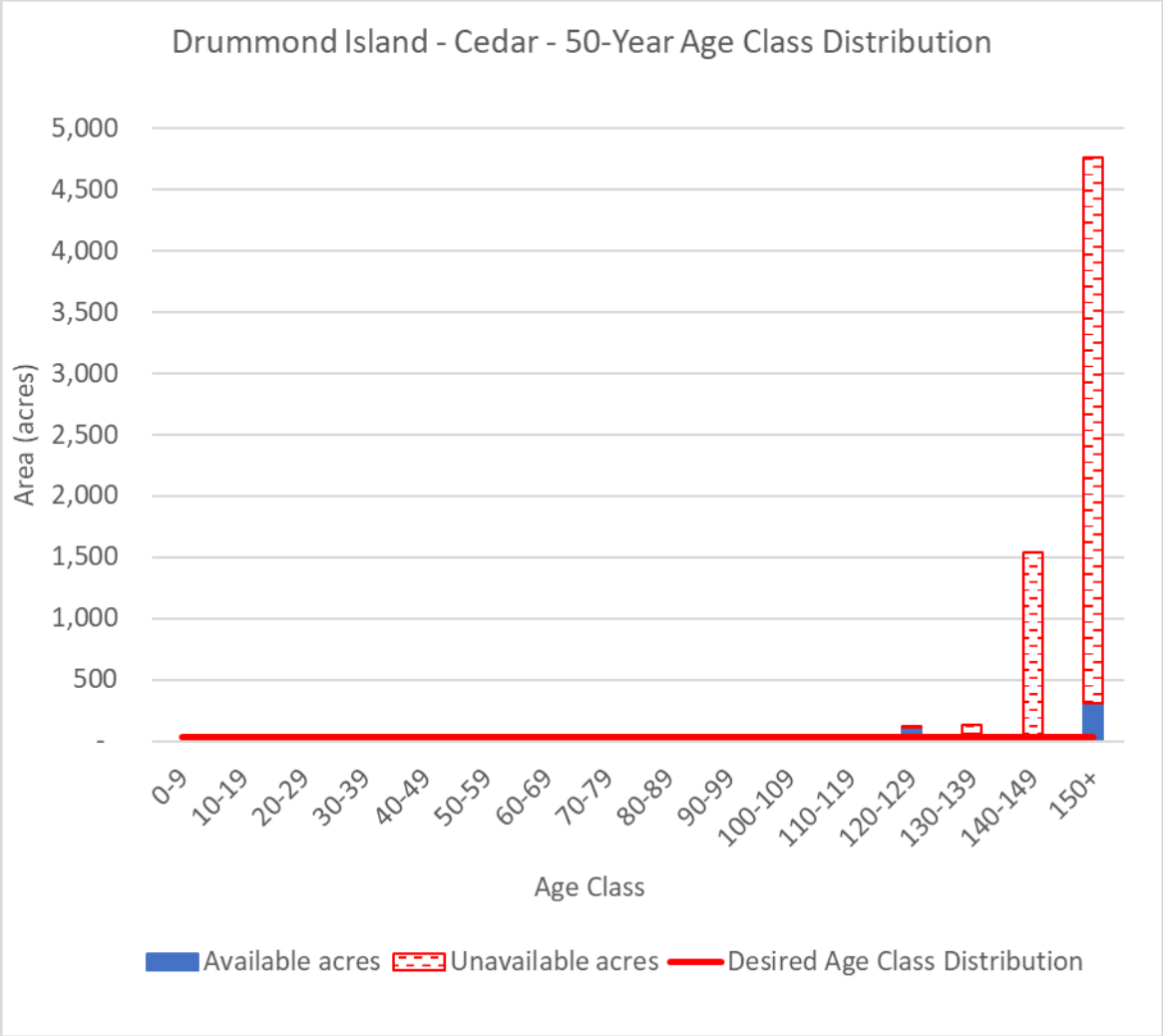


Figure 11. Projected midterm age-class distribution at the end of the fifth planning period compared to the long-term desired age-class distribution.

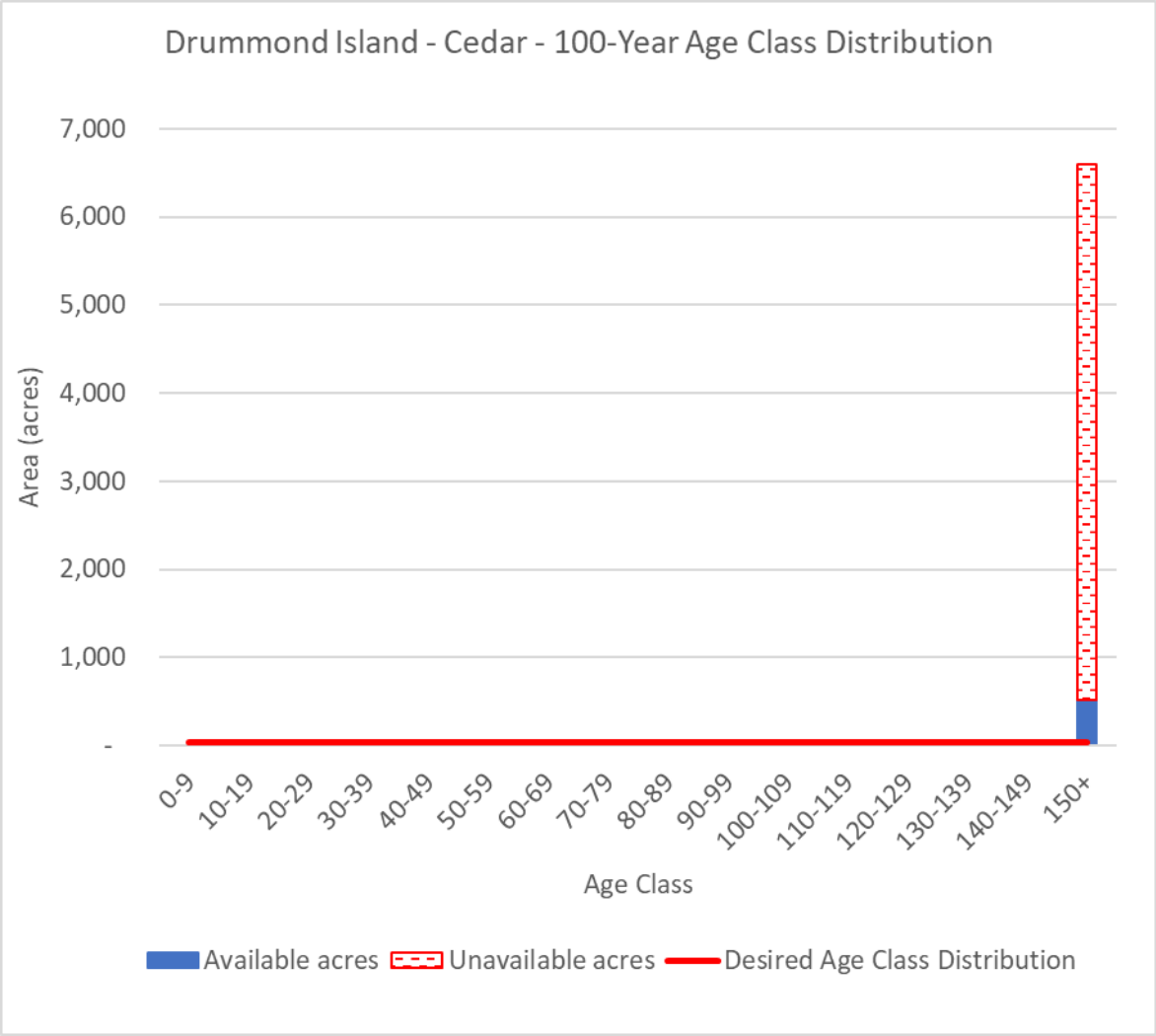


Figure 12. Projected long-term age-class distribution at the end of the 10th planning period compared to the long-term desired age-class distribution.

The long-term achievement of the desired age-class distribution (Figure 12) will concentrate on the management of cedar within the deer wintering complex plans to provide wildlife habitat conditions across the landscape.

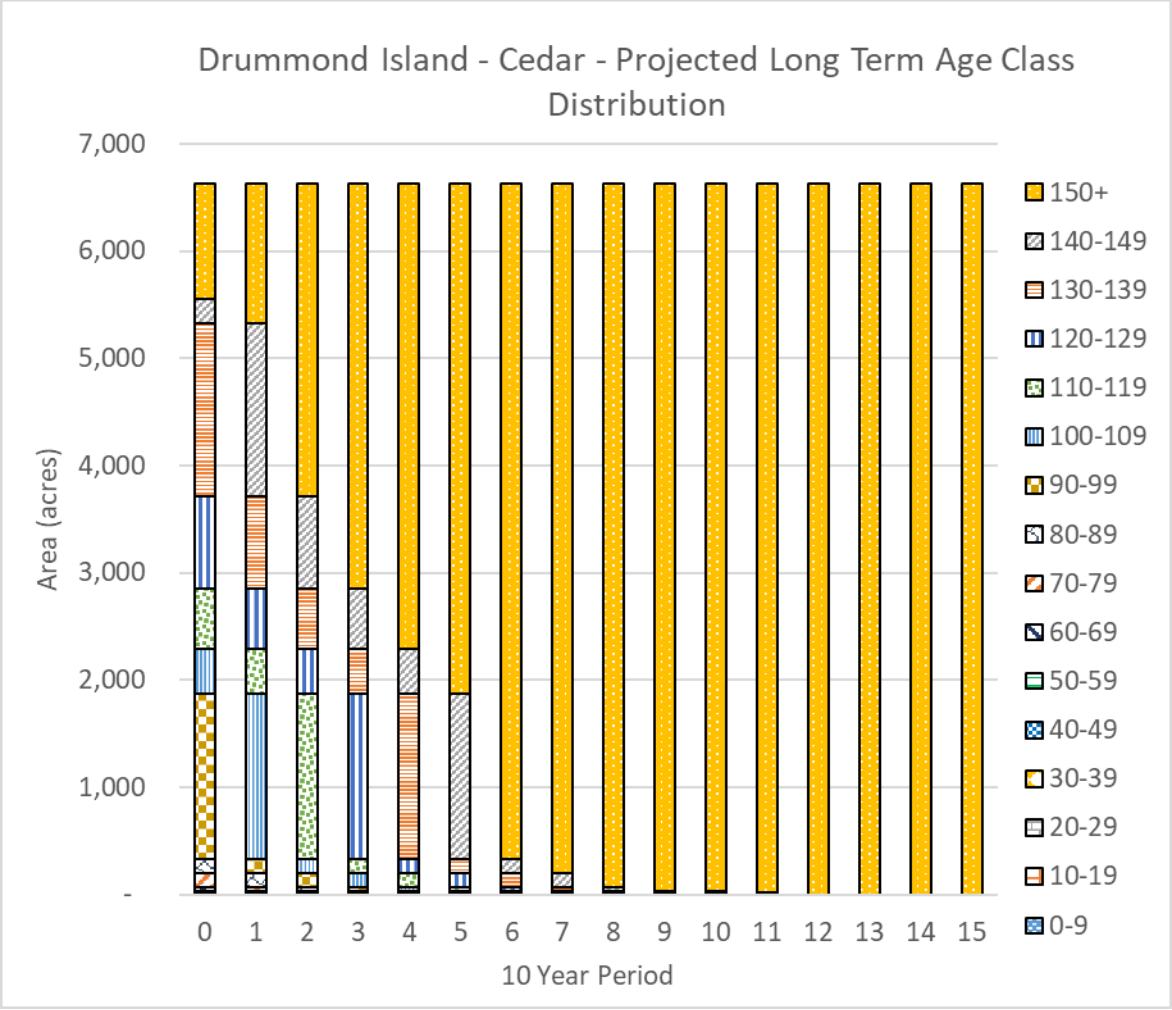


Figure 13. Projected age-class distribution for all acres of cedar over the next 150 years.

Management actions

Maintaining this cover type where it exists on the landscape will be the primary action for this planning period. This cover type provides the best functional shelter habitat related to overwintering deer and deer wintering complexes (see Section 5) and can be a difficult cover type to regenerate through commercial harvest. Continued understanding of how to regenerate the cover type should be considered as emerging research becomes available.

Deer wintering complexes greater than 15,000 acres are modeled as a special analysis unit, or SAU, and information on them can be found in Section 5 of the plan. In deer wintering complexes less than 15,000 acres, harvest of cedar and hemlock is not allowed within those range stands essential for deer survival, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Upland conifer

Current condition

The Drummond Island Management Area has a surplus of acres in the 80 years and older age classes due, in part, to the number of unavailable acres in this cover type (Figure 14). The age-class distribution is currently very unbalanced across almost all the age-class categories. Additionally, a deficit of available acres occurs in all age classes younger than 50 years. The landscape position in which many of these acres occur contributes to the number of acres extending beyond the desired maximum age-class tail of 130 years old.

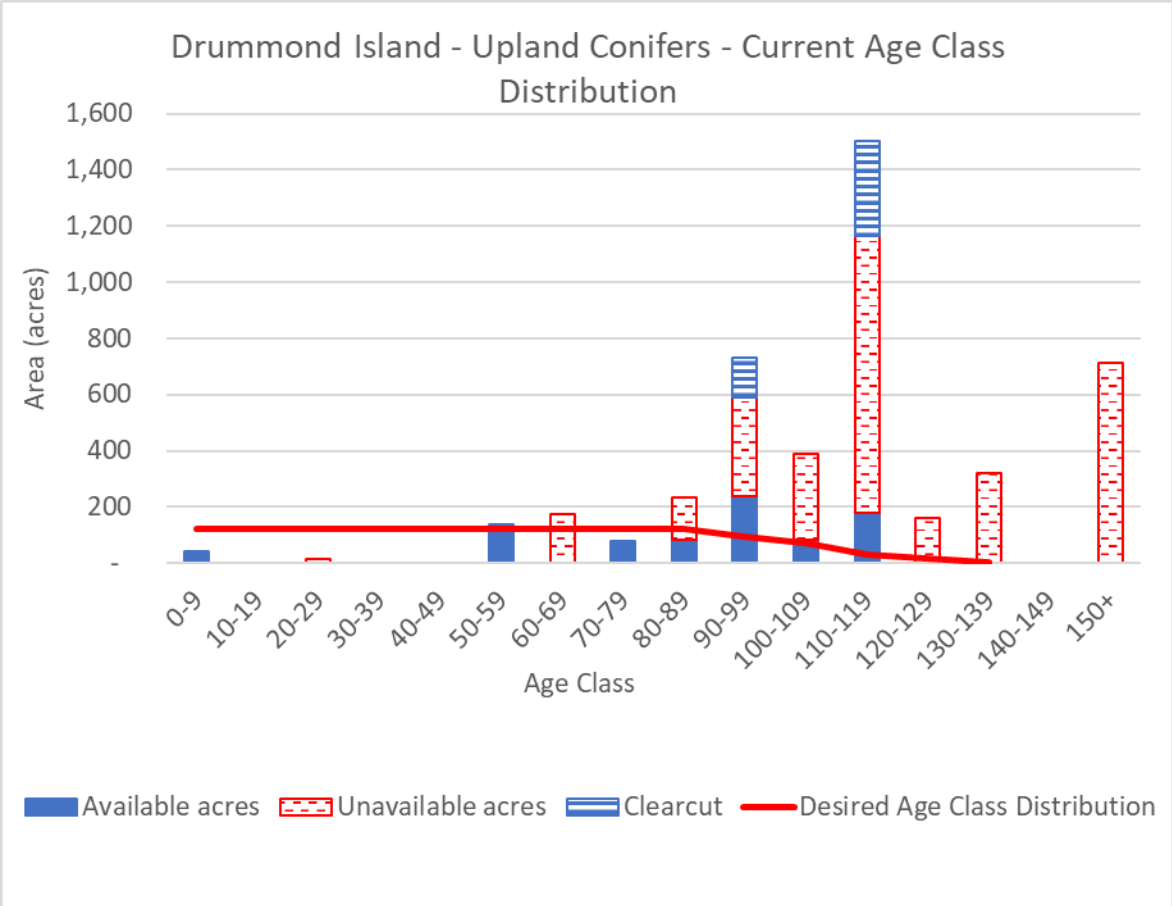


Figure 14. Current age-class distribution, desired age class distribution and projected harvests in the upland conifers cover type over the 10-year planning period.

Table 11. Featured species with upland conifers as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Upland Conifer	Upland Conifer Habitat Acres – Available	Upland Conifer Habitat Acres – Unavailable
Ruffed grouse	Age category: 0-19 Size category: sapling Stocking: medium to well	5,389	204
Snowshoe hare	Age category: 0-19 Size category: sapling Stocking: well	7,108	204
White-tailed deer	All ages and size classes	4,501	--

Desired future condition

The projected long-term cover type trend for upland conifers is stable in the Drummond Island Management Area. There are a few transitions in and out of this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available upland conifer acres and then decreasing number of acres until the maximum tail of 130 years old is reached.

The end of the planning period will result in the establishment of approximately 440 acres of upland conifers from the available acres (Figure 15). Achieving the long-term desired balanced age-class distribution of lowland conifers will take many decades (Figure 15).



Figure 15. Short-term future age-class distribution at the end of the 10-year planning period compared to the long-term desired age-class distribution.

The midterm age-class distribution of upland conifers is beginning to reach the desired future condition for available acres in the age classes between 0 and 30 years old. The number of acres in the older age classes, 150 years old and older, continues to increase as the unavailable acres move to the older age classes (Figure 16).

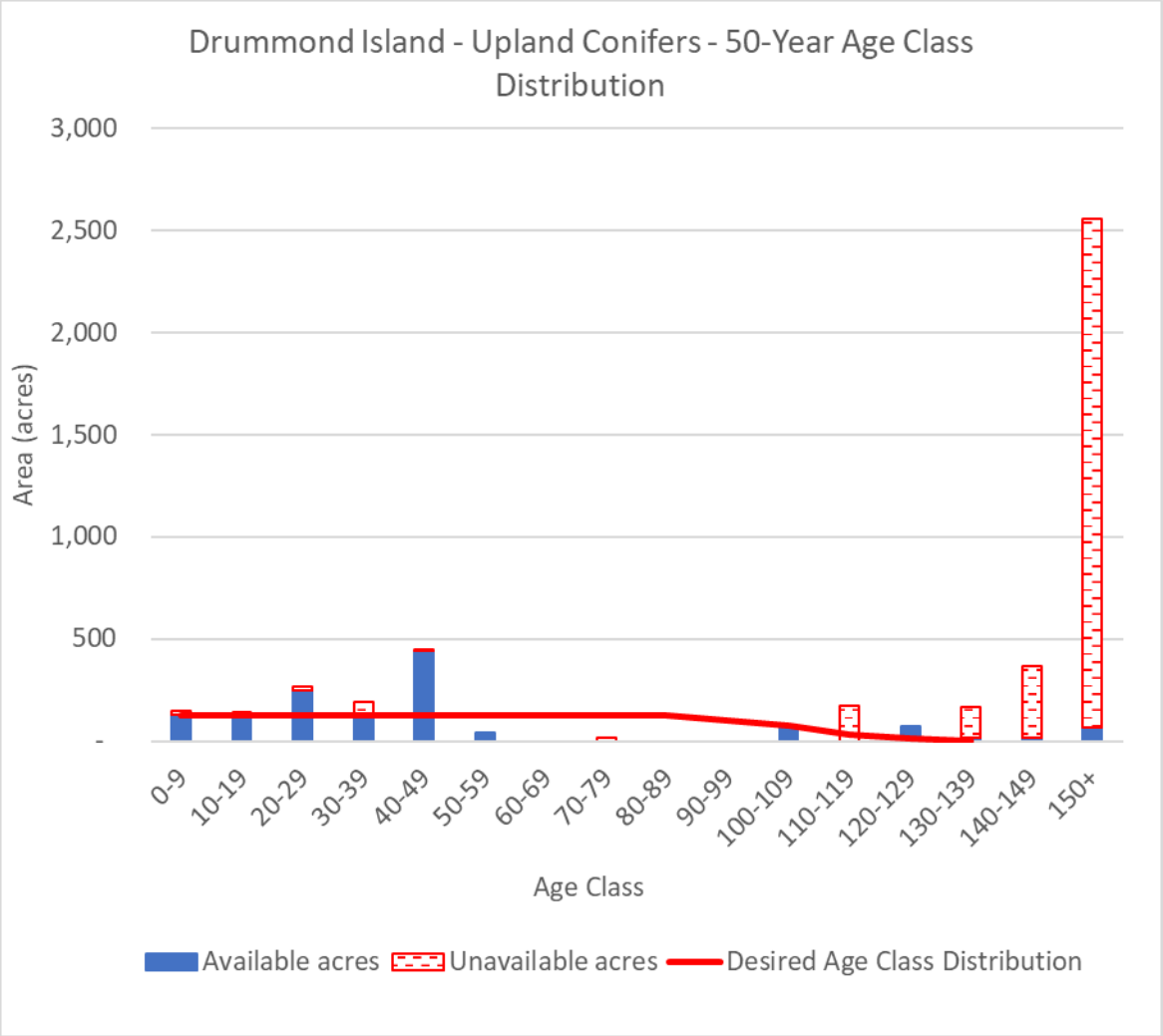


Figure 16. Projected midterm age-class distribution at the end of the fifth planning period compared to the long-term desired age-class distribution.

The long-term achievement of the desired age-class distribution (Figure 17) will concentrate on the manageable acres of upland conifer cover type in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.



Figure 17. Projected long-term age-class distribution at the end of the 10th planning period compared to the long-term desired age-class distribution.

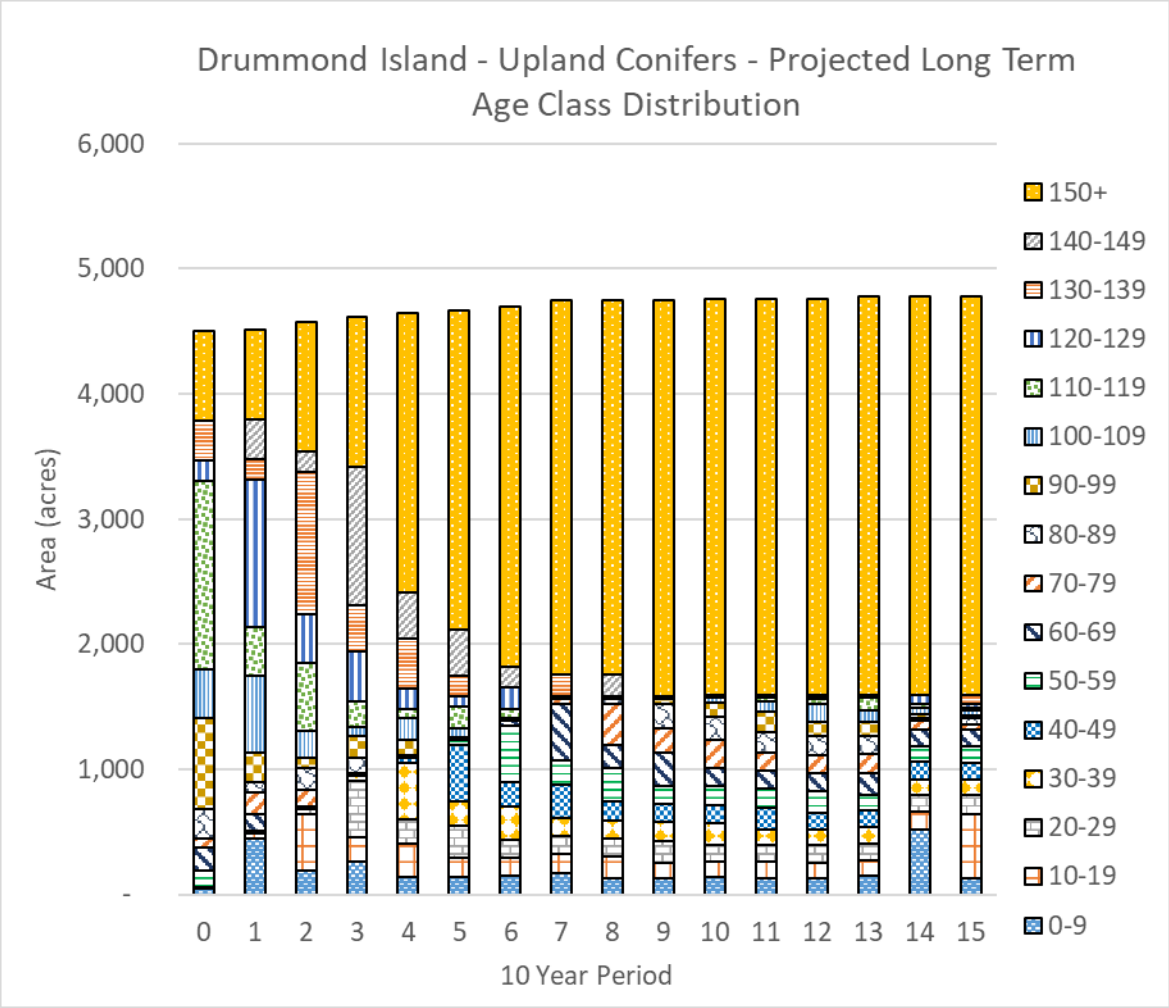


Figure 18. Projected age-class distribution for all acres of upland conifers over the next 150 years.

Management actions

There are 729 acres of clearcut harvest and 201 acres of shelterwood harvest projected in the upland conifer cover type during the planning period. This is above the desired establishment of 123 acres of upland conifer per decade because of the current unbalanced age-class condition and abundance of the cover type currently in older age classes like the 110-119 stand age.

Conservation Area Network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 12; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within the management area.

High Conservation Value Area Type and Name	Acres
Coastal environmental area	**141**
	141
Deer wintering complex	**14,340**
	14,340
Forest habitat core interior	**3,137**
	3,137
Grouse Enhanced Management Site (GEMS)	**2,847**
Drummond	2,847
Grand Total	**20,464**

Ecological reference areas

Ecological reference areas are a type of high conservation value area and are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 13. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 14. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Alvar	A	G2?	S1	2
Existing ERA	Alvar	B	G2?	S1	1
Existing ERA	Boreal forest	B			1
Existing ERA	Boreal forest	B	GU	S3	2
Existing ERA	Boreal forest	C	GU	S3	1
Existing ERA	Dry northern forest	BC	G3?	S3	1

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Great Lakes marsh	BC	G2	S3	1
Existing ERA	Great Lakes marsh	C	G2	S3	1
Existing ERA	Limestone bedrock glade	AB	G2G4	S2	1
Existing ERA	Limestone bedrock glade	B			1
Existing ERA	Limestone bedrock glade	B	G2G4	S2	1
Existing ERA	Limestone bedrock glade	C	G2G4	S2	2
Existing ERA	Limestone bedrock lakeshore	A	G3	S2	2
Existing ERA	Limestone bedrock lakeshore	AB			2
Existing ERA	Limestone bedrock lakeshore	AB	G3	S2	1
Existing ERA	Limestone cliff	A	G4G5	S2	1
Existing ERA	Limestone cobble shore	A			1
Existing ERA	Limestone cobble shore	AB	G2G3	S3	2
Existing ERA	Limestone cobble shore	BC	G2G3	S3	1
Existing ERA	Mesic northern forest	BC	G4	S3	1
Existing ERA	Northern fen	C	G3	S3	1
Existing ERA	Northern shrub thicket	AB	G4	S5	2
Existing ERA	Northern wet meadow	AB	G4G5	S4	1
Existing ERA	Sinkhole	AB			1
Proposed ERA	Boreal forest	B	GU	S3	1
Proposed ERA	Limestone bedrock glade	C	G2G4	S2	1
Proposed ERA	Limestone cobble shore	B	G2G3	S3	1
Grand Total					**34**

Special conservation areas

Reviewable special conservation areas (Table 15) are those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) are those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within the management area.

Reviewable Special Conservation Area Type and Name	Acres
Habitat area or habitat corridor	**4,997**
Maxton Plains: Alvar and associated natural communities	4,449
Drummond Island Shoreline Integrity Area	549
Mineral resource area	**7**
Chippewa County Road Commission	7

Reviewable Special Conservation Area Type and Name	Acres
Grand Total	**5,004**

Table 16. Static special conservation areas within the management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Coldwater Stream Buffer		**17**
--		5
Kemp Creek		12
Designated Trout and Coldwater Streams	**0.6**	
--	0.2	
Kemp Creek	0.4	
Great Lakes Islands		**47,705**
Crab Island		4
Drummond Island		47,699
--		2
Important Bird Areas		**25**
Lower St. Mary's River and Potagannissing Bay		25
Nondedicated Natural Areas		**2,080**
Natural Area Maxton Plains - Middle		5
Natural Area Maxton Plains Natural Area -1		752
Natural Area Maxton Plains Natural Area - 2		1,323
Grand Total	**0.6**	**49,826**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory biotics database (Table 18 and Table 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 17. Rare animal species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal species occurrence within the Drummond Island Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Auridius sandaraca	Sanders' golden leafhopper	SC	--	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Botaurus lentiginosus	American bittern	SC	--	6
Animal	Canis lupus	Gray wolf	SC	LE	1
Animal	Chlidonias niger	Black tern	T	--	1
Animal	Circus hudsonius	Northern harrier	SC	--	2
Animal	Coturnicops noveboracensis	Yellow rail	T	--	1
Animal	Dichagyris reliqua	The relic	SC	--	2
Animal	Elliptio complanata	Eastern elliptio	SC	--	1
Animal	Euconulus alderi	A land snail (no common name)	T	--	1
Animal	Gavia immer	Common loon	T	--	3
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	10
Animal	Lasmigona compressa	Creek heelsplitter	SC	--	1
Animal	Mediappendix exilis	Pleistocene catinella	T	--	1
Animal	Myotis lucifugus	Little brown bat	T	--	1
Animal	Opheodrys vernalis	Smooth green snake	SC	--	1
Animal	Pandion haliaetus	Osprey	SC	--	9
Animal	Tympanuchus phasianellus	Sharp-tailed grouse	SC	--	1
Animal	Vallonia gracilicosta albula	A land snail (no common name)	E	--	3
Animal	Vertigo cristata	Crested vertigo	SC	--	1
Animal	Vertigo elatior	Tapered vertigo	SC	--	4
Animal	Vertigo hubrichti	Hubricht's vertigo	E	--	2
Animal	Vertigo nylanderi	Deep-throat vertigo	E	--	1
Animal	Vertigo paradoxa	Mystery vertigo	SC	--	1
Animal	Vertigo pygmaea	Crested vertigo	SC	--	1
Total	--	--	--	--	**56**

Table 19. Rare plant species conservation status key.

Plant Species Status	Plant Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 20. Rare plant species occurrence within the Drummond Island Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Adlumia fungosa	Climbing fumitory	T	--	1
Plant	Asplenium ruta-muraria	Wall-rue	E	--	1
Plant	Asplenium viride	Green spleenwort	SC	--	2
Plant	Astragalus neglectus	Cooper's milk vetch	SC	--	5
Plant	Calypso bulbosa	Calypso or fairy-slipper	T	--	5
Plant	Carex richardsonii	Richardson's sedge	SC	--	8
Plant	Carex scirpoidea	Bulrush sedge	T	--	4
Plant	Cerastium brachypodum	Shortstalk chickweed	T	--	1
Plant	Cirsium hillii	Hill's thistle	SC	--	16
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC	--	2
Plant	Eleocharis compressa	Flattened spike rush	T	--	5
Plant	Geum triflorum	Prairie smoke	T	--	1
Plant	Graphephorum melicoides	Purple false oats	SC	--	1
Plant	Gymnocarpium robertianum	Limestone oak fern	T	--	3
Plant	Panicum philadelphicum	Philadelphia panic-grass	E	--	1
Plant	Pellaea atropurpurea	Purple cliff brake	T	--	2
Plant	Platanthera unalascensis	Alaska orchid	SC	--	13
Plant	Poa alpina	Alpine bluegrass	T	--	1
Plant	Poa interior	Inland bluegrass	SC	--	1
Plant	Pterospora andromedea	Pine-drops	T	--	4
Plant	Scutellaria parvula	Small skullcap	T	--	3
Plant	Solidago houghtonii	Houghton's goldenrod	T	LT	2
Plant	Sporobolus heterolepis	Prairie dropseed	SC	--	4
Plant	Trichostema brachiatum	False pennyroyal	T	--	2
Plant	Trisetum spicatum	Downy oat-grass	SC	--	1
Total	--	--	--	--	**89**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 22).

Table 21. Non-ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non-ecological reference areas within the management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Mesic northern forest	C	S3	G4	2
Grand Total				**2**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Drummond Island Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Table 24. Maladies of concern in the Drummond management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Nectria cinnabarina	Native	Yes
Wood decay	various	Mostly native	Yes

Aquatic resources

Riparian habitat

A total of 11 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as warm types comprise approximately 100% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	0
Cold small river	0
Cold transitional stream	0
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	11
Warm transitional small river	0
Warm transitional large river	0
Warm stream	0
Warm small river	0
Warm large river	0

Lacustrine habitat

A total of 41 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	30
100-499	11
500+	0

Wetlands

A total of 13,532 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 88% of wetland types found in the management area.

Table 27. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,628

Wetland Type	Acres
Forested	11,888
Riverine	16

Vernal pools and seeps

A total of 855 acres of vernal pools and seeps have been inventoried in the management area, while 33 acres of seeps have been identified.

Riparian vegetation cover

Cedar, marsh and aspen are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover type	Acres
Cedar	1,143
Marsh	1,138
Aspen	919
Upland conifers	707
Northern hardwood	487
Lowland shrub	376
Upland mixed forest	241
Lowland mixed forest	158
Lowland aspen/balsam poplar	107
Lowland conifers	84

Watershed vegetation cover

The management area includes small watersheds with short portions of streams/rivers that all drain into Lake Huron. Marsh and cedar are major cover types of the state forest.

Recreation

Drummond Island is accessed primarily via car ferry from DeTour, with air service also available. Most of the island is accessible by roads and trails, except for the Maxton Plains, where access is intentionally limited to protect sensitive habitats. Recreational facilities include a comprehensive system of motorized trails, including off-road vehicle and snowmobile trails (Table 29).

There are no designated nonmotorized trails or state campgrounds on the island, although dispersed recreation is popular, and there are several private resorts providing accommodation for visitors.

Table 29. Designated recreation trails by use type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	Off-road vehicle (all types) Snowmobile	82.6 45.7
Non-motorized recreation trails	Hiking Equestrian Biking Hunter access trails	0 0 0 12.3
Total		**140.6**

Note: Trail use types may overlap.

The Drummond Grouse Enhanced Management Site on the north side of the island provides a walk-in area managed for grouse, with approximately 12 miles of hunter access trails.

This island is popular for deer, grouse and bear hunting, trapping, fishing, bird-watching, plant study, coastal paddling and motorboating. Protecting rare and unique resources from excessive or unauthorized use and working with partners to ensure recreational activities are compatible with wildlife habitat and resource protection are important.

Table 30. Areas managed for hunting.

Type	Name	Number of Acres
Grouse Enhanced Management Site	Drummond GEMS	2,842.7

Table 31. Boating access sites.

Name	Body of water
Potagannissing Flooding	First Lake

EUP management areas

Escanaba Lake and Till Plain

State forest area: 49,046 acres	Location: Lakeshore of the central Upper Peninsula	Population centers: Manistique Garden
Subsection: Escanaba Lake Plain and Thin Till	Landforms: Beach ridges and swales Flat lake beds Shallow embayments Parabolic dune fields	Land cover: Forested: 40,588 acres Nonforested: 8,459 acres

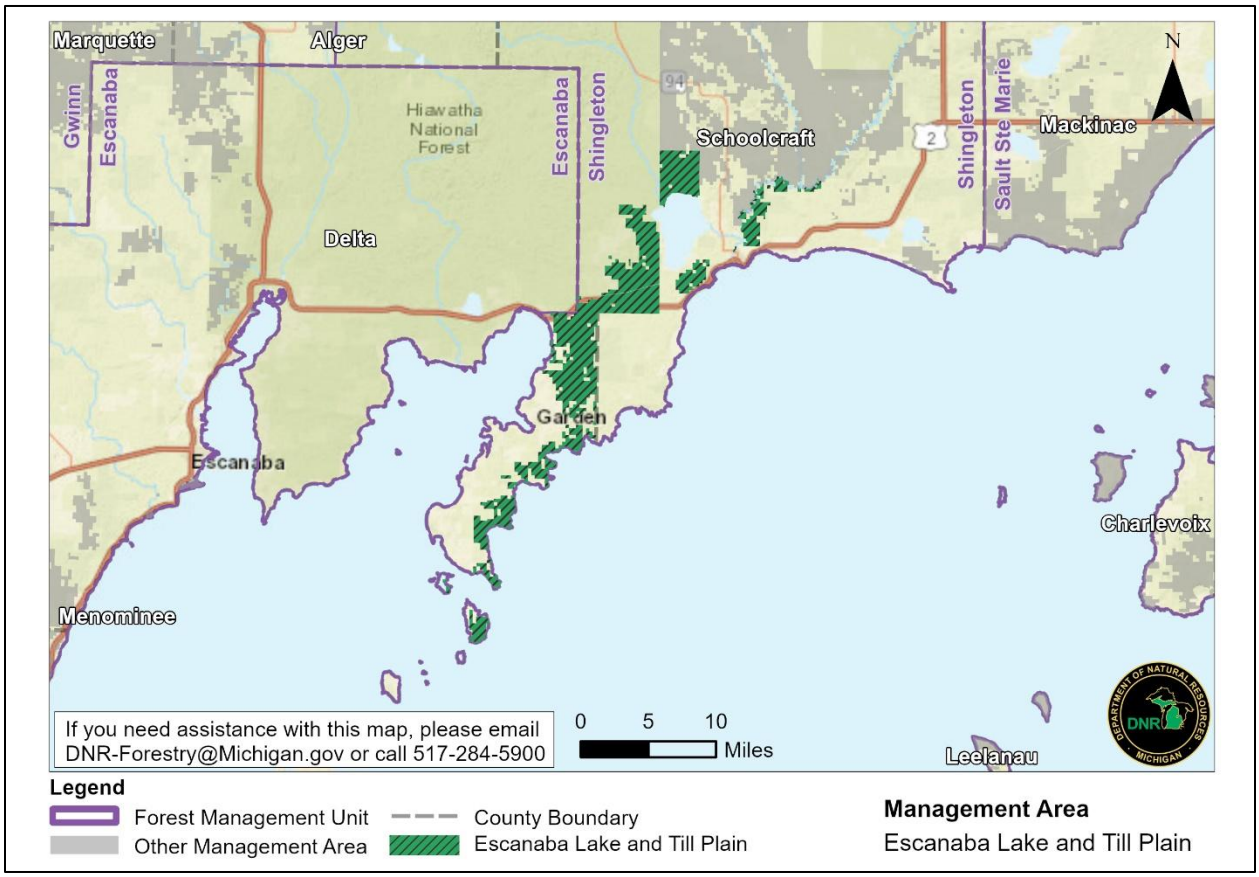


Figure 1. Escanaba Lake and Till Plain Management Area.

Forested landscape

Current and projected future condition

The Escanaba Lake and Till Plain Management Area includes a variety of tolerance levels occurring across all age categories. Most tolerant cover types occur on unavailable lowlands in the old age category. Mid-tolerant cover types mostly occur on available uplands in the mid-aged and mature age categories, while most of the intolerant cover types occur in the young, mid-aged and mature category on available uplands (Figure 2).

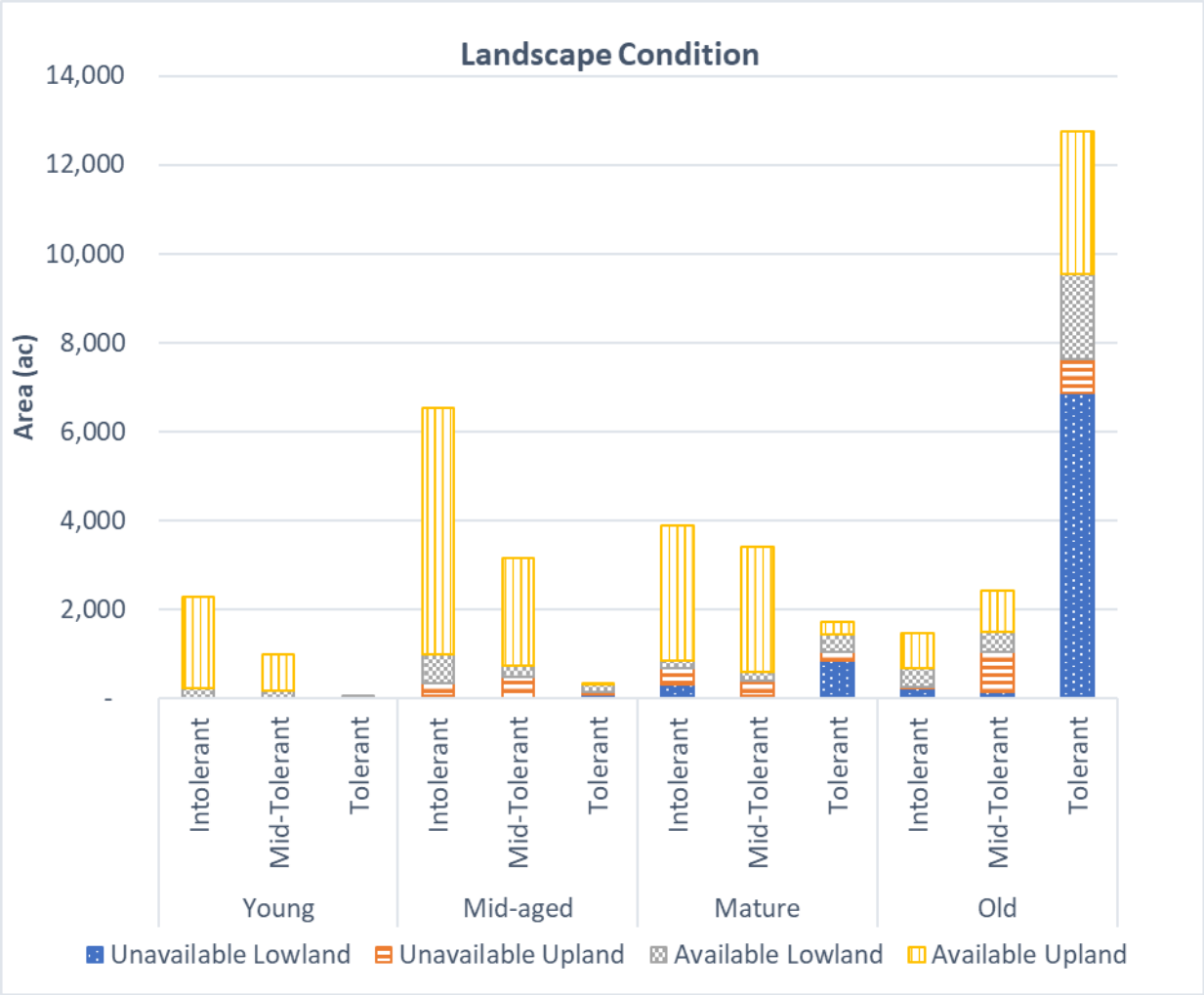


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (see Section 3) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0- to 19-year stands in aspen and jack pine	2,023
Mature forest	Acres of 80-plus-year stands across cover types	4,278
Mature forest	Acres of 120-plus-year stands across cover types	484
Mesic conifer cover types	Acres of mesic conifer cover types	5,163
Mesic conifers in other cover types	Average canopy occupancy	35%
Mast – oak cover types	Acres of oak cover types	794
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	9,635
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	14,206
Nonforested openings	Acres of total herbaceous open land, upland shrub and crop land	1,529
Landscape forest matrix	Percent deciduous forest	41%
Landscape forest matrix	Percent coniferous forest	54%

Another important landscape-level habitat in the management area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, land birds (defined here as songbirds and raptors) and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls and terns) (Ewert, et al., 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed and shelter during migration. In addition to migration habitat, the diverse coastal areas where water and land meet provide unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as important bird areas, or IBAs. The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Escanaba Lake and Till Plain Management area has the following special analysis units. These SAUs have specific cover-type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover-type goals take priority. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer wintering complex – Indian Lake.
- Grouse Enhancement Management Site – Garden Glade.

The Escanaba Lake and Till Plain Management Area is comprised of 83% forested cover types and 17% nonforested cover types. Of the forested cover types, 65% occur in the upland landscape position and 35% occur on lowland landscape positions. The largest contributors to upland cover types are aspen, northern hardwoods and upland conifers. Lowland conifer and cedar cover 21% of the management area. Marsh and lowland shrub are the most common nonforested cover types in the management area, representing 10% of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	9,439	15,353	26,522	40,588
			Northern hardwood	4,075			
			Black/red hybrid oak	0			
			Northern red oak	539			
			Oak mix	312			
			Mixed upland deciduous	987			
		Mixed	Upland mixed forest	1,081	1,081		
		Coniferous	Planted red pine	2,871	10,089		
			Planted jack pine	340			
			Planted white pine	0			
			Planted mixed pine	185			
			Natural red pine	261			
			Natural jack pine	1,270			
			Natural white pine	173			
			Natural mixed pines	423			
			Upland spruce/fir	968			
			Upland conifers	3,378			
			Hemlock	221			
	Lowland	Deciduous	Lowland aspen/balsam poplar	890	1,367	14,065	
			Lowland deciduous	478			
		Mixed	Lowland mixed forest	924	924		
		Coniferous	Cedar	7,501	11,774		
			Lowland conifers	2,972			
			Lowland spruce/fir	1,047			
			Tamarack	253			
Nonforested	Upland	N/A	Herbaceous open land	1,443	N/A	2,239	8,459
			Upland shrub	86			
			Low density trees	56			
			Bare/sparsely vegetated	350			
			Cropland	0			
			Urban	304			
	Lowland	N/A	Lowland shrub	2,165	N/A	6,220	
			Marsh	2,917			
			Bog	77			
			Treed bog	255			
			Water	806			
						Grand Total:	**49,046**

There are 28,537 acres (70% of the total management area and 70% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Escanaba Lake and Till Plain Management Area. Acres unavailable for management are categorized by site condition. Of those, over 22% are in the aspen cover type, 8% in northern hardwoods and 7% in planted red pine. The remaining cover types represent less than 5% each of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

ESCANABA LAKE AND TILL PLAIN Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	9,182	22.6%	257	0.6%	9,440	23.3%
Cedar	1,394	3.4%	6,107	15.0%	7,501	18.5%
Hemlock	91	0.2%	130	0.3%	221	0.5%
Lowland aspen/balsam poplar	833	2.1%	58	0.1%	891	2.2%
Lowland conifers	1,246	3.1%	1,727	4.3%	2,973	7.3%
Lowland deciduous	344	0.8%	135	0.3%	478	1.2%
Lowland mixed forest	839	2.1%	86	0.2%	924	2.3%
Lowland spruce/fir	695	1.7%	352	0.9%	1,047	2.6%
Mixed upland deciduous	854	2.1%	133	0.3%	987	2.4%
Natural mixed pines	409	1.0%	14	0.0%	423	1.0%
Natural red pine	253	0.6%	7	0.0%	261	0.6%
Natural white pine	154	0.4%	19	0.0%	173	0.4%
Northern hardwood	3,218	7.9%	858	2.1%	4,076	10.0%
Northern red oak	539	1.3%	0	0.0%	539	1.3%
Tamarack	38	0.1%	215	0.5%	253	0.6%
Upland conifers	1,965	4.8%	1,413	3.5%	3,378	8.3%
Upland mixed forest	927	2.3%	153	0.4%	1,081	2.7%
Upland spruce/fir	586	1.4%	383	0.9%	968	2.4%
Grand total	**28,537**	**70.3%**	**12,055**	**29.7%**	**40,592**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Conservation values	4,135	34.3%
Deer wintering area	3,971	32.9%
Wildlife concerns	1,084	9.0%
Cannot regenerate	811	6.7%

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
BMPs	765	6.3%
Rare landforms	325	2.7%
Too wet	217	1.8%
Blocked by obstacle	216	1.8%
Species of special concern or T&E	203	1.7%
Unproductive	172	1.4%
Long-term retention	36	0.3%
Recreational/scenic	28	0.2%
Nonmilitary lease/easement	24	0.2%
Total unavailable	**12,055**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Escanaba Lake and Till Plain Management Area has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 5. These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. These harvest levels are necessary to begin achieving long-term planning goals. Implementing these silvicultural regimes will yield 78,456 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Aspen	1,634	-	-	-	-	-	-	1,634
Northern hardwood	-	1,076	-	53	-	-	-	1,129
Planted red pine	233	-	559	-	-	-	-	793
Upland conifers	189	-	-	-	12	-	-	202
Lowland conifers	137	-	-	-	-	-	-	137
Lowland mixed forest	129	-	-	-	-	-	-	129
Mixed upland deciduous	103	6	-	-	6	-	-	115
Upland spruce/fir	107	-	-	-	-	-	-	107
Lowland spruce/fir	71	-	-	-	-	-	-	71
Lowland aspen/balsam poplar	56	-	-	-	-	-	-	56
Oak mix	51	-	-	-	-	-	-	51
Totals	**2,747**	**1,082**	**578**	**53**	**34**	**-**	**-**	**4,494**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection Escanaba Lake and Till Plain Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed aspen	14,796	13,909
	Mixed hardwood	12,710	11,947
	Mixed softwood	6,626	6,228
	Red pine	4,705	4,423
	Mixed spruce	3,669	3,449
	White pine	1,803	1,695
	Mixed oak	644	606
	Jack pine	569	535
	Pulpwood total	**45,524**	**42,793**
Sawtimber (MBF)	Red pine	5,156	4,846
	Sugar maple	3,188	2,997
	White pine	2,777	2,610
	Mixed aspen	2,752	2,587
	Red maple	2,424	2,279
	Red oak	1,188	1,117
	Basswood	356	334
	White oak	155	145
	Mixed oak	46	43
	Sawtimber total	**18,041**	**16,958**
	Total sawtimber harvest volume in cords	**37,940**	**35,663**
	Grand total harvest volume in cords	**83,464**	**78,456**
* Volume estimates based on 100% of the projected harvests for the 10-year planning period. ** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are very few significant cover-type transitions projected for the Escanaba Lake and Till Plain Management Area (Table 7). The managed area of each cover type is projected to remain stable, as treatment regimes will not significantly change the amount of area in each cover type. The largest decreases forecasted are in the lowland spruce/fir and upland spruce/fir cover types, where 73 and 59

acres, respectively, will convert to other cover types through forest management and regeneration activities. The largest increase occurs in the lowland mixed forest type, where 110 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Aspen	9,439	9,444	5
Cedar	7,501	7,501	0
Northern hardwood	4,075	4,086	11
Upland conifers	3,378	3,381	3
Lowland conifers	2,972	2,969	-3
Planted red pine	2,871	2,856	-16
Upland mixed forest	1,081	1,131	50
Lowland spruce/fir	1,047	1,026	-21
Mixed upland deciduous	987	988	1
Upland spruce/fir	968	914	-54
Lowland mixed forest	924	915	-9
Lowland aspen/balsam poplar	890	902	12
Northern red oak	539	539	0
Lowland deciduous	478	500	22
Planted jack pine	340	340	0
Oak mix	312	312	0
Natural red pine	261	261	0
Natural jack pine	1,270	1,270	0
Natural mixed pines	423	423	0
Tamarack	253	252	-1
Hemlock	221	221	0
Planted mixed pine	185	184	-1
Natural white pine	173	173	0
Marsh	2,917	2,917	0
Lowland shrub	2,165	2,165	0
Herbaceous open land	1,443	1,443	0
Water	806	806	0
Bare/sparsely vegetated	350	350	0
Treed bog	255	255	0
Upland shrub	86	86	0
Bog	77	77	0

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Low-density trees	56	56	0
Urban	304	304	0
Total:	**49,046**	**49,046**	**0**

Featured species current and projected habitat acres

There are nine featured species in this management area that span various cover types, age classes and stand-level conditions.

As noted in the featured species management priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres, these are potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the featured species management priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate into any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	2,325	3,249	3,488	3,543
Black bear	Mast	9,635	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	4,410	5,055	4,331	7,549

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Ruffed grouse	Aspen	2,139	3,087	3,102	3,159
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	3,991	4,986	4,614	4,876
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	18,725	18,815	19,387	19,907
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	20,000	19,911	19,372	18,843
Wild turkey	Nonforested openings	1,443	--	--	--
Wood turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

Most of the aspen cover type is currently in the 30- to 49-year-old age classes and has a surplus of acres (Figure 3). The past management regime has been primarily clearcut for this cover type. The younger age classes have a slight deficit in the 0- to 9-year age class and a larger deficit in the 10- to 19-year age class. The older age classes are near the desired age class distribution with little variation.

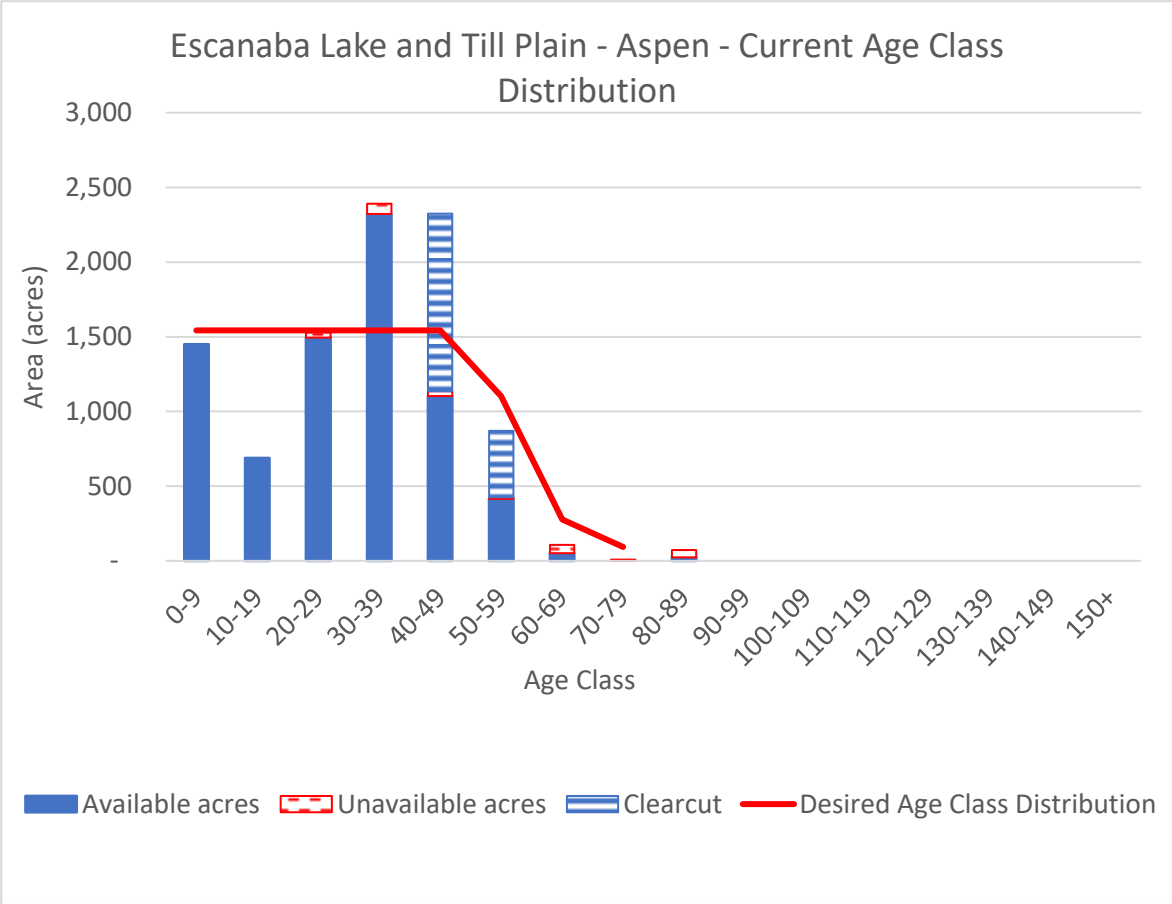


Figure 3. Current age class distribution and projected harvests in the aspen cover type in the Escanaba Lake and Till Plain Management Area.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for ruffed grouse, American woodcock and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres – Unavailable
Ruffed grouse	Age category: 0-19 Size category: sapling	2,139	0
American woodcock	Age category: 0-19 Size category: sapling	2,139	0
Snowshoe hare	Age category: 0-19 Size category: sapling	2,139	0
White-tailed deer	All ages and size classes	9,439	--

Desired future condition

The projected long-term cover-type trend for aspen is stable in the Escanaba Lake and Till Plain Management Area. There are no transitions into or out of this cover type from other cover types forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 40 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of 1,638 acres in the upcoming 0-9 age class. Progress toward the long-term age class distribution of aspen will take many decades in the management area (Figure 4).

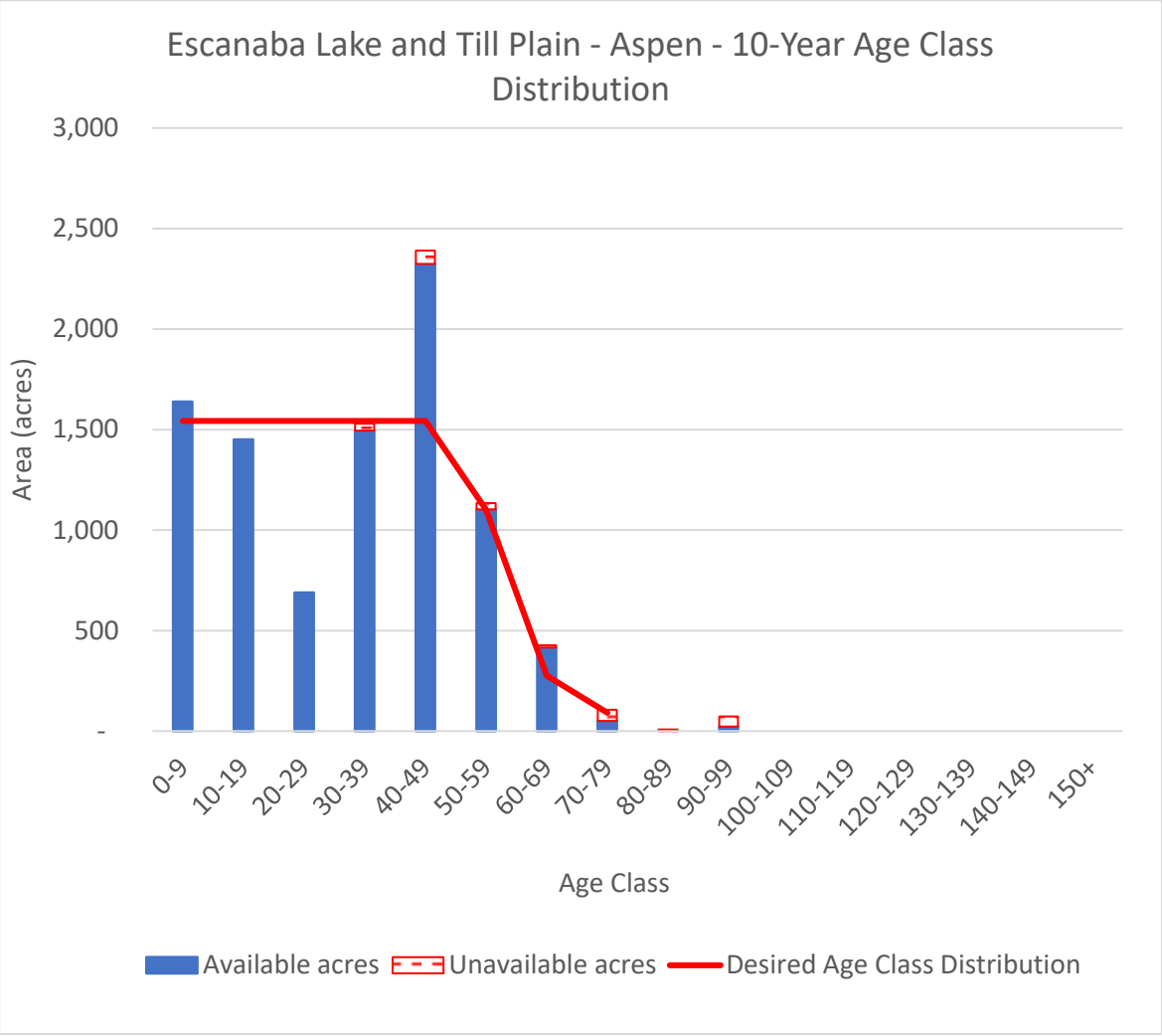


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of aspen acres nearly reaching the desired future condition, with only a few age classes deviating from the target proportions (Figure 5). As is often the case, an unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals (Figure 5).

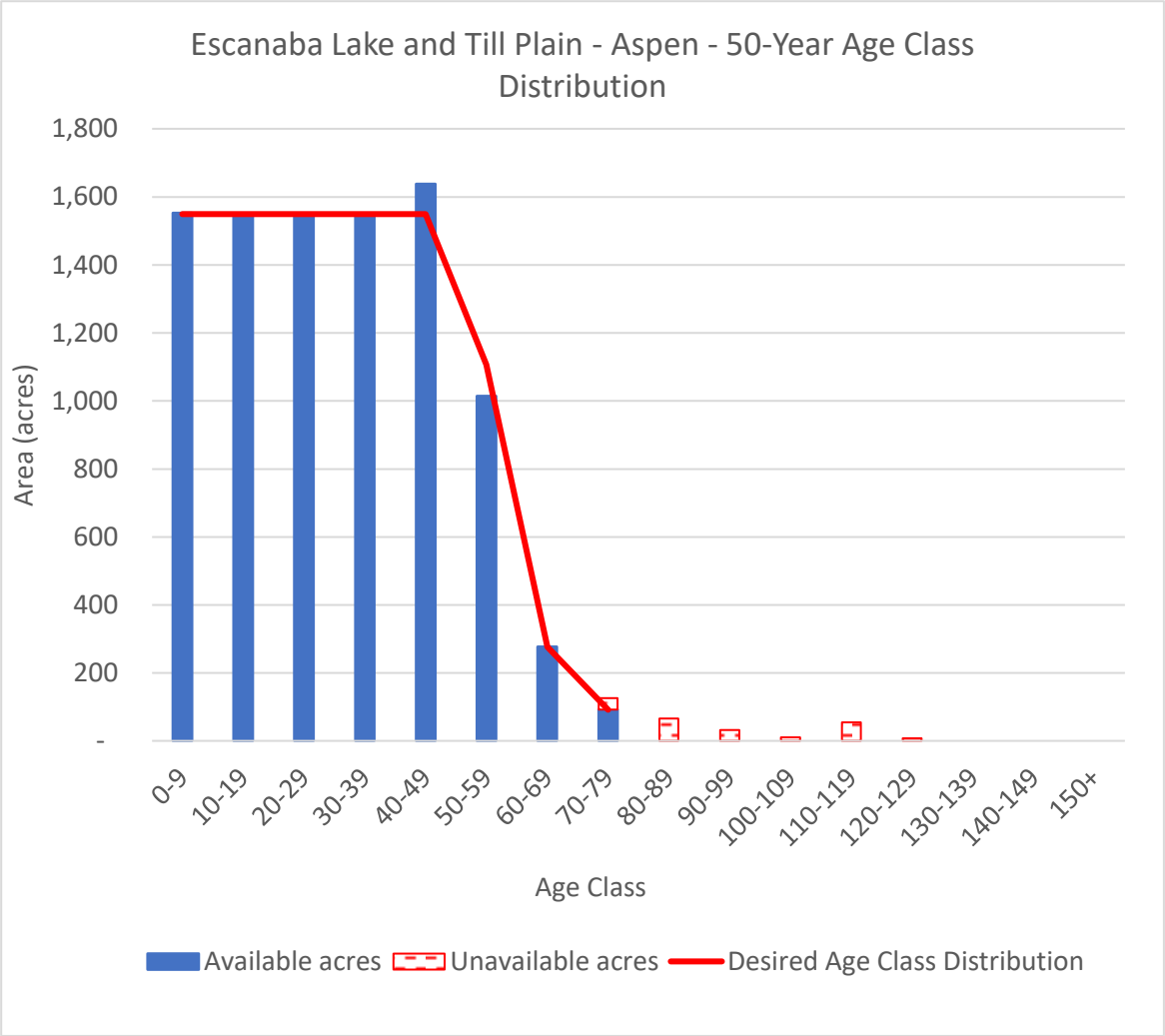


Figure 5. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

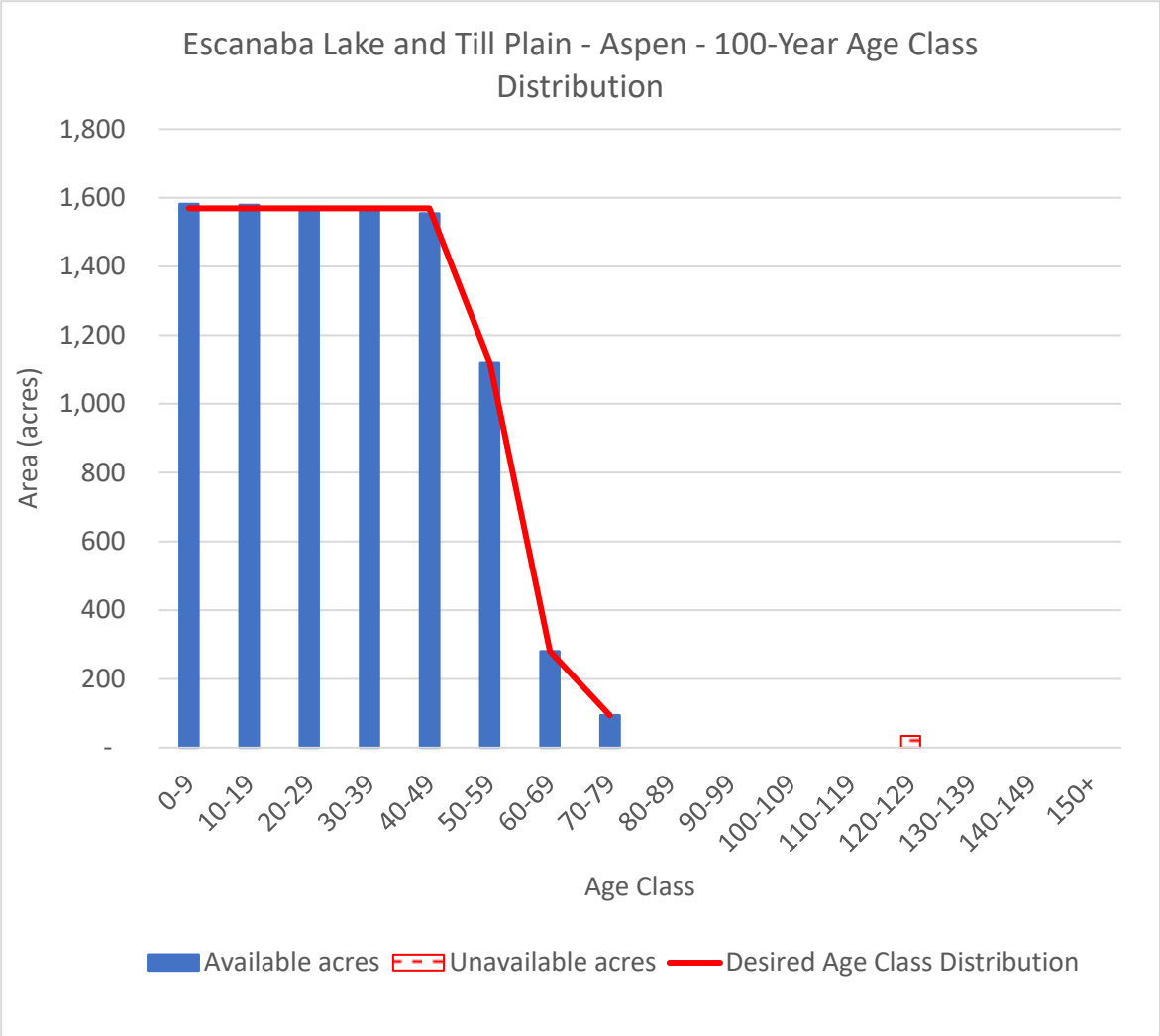


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

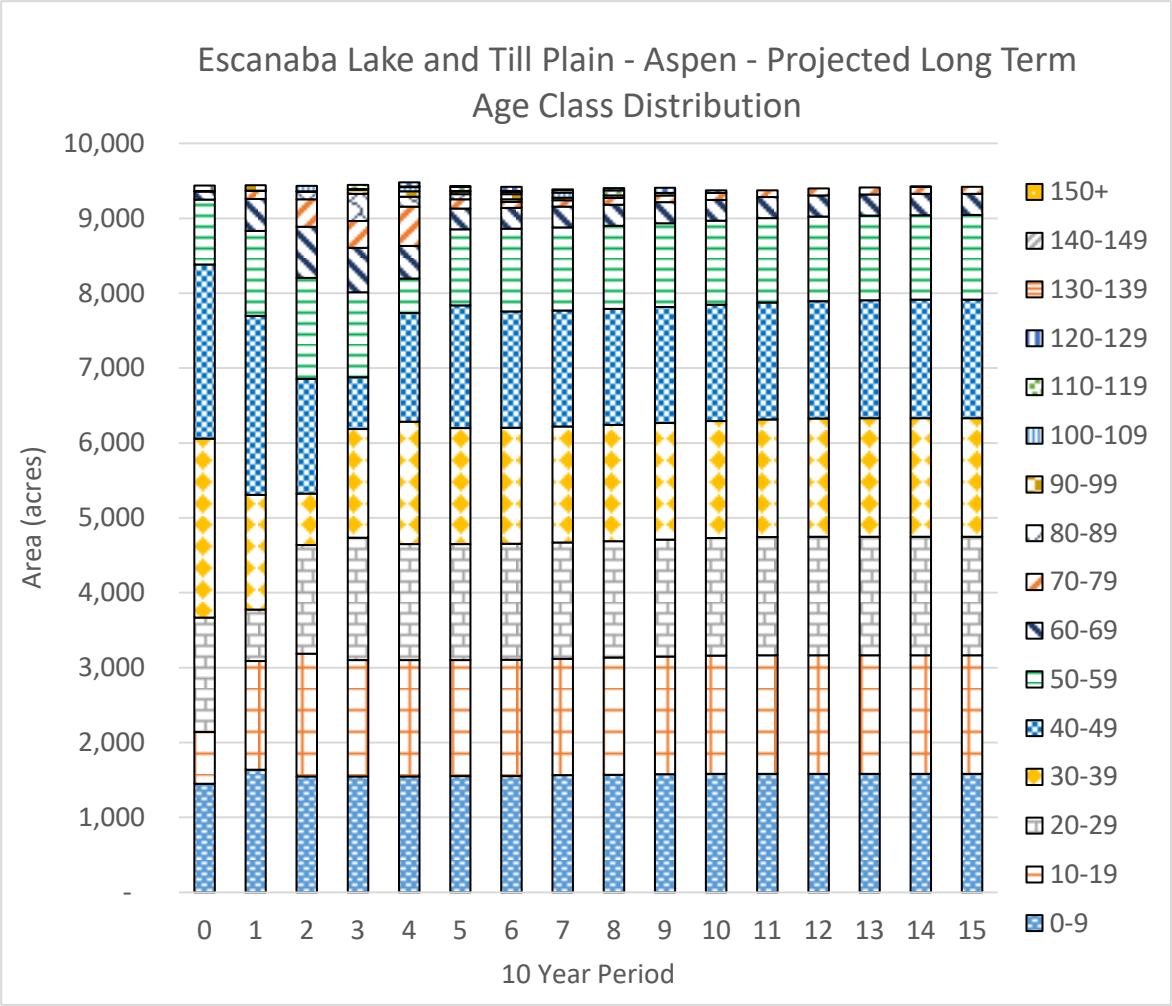


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 1,636 acres of projected clearcut harvest in the aspen cover type during this planning period. This falls slightly above of the desired establishment of 1,543 acres per decade because of the current unbalanced condition.

Cedar

Current condition

Most of this cover type is over 100 years old and occurs mostly unavailable for commercial harvest (Figure 8). The age class distribution is unbalanced, but regulated harvests are not a priority/focus in this cover type. Limited harvests could occur outside of the deer wintering complexes. A portion of this cover type meets the habitat requirements for white-tailed deer and snowshoe hare.

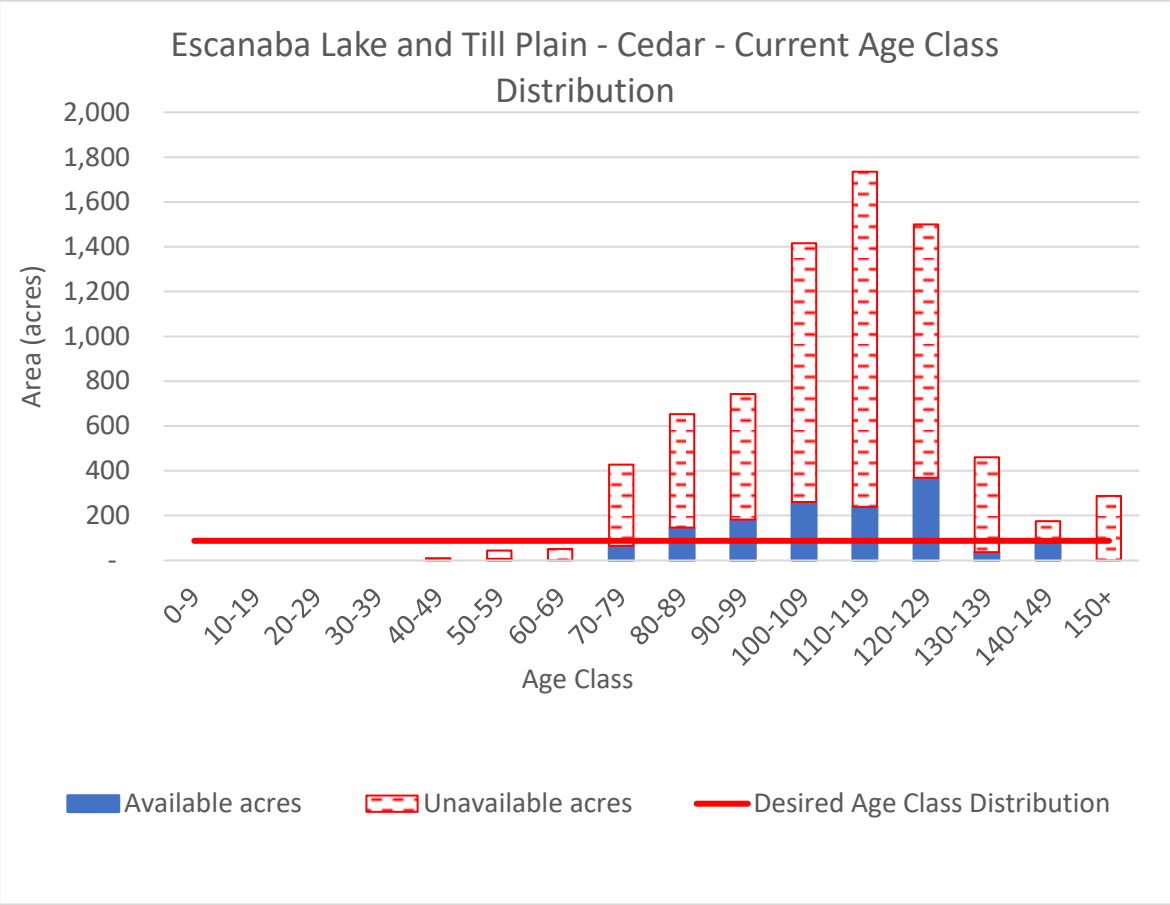


Figure 8. Current age class distribution and unavailable acres in the cedar cover type in the Escanaba Lake and Till Plain Management Area.

Table 10. Featured species with cedar as a selected habitat cover type, habitat variables and current acres (i.e. potential habitat).

Featured Species	Featured Species Habitat – Cedar	Cedar Habitat Acres – Available	Cedar Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size class: sapling	0	0
White-tailed deer	All ages and size classes	--	7,501

Desired future condition

The projected long-term cover-type trend for cedar is stable in the Escanaba Lake and Till Plain Management Area. There are few projected transitions into or out of this cover type from other cover types forecasted. The long-term goal for this cover type is to manage and maintain wildlife habitat.

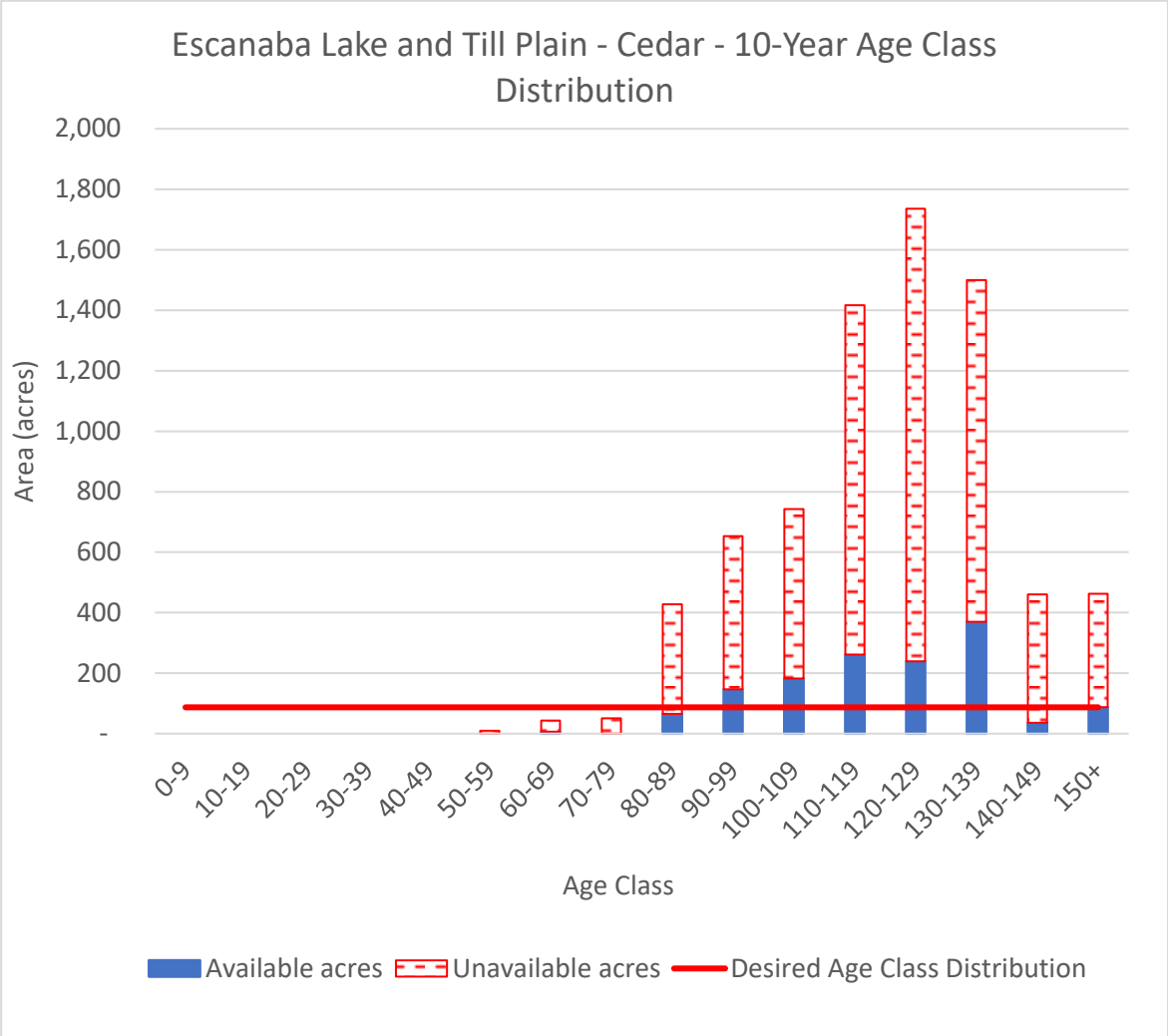


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

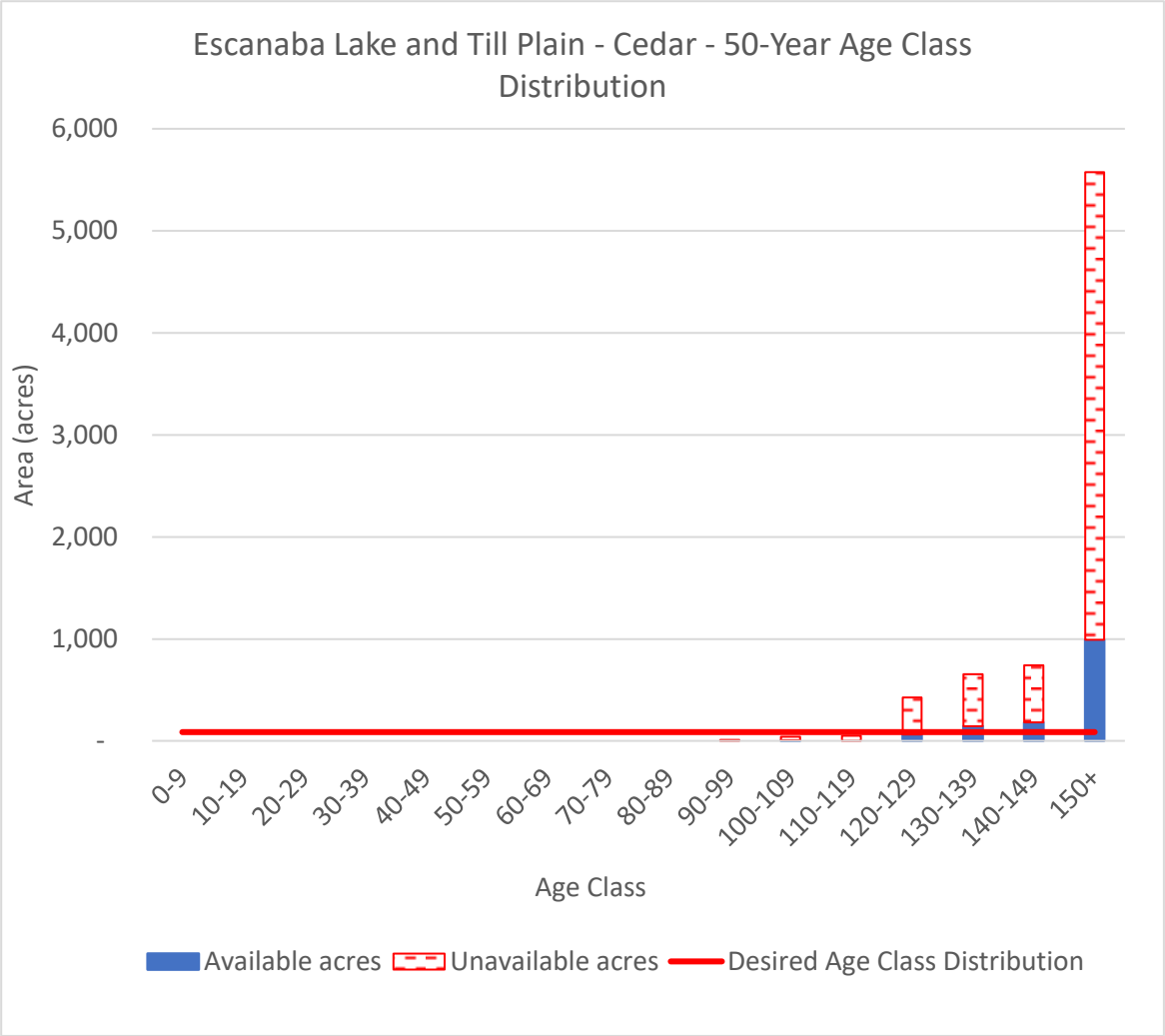


Figure 10. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of cedar acres beginning to reach the desired future condition (Figure 10).

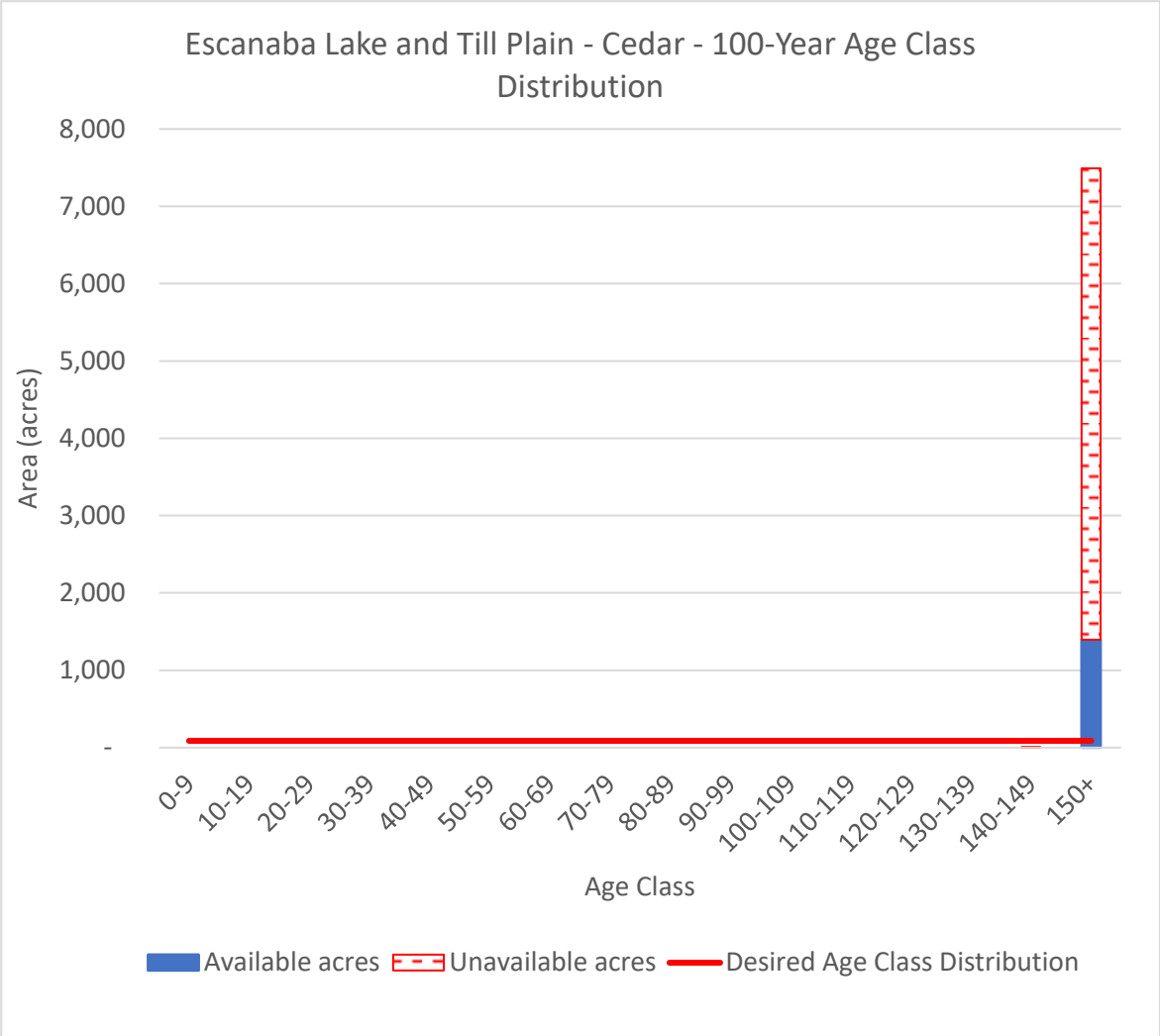


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate on the management of cedar within the deer wintering complex plans to provide wildlife habitat conditions with mature forest.

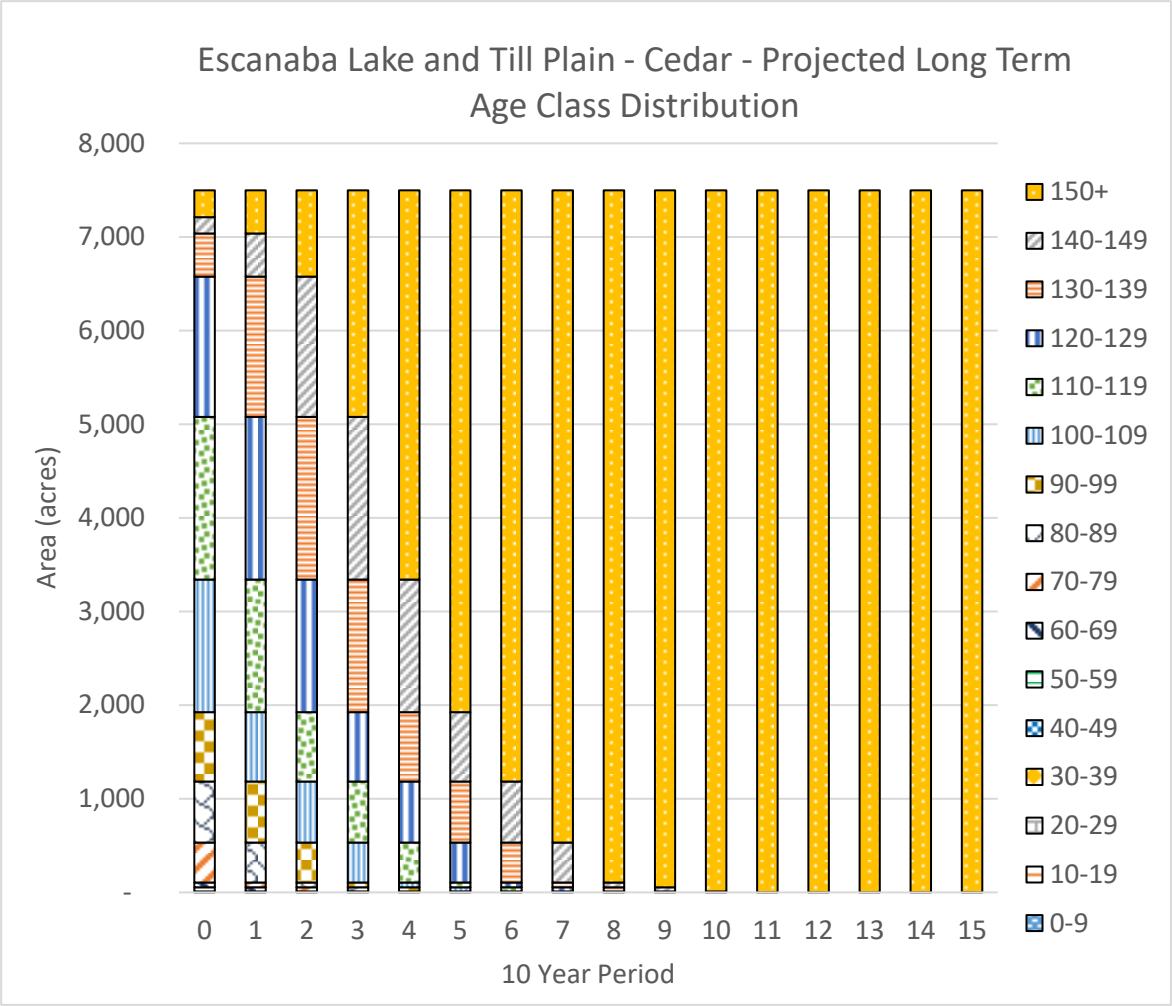


Figure 12. Projected age class distribution for all acres of cedar over the next 150 years.

Management actions

Maintaining this cover type where it exists on the landscape will be the primary action for this planning period. This cover type provides the best functional shelter habitat related to overwintering deer and deer wintering complexes (see Section 5) and can be a difficult cover type to regenerate through commercial harvest. Continued understanding of how to regenerate the cover type should be considered as emerging research becomes available.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 80 and 109 years old in the Escanaba Lake and Till Plain Management Area (Figure 13). The past management regime has been primarily single tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition, where a featured stand age becomes less evident, but the dominant age of these stands will likely increase beyond 150 years old prior to a younger age cohort becoming the prominent component of these stands.

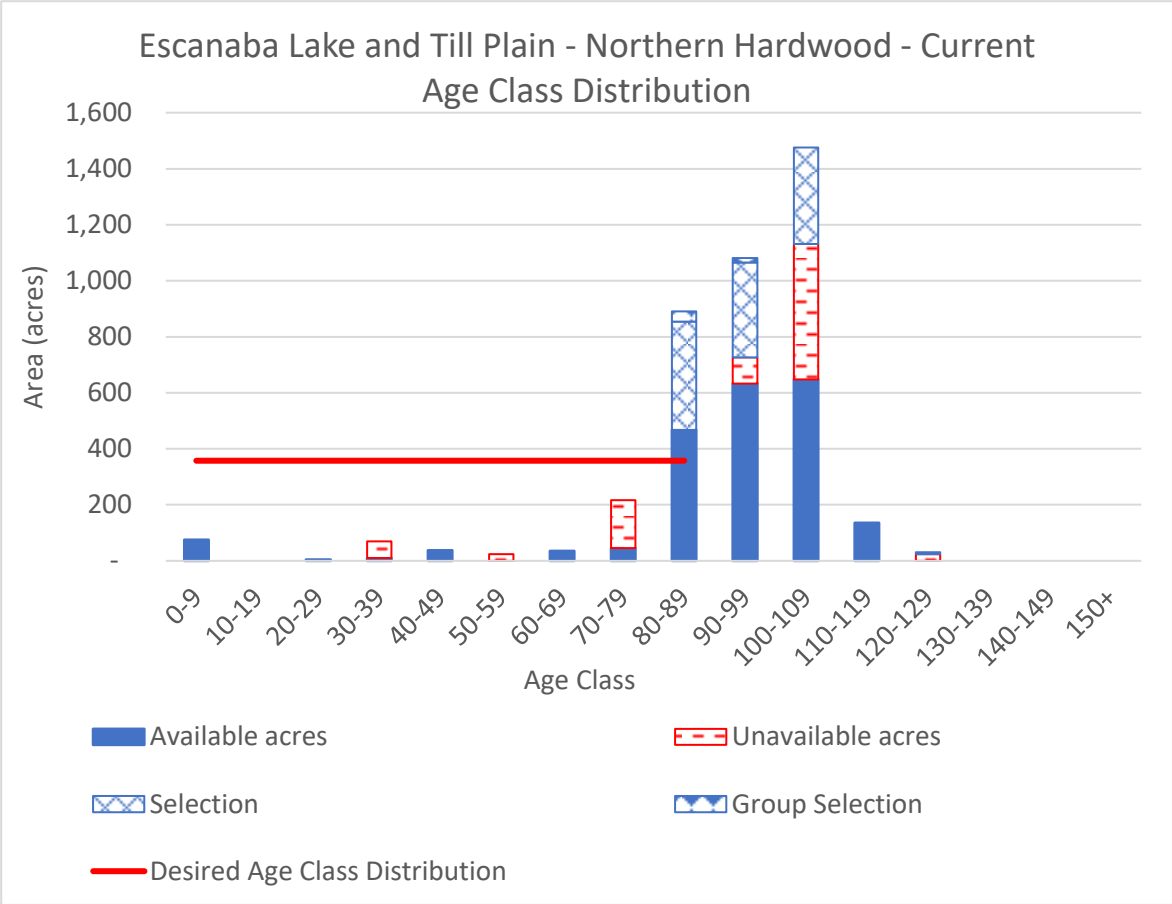


Figure 13. Current age class distribution and projected harvests in the northern hardwood cover type in the Escanaba Lake and Till Plain Management Area.

Stand densities of northern hardwood stands are well distributed in the ideal basal area classes for optimal growing conditions in the Escanaba Lake and Till Plain Management Area (Figure 14). Current conditions are a result of beech salvage efforts in the previous planning period and a regulated selection harvest regime that has been in place in this management area for decades.

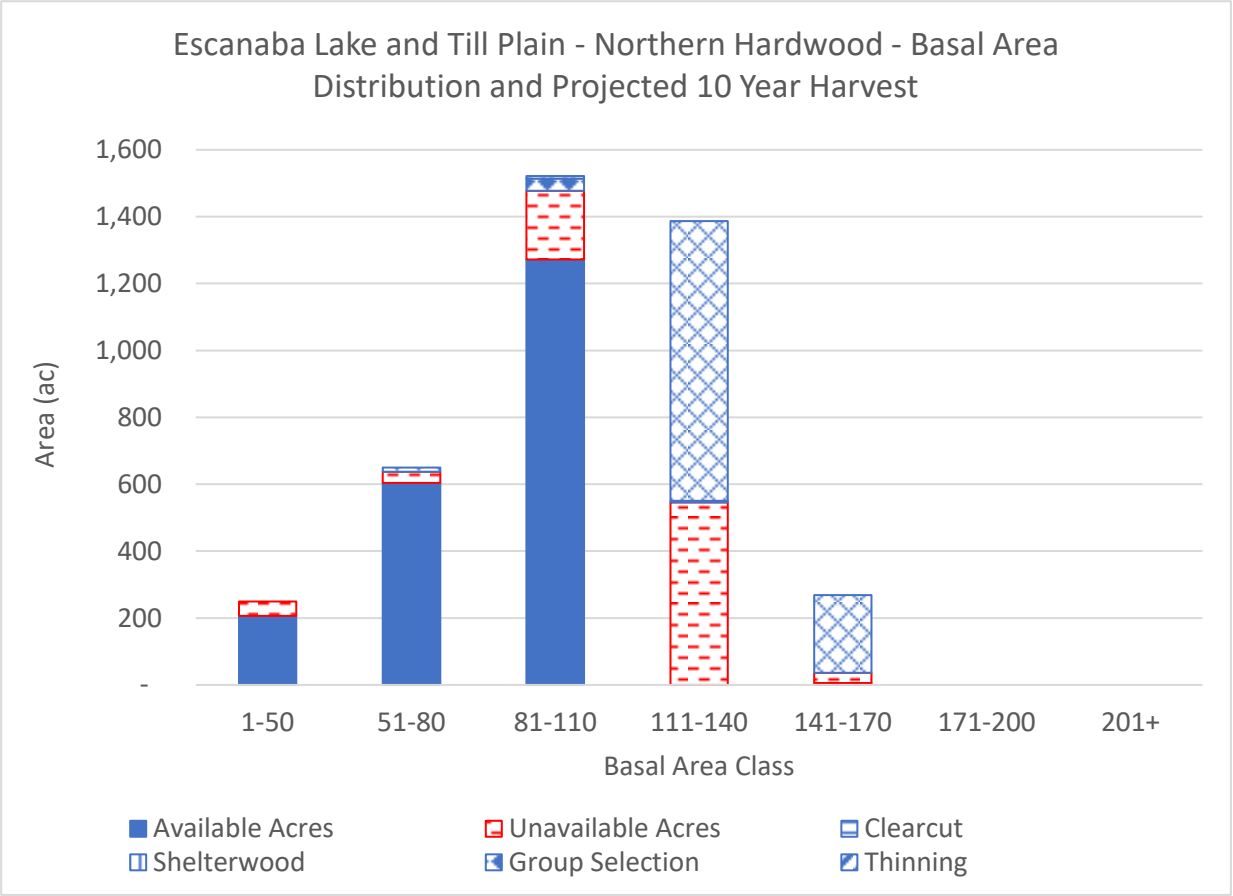


Figure 14. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Approximately 80% of northern hardwood stands in the Escanaba Lake and Till Plain Management Area are available for harvest. Selection is the primary silvicultural treatment projected during this 10-year planning period, but there may be opportunities to utilize even-aged management silvicultural regimes to increase stem density, species composition and regeneration within the northern hardwood areas.

Table 11. Featured species with northern hardwoods as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Available
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	2,322	585
White-tailed deer	All sizes and age classes	4,075	--

Desired future condition

The projected long-term cover-type trend for northern hardwood is slightly increasing in the Escanaba Lake and Till Plain Management Area. There are very few transitions into this cover type from other cover types and equally few transitions from northern hardwoods to other cover types forecasted in this management area.

The desired basal area distribution is a bell-shaped curve, where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupying the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is a long-term goal for northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area, as canopy gaps fill in with regenerating seedlings, saplings and poles, and eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. The Escanaba Lake and Till Plain Management Area will take several decades to reach the desired future condition because of the impacts from beech bark disease. The amount of American beech that once occupied much of the northern hardwood stands has resulted in lower than normal residual basal area and decreased stocking levels across much of the eastern Upper Peninsula.

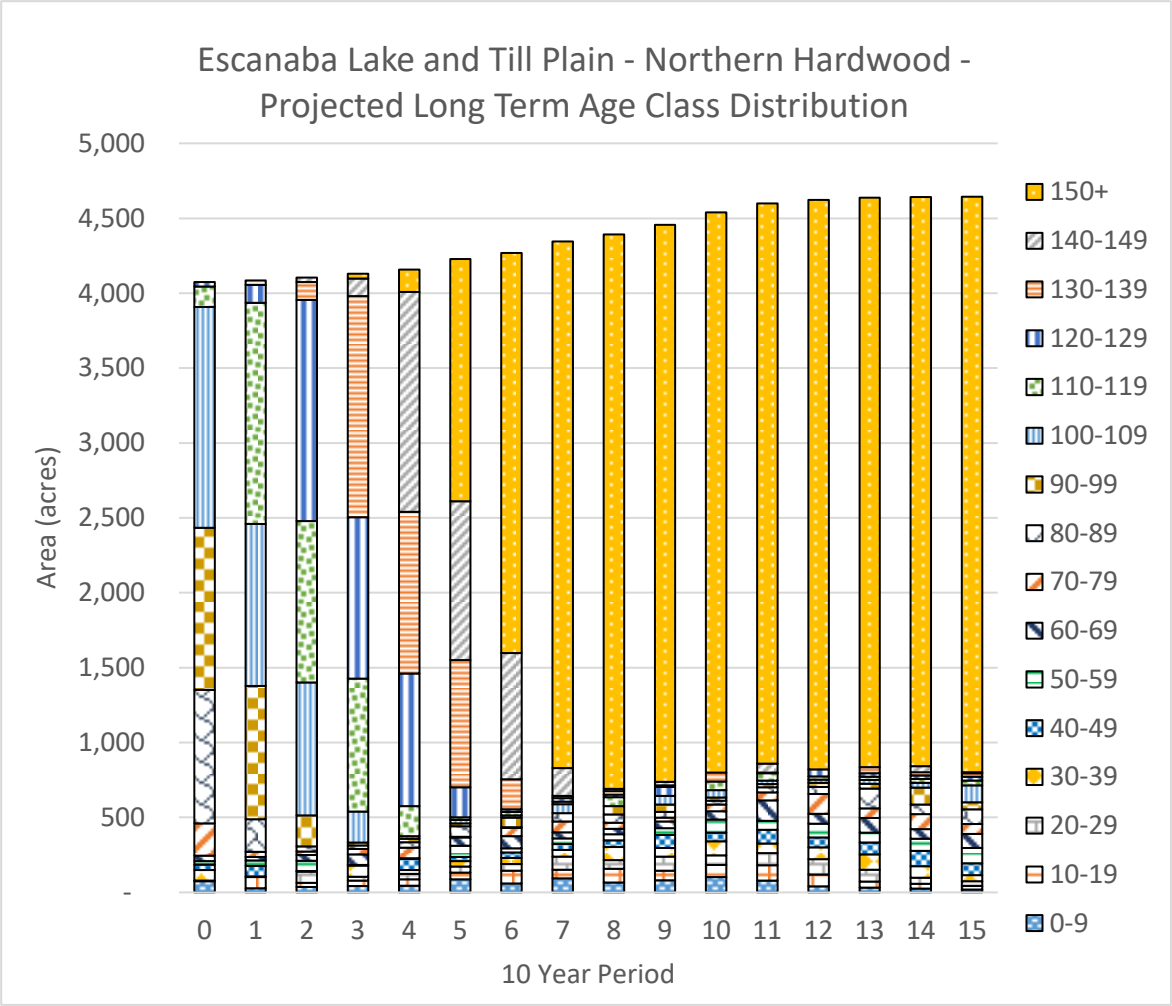


Figure 15. Projected age class distribution for all acres of northern hardwood over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 1,076 acres, as well as 53 acres of the group selection harvest regime (Table 5). Multiple silvicultural regimes should continue to be considered, including group selection, as emerging research results become available. Emphasis should be placed on larger canopy gaps to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition.

Planted red pine

Current condition

Current age class distributions for the planted red pine cover type are moderately unbalanced, with most of the age classes currently occupying the 0- to 9-year-old age class and the 60- to 79-year-old age classes and all acres are available for commercial management (Figure 16). The past management regime has been primarily thinning every 10 years to achieve an approximate residual basal area of 120 square feet.

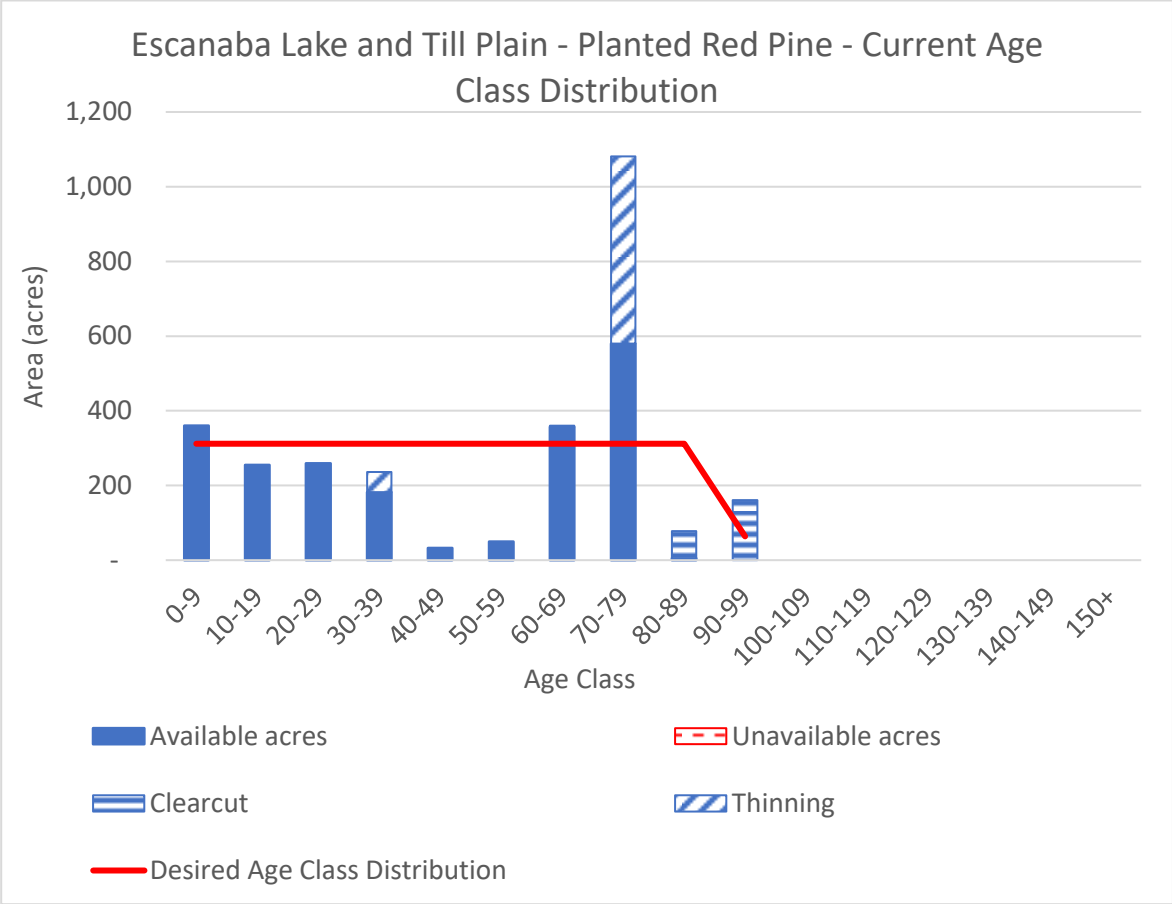


Figure 16. Current age class distribution, desired age class distribution and projected harvests in the planted red pine cover type over the 10-year planning period.

Current conditions are a result of plantations established during the 1930s by the Civilian Conservation Corps and continued planting efforts in later decades, most of which have, during the previous two planning periods, reached – or are now reaching – economic maturity. Additionally, there have been consistent commercial harvests and regeneration efforts on available planted red pine acres during the previous planning periods.

Desired future condition

The projected long-term cover type trend for planted red pine is stable in the Escanaba Lake and Till Plain Management Area. There are very few transitions into this cover type from other cover types, and equally few transitions from planted red pine to other cover types, forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available planted red pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of diseases and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of 168 acres in the upcoming 0- to 9-year-old age class. Progress toward the long-term age class distribution of planted red pine will take many decades in the management area (Figure 17).

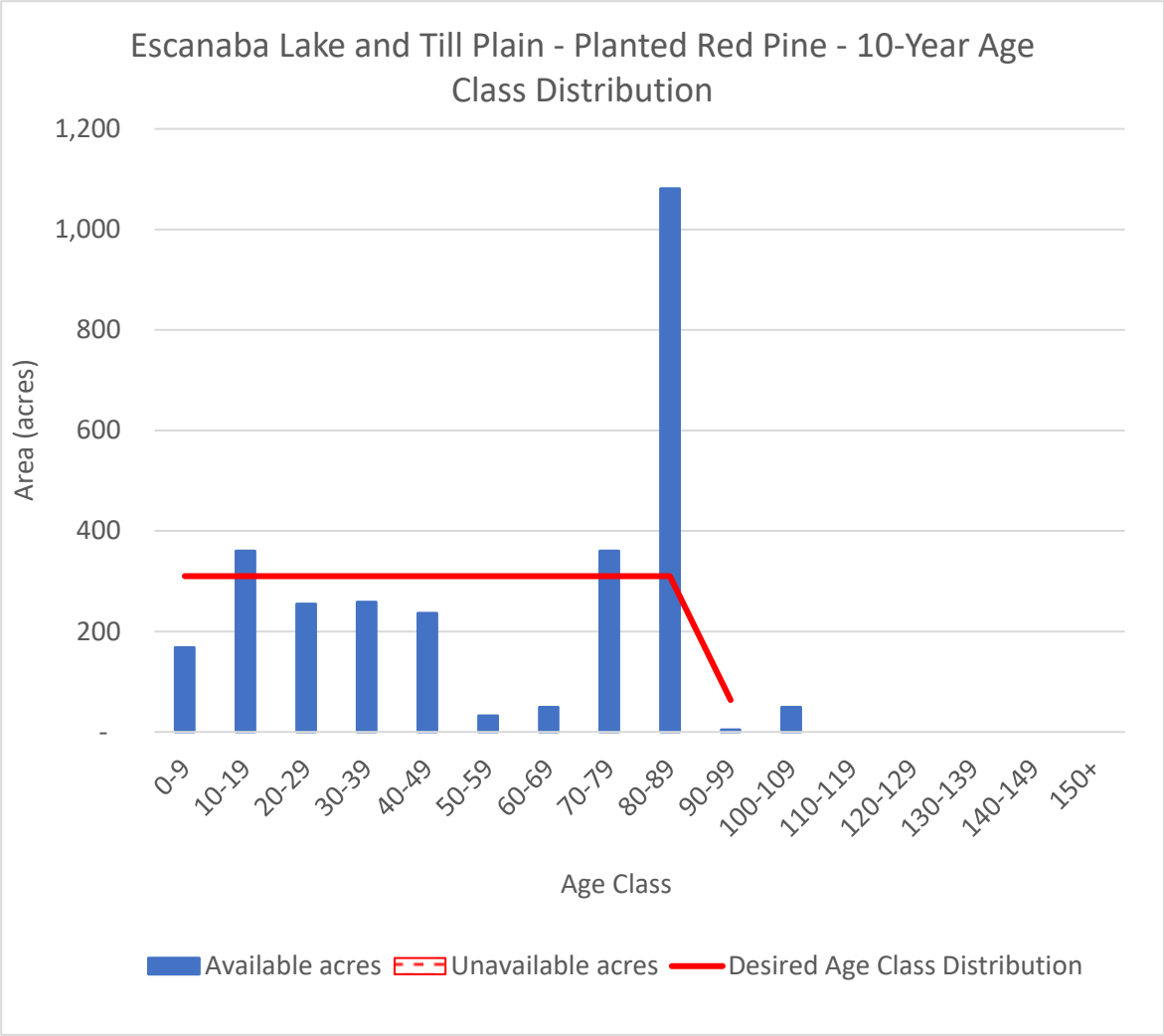


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of planted red pine beginning to improve, with a few age classes nearing the desired future condition. As is often the case, an unbalanced condition in

the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals (Figure 18).

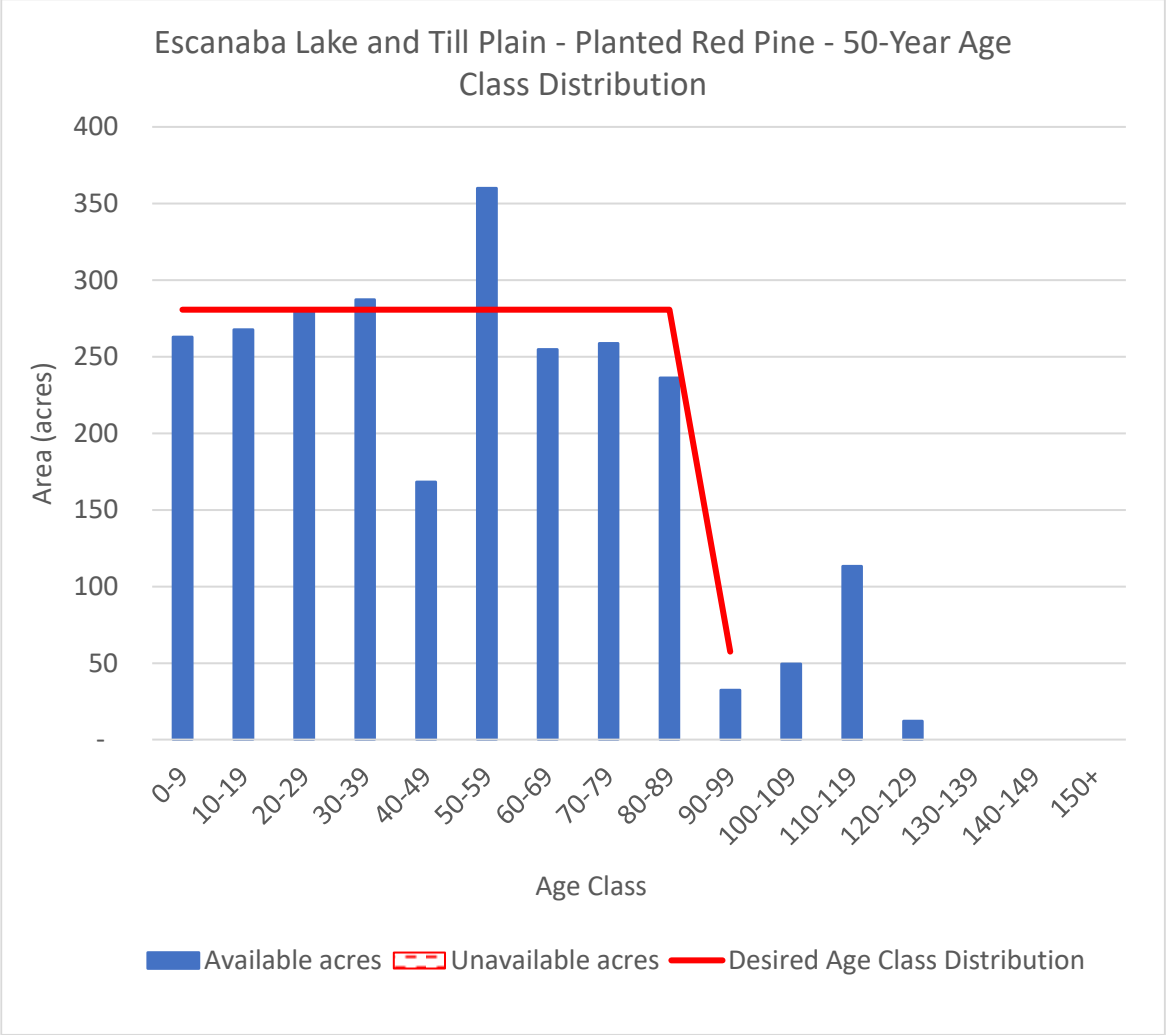


Figure 18. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a wide variety of potential wildlife habitat conditions across the landscape in young, mid-aged and mature forest.



Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

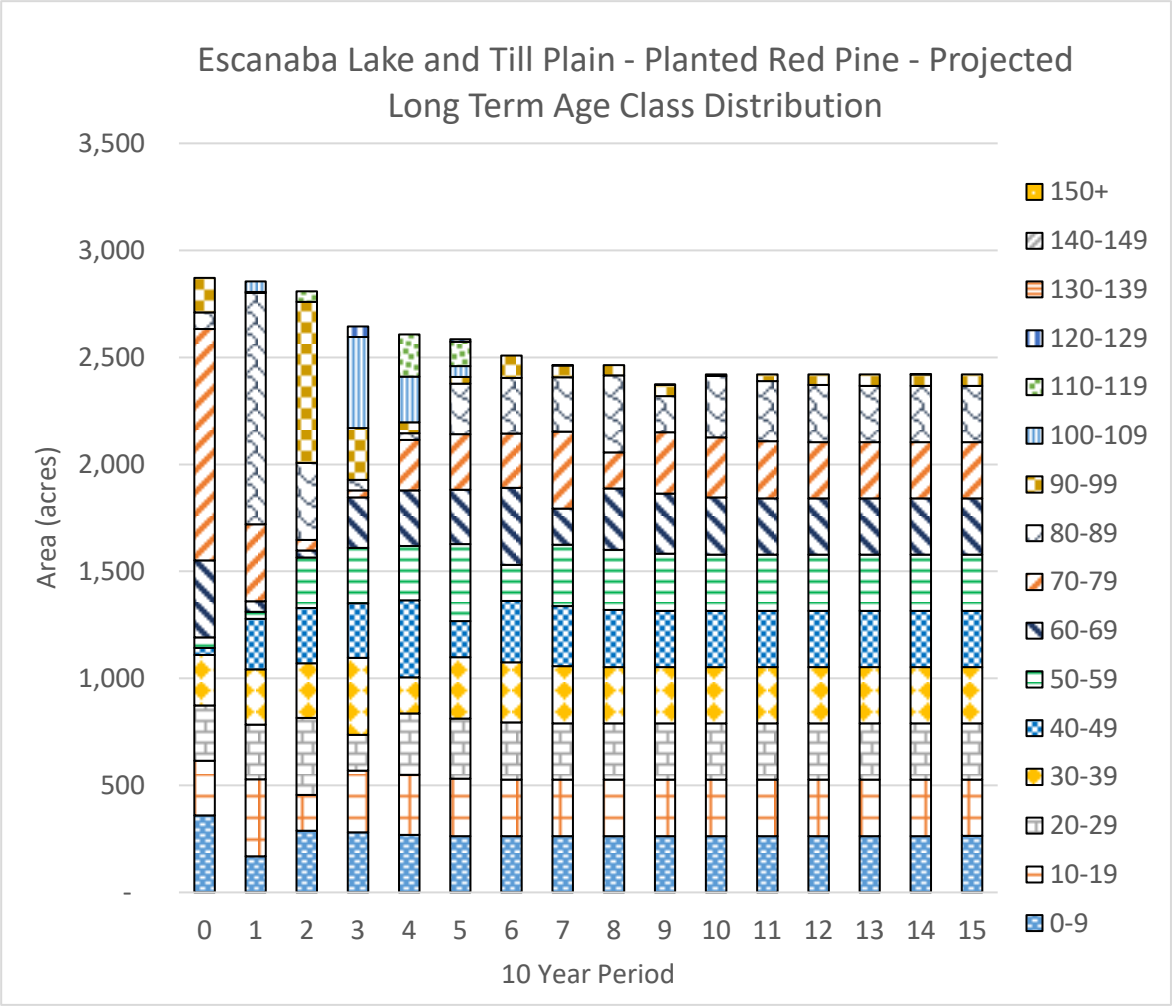


Figure 20. Projected age class distribution for all acres of planted red pine over the next 150 years.

Management actions

There are 233 acres of projected clearcut harvest in the planted red pine cover type during this planning period. This is slightly below the desired establishment of 310 acres per decade because of the current unbalanced condition. In addition to clearcut acres, there are 559 acres projected for thinning in this cover type (Table 5).

Conservation Area Network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within the Escanaba Lake and Till Plain Management Area.

High Conservation Value Area Type and Name	Acres
Coastal environmental area	**22**
	22
Deer wintering complex	**16,885**
	16,885
Forest habitat core interior	**1,341**
	1,341
Grouse Enhanced Management Site	**6,304**
Garden Grade	6,304
Grand total	**24,552**

Ecological reference areas

Ecological Reference Areas, a type of HCVA, are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 13. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 14. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	C			1
Existing ERA	Intermittent wetland	AB			1
Existing ERA	Intermittent wetland	C			1

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Limestone bedrock glade	AB	G2G4	S2	2
Existing ERA	Limestone bedrock glade	B	G2G4	S2	1
Existing ERA	Limestone bedrock glade	C	G2G4	S2	1
Existing ERA	Limestone bedrock lakeshore	A	G3	S2	1
Existing ERA	Limestone bedrock lakeshore	AB	G3	S2	1
Existing ERA	Limestone bedrock lakeshore	B	G3	S2	1
Existing ERA	Limestone cliff	A	G4G5	S2	1
Existing ERA	Wooded dune and swale complex	AB	G3	S3	1
Existing ERA	Wooded dune and swale complex	B	G3	S3	1
Existing ERA	Wooded dune and swale complex	C	G3	S3	1
Proposed ERA	Boreal forest	BC	GU	S3	3
Proposed ERA	Great Lakes marsh	C	G2	S3	1
Proposed ERA	Limestone bedrock lakeshore	B	G3	S2	2
Proposed ERA	Limestone cobble shore	B	G2G3	S3	1
Proposed ERA	Wooded dune and swale complex	C	G3	S3	2
Grand total					**23**

Special conservation areas

Reviewable special conservation areas (Table 15) are those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) are those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within the Escanaba Lake and Till Plain Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**6**
Merwin Campground	6
Merwin Creek Boat Launch	1
Habitat Area or Habitat Corridor	**1,016**
Maxton Plains: Alvar and associated natural communities	1,016
Mineral Resource Area	**26**
Schoolcraft County Road Commission	26
Visual Management Areas	**103**
Rainey Wildlife Viewing Area	103
Grand total	**1,151**

Table 16. Static special conservation areas within the Escanaba Lake and Til Plain Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**45**
Emergent marsh		1
Northern wet meadow		38
Poor fen		6
Designated Trout and Coldwater Stream Buffer		**165**
Unnamed		131
Spring Creek		23
Thompson Creek		10
Designated Trout and Coldwater Streams	**6.1**	
Unnamed	4.8	
Spring Creek	0.9	
Thompson Creek	0.4	
Great Lakes Islands		**1,462**
Little Summer Island		108
Summer Island		1,354
Nondedicated Natural Areas		**289**
Natural Area Point Detour		289
Wild and Scenic Rivers	**0.8**	
Indian Wild and Scenic River	0.8	
Wood Turtle Stream 100-Foot Buffer		**27**
Manistique River		27
Wood Turtle Stream 660-Foot Buffer		**221**
Manistique River		221
Grand Total	**6.9**	**2,209**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory biotics database (Table 18 and Table 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 17. Rare animal species conservation status key.

Species Status	Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal species occurrence within the Escanaba Lake and Till Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Acipenser fulvescens	Lake sturgeon	T		1
Animal	Ammodramus savannarum	Grasshopper sparrow	SC		1
Animal	Boloria frigga	Frigga fritillary	SC		1
Animal	Bombus borealis	Northern amber bumble bee	SC		1
Animal	Bombus terricola	Yellow banded bumble bee	SC		5
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Cincinnatia cincinnatiensis	Campeloma spire snail	SC		1
Animal	Coregonus artedi	Lake herring or Cisco	T		1
Animal	Falco columbarius	Merlin	SC		1
Animal	Glyptemys insculpta	Wood turtle	T		1
Animal	Haliaeetus leucocephalus	Bald eagle	SC		6
Animal	Mediappendix exilis	Pleistocene catinella	T		1
Animal	Myotis lucifugus	Little brown bat	T		3
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC		1
Animal	Pandion haliaetus	Osprey	SC		3
Animal	Planogyra asteriscus	Eastern flat-whorl	SC		1
Animal	Setophaga kirtlandii	Kirtland's warbler	E		1
Animal	Stylurus amnicola	Riverine snaketail	SC		1
Animal	Tympanuchus phasianellus	Sharp-tailed grouse	SC		1
Animal	Vertigo cristata	Crested vertigo	SC		1
Animal	Vertigo elatior	Tapered vertigo	SC		2
Animal	Vertigo hubrichti	Hubricht's vertigo	E		2
Total	-	-	-	-	**37**

**Occurrence information provided by field staff.*

Table 19. Rare plant species conservation status key.

Species Status	Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 20. Rare plant species occurrence within the Escanaba Lake and Till Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Adlumia fungosa	Climbing fumitory	T		1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T		3
Plant	Carex albolutescens	Sedge	T		1
Plant	Carex richardsonii	Richardson's sedge	SC		1
Plant	Cirsium pitcheri	Pitcher's thistle	T	LT	3
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		1
Plant	Drosera anglica	English sundew	SC		1
Plant	Graphephorum melicoides	Purple false oats	SC		1
Plant	Iris lacustris	Dwarf lake iris	T	LT	6
Plant	Minuartia dawsonensis	Rock sandwort	T		1
Plant	Neottia auriculata	Auricled twayblade	SC		1
Plant	Schoenoplectus torreyi	Torrey's bulrush	SC		2
Plant	Stachys pilosa	Hairy hedge-nettle	SC		1
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC		3
Total	-	-	-	-	**26**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 21).

Table 21. Non-ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non -ecological reference area natural communities within the Escanaba Lake and Till Plain Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Emergent marsh	AB	S4	GU	1
Northern wet meadow	AB	S4	G4G5	1
Poor fen	B	S3	G3	1
Grand total				**3**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Escanaba Lake and Till Plain Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Hemlock woolly adelgid	Adelges tsugae	Non-native	No

Table 24. Maladies of concern in the Escanaba Lake and Till Plain Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Nectria cinnabarina	Native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No
Oak wilt	Bretziella fagacearum	Non-native	No
Wood decay	Various	Mostly native	Yes

Aquatic resources

Riparian habitat

Approximately 26 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as warm types comprise approximately 99% of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	<1
Cold small river	0
Cold transitional stream	0
Cold transitional small river	0

Type	Length (miles)
Cold transitional large river	0
Warm transitional stream	15
Warm transitional small river	1
Warm transitional large river	0
Warm stream	0
Warm small river	<1
Warm large river	10

Lacustrine habitat

A total of 17 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	16
100-499	0
500+	1

Wetlands

A total of 19,735 acres of wetlands are found in the management area (Table 27). Forested wetlands comprise approximately 95% of wetland types found in the management area.

Table 27. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	757
Forested	18,706
Riverine	272

Vernal pools and seeps

A total of 401 acres of vernal pools and seeps have been inventoried in the management area, while 25 acres of seeps have been identified.

Riparian vegetation cover

Cedar and lowland shrub are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Cedar	950
Lowland shrub	920
Marsh	681
Northern hardwood	677

Cover Type	Acres
Aspen	492
Upland conifers	357
Mixed upland deciduous	295
Bare/sparsely vegetated	280
Lowland conifers	241
Lowland deciduous	137

Watershed vegetation cover

The management area includes portions of important watersheds of the Fishdam River and Little Fishdam River (Table 29 and Table 30). Aspen is a major cover type of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top five) and area for the area of the Fishdam River watershed located within the management area.

Cover Type	Acres
Aspen	1,368
Northern hardwood	537
Planted red pine	404
Upland mixed forest	209
Natural jack pine	120

Table 30. Largest vegetative cover types (i.e., top five) and area for the area of the Little Fishdam River watershed located within the management area.

Cover Type	Acres
Aspen	1,724
Lowland conifer	485
Lowland shrub	471
Cedar	426
Upland conifer	410

Recreation

Access for management and public recreation is generally good in the Escanaba Lake and Till Plain Management Area, with U.S. 2 going through the area and a well-developed two-track/road system. Summer Islands may be accessed by private boat, small plane (airfield on Little Summer) and off-road vehicles or snowmobiles when conditions allow them across the ice. These islands provide for recreational boating, camping, hunting, fishing and waterfowl hunting, although there are no defined recreational facilities.

Several snowmobile trails traverse this management area. The nonmotorized Indian Lake Pathway is located north of Manistique and the Ninga Aki Pathway on the Garden Peninsula. The biking route of the Iron Belle Trail runs through the management area along U.S. 2. Nearby recreation opportunities include the Haywire State Trail (rail-trail), which travels from Marquette to Shingleton and is designated for ORV

and snowmobile use, with all nonmotorized uses also permitted (Table 31). There are two state forest campgrounds within the management area, and dispersed camping is also popular along the lakeshore. Additional recreation opportunities are provided by Indian Lake State Park, which is adjacent to state forest land.

Table 31. Designated recreation trails by use type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	Off-road vehicle (all types) Snowmobile	0 22.9
Nonmotorized recreation trails	Hiking Equestrian Biking Hunter access trails	7.3 0 0 10
Total		**40.2**

Note: Trail use types may overlap.

Table 32. State forest campgrounds.

Name	Number of sites
Merwin Creek State Forest Campground	10
Portage Bay State Forest Campground	23

The Garden Grade Grouse Enhanced Management Site at the top of the Garden Peninsula includes nearly 7,000 acres of primarily aspen, providing walk-in hunting opportunities for grouse hunters (Table 33).

Opportunities for recreation within the management area include hunting and trapping, fishing, scenic viewing, bird watching and berry picking. U.S. 2 is part of the Lake Michigan Circle Tour that many people travel during the summer and fall months.

Table 33. Areas managed for hunting.

Type	Name	Acres
Grouse Enhanced Management Site	Garden Grade GEMS	6,299

Table 34. Boating access sites.

Name	Body of Water
Merwin Creek State Forest Campground	Merwin Creek

EUP management areas

Grand Marais Moraine Complex

State forest area: 317,037 acres	Location: Lake Superior shoreline and vicinity, central and eastern Upper Peninsula	Population centers: Grand Marais Paradise
Subsection: Grand Marais Glaciofluvial-Moraine Complex	Landforms: Sand dunes, sand spits, shoreline, beach ridges, outwash plains, kettles, alternating swales	Land cover: Forested: 264,156 acres Nonforested: 52,881 acres

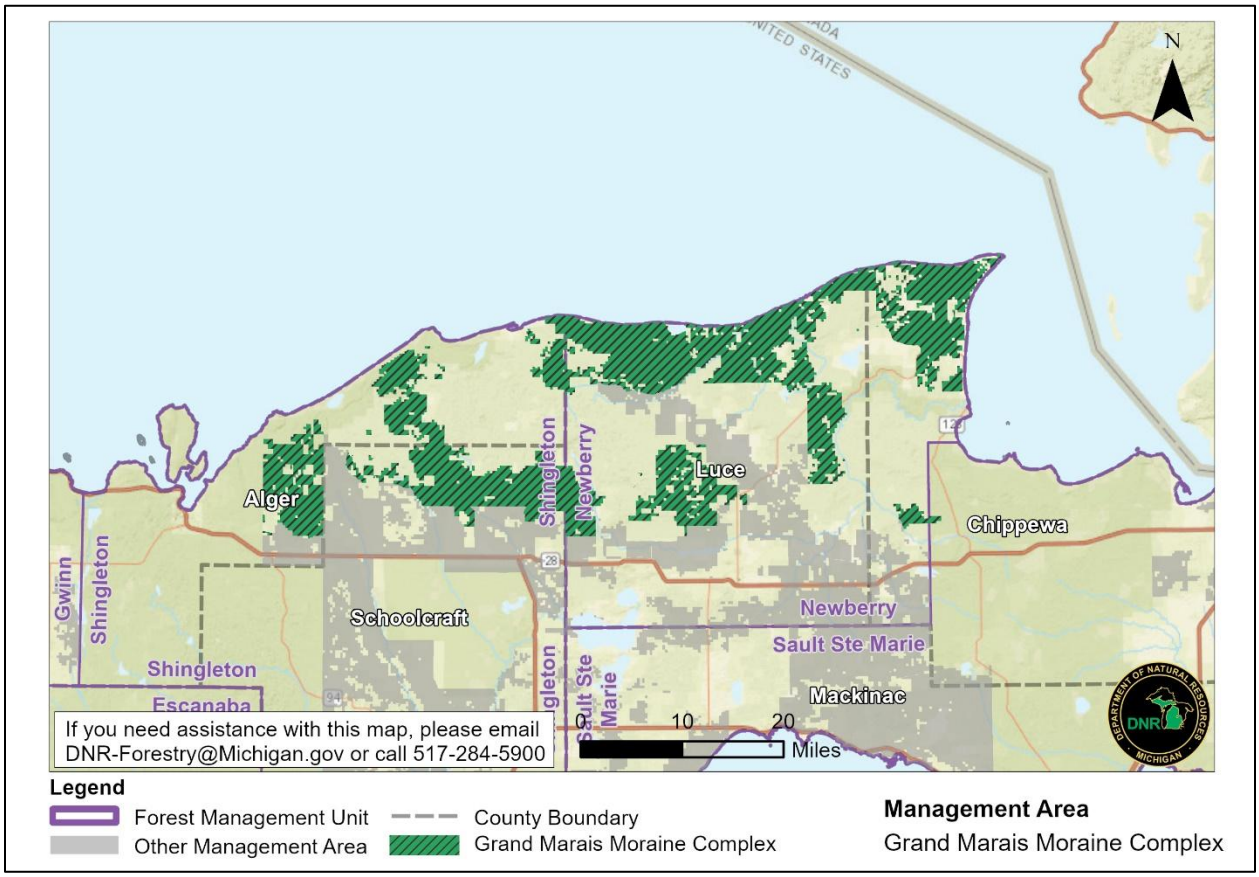


Figure 1. Grand Marais Moraine Complex Management Area.

Forested landscape

Current and projected future conditions

The Grand Marais Moraine Complex Management Area is dominated by available uplands, of which mid-tolerant and intolerant cover types account for most of the area in terms of acres. When all age classes and landscape positions are combined, cover type tolerance levels have a fairly even distribution. Tolerant cover types occur mostly in the old age category, which covers the largest area of all four age categories (Figure 2).

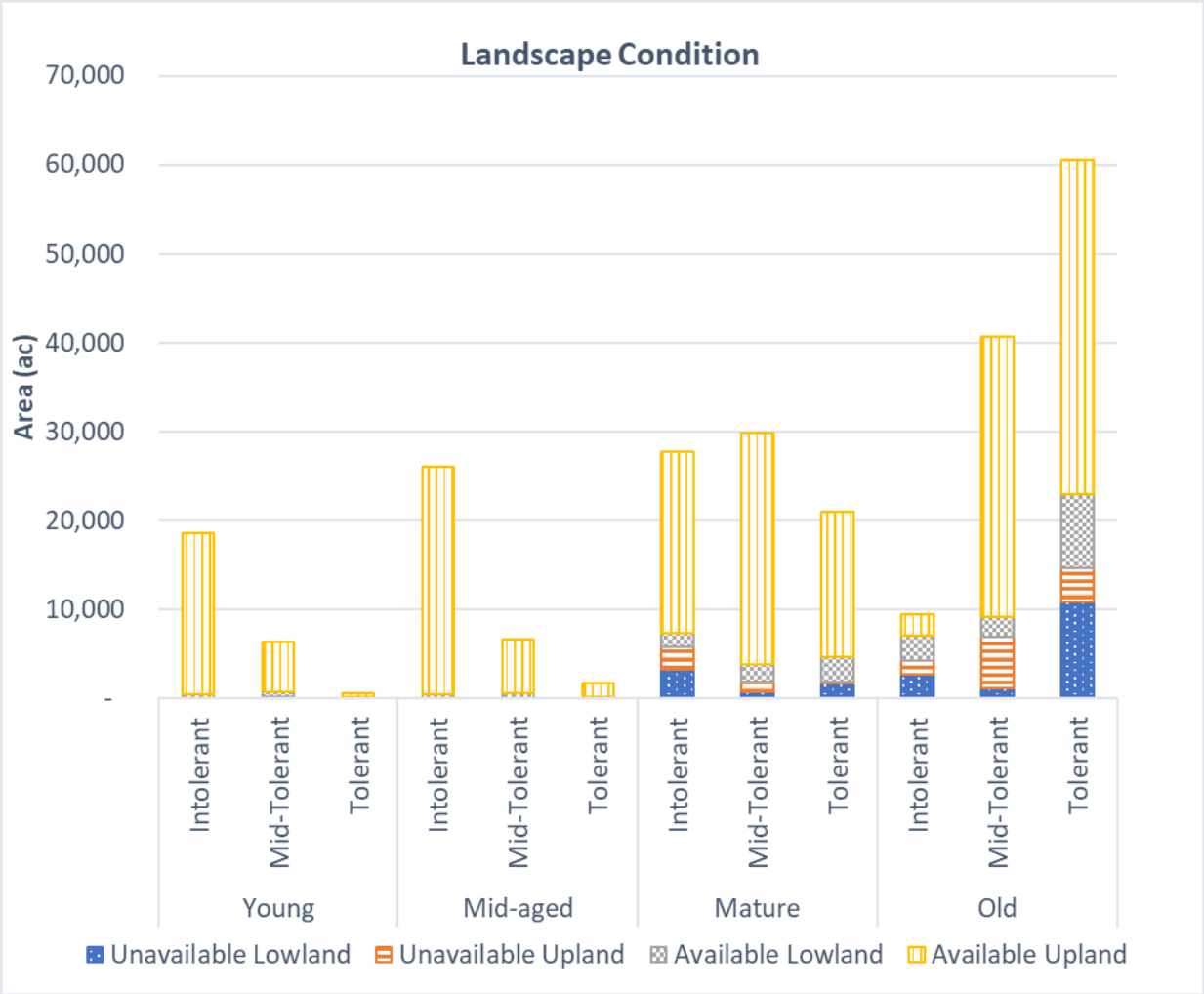


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (see Section 3) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0- to 19-year stands in aspen and jack pine	7,758
Mature forest	Acres of 80-plus-year year stands across cover types	110,610
Mature forest	Acres of 120-plus-year stands across cover types	36,127
Mesic conifer cover types	Acres of mesic conifer cover types	39,075
Mesic conifers in other cover types	Average canopy occupancy	49%
Mast – oak cover types	Acres of oak cover types	419
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	26,329
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	138,062
Nonforested openings	Acres of total herbaceous open land, upland shrub and crop land	14,125
Landscape forest matrix	Percent deciduous forest	30%
Landscape forest matrix	Percent coniferous forest	64%

Other important landscape-level habitat in this management area includes large opening complexes, coastal habitat and natural pine communities.

Large opening complexes

Because opening complexes were not included within the State Forest Management Plan model, it should be noted that there are no future predicted acres for this habitat type. This does not mean that these areas are not intended to be managed. Within the Grand Marais Moraine Complex, there are several areas that are suitable and are maintained as habitat for sharp-tailed grouse and other wildlife species like Kirtland's warbler, upland sandpiper and white-tailed deer, including Kingston Plains, Stanley Lake, Dutch Fred Lake, Danaher Plains, and the Sleeper Lake Fire and Duck Lake Fire areas.

Coastal habitat

The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, land birds (defined here as songbirds and raptors) and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls and terns) (Ewert, et al., 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provide unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as important bird areas, including Whitefish Point, where thousands of birds migrate through every spring and fall. Furthermore, the entire shoreline from Whitefish Point to Grand Marais is critical habitat for piping plover. The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

Natural pine habitat

The Grand Marais Management Area has the largest amount of natural red, natural white and mixed pine (dry northern forest natural community) acres in the Upper Peninsula. These areas generally have a well-developed shrub layer and larger standing and down dead trees, providing habitat for shrub-nesting birds, secondary cavity-nesting species (birds, American marten, northern flying squirrel) and small mammals that provide a food base for predators such as American martens, owls and other forest raptors. Natural red and white pine trees can function as nesting cover for numerous bird species including pine sisken, yellow-rumped warbler, pine warbler, red crossbill and white-winged crossbill. This habitat can be important for winter migrants because of the energetic advantage provided by dense foliage. Young trees, where there are dense branches close to the ground, provide thermal protection and protection from avian predators for many wildlife species, such as ruffed and spruce grouse.

Legacy trees (usually red pine or white pine) in these stands are structurally complex, with large branch systems, thick bark, buttressed roots and cavities creating niche habitats for species such as bats, insect-gleaning birds, and perching and nesting forest raptors, and they provide escape trees for black bears. Larger trees provide a more reliable seed source for species such as red-crossbill, migrant pine grosbeak and red squirrel. Both red and white pine are long-lived and can reach ages of 200-450 years.

Special analysis units

The Grand Marais Morais Moraine Management Area has the following special analysis units. These SAUs have specific cover-type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer wintering complex – Cusino
- Grouse Enhancement Management Site – Halifax
- Grouse Enhancement Management Site – Melstrand
- Deer wintering complex – McMillan Ten Curves
- Deer wintering complex – Hulbert Hendrie Sage River

The Grand Marais Moraine Complex Management Area is comprised of 83% forested cover types and 17% nonforested cover types. Of the forested cover types, 70% are in the upland landscape position and 13% are in the lowland landscape position. The largest contributors to upland cover types are northern hardwoods, natural jack pine, aspen and planted red pine. The largest cover types in terms of area in the lowland landscape position are lowland conifers, cedar and lowland spruce/fir. Lowland shrub is the most common nonforested cover type in the management area, representing 5% of the landscape (Table 2).

Table 2. Summary table describing the current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	22,309	74,461	220,728	264,156
			Northern hardwood	43,676			
			Black/red hybrid oak	0			
			Northern red oak	364			
			Oak mix	841			
			Mixed upland deciduous	7,271			
		Mixed	Upland mixed forest	11,089	11,089		
		Coniferous	Planted red pine	21,844	135,177		
			Planted jack pine	17,705			
			Planted white pine	263			
			Planted mixed pine	921			
			Natural red pine	16,269			
			Natural jack pine	39,104			
			Natural white pine	13,594			
			Natural mixed pines	14,800			
			Upland spruce/fir	1,315			
			Upland conifers	7,865			
			Hemlock	1,498			
	Lowland	Deciduous	Lowland aspen/balsam poplar	650	4,475	43,428	
			Lowland deciduous	3,825			
		Mixed	Lowland mixed forest	3,919	3,919		
		Coniferous	Cedar	10,967	35,035		
			Lowland conifers	13,669			
			Lowland spruce/fir	9,317			
			Tamarack	1,082			
Nonforested	Upland	N/A	Herbaceous open land	8,905	N/A	19,081	52,881
			Upland shrub	5,133			
			Low-density trees	3,149			
			Bare/sparsely vegetated	811			
			Cropland	87			
			Urban	995			
	Lowland	N/A	Lowland shrub	15,281	N/A	33,800	
			Marsh	4,865			
			Bog	2,836			
			Treed bog	5,106			
			Water	5,713			
						Grand total:	**317,037**

There are 228,302 acres (72% of the total management area and 86% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Grand Marais Moraine Complex Management Area (Table 3). Of that, just under 16% is in the northern hardwood cover type, almost 14% is natural jack pine, while aspen and planted red pine cover just over 8% each. The remaining cover types each represent less than 6% each, for a total of 33.8% of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

GRAND MARAIS MORAINE COMPLEX Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	22,027	8.3%	283	0.1%	22,310	8.4%
Cedar	4,598	1.7%	6,369	2.4%	10,967	4.2%
Hemlock	1,081	0.4%	417	0.2%	1,498	0.6%
Lowland aspen/balsam poplar	613	0.2%	38	0.0%	650	0.2%
Lowland conifers	7,247	2.7%	6,422	2.4%	13,669	5.2%
Lowland deciduous	2,696	1.0%	1,129	0.4%	3,825	1.4%
Lowland mixed forest	3,003	1.1%	917	0.3%	3,920	1.5%
Lowland spruce/fir	4,326	1.6%	4,992	1.9%	9,318	3.5%
Mixed upland deciduous	6,290	2.4%	982	0.4%	7,272	2.8%
Natural jack pine	36,450	13.8%	2,656	1.0%	39,106	14.8%
Natural mixed pines	12,961	4.9%	1,839	0.7%	14,800	5.6%
Natural red pine	15,262	5.8%	1,007	0.4%	16,269	6.2%
Natural white pine	12,273	4.6%	1,323	0.5%	13,596	5.1%
Northern hardwood	41,419	15.7%	2,259	0.9%	43,678	16.5%
Northern red oak	296	0.1%	68	0.0%	364	0.1%
Oak mix	598	0.2%	243	0.1%	841	0.3%
Planted jack pine	17,368	6.6%	339	0.1%	17,707	6.7%
Planted mixed pine	846	0.3%	75	0.0%	921	0.3%
Planted red pine	21,568	8.2%	278	0.1%	21,845	8.3%
Planted white pine	263	0.1%	0	0.0%	263	0.1%
Tamarack	212	0.1%	870	0.3%	1,082	0.4%
Upland conifers	6,229	2.4%	1,636	0.6%	7,865	3.0%
Upland mixed forest	9,777	3.7%	1,314	0.5%	11,091	4.2%
Upland spruce/fir	718	0.3%	598	0.2%	1,316	0.5%
Grand total	**228,119**	**86.4%**	**36,054**	**13.6%**	**264,173**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Conservation values	17,375	48.2%
Best management practices	3,739	10.4%
Unproductive	3,463	9.6%
Deer wintering area	2,594	7.2%
Wildlife concerns	1,665	4.6%
Blocked by obstacle	1,495	4.1%
Federal/state/local law	1,357	3.8%
Too wet	1,086	3.0%
Too steep	740	2.1%
Long-term retention	642	1.8%
Recreational/scenic	498	1.4%
Rare landforms	391	1.1%
Blocked by railroad	350	1.0%
Denied access	214	0.6%
Nonmilitary lease/easement	202	0.6%
Species of special concern or T&E	129	0.4%
Other DNR/division processes	73	0.2%
Other influence zones	43	0.1%
Total unavailable	**36,054**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Grand Marais Moraine Complex Management Area has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals and establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 653,981 cords, the planned harvest volume for the decade (

Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern hardwood	225	11,998	-	2,840	600	-	-	15,662
Planted red pine	1,813	-	3,028	-	-	-	-	4,840
Planted jack pine	4,410	-	-	-	-	-	-	4,410
Aspen	3,380	-	-	-	-	-	-	3,380
Natural jack pine	3,016	-	-	-	-	-	-	3,016
Upland conifers	1,562	-	-	-	447	-	-	2,009
Natural mixed pines	-	-	671	-	671	-	-	1,341
Mixed upland deciduous	926	98	-	-	167	-	-	1,192
Natural red pine	-	-	587	-	587	-	-	1,174
Lowland conifers	1,122	-	-	-	-	-	-	1,122
Upland mixed forest	950	-	-	-	-	-	-	950
Lowland spruce/fir	514	-	-	-	-	-	-	514
Natural white pine	-	-	200	-	192	-	-	392
Lowland deciduous	238	-	-	-	2	-	-	240
Lowland mixed forest	218	-	-	-	-	-	-	218
Lowland aspen/balsam poplar	169	-	-	-	-	-	-	169
Hemlock	-	119	-	-	-	-	-	119
Upland spruce/fir	103	-	-	-	-	-	-	103
Tamarack	49	-	-	-	-	-	-	49
Oak mix	43	-	-	-	-	-	-	43

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Planted mixed pine	-	-	17	-	-	-	-	17
Totals	**18,738**	**12,215**	**4,503**	**2,840**	**2,665**	**-**	**-**	**40,961**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Grand Marais Moraine Complex Management Area Product	Species	Volume Planned *	Volume Prepared**
Pulpwood (cords)	Jack pine	128,324	120,624
	Mixed hardwood	106,056	99,693
	Red pine	39,340	36,980
	Mixed softwood	35,486	33,356
	Mixed aspen	27,189	25,557
	Mixed spruce	20,540	19,307
	White pine	9,401	8,837
	Mixed oak	4,793	4,506
	Pulpwood total	**371,128**	**348,860**
Sawtimber (MBF)	Red pine	57,670	54,210
	Sugar maple	41,167	38,697
	White pine	19,006	17,866
	Red maple	18,034	16,952
	Mixed aspen	8,508	7,997
	Red oak	5,619	5,282
	Basswood	4,629	4,351
	Mixed oak	1,029	968
	White oak	1,018	957
	Sawtimber total	**156,681**	**147,280**
	Total sawtimber harvest volume in cords	**324,597**	**305,121**
	Grand total harvest volume in cords	**695,725**	**653,981**

*Volume estimates based on 100% of the projected harvests for the 10-year planning period.

**Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are some cover type transitions projected for the Grand Marais Moraine Complex Management Area (*Table 7*). The largest transition is projected for planted jack pine and upland conifers. Planted jack pine is projected to decrease by approximately 3%, and upland conifers are projected to decrease by nearly 7%. A significant amount of the planted jack pine area will transition to natural jack pine or other

cover types like upland mixed forest, whereas a portion of upland conifers is projected to become more diverse and transition to upland mixed cover types or other upland cover types with more deciduous species. Planted red pine is also projected to increase by 2%, whereas natural red pine, white pine and mixed pine are projected to remain stable. Other cover types are projected to remain fairly stable, as treatment regimens will not significantly change the amount of area in each cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Northern hardwood	43,676	43,768	93
Natural jack pine	39,104	41,586	2,483
Aspen	22,309	22,598	289
Planted red pine	21,844	22,364	520
Planted jack pine	17,705	14,638	-3,066
Natural red pine	16,269	16,269	0
Natural mixed pine	14,800	14,800	0
Lowland conifers	13,669	13,644	-25
Natural white pine	13,594	13,594	0
Upland mixed forest	11,089	11,391	302
Cedar	10,967	10,967	0
Lowland spruce/fir	9,317	9,180	-137
Upland conifers	7,865	7,317	-547
Mixed upland deciduous	7,271	7,253	-19
Lowland mixed forest	3,919	4,106	187
Lowland deciduous	3,825	3,797	-27
Hemlock	1,498	1,498	0
Upland spruce/fir	1,315	1,261	-54
Tamarack	1,082	1,074	-8
Planted mixed pine	921	921	0
Oak mix	841	841	0
Lowland aspen/balsam poplar	650	660	10
Northern red oak	364	364	0
Planted white pine	263	263	0
Black/red hybrid oak	0	0	0
Lowland shrub	15,281	15,281	0
Herbaceous open land	8,905	8,905	0
Water	5,713	5,713	0
Upland shrub	5,133	5,133	0
Treed bog	5,106	5,106	0
Marsh	4,865	4,865	0

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Low-density trees	3,149	3,149	0
Bog	2,836	2,836	0
Urban	995	995	0
Bare/sparsely vegetated	811	811	0
Cropland	87	87	0
Total:	**317,037**	**317,037**	**0**

Featured species current and projected habitat acres

There are 14 featured species in this management area that span various cover types, age classes and stand-level conditions.

As noted in the featured species management priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors, including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres, these are potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the featured species management priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Black bear	Mast	26,329	--	--	--
Black-backed woodpecker	Natural disturbance	--	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	59,201	73,536	64,569	88,985
Black-throated blue warbler	Northern hardwoods, mixed upland deciduous	29,387	39,660	22,623	40,118
Kirtland's warbler	Jack pine (planted and natural)-Danaher/Kingston plains, Duck Lake, Whitefish Point	22,779	21,858	14,684	14,540
Marten U.P.	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	78,229	93,957	84,290	109,046
Moose	To be determined	--	--	--	--
Red crossbill	Natural red pine, natural white pine, natural mixed pine, planted red pine	8,087	8,024	11,937	19,943
Ruffed grouse	Aspen	7,239	6,870	7,561	7,838

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Sharp-tailed grouse	Nonforested openings	40,410	--	--	--
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	39,295	39,492	27,281	27,530
Spruce grouse, mature	Natural jack pine, natural white pine, natural mixed pine, upland conifer, upland spruce/fir, lowland spruce/fir, lowland conifer, tamarack	41,262	40,649	60,612	67,147
Spruce grouse, young	Jack pine (natural and planted)	22,779	21,858	14,683	14,540
Wood turtle	Nonforest openings	--	--	--	--
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	93,944	94,763	96,375	99,089

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
White-tailed deer (shelter)*	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	112,321	112,094	113,269	112,395

*Deer wintering complexes greater than 15,000 acres are modeled as a special analysis unit, or SAU, and information on them can be found in Section 5 of the plan. In deer wintering complexes less than 15,000 acres, harvest of cedar and hemlock is not allowed within range stands essential for deer survival, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated featured species

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 80 and 110 years old in the Grand Marais Moraine Complex Management Area (Figure 3). The past management regime has been primarily single tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition, where a featured stand age becomes less evident, but the dominant age of these stands will likely increase beyond 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 3).

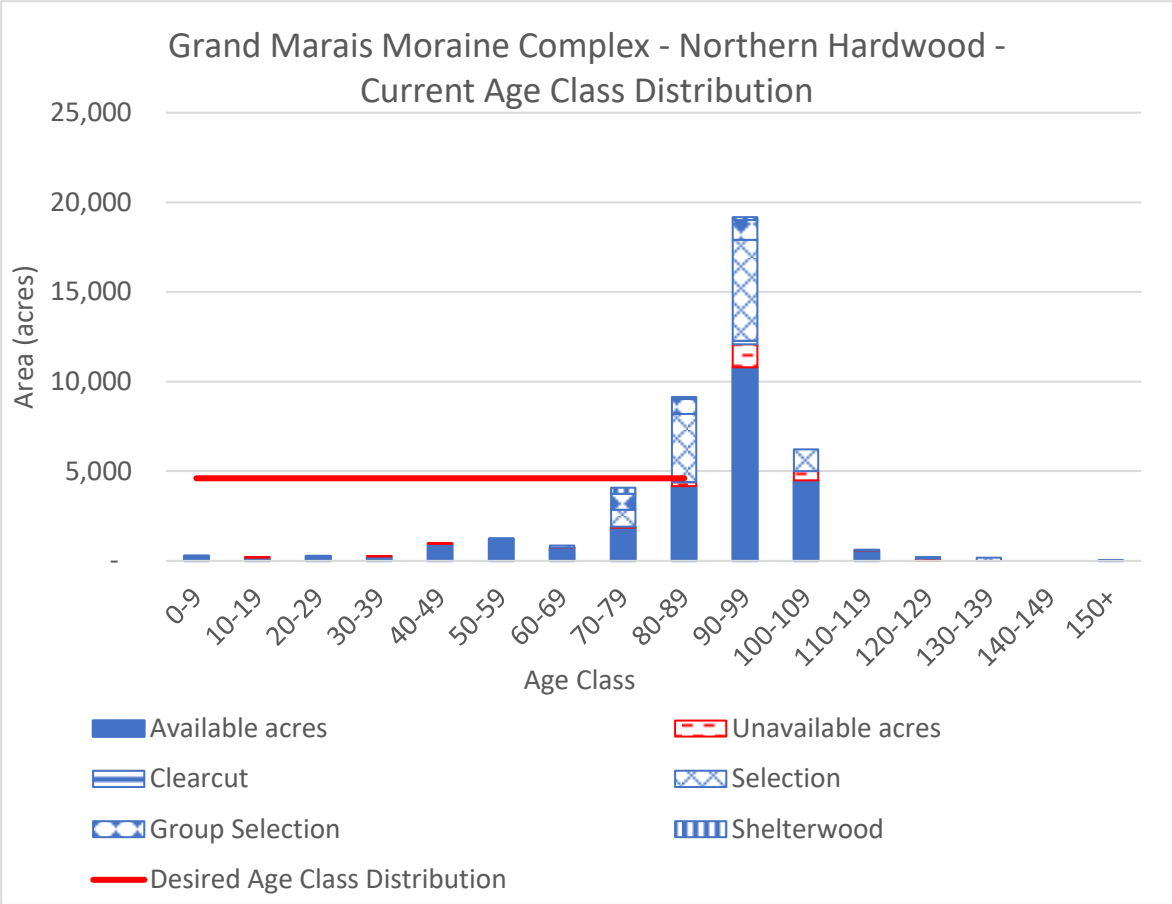


Figure 3. Current age class distribution and projected harvests in the northern hardwood cover type in the Grand Marais Moraine Complex Management Area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Grand Marais Moraine Complex Management Area (Figure 4). Current conditions are a result of beech salvage efforts in the previous planning period and a regular selection harvest regime across this cover type.

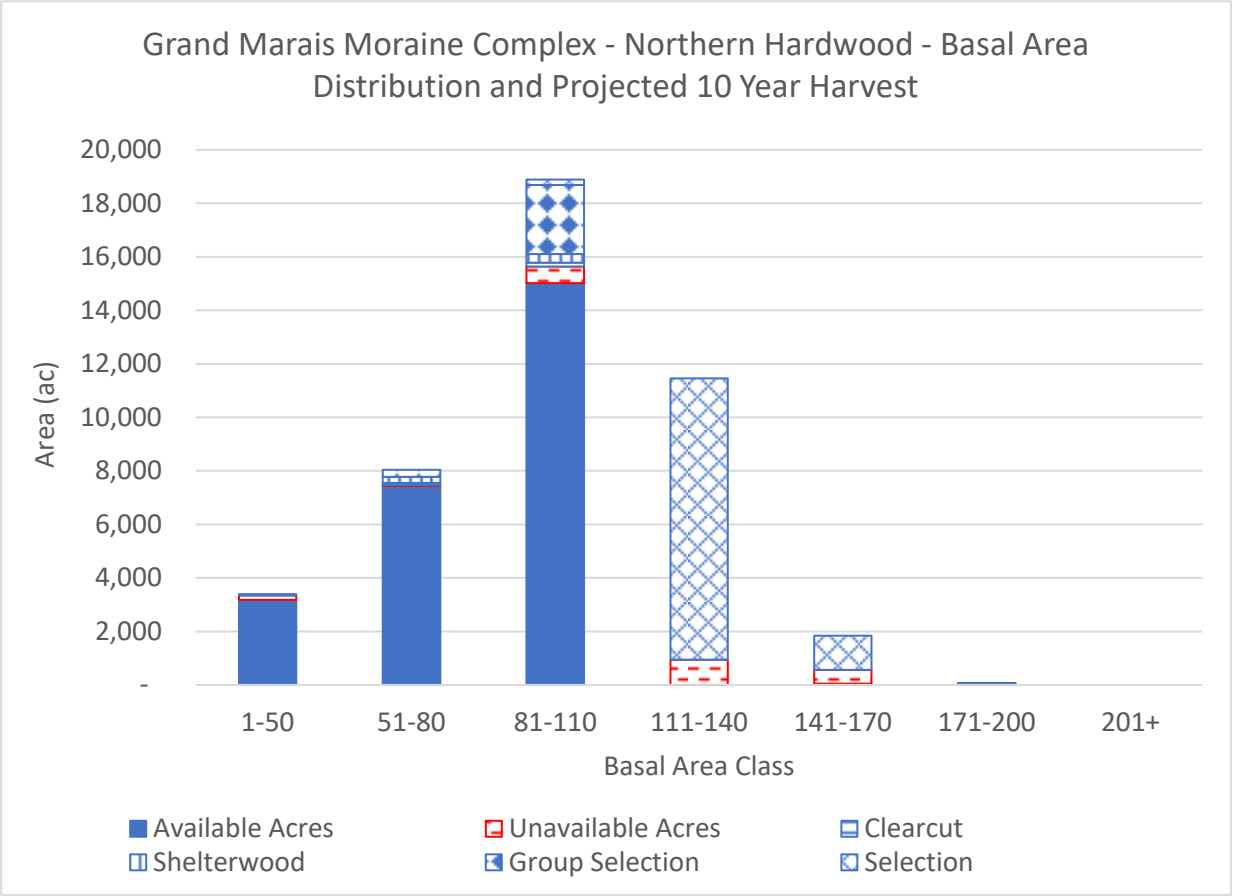


Figure 4. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are very few acres of unavailable northern hardwoods in the Grand Marais Moraine Complex Management Area. Selection is the primary silvicultural treatment projected during this 10-year planning period. There is a smaller amount of group selection prescribed, and there may be opportunities to utilize even-aged management silvicultural regimes to increase stem density, species composition and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for black-throated blue warbler, blackburnian warbler and marten (Table 9).

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	25,655	2,022
Black-throated blue warbler	Age category: 80+ Size category: sawlog	25,655	2,022

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
	Basal area: 81+		
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	25,655	2,022
White-tailed deer	All ages and size classes	43,676	--

Desired future condition

The projected long-term cover type trend for northern hardwood is slightly increasing in the Grand Marais Moraine Complex Management Area. There are few transitions into this cover type from other cover types forecasted and equally few transitions from northern hardwoods to other cover types in this management area.

The desired basal area distribution is a bell-shaped curve, where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupying the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area, as canopy gaps fill in with regenerating seedlings, saplings and poles and eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. The Grand Marais Moraine Complex Management Area will take several decades to reach the desired future condition because of the impacts from beech bark disease. The amount of American beech that once occupied much of the northern hardwood stands has resulted in lower than normal residual basal area and decreased stocking levels across much of the eastern Upper Peninsula.

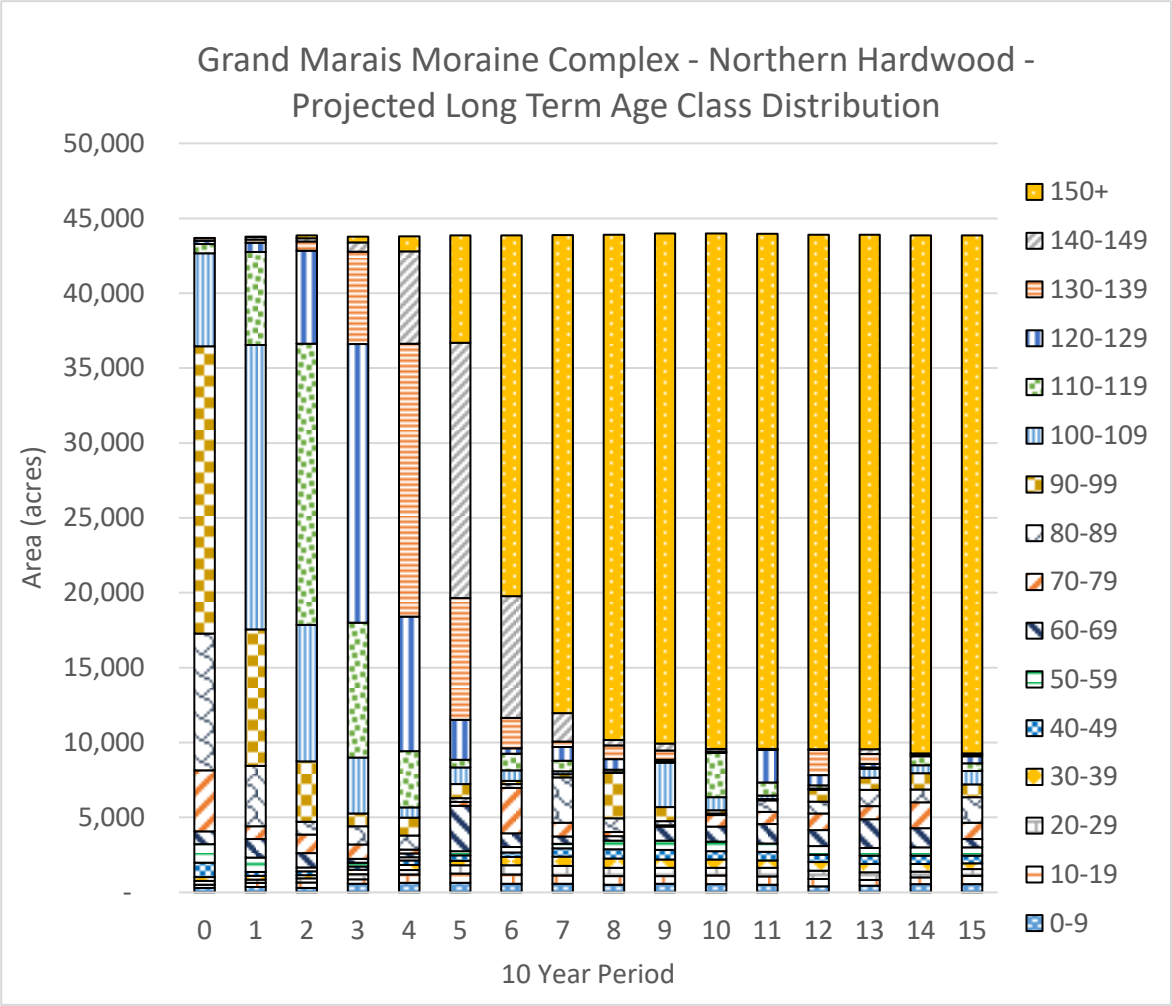


Figure 5. Projected age class distribution for all acres of jack pine over the next 150 years in the Grand Marais Moraine Complex Management Area.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime over 11,998 acres (Table 5). Other silvicultural methodologies for the cover type are projected for this management area, with 2,840 acres of group selection, 600 acres of shelterwood and 225 acres of clearcut management. Multiple silvicultural regimes should continue to be considered as emerging research results become available. Emphasis on larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition.

Natural jack pine

Current condition

Most of the natural jack pine cover type is currently between stand ages of 0 and 49 years old in the Grand Marais Moraine Complex Management Area (Figure 6). The age class distribution is currently

unbalanced, especially in the 0- to 9-year-old age class, where there is an abundance of acres. There is a deficit in the 50-59 and 60-69 age classes, which will lead to a very slight deficit in the 0- to 9-year age class for the next planning period. A small number of acres extend beyond the desired maximum age class distribution, most of which are unavailable for harvest.

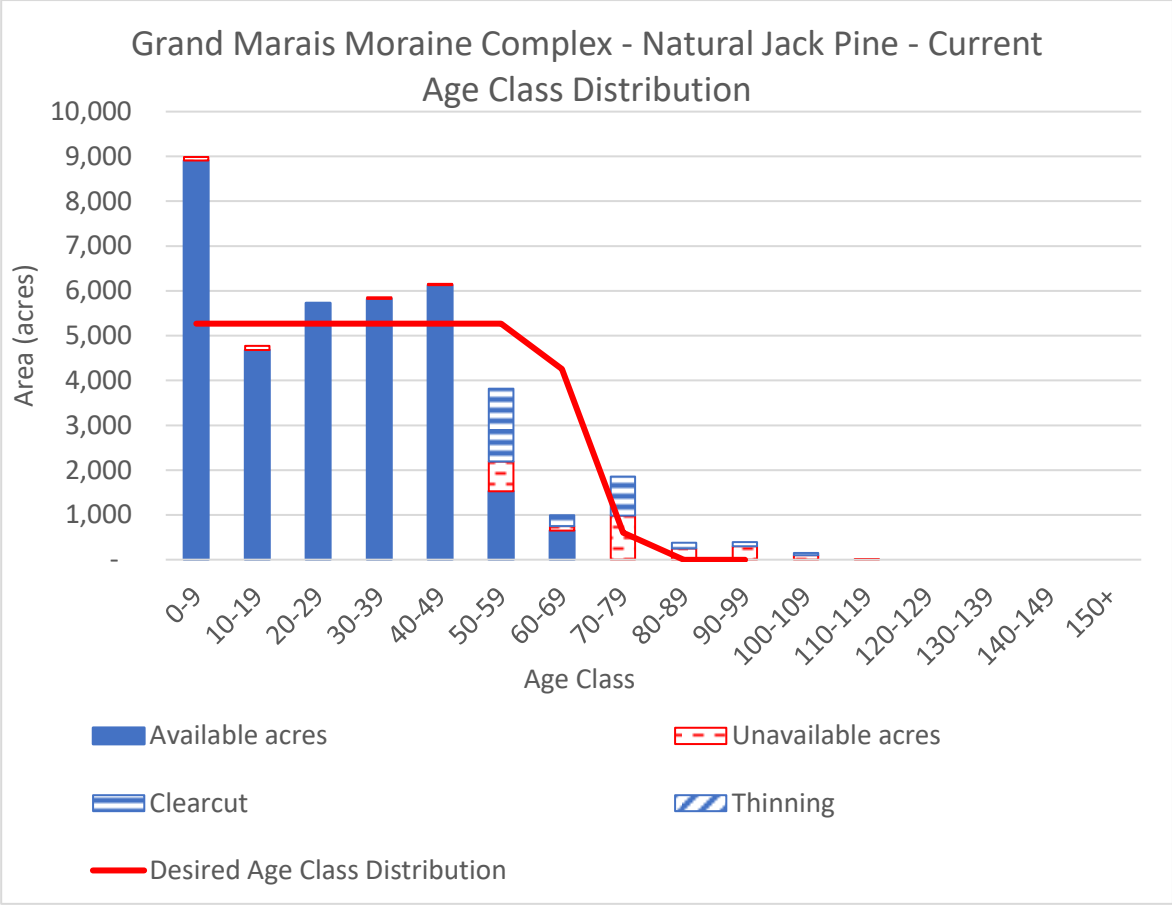


Figure 6. Current age class distribution and projected harvests in natural jack pine cover type in the Grand Marais Moraine Complex Management Area.

Current conditions are a result of consistent commercial harvests and regeneration efforts, an older age class of jack pine occurring on the landscape and thousands of acres that burned during the Duck Lake Fire in 2012. These factors contribute to the surplus of acres in the younger age classes and the balanced condition in the older age classes, where the deviation from the desired age class distribution is less than other cover types in this management area. A portion of this cover type meets the habitat requirements for Kirtland's warbler, snowshoe hare and spruce grouse. Jack pine habitat acres calculated for Kirtland's warbler are those acres found within outwash plains in the Danaher/Kingston plains, Duck Lake and Whitefish Point (

Table 10).

Table 10. Featured species with natural jack pine as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Jack Pine	Jack Pine Habitat Acres – Available	Jack Pine Habitat Acres – Unavailable
Kirtland's warbler	Age category: 0-19 Size category: sapling	11,057 (includes planted JP)	--
Snowshoe hare	Age category: 0-19 Size category: sapling	13,587	171
Spruce grouse, mature	Age category: 40+ Size category: pole, sawlog	4,775	1,654
Spruce grouse, young	Age category: 0-19	13,587	171

Desired future condition

The projected long-term cover type trend for natural jack pine shows a slight increase in the Grand Marais Moraine Complex Management Area due to transitions from planted jack pine into the natural jack pine cover type, although a stable long-term cover-type condition is desired, with equal transitions into and out of the cover type.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of jack pine budworm outbreaks and to reduce the threat of damaging wildfire.

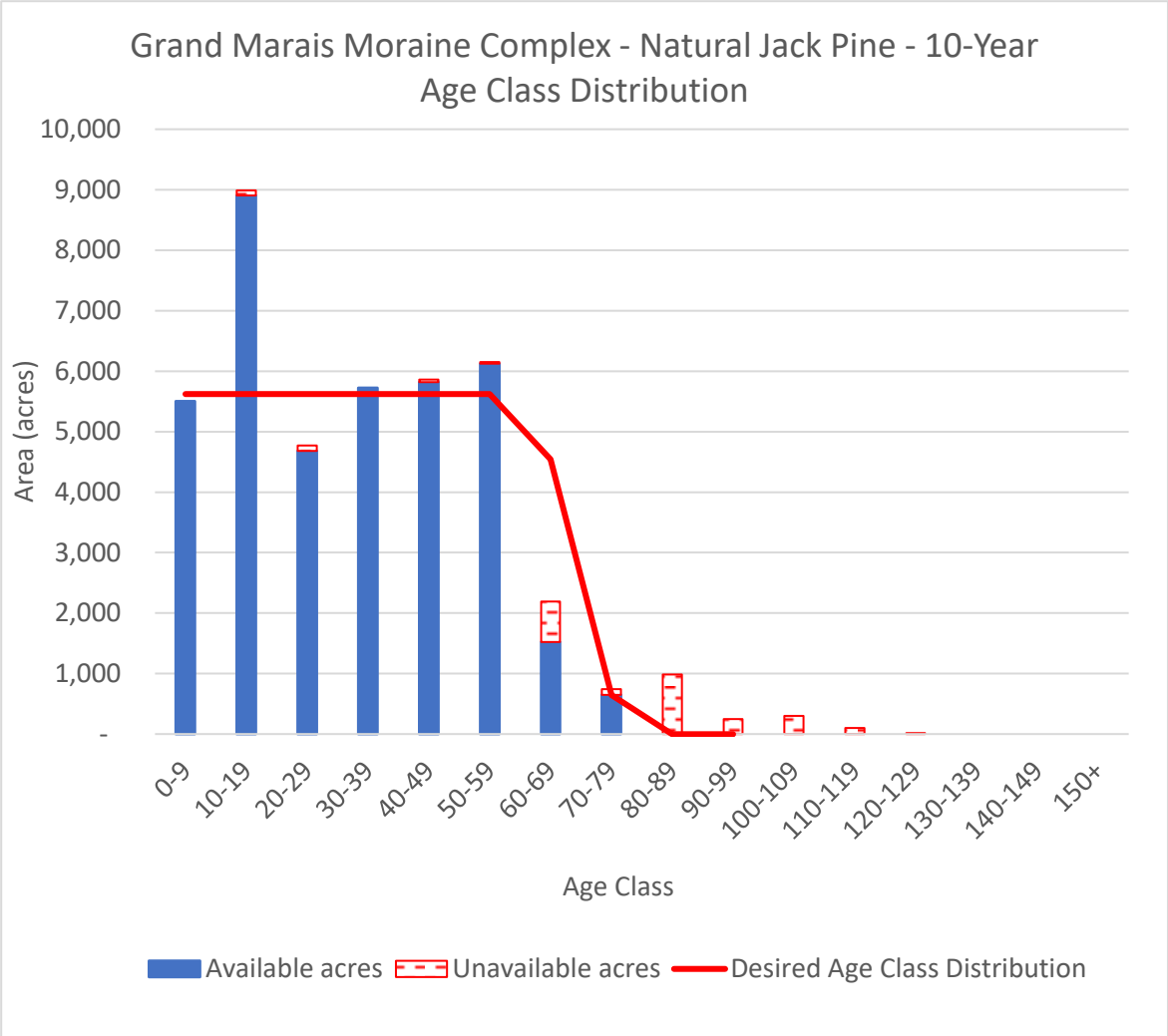


Figure 7. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 5,503 acres of the 0-9 age class of natural jack pine, which is close to the desired age class distribution of 5,623. Progress toward the long-term desired age class distribution will take many decades of even-aged management to fully reach the desired age class distribution in this management area (Figure 8).

The midterm age class distribution of jack pine continues to reach closer to the desired future condition for available acres (Figure 8), carrying forward a notable abundance of 50- to 59-year-old stands from the Duck Lake Fire.

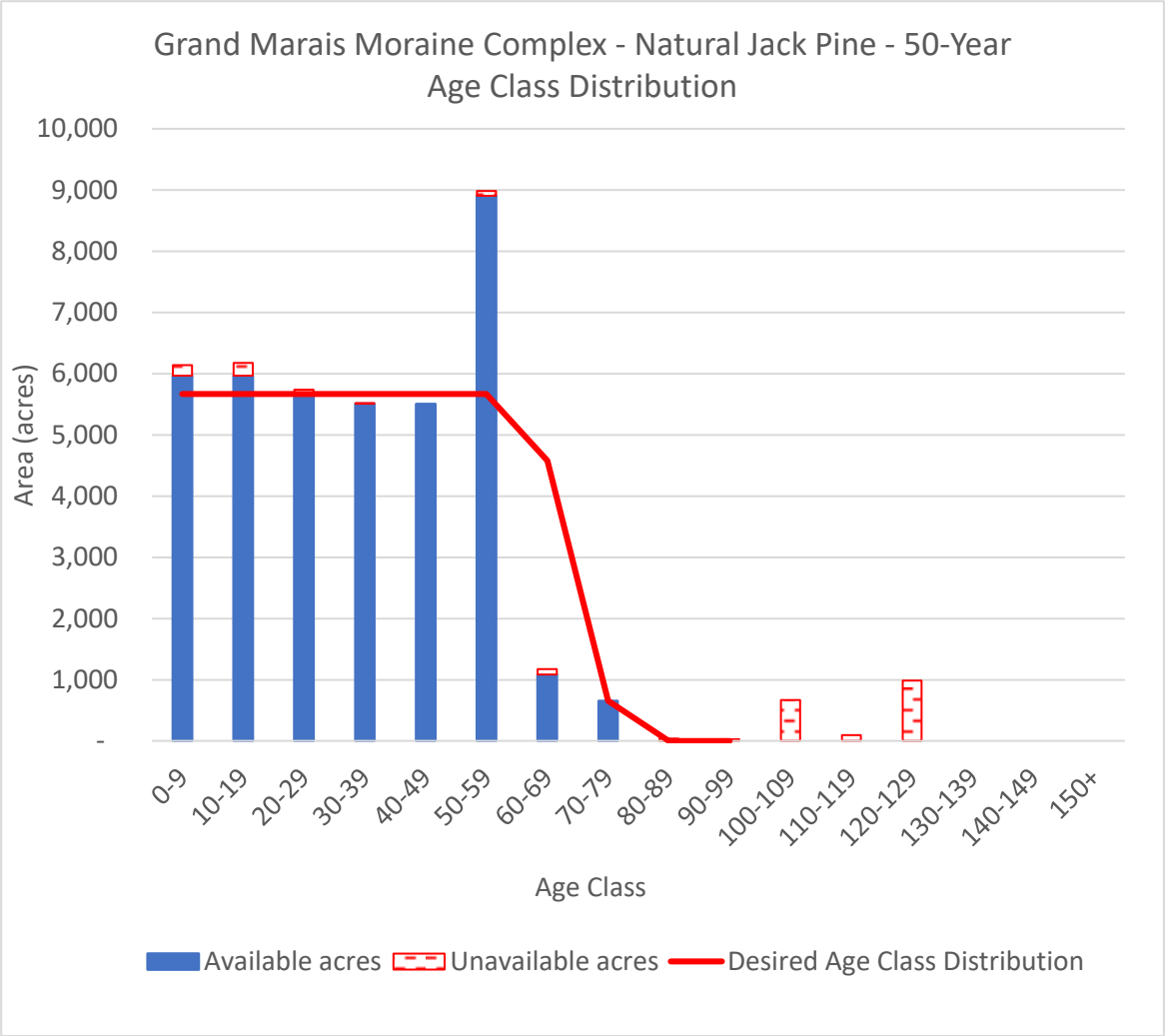


Figure 8. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 9) will concentrate the manageable acres of jack pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest. As the future acreage of the cover type is predicted to increase with time, desired age class distribution proportions will also increase.

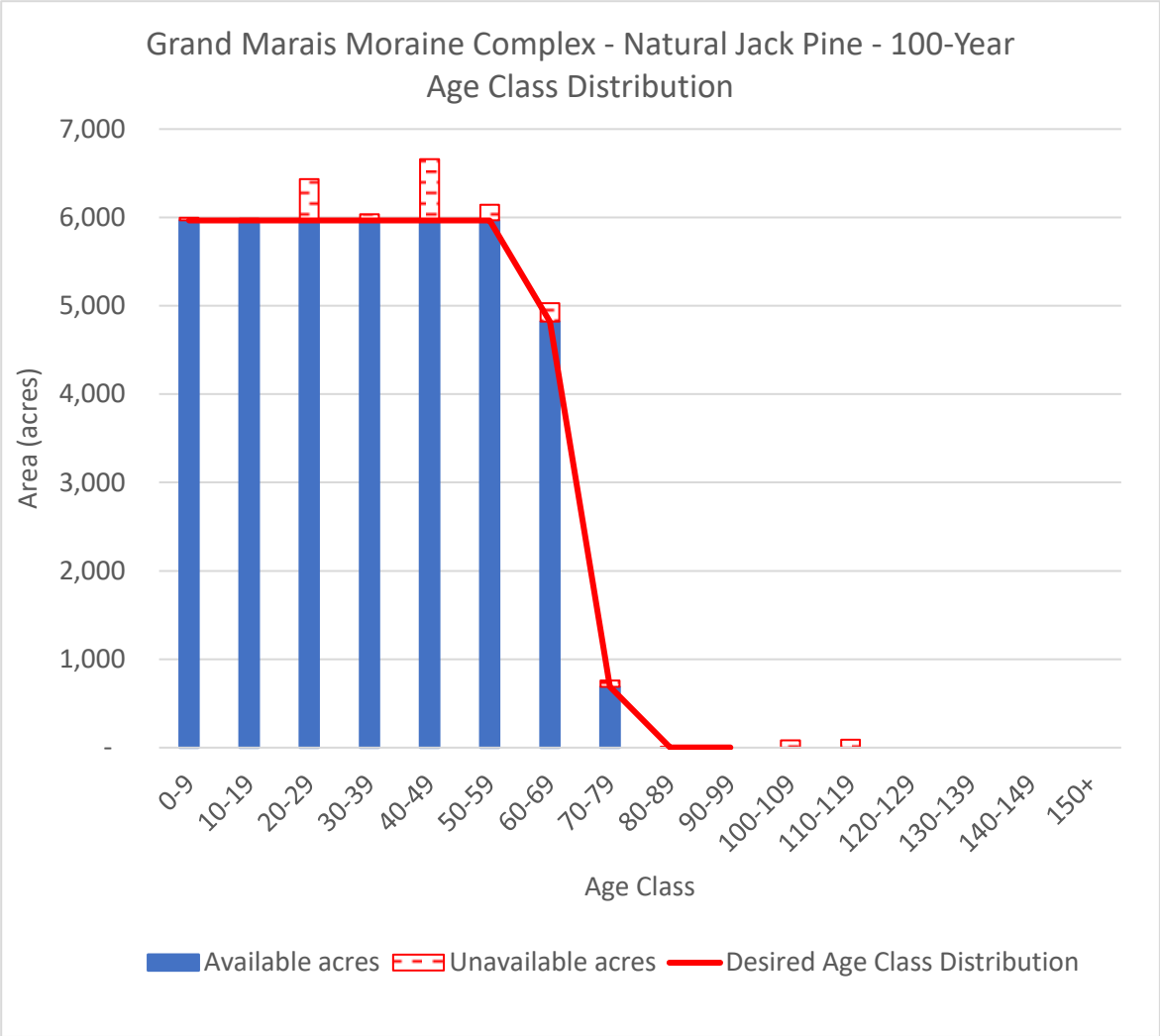


Figure 9. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

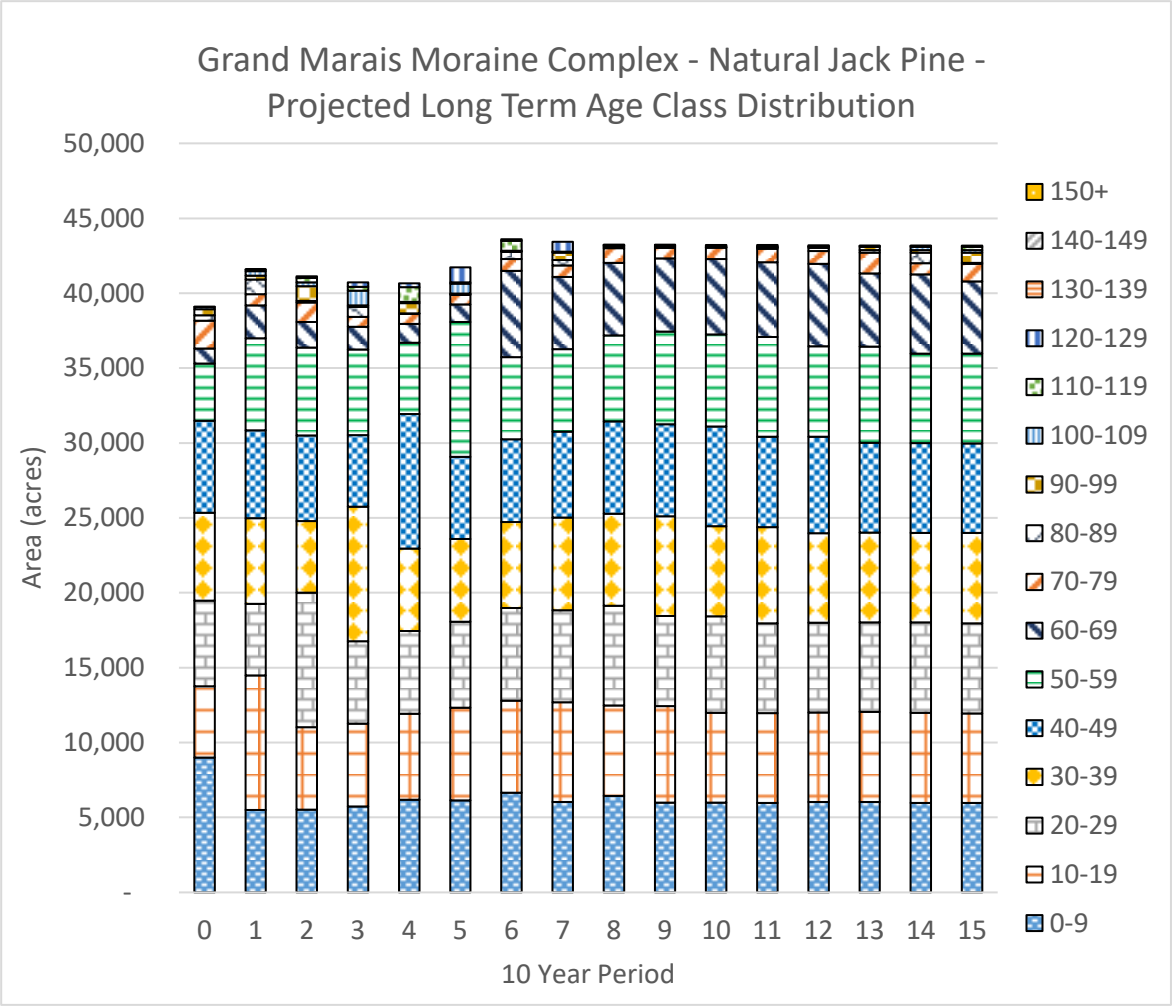


Figure 10. Projected age class distribution for all acres of jack pine over the next 150 years in the Grand Marais Moraine Complex Management Area.

Management actions

There are 3,016 acres of projected clearcut harvest in the natural jack pine cover type during the planning period. A significant proportion of the newly established future stands of this cover type are projected to result from a transition from other cover types, mainly planted jack pine through even-aged management and natural means of regeneration.

Aspen

Current condition

A majority of the aspen cover type is currently between stand ages of 0 and 39 years old in the Grand Marais Moraine Complex Management Area (Figure 11). The age class distribution is currently unbalanced, especially in the 30- to 39-year-old age class, where there is a surplus of acres. There is a deficit in the older age classes and a small number of acres that extend beyond the desired maximum age class distribution.

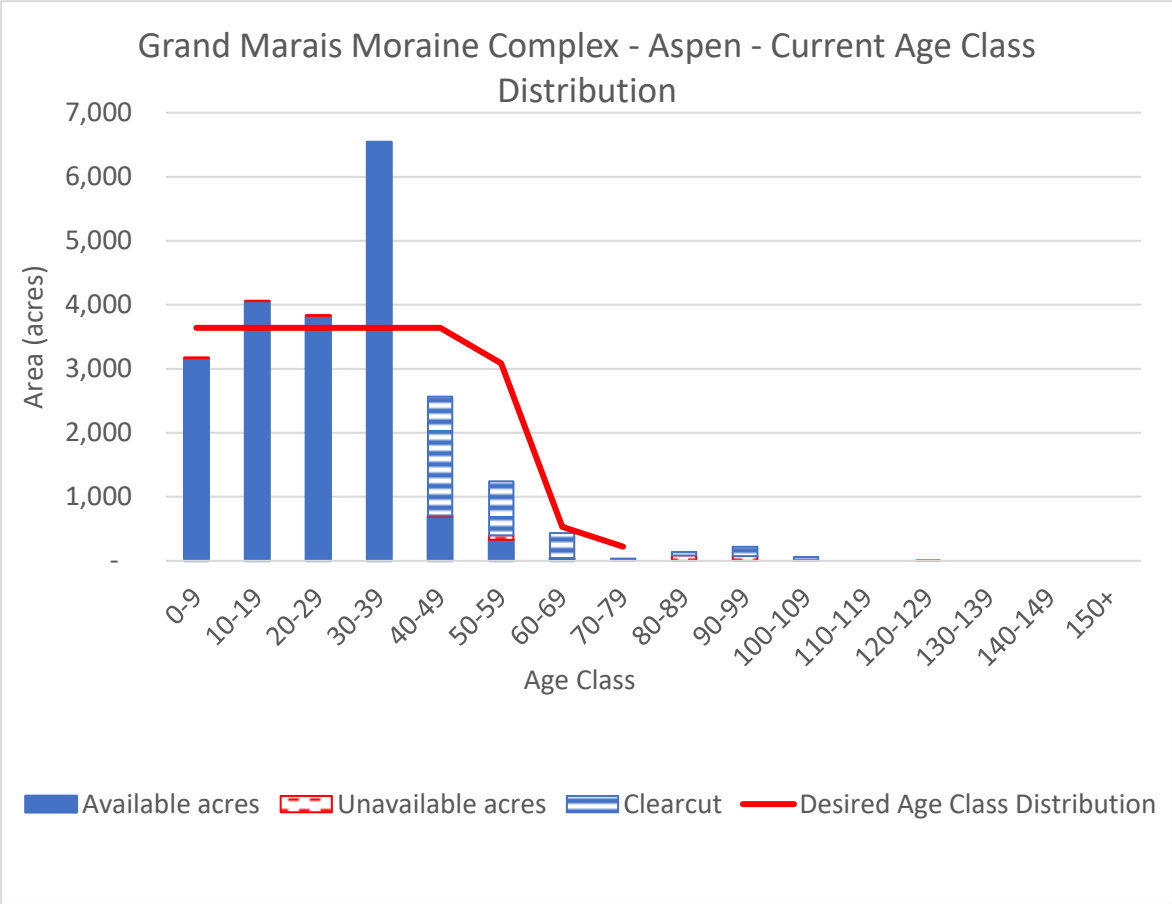


Figure 11. Current age class distribution and projected harvests in aspen cover type in the Grand Marais Moraine Complex Management Area.

Current conditions are a result of consistent commercial harvests and regeneration efforts on aspen acres during previous planning periods. Older age classes of aspen cover types and a higher desired age class distribution within the management area can be attributed to aspen occupying relatively fewer productive sites than in other management areas within the state. A portion of this cover type meets the habitat requirements for ruffed grouse and snowshoe hare (Table 11).

Table 11. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres – Unavailable
Ruffed grouse	Age category: 0-19 Size category: sapling	7,221	19
Snowshoe hare	Age category: 0-19 Size category: sapling	7,221	19
White-tailed deer	All sizes and age classes	22,309	--

Desired future condition

The projected long-term cover-type trend for aspen is stable in the Grand Marais Moraine Complex Management Area. Much of the aspen area is available for active management, with few transitions into this cover type or out to other cover types. Habitat elements in this cover type will be preserved due to the abundance of adjacent cover types.

The long-term goal for this cover type is balanced age classes between 0 and 40 years old for all available aspen stands and a lower proportion of acreage in the 50-year-old and 60-year-old classes in this management area (Figure 12).

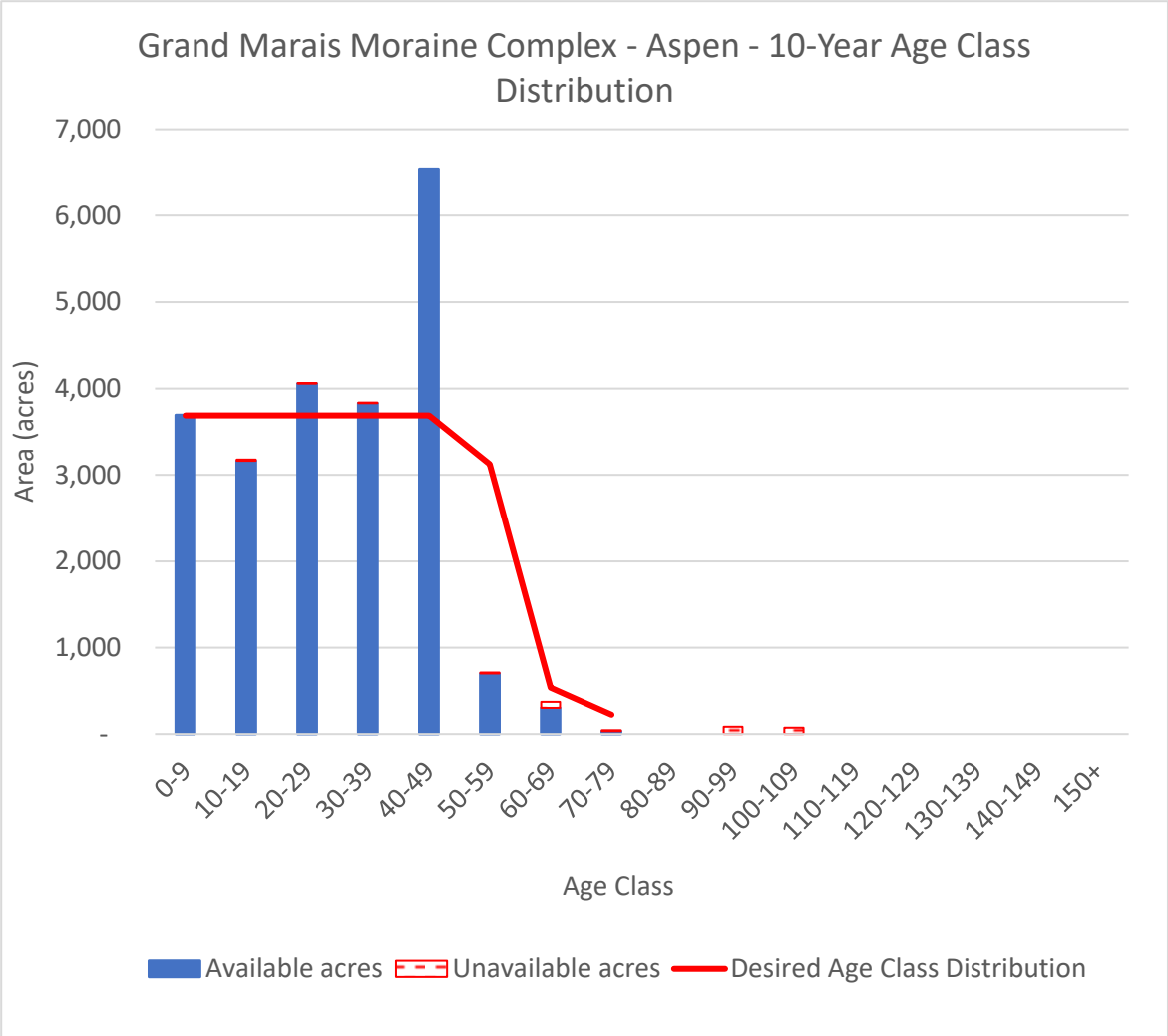


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 3,692 acres of aspen in the 0-9 age class. Progress toward the long-term desired age class distribution of aspen begins to improve, but it will take many decades of even-aged management in this management area to reach the desired age class distribution (Figure 13).

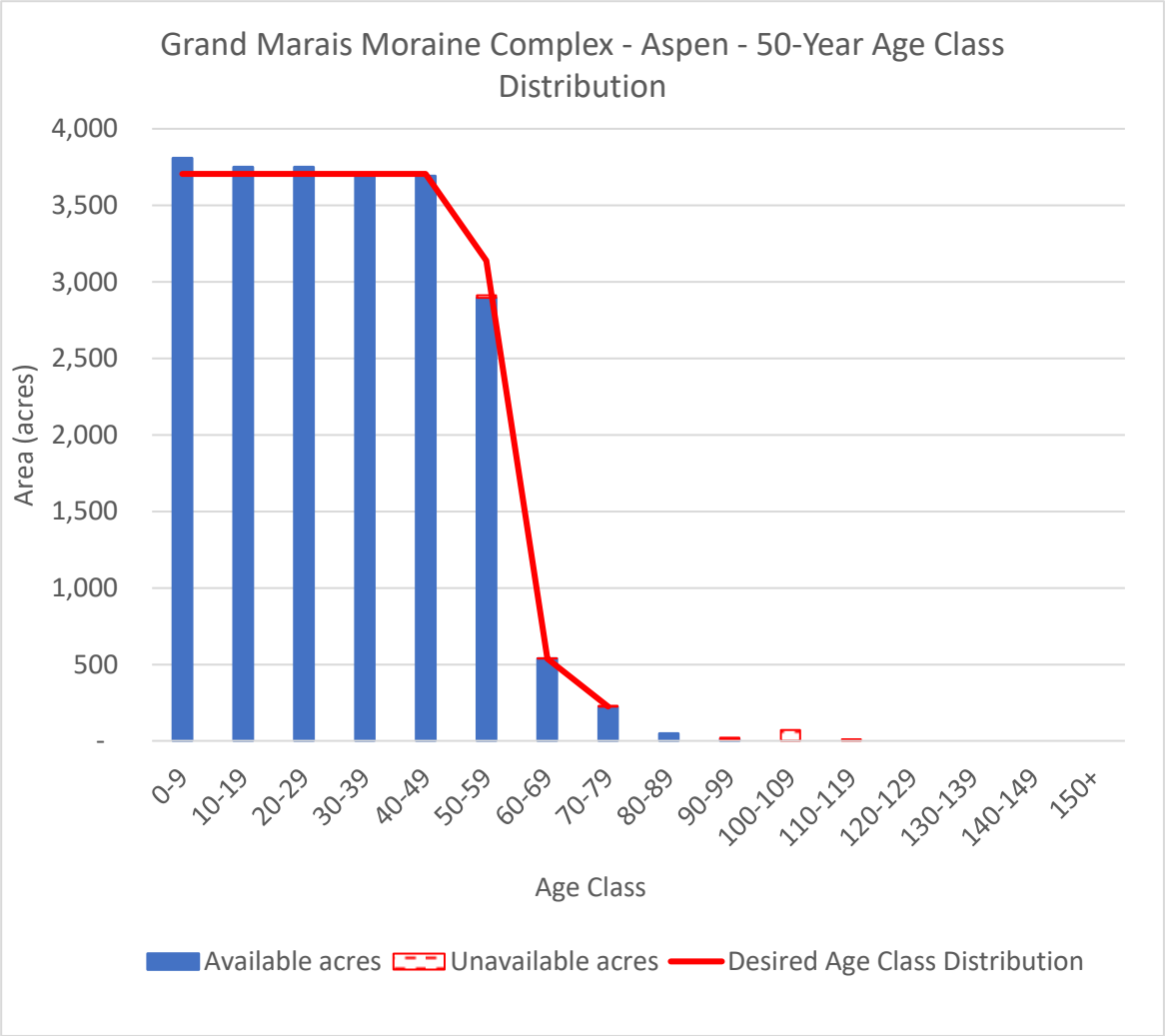


Figure 13. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The midterm age class distribution of aspen is nearly at the desired future condition, with few age classes significantly deviating from the target proportions for available acres (Figure 13). There is a small number of acres beyond the max tail age of 70 years, most of which is unavailable for harvest or extended to balance the 0-9 age class.

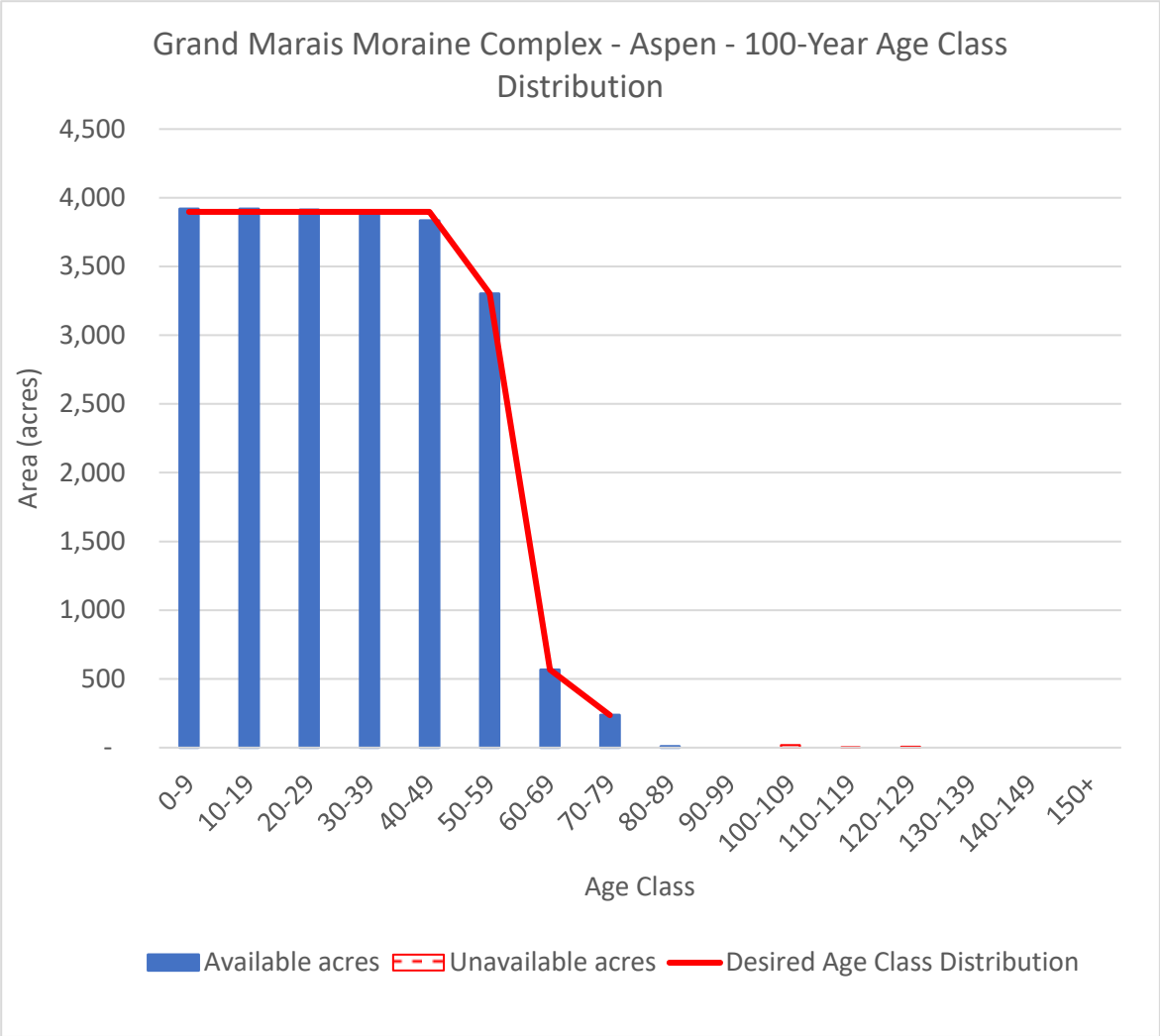


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 15) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

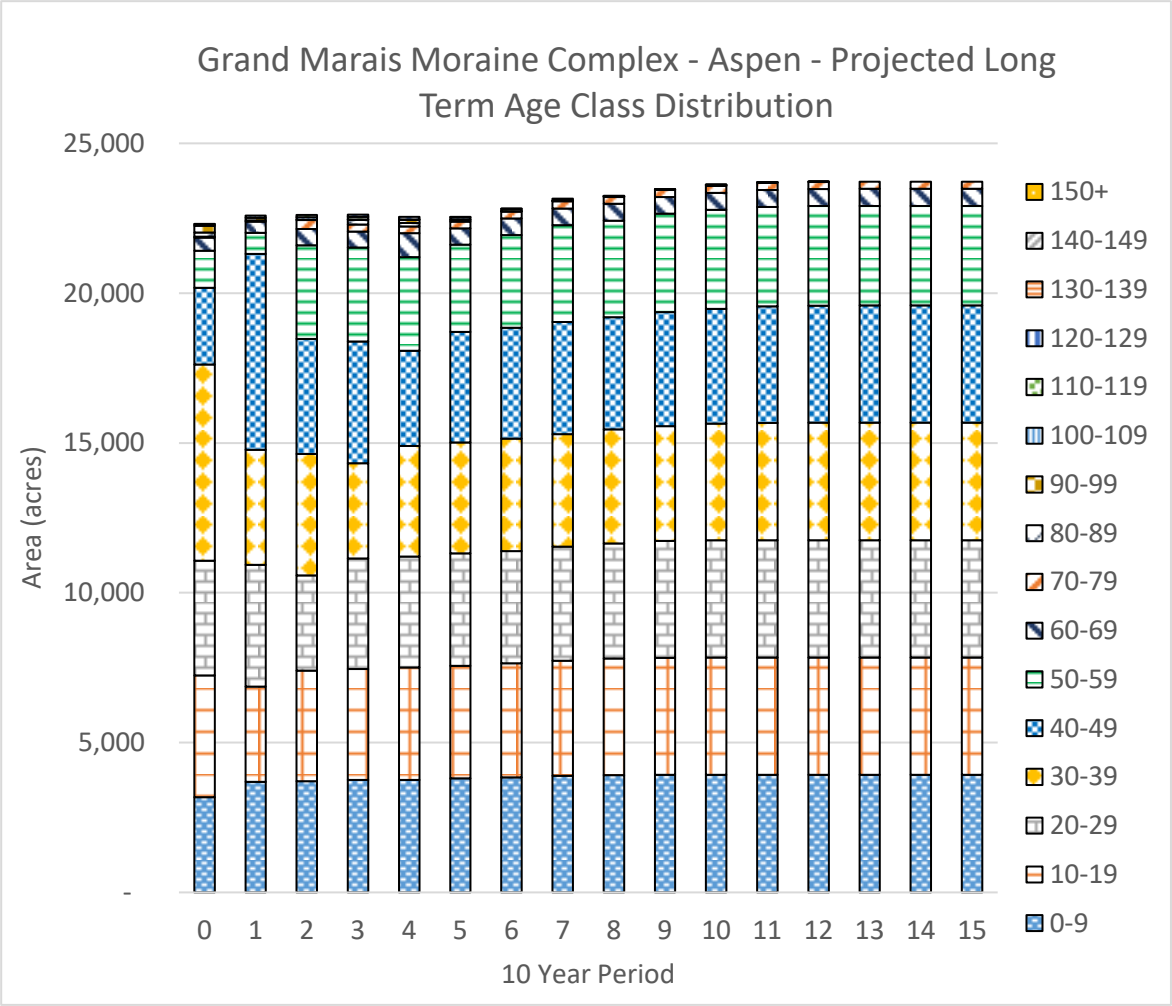


Figure 15. Projected age class distribution for all acres of aspen over the next 150 years in the Grand Marais Moraine Complex Management Area.

Management actions

There are 3,380 acres of projected clearcut harvest in the aspen cover type during the planning period. This falls slightly short of the desired establishment of 3,687 acres of aspen per decade. Transitions to aspen from other cover types accounts for the rest of the desired establishment.

Planted red pine

Current condition

Most of the planted red pine cover type is currently between stand ages of 0-9 years old and 60-69 years old in the Grand Marais Complex Management Area (Figure 16). The age class distribution is currently very unbalanced across all age classes, with the largest deficits between the 30- to 39-year-old and the 40- to 49-year-old age classes.

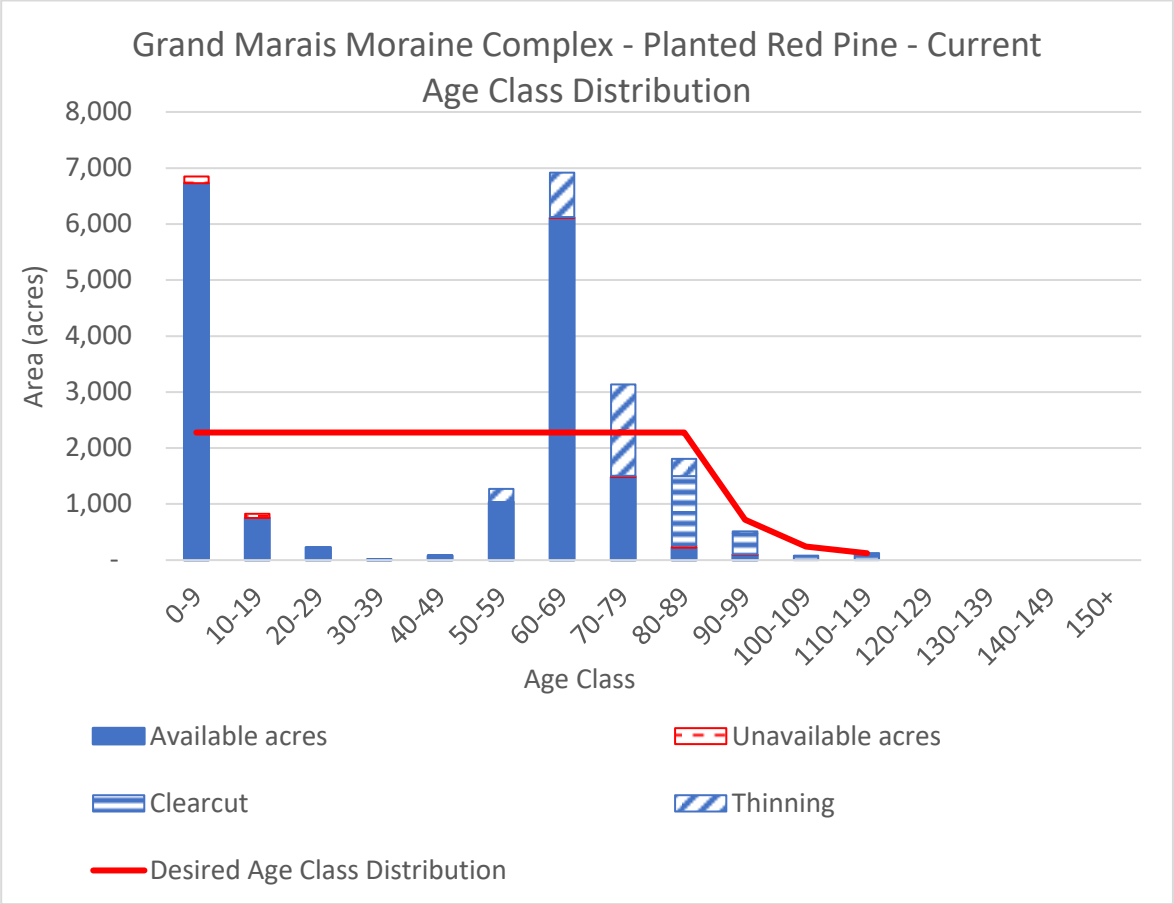


Figure 16. Current age class distribution and projected harvests in planted red pine cover type in the Grand Marais Moraine Complex Management Area.

Current conditions are the result of many acres planted during the 1950s and 60s across the area reaching a harvestable condition and thousands of acres burned in the Duck Lake Fire in 2012, causing an increase in the 0- to 9-year age class. Consistent commercial harvests and regeneration efforts have occurred on available planted red pine acres during the previous two planning periods. Only a small portion of planted red pine acres may be considered as potential habitat for red crossbill due to specific habitat requirements (Table 12).

Table 12. Featured species with planted red pine as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Planted Red Pine	Planted Red Pine Habitat Acres – Available
Red crossbill	Age category: 80+ Size category: sawlog Stocking: poor, medium Canopy closure: 0-50%	882

Desired future condition

The projected long-term cover type trend for planted red pine is increasing, with eventual stabilization, in the Grand Marais Moraine Complex Management Area. Much of the planted red pine area is available, with very few unavailable acres. There are very few transitions out of the cover type, and some transitions into the cover type, projected. Habitat elements in this cover type will be preserved due to the abundance of adjacent cover types.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available planted pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of invasive pest outbreaks and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of the desired number of acres for the 0- to 9-year-old age class. Progress toward the long-term desired age class distribution of planted red pine will take many decades in this management area (Figure 17).

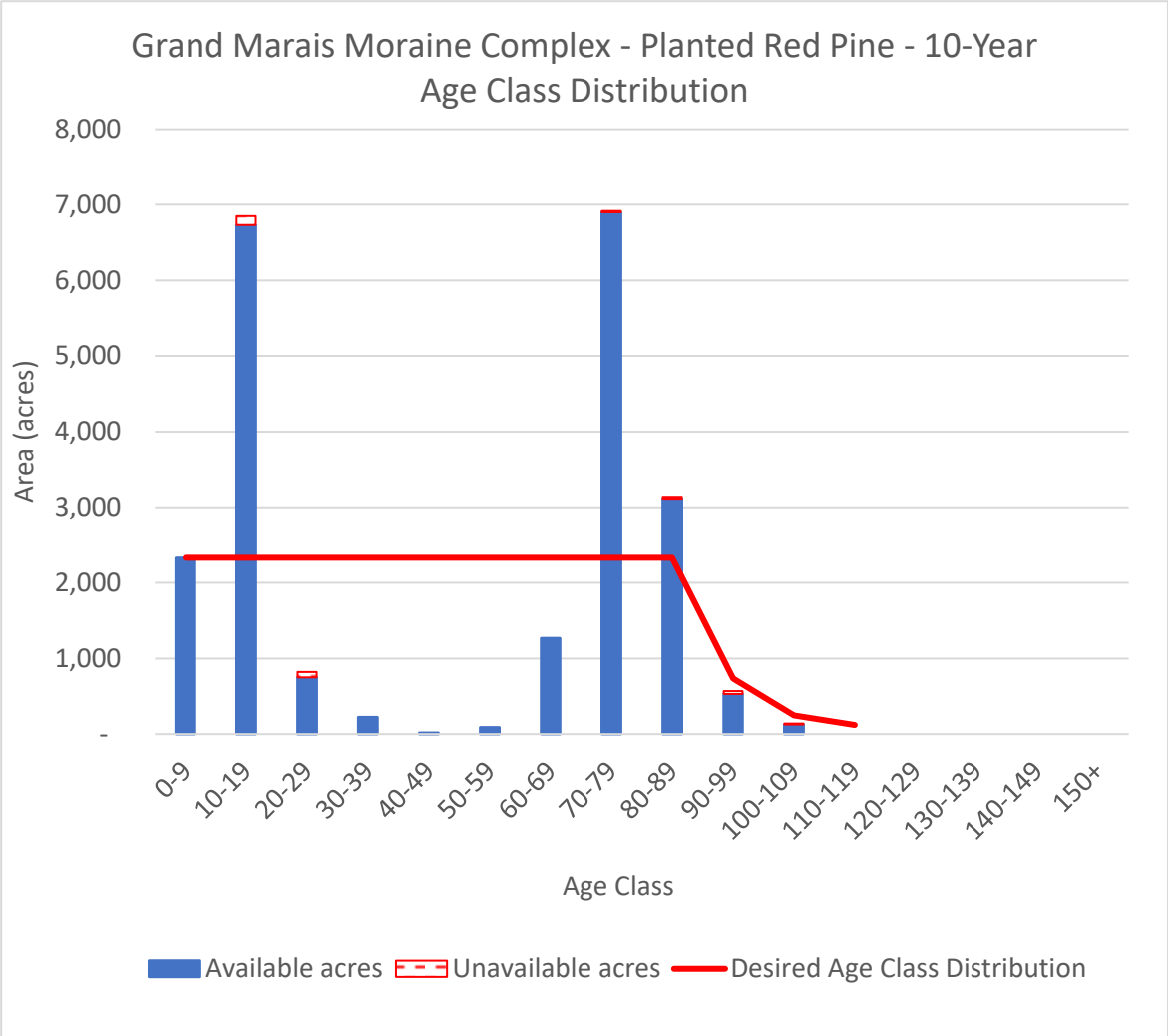


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution of planted red pine is beginning to reach the desired future condition for available acres in the 0-49 age classes (Figure 18). There will be an abundance in the 50-59 age class, carrying forward the current 10- to 19-year-old age class. There is also a deficit in the 60- to 90-year-old age classes. Current unbalanced age classes will result in the need to hold a significant number of acres in older age classes in the midterm age period to achieve the desired age class distribution in future planning periods.

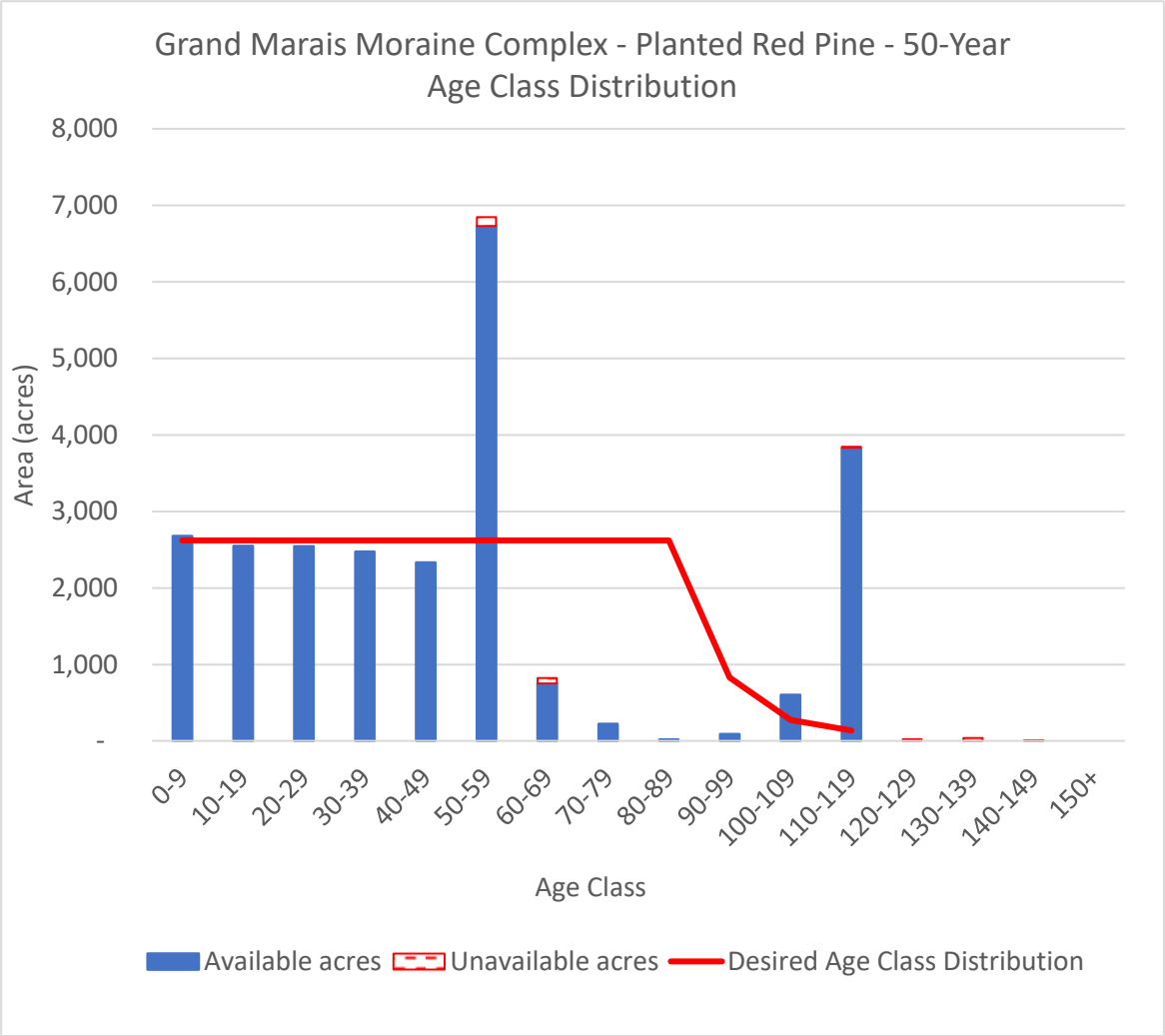


Figure 18. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

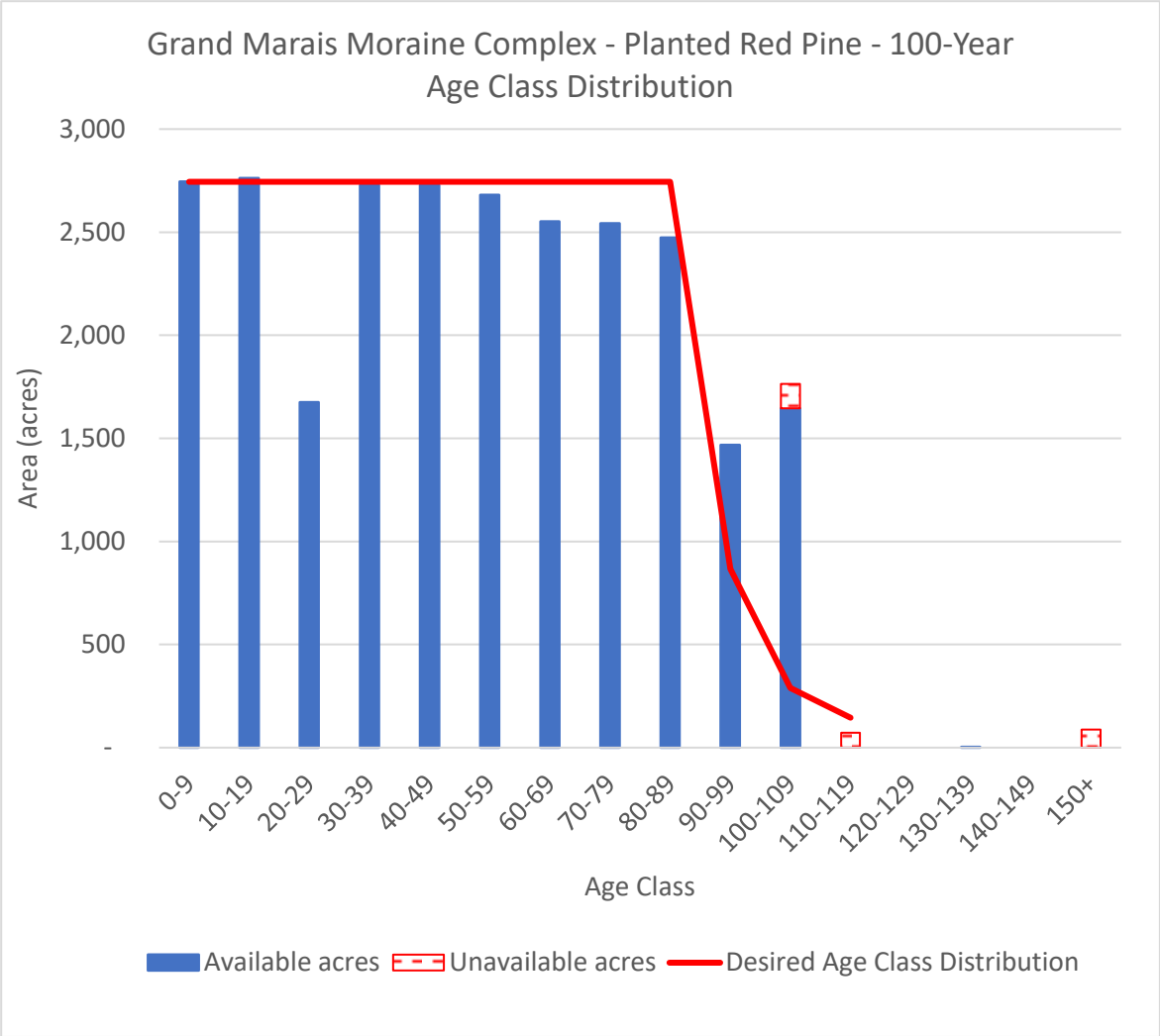


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

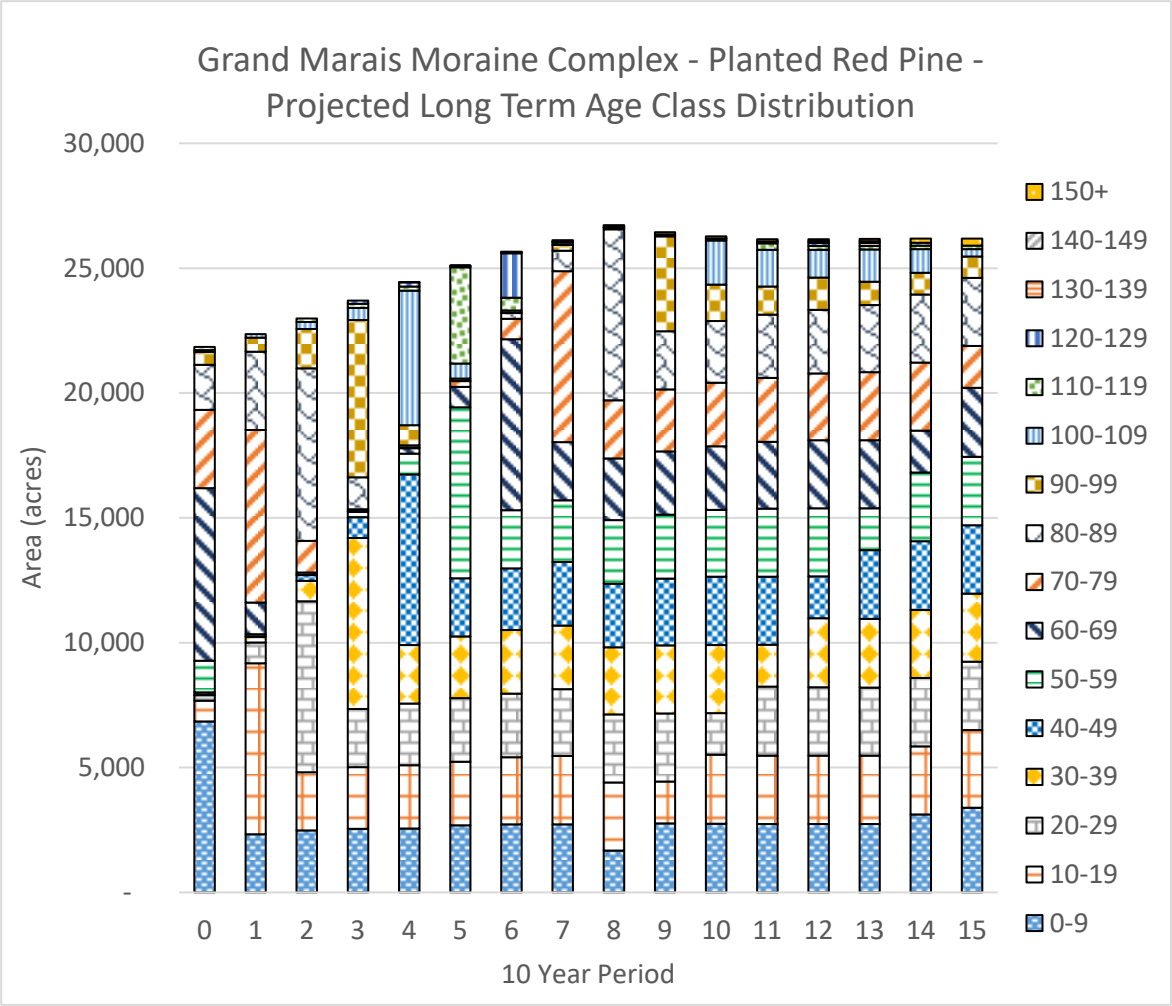


Figure 20. Projected age class distribution for all acres of planted red pine over the next 150 years in the Grand Marais Moraine Complex Management Area.

Management actions

There are 1,813 acres of projected clearcut harvest in the planted red pine cover type and 3,028 acres of thinning projected during the planning period. This falls slightly short of the desired establishment of 2,331 acres of planted pine per decade because of the current unbalanced age class condition, and the projected harvest totals do not include transitions into this cover type.

Planted jack pine

Current condition

Most of the planted jack pine cover type is currently in the 0- to 9-year-old age class. (Figure 21). The past management regime has been primarily clear-cut for this cover type. The younger age classes have a substantial surplus, and the area covered by planted jack pine decreases steadily as the age class increases, except for the 50- to 59-year age class, which has a surplus.

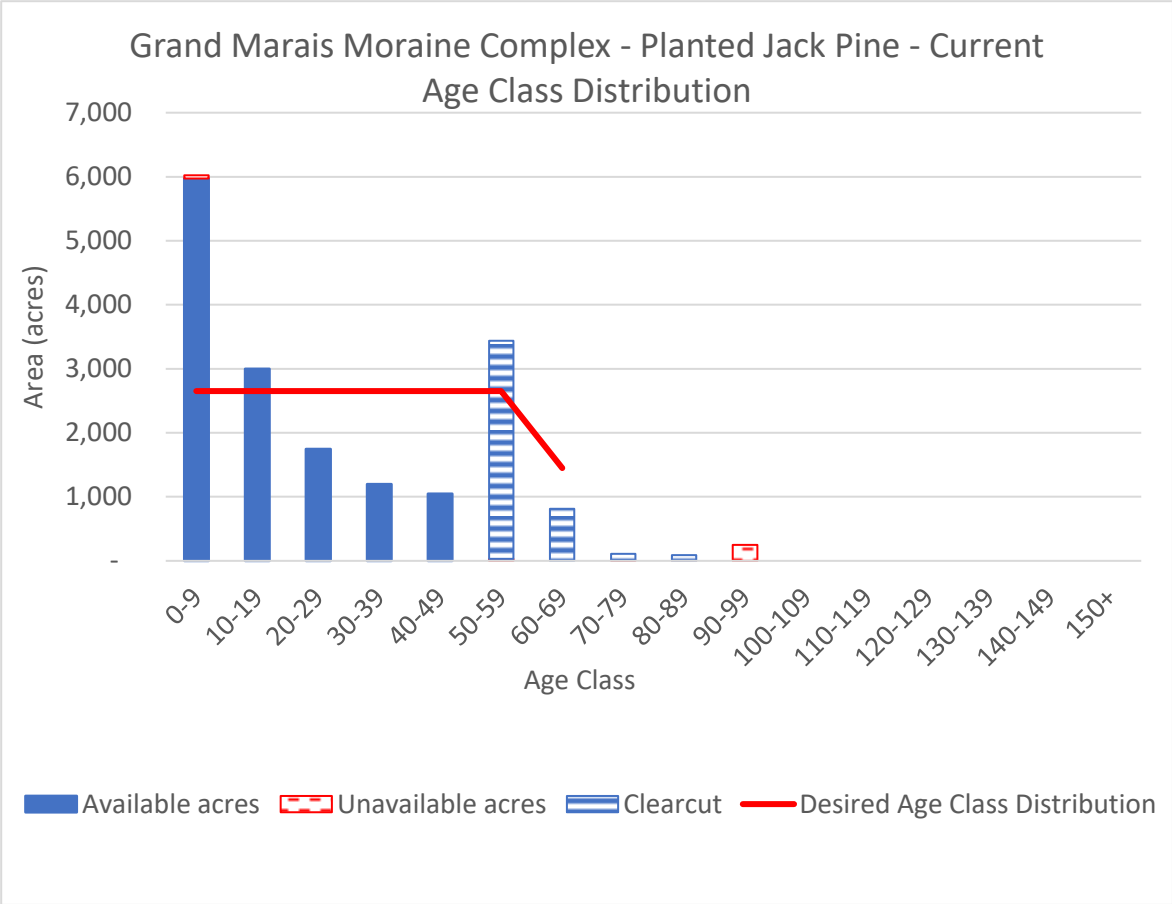


Figure 21. Current age class distribution, desired age class distribution and projected harvests in the planted jack pine cover type over the 10-year planning period.

Current conditions are largely due to the 2012 Duck Lake Fire, which caused substantial damage to the existing jack pine cover type. This prompted the planting of thousands of acres of jack pine to restore the cover type in the affected area. In other areas of the Grand Marais Moraine Complex, consistent commercial harvests and regeneration efforts on available planted jack pine acres have occurred during the previous planning periods. A portion of this cover type meets the habitat requirements for Kirtland's warbler, snowshoe hare and spruce grouse. Jack pine habitat acres calculated for Kirtland's warbler are those acres found within outwash plains in the Danaher/Kingston plains, Duck Lake and Whitefish Point (Table 13).

Table 13. Featured species with planted jack pine as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Jack Pine	Jack Pine Habitat Acres – Available	Jack Pine Habitat Acres – Unavailable
Kirtland's warbler	Age category: 0-19 Size category: sapling	11,057 (includes natural JP)	--
Snowshoe hare	Age category: 0-19 Size category: sapling	8,970	52

Featured Species	Featured Species Habitat – Jack Pine	Jack Pine Habitat Acres – Available	Jack Pine Habitat Acres – Unavailable
Spruce grouse, young	Age category: 0-19	8,970	52

Desired future condition

The projected long-term cover type trend for planted jack pine is decreasing in the Grand Marais Moraine Complex Management Area as opportunities to naturally regenerate the cover type are utilized. Although there are some transitions into this cover type from other cover types, like natural jack pine when natural regeneration is not successful, transitions out of this cover type are forecasted to outweigh them.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available planted jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the planted jack pine cover type is distributed within the desired age classes.

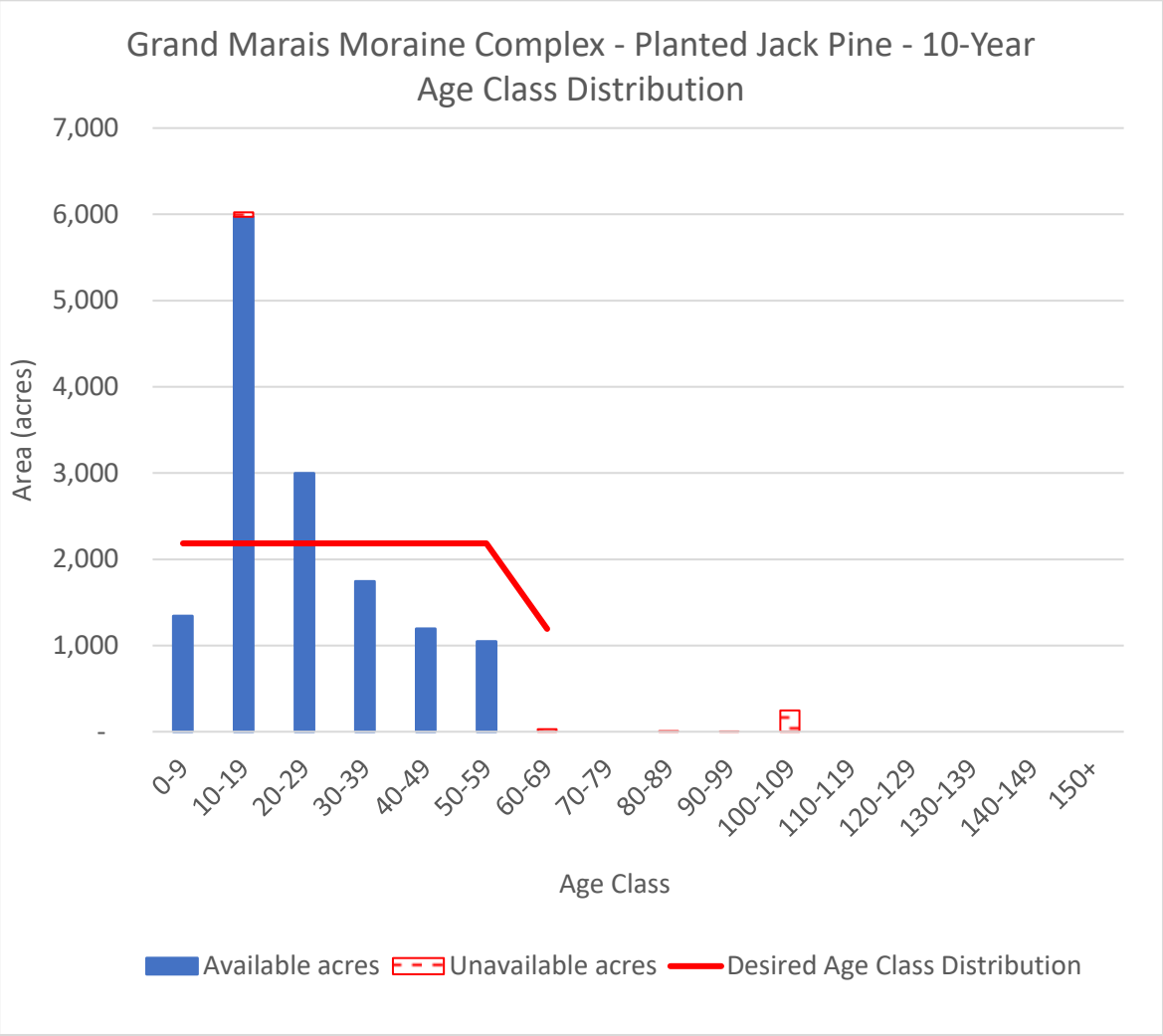


Figure 22. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 1,343 acres, which is below the desired amount. It will take many decades of even-aged management to fully reach the desired long-term age class distribution in this management area (Figure 23).

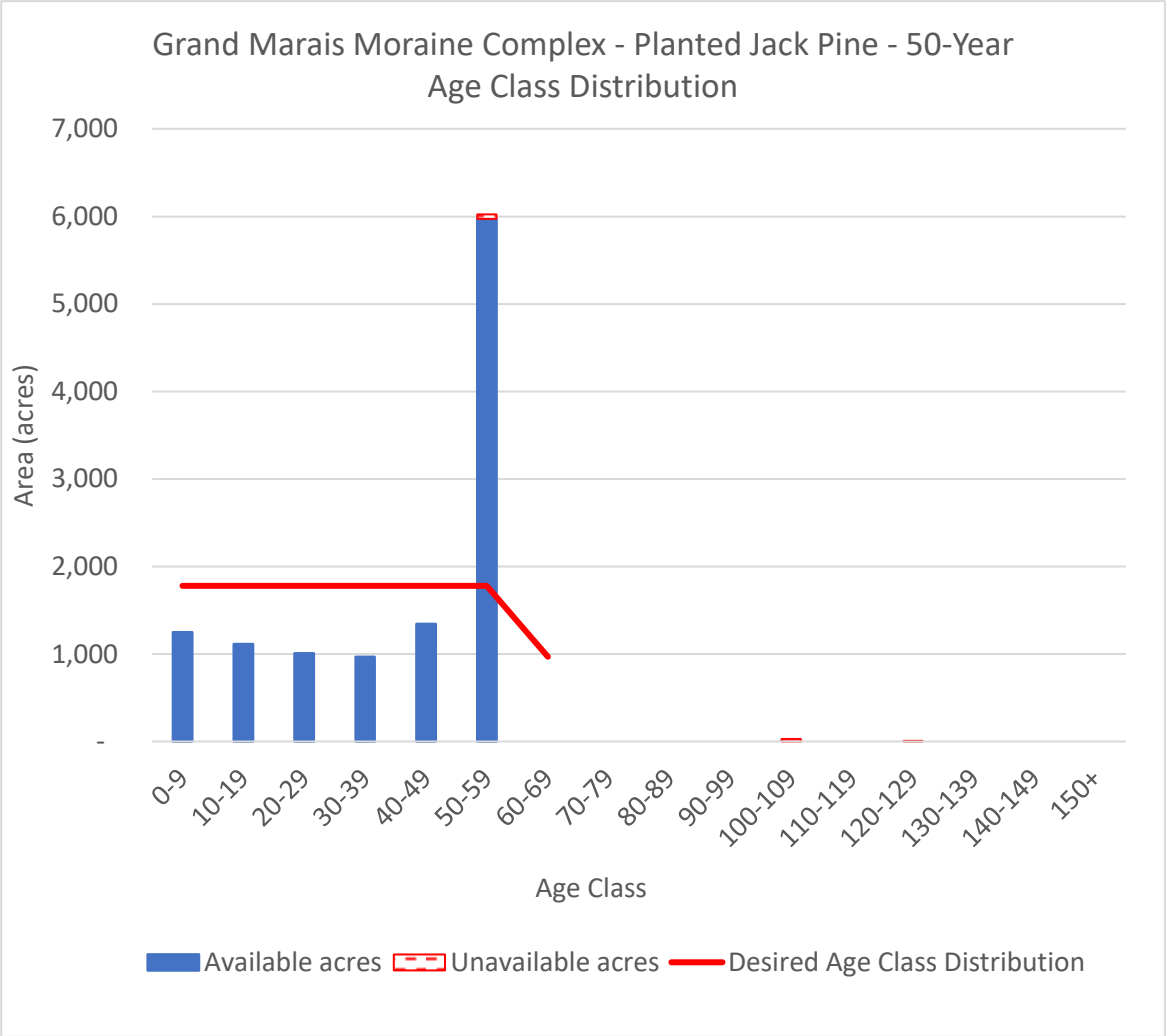


Figure 23. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of planted jack pine acres beginning to move toward the desired future condition as fewer acres are established and the surplus of planted jack pine acres reach rotation age (Figure 24).

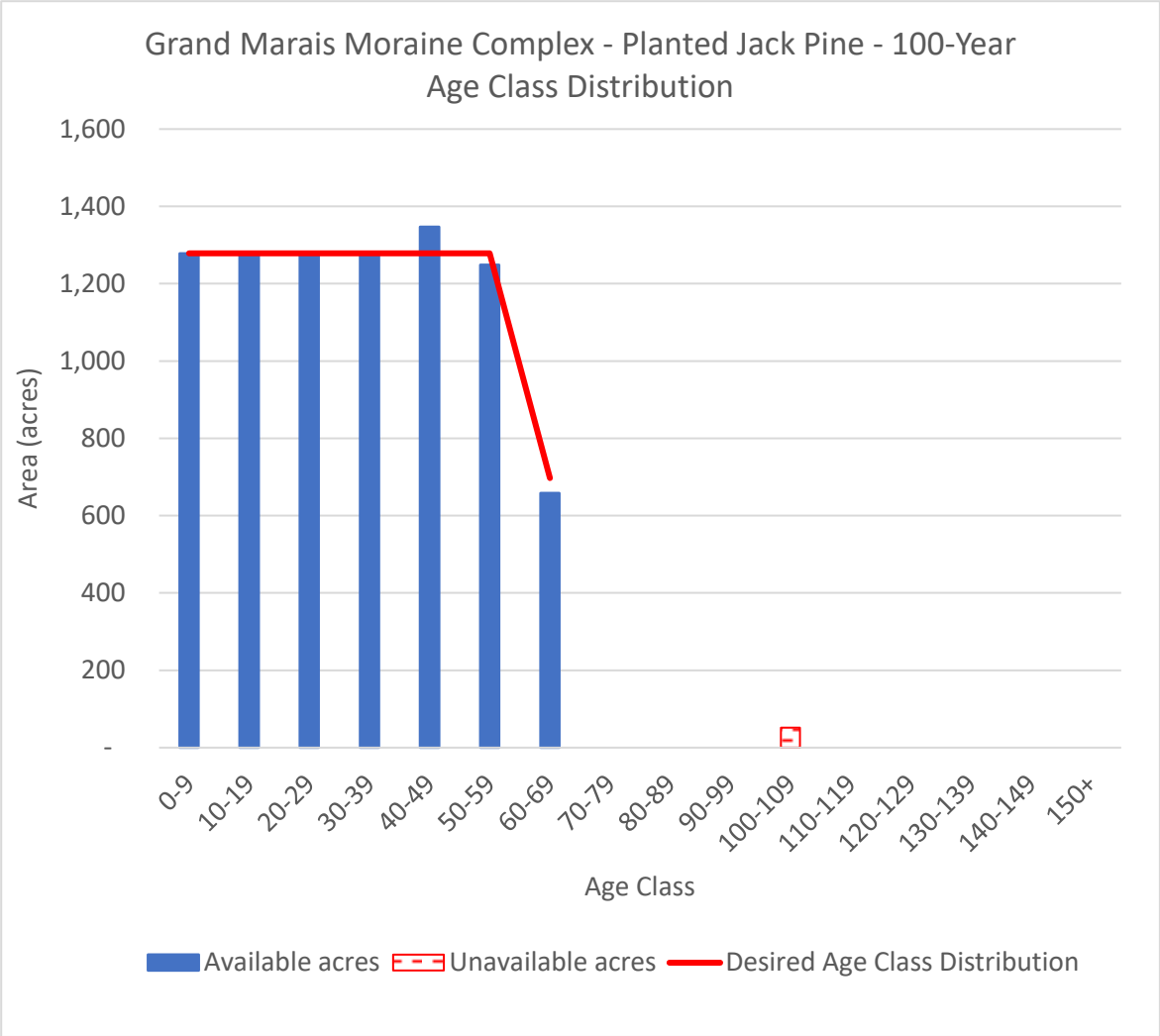


Figure 24. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 25) will concentrate the manageable acres of planted jack pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

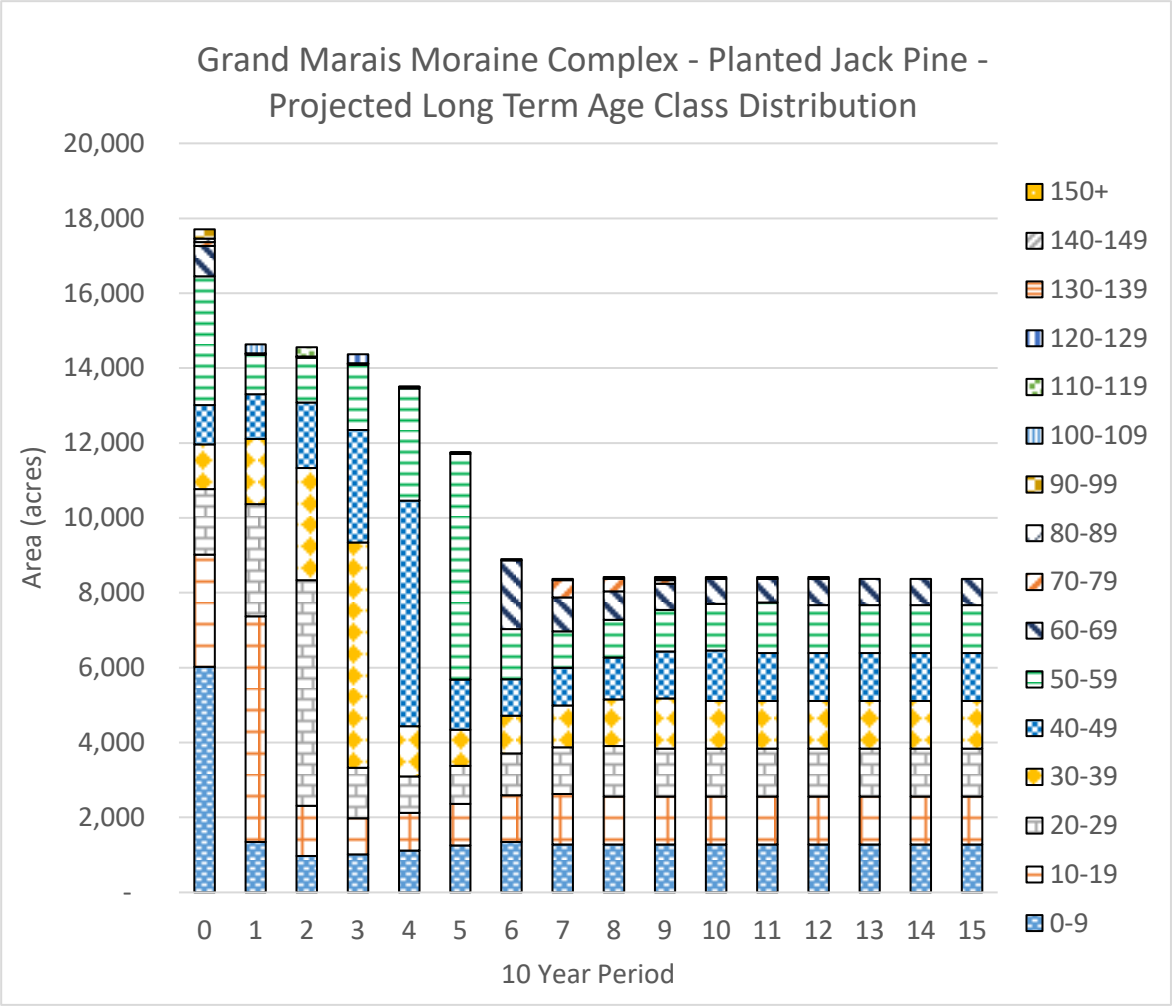


Figure 25. Projected age class distribution for all acres of planted jack pine over the next 150 years in the Grand Marais Moraine Complex Management Area.

Management actions

There are 4,410 acres of projected clearcut harvest in the planted jack pine cover type during this planning period. This is significantly higher than the desired establishment of 2,653 acres per decade because of the current unbalanced condition and transitions to natural jack pine types.

Conservation Area Network

High conservation value areas

There are up to eight different high conservation value area types that can be found in each management area (Table 14; see Biodiversity in Section 3 for more information).

Table 14. High conservation value areas within the management area.

High Conservation Value Area Type and Name	Acres
Critical coastal habitat (piping plover)	**5,250**

High Conservation Value Area Type and Name	Acres
	5,250
Critical dunes	**5,545**
	5,545
Deer wintering complex	**10,834**
	10,834
Forest habitat core interior	**2,849**
	2,849
Natural rivers vegetative buffer	**1,857**
	1,857
Natural rivers zoning district	**4,236**
	4,236
State wildlife management areas	**7,114**
Blind Sucker River Flooding SWMA	4,756
Stanley Lake Flooding SWMA	2,357
State wildlife research areas	**1**
Cusino SWRA	1
Verified Type 1 and Type 2 old growth	**68**
Type 1 old growth	5
Type 2 old growth	62
Grouse Enhanced Management Sites	**3,925**
Halifax	2,705
Melstrand	1,219
Grand total	**41,679**

Ecological reference areas

Ecological reference areas, a type of HCVA, are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 15. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 16. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	AB			2
Existing ERA	Bog	B			2
Existing ERA	Bog	B	G3G5	S4	3
Existing ERA	Dry northern forest	B			4
Existing ERA	Dry northern forest	C	G3?	S3	1
Existing ERA	Dry northern forest	D			1
Existing ERA	Dry-mesic northern forest	AB			1
Existing ERA	Dry-mesic northern forest	AB	G4	S3	2
Existing ERA	Dry-mesic northern forest	BC	G4	S3	1
Existing ERA	Emergent marsh	AB	GU	S4	1
Existing ERA	Hardwood-conifer swamp	BC	G4	S3	1
Existing ERA	Interdunal wetland	AB	G2?	S2	2
Existing ERA	Intermittent wetland	A			1
Existing ERA	Intermittent wetland	C	G2	S3	1
Existing ERA	Mesic northern forest	AB	G4	S3	1
Existing ERA	Mesic northern forest	B			2
Existing ERA	Mesic northern forest	C	G4	S3	2
Existing ERA	Muskeg	AB	G4G5	S3	2
Existing ERA	Patterned fen	A	GU	S2	1
Existing ERA	Patterned fen	AB		S2	1
Existing ERA	Patterned fen	B	GU	S2	1
Existing ERA	Patterned fen	C	GU	S2	1
Existing ERA	Poor fen	B		S3	1
Existing ERA	Rich conifer swamp	A	G4	S3	3
Existing ERA	Rich conifer swamp	B	G4	S3	1
Existing ERA	Rich conifer swamp	C	G4	S3	2
Existing ERA	Sand and gravel beach	AB			1
Existing ERA	Sand and gravel beach	AB	G3?	S3	1
Existing ERA	Wooded dune and swale complex	B			1
Proposed ERA	Dry northern forest	B	G3?	S3	2
Proposed ERA	Dry northern forest	C	G3?	S3	4
Proposed ERA	Dry northern forest	CD	G3?	S3	1
Proposed ERA	Open dunes	B	G3	S3	1
Proposed ERA	Poor fen		G3	S3	1
Grand total					**53**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 17) are those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 18) are those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 17. Reviewable special conservation areas within the management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated recreational area	**295**
Andrus Lake Campground	9
Bass Lake (Luce) Campground	16
Blind Sucker No. 1 Campground	8
Blind Sucker No. 2 Campground	5
Bodi Lake Campground	38
Canoe Lake Campground	9
Culhane Lake State Forest Campground	12
Cusino Lake Campground	10
East Branch of Fox River Campground	11
High Bridge State Forest Campground	3
Kingston Lake Campground	16
Lake Superior Campground	52
North Gemini Lake Campground	9
Perch Lake State Forest Campground	26
Pike Lake State Forest Campground	6
Reed and Green Bridge Campground	0
Ross Lake Campground	10
Shelldrake Dam	0
South Gemini Lake Campground	8
Two-Hearted River Mouth Boat Access Site	1
Two-Hearted River Mouth Campground	18
Unspecified	28
Contiguous resource area	**850**
Crisp Point/Browns Lake Proposed Natural Area	850
Habitat area or habitat corridor	**530**
Vermilion Point Important Bird Habitat	-
Whitefish Point Important Bird Area (IBA)	530
Mineral resource area	**15**
Camp 7 Gravel Pit	15
Possible Type 1 or Type 2 old growth	**1,055**
--	1,055
Visual management areas	**24**
Unspecified	24
Grand total	**2,769**

Table 18. Static special conservation areas within the management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common natural heritage element occurrences		**1,058**
Dry-mesic northern forest		3
Muskeg		1,002
Poor conifer swamp		53
Designated trout and coldwater stream buffer		**6,322**
--		2,512
Atwood Creek		21
Auger Creek		75
Baird Creek		64
Baker Creek		28
Black Creek		67
Blind Sucker River		108
Camp One Creek		39
Camp Seven Creek		54
Chapel Creek		24
Clear Creek		82
Cold Creek		13
Cris Brown Creek		18
Culhane Creek		46
Deer Creek		24
Driggs River		48
East Branch Fox River		155
East Branch Two Hearted River		173
East Creek		54
Fox River		172
Grand Marais Creek		5
Grass Creek		44
Hurricane River		22
Linton Creek		79
Little Beaver Creek		10
Little Fox River		220
Little Two Hearted River		189
Loon Creek		13
Mahoney Creek		7
Mosquito River		89
Murphy Creek		65
North Branch Murphy Creek		2
North Branch Two Hearted River		145
O'Briens Creek		2

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Pelican Creek		11
Porter Creek		17
Ross Creek		56
Savage Creek		59
Shelldrake River		73
Silver Creek		103
South Branch Linton Creek		66
South Branch Shelldrake River		158
Spray Creek		45
Spring Creek		50
Stony Creek		8
Sucker River		278
Sullivan Creek		6
Tahquamenon River		43
Threemile Creek		70
Trout Creek		36
Two Hearted River		357
Wabash Creek		53
West Branch Fox River		166
Designated trout and coldwater streams	**246.8**	
--	98.4	
Atwood Creek	0.8	
Auger Creek	3.0	
Baird Creek	2.6	
Baker Creek	1.0	
Black Creek	2.5	
Blind Sucker River	4.1	
Camp One Creek	1.4	
Camp Seven Creek	2.3	
Chapel Creek	0.9	
Clear Creek	3.2	
Cold Creek	0.4	
Cris Brown Creek	0.7	
Culhane Creek	1.7	
Deer Creek	0.9	
Driggs River	2.1	
East Branch Fox River	5.5	
East Branch Two Hearted River	7.1	
East Creek	2.0	
Fox River	6.4	
Grand Marais Creek	0.2	
Grass Creek	1.7	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Hurricane River	0.8	
Linton Creek	3.3	
Little Beaver Creek	0.4	
Little Fox River	8.5	
Little Two Hearted River	8.0	
Loon Creek	0.6	
Mahoney Creek	0.3	
Mosquito River	3.5	
Murphy Creek	2.5	
North Branch Murphy Creek	0.0	
North Branch Two Hearted River	6.5	
O'Briens Creek	0.1	
Pelican Creek	0.4	
Porter Creek	0.7	
Ross Creek	2.2	
Savage Creek	2.2	
Shelldrake River	2.9	
Silver Creek	3.8	
South Branch Linton Creek	2.6	
South Branch Shelldrake River	6.6	
Spray Creek	1.8	
Spring Creek	1.8	
Stony Creek	0.3	
Sucker River	10.9	
Sullivan Creek	0.2	
Tahquamenon River	1.6	
Threemile Creek	2.6	
Trout Creek	1.2	
Two Hearted River	13.2	
Wabash Creek	2.1	
West Branch Fox River	6.4	
Important bird areas		**67**
Grand Marais to Whitefish Point beaches (piping plover)		< 1
Sleeper Lake burn		38
Tahquamenon Falls State Park and Munising Moraine I		2
Whitefish Point		27
Natural beauty roads	**3.1**	
Old Seney Road	1.0	
School Forest Road	1.3	
Whitewash Road	0.7	
Nondedicated natural areas		**166**

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Natural Area Betsy Lake Natural Area Preserve		6
Natural Area Crisp Point		46
Natural Area Deer Park		47
Natural Area Marsh Lakes		12
Natural Area Tahquamenon Falls Natural Area		1
Natural Area Vermilion Point		55
Wood turtle stream 100-foot buffer		**10**
Shelldrake River		10
Wood turtle stream 660-foot buffer		**64**
Shelldrake River		64
Grand total	**249.9**	**7,687**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory biotics database (Table 18 and **Error! Reference source not found.**) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 19. Rare animal species conservation status key.

Species Status	Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 20. Rare animal species occurrence within the Grand Marais Moraine Complex Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T		3
Animal	Alces alces*	Moose	SC		--
Animal	Antrostomus vociferus	Eastern whip-poor-will	T		1
Animal	Boloria freija	Freija fritillary	SC		1
Animal	Bombus borealis	Northern amber bumble bee	SC		2
Animal	Bombus terricola	Yellow banded bumble bee	SC		5
Animal	Botaurus lentiginosus	American bittern	SC		2
Animal	Brachionycha borealis	Boreal brachionyncha	SC		1
Animal	Buteo lineatus	Red-shouldered hawk	SC		1
Animal	Canachites canadensis	Spruce grouse	T		1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Charadrius melodus	Piping plover	E	LE	4
Animal	Coregonus artedi	Lake herring or cisco	T		1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Cottus ricei	Spoonhead sculpin	SC		1
Animal	Elliptio complanata	Eastern elliptio	SC		4
Animal	Euxoa aurulenta	Dune cutworm	SC		1
Animal	Falco columbarius	Merlin	SC		1
Animal	Gavia immer	Common loon	T		11
Animal	Glaucomys sabrinus	Northern flying squirrel	SC		1
Animal	Glyptemys insculpta	Wood turtle	T		1
Animal	Haliaeetus leucocephalus	Bald eagle	SC		7
Animal	Myotis lucifugus	Little brown bat	T		3
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC		6
Animal	Opheodrys vernalis	Smooth green snake	SC		5
Animal	Pandion haliaetus	Osprey	SC		8
Animal	Picoides arcticus	Black-backed woodpecker	SC		1
Animal	Polygonia gracilis	Hoary comma	X		1
Animal	Setophaga kirtlandii	Kirtland's warbler	E		1
Animal	Somatochlora incurvata	Incurvate emerald	SC		1
Animal	Trimerotropis huroniana	Lake Huron locust	T		6
Animal	Tympanuchus phasianellus	Sharp-tailed grouse	SC		4
Total	-	-	-	-	**86**

**Occurrence information provided by field staff.*

Table 21. Rare plant species conservation status key.

Species Status	Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 22. Rare plant species occurrence within the Grand Marais Moraine Complex Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Crataegus douglasii	Douglas's hawthorn	SC		3
Plant	Drosera anglica	English sundew	SC		3
Plant	Empetrum nigrum	Black crowberry	T		3
Plant	Juncus stygius	Moor rush	E		1
Plant	Juncus vaseyi	Vasey's rush	T		1
Plant	Leymus mollis	American dune wild-rye	SC		10

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Littorella uniflora	American shore-grass	SC		4
Plant	Myriophyllum alterniflorum	Alternate-leaved water-milfoil	SC		2
Plant	Neottia auriculata	Auricled twayblade	SC		2
Plant	Potamogeton confervoides	Alga pondweed	SC		1
Plant	Pyrola minor	Lesser pyrola	SC		3
Plant	Rorippa aquatica	Lake cress	SC		1
Plant	Rubus acaulis	Dwarf raspberry	T		2
Plant	Salix pellita	Satiny willow	T		1
Plant	Spinulum canadense	Clubmoss	SC		1
Plant	Stellaria longipes	Stitchwort	SC		2
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC		6
Total	-	-	-	-	**46**

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 23).

Table 23. Non-ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 24. Non-ecological reference area natural communities within the Grand Marais Moraine Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Sum of Acreage	Count of Element Occurrence ID
Dry-mesic northern forest	AB	S3		3	1
Mesic northern forest	C	S3		44	2

Community Type	Element Occurrence Rank	State Rank	Global Rank	Sum of Acreage	Count of Element Occurrence ID
Muskeg	AB	S3		79	1
Muskeg	B	S3		814	2
Muskeg	BC	S3		109	2
Poor conifer swamp	AB	S4	G4	18	1
Poor conifer swamp	BC	S4	G4	35	1
Grand total				**1,102**	**10**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 25) and diseases (Table 26) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 25. Defoliating insects of concern in the Grand Marais Moraine Complex Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes
Redheaded pine sawfly	Neodiprion lecontei	Native	Yes

Table 26. Maladies of concern in the Grand Marais Moraine Complex Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Nectria cinnabarina	Native	Yes
Armillaria root rot	Armillaria mellea	Native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No
Oak wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

Approximately 199 miles of streams and rivers are found in the management area (Table 27). Streams/rivers classified as cold types comprise approximately 81% of the riverine mileage.

Table 27. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	103
Cold small river	23
Cold transitional stream	34
Cold transitional small river	1

Type	Length (miles)
Cold transitional large river	0
Warm transitional stream	37
Warm transitional small river	1
Warm transitional large river	0
Warm stream	0
Warm small river	0
Warm large river	<1

Lacustrine habitat

A total of 109 lakes and ponds of at least 1 surface acre are found in the management area (Table 28).

Table 28. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	96
100-499	12
500+	1

Wetlands

A total of 67,466 acres of wetlands are found in the management area (Table 29). Forested wetlands comprise approximately 93% of wetland types found in the management area.

Table 29. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	4,049
Forested	62,811
Riverine	586

Vernal pools and seeps

A total of 353 acres of vernal pools and seeps have been inventoried in the management area, while 505 acres of seeps have been identified.

Riparian vegetation cover

Lowland shrub and northern hardwood are predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 30).

Table 30. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	5,104
Northern hardwood	3,533
Lowland conifers	2,436

Cover Type	Acres
Natural white pine	2,058
Aspen	1,792
Natural mixed pines	1,770
Natural jack pine	1,636
Cedar	1,601
Natural red pine	1,509
Upland conifers	1,270

Watershed vegetation cover

The management area includes portions of important watersheds of the Tahquamenon River and Big Two Hearted River (Table 31 and Table 32). Northern hardwood and pines (i.e., red, white, jack) are major cover types of the state forest in each watershed.

Table 31. Largest vegetative cover types (i.e., top five) and area for the area of the Tahquamenon River watershed located within the management area.

Cover Type	Acres
Northern hardwood	10,326
Aspen	9,244
Lowland conifer	3,785
Planted red pine	2,211
Cedar	2,195

Table 32. Largest vegetative cover types (i.e., top five) and area for the area of the Big Two Hearted River watershed located within the management area.

Cover Type	Acres
Natural red pine	5,214
Natural white pine	3,949
Natural jack pine	3,385
Northern hardwood	3,259
Planted jack pine	2,261

Recreation

The Grand Marais Moraine Complex Management Area is generally accessible for recreation opportunities via County Road 407, Highway 123 and paved/gravel county roads and two-tracks. However, in some areas, access is restricted by creeks and wetland cover types and concern over impact to fragile areas, particularly along the Lake Superior shoreline.

This area is a destination for winter snowmobilers as well as summer tourists. Access to Pictured Rocks National Lakeshore is through this management area. When Pictured Rocks National Lakeshore campgrounds are full, park visitors often camp at nearby state forest campgrounds, and people frequently hike the Fox River Pathway from Kingston Lake State Forest Campground to Twelve Mile Beach campground in the national lakeshore.

This management area includes a well-developed system of snowmobile and off-road vehicle trails. Nonmotorized trails include significant sections of the North Country National Scenic Trail/Iron Belle Trail, Headquarters Lake Equestrian Trail and Fox River Pathway (Table 33).

There are numerous state forest campgrounds within the management area (Table 34), including the Mouth of the Two Hearted River, with 39 sites, and Headquarters Lake Equestrian, which includes a large equestrian day-use area. Tahquamenon Falls and Muskallonge Lake state parks provide added recreation opportunities adjacent to state forest land. Dispersed camping is also popular, particularly in the Deer Park area.

Table 33. Designated recreation trails by use type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	Off-road vehicle (all types) Snowmobile	135.2 181.4
Nonmotorized recreation trails	Hiking Equestrian Biking Hunter access trails	106.2 24.5 1.3 17.9
Total		**466.5**

Note: Trail use types may overlap.

Table 34. State forest campgrounds

Name of State Forest Campground (SFCG)	Number of sites	Equestrian	ORV
Andrus Lake SFCG	25		
Bass Lake SFCG (Luce)	18		
Blind Sucker No. 2 SFCG	32		
Blind Sucker No.1 SFCG	13		
Bodi Lake SFCG	12		
Canoe Lake SFCG	4		
Culhane Lake SFCG	12		
Cusino Lake SFCG	6		
East Branch of Fox River SFCG	19		
Headquarters Lake SFCG and Trail Camp	6	X	
High Bridge SFCG	7		
Holland Lake SFCG	15		X
Kingston Lake SFCG	16		
Lake Superior SFCG	18		
Mouth of Two Hearted River SFCG	39		
North Gemini SFCG	17		
Perch Lake SFCG	35		
Pike Lake SFCG (Luce)	8		

Name of State Forest Campground (SFCG)	Number of sites	Equestrian	ORV
Pretty Lake SFCG	18		
Reed and Green Bridge SFCG	7		
Ross Lake SFCG	10		
South Gemini SFCG	8		

Blind Sucker River Flooding State Wildlife Management Area is located in northwest Luce County, about 12 miles east of Grand Marais. Several marshes and pothole lakes are inundated by and incorporated into the Blind Sucker Flooding. Most public use is fishing-oriented, with minor fall waterfowl hunting, moderate furbearer trapping activity and light winter ice fishing. In addition, there is increasing use of the flooding for bird-watching, canoeing and kayaking. Stanley Lake Flooding is centered along the Fox River in northern Schoolcraft County. There are a number of two-tracks providing access.

The Halifax and Melstrand GEMS, or Grouse Enhanced Management Sites, provide areas focused on upland bird hunting, with 12 and 4.7 miles, respectively, of hunter walking trails to facilitate access.

Opportunities for wildlife recreation within the management area include hunting for ruffed grouse, deer and bear, trapping of furbearing species and wildlife viewing. The area around the Two Hearted River is also popular for blueberry picking, kayaking, beach combing, fishing and bird watching. There are 20 boating access sites, providing access to inland lakes and floodings, the Two Hearted and Fox rivers and Lake Superior.

Table 35. Areas managed for hunting.

Type	Name	Acres
State wildlife management areas	Blind Sucker River Flooding Stanley Wildlife Flooding SWMA	4,753.0 2,355.5
State wildlife research areas	Cusino SWRA	0.8
Grouse Enhanced Management Sites	Halifax GEMS Melstrand GEMS	2,709.7 1,218.3
Total		**11,037.3**

Table 36. Boating access sites.

Name	Body of Water
Andrus Lake State Forest Campground	Andrus Lake
Bass Lake SFCG	Bass Lake
Blind Sucker #1 SFCG	Blind Sucker Flooding
Blind Sucker #2 SFCG	Blind Sucker Flooding
Bodi Lake SFCG	Bodi Lake
Brockies Pond	Brockies Trout Pond
Culhane SFCG	Culhane Lake
Kingston Lake SFCG	Kingston Lake

Mouth Of Two Hearted River SFCG	Two Hearted River
North Gemini Lake SFCG	Gemini Lake
Peanut Lake	Peanut Lake
Perch Lake SFCG	Perch Lake
Pike Lake SFCG	Pike Lake
Shelldrake Dam SFCG	Shelldrake Lake
Silver Creek Pond	Silver Creek Trout Pond
Spring Creek Trout Pond	Silver Creek Trout Pond
Stanley Lake SFCG	Stanley Lake
Tahquamenon Falls - River Mouth	Lake Superior
Tahquamenon Falls Bay	Lake Superior
Wagner Dam	Fox River

EUP management areas

Rudyard Silty Lake Plain

State forest area: 49,432 acres	Location: Eastern Upper Peninsula	Population centers: Sault Ste. Marie Kincheloe
Subsection: Rudyard Silty Lake Plain	Landforms: Broad clay lake plain Sand plain	Land cover: Forested: 36,520 acres Nonforested: 12,912 acres

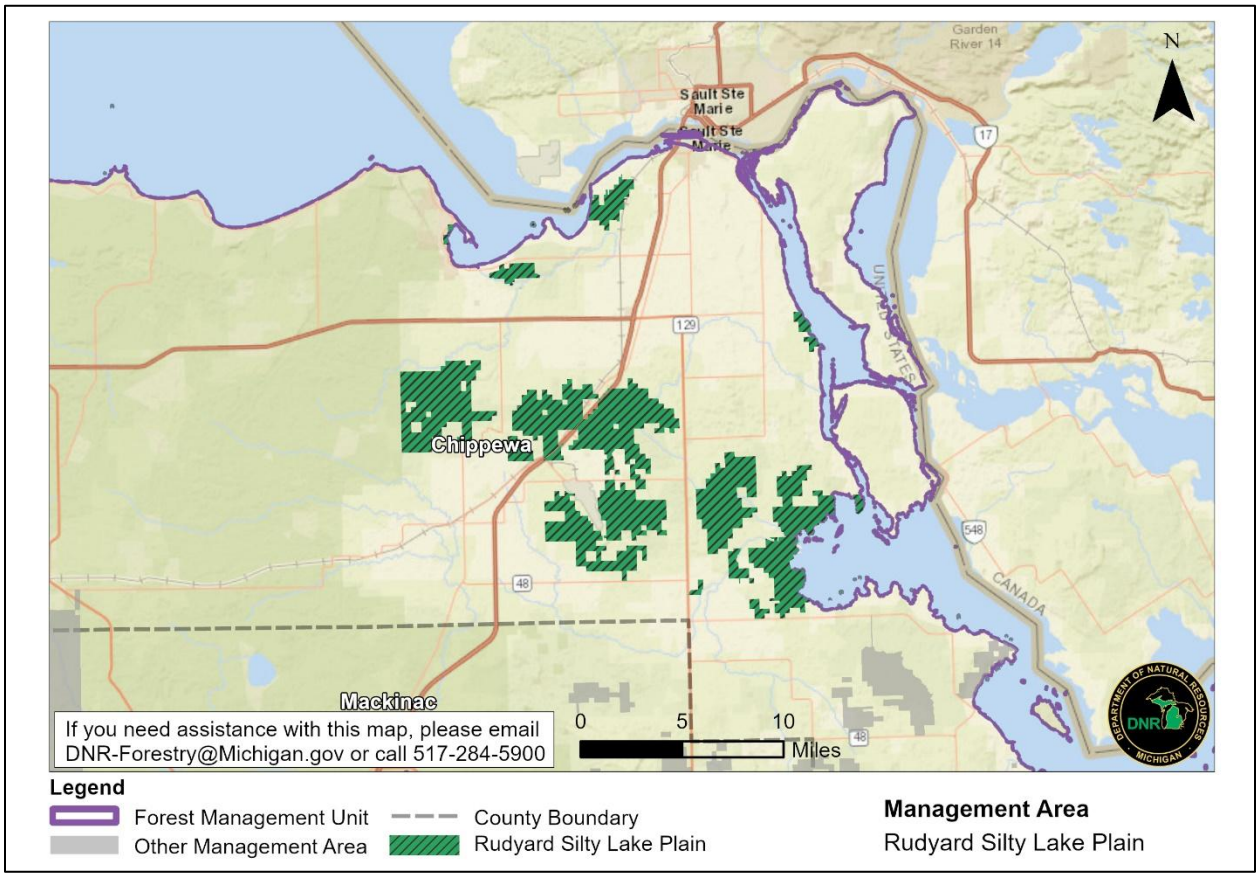


Figure 1. Rudyard Silty Lake Plain Management Area.

Forested landscape

Current and projected future condition

The Rudyard Silty Lake Plain Management Area includes a variety of ages and tolerance levels. Most of the acres are tolerant cover types in the old-aged category and occur on unavailable lowlands. The majority of intolerant cover types occur on available uplands in the young and mid-aged categories. Mid-tolerant cover types occur mostly on available uplands and lowlands in the mature age category (Figure 2).

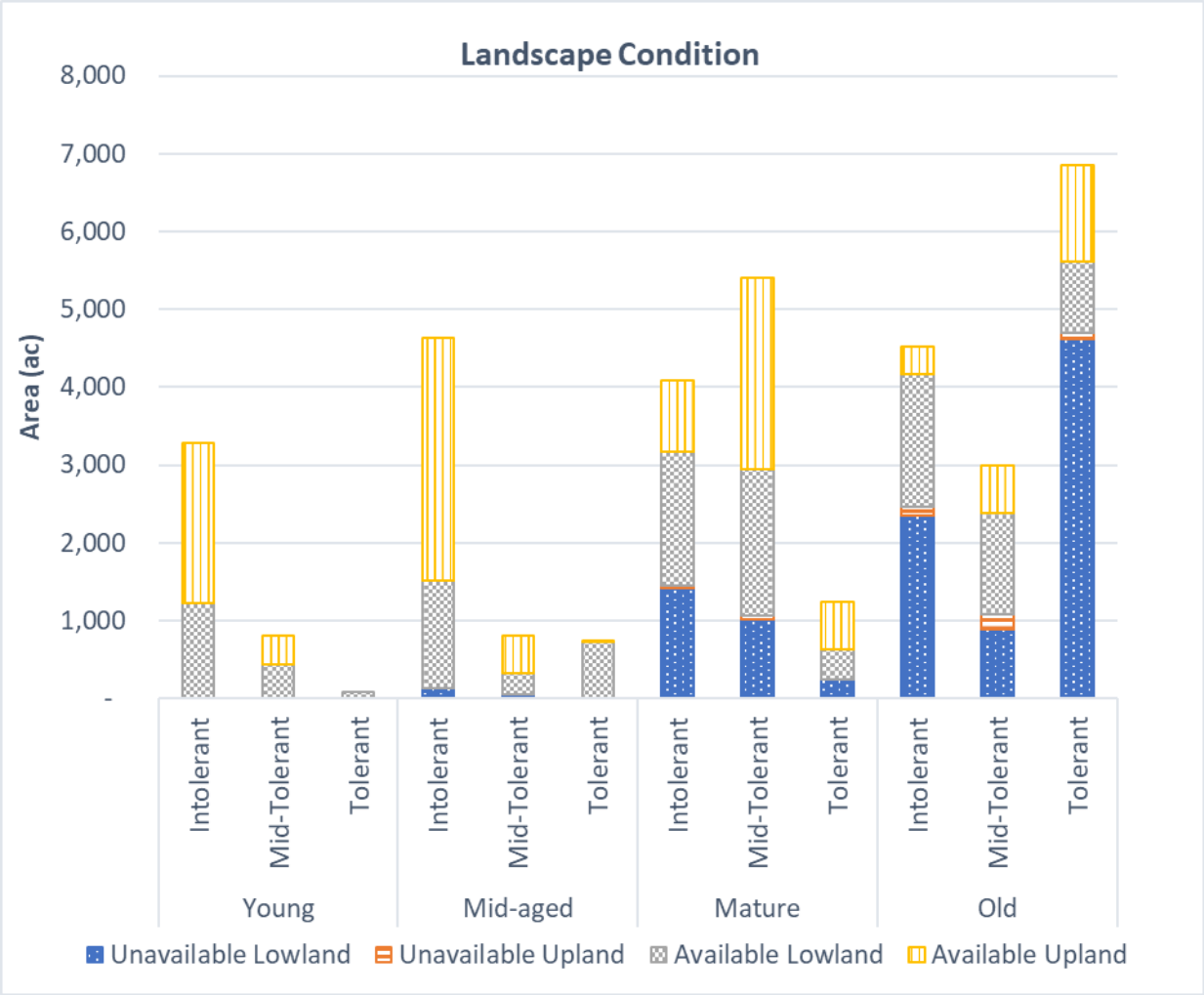


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (see Section 3) establish a baseline and future condition based on management over the planning period (

Table 1).

Table 1. Current acres of landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0- to 19-year stands in aspen and jack pine	2,048
Mature forest	Acres of 80-plus-year stands across cover types	14,364
Mature forest	Acres of 120-plus-year stands across cover types	2,744
Mesic conifer cover types	Acres of mesic conifer cover types	422
Mesic conifers in other cover types	Average canopy occupancy	19%
Mast – oak cover types	Acres of oak cover types	453
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	7,350
Big trees	Total canopy stand occupancy of species in sawlog or greater size class	16,362
Nonforested openings	Acres of total herbaceous open land, upland shrub and crop land	830
Landscape forest matrix	Percent deciduous forest	51%
Landscape forest matrix	Percent coniferous forest	44%

Other important landscape-level habitat in this management area includes a large opening/shallow flooding complex known as the Munuscong Potholes, which is managed for waterfowl, sharptailed grouse and grassland/marsh-nesting birds.

Coastal wetlands associated with the St. Mary's River system and Munuscong Bay State Wildlife Area are dynamic wetland systems that provide habitat for yellow rail, marsh wren, osprey, common tern, black tern, muskrat and waterfowl. This is an area of cultural importance for the Anishinaabe, and restoration of wild rice within the Great Lakes coastal wetlands is a partnership priority.

The Rudyard Silty Lake Plain Management Area does not have any special analysis units. See Section 5 for a detailed description of the management direction and harvest goals of SAUs in other management areas.

The Rudyard Silty Lake Plain Management Area is comprised of 74% forested cover types and 26% nonforested cover types. Of the forested cover types, a greater percentage occurs on the lowland landscape position than the upland landscape positions. The largest contributors to upland cover types are aspen and northern hardwoods. Lowland aspen/balsam poplar, lowland deciduous, cedar and lowland spruce/fir are the most prominent cover types on the lowland landscape position. Lowland shrub is the most common nonforested cover type in the management area, representing 24% of the landscape (

Table 2).

Table 2. Landscape conditions and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	5,450	9,384	12,905	36,520
			Northern hardwood	1,830			
			Black/red hybrid oak	0			
			Northern red oak	408			
			Oak mix	45			
			Mixed upland deciduous	1,652			
		Mixed	Upland mixed forest	557	557		
		Coniferous	Planted red pine	1,693	2,964		
			Planted jack pine	195			
			Planted white pine	0			
			Planted mixed pine	4			
			Natural red pine	44			
			Natural jack pine	606			
			Natural white pine	107			
			Natural mixed pines	100			
			Upland spruce/fir	47			
			Upland conifers	159			
			Hemlock	8			
	Lowland	Deciduous	Lowland aspen/balsam poplar	4,582	9,086	23,615	
			Lowland deciduous	4,505			
		Mixed	Lowland mixed forest	1,303	1,303		
		Coniferous	Cedar	4,040	13,226		
			Lowland conifers	2,935			
			Lowland spruce/fir	4,183			
			Tamarack	2,067			
Nonforested	Upland	N/A	Herbaceous open land	710	N/A	1,284	12,912
			Upland shrub	120			
			Low density trees	328			
			Bare/sparsely vegetated	50			
			Cropland	0			
			Urban	76			
	Lowland	N/A	Lowland shrub	6,787	N/A	11,629	
			Marsh	3,363			
			Bog	253			
			Treed bog	543			
			Water	683			
						Grand Total:	49,432

Desired future condition

There are 25,340 acres (51% of the total management area and 69% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Rudyard Silty Lake Plain Management Area (Table 3). Of that, approximately 15% is in the aspen cover type, while lowland aspen/balsam poplar, lowland deciduous and lowland spruce/fir cover around 8% each. The remaining cover types each represent less than 5% each, for a total of approximately 60% of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

RUDYARD SILTY LAKE PLAIN Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	5,410	14.8%	40	0.1%	5,450	14.9%
Cedar	685	1.9%	3,356	9.2%	4,040	11.1%
Hemlock	0	0.0%	8	0.0%	8	0.0%
Lowland aspen/balsam poplar	3,126	8.6%	1,456	4.0%	4,582	12.5%
Lowland conifers	1,439	3.9%	1,496	4.1%	2,935	8.0%
Lowland deciduous	2,877	7.9%	1,628	4.5%	4,505	12.3%
Lowland mixed forest	986	2.7%	318	0.9%	1,303	3.6%
Lowland spruce/fir	3,252	8.9%	931	2.5%	4,183	11.5%
Mixed upland deciduous	1,457	4.0%	194	0.5%	1,652	4.5%
Natural jack pine	520	1.4%	86	0.2%	606	1.7%
Natural mixed pines	100	0.3%	0	0.0%	100	0.3%
Natural red pine	31	0.1%	14	0.0%	44	0.1%
Natural white pine	107	0.3%	0	0.0%	107	0.3%
Northern hardwood	1,745	4.8%	85	0.2%	1,830	5.0%
Northern red oak	408	1.1%	0	0.0%	408	1.1%
Oak mix	45	0.1%	0	0.0%	45	0.1%
Planted jack pine	195	0.5%	0	0.0%	195	0.5%
Planted mixed pine	4	0.0%	0	0.0%	4	0.0%
Planted red pine	1,693	4.6%	0	0.0%	1,693	4.6%
Tamarack	553	1.5%	1,514	4.1%	2,067	5.7%
Upland conifers	125	0.3%	35	0.1%	159	0.4%
Upland mixed forest	557	1.5%	0	0.0%	557	1.5%
Upland spruce/fir	27	0.1%	20	0.1%	47	0.1%
Grand total	**25,340**	**69.4%**	**11,180**	**30.6%**	**36,520**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too wet	2,092	18.7%
Deer wintering area	1,963	17.6%
Unproductive	1,724	15.4%
Blocked by obstacle	1,525	13.6%
Wildlife concerns	1,519	13.6%
Conservation values	1,314	11.8%
Best management practices	482	4.3%
Denied access	144	1.3%
Long-term retention	114	1.0%
Neighbor/interest group	108	1.0%
Species of special concern or T&E	97	0.9%
Other influence zones	40	0.4%
Too steep	21	0.2%
Recreational/scenic	20	0.2%
Other DNR/division processes	17	0.1%
Total unavailable	**11,180**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Rudyard Silty Lake Plain Management Area has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels needed during the first 10-year planning period are summarized in Table 5.

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 78,703 cords, the planned harvest volume for the decade (

Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Planted red pine	-	-	766	-	-	-	-	766
Aspen	727	-	-	-	-	-	-	727
Mixed upland deciduous	446	39	-	-	63	-	-	548
Northern hardwood	-	543	-	-	-	-	-	543
Lowland aspen/balsam poplar	404	-	-	-	-	-	-	404
Lowland deciduous	337	-	-	-	-	-	-	337
Lowland spruce/fir	305	-	-	-	-	-	-	305
Lowland conifers	254	-	-	-	-	-	-	254
Upland mixed forest	145	-	-	-	-	-	-	145
Natural jack pine	93	-	-	-	-	-	-	93
Tamarack	78	-	-	-	-	-	-	78
Northern red oak	8	-	-	32	-	-	-	39
Upland conifers	20	-	-	-	-	-	-	20
Upland spruce/fir	12	-	-	-	-	-	-	12
Totals	**2,827**	**582**	**766**	**32**	**63**	**-**	**-**	**4,270**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection Rudyard Silty Lake Plain Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed hardwood	14,950	14,053
	Mixed softwood	8,390	7,886
	Mixed spruce	7,171	6,740
	Mixed aspen	6,932	6,516
	Red pine	4,189	3,937
	Mixed oak	1,523	1,431
	Jack pine	1,171	1,100
	White pine	683	642
	Pulpwood total	**45,007**	**42,307**
Sawtimber (MBF)	Red pine	4,493	4,224
	Red oak	3,418	3,213
	Red maple	2,558	2,405
	Mixed aspen	1,734	1,630
	White pine	1,691	1,589
	Sugar maple	1,516	1,425
	Basswood	220	207
	Mixed oak	206	193
	White oak	169	159
	Sawtimber total	**16,004**	**15,044**
	Total sawtimber harvest volume in cords	**33,696**	**31,674**
	Grand total harvest volume in cords	**78,703**	**73,981**

*Volume estimates based on 100% of the projected harvests for the 10-year planning period.
**Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are very few cover-type transitions projected for the Rudyard Silty Lake Plain Management Area (Table 7). The managed area of each cover type is projected to remain fairly stable, as treatment regimes will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the lowland deciduous cover type, where 113 acres will convert to other cover types through forest management and regeneration activities. The largest increase occurs in the lowland aspen/balsam poplar type, where 113 acres are projected to convert into this cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Aspen	5,450	5,496	47
Lowland aspen/balsam poplar	4,582	4,695	113
Lowland deciduous	4,505	4,392	-113
Lowland spruce/fir	4,183	4,148	-35
Cedar	4,040	4,040	0
Lowland conifers	2,935	2,923	-11
Tamarack	2,067	2,045	-22
Northern hardwood	1,830	1,859	29
Planted red pine	1,693	1,696	3
Mixed upland deciduous	1,652	1,644	-8
Lowland mixed forest	1,303	1,381	77
Natural jack pine	606	589	-17
Upland mixed forest	557	504	-53
Northern red oak	408	401	-7
Planted jack pine	195	204	9
Upland conifers	159	156	-4
Natural white pine	107	107	0
Natural mixed pines	100	100	0
Upland spruce/fir	47	42	-6
Oak mix	45	45	0
Natural red pine	44	44	0
Hemlock	8	8	0
Planted mixed pine	4	4	0
Lowland shrub	6,787	6,787	0
Marsh	3,363	3,363	0
Herbaceous open land	710	710	0
Water	683	683	0
Treed bog	543	543	0
Low density trees	328	328	0
Bog	253	253	0
Upland shrub	120	120	0
Urban	76	76	0
Bare/sparsely vegetated	50	50	0
Total:	**49,432**	**49,432**	**0**

Featured species current and projected habitat acres

There are seven featured species in this management area that span various cover types, age classes and stand-level conditions.

As noted in the featured species management priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the State Forest Management Plan modeling effort was limited by several factors, including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres, these are potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the featured species management priority (see Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually within 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Black bear	Generalist/mast	7,350	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	1,530	1,870	823	2,241
Marten U.P.	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed	7,187	7,454	6,997	8,346

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
	forest, lowland conifers, hemlock, cedar				
Moose	To be determined	--	--	--	--
Ruffed grouse	Aspen	1,433	1,171	1,701	1,717
Sharp-tailed grouse	Herbaceous open land, upland shrub, low density trees, lowland shrub, bog, treed bog	8,741	--	--	--
Snowshoe hare forest	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	4,868	4,925	4,711	4,674
Wood turtle	Nonforested openings	--	--	--	--
White-tailed deer (food)	Food: Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	20,331	20,415	20,870	21,280
White-tailed deer (shelter)*	Shelter: hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	13,322	13,269	12,972	12,626

*Deer wintering complexes greater than 15,000 acres are modeled as a special analysis unit, or SAU, and information on them can be found in Section 5 of the plan. In deer wintering complexes less than 15,000

acres, harvest of cedar and hemlock is not allowed on range stands essential for survival, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated featured species

Aspen

Current condition

Most of the aspen cover type is currently in the 30- to 39-year-old age class. (Figure 3). The past management regime has been primarily clearcut in the management area. Several age classes in this cover type have a deficit, including the 0- to 9-year age class and the 40- to 49-year and older age classes. Limited available acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period.

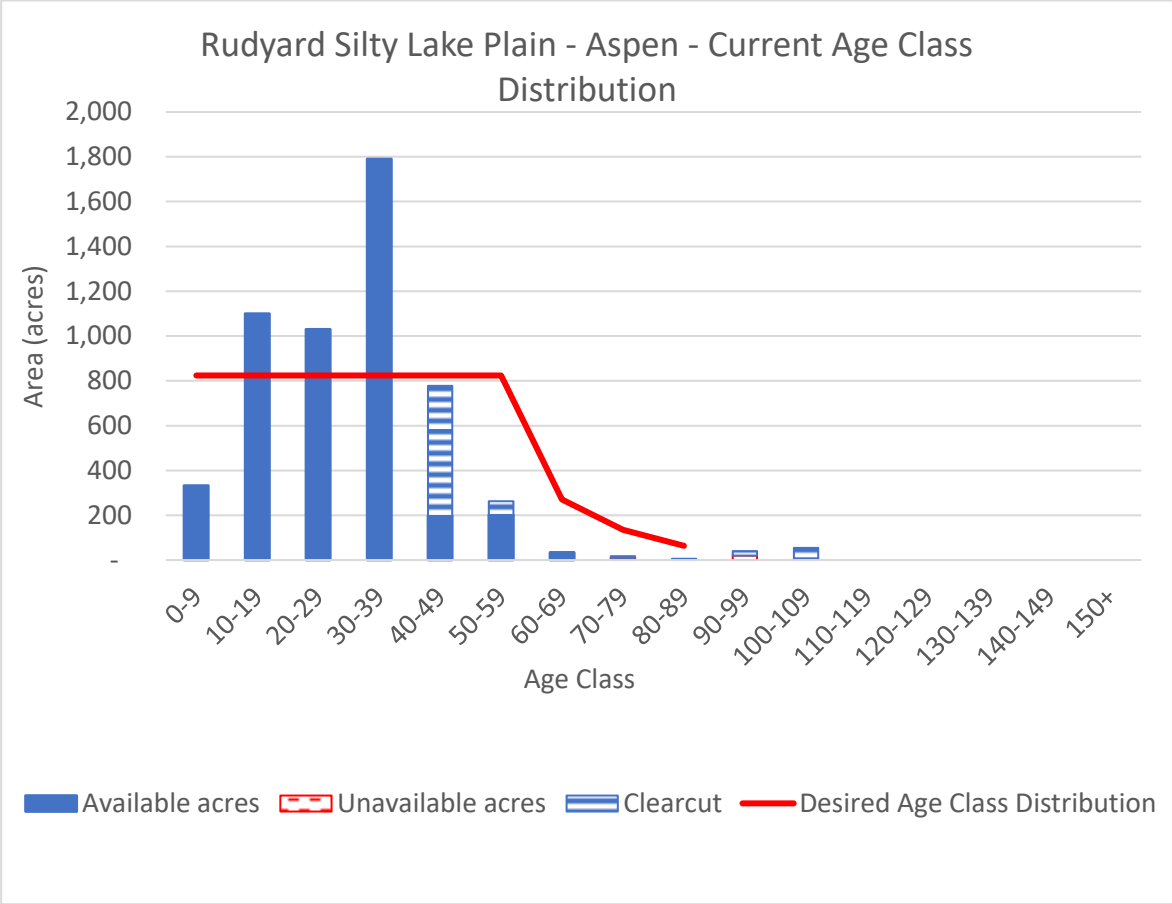


Figure 3. Current age class distribution, desired age class distribution and projected harvests in the aspen cover type in the Rudyard Silty Lake Plain Management Area.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for ruffed grouse and snowshoe hare (Table 9).

Table 9. Featured species with aspen as a selected habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres – Unavailable
Ruffed grouse	Age category: 0-19 Size class: sapling	1,433	0
Snowshoe hare	Age category: 0-19 Size class: sapling	1,433	0
White-tailed deer	All ages and size classes	5,450	--

Desired future condition

The projected long-term cover type trend for aspen is stable in the Rudyard Silty Lake Plain Management Area. There are a few transitions into this cover type from other cover types and equally few transitions from aspen to other cover types forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of 839 acres in the upcoming 0-9 age class. Progress toward the long-term age class distribution of aspen will take many decades in the management area (Figure 4).

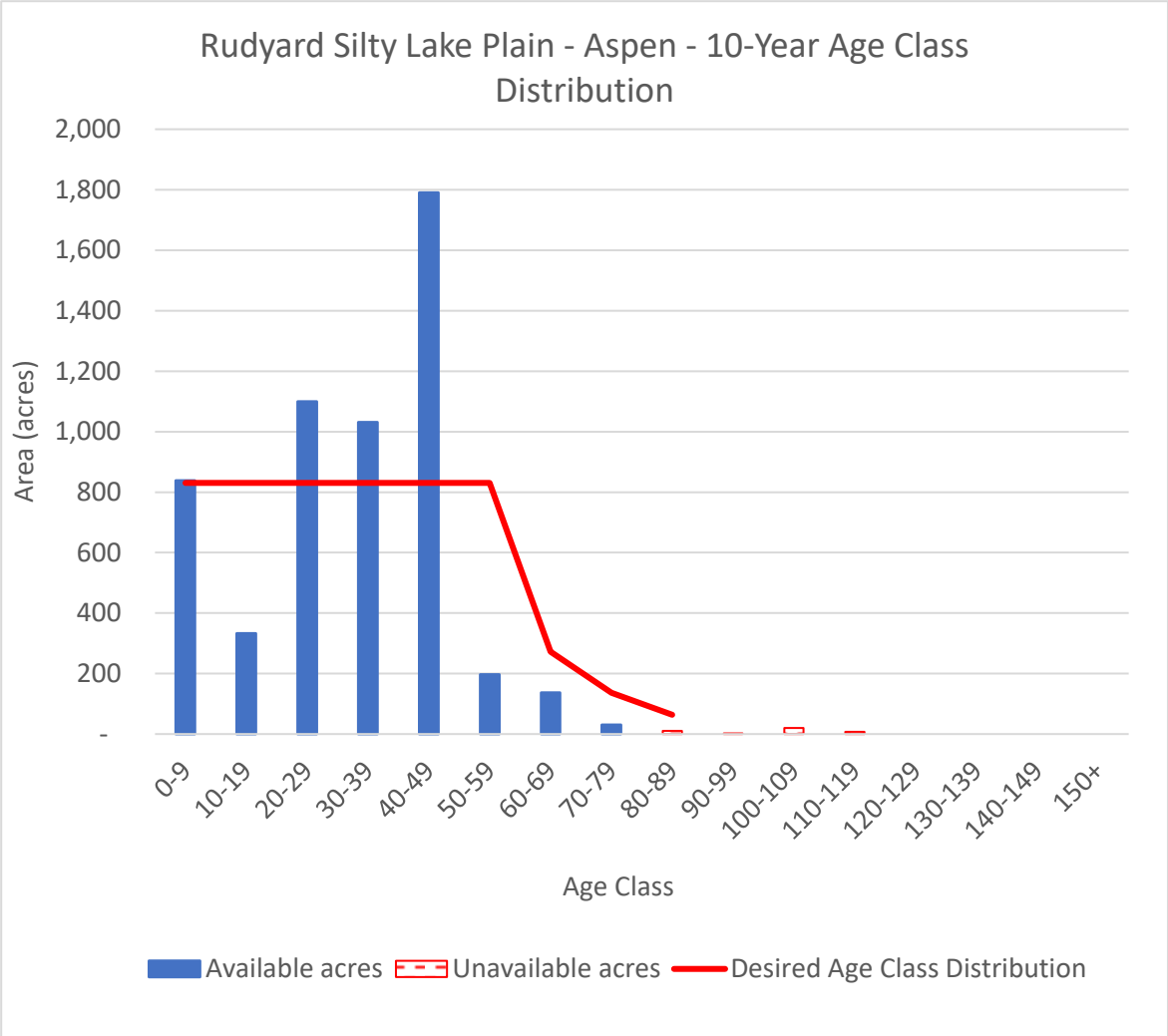


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of aspen acres nearly reaching the desired future condition, with only a few age classes deviating from the target proportions (Figure 5). As is often the case, an extremely unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals (Figure 5).

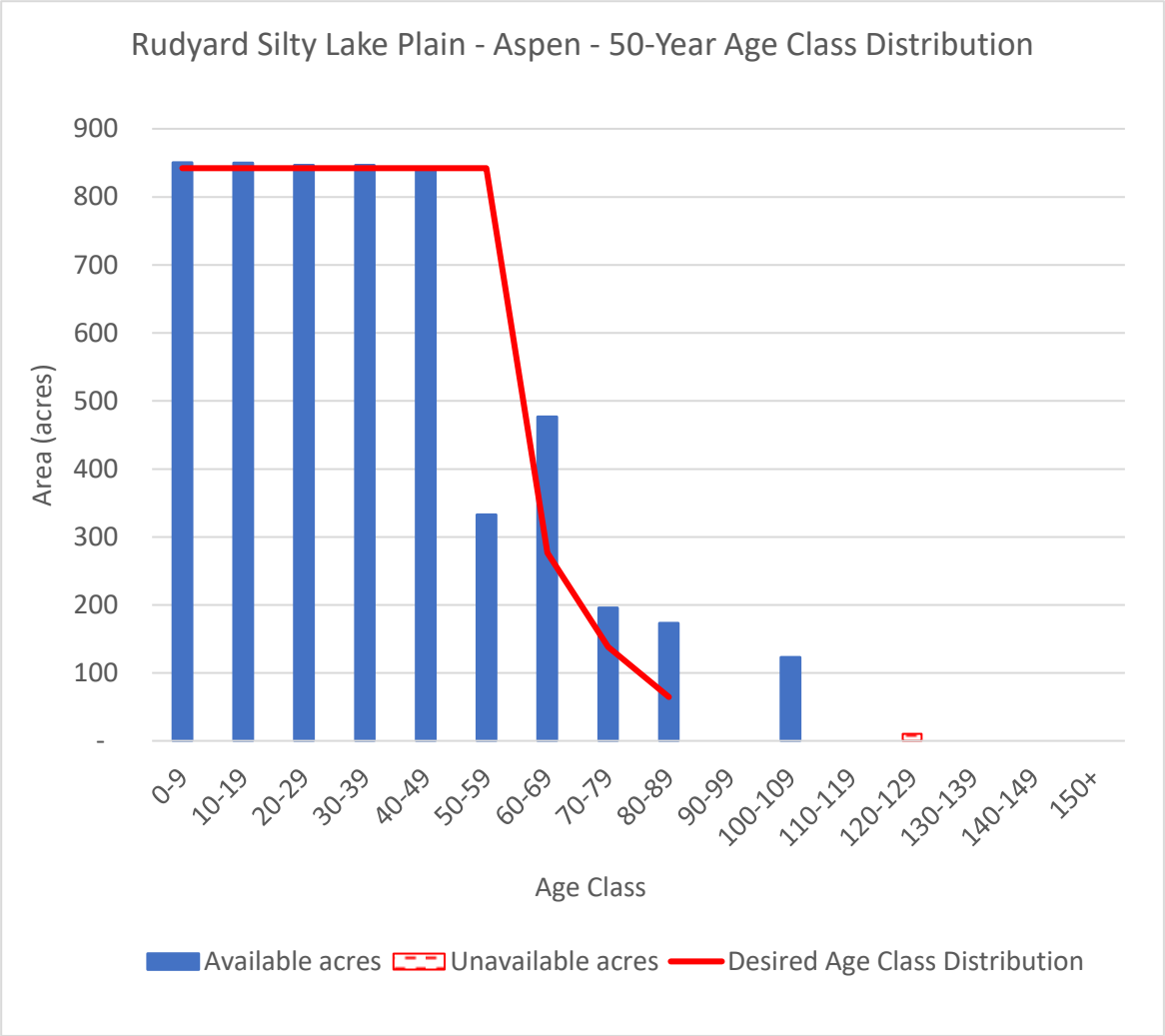


Figure 5. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate on the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

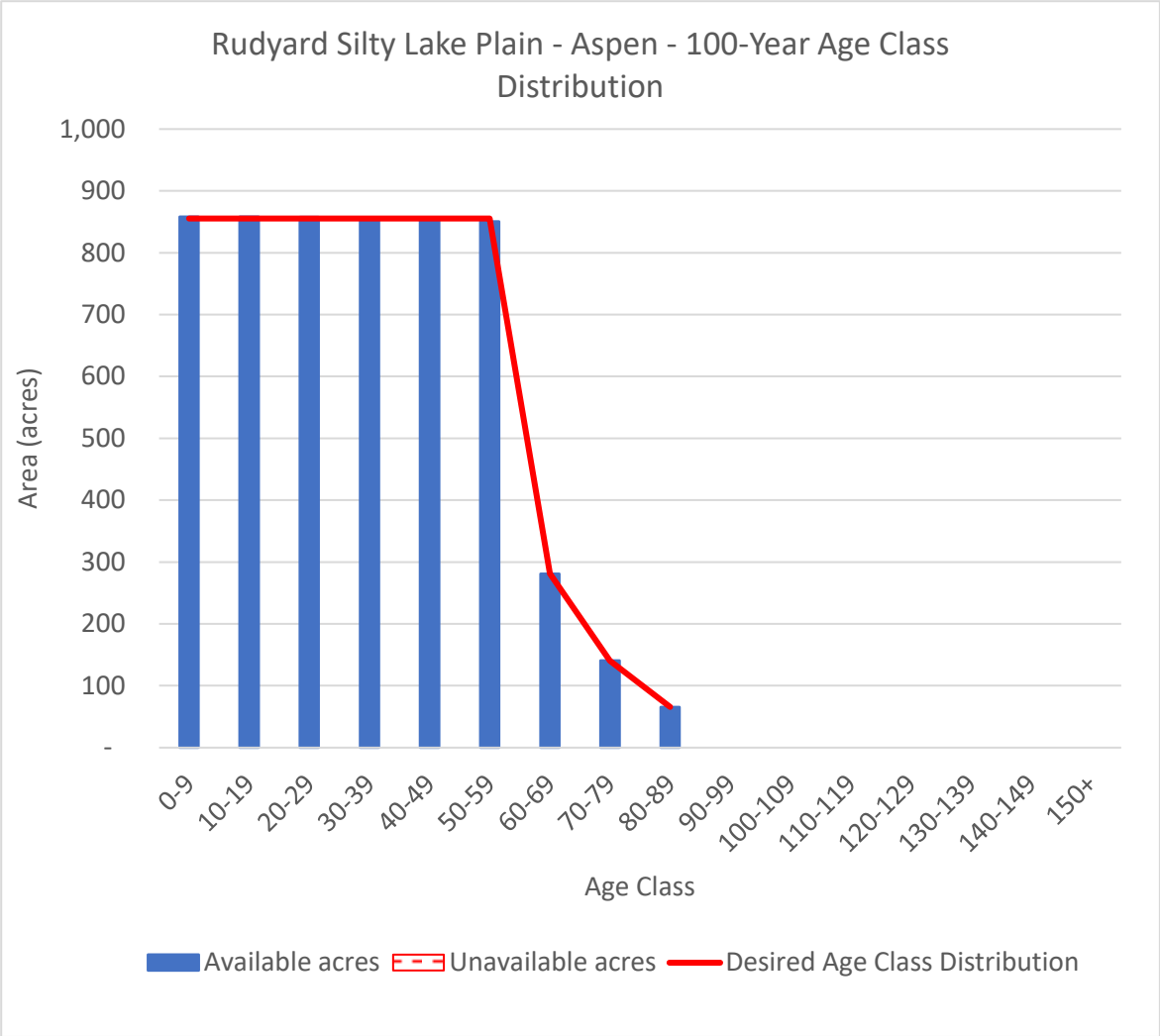


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

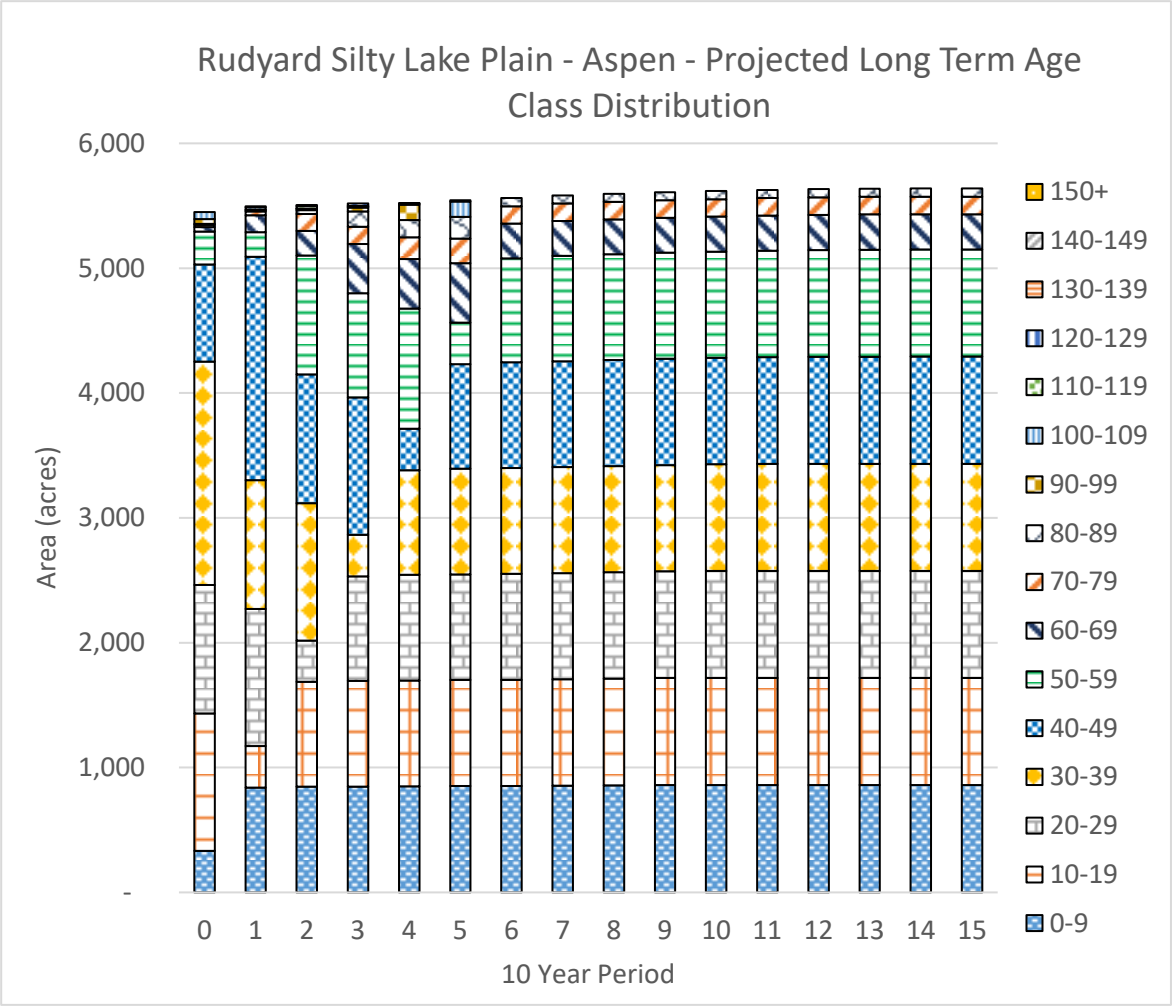


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years.

Management actions

There are 727 acres of projected clearcut harvest in the aspen cover type during this planning period. This projection is not significantly different than the 831-acre desired age class distribution target of this planning cycle.

Lowland deciduous

Current condition

The Rudyard Silty Lake Plain Management Area has a surplus of acres in the 0- to 9-year-old age class due to the harvesting of mature and overmature acres on the landscape during the last planning period (Figure 8). The age class distribution is currently very unbalanced across almost all age class categories. The landscape position on which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 110 years old.

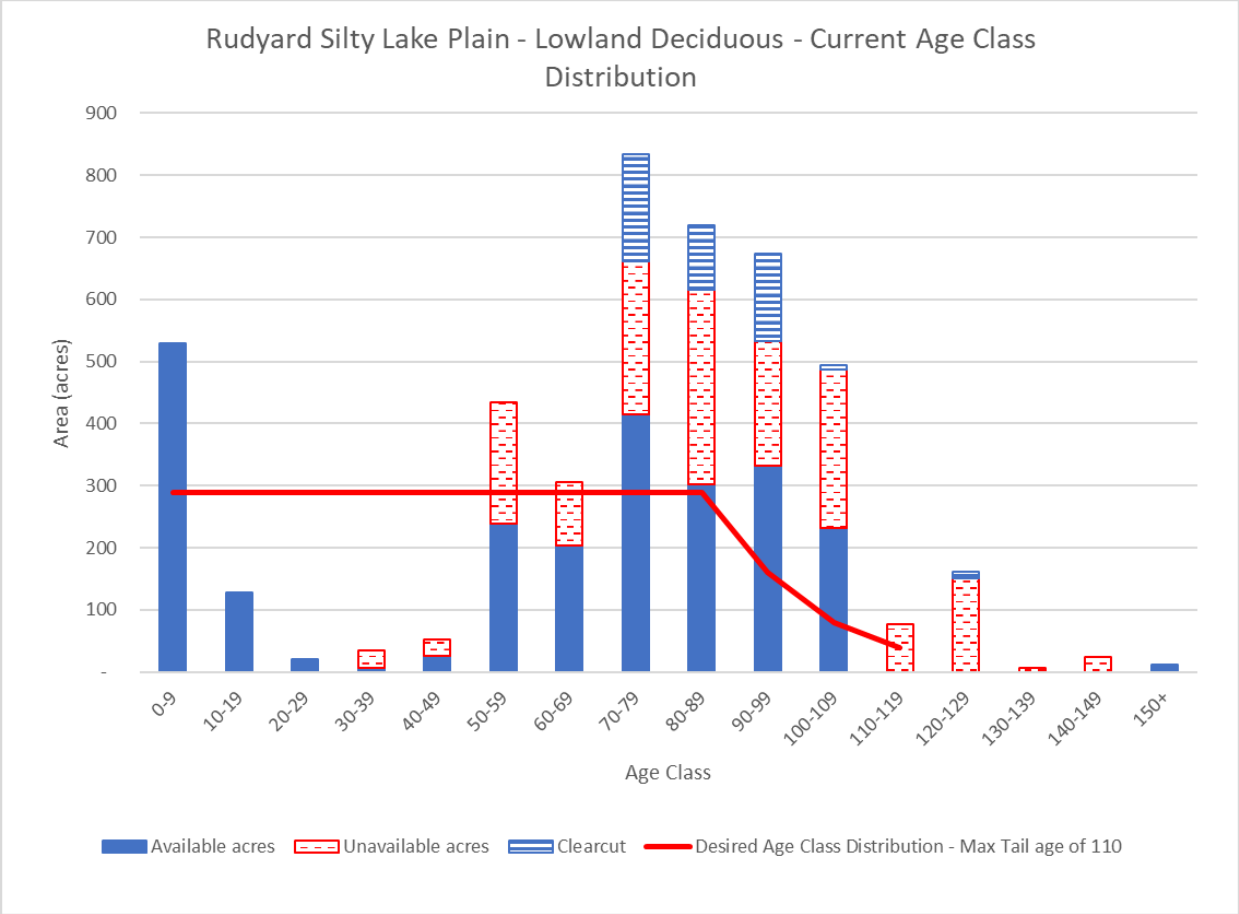


Figure 8. Current age class distribution, desired age class distribution and projected harvests in the lowland deciduous cover type in the Rudyard Silty Lake Plain management area.

Table 10. Featured species with lowland deciduous as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Deciduous	Lowland Deciduous Habitat Acres – Available	Lowland Deciduous Habitat Acres – Unavailable
White-tailed deer	All ages and size classes	4,505	--

Desired future condition

The projected long-term cover type trend for lowland deciduous is stable in the Rudyard Silty Lake Plain Management Area (Figure 9). There are very few transitions into and out of this cover type during this planning period.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available lowland deciduous acres and then decreasing number of acres until the max tail of 80 years old is reached.

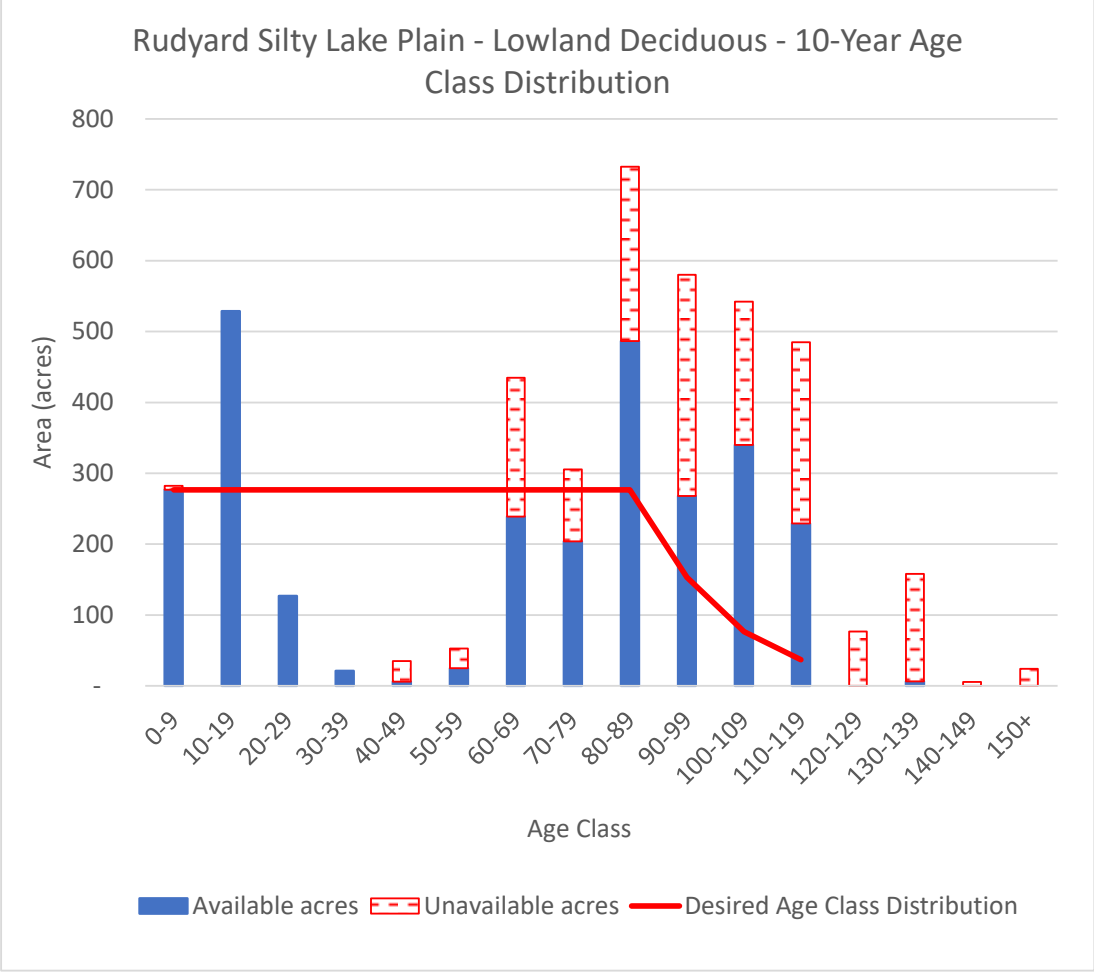


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of approximately 277 acres of lowland deciduous from the available acres. It will take many decades to achieve the desired balanced age class condition of lowland conifers (*Figure 10*).

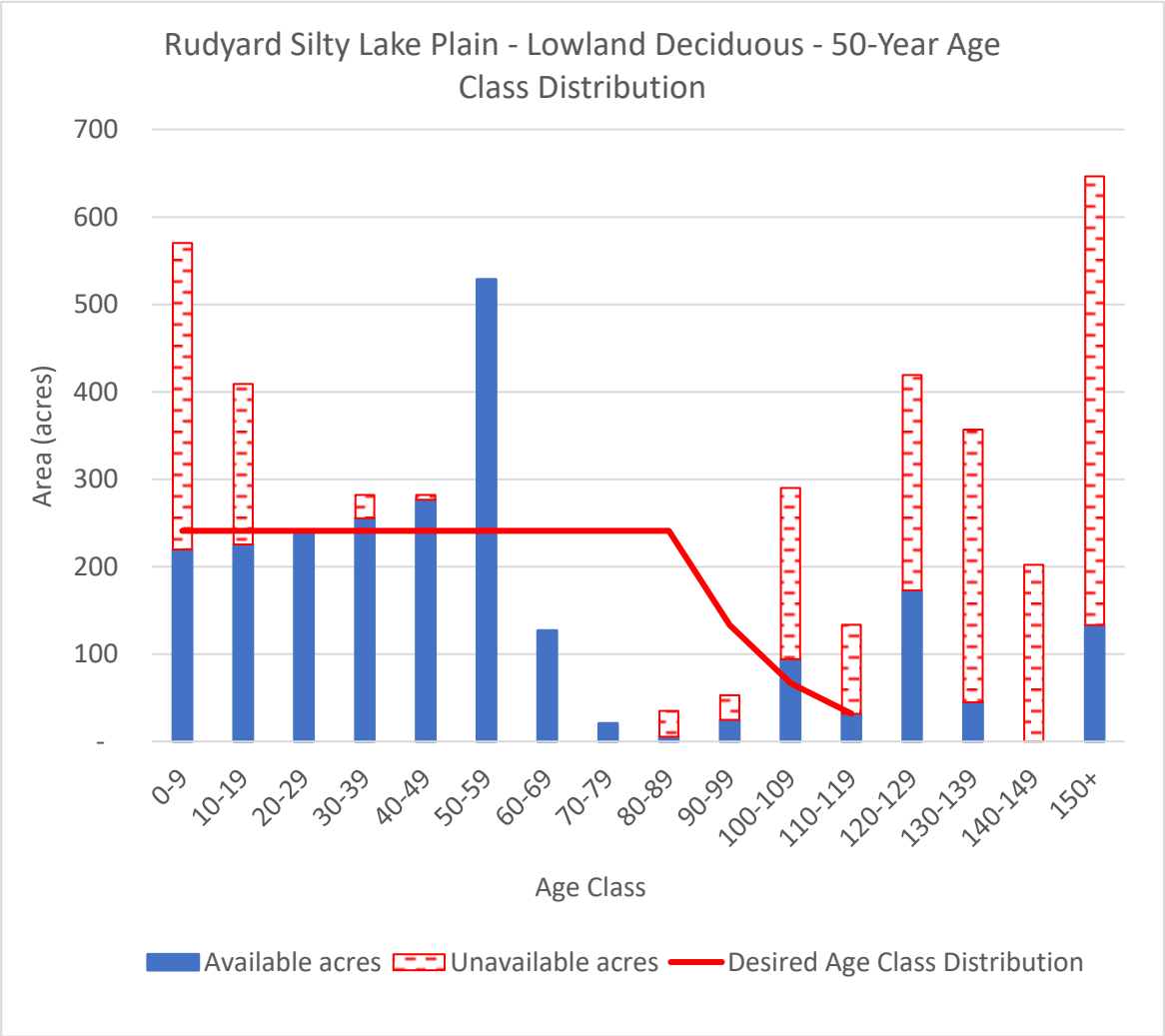


Figure 10. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The midterm age class distribution of lowland deciduous is nearing the desired future condition for available acres in the age classes. The number of acres in the older age classes, 90 years old and older, continues to increase as the unavailable acres continue to move to the older age classes (Figure 11). As older stands of unavailable lowland deciduous continue to age and reach mortality through the process of senescence, natural regeneration of the stands does not convert them to other cover types, and they are still unavailable for commercial harvest.

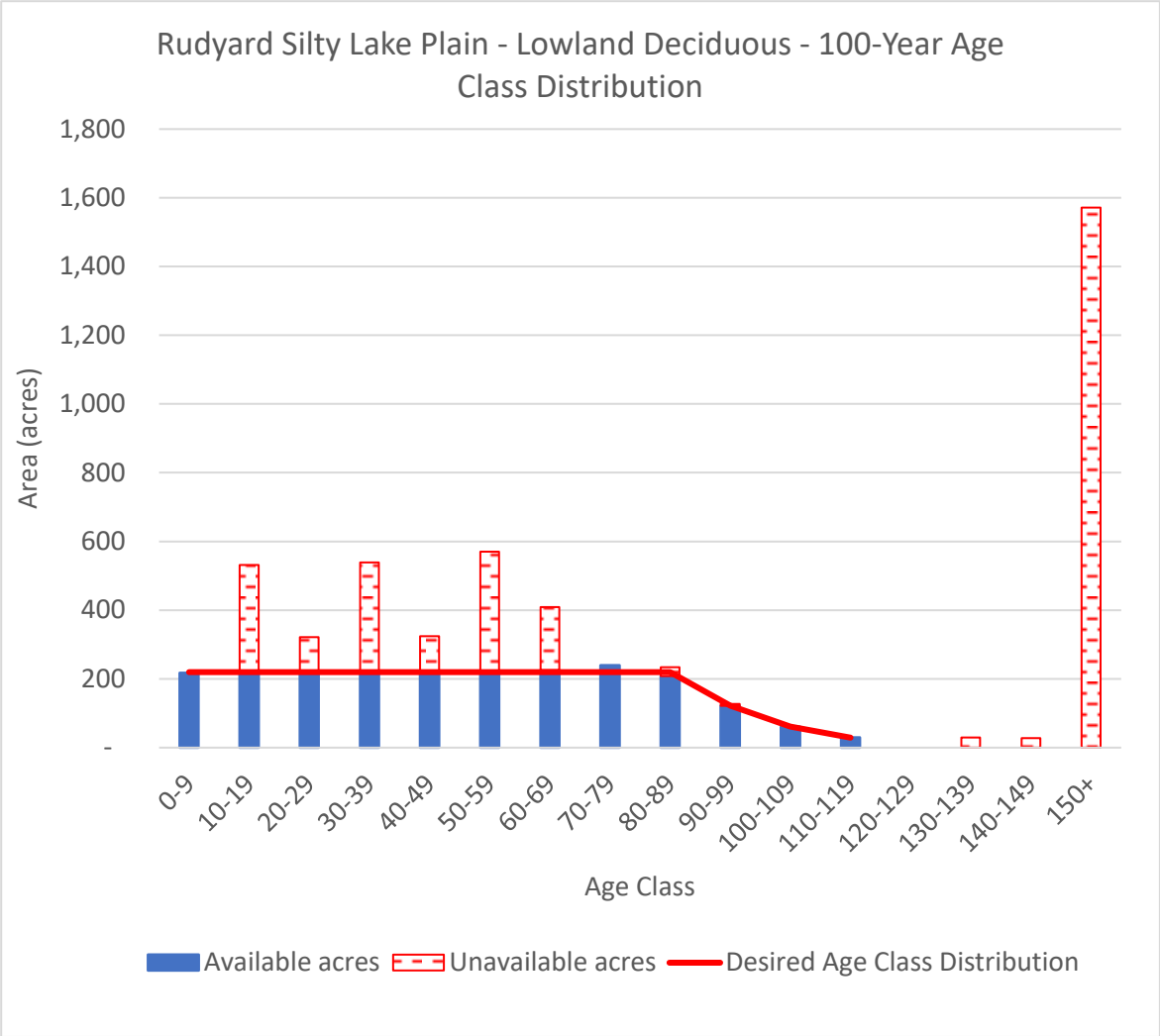


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 12) will concentrate on the manageable acres of lowland deciduous cover type in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

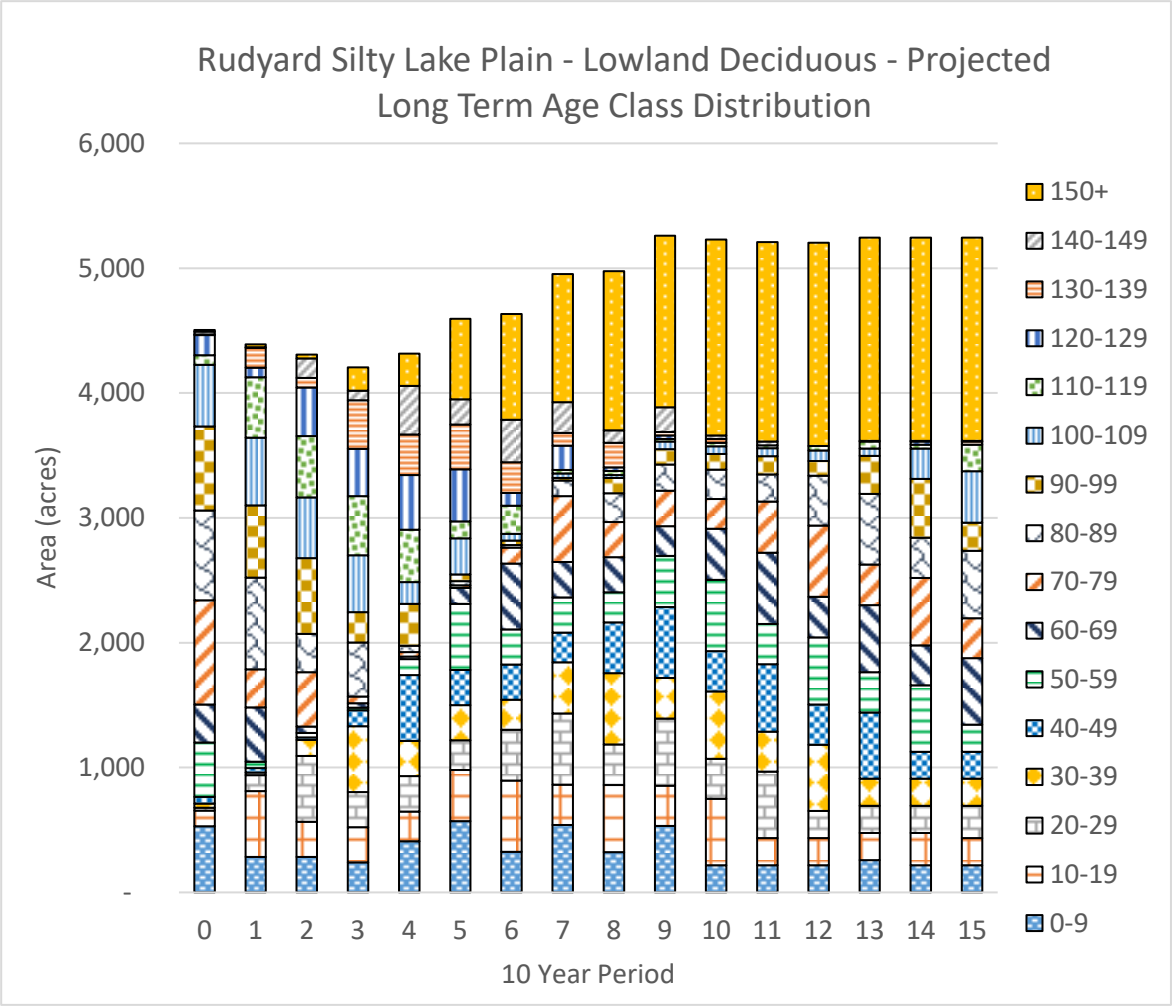


Figure 12. Projected age class distribution for all acres of lowland deciduous over the next 150 years in the Rudyard Silty Lake Plain Management Area.

Management actions

The desired future conditions and associated featured species habitat will be maintained and achieved through continued application of the projected harvest regime available on the 337 acres of projected clearcut harvest in the lowland deciduous cover type during the planning period. This is aligned with the desired establishment of lowland deciduous per decade for the 0- to 9-year-old age class.

Lowland spruce/fir

Current condition

The age class distribution is currently unbalanced in this management area. About 30% of the management area is unavailable for commercial harvest due to its landscape position or other management priorities such as unique natural communities or species of special concern. Unavailable acres will be subject to natural processes, resulting in a range of successional stages across this management area.

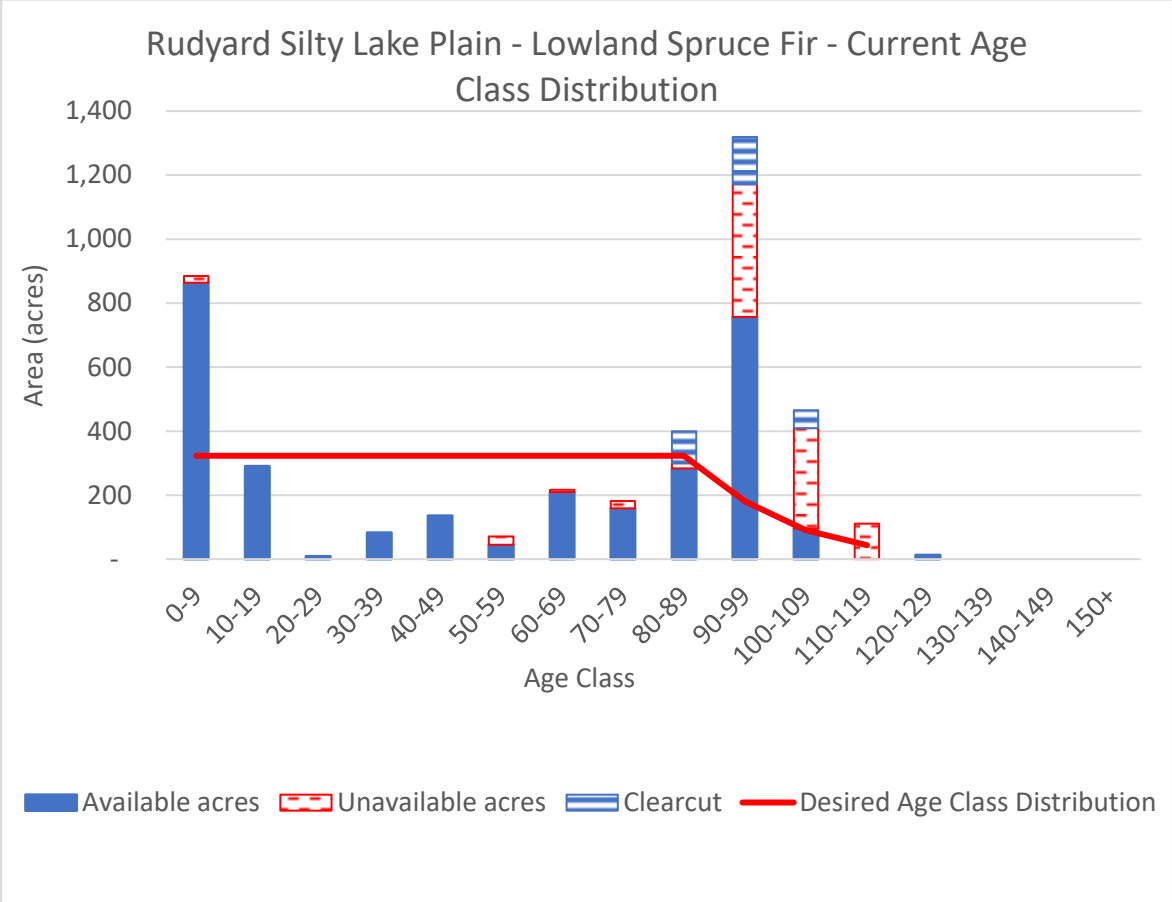


Figure 13. Current age class distribution and projected harvests in the lowland spruce/fir cover type in the Rudyard Silty Lake Plain Management Area.

Current conditions are a result of successful commercial harvest and natural regeneration efforts that have been in place in this management area for decades as well as unavailable acres due to landscape positions of the cover type. A portion of this cover type meets the habitat requirements for snowshoe hare (*Table 11*).

Table 11. Featured species with lowland spruce/fir as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Spruce/Fir	Lowland Spruce/Fir Habitat Acres – Available	Lowland Spruce/Fir Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size class: sapling	1,155	21

Desired future condition

The projected long-term cover type trend for lowland spruce/fir is stable in the Rudyard Silty Lake Plain Management Area. There are very few projected transitions into or out of this cover type forecasted in the current planning period.

The long-term goal for this cover type is balanced age classes between 0 and 89 years old and a max lower proportion age class of 130 years old for all available lowland spruce/fir stands in this management area (Figure 14).

The end of the planning period will result in the establishment of 319 acres in the upcoming 0- to 9-year-old age class. Progress toward the long-term age class distribution of lowland spruce/fir will take many decades in the management area.

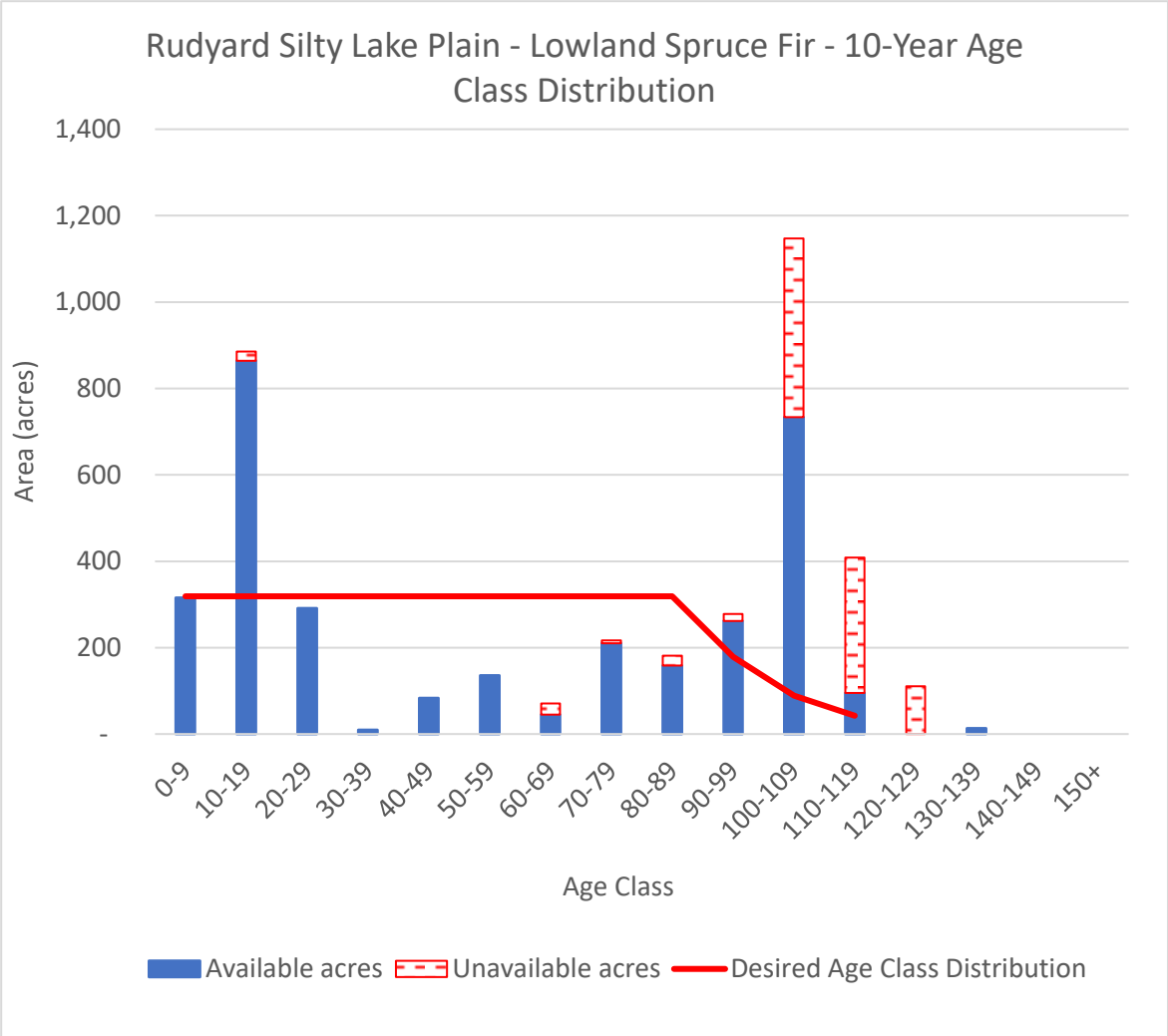


Figure 14. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of lowland spruce/fir acres nearly reaching the desired future condition, especially in the younger age classes. The older age classes continue to show deficits due to the unbalanced condition during the first planning period (Figure 15). As is often the case, an extremely unbalanced condition in the first planning period can result in the need to carry some acres slightly longer into older age classes in future years to meet the desired distribution and achieve age class goals. Unavailable acres of this cover type, due to their landscape position or other factors, will continue to age through natural processes.

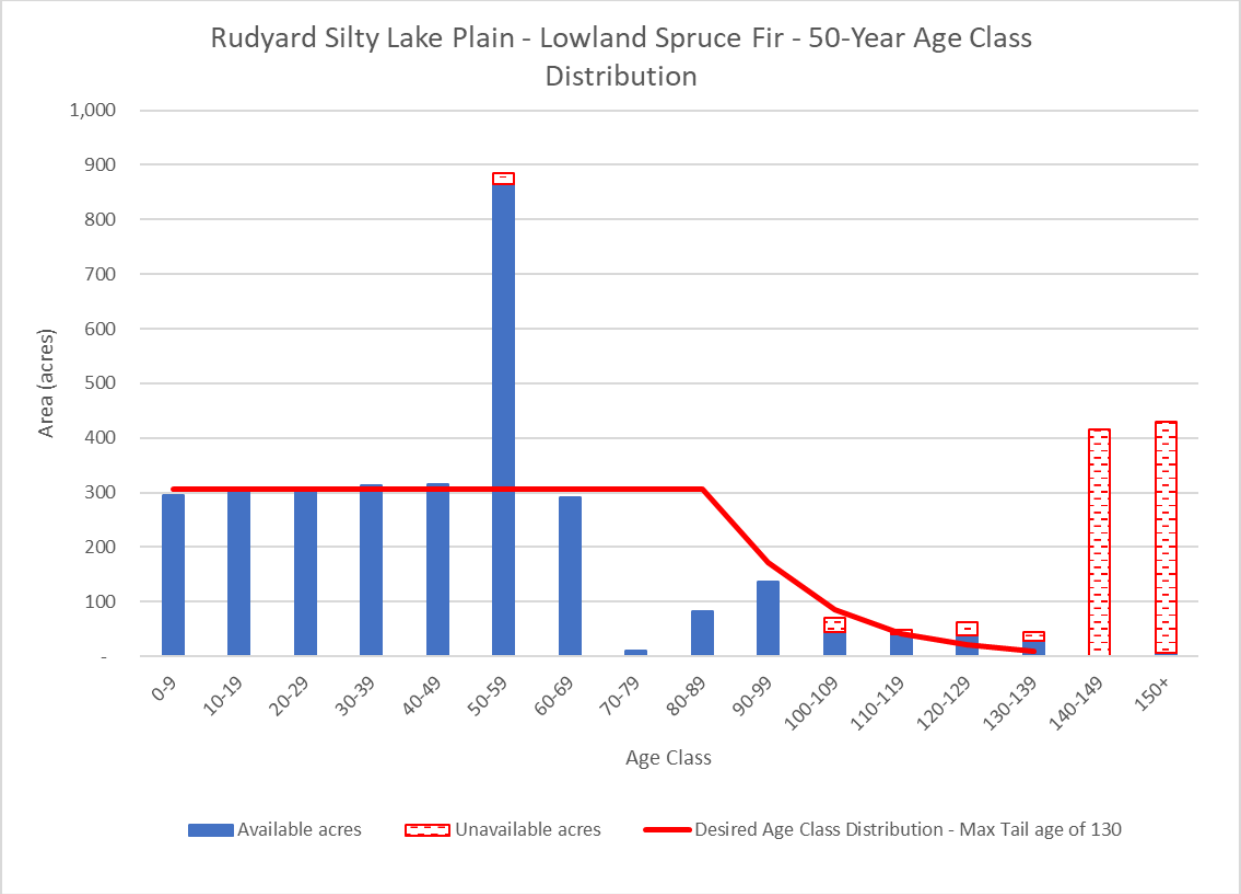


Figure 15. Projected midterm age class distribution at the end of the midterm planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 16) will concentrate on the manageable acres of lowland spruce/fir in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

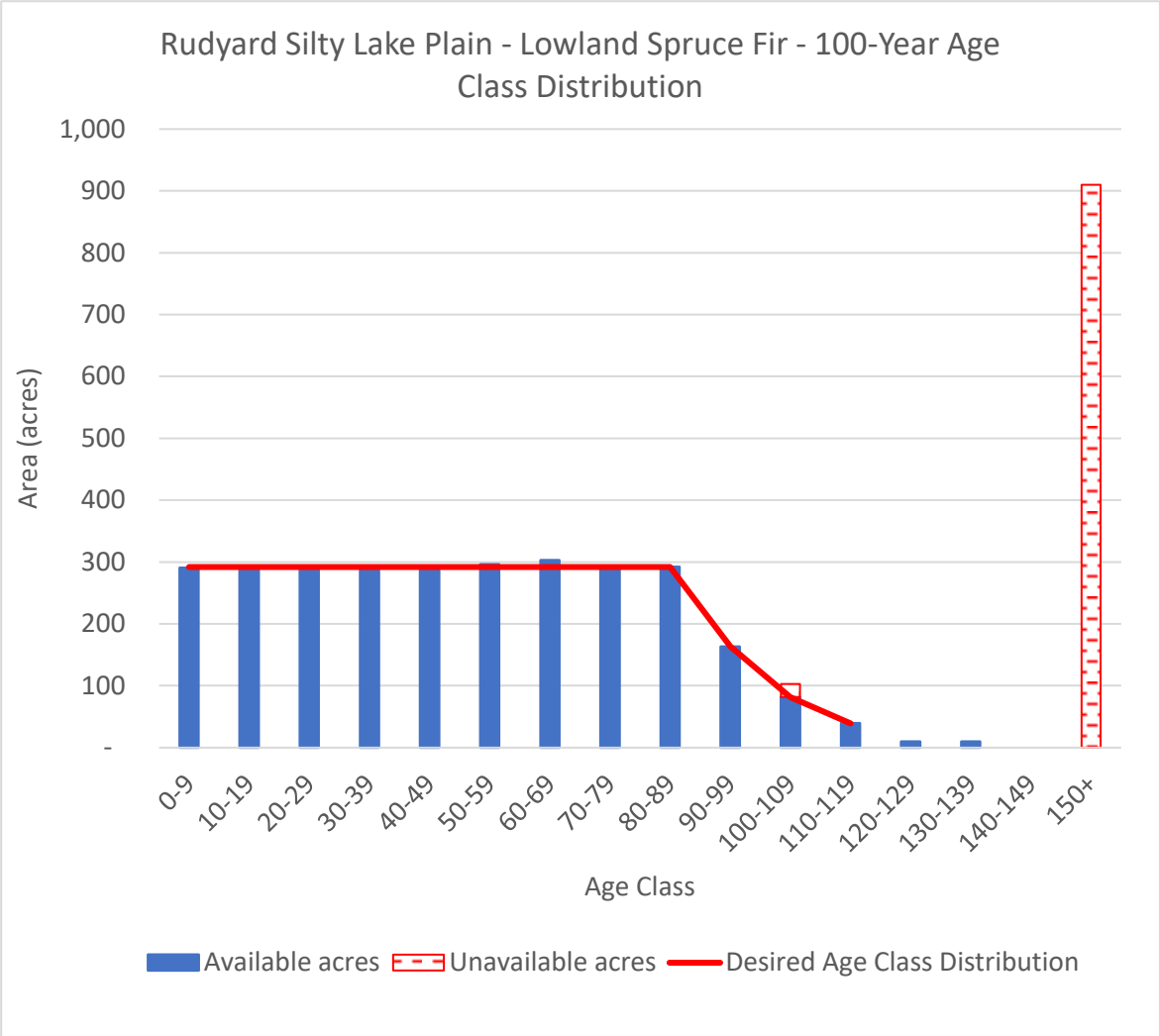


Figure 16. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

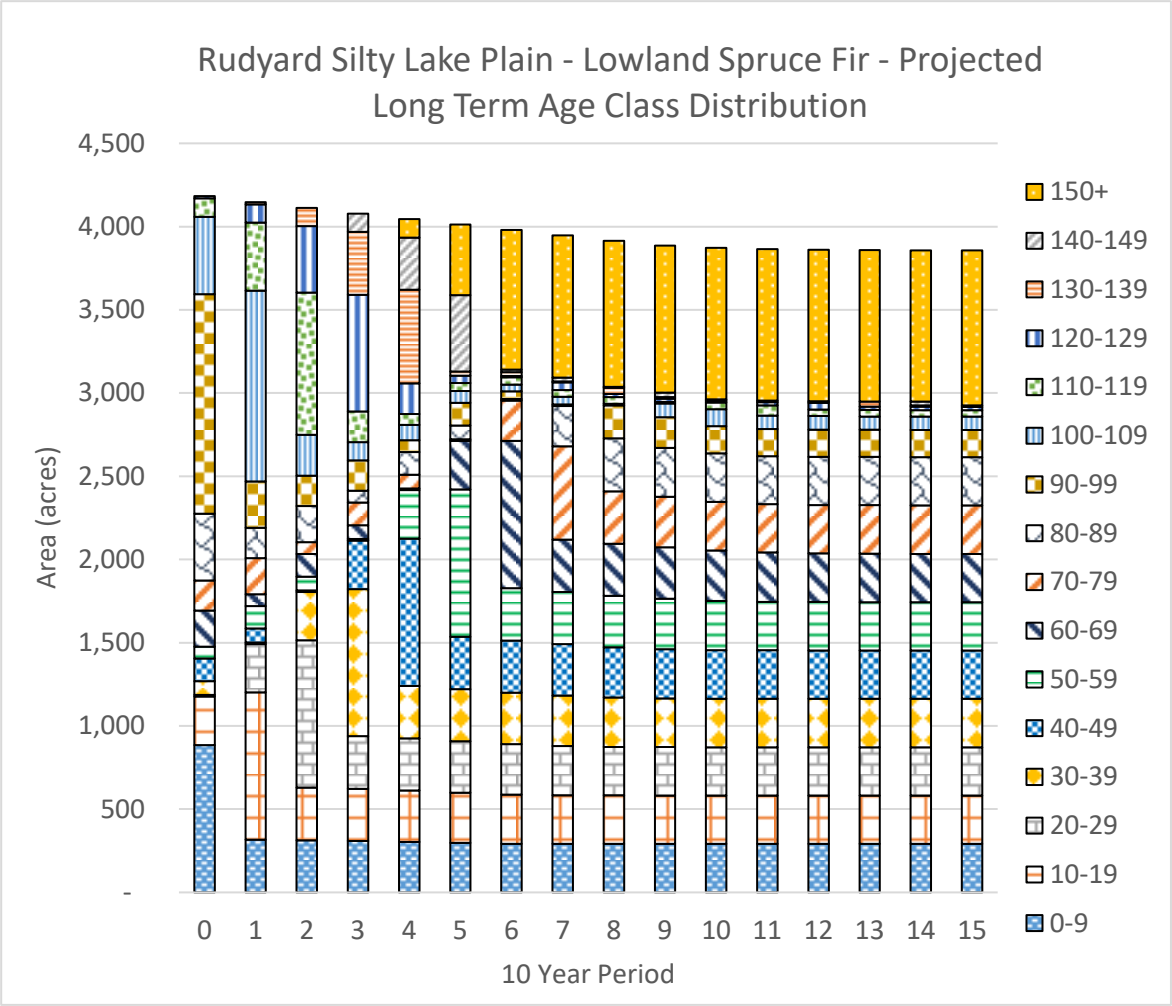


Figure 17. Projected age class distribution for all acres of lowland spruce/fir over the next 150 years.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected clearcut regime on 305 acres (Table 5). This projected harvest is nearly aligned with the desired age class distribution.

Lowland aspen/balsam poplar

Current condition

The Rudyard Silty Lake Plain Management Area has a surplus of acres in the 0- to 9-year-old age class due to the harvesting of mature and overmature acres on the landscape during the last planning period (Figure 18). The age class distribution is currently very unbalanced across almost all the age class categories. The landscape position on which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 80 years old.

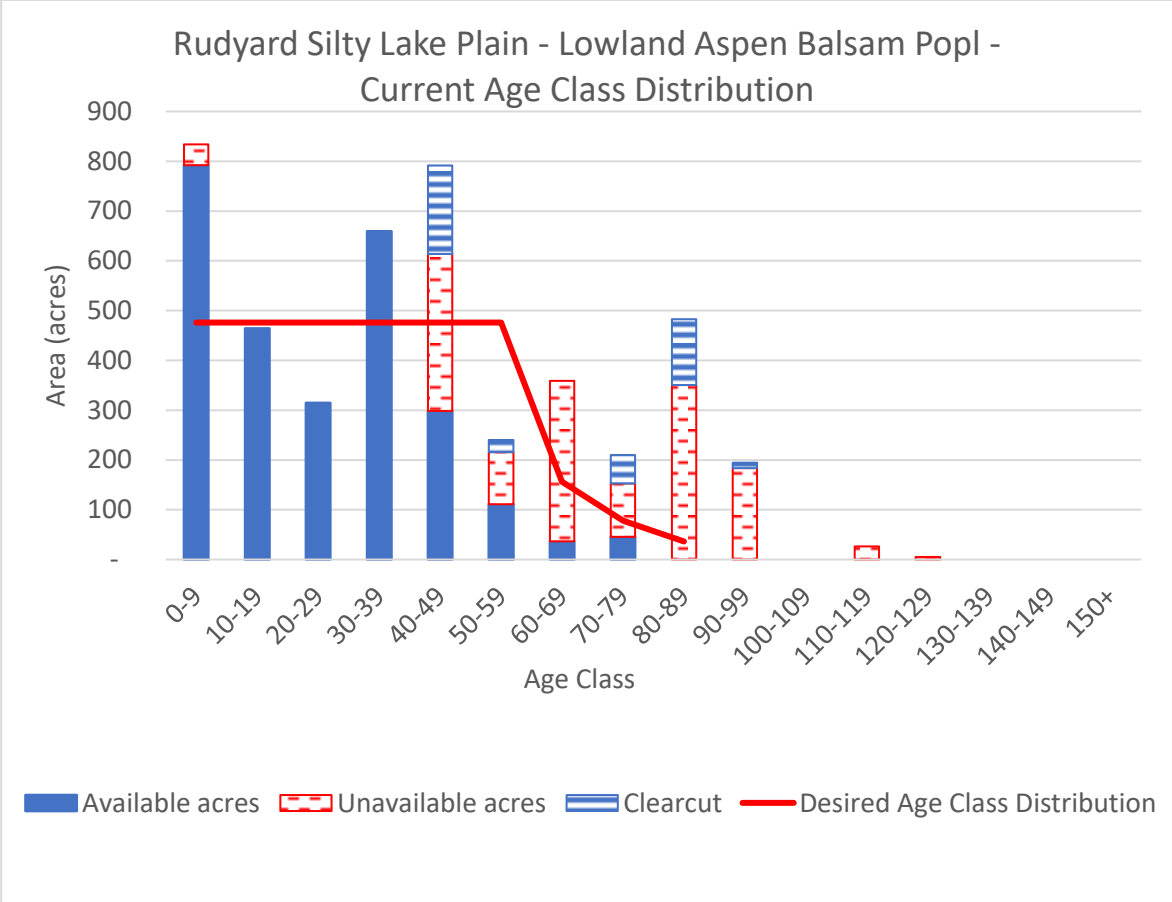


Figure 18. Current age class distribution, desired age class distribution and projected harvests in the aspen cover type in the Rudyard Silty Lake Plain management area.

Table 12. Featured species with lowland aspen/balsam poplar as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Aspen/Balsam Poplar	Lowland Aspen/Balsam Poplar Habitat Acres – Available	Lowland Aspen/Balsam Poplar Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size class: sapling	1,256	42
White-tailed deer	All ages and size classes	4,183	--

Desired future condition

The projected long-term cover type trend for lowland aspen/balsam poplar is stable in the Rudyard Silty Lake Plain Management Area. There is a slight increase in transitions into this cover type during this planning period and the following three planning periods, while longer-term projections for the cover type show a slight downward trend in midterm periods and acreages stabilizing after the ninth planning period (*Figure 21*).

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available lowland aspen/balsam poplar acres and lower proportions of available acres until the max tail of 80 years old is reached.

The end of the planning period will result in the establishment of approximately 511 acres of lowland aspen/balsam poplar from the available acres (*Figure 19*). It will take many decades to achieve the long-term desired balanced age class distribution of lowland conifers (*Figure 20*).

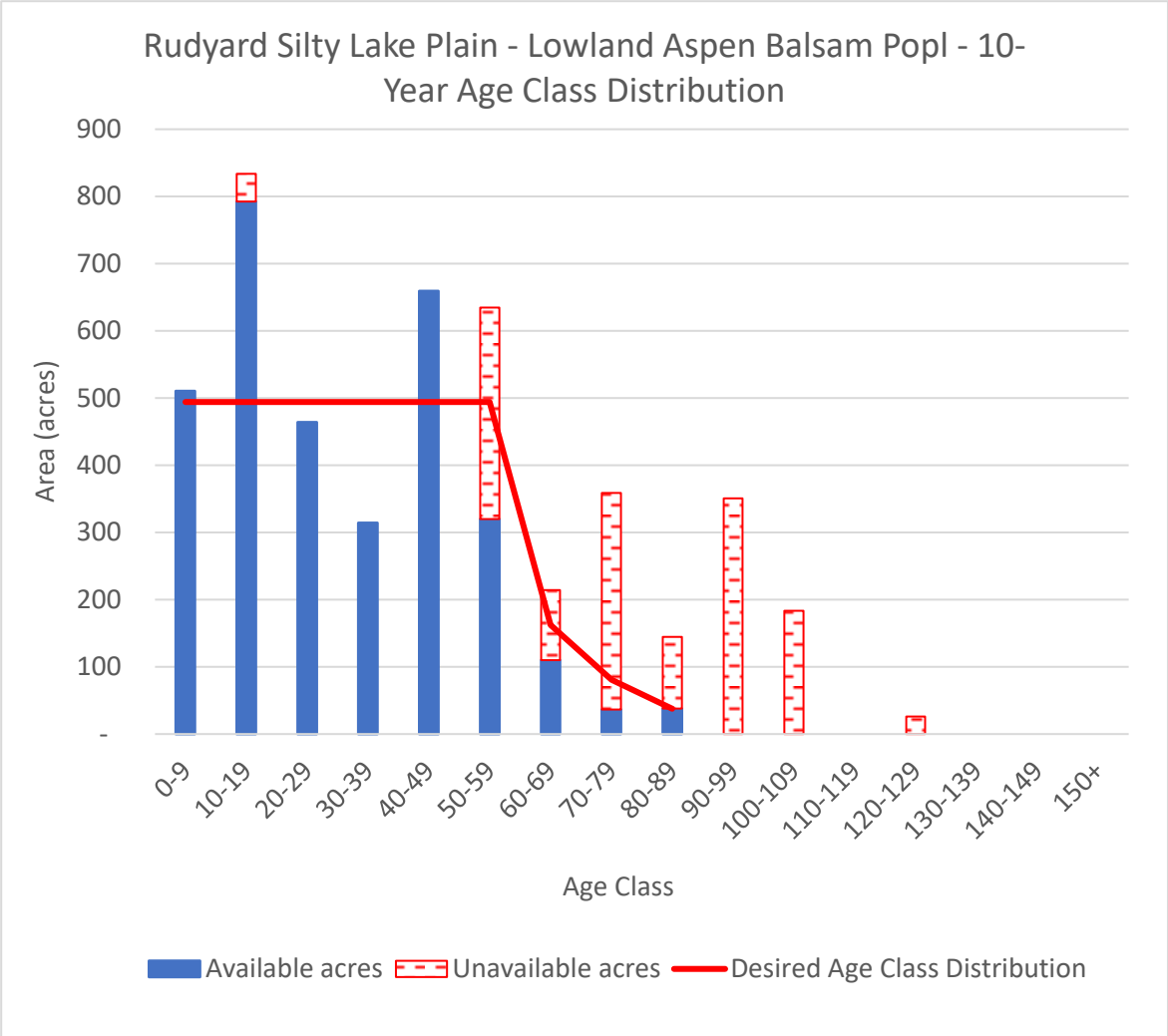


Figure 19. Short-term future age class distribution at the end of the 10-year planning period compared to long-term desired age class distribution.

The midterm age class distribution of lowland aspen/balsam poplar is nearing the desired future condition for available acres in the age classes. The number of acres in the older age classes, 90 years old and older, continues to increase as the unavailable acres continue to move to the older age classes (Figure 20).

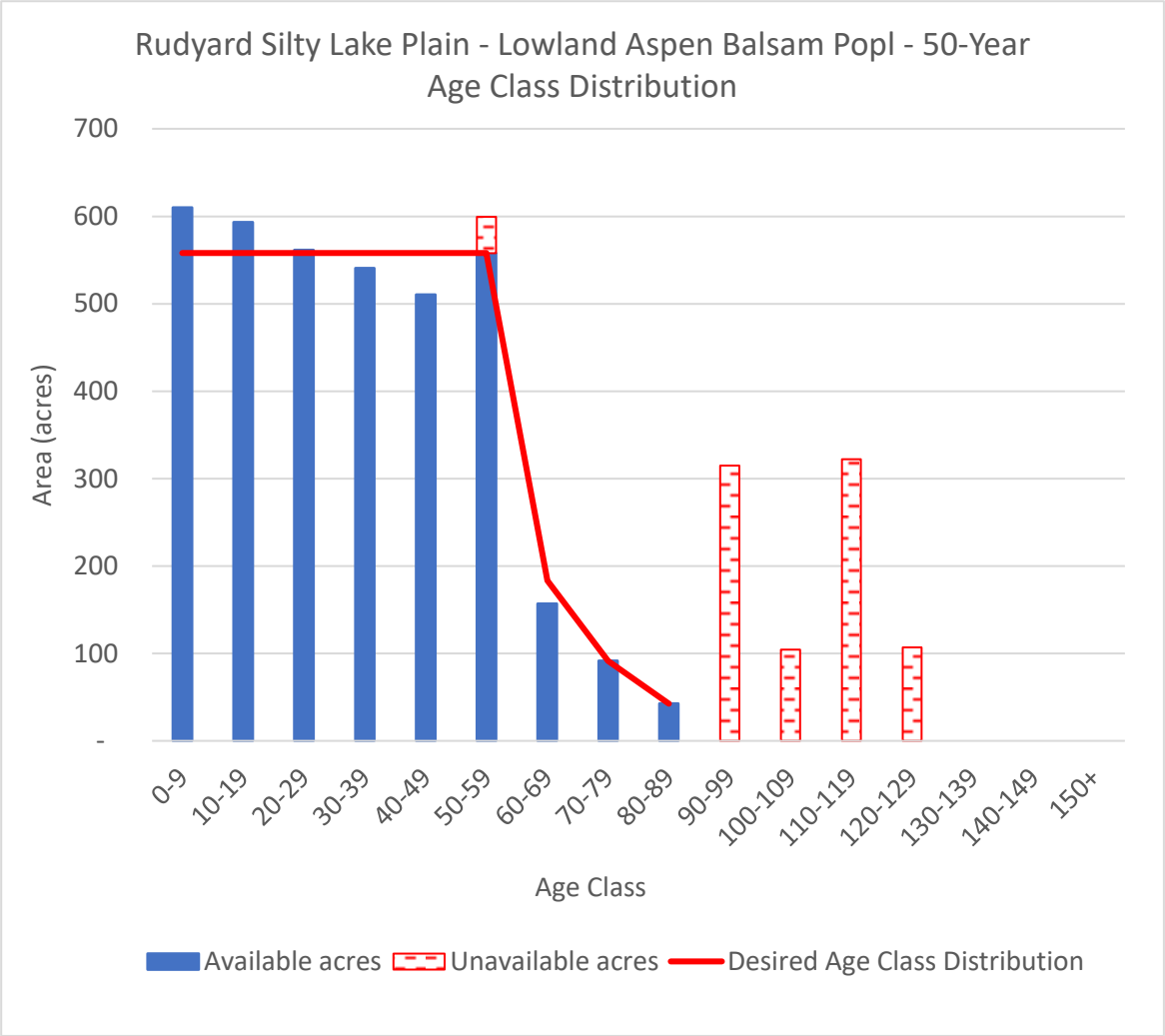


Figure 20. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (*Figure 21*) will concentrate on the manageable acres of lowland aspen/balsam poplar cover type in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

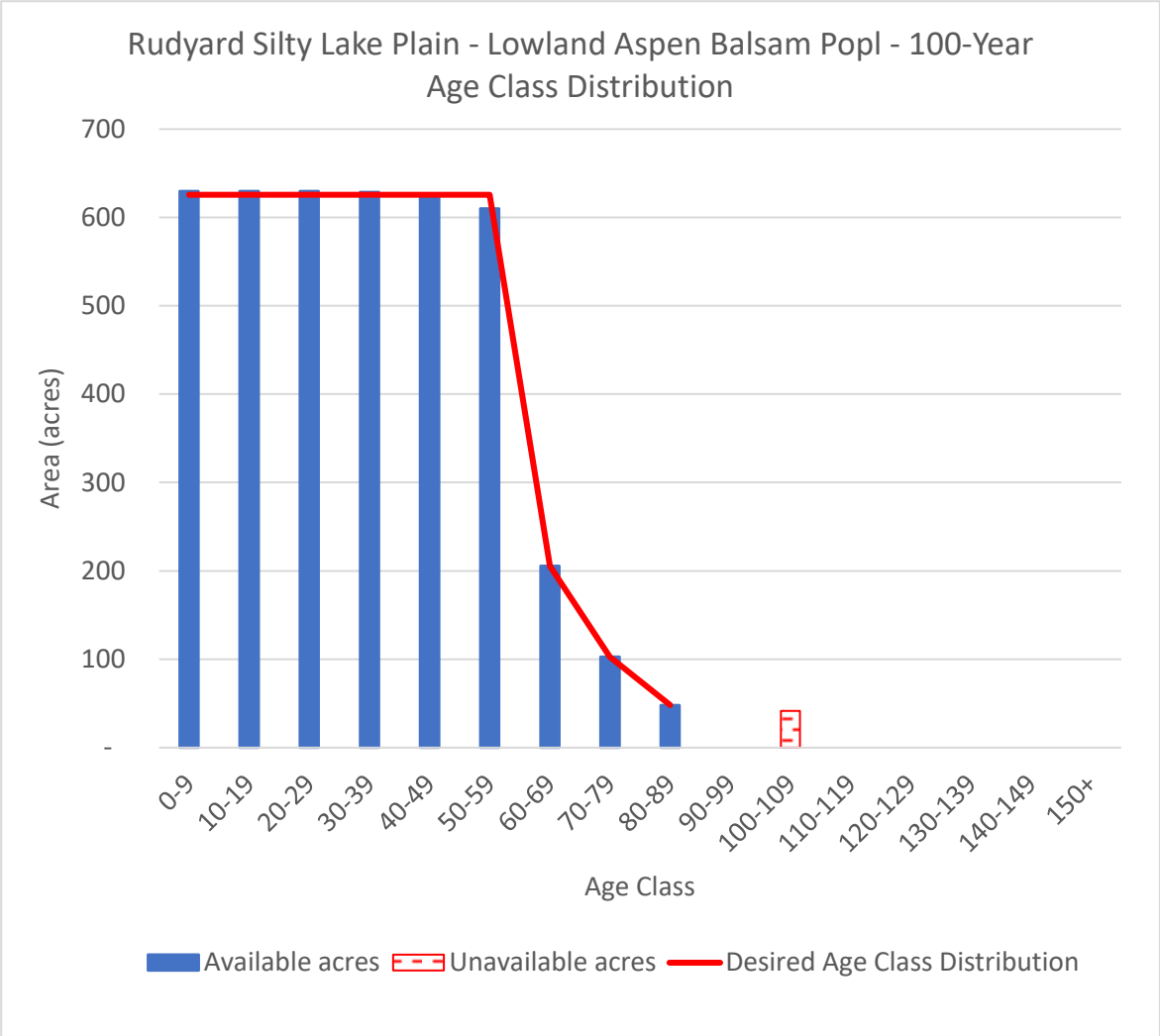


Figure 21. Projected long-term age class distribution at the end of the 10th planning period compared to long-term desired age class distribution.

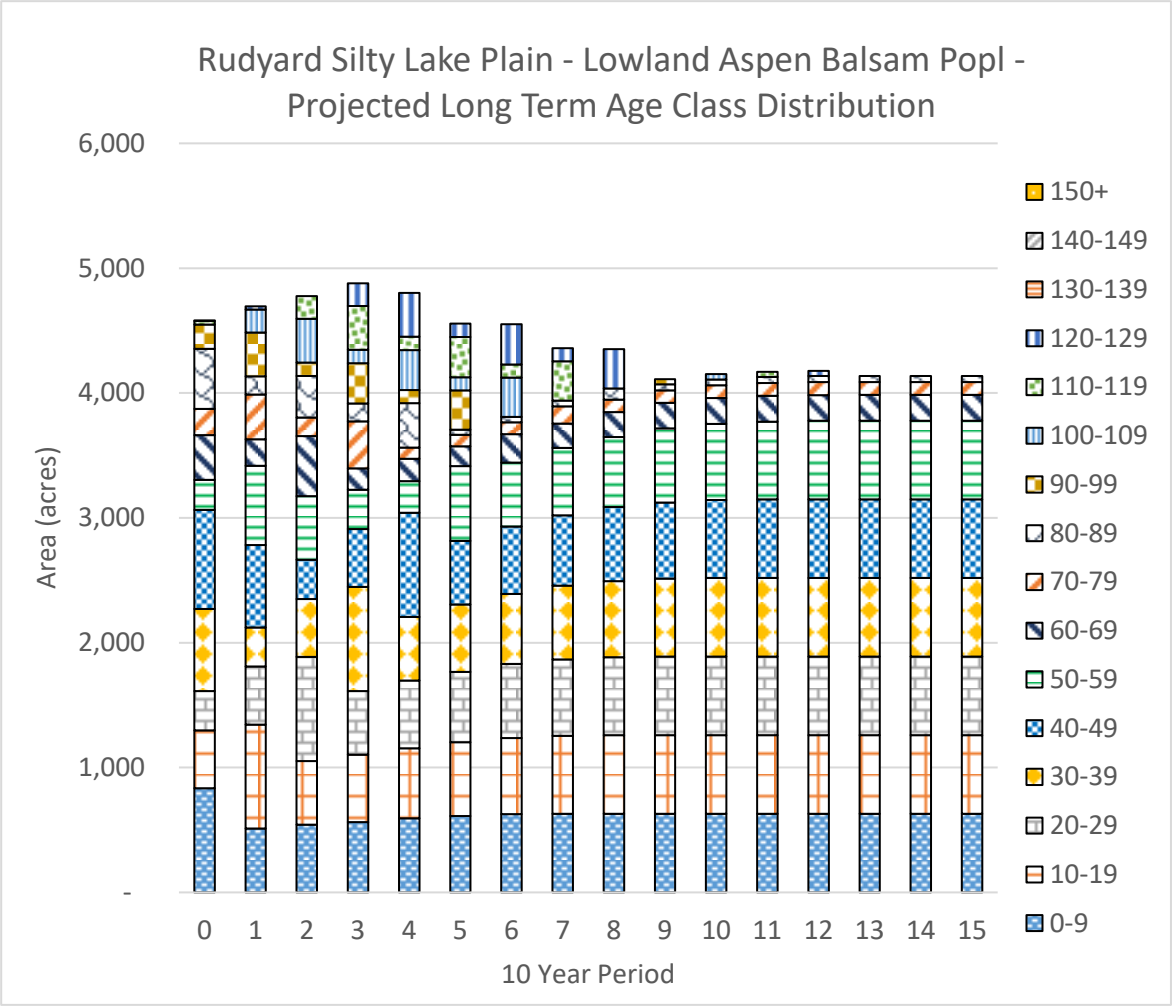


Figure 22. Projected age class distribution for all acres of lowland aspen/balsam poplar over the next 150 years in the Rudyard Silty Lake Plain Management Area.

Management actions

There are 404 acres of projected clearcut harvest in the lowland aspen/balsam poplar cover type during the planning period. This is just below the desired establishment of 494 acres of lowland aspen/balsam poplar per decade because of the current unbalanced age class condition and forecasted transitions into the cover type.

Conservation Area Network

High conservation value areas

There are up to nine different high conservation value area types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas within the Rudyard Silt Plain Management Area.

High Conservation Value Area Type and Name	Acres
Coastal environmental areas	**920**
	920
Dedicated management areas	**728**
	728
Deer wintering complex	**7,867**
	7,867
State wildlife management areas	**13,806**
Munuscong Bay SWMA	13,806
Verified Type 1 and Type 2 old growth	**45**
Type 1 old growth	45
Grand total	**23,366**

Ecological reference areas

Ecological reference areas, a type of HCVA, are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 15. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Great lakes marsh	AB			2
Existing ERA	Great lakes marsh	C			1
Existing ERA	Great lakes marsh	C	G2	S3	1
Existing ERA	Northern shrub thicket	B			1
Existing ERA	Poor fen	AB			1
Grand total					**6**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 14) are those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 15) are those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the Rudyard Silty Plain Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated recreational area	**306**
Algonquin Ski Trail	-
Kinross ORV Trailhead	1
Munoscong State Forest Campground	52
Pinebowl Pathway Trailhead	0
Rail Trail Corridor	253
Cultural or customary area	**22**
Wilson Road Sugar Bush	22
Mineral resource area	**85**
Chippewa County Road Commission	3
Payne & Dolan Inc.	83
Possible Type 1 or Type 2 old growth	**298**
--	298
Grand total	**711**

Table 17. Static special conservation areas within the Rudyard Silty Plain Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated trout and coldwater stream buffer		**442**
--		279
Hutton Creek		109
North Pine River		22
Sanderson Creek		16
South Branch Waiska River		17
Designated trout and coldwater streams	**16.9**	
--	10.5	
Hutton Creek	4.3	
North Pine River	0.8	
Sanderson Creek	0.7	
South Branch Waiska River	0.6	
Great Lakes islands		**11**
Round Island		8
Unknown		3
Important bird areas		**1,203**
Rudyard Clay Plain		816
Sault Sainte Marie Clay Plain		386
Wood turtle stream 100-foot buffer		**1**
Waiska River		1
Wood turtle stream 660-foot buffer		**20**
Waiska River		20
Grand total	**16.9**	**1,676**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory biotics database (Table 19, Table 20 and Table 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18. Rare plant and animal species conservation status key.

Species Status	Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal species occurrence within the Rudyard Silty Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Acipenser fulvescens	Lake sturgeon	T		1
Animal	Alces alces	Moose	SC		1
Animal	Ammodramus savannarum	Grasshopper sparrow	SC		1
Animal	Bombus borealis	Northern amber bumble bee	SC		2
Animal	Botaurus lentiginosus	American bittern	SC		2
Animal	Buteo lineatus	Red-shouldered hawk	SC		1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Chlidonias niger	Black tern	T		1
Animal	Cistothorus palustris	Marsh wren	SC		2
Animal	Coregonus artedi	Lake herring or cisco	T		1
Animal	Coturnicops noveboracensis	Yellow rail	T		2
Animal	Gallinula galeata	Common gallinule	T		1
Animal	Haliaeetus leucocephalus	Bald eagle	SC		9
Animal	Ixobrychus exilis	Least bittern	T		2
Animal	Myotis lucifugus	Little brown bat	T		1
Animal	Necturus maculosus	Mudpuppy	SC		1
Animal	Nycticorax nycticorax	Black-crowned night-heron	SC		1
Animal	Pandion haliaetus	Osprey	SC		3
Animal	Sterna hirundo	Common tern	T		1
Animal	Tympanuchus phasianellus	Sharp-tailed grouse	SC		3
Total	-	-	-	-	**36**

**Occurrence information provided by field staff.*

Table 20. Rare plant species occurrence within the Rudyard Silty Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Asplenium viride	Green spleenwort	SC		1
Plant	Draba cana	Ashy whitlow grass	E		1
Total	-	-	-	-	**2**

Table 21. Other rare species occurrence within the Rudyard Silty Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great blue heron rookery	Great blue heron rookery			2
Total	-	-	-	-	2

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 22).

Table 22. Non-ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non-ecological reference area natural communities within the Rudyard Silty Lake Plain Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Dry-mesic northern forest	CD	S3	G4	2
Grand total				**2**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Rudyard Silty Lake Plain management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar dispar	Non-native	Yes

Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Table 25. Maladies of concern in the Rudyard Silty Lake Plain management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Nectria cinnabarina	Native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No
Armillaria root rot	Armillaria mellea	Native	Yes

Aquatic resources

Riparian habitat

A total of 28 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as cold types comprise approximately 75% of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	1
Cold small river	0
Cold transitional stream	6
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	7
Warm transitional small river	0
Warm transitional large river	0
Warm stream	11
Warm small river	3
Warm large river	0

Lacustrine habitat

A total of seven lakes and ponds of at least 1 surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	6
100-499	1
500+	0

Wetlands

A total of 32,945 acres of wetlands are found in the management area (Table 28). Forested wetlands comprise approximately 90% of wetland types found in the management area.

Table 28. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	3,053
Forested	29,813
Riverine	79

Vernal pools and seeps

A total of 45 acres of vernal pools have been inventoried in the management area, while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub, marsh and lowland aspen/balsam poplar are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 29).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	1,545
Marsh	995
Lowland aspen/balsam poplar	600
Lowland deciduous	520
Lowland spruce/fir	427
Aspen	384
Lowland conifers	186
Cedar	178
Mixed upland deciduous	175
Herbaceous open land	148

Watershed vegetation cover

The management area includes portions of important watersheds of the Munuscong River and Waiska River (Table 30 and Table 31). Aspen and lowland communities are major cover types of the state forest in each watershed.

Table 30. Largest vegetative cover types (i.e., top five) and area for the area of the Munuscong River watershed located within the management area.

Cover Type	Acres
Aspen	1,778
Lowland spruce/fir	1,709
Marsh	1,050
Planted red pine	1,022
Cedar	961

Note: Area of lowland marsh is based on forest inventory mapping standards. Other plans may differ in area (acres) and scope.

Table 31. Largest vegetative cover types (i.e., top five) and area for the area of the Waiska River watershed located within the management area.

Cover Type	Area (acres)
Aspen	2,127
Lowland shrub	2,047
Lowland aspen/balsam fir	1,709
Lowland spruce/fir	1,080
Marsh	823

Recreation

The Rudyard Silty Lake Plain Management Area consists of several fragmented blocks, which limits access both for public recreation and management. Wet conditions also limit access in some areas, while facilitating preservation of the rich conifer swamp. Road access will continue to be monitored to control dumping issues and potential impact to wetland soils.

Motorized recreation trails in this management area include several snowmobile and off-road vehicle trails. The 31-mile Kinross Motorcycle Trail is restricted to motorcycle use only by DNR director's order. Hiking trails include the Algonquin and Pine Bowl pathways/ski trails. The Pine Bowl Pathway is also open to equestrian use (Table 32).

There is just one state forest campground (rustic) within the management area, located on the Munuscong River a few miles inland from the St. Marys River (Table 33).

Table 32. Designated recreation trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	Off-road vehicle (all types) Snowmobile	35.2 25.7
Nonmotorized recreation trails	Hiking Equestrian Biking Hunter access trails	14.5 6.0 0 0
Total		**81.4**

Note: Trail use types may overlap.

Table 33. State forest campgrounds.

Name	Number of sites
Munuscong River State Forest Campground	25

Munuscong State Wildlife Management Area is over 14,200 acres (a small portion is in the neighboring management area) on the shores of Munuscong Lake (St. Marys River). Munuscong supports a diversity

of habitats and wildlife. The area is popular for hunting, trapping, canoeing, kayaking and birding/wildlife viewing.

Elsewhere in the management area, deer hunting is popular within the large swamp portion, and there is a long history of waterfowl hunting along the St. Marys River. Bird-watching is an increasingly popular pursuit.

Table 34. Areas managed for hunting.

Type	Name	Number of Acres
State wildlife management areas	Munuscong Bay SWMA	13,841.5

Table 35. Boating access sites.

Name	Body of Water
Conley Point	St Marys River
Munuscong River State Forest Campground	Munuscong River

EUP management areas

Seney Lake Plain

State forest area: 331,187 acres	Location: Interior central and eastern Upper Peninsula	Population centers: Manistique Newberry
Subsection: Seney Lake Plain	Landforms: Beach ridges and depressions Sand spits Transverse sand dunes Sand bars	Land cover: Forested: 217,345 acres Nonforested: 113,841 acres

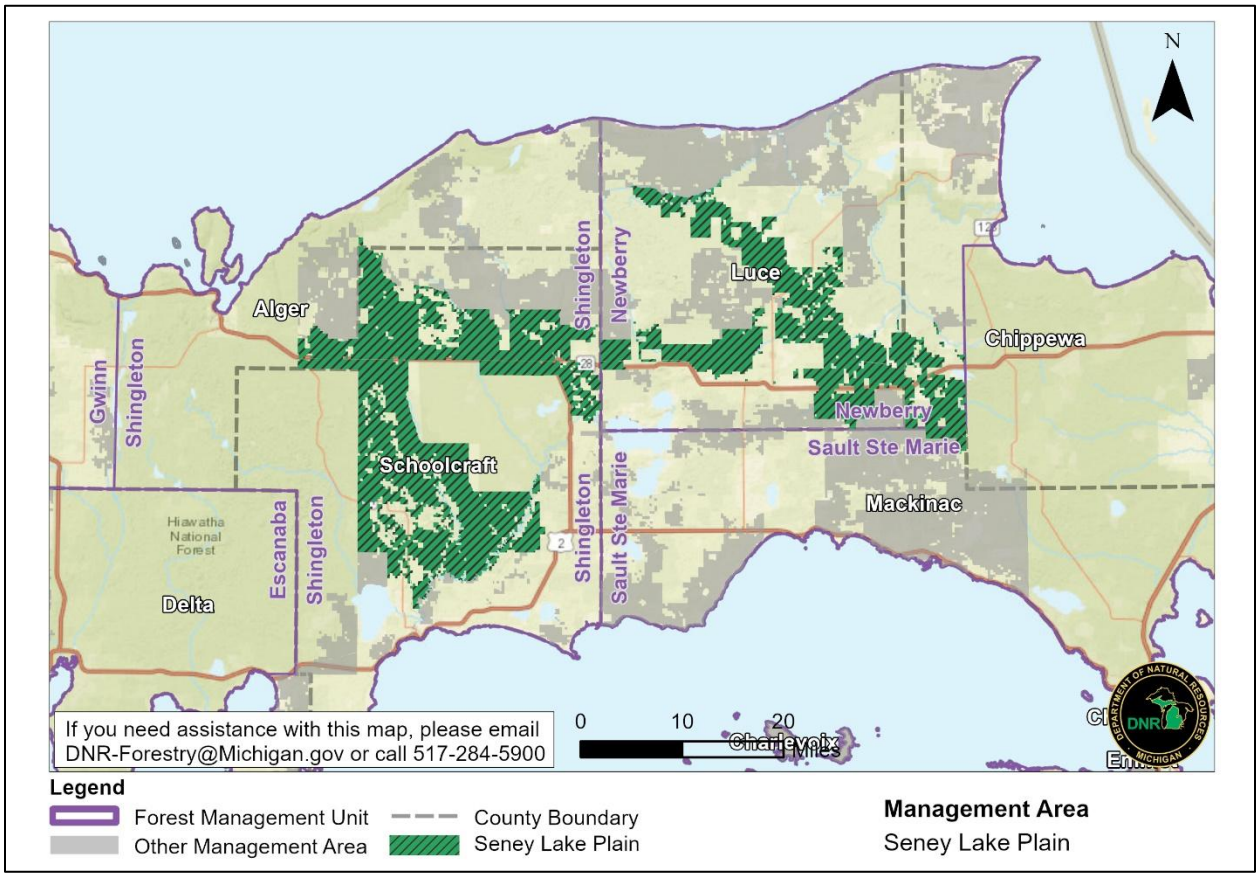


Figure 1. Seney Lake Plain Management Area.

Forested landscape

Current and projected future condition

The Seney Lake Plain Management Area includes a variety of tolerance levels occurring mostly in the mature and old age categories. The majority of tolerant cover types occur on unavailable lowlands in the old age category. Mid-tolerant cover types mostly occur on available uplands in the mature and old age categories, while the majority of the intolerant cover types occur in the mid-aged category on available uplands (Figure 2).

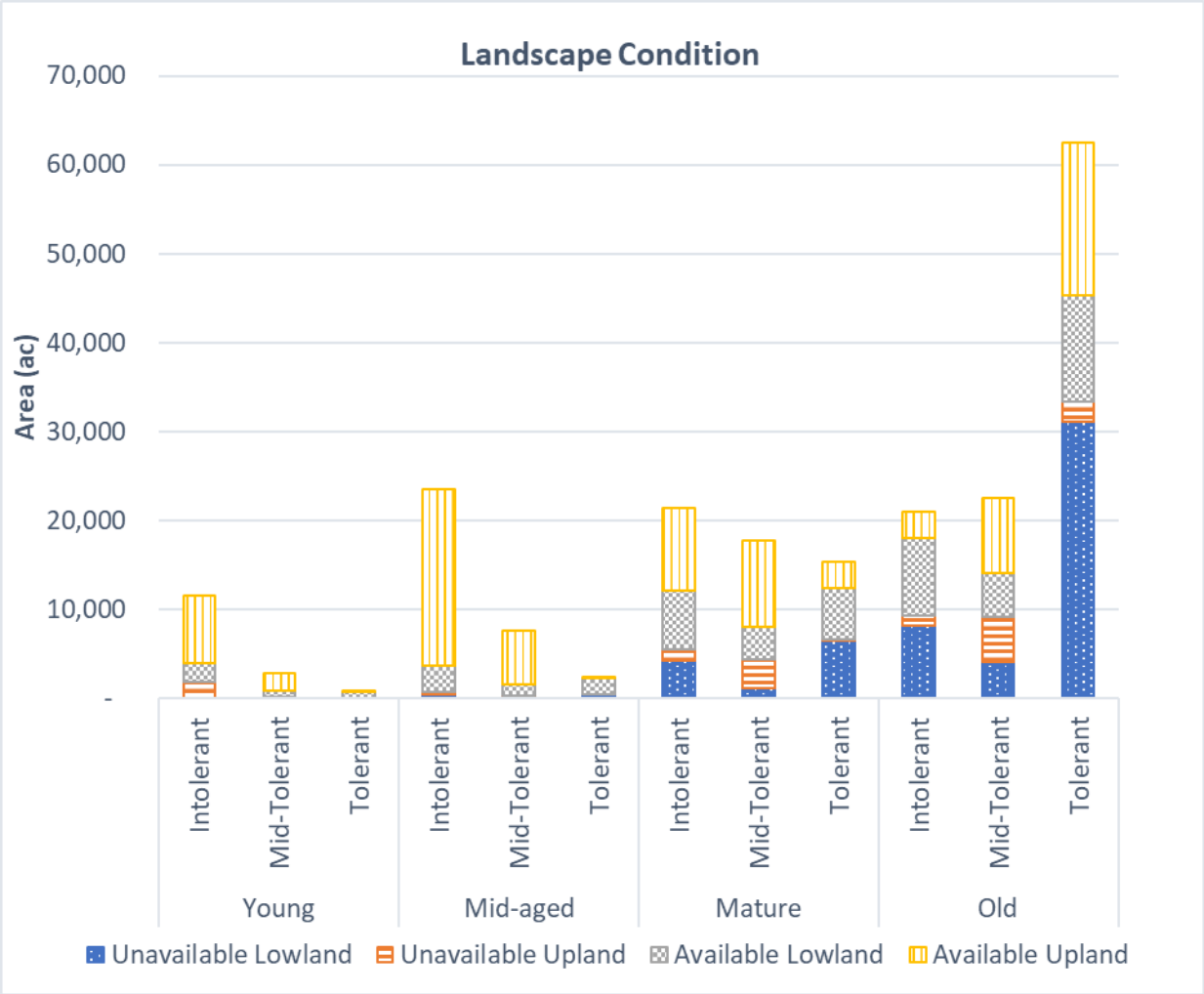


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (see Section 3) establish a baseline and future condition based on management over the planning period (

Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0- to 19-year stands in aspen and jack pine	9,309
Mature forest	Acres of 80-plus-year stands across cover types	105,921
Mature forest	Acres of 120-plus-year stands across cover types	45,655
Mesic conifer cover types	Acres of mesic conifer cover types	21,646
Mesic conifers in other cover types	Average canopy occupancy	52%
Mast – oak cover types	Acres of oak cover types	419
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	26,329
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	86,964
Nonforested openings	Acres of total herbaceous open land, upland shrub and crop land	3,995
Landscape forest matrix	Percent deciduous forest	24%
Landscape forest matrix	Percent coniferous forest	70%

The Seney Lake Plain Management Area has the following special analysis units. These SAUs have specific cover-type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this management area, SAU cover type goals take priority. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer wintering complex – Hulbert Hendrie Sage River
- Deer wintering complex – McMillan Ten Curves
- Deer wintering complex – Cusino
- Deer wintering complex – Indian Lake
- Deer wintering complex – Gulliver Scott Point Rock River

The Seney Lake Plain Management Area is comprised of 66% forested cover types and 34% nonforested cover types. Of the forested cover types, there is a near-even split between the upland and lowland landscape positions. The largest contributors to upland cover types are natural jack pine, aspen and northern hardwoods. Lowland conifer, cedar and lowland spruce/fir make up 27% of the lowland landscape position. Lowland shrub is the most common nonforested cover type in the management area, representing 18% of the landscape (

Table 2).

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	15,977	37,324	106,234	217,345
			Northern hardwood	17,821			
			Black/red hybrid oak	0			
			Northern red oak	250			
			Oak mix	219			
			Mixed upland deciduous	3,057			
		Mixed	Upland mixed forest	4,732	4,732		
		Coniferous	Planted red pine	5,796	64,179		
			Planted jack pine	4,353			
			Planted white pine	150			
			Planted mixed pine	368			
			Natural red pine	6,931			
			Natural jack pine	24,950			
			Natural white pine	3,963			
			Natural mixed pines	9,052			
			Upland spruce/fir	887			
			Upland conifers	6,543			
			Hemlock	1,188			
	Lowland	Deciduous	Lowland aspen/balsam poplar	5,095	15,182	111,111	
			Lowland deciduous	10,087			
		Mixed	Lowland mixed forest	7,658	7,658		
		Coniferous	Cedar	28,337	88,272		
			Lowland conifers	32,269			
			Lowland spruce/fir	22,188			
			Tamarack	5,478			
Nonforested	Upland	N/A	Herbaceous open land	3,687	N/A	5,346	113,841
			Upland shrub	304			
			Low density trees	287			
			Bare/sparsely vegetated	42			
			Cropland	4			
			Urban	1,022			
	Lowland	N/A	Lowland shrub	59,740	N/A	108,495	
			Marsh	23,580			
			Bog	2,260			
			Treed bog	17,847			
			Water	5,069			
						Grand total:	**331,187**

There are 151,296 acres (46% of the total management area and 67% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Seney Lake Plain Management Area (Table 3). Acres unavailable for management are categorized by site condition (Table 4). Of those, approximately 10% is within lowland conifers, about 10% in natural jack pine, 7.8% in northern hardwood and 7% in aspen cover types.

Table 3. Landscape conditions and cover type composition of the Seney Lake Plain Management Area.

SENEY LAKE PLAIN Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	15,048	6.9%	937	0.4%	15,985	7.4%
Cedar	6,350	2.9%	21,988	10.1%	28,338	13.0%
Hemlock	701	0.3%	487	0.2%	1,188	0.5%
Lowland aspen/balsam poplar	4,467	2.1%	629	0.3%	5,096	2.3%
Lowland conifers	15,983	7.4%	16,291	7.5%	32,274	14.8%
Lowland deciduous	6,342	2.9%	3,745	1.7%	10,088	4.6%
Lowland mixed forest	5,740	2.6%	1,918	0.9%	7,658	3.5%
Lowland spruce/fir	12,976	6.0%	9,225	4.2%	22,200	10.2%
Mixed upland deciduous	2,268	1.0%	789	0.4%	3,057	1.4%
Natural jack pine	21,494	9.9%	3,489	1.6%	24,983	11.5%
Natural mixed pines	5,480	2.5%	3,582	1.6%	9,061	4.2%
Natural red pine	4,939	2.3%	1,998	0.9%	6,937	3.2%
Natural white pine	2,920	1.3%	1,045	0.5%	3,966	1.8%
Northern hardwood	16,851	7.7%	974	0.4%	17,825	8.2%
Northern red oak	244	0.1%	6	0.0%	250	0.1%
Oak mix	219	0.1%	0	0.0%	219	0.1%
Planted jack pine	4,351	2.0%	3	0.0%	4,354	2.0%
Planted mixed pine	365	0.2%	3	0.0%	368	0.2%
Planted red pine	5,703	2.6%	99	0.0%	5,802	2.7%
Tamarack	2,539	1.2%	2,940	1.4%	5,478	2.5%
Upland conifers	5,111	2.4%	1,434	0.7%	6,545	3.0%
Upland mixed forest	4,151	1.9%	582	0.3%	4,733	2.2%
Upland spruce/fir	737	0.3%	150	0.1%	887	0.4%
Grand total	**145,127**	**66.7%**	**72,312**	**33.3%**	**217,439**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Conservation values	17,777	24.6%
Deer wintering area	13,182	18.2%
Unproductive	11,223	15.5%
Blocked by obstacle	8,306	11.5%
Best management practices	6,973	9.6%
Blocked by railroad	4,424	6.1%
Wildlife concerns	4,185	5.8%
Too wet	3,053	4.2%
Non-DNR agency concerns	975	1.3%
Federal/state/local law	973	1.3%
Long-term retention	364	0.5%
Denied access	320	0.4%
Nonmilitary lease/easement	298	0.4%
Too steep	96	0.1%
Other DNR/division processes	43	0.1%
Recreational/scenic	42	0.1%
Cannot regenerate	39	0.1%
Other influence zones	35	0.0%
Species of special concern or T&E	5	0.0%
Total unavailable	**72,312**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Seney Lake Plain Management Area has unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. Implementing these silvicultural regimes will yield approximately 318,101 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern hardwood	216	3,357	-	277	230	-	-	4,079
Natural jack pine	2,692	-	-	-	-	-	-	2,692
Lowland conifers	2,477	-	-	-	-	-	-	2,477
Aspen	2,232	-	-	-	-	-	-	2,232
Lowland spruce/fir	1,683	-	-	-	-	-	-	1,683
Upland conifers	1,027	-	-	-	201	-	-	1,228

Silvicultural Regimes								
Lowland aspen/balsam poplar	872	-	-	-	-	-	-	872
Lowland deciduous	596	-	-	-	7	-	-	603
Planted red pine	97	-	478	-	-	-	-	575
Lowland mixed forest	482	-	-	-	-	-	-	482
Upland mixed forest	443	-	-	-	-	-	-	443
Mixed upland deciduous	238	27	-	-	48	-	-	314
Natural mixed pines	-	-	130	-	131	-	-	261
Upland spruce/fir	113	-	-	-	-	-	-	113
Northern red oak	17	-	-	68	-	-	-	85
Natural red pine	-	-	31	-	31	-	-	62
Planted mixed pine	59	-	-	-	-	-	-	59
Oak mix	37	-	-	-	-	-	-	37
Natural white pine	-	-	14	-	13	-	-	28
Planted white pine	-	-	23	-	-	-	-	23
Planted jack pine	5	-	-	-	-	-	-	5
Totals	**13,284**	**3,384**	**676**	**345**	**662**	**-**	**-**	**18,351**

Table 6. Projected 10-year harvest volume by species.

10-Year Estimated Harvest Volume Projection Seney Lake Plain Management Area Product	Species	Volume Planned *	Volume Prepared* *
Pulpwood (cords)	Mixed hardwood	56,992	53,573
	Mixed softwood	42,767	40,201
	Jack pine	39,245	36,891
	Mixed spruce	24,405	22,940
	Mixed aspen	19,155	18,005
	Red pine	6,886	6,473
	White pine	6,551	6,158
	Mixed oak	2,554	2,401
	Pulpwood total	**198,555**	**186,642**
	White pine	17,305	16,267
	Red pine	12,254	11,519
	Sugar maple	12,158	11,429
	Red maple	7,698	7,236

10-Year Estimated Harvest Volume Projection Seney Lake Plain Management Area Product	Species	Volume Planned *	Volume Prepared**
Sawtimber (MBF)	Mixed aspen	4,733	4,449
	Red oak	2,452	2,305
	Basswood	1,280	1,203
	White oak	215	202
	Mixed oak	203	191
	Sawtimber total	**58,299**	**54,801**
	Total sawtimber harvest volume in cords	**119,545**	**112,373**
	Grand total harvest volume in cords	**318,101**	**299,015**

*Volume estimates based on 100% of the projected harvests for the 10-year planning period.

**Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

Although many cover types within the management area are projected to remain stable, there are some significant cover-type transitions projected (Table 7). Lowland mixed forest has the largest influx from other cover types, specifically lowland conifers and lowland spruce/fir. The lowland mixed forest cover types are projected to increase in acreage by approximately 14% or 1,136 acres, while lowland conifer cover types are expected to decrease by nearly 2.7% or 862 acres. This forecasted cover type transition supports objectives of the deer wintering complex special analysis units to move toward 50% of the complex as sustainable food stands, while maintaining all primary shelter and secondary shelter where possible. There is also a forecasted decrease in natural jack pine cover type by 3.7% or 917 acres.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Lowland conifers	32,269	31,407	-862
Cedar	28,337	28,337	0
Natural jack pine	24,950	24,033	-917
Lowland spruce/fir	22,188	21,969	-218
Northern hardwood	17,821	17,920	98

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Aspen	15,977	16,101	124
Lowland deciduous	10,087	10,124	37
Natural mixed pines	9,052	9,060	8
Lowland mixed forest	7,658	8,794	1,136
Natural red pine	6,931	6,931	0
Upland conifers	6,543	6,835	292
Planted red pine	5,796	6,016	220
Tamarack	5,478	5,478	0
Lowland aspen/balsam poplar	5,095	5,018	-77
Upland mixed forest	4,732	4,749	17
Planted jack pine	4,353	4,506	153
Natural white pine	3,963	3,963	0
Mixed upland deciduous	3,057	3,149	92
Hemlock	1,188	1,188	0
Upland spruce/fir	887	830	-57
Planted mixed pine	368	327	-40
Northern red oak	250	242	-8
Oak mix	219	219	0
Planted white pine	150	150	0
Black/red hybrid oak	0	0	0
Lowland shrub	59,740	59,740	0
Marsh	23,580	23,580	0
Treed bog	17,847	17,847	0
Water	5,069	5,069	0
Herbaceous open land	3,687	3,687	0
Bog	2,260	2,260	0
Urban	1,022	1,022	0
Upland shrub	304	304	0
Low density trees	287	287	0
Bare/sparsely vegetated	42	42	0
Cropland	4	4	0
Total:	**331,187**	**331,187**	**0**

Featured species current and projected habitat acres

There are 15 featured species in this management area that span various cover types, age classes and stand-level conditions.

As noted in the featured species management priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres, those are potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the featured species management priority (see Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 and 60 years; this is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	6,024	6,896	7,559	7,720
Black bear	Generalist/mast	26, 329	--	--	--
Black-backed woodpecker	Natural disturbance	--	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	24,322	29,678	28,402	40,273
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed	61,962	72,504	70,931	85,756

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
	forest, lowland conifers, hemlock, cedar				
Moose	To be determined	--	--	--	--
Red crossbill habitat	Natural red pine, natural white pine, natural mixed pine, planted red pine	3,585	3,233	4,771	6,513
Ruffed grouse	Aspen	3,340	3,858	4,640	4,753
Sharp-tailed grouse	Herbaceous open land, upland shrub, low density trees, lowland shrub, bog, treed bog	84, 125	--	--	--
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	30,269	32,785	21,029	21,607
Spruce grouse, mature	Natural jack pine, natural white pine, natural mixed pine, upland conifer, upland spruce/fir, lowland spruce/fir, lowland conifer, tamarack	36,416	37,787	55,729	59,342
Spruce grouse, young	Jack pine (natural and planted)	10,142	6,822	5,783	5,665
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	64,895	66,631	70,231	74,000
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine,	117,670	116,745	117,571	116,623

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
	natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers				
Wood thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	19,520	22,838	18,958	27,016
Wood turtle	Nonforested openings	--	--	--	--

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods, as well as balance food and shelter in deer wintering complexes. The following sections will provide additional details for each of the significant cover types in the Seney Lake Plain Management Area.

Cover type composition and associated featured species

Natural jack pine

Current condition

Most of the natural jack pine cover type is currently between stand ages of 0 and 49 years old in the Seney Lake Plain Management Area (Figure 3). The age class distribution is currently unbalanced, especially in the 0- to 49-year-old age classes, where the bulk of acres occur. There is a deficit in the 50-59 and 60-69 age classes, which will lead to a deficit in the 0- to 9-year-old age class for the next planning period. A small number of acres extend beyond the desired maximum age class distribution.

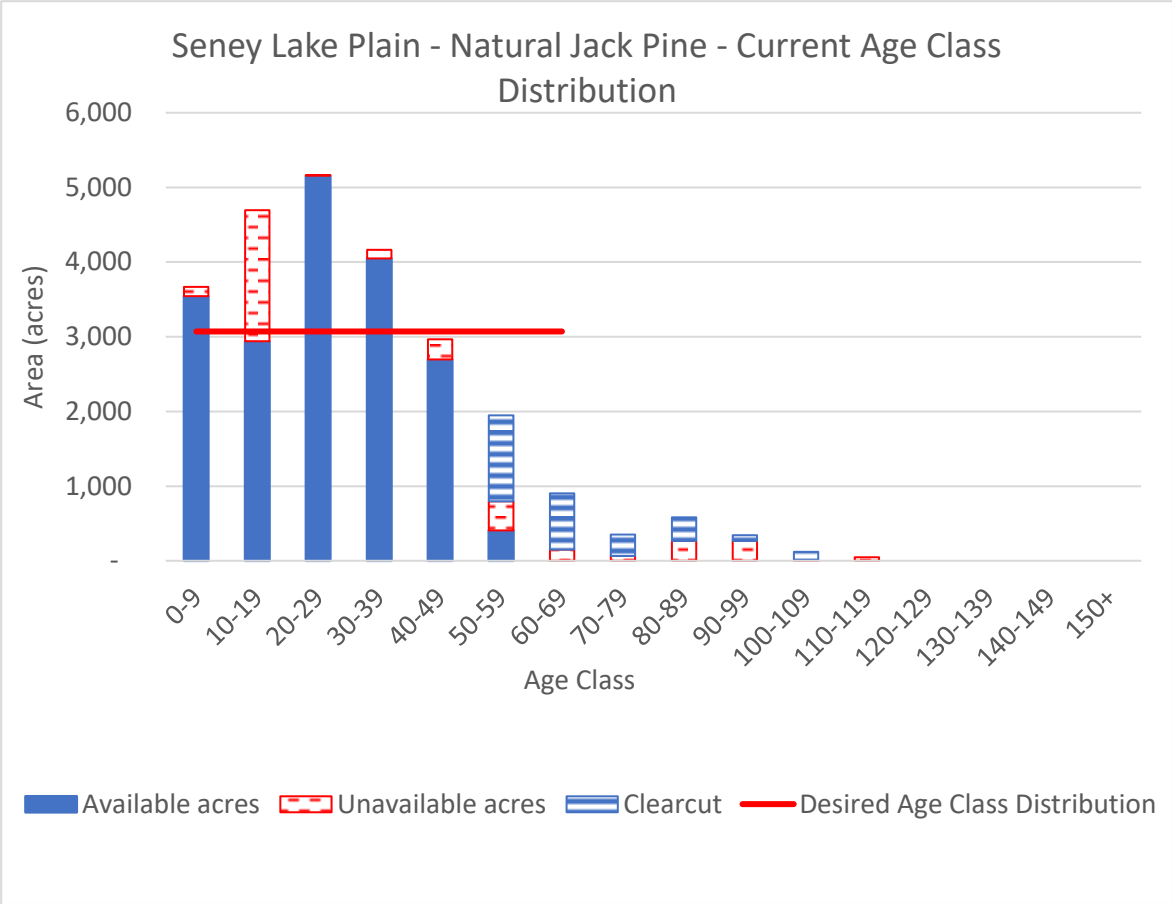


Figure 3. Current age class distribution and projected harvests in natural jack pine cover type in the Seney Lake Plain Management Area.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available jack pine acres during the previous two planning periods. A portion of this cover type meets the habitat requirements for snowshoe hare and spruce grouse.

Table 9. Featured species with jack pine as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Jack Pine	Jack Pine Habitat Acres – Available	Jack Pine Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	6,484	1,877
Spruce grouse	Age category: 0-19 Size category: sapling	8,265	1,877
Spruce grouse	Age category: 40+ Size category: sawlog	1,652	392

Desired future condition

The projected long-term cover type trend for natural jack pine is decreasing in the Seney Lake Plain Management Area. A significant proportion of the natural jack pine area falls in the unavailable category, and with natural succession, will eventually transition into other cover types long-term. Habitat elements in this cover type will be preserved due to the abundance of adjacent cover types.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old for all available jack pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of jack pine budworm outbreaks and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of a desirable number of acres in the 0- to 9-year-old age class. Progress toward the long-term desired age class distribution of jack pine will take many decades of even-aged management in this management area (Figure 5).

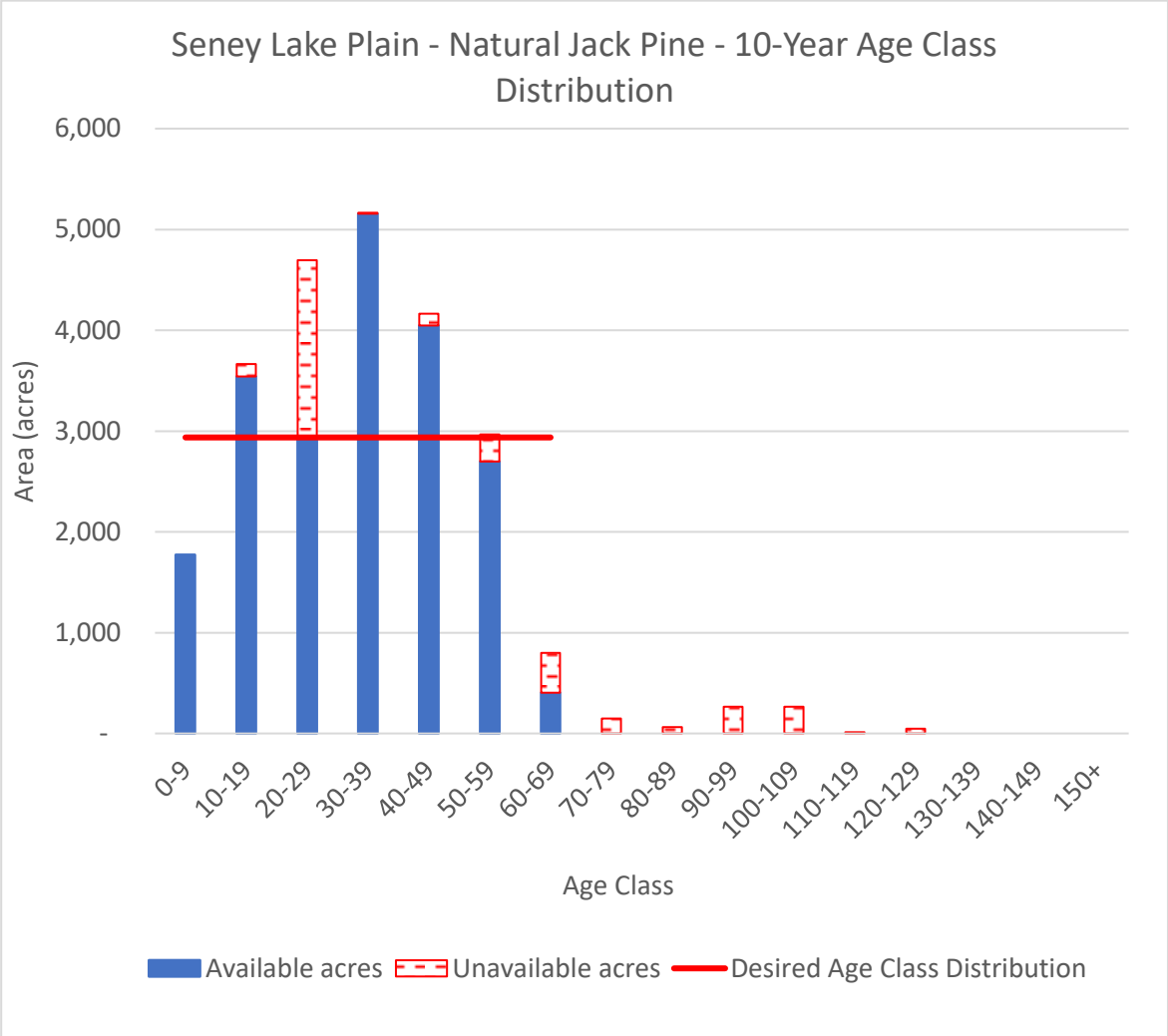


Figure 4. Short-term future age class distribution at the end of the 10-year planning period.

The midterm age class distribution of jack pine is beginning to reach the desired future condition for available acres (Figure 5). There is an increase in acres in the older age classes, beyond the desired age

of 60 years old, due to the number of unavailable acres in this management area. As is often the case, unbalanced age classes may result in the need to leave some acres in older age classes to achieve the desired age class distribution in future planning periods compared to the long-term desired age class distribution.

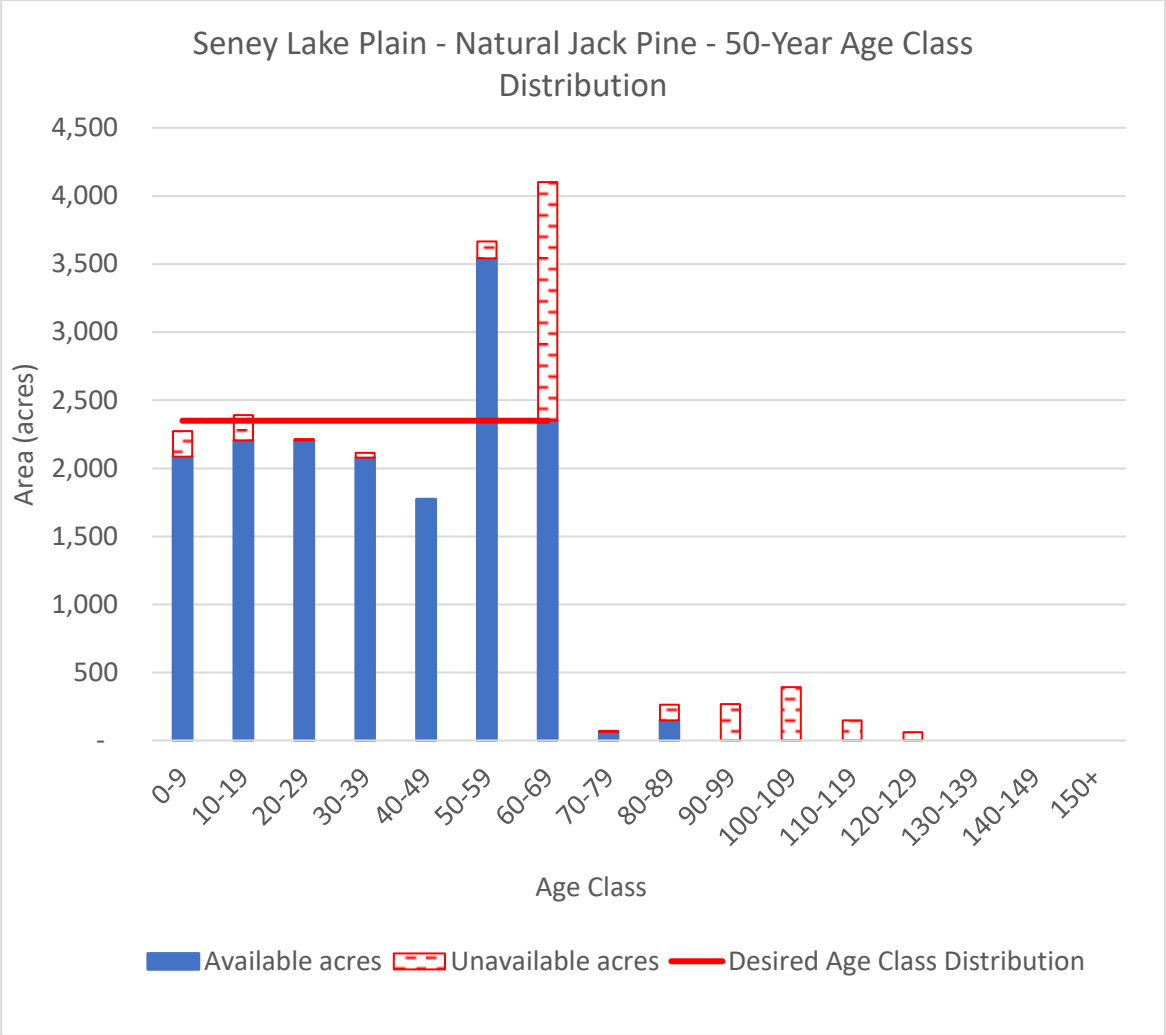


Figure 5. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of jack pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

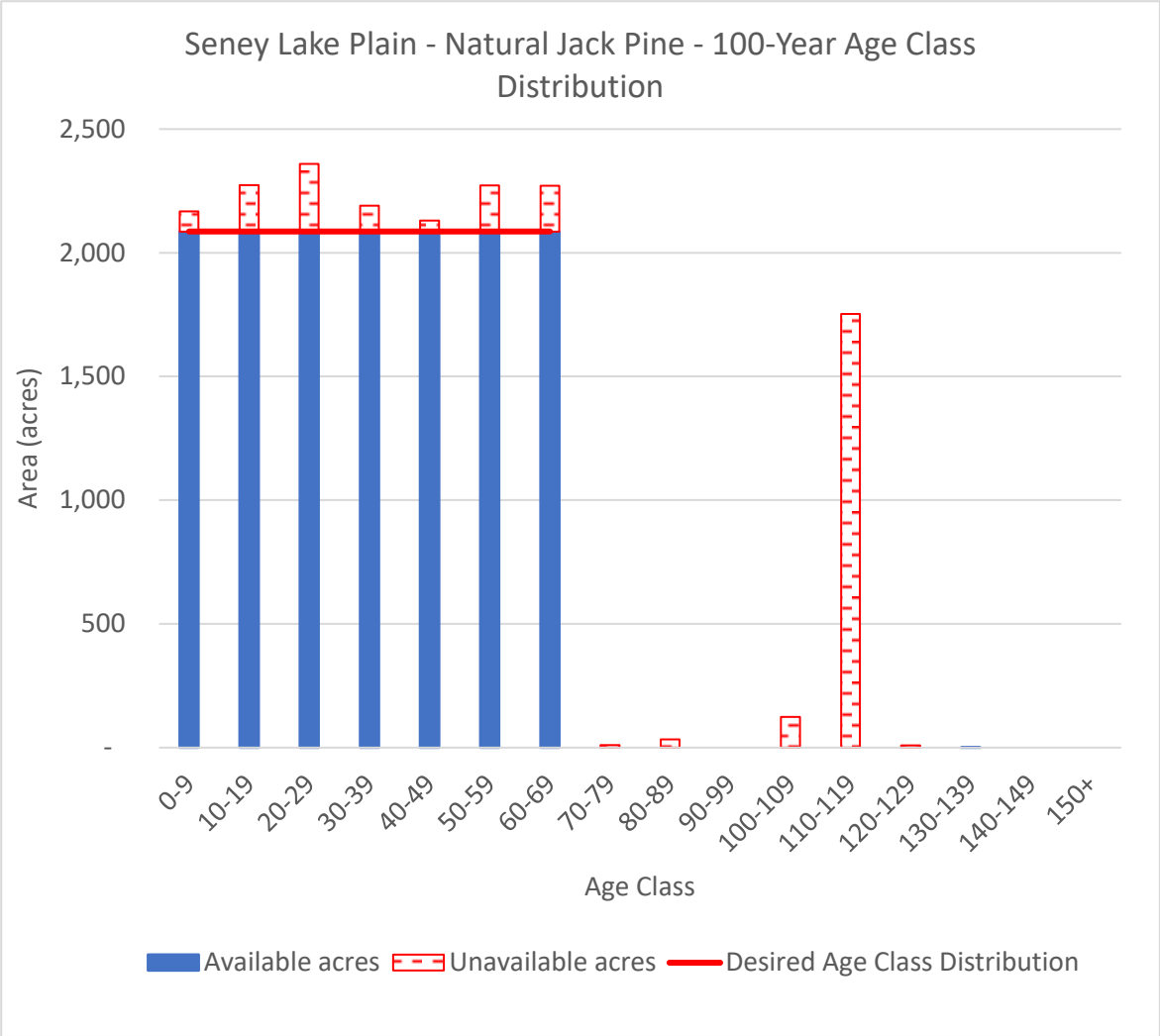


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

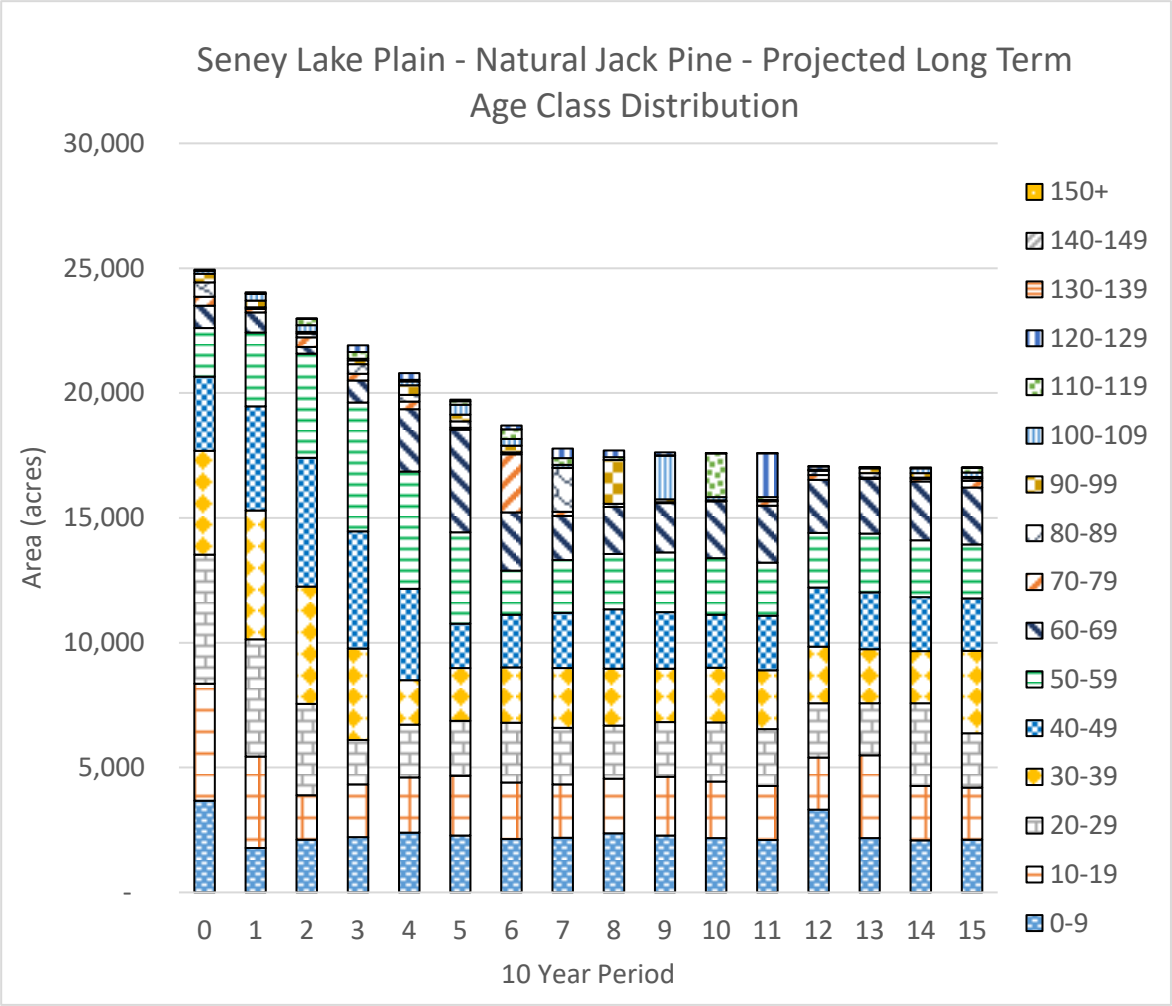


Figure 7. Projected age class distribution for all acres of jack pine over the next 150 years in the Seney Lake Plain Management Area.

Management actions

There are 2,692 acres of projected clearcut harvest in the natural jack pine cover type during the planning period. This falls slightly short of the desired establishment of 3,069 acres of natural jack pine per decade because of the current unbalanced age class condition and transitions out of the cover type.

Lowland conifer

Current condition

The Seney Lake Plain Management Area has a surplus of acres in the 0- to 9-year-old age class due to the harvesting of the large number of mature and overmature acres on the landscape (Figure 8). The age class distribution is currently very unbalanced across almost all the age class categories. Additionally, a deficit of available acres occurs in almost all age classes. The landscape position in which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 110 years old.

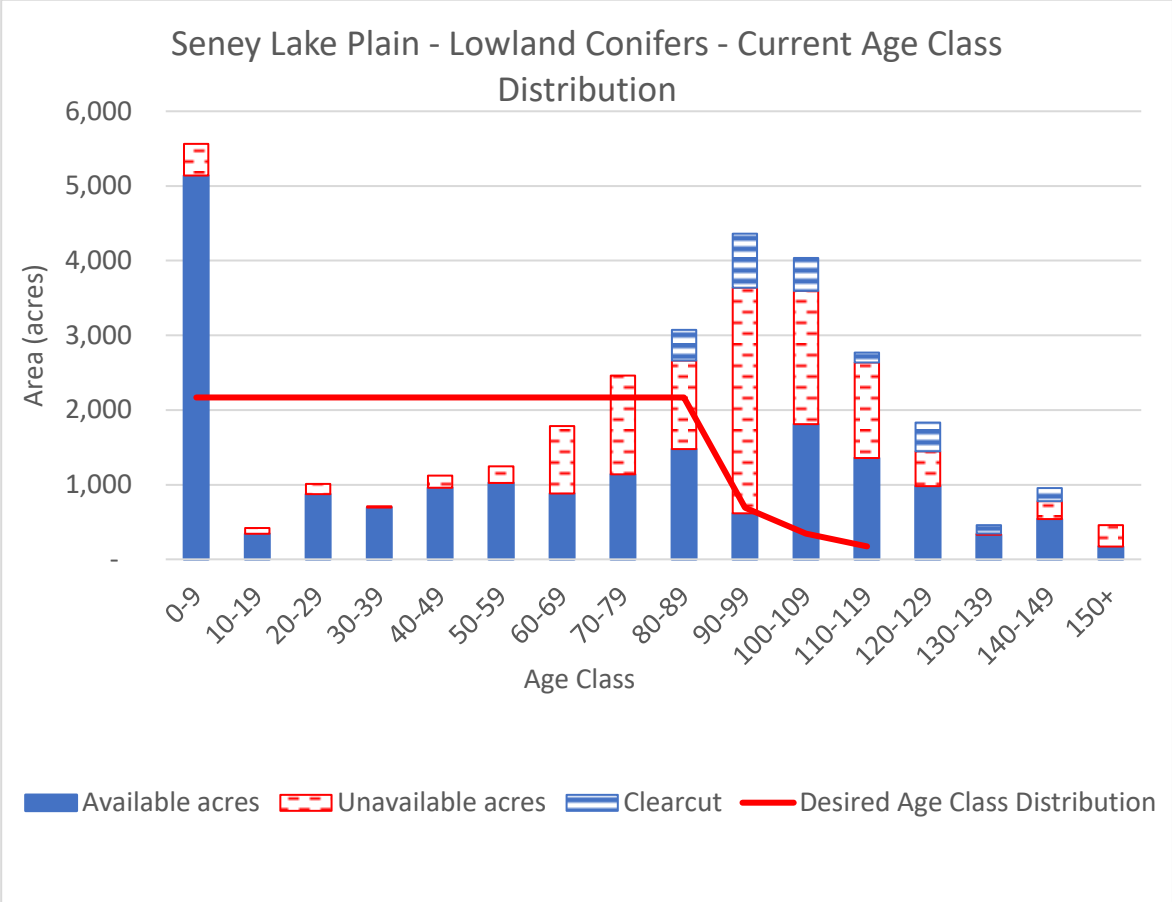


Figure 8. Current age class distribution, desired age class distribution and projected harvests in the aspen cover type over the 10-year planning period.

Table 10. Featured species with lowland conifers as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Conifers	Lowland Conifer Habitat Acres – Available	Lowland Conifer Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	5,485	500

Featured Species	Featured Species Habitat – Lowland Conifers	Lowland Conifer Habitat Acres – Available	Lowland Conifer Habitat Acres – Unavailable
Spruce grouse	Age category: 40+ Size category: sawlog	8,559	8,019
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	7,215	6,664
White-tailed deer	All ages and size classes	32,269	--

Desired future condition

The projected long-term cover-type trend for lowland conifers is a decrease in total acres, especially in the first three planning phases, and then stabilizing in the later planning phases in the Seney Lake Plain Management Area (Figure 9). Transitions out of the cover type into lowland mixed forests are forecasted, as species diversity is expected to increase.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available lowland conifer acres and then decreasing in number of acres until the max tail of 110 years old is reached.

The end of the planning period will result in the establishment of approximately 1,811 acres of lowland conifers from the available acres. It will take many decades to achieve the long-term desired balanced age class distribution of lowland conifers (Figure 10).

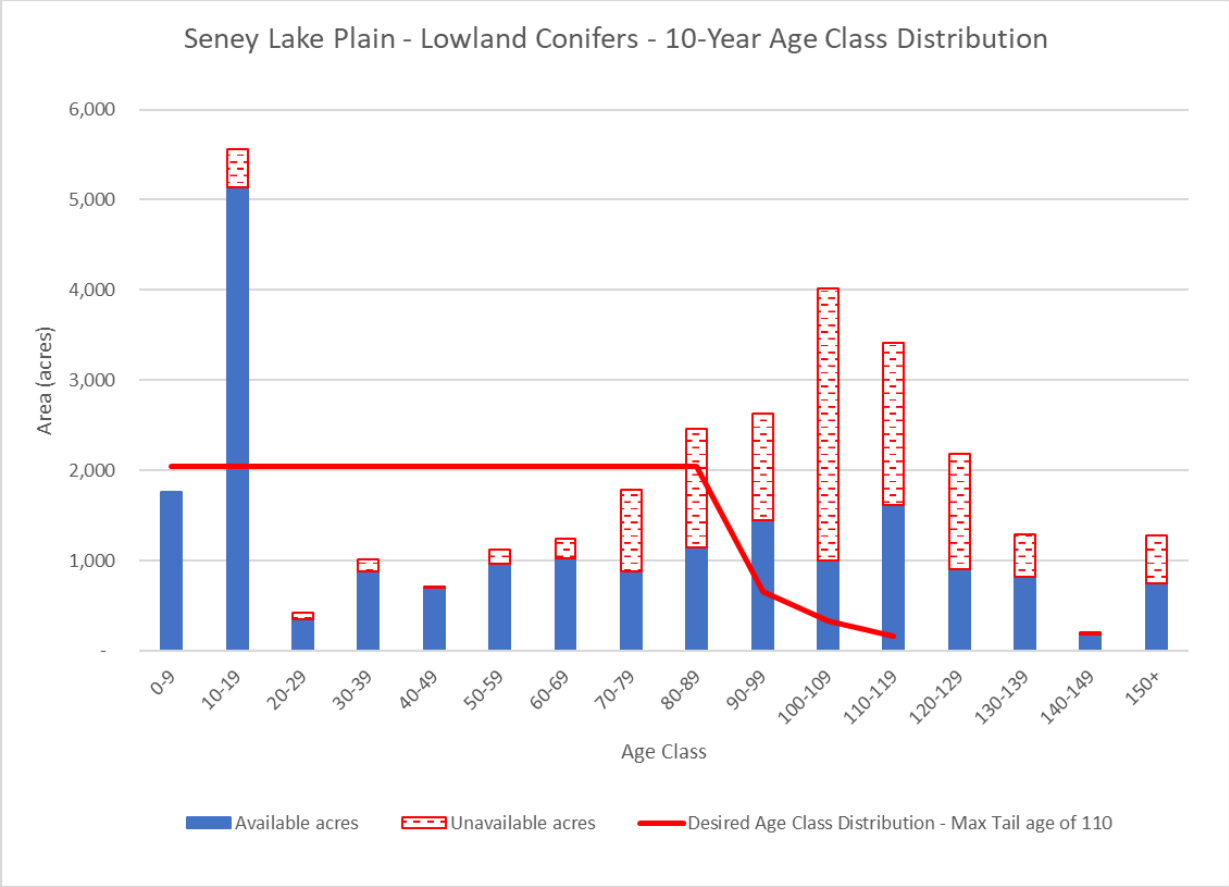


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution of lowland conifers is beginning to reach the desired future condition for available acres in the 0-9 through 40- to 49-year-old age classes and between the 90- to 99-year and 100- to 109-year age classes. The number of acres in the older age classes, 120 years old and older, continues to increase as the unavailable acres continue to move to the older age classes (Figure 10).

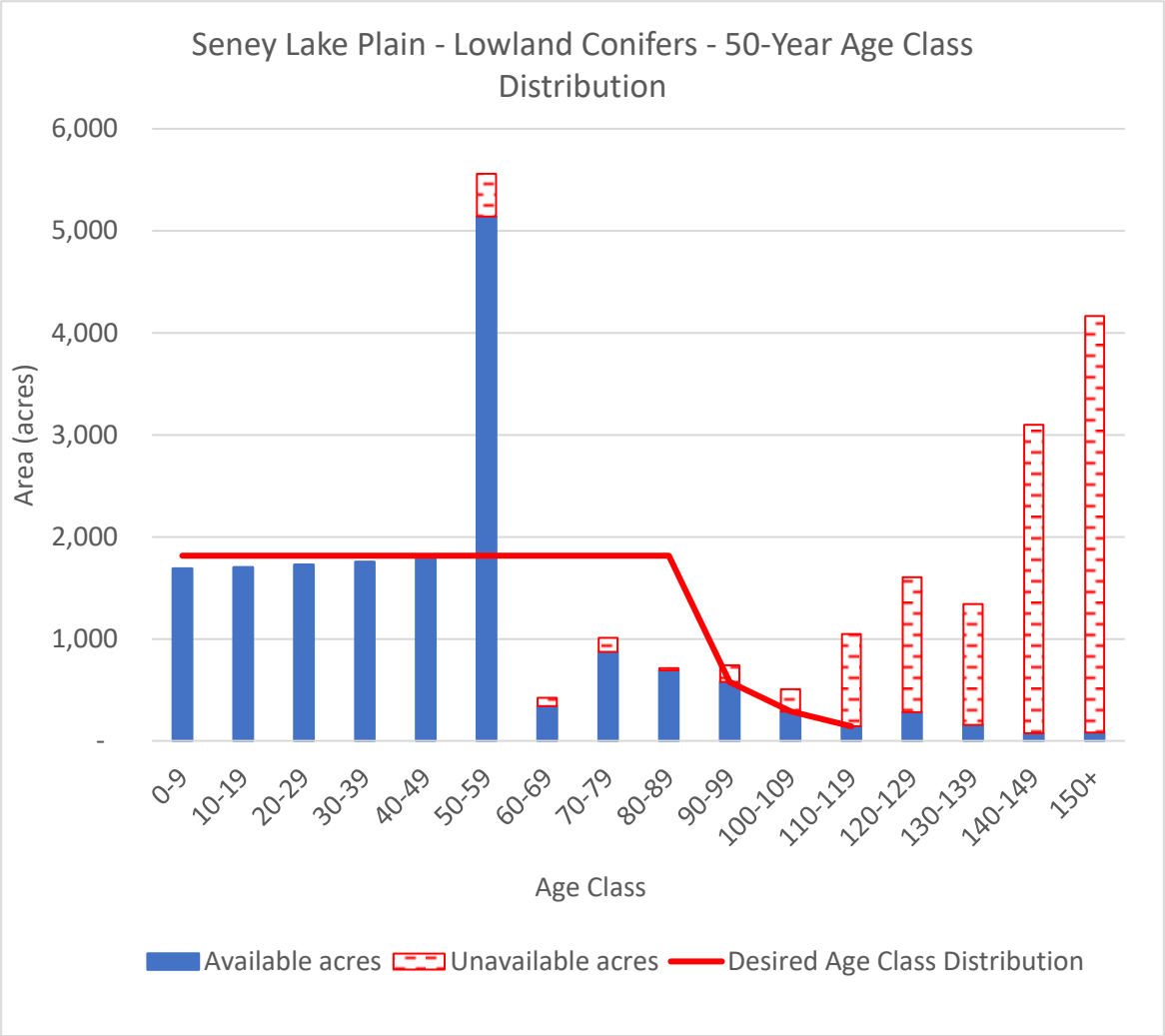


Figure 10. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate on the manageable acres of lowland conifer cover type in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

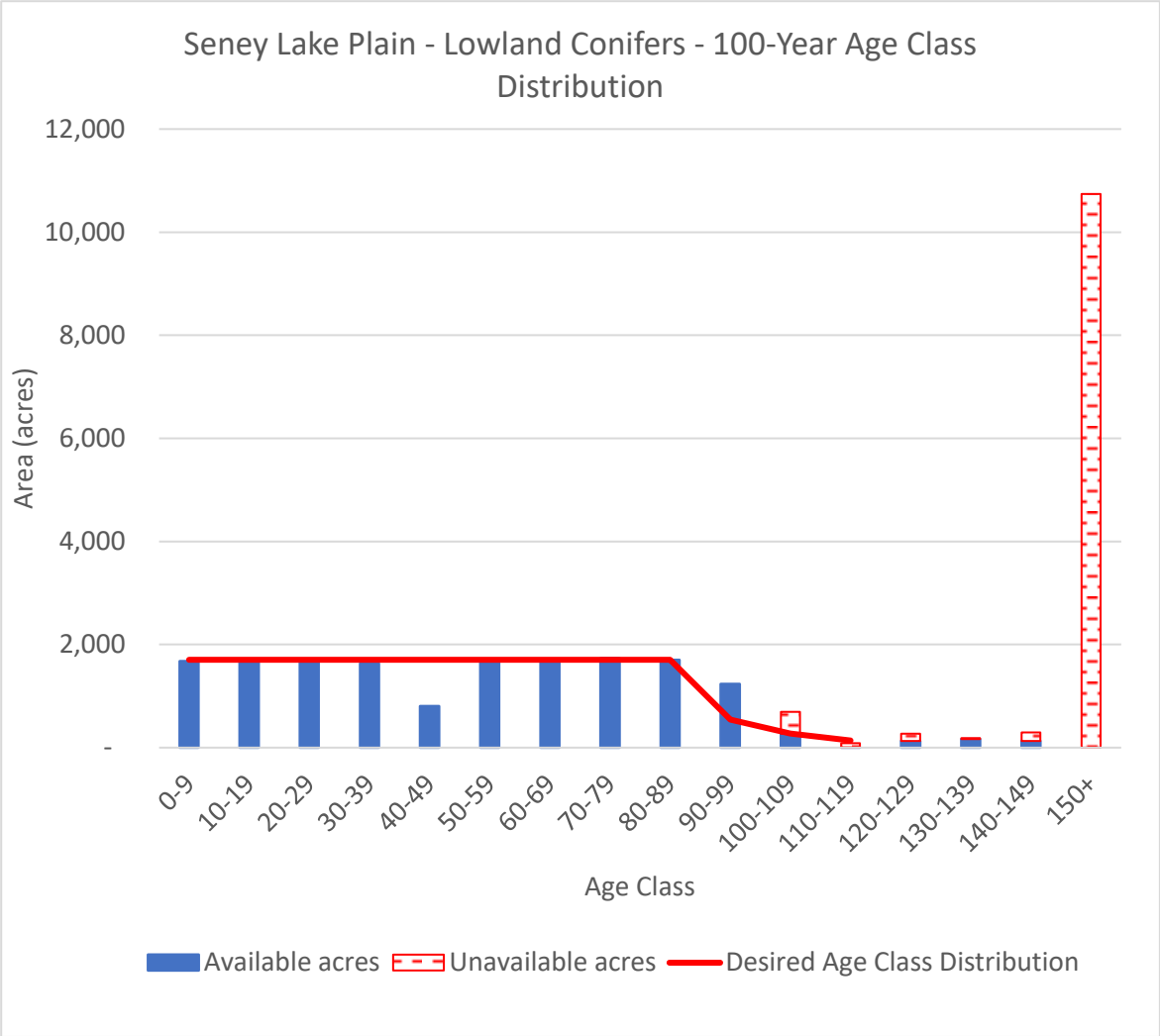


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

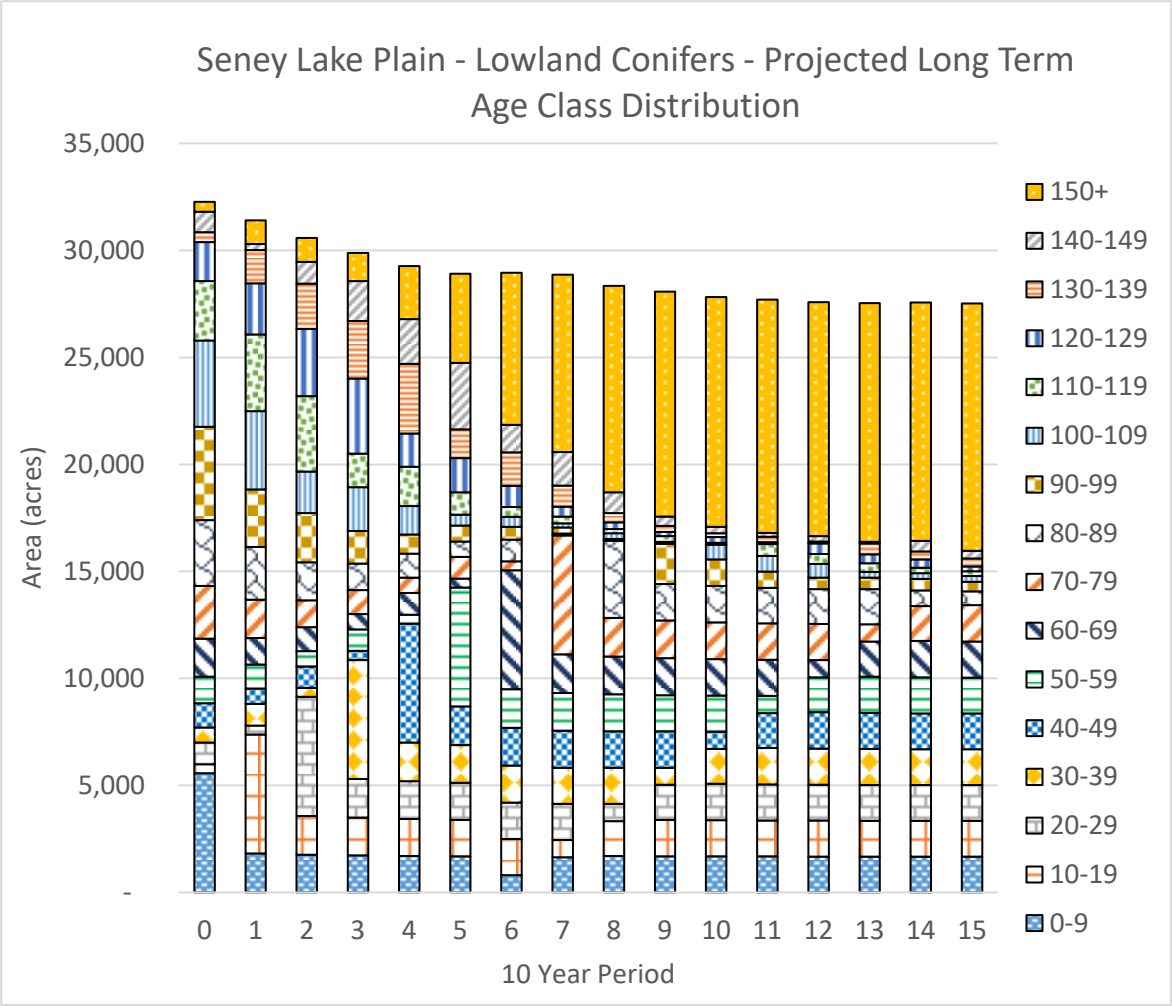


Figure 12. Projected age class distribution for all acres of lowland conifers over the next 150 years in the Seney Lake Plain Management Area.

Management actions

There are 2,477 acres of projected clearcut harvest in the lowland conifer cover type during the planning period. This is below the desired establishment of 2,077 acres of lowland conifer per decade because of the current unbalanced age class condition and deficit of desired established age class acres across almost all age categories. Significant proportions of this cover type being unavailable for management activity is a factor contributing to the deficit.

Retaining cedar and hemlock within this cover type is necessary to maintain/increase species diversity and habitat structure and is critical in areas of high deer densities, where recruitment of these tree species is unlikely due to browse pressure. Both hemlock and cedar are relatively uncommon on the landscape, have decreased significantly since European settlement and are long-lived species whose value is extremely high for wildlife.

Deer wintering complexes greater than 15,000 acres are modeled as a special analysis unit, and information on them can be found in Section 5 of the plan. In deer wintering complexes less than 15,000

acres, harvest of cedar and hemlock is not allowed within range stands essential for survival, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 80-89 and 110-119 years old in the Seney Lake Plain Management Area (Figure 13). The past management regime has been primarily single tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition, where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands.

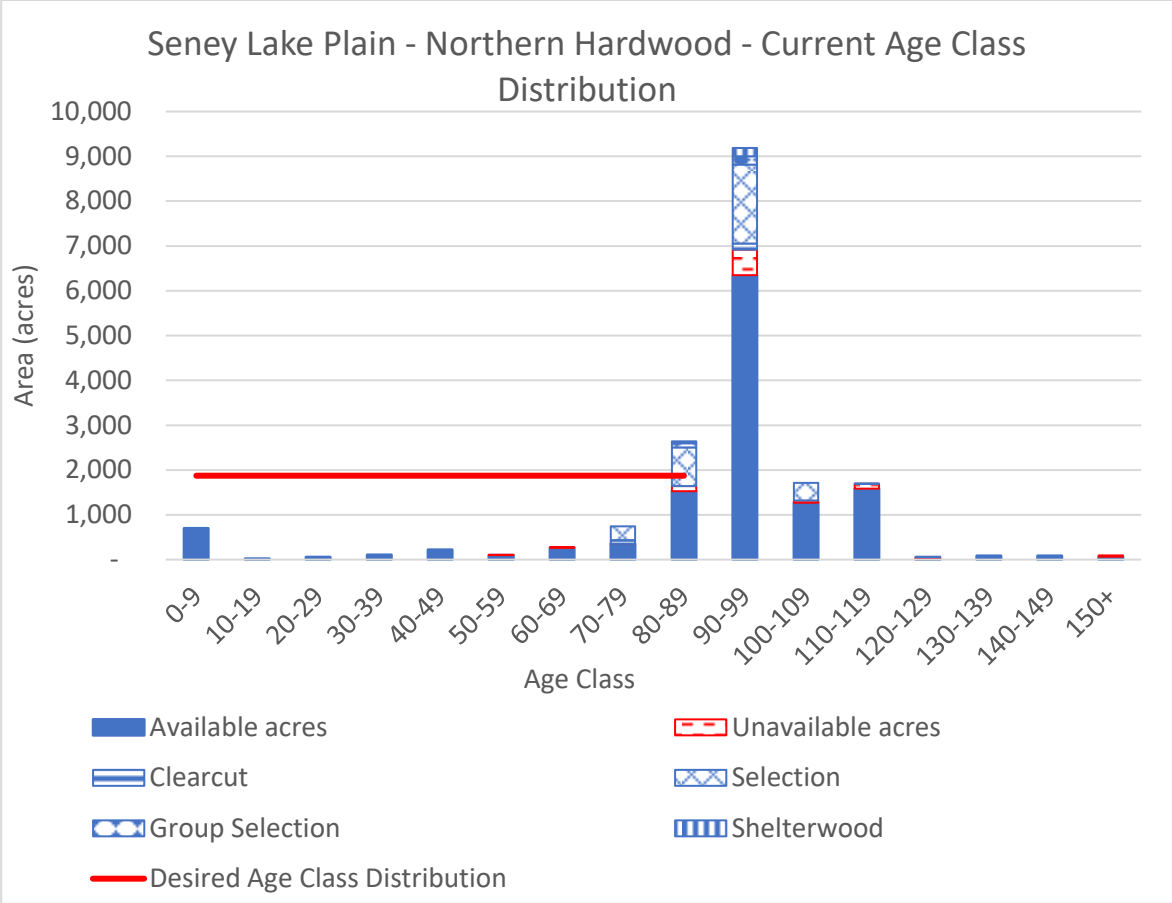


Figure 13. Current age class distribution and projected harvests in the northern hardwood cover type in the Seney Lake Plain Management Area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Seney Lake Plain Management Area (Figure 14). Current conditions are a result of beech salvage efforts in the previous planning period and a regulated selection harvest regime that has been in place in this management area for decades.

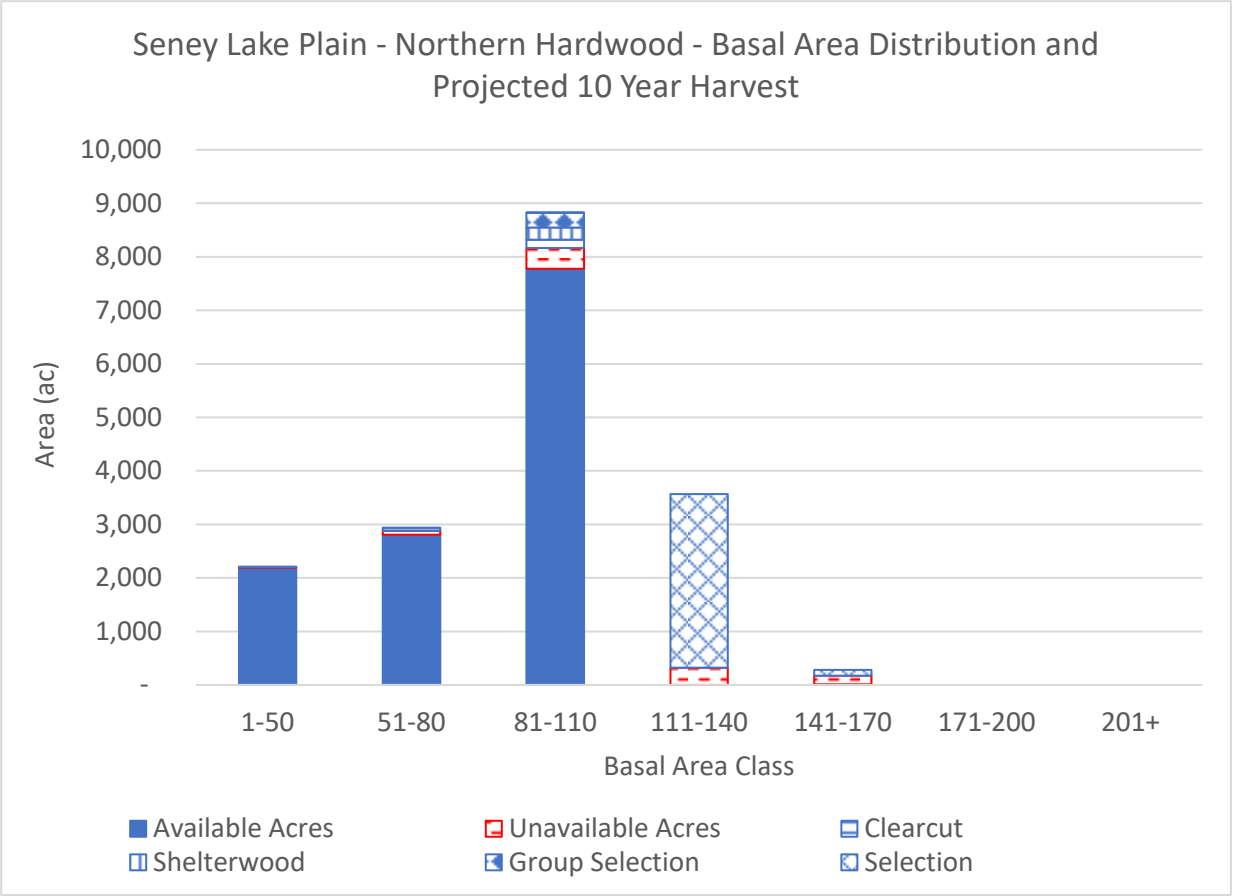


Figure 14. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are very few acres of unavailable northern hardwoods in the Seney Lake Plain Management Area. Selection is the primary silvicultural treatment projected during this 10-year planning period, along with group selection methods; however, there may be opportunities to utilize even-aged management silvicultural regimes to increase stem density, species composition and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for blackburnian warbler, wood thrush, marten and white-tailed deer.

Table 11. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	10,820	847

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Wood thrush	Age category: 40+ Size category: sawlog Basal area: 81+	11,863	866
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	10,280	847
White-tailed deer	All ages and size classes	17,821	--

Desired future condition

The projected long-term cover type trend for northern hardwood is slightly increasing in the Seney Lake Plain Management Area. There are very few transitions into this cover type from other cover types and equally few transitions from northern hardwoods to other cover types forecasted in this management area.

The desired basal area distribution is a bell-shaped curve, where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupying the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area, as canopy gaps fill in with regenerating seedlings, saplings and poles, and remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. The Seney Lake Plain Management Area will take several decades to reach the desired future condition because of the impacts from beech bark disease. The amount of American beech that once occupied much of the northern hardwood stands has resulted in lower residual basal area and decreased stocking levels across much of the eastern Upper Peninsula.

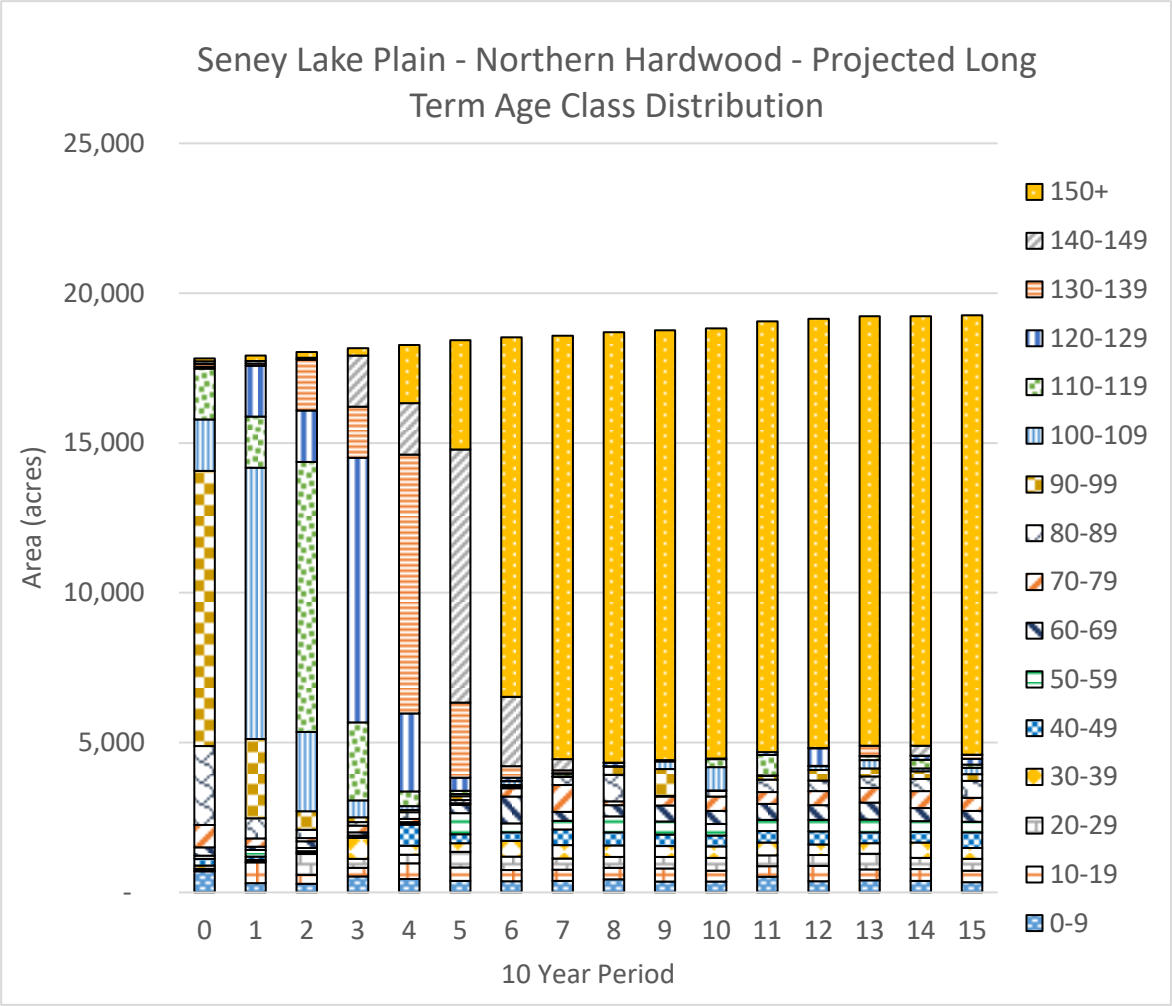


Figure 15. Projected age class distribution for all acres of northern hardwood over the next 150 years in the Seney Lake Plain Management Area.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 3,357 acres in the first planning period. Multiple silvicultural regimes should continue to be considered as emerging research results become available. Planned projected harvest regimes also include 277 acres of group selection, 230 acres of shelterwood and 216 acres of clearcut harvest. Emphasis on larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition.

Aspen

Current condition

Most of the aspen cover type is currently in the 30- to 39-year-old age class (Figure 16). The past management regime has been primarily clearcut for this cover type. The 0-9, 10-19 and 50-59 age classes fall below the desired age class area goal. Limited available acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period.

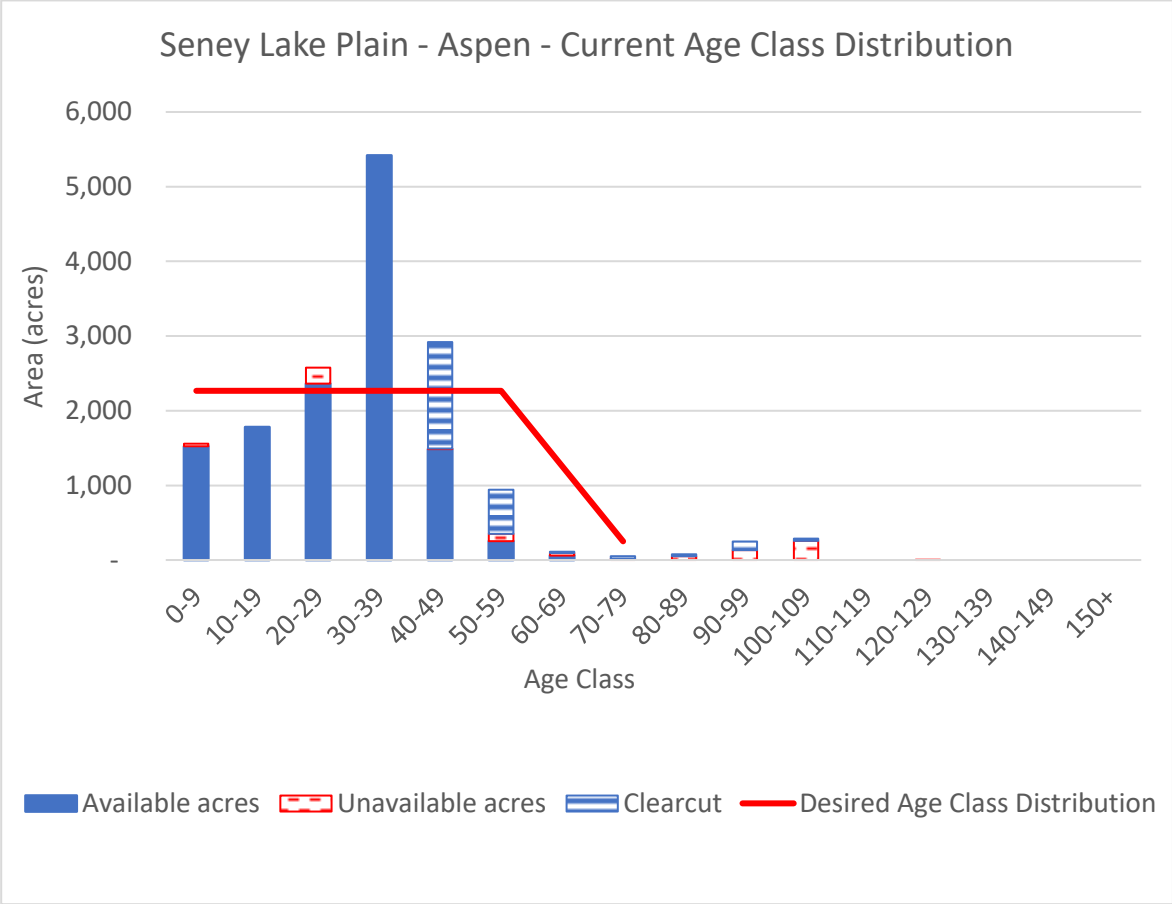


Figure 16. Current age class distribution, desired age class distribution and projected harvests in the aspen cover type over the 10-year planning period.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock, ruffed grouse, snowshoe hare and white-tailed deer.

Table 12. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres – Unavailable
American woodcock	Age category: 0-19 Size class: sapling	3,303	37
Ruffed grouse	Age category: 0-19 Size class: sapling	3,303	37
Snowshoe hare	Age category: 0-19 Size class: sapling	3,303	37
White-tailed deer	All ages and size classes	15,997	--

Desired future condition

The projected long-term cover type trend for aspen is stable in the Seney Lake Plain Management Area. There are a few transitions into this cover type from other cover types and equally few transitions from aspen to other cover types forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 50 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to ensure the aspen cover type is distributed within the desired age classes.

The end of the planning period will result in the establishment of the desired amount of regeneration in in the upcoming 0-9 age class, given the number of available acres in the current 40- to 49-year and 50- to 59-year age classes. Progress toward the long-term age class distribution of aspen will take many decades in the management area (Figure 17).

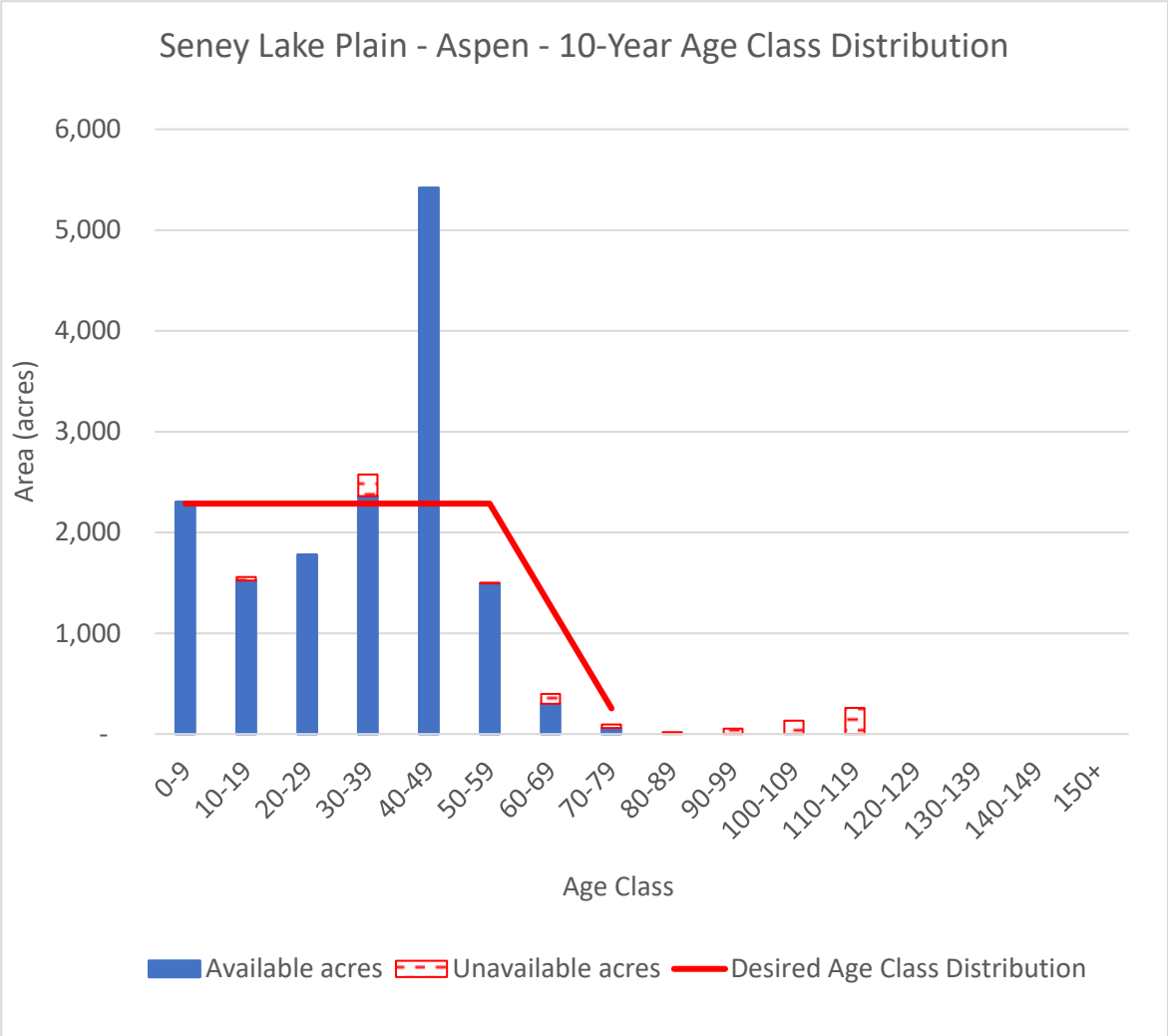


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of aspen acres nearly reaching the desired future condition, with only a few age classes deviating from the target proportions (Figure 18). As is often the case, an unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals.



Figure 18. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

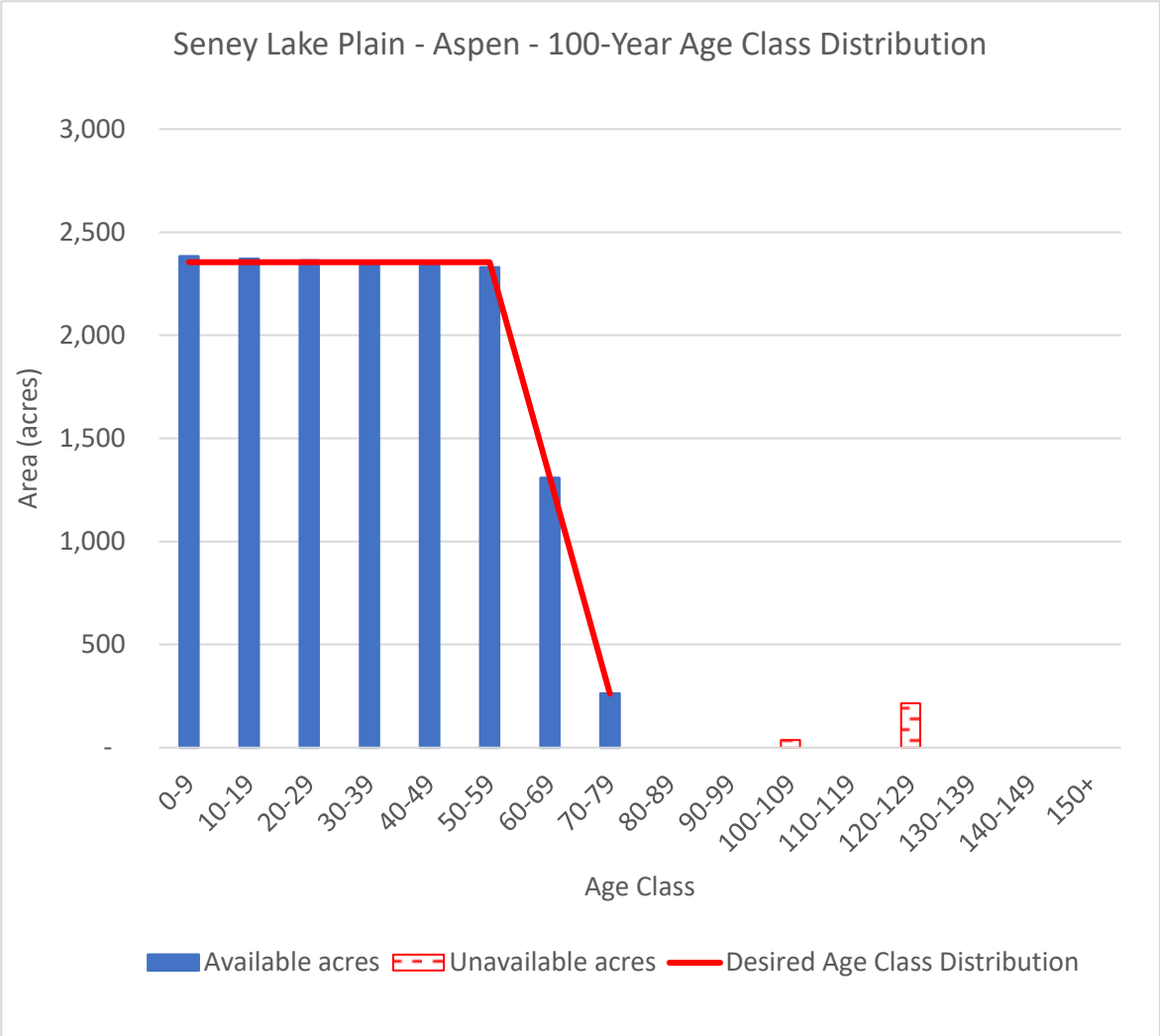


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

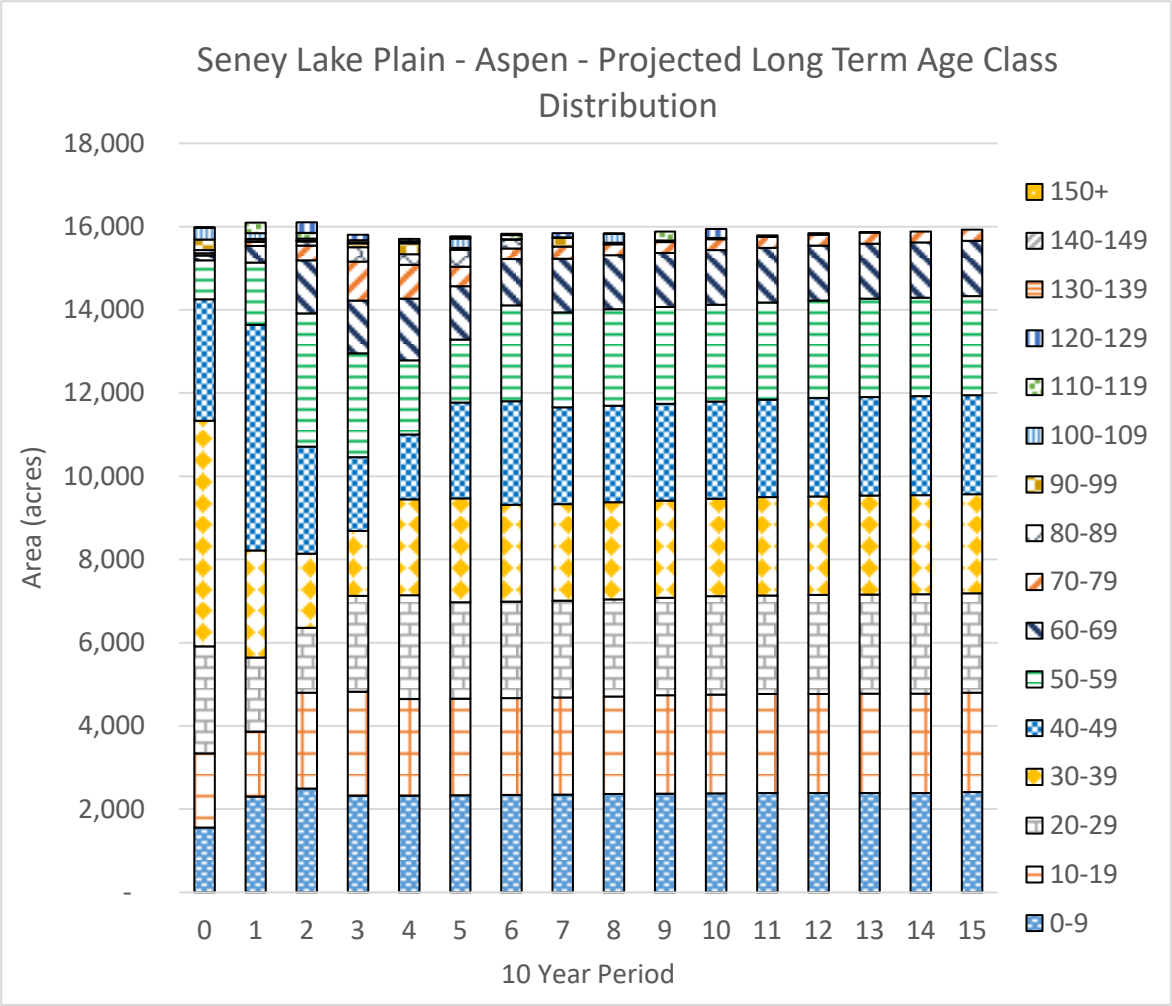


Figure 20. Projected age class distribution for all acres of aspen over the next 150 years in the Seney lake Plain Management Area.

Management actions

There are 2,232 acres of projected clearcut harvest in the aspen cover type during this planning period. This falls slightly short of the desired establishment of 2,267 acres per decade because of the current unbalanced condition.

Lowland spruce/fir

Current condition

The age class distribution is currently unbalanced in this management area. There is a deficit in several of the age class categories, including the 10- to 19-year-old through 50- to 59-year-old age classes. Nearly 40% of the cover type is considered unavailable for commercial forest management. Many stands are inaccessible due to their landscape position, active management operability within the stand or other management priorities such as unique natural communities or species of special concern. Unavailable acres will be subject to natural processes, resulting in a range of age classes across the cover type in the Seney Lake Plain Management Area.

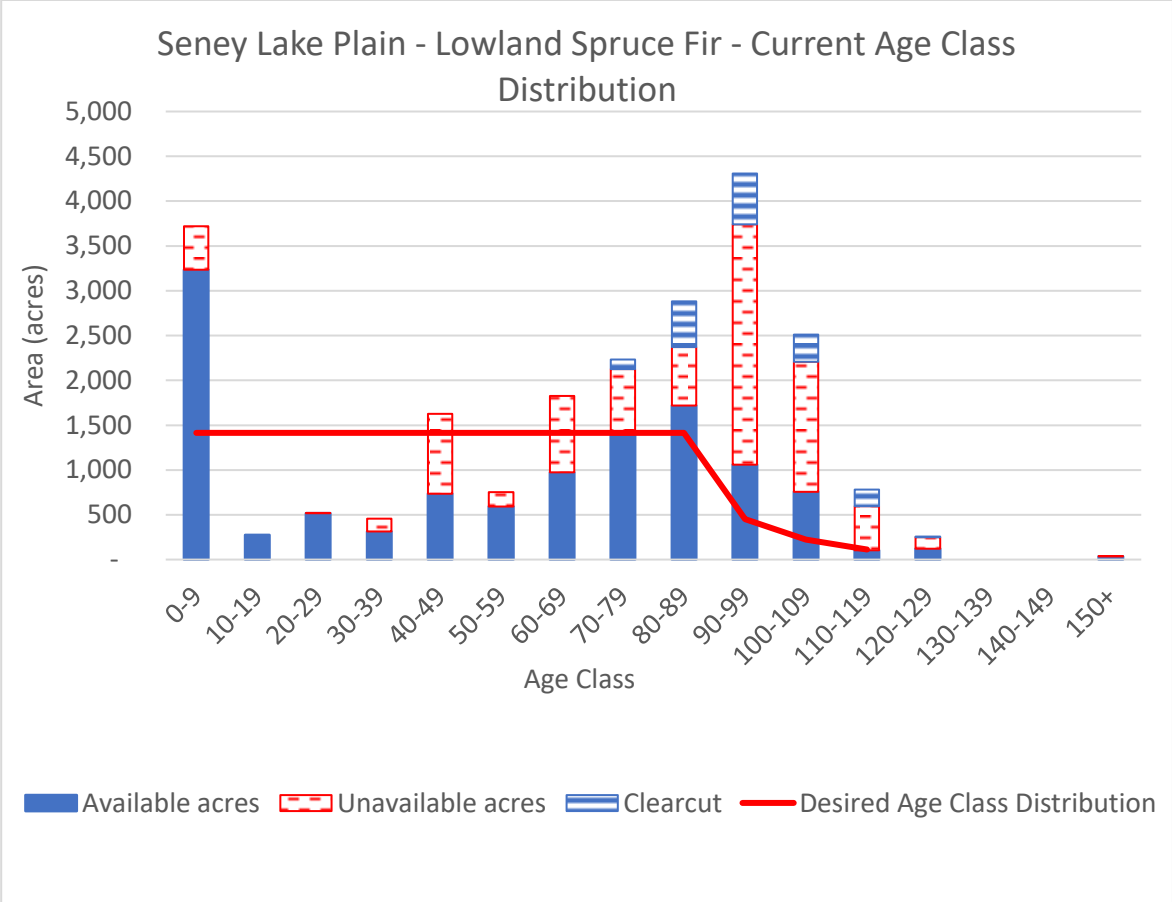


Figure 21. Current age class distribution and projected harvests in the lowland spruce/fir cover type in the Seney Lake Plain Management Area.

Current conditions are a result of successful commercial harvest efforts and natural regeneration as well as landscape positions of the cover type. A portion of this cover type meets the habitat requirements for snowshoe hare and spruce grouse.

Table 13. Featured species with lowland spruce/fir as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Spruce/Fir	Lowland Spruce/Fir Habitat Acres – Available	Lowland Spruce/Fir Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	3,511	483
Spruce grouse	Age category: 40+ Size category: sawlog	2,216	2,742

Desired future condition

The projected long-term cover type trend for lowland spruce/fir is fairly stable in the Seney Lake Plain Management Area, with a slight downward trend in the initial planning period and a slight long-term downward trend across the 150-year projections (Figure 22). Transitions out of this cover type to lowland mixed forest are forecasted for the initial planning period.

The long-term goal for this cover type is balanced age classes between 0 and 89 years old and a max tail age of 110 years old for all available lowland spruce/fir stands in this management area.

The end of the planning period will result in the establishment of the desired amount of regeneration in in the upcoming 0-9 age class given the amount of merchantable and available acres in the older age classes. Progress toward the long-term age class distribution of lowland spruce/fir will take many decades in the management area (Figure 22).

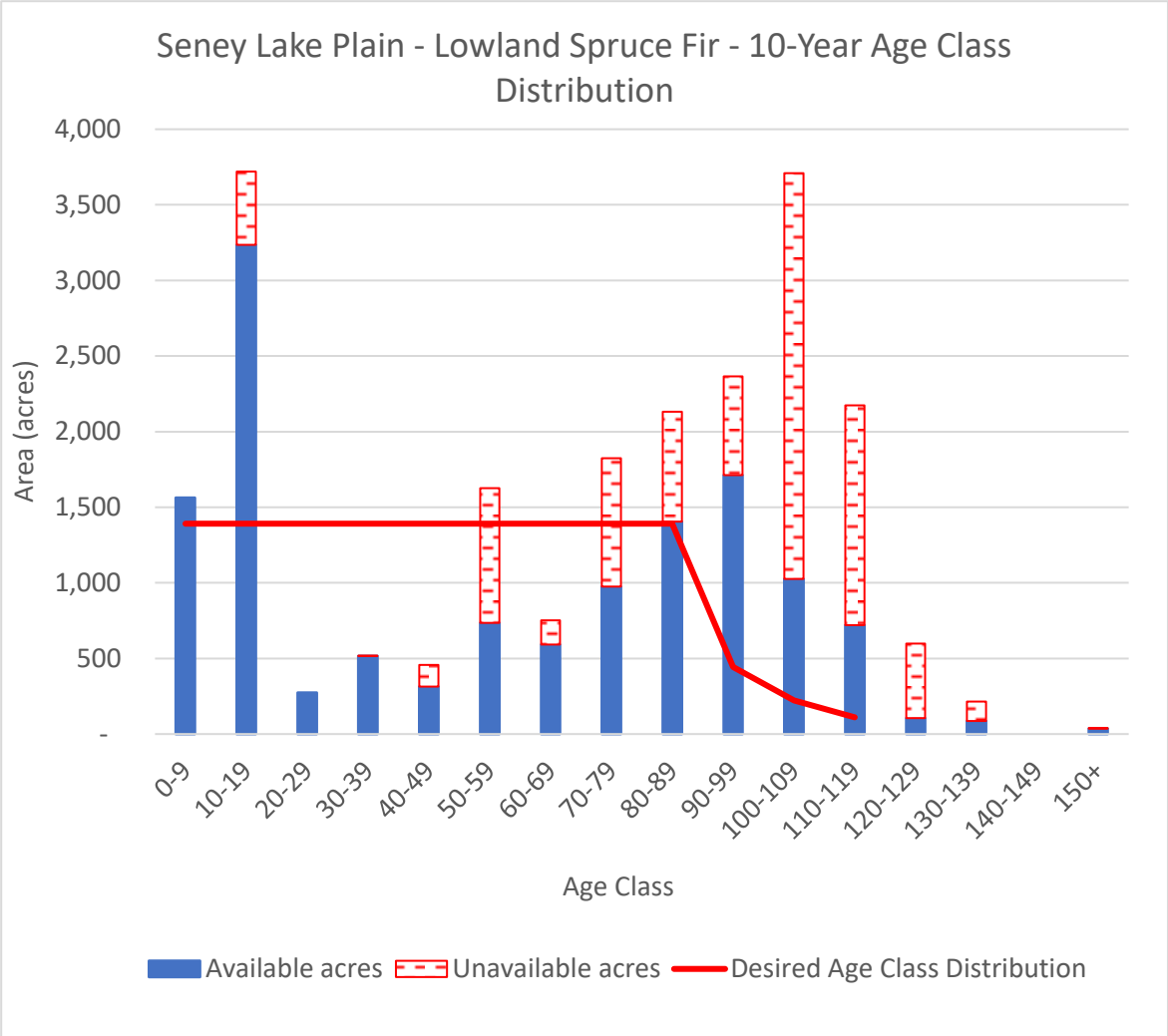


Figure 22. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of lowland spruce/fir acres beginning to reach the desired future condition, especially in the younger age classes, with very little deviation. Older age classes continue to show deficits due to the unbalanced condition during the first planning period (Figure 23). As is often the case, an extremely unbalanced condition in the first planning period can result in the need to carry some acres slightly longer into older age classes in future years, including the 120- to 129-year-old age classes, in order to meet the desired distribution and achieve age class goals (Figure 23).

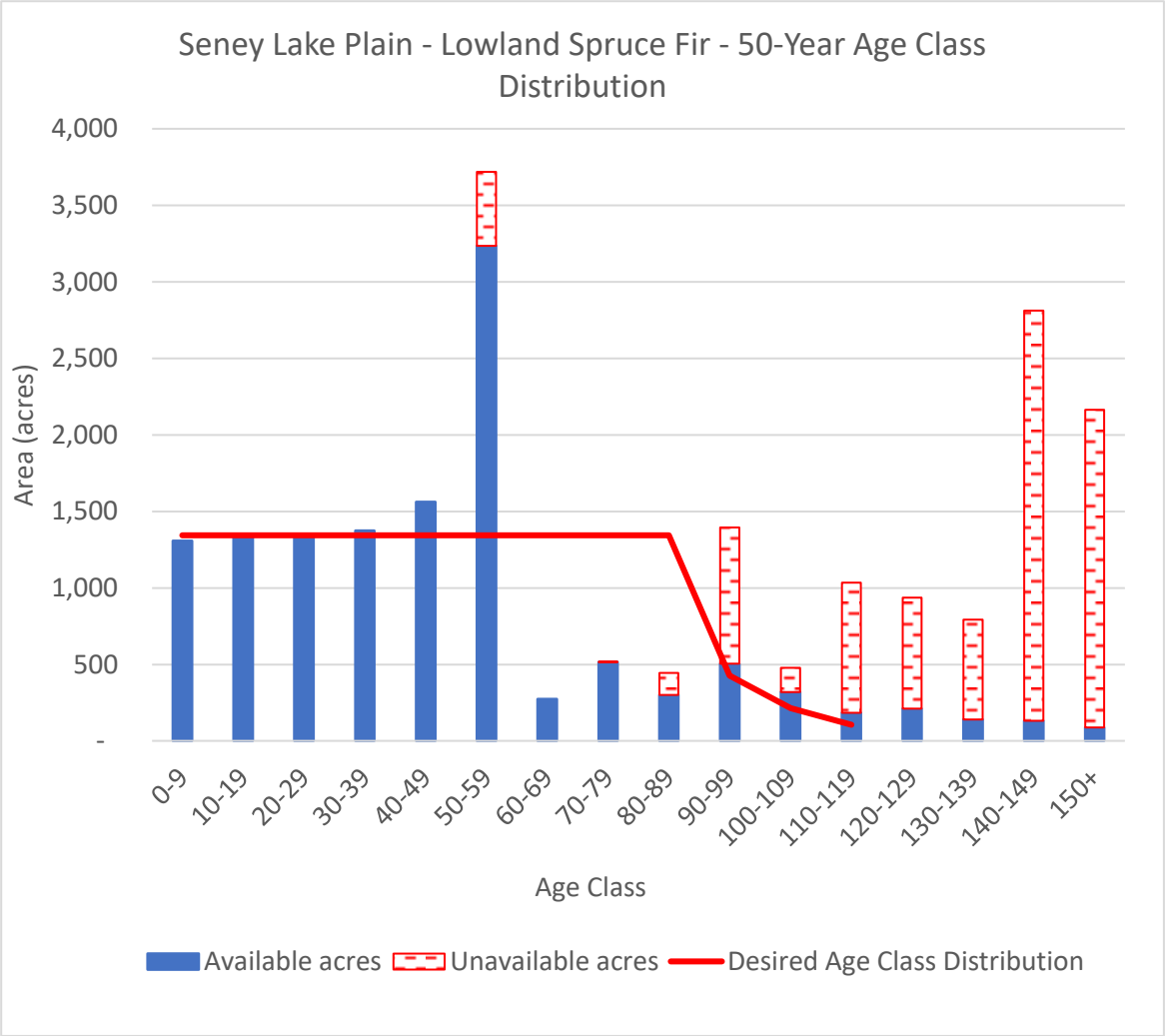


Figure 23. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution will concentrate the manageable acres of lowland spruce/fir in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest. Unavailable acres of the cover type will continue to age and allow natural processes to occur (Figure 24).

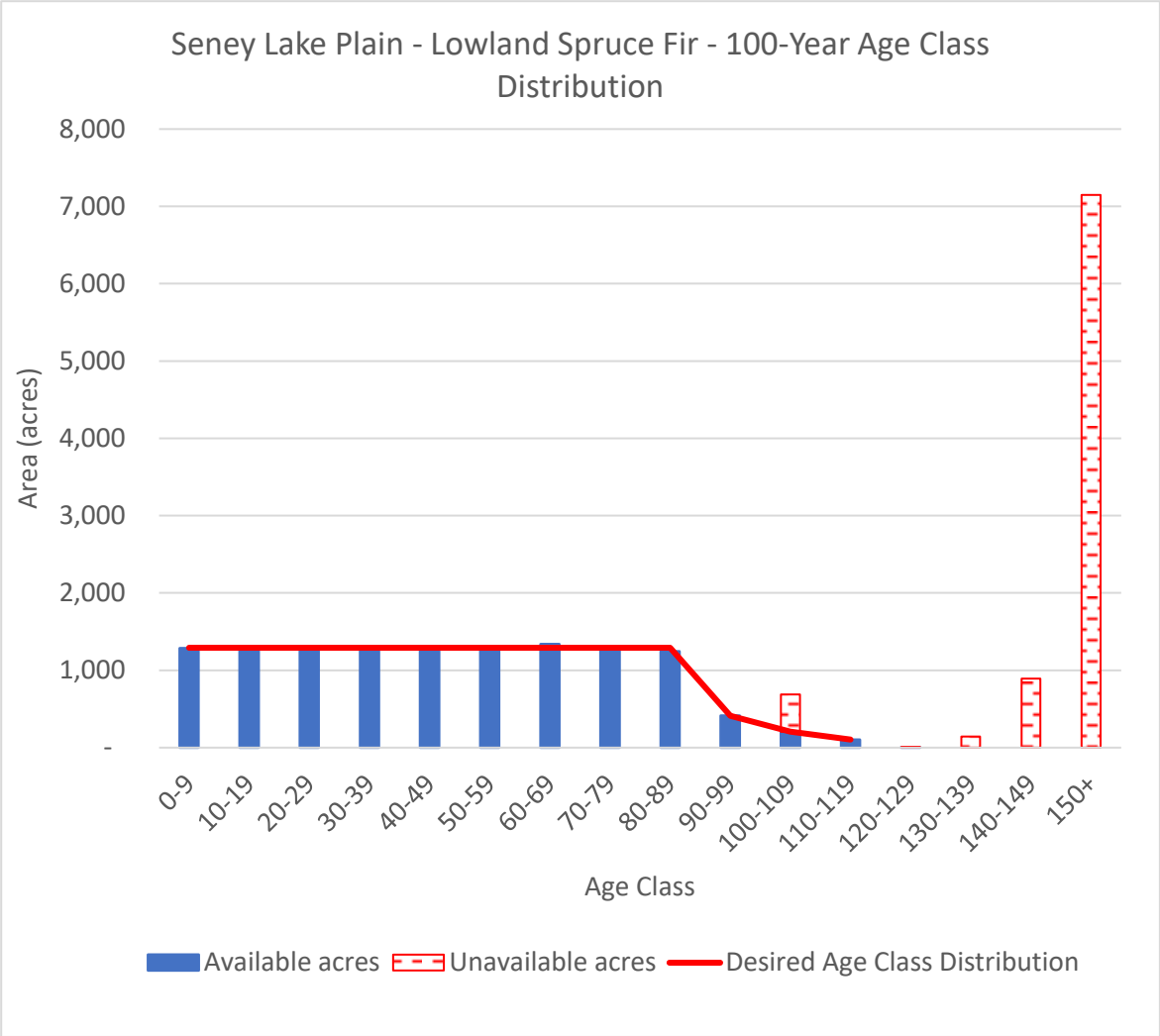


Figure 24. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

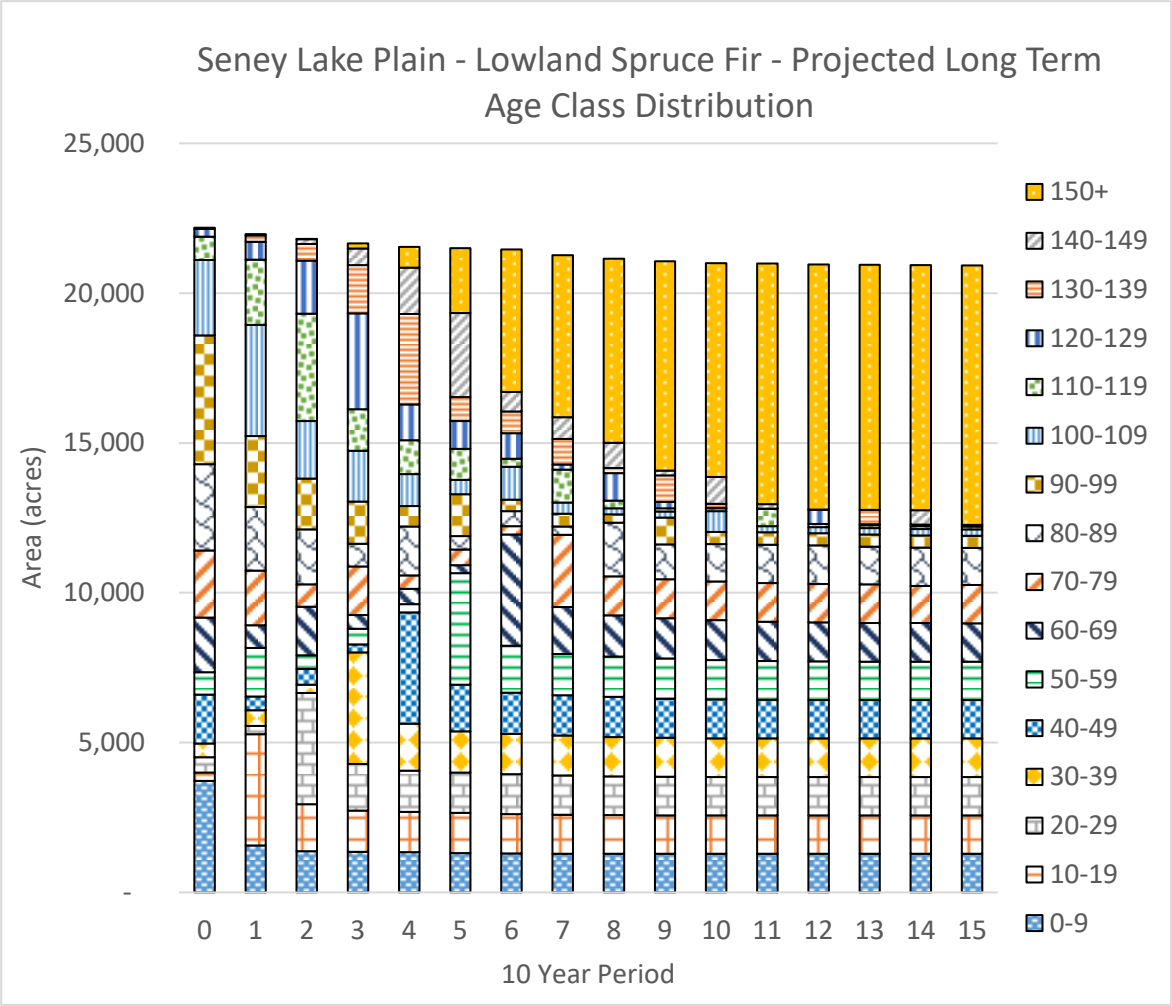


Figure 25. Projected age class distribution for all acres of lowland spruce/fir over the next 150 years in the Seney Lake Plain Management Area.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected clearcut harvest regime on 1,683 acres (Table 5).

Conservation area network

High conservation value areas

There are up to nine different high conservation value area types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas within the Seney Lake Plain Management Area.

High Conservation Value Area Type and Name	Acres
Coastal environmental areas	**920**
	920
Dedicated management areas	**728**
	728
Deer wintering complex	**7,867**
	7,867
State wildlife management areas	**13,806**
Munuscong Bay SWMA	13,806
Verified Type 1 and Type 2 old growth	**45**
Type 1 old growth	45
Grand total	**23,366**

Ecological reference areas

Ecological reference areas, a type of HCVA, are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 15. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	AB	G3G5	S4	2
Existing ERA	Dry northern forest	AB	G3?	S3	1
Existing ERA	Dry northern forest	B	G3?	S3	1
Existing ERA	Dry northern forest	BC	G3?	S3	1
Existing ERA	Dry-mesic northern forest	AB			1
Existing ERA	Dry-mesic northern forest	AB	G4	S3	5
Existing ERA	Dry-mesic northern forest	BC	G4	S3	1
Existing ERA	Dry-mesic northern forest	D	G4	S3	1
Existing ERA	Hardwood-conifer swamp	AB			1
Existing ERA	Muskeg	A			2
Existing ERA	Muskeg	AB	G4G5	S3	1
Existing ERA	Northern fen	AB		S3	1
Existing ERA	Northern shrub thicket	AB	G4	S5	2
Existing ERA	Northern wet meadow	AB	G4G5	S4	2
Existing ERA	Patterned fen	A	GU	S2	4
Existing ERA	Patterned fen	AB	GU	S2	4
Existing ERA	Poor conifer swamp	B	G4	S4	2
Existing ERA	Poor fen	A			1
Existing ERA	Poor fen	AB	G3	S3	2
Existing ERA	Poor fen	B		S3	2
Existing ERA	Rich conifer swamp	AB			3
Existing ERA	Rich conifer swamp	AB	G4	S3	5
Existing ERA	Rich conifer swamp	C	G4	S3	1
Existing ERA	Rich tamarack swamp	A			1
Proposed ERA	Dry northern forest	A	G3?	S3	1
Proposed ERA	Dry northern forest	AB	G3?	S3	1
Proposed ERA	Dry northern forest	B	G3?	S3	1
Proposed ERA	Dry northern forest	C	G3?	S3	1
Proposed ERA	Northern fen		G3	S3	1
Proposed ERA	Northern fen	A	G3	S3	2
Proposed ERA	Poor fen	AB	G3	S3	2
Grand total					**56**

Special conservation areas

Reviewable special conservation areas (Table 16) are those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) are those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the Seney Lake Plain Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated recreational area	**14**
Boat launch	1
Natalie Campground	13
Habitat area or habitat corridor	**3,214**
Maxton Plains: Alvar and associated natural communities	1,197
--	1,531
--	486
Mineral resource area	**9**
Dollarville Gravel Pit	2
Schoolcraft County Road Commission	7
Possible Type 1 or Type 2 old growth	**970**
--	970
Spring, wetlands or riparian areas	**890**
Maxton Plains: Alvar and associated natural communities	201
Tahquamenon River Spreads	689
Visual management areas	**20,948**
Pictured Rocks National Lakeshore	13,838
Two Hearted River Visual Management Area	7,110
Grand total	**26,045**

Table 17. Static special conservation areas within the management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common natural heritage element occurrences		**6,948**
Dry-mesic northern forest		39
Muskeg		6,708
Northern wet meadow		201
Designated trout and coldwater stream buffer		**6,432**
Unnamed		3,016
Auger Creek		275
Bev Creek		73
Brace Creek		72
Carlson Creek		14
Cold Creek		44
Dawson Creek		21
Deer Creek		79
Driggs River		209
East Branch Fox River		190
East Branch Sage River		190
East Branch Two Hearted River		45

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
East Creek		25
East Lake Creek		34
First Creek		63
Fox River		298
Gimlet Creek		24
Gronden Creek		13
Hendrie River		86
Hiawatha Creek		44
Hudson Creek		24
Johns Creek		15
Kings Creek		6
Little Dawson Creek		36
McLeod Ditch		9
Murphy Creek		220
North Branch Murphy Creek		11
North Branch Stutts Creek		98
North Branch Two Hearted River		94
Quinn Creek		63
Red Creek		14
Sage River		35
Savage Creek		6
Silver Creek		40
Sixteen Creek		45
South Branch Hendrie River		90
South Branch Two Hearted River		10
Southside Creek		25
Spring Creek		32
Stoner Creek		26
Stutts Creek		49
Syphon Creek		84
Tahquamenon River		50
Teaspoon Creek		96
Third Creek		89
Thirtynine Creek		1
Two Hearted River		15
West Branch Hendrie River		38
West Branch Hickey Creek		103
West Branch Sage River		78
West Branch Two Hearted River		117
Designated trout and coldwater streams	**252.4**	
	119.0	
Auger Creek	11.3	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Bev Creek	2.7	
Brace Creek	2.7	
Carlson Creek	0.6	
Cold Creek	1.8	
Dawson Creek	0.9	
Deer Creek	3.1	
Driggs River	7.4	
East Branch Fox River	8.1	
East Branch Sage River	7.0	
East Branch Two Hearted River	1.9	
East Creek	1.0	
East Lake Creek	1.3	
First Creek	2.3	
Fox River	11.4	
Gimlet Creek	0.9	
Gronden Creek	0.6	
Hendrie River	3.4	
Hiawatha Creek	1.6	
Hudson Creek	1.1	
Johns Creek	0.6	
Kings Creek	0.2	
Little Dawson Creek	1.5	
McLeod Ditch	0.3	
Murphy Creek	8.7	
North Branch Murphy Creek	0.4	
North Branch Stutts Creek	3.8	
North Branch Two Hearted River	4.0	
Quinn Creek	2.3	
Red Creek	0.6	
Sage River	1.5	
Savage Creek	0.2	
Silver Creek	1.5	
Sixteen Creek	1.7	
South Branch Hendrie River	3.4	
South Branch Two Hearted River	0.4	
Southside Creek	0.9	
Spring Creek	1.2	
Stoner Creek	0.9	
Stutts Creek	1.9	
Syphon Creek	3.2	
Tahquamenon River	1.8	
Teaspoon Creek	4.2	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Third Creek	3.6	
Two Hearted River	0.5	
West Branch Hendrie River	1.4	
West Branch Hickey Creek	4.0	
West Branch Sage River	3.0	
West Branch Two Hearted River	4.4	
Important bird areas		**16,898**
Dollarville Flooding		1,115
Raco Plains and Wilwin Wetland		1,203
Seney National Wildlife Refuge		274
Sleeper Lake Burn		14,293
Nondedicated natural areas		**1,125**
Natural Area McMahon Lake Strangmoor		1,125
Wood turtle stream 100-foot buffer		**362**
Creighton River		12
Duck Creek		28
Manistique River		255
Stutts Creek		68
Wood turtle stream 660-foot buffer		**2,023**
Creighton River		104
Duck Creek		174
Manistique River		1,399
Stutts Creek		347
Grand total	**252.4**	**33,776**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory biotics database (Table 18) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18. Rare animal and plant species conservation status key.

Species Status	Species Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal species occurrence within the Seney Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T		2
Animal	Alces alces	Moose	SC		1
Animal	Boloria frigga	Frigga fritillary	SC		4
Animal	Bombus borealis	Northern amber bumble bee	SC		5
Animal	Bombus fervidus	Yellow bumble bee	SC		1
Animal	Bombus terricola	Yellow banded bumble bee	SC		6
Animal	Botaurus lentiginosus	American bittern	SC		1
Animal	Canachites canadensis	Spruce grouse	T		2
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Coturnicops noveboracensis	Yellow rail	T		3
Animal	Falco columbarius	Merlin	SC		2
Animal	Gavia immer	Common loon	T		3
Animal	Glaucomys sabrinus	Northern flying squirrel	SC		2
Animal	Glyptemys insculpta	Wood turtle	T		4
Animal	Haliaeetus leucocephalus	Bald eagle	SC		5
Animal	Lithobates palustris	Pickerel frog	SC		1
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC		3
Animal	Notropis dorsalis	Bigmouth shiner	T		1
Animal	Opheodrys vernalis	Smooth green snake	SC		2
Animal	Pandion haliaetus	Osprey	SC		7
Animal	Papaipema aweme	Aweme borer	SC		1
Animal	Plebejus idas nabokovi	Northern blue	T		2
Animal	Polygonia gracilis	Hoary comma	X		1
Animal	Setophaga kirtlandii	Kirtland's warbler	E		2
Animal	Somatochlora incurvata	Incurvate emerald	SC		1
Animal	Tympanuchus phasianellus	Sharp-tailed grouse	SC		3
Total	-	-	-	-	**66**

**Occurrence information provided by field staff.*

Table 20. Rare plant species occurrence within the Seney Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Bartonia paniculata	Panicled screwstem	T		1
Plant	Botrychium mormo	Goblin moonwort	E		1
Plant	Carex nigra	Black sedge	E		1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Cirsium pitcheri	Pitcher's thistle	T	LT	1
Plant	Drosera anglica	English sundew	SC		1
Plant	Eleocharis nitida	Slender spike rush	E		1
Plant	Huperzia selago	Fir clubmoss	SC		3
Plant	Juncus vaseyi	Vasey's rush	T		2
Plant	Neottia auriculata	Auricled twayblade	SC		2
Plant	Petasites sagittatus	Sweet coltsfoot	T		7
Plant	Piptatherum canadense	Canada rice grass	T		1
Plant	Potamogeton confervoides	Alga pondweed	SC		4
Plant	Rubus acaulis	Dwarf raspberry	T		4
Plant	Salix pellita	Satiny willow	T		1
Plant	Stachys pilosa	Hairy hedge-nettle	SC		1
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC		1
Plant	Trichophorum clintonii	Clinton's bulrush	SC		4
Plant	Vaccinium cespitosum	Dwarf bilberry	T		3
Total	-	-	-	-	**39**

Table 21. Other occurrence within the Seney Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great blue heron rookery	Great blue heron rookery			2

Non-ecological reference area natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 22).

Table 22. Non-ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence

Element Occurrence Rank	State Rank	Global Rank
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non- ecological reference area natural communities within the Seney Lake Plain Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Dry-mesic northern forest	AB	S3	G4	1
Dry-mesic northern forest	B	S3	G4	1
Muskeg	A	S3	G4G5	1
Muskeg	AB	S3	G4G5	1
Muskeg	BC	S3	G4G5	1
Northern wet meadow	A	S4	G4G5	1
Grand total				**6**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Seney Lake Plain Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes

Table 25. Maladies of concern in the Seney Lake Plain Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Nectria cinnabarina	Native	Yes
Armillaria root rot	Armillaria mellea	Native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No

Aquatic resources

Riparian habitat

A total of 507 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as warm types comprise approximately 69% of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	85
Cold small river	24
Cold transitional stream	50
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	235
Warm transitional small river	46
Warm transitional large river	20
Warm stream	1
Warm small river	23
Warm large river	23

Lacustrine habitat

A total of 41 lakes and ponds of at least 1 surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	38
100-499	3
500+	0

Wetlands

A total of 280,415 acres of wetlands are found in the management area (Table 28). Forested wetlands comprise approximately 94% of wetland types found in the management area.

Table 28. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	15,862
Forested	263,368
Riverine	1,185

Vernal pools and seeps

A total of 371 acres of vernal pools and seeps have been inventoried in the management area, while 617 acres of seeps have been identified.

Riparian vegetation cover

Lowland shrub is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 29).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	17,501
Lowland conifers	4,817
Marsh	4,472
Cedar	4,320
Natural jack pine	2,712
Lowland deciduous	2,511
Northern hardwood	2,111
Lowland spruce/fir	1,699
Aspen	1,648
Natural mixed pines	1,505

Watershed vegetation cover

The management area includes portions of important watersheds of the Tahquamenon River and Manistique River (Table 30 and Table 31). Lowland shrub is a major cover type of state forest in each watershed.

Table 30. Largest vegetative cover types (i.e., top five) and area for the area of the Tahquamenon River watershed located within the management area.

Cover Type	Acres
Lowland shrub	20,985
Cedar	14,844
Lowland conifer	13,150
Lowland spruce/fir	8,473
Aspen	6,662

Table 31. Largest vegetative cover types (i.e., top five) and area for the area of the Manistique River watershed located within the management area.

Cover Type	Acres
Lowland shrub	41,930
Natural jack pine	22,464
Marsh	20,892
Lowland conifer	19,250
Cedar	18,075

Recreation

Public access to the Seney Lake Plain Management Area varies across the area, with some areas accessible by state, county or forest access roads and other areas with very limited access due to the large areas of marsh, swamp and lowland brush and barriers such as rivers, creeks and the Wisconsin Central Railroad. Recreational facilities found here include snowmobile trails, off-road vehicle trails and the Fox River Pathway. The Haywire State Trail (rail-trail), which travels from Marquette to Shingleton, passes through this management area and is designated for ORV and snowmobile use, with all nonmotorized uses also permitted (Table 32).

There are two small state forest campgrounds (rustic) within the management area, one on the Fox River and one on the Dollarville Flooding (Table 33). Dispersed camping is also popular in certain areas, such as along the Fox River. The management area is adjacent to the Hiawatha National Forest, expanding the dispersed recreation opportunities in the area.

Table 32. Designated recreation trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	Off-road vehicle (all types) Snowmobile	15.4 81
Nonmotorized recreation trails	Hiking Equestrian Biking	6.9 0 0
		103.3

Note: Trail use types may overlap.

Table 33. State forest campgrounds.

Name	Number of sites
Natalie State Forest Campground	12
Fox River State Forest Campground	7

There are three state wildlife management/research areas located within the management area. Dollarville Flooding offers waterfowl hunting, fishing, paddling and wildlife viewing opportunities. There is an accessible boardwalk near the boat launch, which provides public access to a hunting and wildlife

viewing blind overlooking the flooding. Bullock Ranch Flooding State Wildlife Management Area is a large area of land managed for wildlife, with parking lots located off M-28 (Table 34).

Deer, grouse and bear hunting, as well as trapping, fishing and mushroom picking, are popular within this management area.

Table 34. Areas managed for hunting.

Type	Name	Number of Acres
State wildlife management areas	Bullock Ranch Flooding SWMA Dollarville Flooding SWMA	12,635 2,978
Total		**15,613**

Boating access sites are available on the Tahquamenon River, the West Branch of the Manistique River and the Fox River, as well as on several small inland lakes and the Dollarville Flooding (Table 35). These water courses provide access for fishing, canoeing and kayaking. Private canoe outfitters operate on the Manistique and Tahquamenon rivers.

Table 35. Boating access sites.

Name	Waterbody
Ashford Lake	Ashford Lake
Dodge Lake	Dodge Lake
Dollarville Dam East	Tahquamenon River
Dollarville Dam West	Dollarville Flooding
Fox River State Forest Campground	Fox River
McPhee's Landing	Tahquamenon River
Natalie	Tahquamenon River
West Branch	West Branch Manistique River
Total	**8**

EUP management areas

St. Ignace Lake Plain

State forest area: 273,002 acres	Location: Interior central and eastern Upper Peninsula	Population centers: Naubinway Cedarville
Subsection: St. Ignace Lake Plain	Landforms: Flat lake beds Dune fields Shallow embayments Exposed limestone	Land cover: Forested: 233,011 acres Nonforested: 39,991 acres

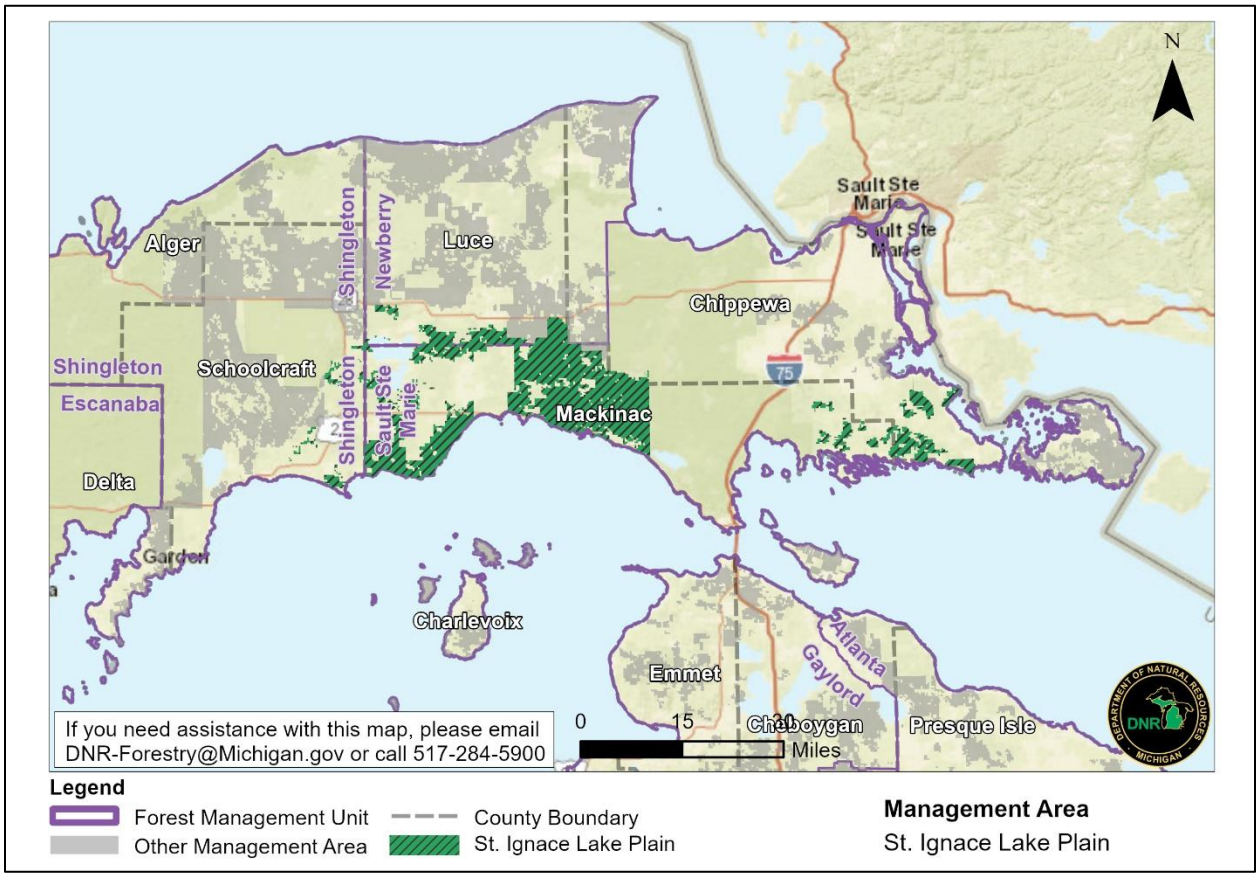


Figure 1. St. Ignace Lake Plain Management Area.

Forested landscape

Current and projected future condition

The St. Ignace Lake Plain Management Area includes a variety of tolerance levels, with most of the acres occurring in the old age categories. The majority of tolerant cover types occur on unavailable lowlands in the old age category. Mid-tolerant cover types mostly occur on available uplands in the mature and old age categories. The majority of the intolerant cover types occur in the mid-aged category on available uplands (Figure 2).

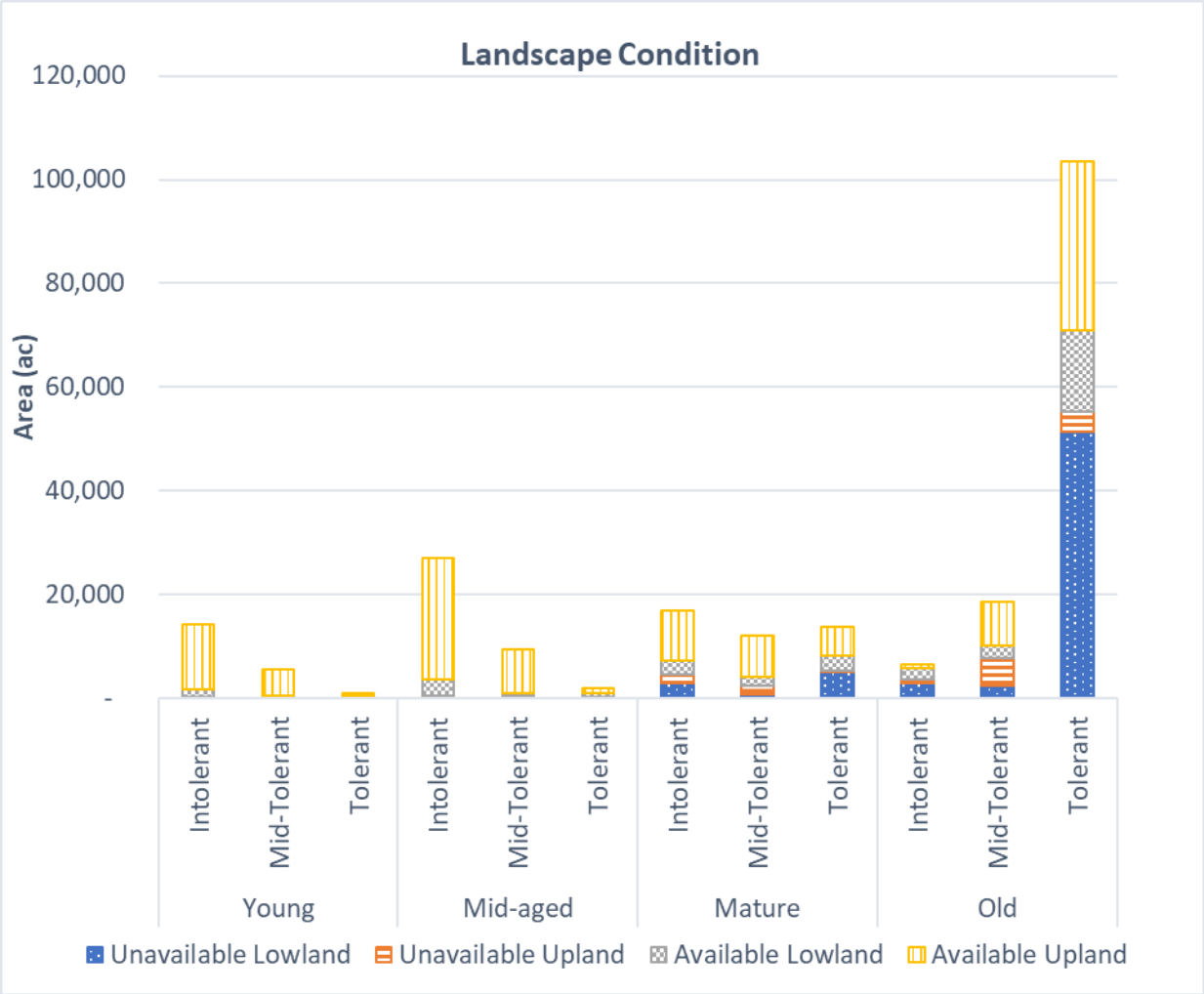


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (see Section 3) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0- to 19-year stands in aspen and jack pine	12,521
Mature forest	Acres of 80-plus-year stands across cover types	128,773
Mature forest	Acres of 120-plus-year stands across cover types	30,478
Mesic conifer cover types	Acres of mesic conifer cover types	13,488
Mesic conifers in other cover types	Average canopy occupancy	25%
Mast – oak cover types	Acres of oak cover types	453
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	7,350
Big trees	Total canopy stand occupancy of species in sawlog or greater size class	89,547
Nonforested openings	Acres of total herbaceous open land, upland shrub and crop land	6,291
Landscape forest matrix	Percent deciduous forest	46%
Landscape forest matrix	Percent coniferous forest	49%

Another important landscape-level habitat in the management area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, land birds (defined here as songbirds and raptors) and waterbirds (loons, grebes, cormorants, herons, rails, cranes gulls, and terns) (Ewert, et al., 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provide unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as important bird areas. The Great Lakes shoreline provides habitat for several rare plant species that are endemic to the Great Lakes.

Forest managers and others doing intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The St. Ignace Lake Plain Management Area has the following special analysis units. These SAUs have specific cover-type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority. See Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer wintering complex – Gulliver Scott Point Rock River
- Deer wintering complex – McMillan Ten Curves
- Deer wintering complex – Hulbert Hendrie Sage River
- Deer wintering complex – Indian Lake

The St. Ignace Lake Plain Management Area is comprised of 85% forested cover types and 15% nonforested cover types. Of the forested cover types, 48% occur on the upland landscape position and 37% occur on lowlands. The largest contributors to upland cover types are aspen, northern hardwoods and planted red pine. Cedar comprises 31% of the lowland cover types, making it the most prominent cover type in this management area (

Table 2).

Table 2. Landscape conditions and distribution of cover types in the St. Ignace Lake Plain Management Area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	45,459	96,147	132,302	233,011
			Northern hardwood	41,129			
			Black/red hybrid oak	0			
			Northern red oak	281			
			Oak mix	166			
			Mixed upland deciduous	9,113			
		Mixed	Upland mixed forest	6,475	6,475		
		Coniferous	Planted red pine	13,810	29,680		
			Planted jack pine	223			
			Planted white pine	48			
			Planted mixed pine	102			
			Natural red pine	679			
			Natural jack pine	1,334			
			Natural white pine	1,643			
			Natural mixed pines	1,855			
			Upland spruce/fir	2,964			
			Upland conifers	5,899			
			Hemlock	1,122			
	Lowland	Deciduous	Lowland aspen/balsam poplar	6,492	10,360	100,709	
			Lowland deciduous	3,868			
		Mixed	Lowland mixed forest	5,002	5,002		
		Coniferous	Cedar	57,069	85,348		
			Lowland conifers	19,327			
			Lowland spruce/fir	7,325			
			Tamarack	1,627			
Nonforested	Upland	N/A	Herbaceous open land	4,020	N/A	8,598	39,991
			Upland shrub	2,271			
			Low density trees	917			
			Bare/sparsely vegetated	791			
			Cropland	0			
			Urban	599			
	Lowland	N/A	Lowland shrub	19,837	N/A	31,393	
			Marsh	4,442			
			Bog	520			
			Treed bog	3,534			
			Water	3,060			
						Grand total:	**273,002**

There are 156,459 acres (57% of the total management area and 67% of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the St. Ignace Lake Plain Management Area (Table 3). Of that, about 28% is in aspen cover type and approximately 25% is the northern hardwood cover type. The remaining 57% of the forested and available land in the management area is comprised of significant lesser proportions of the remaining cover types.

Table 3. Landscape conditions and cover type composition of the St. Ignace Lake Plain Management Area.

ST IGNACE LAKE PLAIN Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	43,729	18.8%	1,740	0.7%	45,470	19.5%
Cedar	11,809	5.1%	45,261	19.4%	57,070	24.5%
Hemlock	595	0.3%	527	0.2%	1,122	0.5%
Lowland aspen/balsam poplar	5,985	2.6%	508	0.2%	6,492	2.8%
Lowland conifers	7,859	3.4%	11,471	4.9%	19,331	8.3%
Lowland deciduous	2,652	1.1%	1,217	0.5%	3,869	1.7%
Lowland mixed forest	2,989	1.3%	2,013	0.9%	5,002	2.1%
Lowland spruce/fir	3,076	1.3%	4,250	1.8%	7,326	3.1%
Mixed upland deciduous	7,541	3.2%	1,572	0.7%	9,113	3.9%
Natural jack pine	772	0.3%	563	0.2%	1,335	0.6%
Natural mixed pines	656	0.3%	1,201	0.5%	1,856	0.8%
Natural red pine	230	0.1%	450	0.2%	680	0.3%
Natural white pine	1,042	0.4%	601	0.3%	1,643	0.7%
Northern hardwood	37,978	16.3%	3,153	1.4%	41,131	17.6%
Northern red oak	281	0.1%	0	0.0%	281	0.1%
Oak mix	39	0.0%	127	0.1%	166	0.1%
Planted jack pine	223	0.1%	0	0.0%	223	0.1%
Planted mixed pine	92	0.0%	10	0.0%	102	0.0%
Planted red pine	13,473	5.8%	339	0.1%	13,812	5.9%
Planted white pine	48	0.0%	0	0.0%	48	0.0%
Tamarack	478	0.2%	1,149	0.5%	1,627	0.7%
Upland conifers	3,148	1.4%	2,753	1.2%	5,901	2.5%
Upland mixed forest	5,351	2.3%	1,125	0.5%	6,476	2.8%
Upland spruce/fir	2,219	1.0%	746	0.3%	2,965	1.3%
Grand total	**152,264**	**65.3%**	**80,777**	**34.7%**	**233,041**	**100.0%**

Table 4. Site conditions for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Deer wintering area	32,298	40.0%
Conservation values	19,699	24.4%
Too wet	7,778	9.6%
Best management practices	5,187	6.4%
Wildlife concerns	4,446	5.5%
Unproductive	2,722	3.4%
Blocked by obstacle	2,396	3.0%
Nonmilitary lease/easement	1,954	2.4%
Other DNR/division processes	1,720	2.1%
Denied access	601	0.7%
Long-term retention	529	0.7%
Too steep	455	0.6%
Rare landforms	281	0.3%
Blocked by railroad	246	0.3%
Species of special concern or T&E	180	0.2%
Recreational/scenic	176	0.2%
Other influence zones	64	0.1%
Federal/state/local law	23	0.0%
Cannot regenerate	18	0.0%
Historical/archaeological	5	0.0%
Total unavailable	**80,777**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the St. Ignace Lake Plain Management Area has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvests levels needed during the first 10-year planning period are summarized in Table 5. These harvest levels are necessary to begin achieving long-term planning goals. Implementing these silvicultural regimes will yield 554,873 cords, the planned harvest volume for the decade (Table 7).

Table 5. Projected number of acres to be harvested by silvicultural regime for each cover type within the St. Ignace Lake Plain Management Area.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern hardwood	218	10,365	-	586	-	-	-	11,169
Aspen	6,456	-	-	-	-	-	-	6,456
Planted red pine	1,516	-	2,226	-	-	-	-	3,742
Lowland conifers	1,318	-	-	-	-	-	-	1,318
Lowland aspen/balsam poplar	1,098	-	-	-	-	-	-	1,098
Mixed upland deciduous	918	76	-	-	-	-	-	993
Upland conifers	729	-	-	-	201	-	-	930
Lowland spruce/fir	667	-	-	-	-	-	-	667
Lowland mixed forest	386	-	-	-	-	-	-	386
Lowland deciduous	325	12	-	-	-	-	-	337
Upland spruce/fir	316	-	-	-	-	-	-	316
Upland mixed forest	252	-	-	-	-	-	-	252
Natural jack pine	127	-	-	-	-	-	-	127
Natural white pine	-	-	50	-	75	-	-	125
Tamarack	108	-	-	-	-	-	-	108
Planted mixed pine	12	-	6	-	-	-	-	18
Planted white pine	-	-	6	-	-	-	-	6
Totals	**14,446**	**10,452**	**2,288**	**586**	**276**	**-**	**-**	**28,047**

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. The following sections will provide additional details for each of the significant cover types in the St. Ignace Lake Plain Management Area.

Table 6. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Cedar	57,069	57,069	0
Aspen	45,459	45,664	205
Northern hardwood	41,129	41,151	22
Lowland conifers	19,327	19,201	-126
Planted red pine	13,810	13,774	-36
Mixed upland deciduous	9,113	9,012	-101
Lowland spruce/fir	7,325	7,166	-159
Lowland aspen/balsam poplar	6,492	6,336	-156
Upland mixed forest	6,475	6,857	383
Upland conifers	5,899	5,603	-296
Lowland mixed forest	5,002	5,389	387
Lowland deciduous	3,868	3,953	86
Upland spruce/fir	2,964	2,798	-166
Natural mixed pines	1,855	1,858	2
Natural white pine	1,643	1,643	0
Tamarack	1,627	1,608	-19
Natural jack pine	1,334	1,308	-26
Hemlock	1,122	1,122	0
Natural red pine	679	679	0
Northern red oak	281	276	-5
Planted jack pine	223	239	16
Oak mix	166	166	0
Planted mixed pine	102	90	-12
Planted white pine	48	48	0
Lowland shrub	19,837	19,837	0
Marsh	4,442	4,442	0
Herbaceous open land	4,020	4,020	0
Treed bog	3,534	3,534	0
Water	3,060	3,060	0
Upland shrub	2,271	2,271	0
Low density trees	917	917	0
Bare/sparsely vegetated	791	791	0
Urban	599	599	0
Bog	520	520	0
Total:	**273,002**	**273,002**	**0**

Table 7. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection St. Ignace Lake Plain Management Area Product	Species	Volume Planned *	Volume Prepared**
Pulpwood (cords)	Mixed hardwood	87,951	82,674
	Mixed aspen	65,175	61,264
	Mixed softwood	40,931	38,475
	Mixed spruce	25,015	23,514
	Red pine	23,870	22,437
	White pine	6,281	5,904
	Mixed oak	4,735	4,451
	Jack pine	4,151	3,902
	Pulpwood total	**258,107**	**242,621**
Sawtimber (MBF)	Red pine	45,915	43,160
	Sugar maple	31,957	30,040
	Mixed aspen	21,120	19,853
	Red maple	14,731	13,847
	White pine	12,310	11,571
	Red oak	5,246	4,931
	Basswood	4,015	3,774
	White oak	2,654	2,495
	Mixed oak	547	514
	Sawtimber total	**138,494**	**130,184**
	Total sawtimber harvest volume in cords	**296,766**	**278,960**
	Grand total harvest volume in cords	**554,873**	**521,581**
*Volume estimates based on 100% of the projected harvests for the 10-year planning period. **Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

Desired future condition

Although many cover types within the management area are projected to remain stable, there are some significant cover-type transitions projected. Upland mixed forest and lowland mixed forest are expected to have the largest influx from other cover types and are projected to increase in abundance. Upland

mixed forest is projected to increase by 6%, or 383 acres, and lowland mixed forest cover types are projected to increase by approximately 7%, or 383 acres. Upland conifers and lowland spruce/fir are projected to have the most transitions out of the cover types, at 5% and 2.2%, respectively. This forecasted cover-type transition is related to habitat goals of the deer wintering complexes within the management area.

Featured species current and projected habitat acres

There are eleven featured species in this management area that span various cover types, age classes and stand-level conditions.

As noted in the featured species management priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors, including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres, those are potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the featured species management priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the State Forest Management Plan model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
American woodcock, young	Aspen, lowland aspen, lowland deciduous	15,448	14,267	16,125	16,037
Black bear	Generalist/mast	7,350			
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	36,170	44,404	29,590	49,777

Featured Species	Priority Cover types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
Black-throated blue warbler	Northern hardwoods, mixed upland deciduous	29,868	38,064	22,383	41,838
Golden-winged warbler, young	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	12,801	11,613	13,493	13,643
Marten, U.P.	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	100,054	112,039	97,604	119,416
Moose	To be determined	--	--	--	--
Ruffed grouse	Aspen	12,794	11,550	13,428	13,516
Sharp-tailed grouse	Herbaceous open land, upland shrub, low density trees, lowland shrub, bog, treed bog	31,099			
Snowshoe hare forest	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	22,938	24,374	21,249	21,359

Featured Species	Priority Cover types	Total Habitat Acres Current	10-Year Projected Habitat Acres	50-Year Projected Habitat Acres	100-Year Projected Habitat Acres
White-tailed deer (food)	Food: Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	117,984	118,927	121,983	124,879
White-tailed deer (shelter)	Shelter: hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	111,843	110,928	108,005	105,331
Wood turtle	Nonforested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current condition

Most of the natural aspen cover type is currently between stand ages of 0 and 49 years old in the St. Ignace Lake Plain Management Area (Figure 3). The age class distribution is currently in an unbalanced condition. There is a deficit in the 50-59 and 60-69 age classes and a surplus in the age classes between 10- to 19-year-old and 40- to 49-year-old. A small number of acres extend beyond the desired maximum age class distribution. These acres are either prescribed for harvest or are unavailable for harvest.

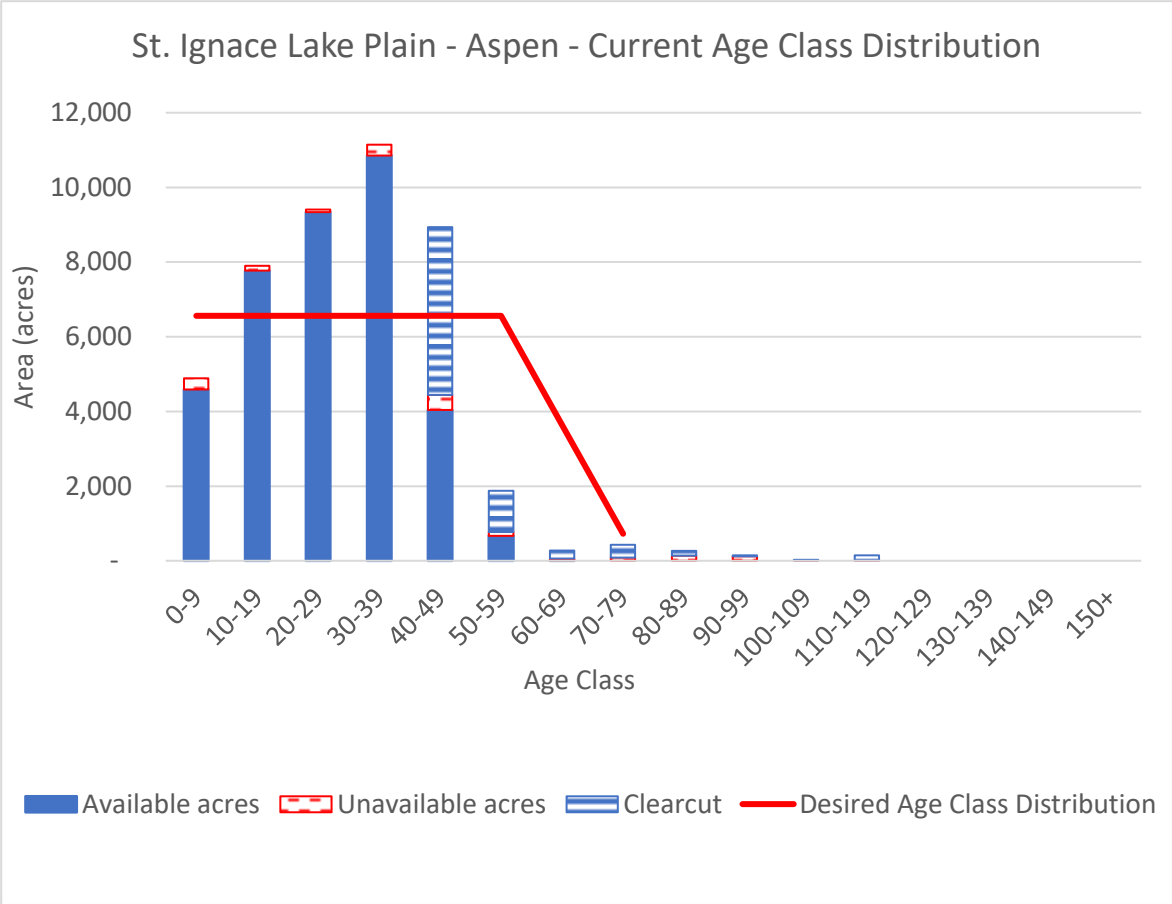


Figure 3. Current age class distribution and projected harvests in aspen cover type in the St. Ignace Lake Plain Management Area.

Current conditions are a result of consistent commercial harvests and regeneration efforts on available aspen acres during the previous planning periods. A portion of this cover type meets the habitat requirements for American woodcock, ruffed grouse and snowshoe hare.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres – Available	Aspen Habitat Acres – Unavailable
American woodcock	Age category: 0-19 Size class: sapling	12,357	437
Ruffed grouse	Age category: 0-19 Size class: sapling	12,357	437
Snowshoe hare	Age category: 0-19 Size class: sapling	12,357	437
White-tailed deer	All ages and size classes	45,459	--

Desired future condition

The projected long-term cover-type trend for aspen is stable in the St. Ignace Lake Plain Management Area. Much of the aspen area falls in the available category, and around 4% of the cover type is unavailable.

The long-term goal for this cover type is balanced age classes between 0 and 60 years old for all available aspen stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to provide regulated harvests, wildlife habitat and recreation opportunities.

The end of the planning period will result in the establishment of 6,662 acres of aspen in the 0-9 age class, which is very slightly over the desired level of 6,589 acres. Progress toward the long-term desired age class distribution of aspen can be seen in the younger age classes, but it will take many decades of even-aged management for all age classes to reach the desired distribution, especially with the number of surplus aspen acres present (Figure 4).

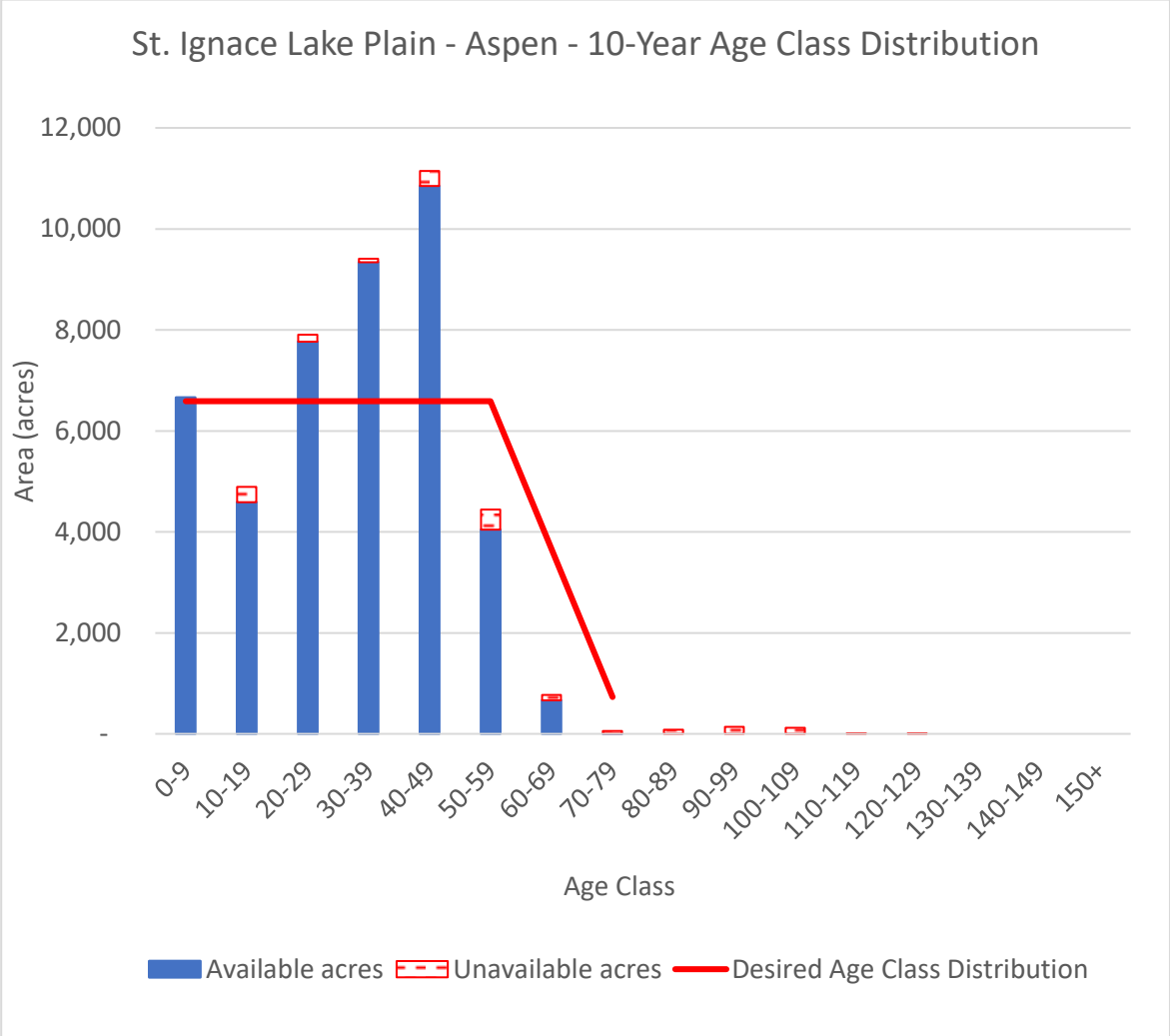


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution of aspen has nearly reached the desired future condition for available acres (Figure 5), with few deviations from the target proportions. There is a surplus of acres in the 70- to 99-year age classes that has been carried forward from previous planning periods. Some acres are shown beyond the max tail age of 70 years, of which a portion remains unavailable for harvest.

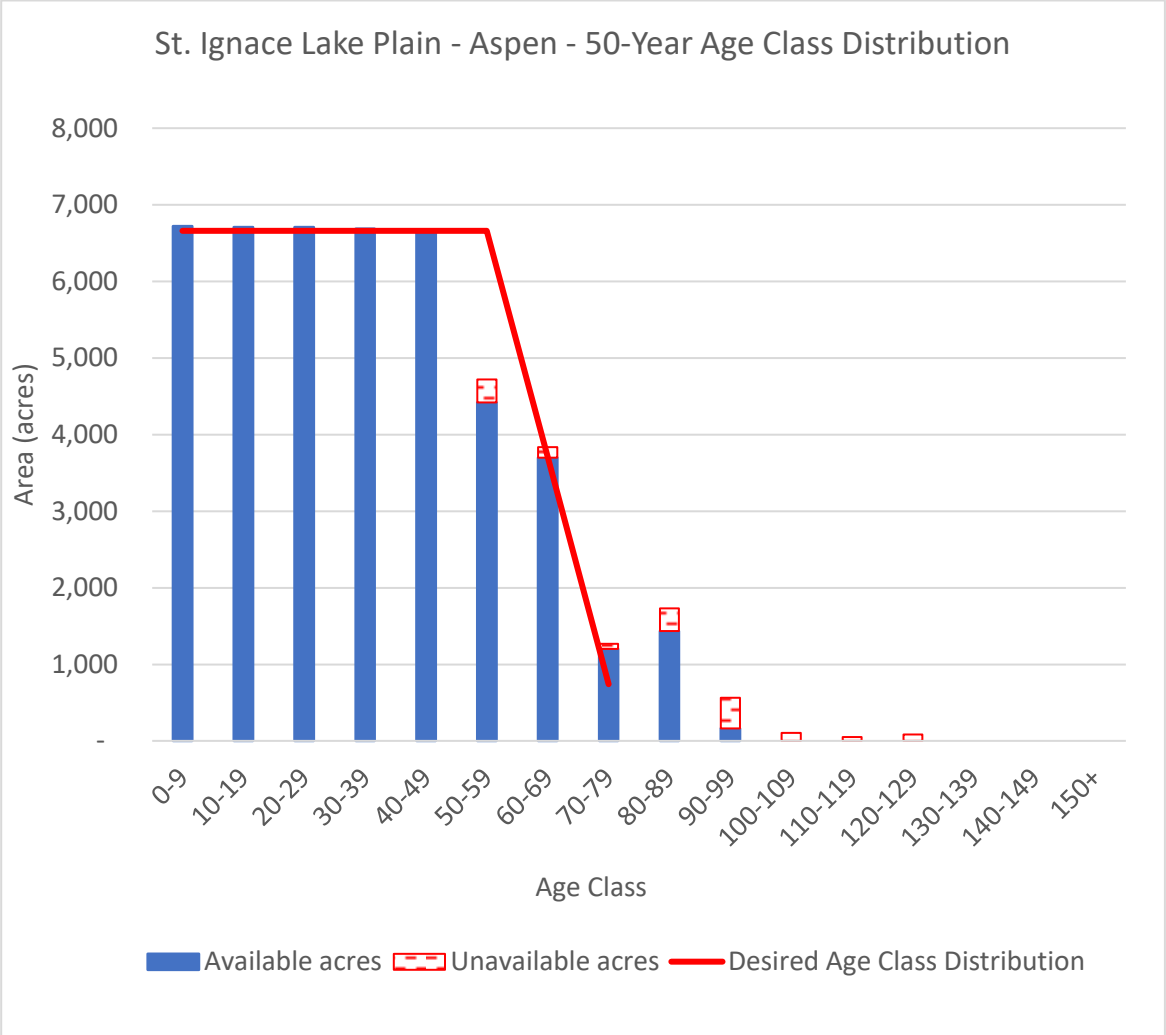


Figure 5. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

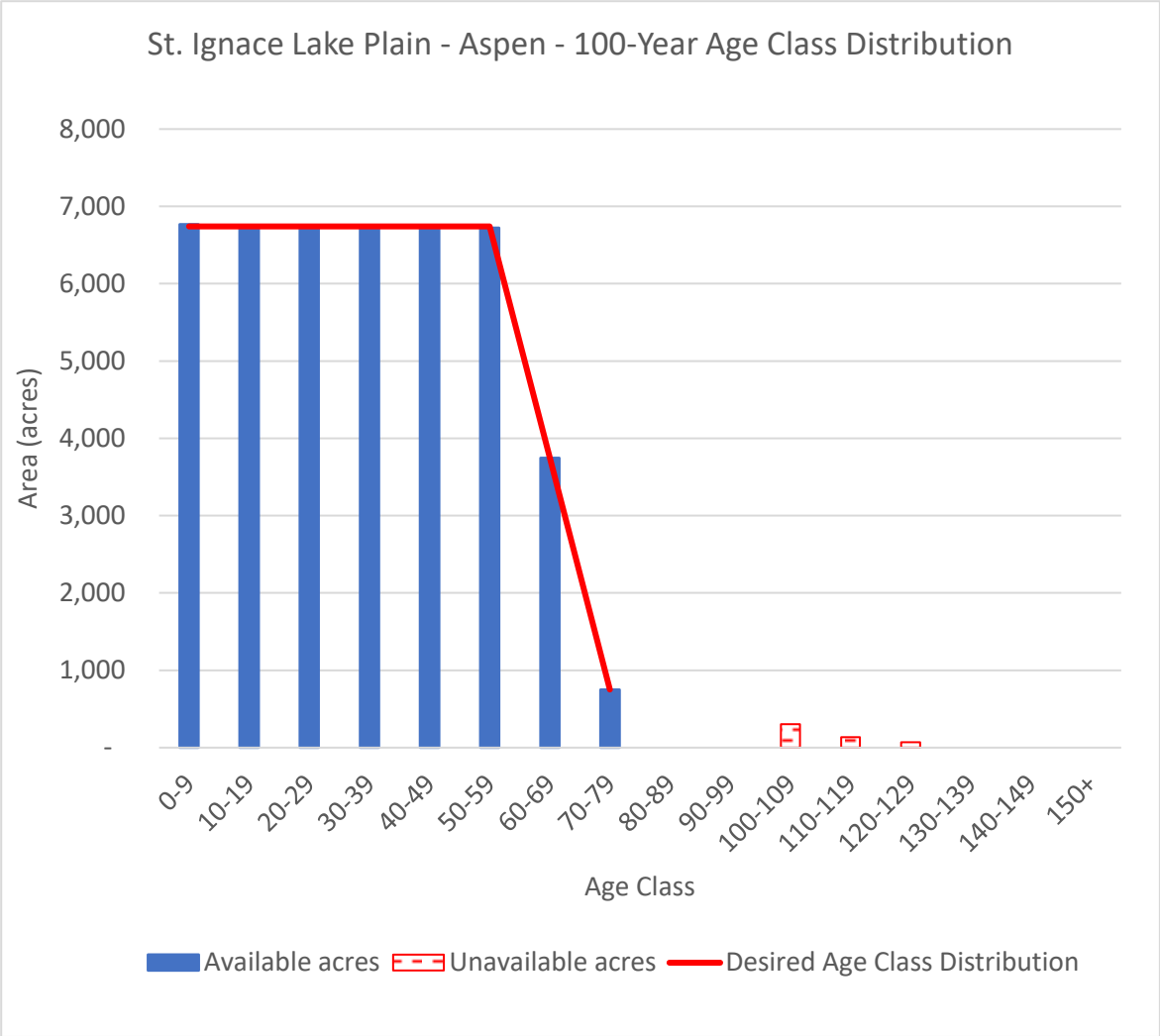


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

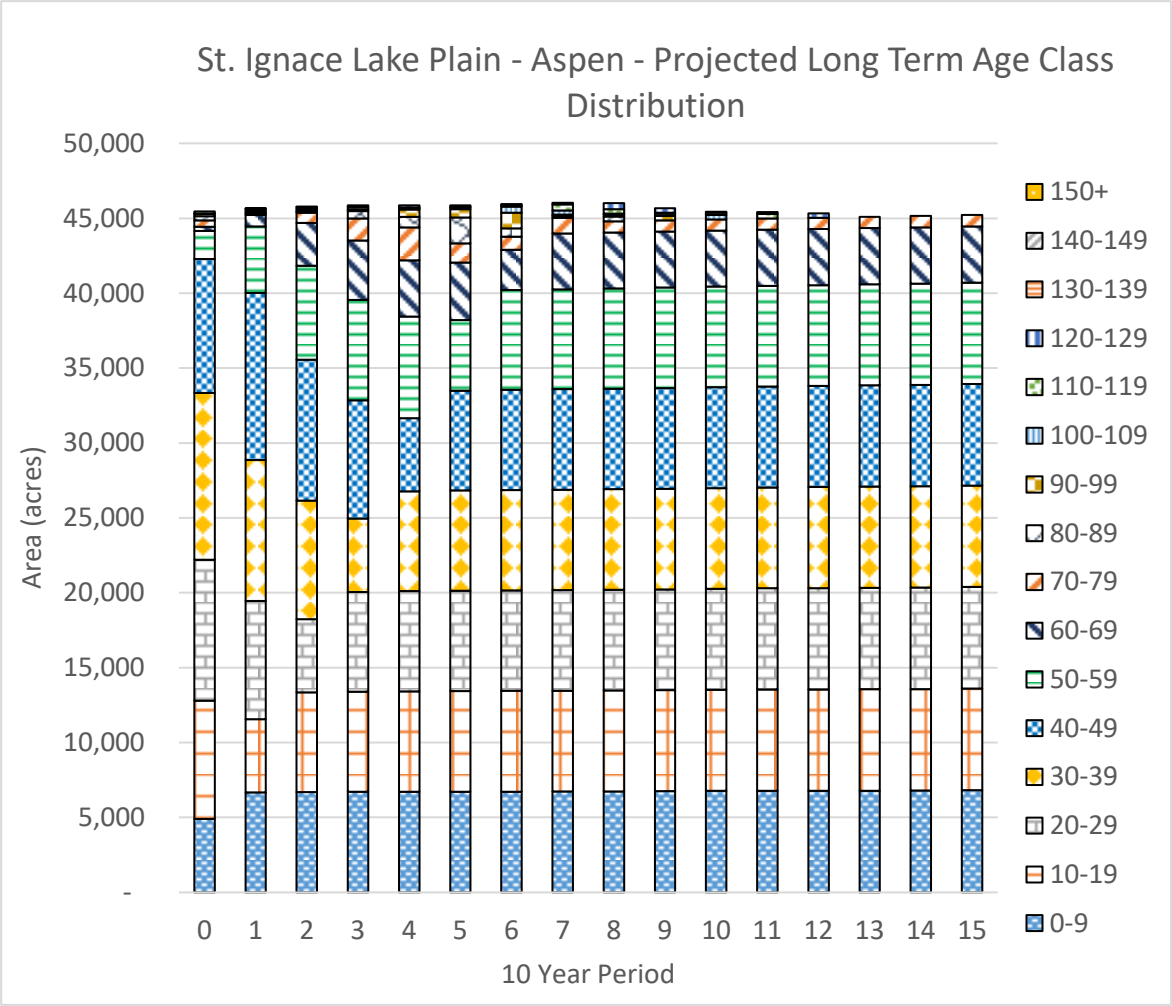


Figure 7. Projected age class distribution for all acres of aspen over the next 150 years in the St. Ignace Lake Plain Management Area.

Management actions

There are 6,456 acres of projected clearcut harvest in the aspen cover type during the planning period. This falls slightly short of the desired establishment of 6,589 acres of aspen per decade because of the current unbalanced age class condition.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 80 and 110 years old in the St. Ignace Lake Plain Management Area (Figure 8). The past management regime has been primarily single tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition, where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10).

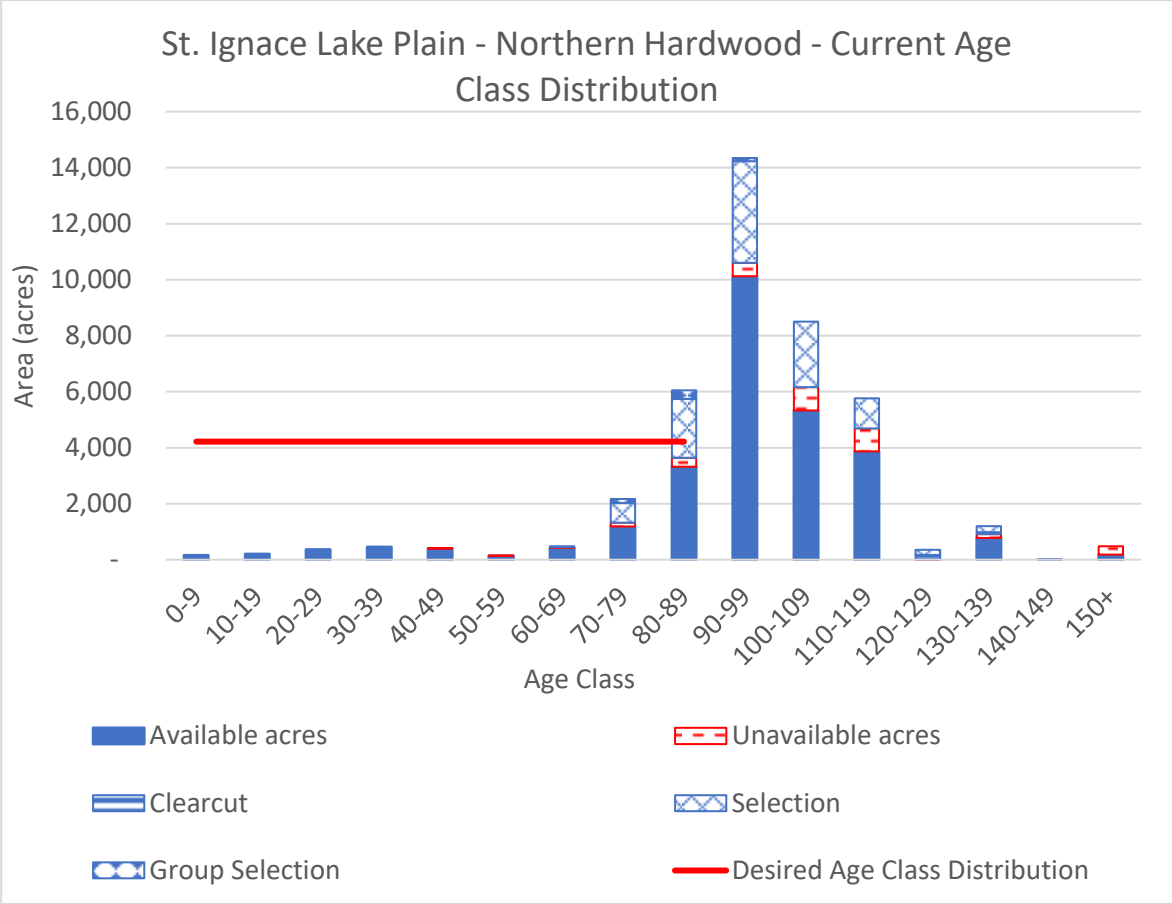


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the St. Ignace Lake Plain Management Area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the St. Ignace Lake Plain Management Area (Figure 9). Current conditions are a result of beech salvage efforts in the previous planning period and a regulated selection harvest regime that has been in place in this management area for decades.

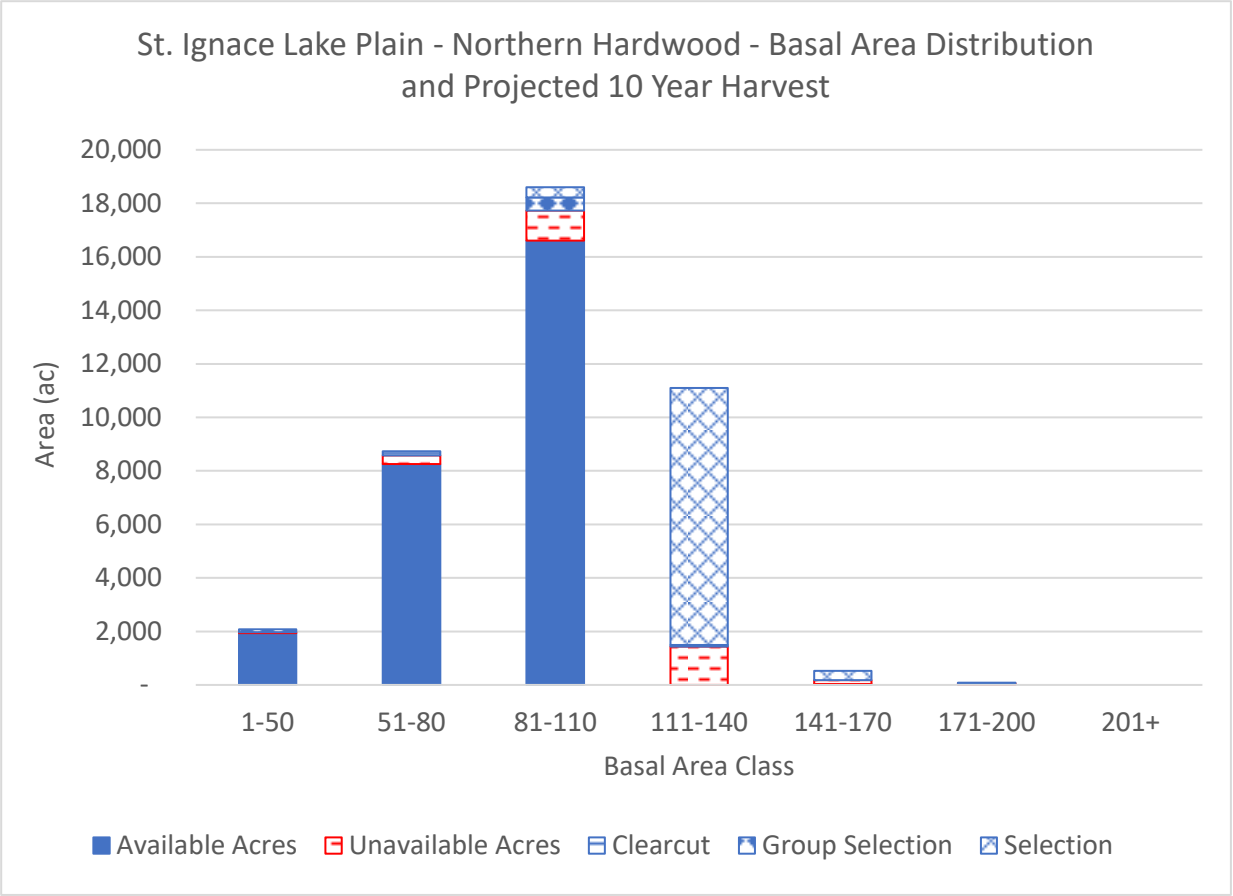


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

There are very few acres of unavailable northern hardwoods in the St. Ignace Lake Plain Management Area. Selection is the primary silvicultural treatment projected during this 10-year planning period, but there may be opportunities to utilize even-aged management silvicultural regimes to increase stem density, species composition and regeneration within the northern hardwood areas. A portion of this cover type meets the habitat requirements for blackburnian warbler, black-throated blue warbler, marten and white-tailed deer.

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	25,183	2,870

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres – Available	Northern Hardwood Habitat Acres – Unavailable
Black-throated blue warbler	Age category: 80+ Size category: sawlog Basal area: 81+	25,183	2,870
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	25,183	2,870
White-tailed deer	All sizes and age classes	41,129	--

Desired future condition

The projected long-term cover-type trend for northern hardwood is stable in the St. Ignace Lake Plain Management Area. There are very few transitions into this cover type from other cover types and equally few transitions from northern hardwoods to other cover types forecasted in this management area.

The desired basal area distribution is a bell-shaped curve, where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupying the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area, as canopy gaps fill in with regenerating seedlings, saplings and poles, and remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. It will take several decades for the St. Ignace Lake Plain Management Area to reach the desired future condition because of the impacts from beech bark disease. The amount of American beech that once occupied much of the northern hardwood stands has resulted in lower than normal residual basal area and decreased stocking levels across much of the eastern Upper Peninsula.

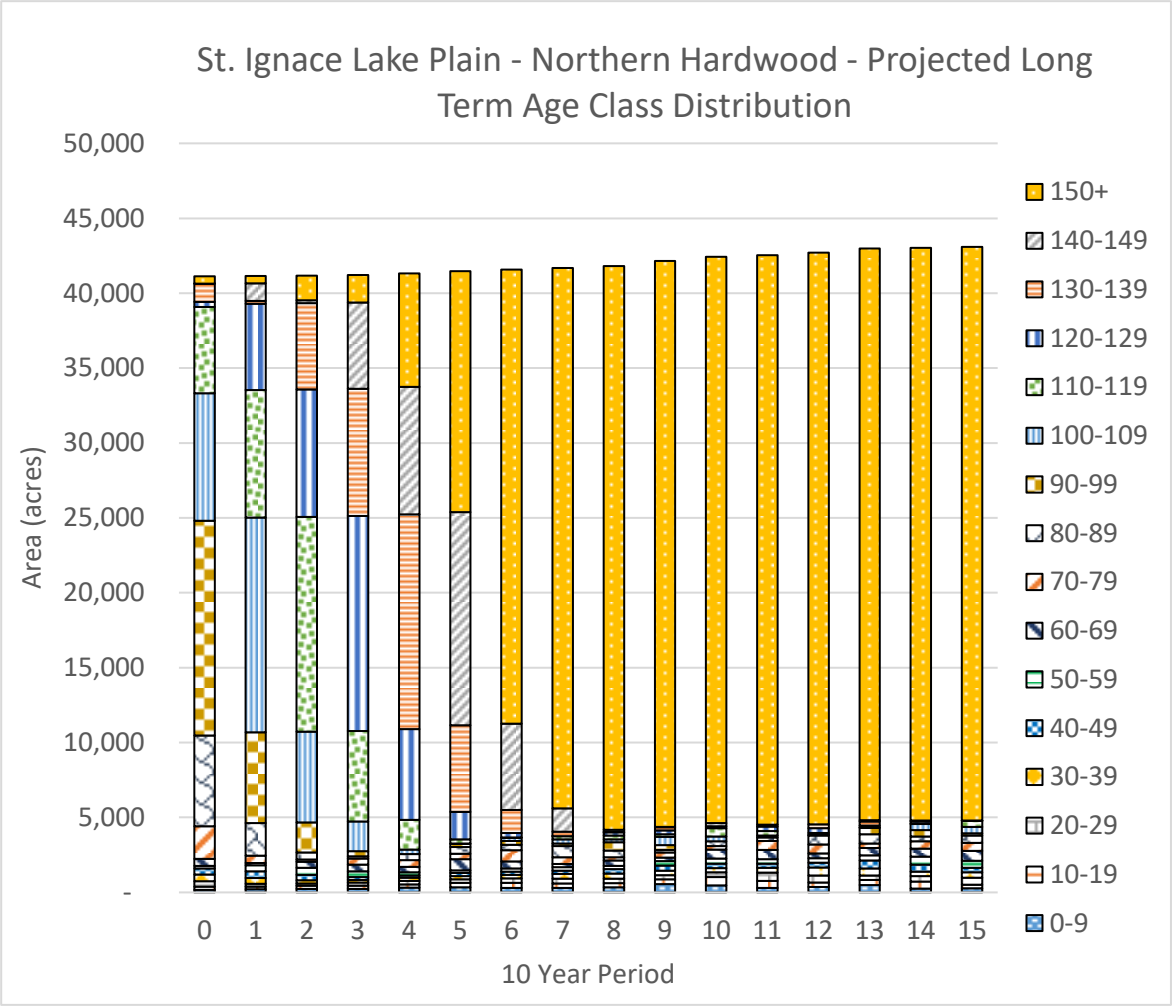


Figure 10. Projected age class distribution for all acres of northern hardwood over the next 150 years in the St. Ignace Lake Plain Management Area.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 10,365 acres, clearcut on 218 acres and group selection on 586 acres (Table 5). Multiple silvicultural regimes should continue to be considered as emerging research results become available. Emphasis should be placed on larger canopy gaps to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition.

Planted red pine

Current condition

Most of the planted red pine cover type is currently in the 0- to 29-year-old age classes, and nearly all the acres are available for commercial management; roughly 3% of the cover type is considered unavailable (Table 4). The past management regime has been primarily thinning every 10 years to achieve an approximate residual basal area of 120 square feet. The age class distribution in this cover type is in a very unbalanced condition.

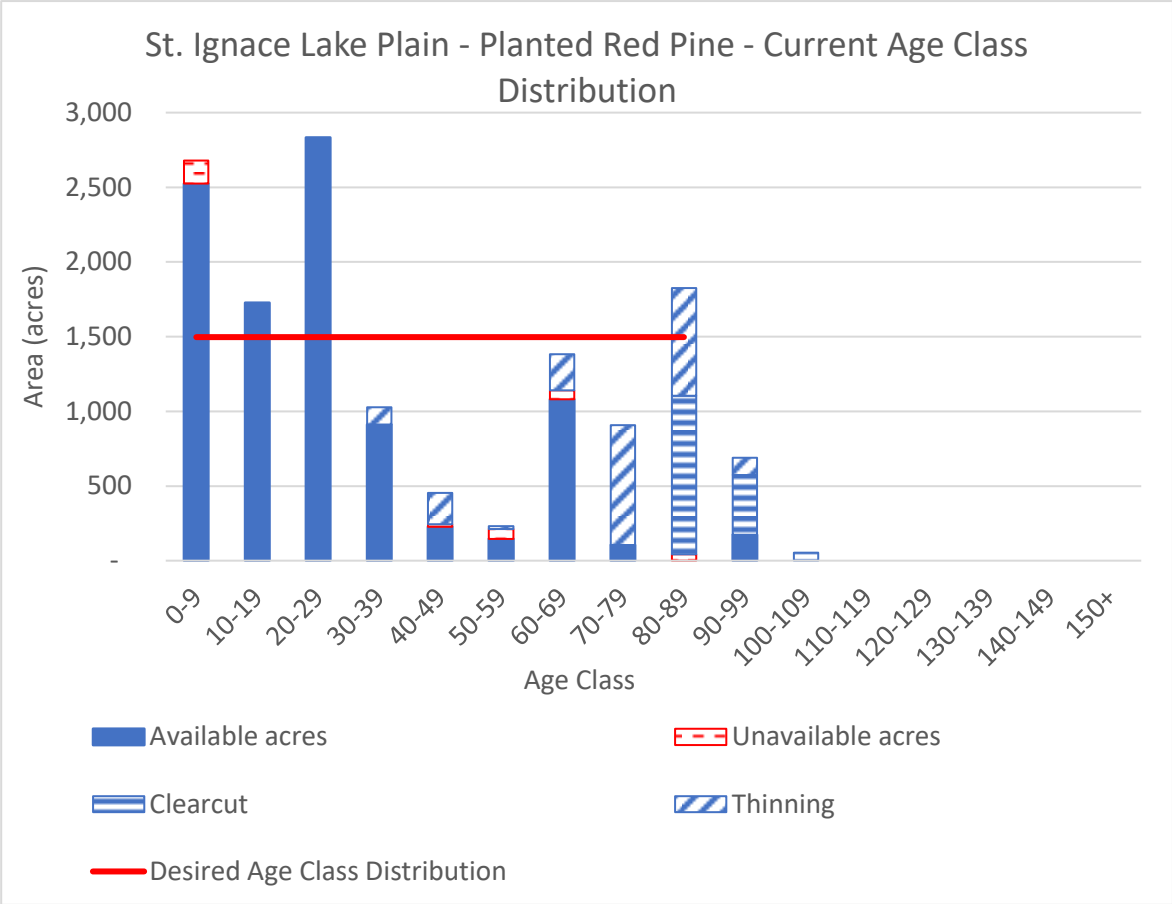


Figure 11. Current age class distribution, desired age class distribution and projected harvests in the planted red pine cover type over the 10-year planning period.

Current conditions are a result of plantations established during the 1930s by the Civilian Conservation Corps, most of which reached maturity during the previous two planning periods. Additionally, there have been consistent commercial harvests and regeneration efforts on available planted red pine acres during the previous planning periods.

Desired future condition

The projected long-term cover-type trend for planted red pine is stable in the St. Ignace Lake Plain Management Area. There are very few transitions into this cover type from other cover types and equally few transitions from planted red pine to other cover types forecasted in this management area.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available planted red pine stands in this management area. Maintaining lower acreage in old age classes continues to be desirable to lessen the prevalence and severity of diseases and to reduce the threat of damaging wildfire.

The end of the planning period will result in the establishment of 1,482 acres in the upcoming 0-9 age class. Progress toward the long-term age class distribution of planted red pine will take many decades in the management area (Figure 12).

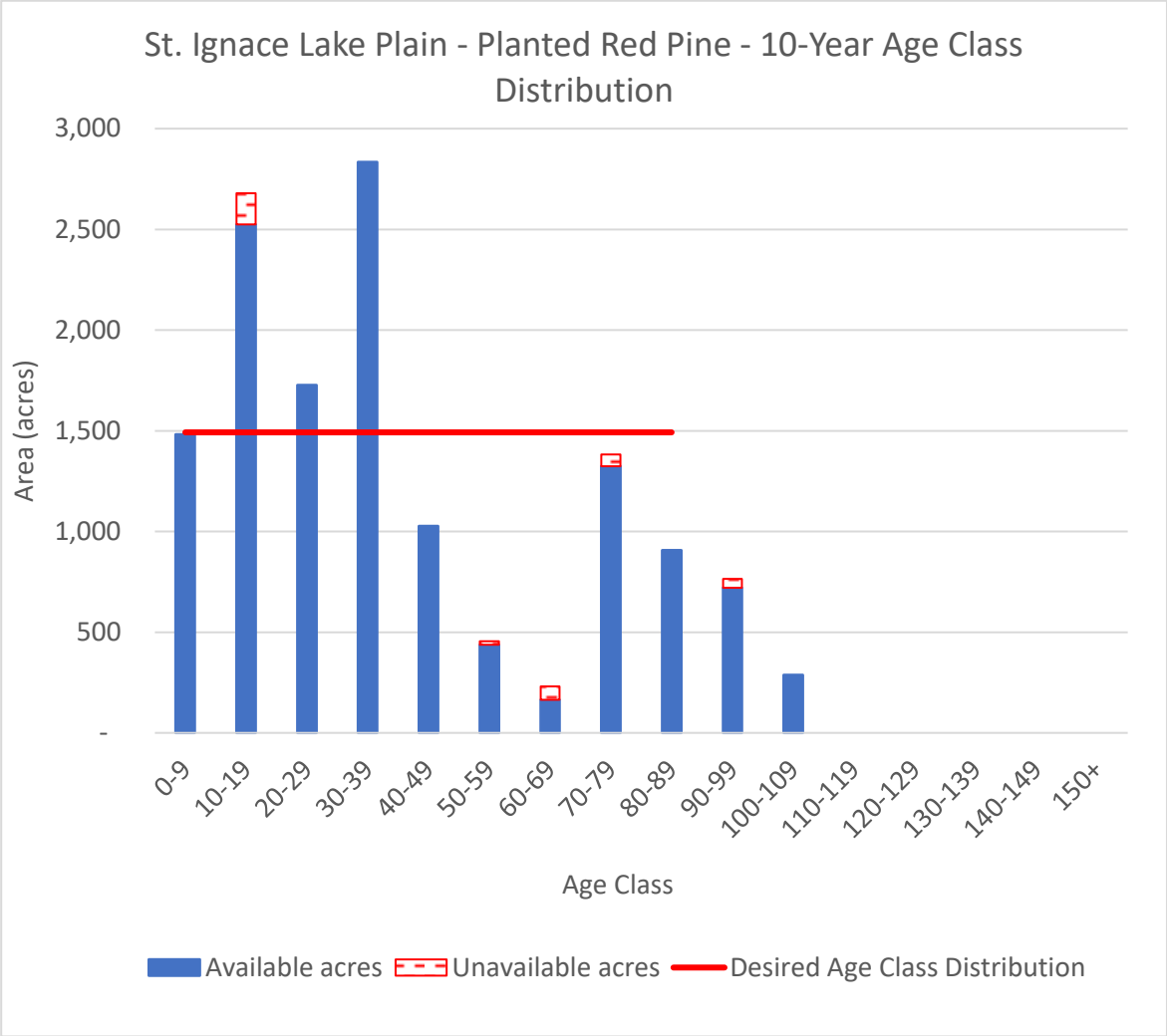


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

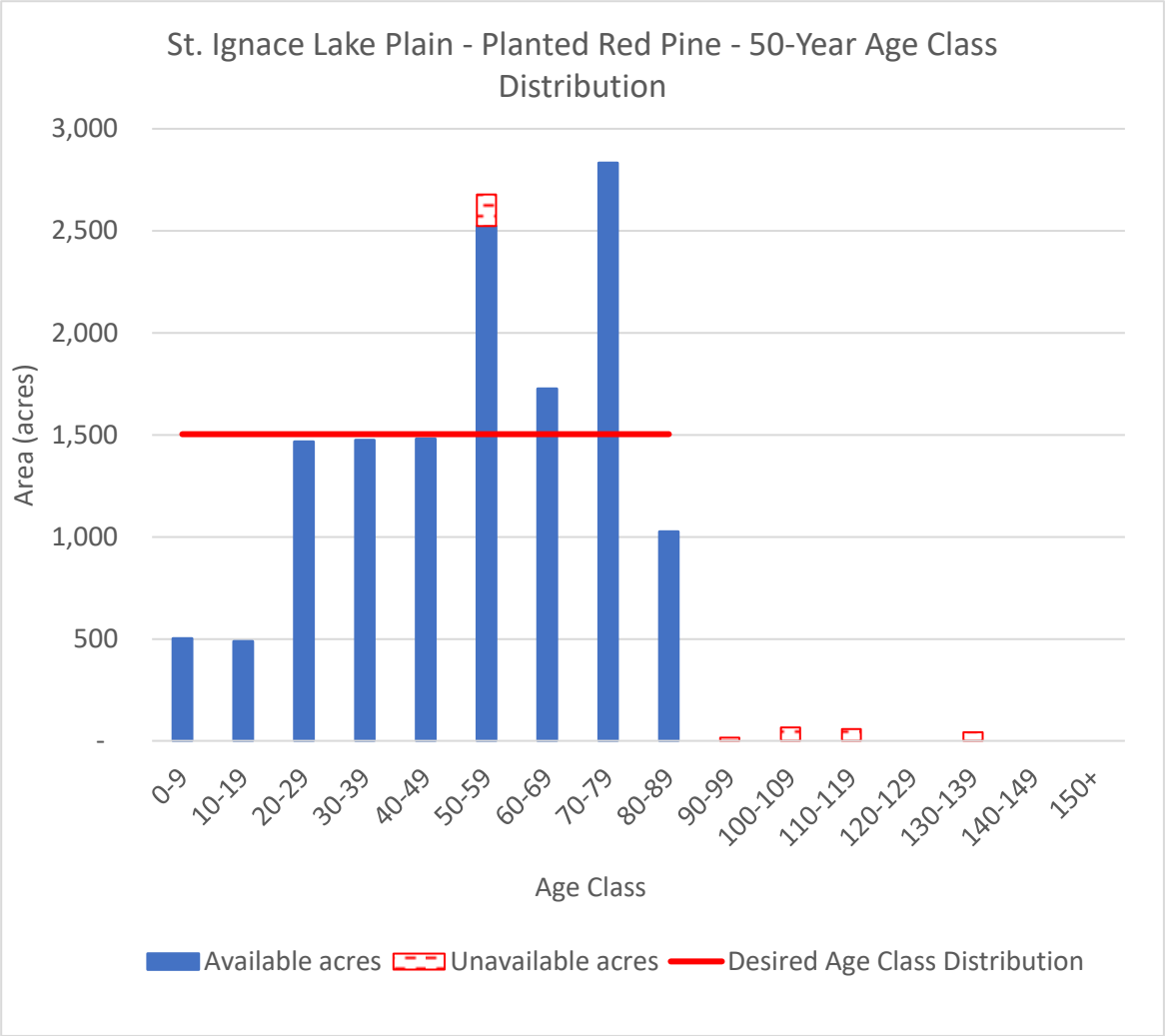


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of planted red pine beginning to improve, with a few age classes nearing the desired future condition. As is often the case, an extremely unbalanced condition in the first planning period can often result in the need to carry some acres slightly longer into older age classes to achieve the desired age class goals (Figure 13).

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

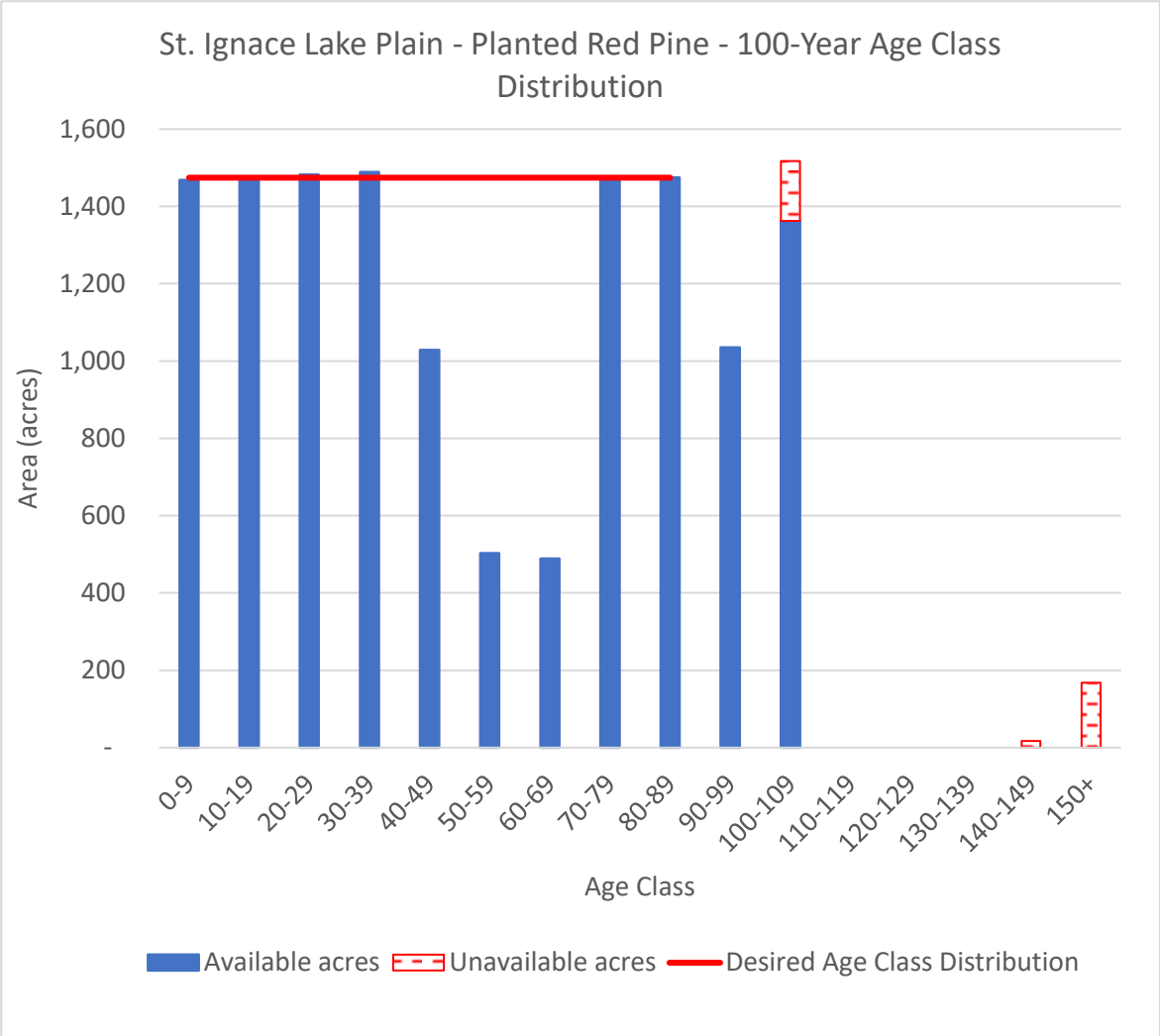


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

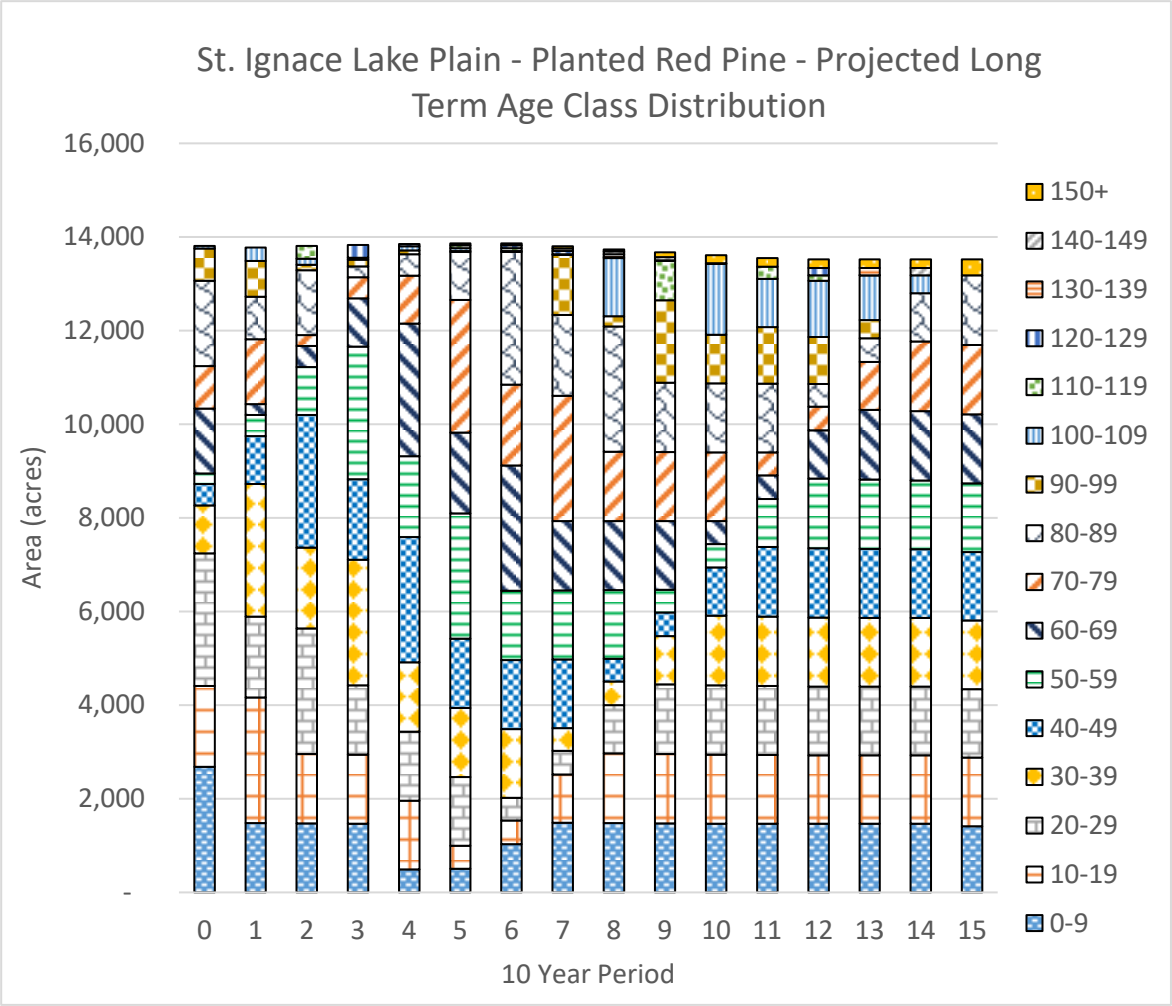


Figure 15. Projected age class distribution for all acres of planted red pine over the next 150 years in the St. Ignace Lake Plain Management Area.

Management actions

There are 1,516 acres of projected clearcut harvest in the planted red pine cover type during this planning period. This is slightly above the desired establishment of 1,493 acres per decade because of the current unbalanced condition. In addition to clearcut acres, there are 2,226 acres projected for thinning in this cover type.

Lowland conifers

Current condition

The St. Ignace Lake Plain Management Area has a surplus of acres in the 0- to 9-year age class due to harvesting of the large number of mature and overmature acres on the landscape (Figure 16). The age class distribution is currently very unbalanced across almost all the age class categories. Additionally, a deficit of available acres occurs in almost all age classes. The landscape position in which many of these acres occur contributes to the number of acres extending beyond the desired maximum age class tail of 80 years old. A portion of this cover type meets the habitat requirements for snowshoe hare and marten (

Table 11).

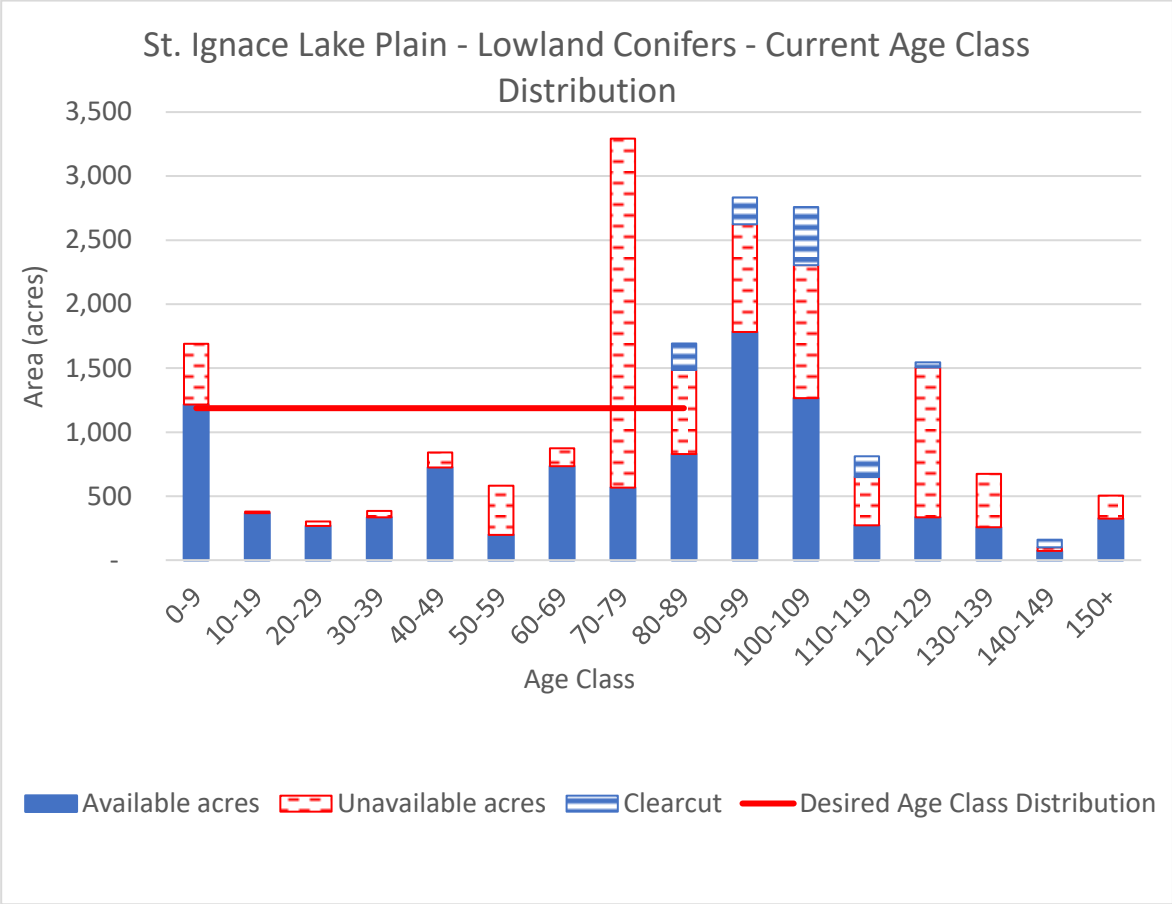


Figure 16. Current age class distribution, desired age class distribution and projected harvests in the lowland cover type over the 10-year planning period.

Table 11. Featured species with lowland conifers as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Lowland Conifer	Lowland Conifer Habitat Acres – Available	Lowland Conifer Habitat Acres – Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	1,585	486
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	5,057	4,070

Desired future condition

The projected long-term cover-type trend for lowland conifers is fairly stable, but with a slight transition away from the cover type, in the St. Ignace Lake Plain Management Area. Transitions out of this cover type during this planning period are generally to the lowland mixed forest cover types. Transitions out of the cover type into lowland mixed forests are forecasted as species diversity is expected to increase.

Retaining cedar and hemlock within this cover type is necessary to maintain/increase species diversity and habitat structure and is critical in areas of high deer densities, where recruitment of these tree species is unlikely due to browse pressure. Both hemlock and cedar are relatively uncommon on the landscape, have decreased significantly since European settlement and are long-lived species whose value is extremely high for wildlife.

The long-term goal for this cover type is balanced age classes between 0 and 80 years old for all available lowland conifer acres and then decreasing in number of acres until the max tail of 110 years old is reached.

The end of the planning period will result in the establishment of approximately 1,126 acres of lowland conifers from the available acres. It will take many decades to achieve the long-term desired balanced age class distribution of lowland conifers (Figure 17).

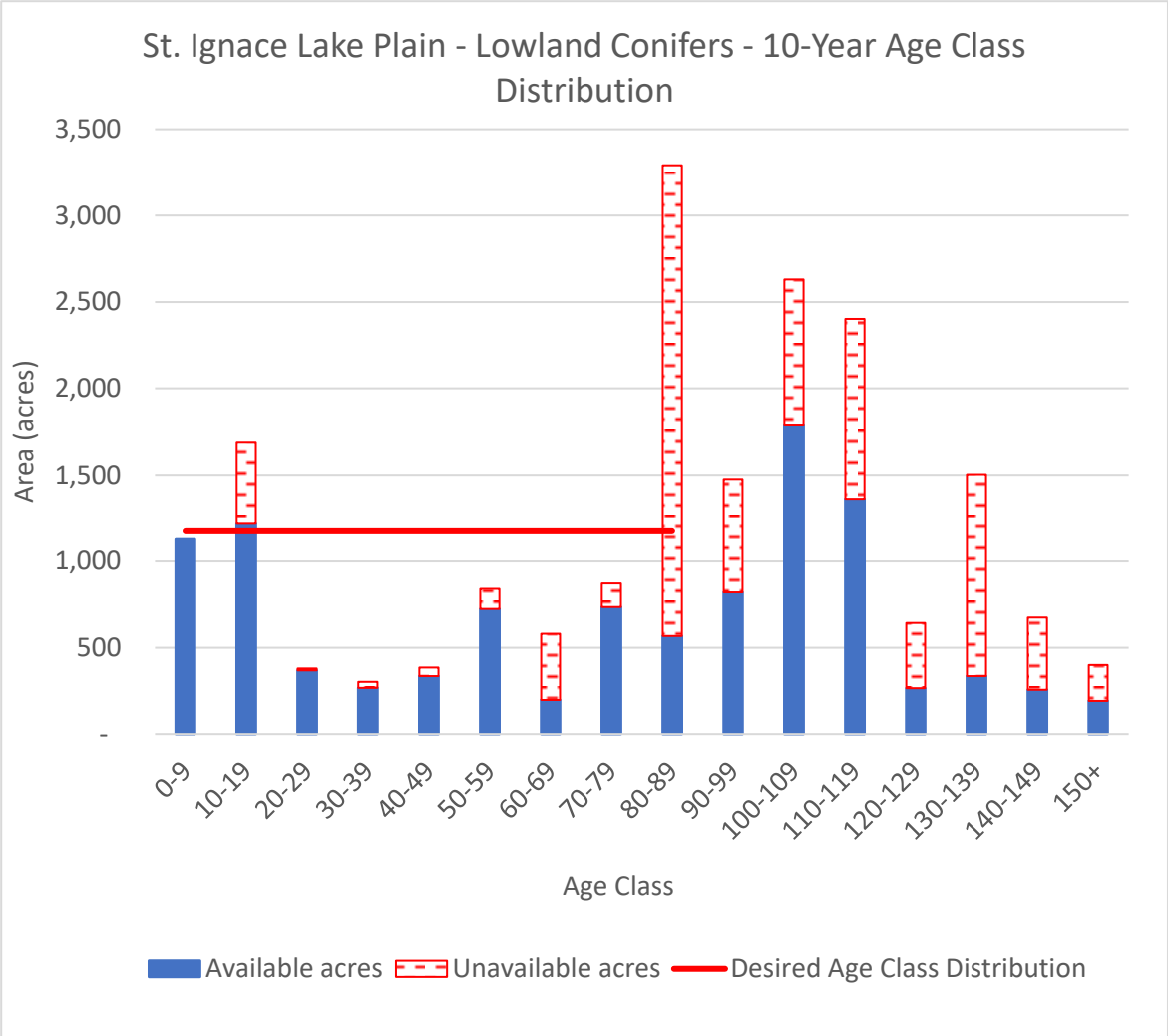


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution of lowland conifers is beginning to reach the desired future condition for available acres in the age classes between 20 and 40 years old. The number of acres in the older age classes, 120 years old and older, continues to increase as the unavailable acres continue to move to the older age classes (Figure 18).

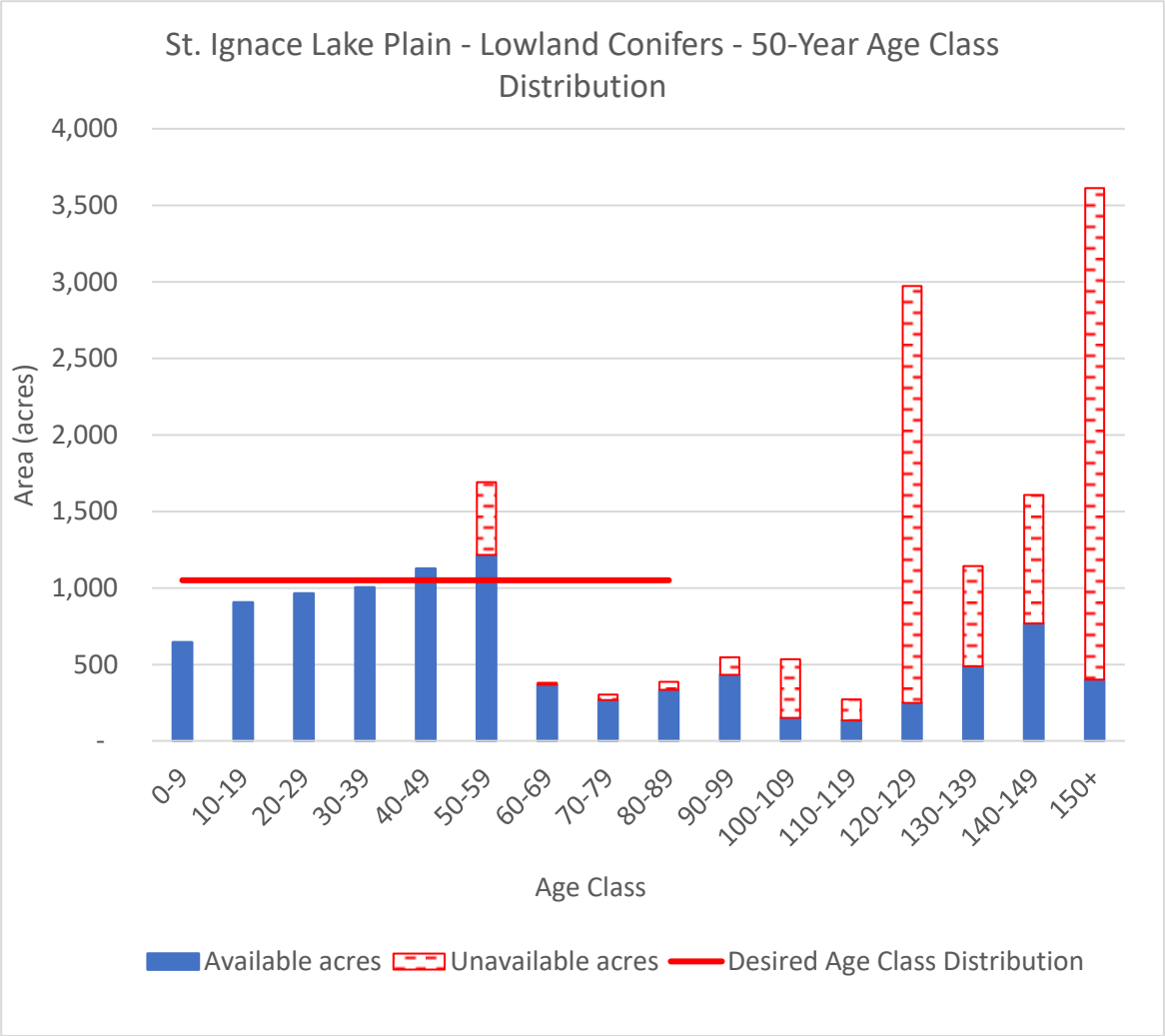


Figure 18. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate on the manageable acres of lowland conifer cover type in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged and mature forest.

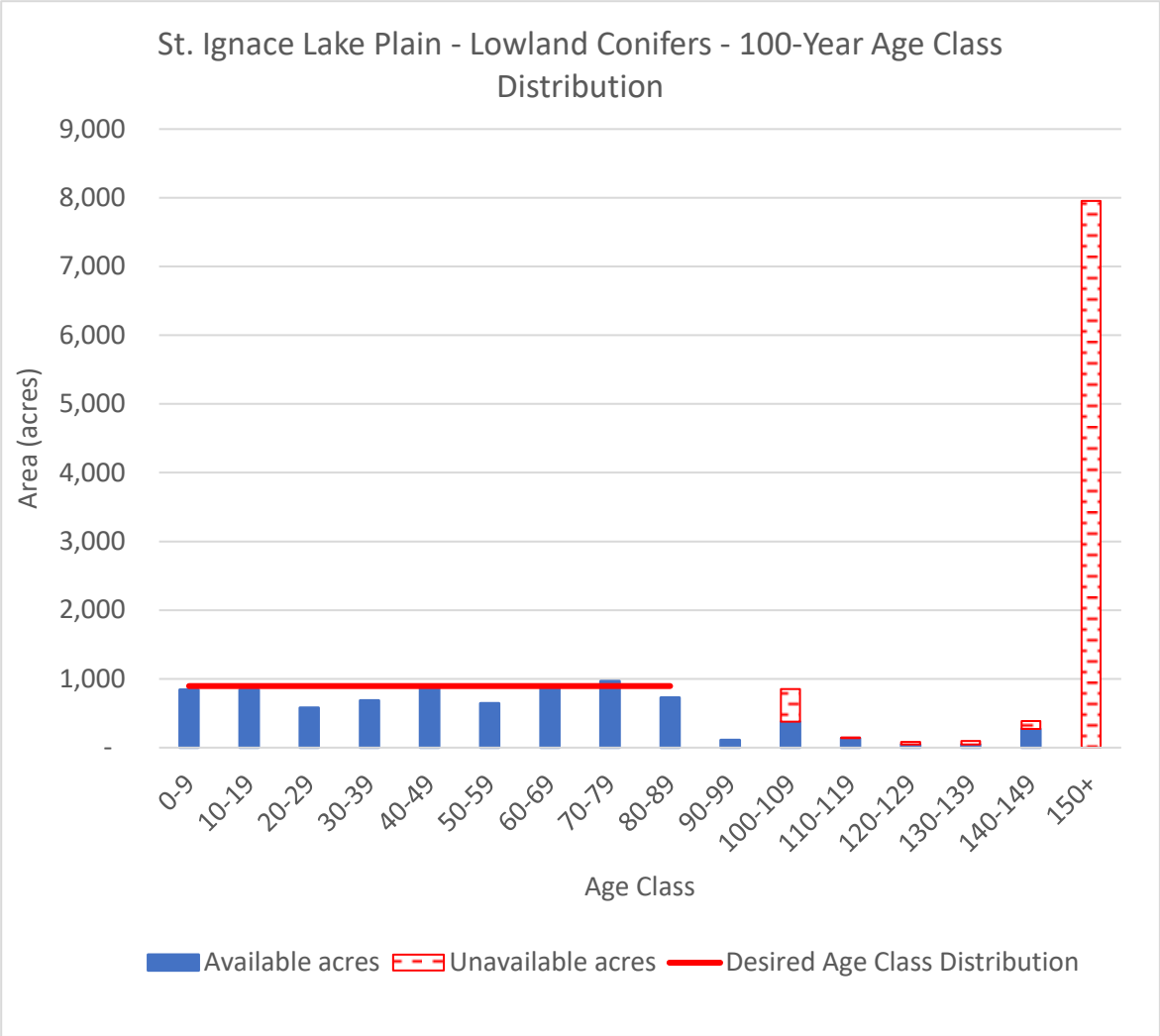


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

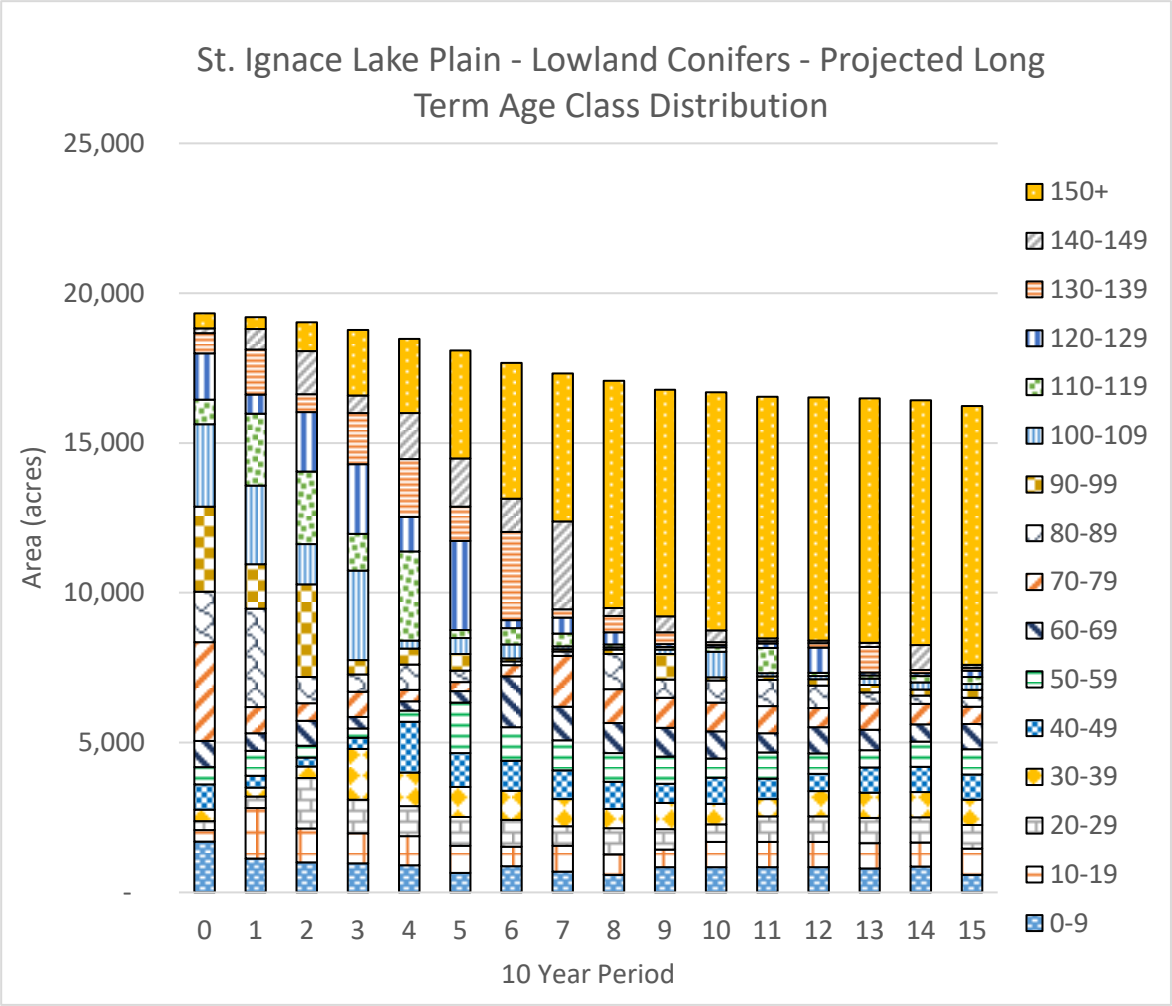


Figure 20. Projected age class distribution for all acres of lowland conifers over the next 150 years in the St. Ignace Lake Plain Management Area.

Management actions

There are 1,318 acres of projected clearcut harvest in the lowland conifer cover type during the planning period. This is above the desired establishment of 1,173 acres of lowland conifer per decade because of the current unbalanced age class condition and the number of acres beyond the desired max tail age of 80 years old.

Retaining cedar and hemlock within this cover type is necessary to maintain/increase species diversity and habitat structure and is critical in areas of high deer densities, where recruitment of these tree species is unlikely due to browse pressure. Both hemlock and cedar are relatively uncommon on the landscape, have decreased significantly since European settlement and are long-lived species whose value is extremely high for wildlife.

Cedar

Current condition

The majority of this cover type is over 100 years old, and it occurs mostly on acres unavailable for commercial harvest. The age class distribution is unbalanced, but regulated harvests are not a priority/focus in this cover type. A portion of this cover type meets the habitat requirements for white-tailed deer, snowshoe hare and marten.

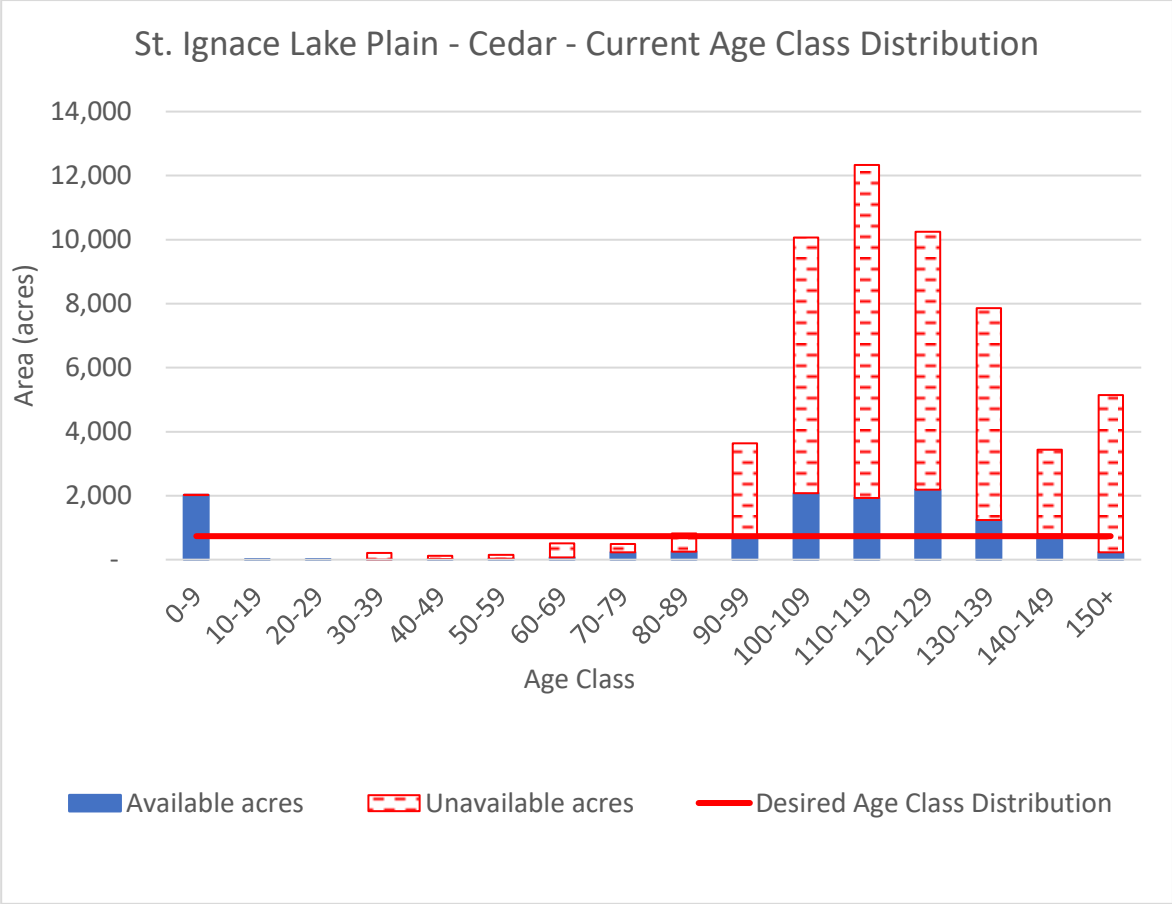


Figure 21. Current age class distribution and projected harvests in cedar cover type in the St. Ignace Lake Plain Management Area.

Table 12. Featured species with cedar as a priority habitat cover type, habitat variables and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Cedar	Cedar Habitat Acres – Available	Cedar Habitat Acres – Unavailable
Snowshoe hare	Age category: 80+ Size category: pole, sawlog Basal area: 81+	2,032	5
Marten	Age category: 40+	9,057	41,640

Featured Species	Featured Species Habitat – Cedar	Cedar Habitat Acres – Available	Cedar Habitat Acres – Unavailable
	Size category: pole, sawlog Basal area: 81+		
White-tailed deer, wintering complexes	All sizes and age classes	57,069	--

Desired future condition

The projected long-term cover type trend for cedar is stable in the St. Ignace Lake Plain Management Area. There are no projected transitions into or out of this cover type from other cover types forecasted.

The long-term goal for this cover type is to manage and maintain wildlife habitat.

Deer wintering complexes greater than 15,000 acres are modeled as a special analysis unit, or SAU, and information on them can be found in Section 5 of the plan. In deer wintering complexes less than 15,000 acres, harvest of cedar and hemlock is not usually acceptable within range stands essential for survival, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

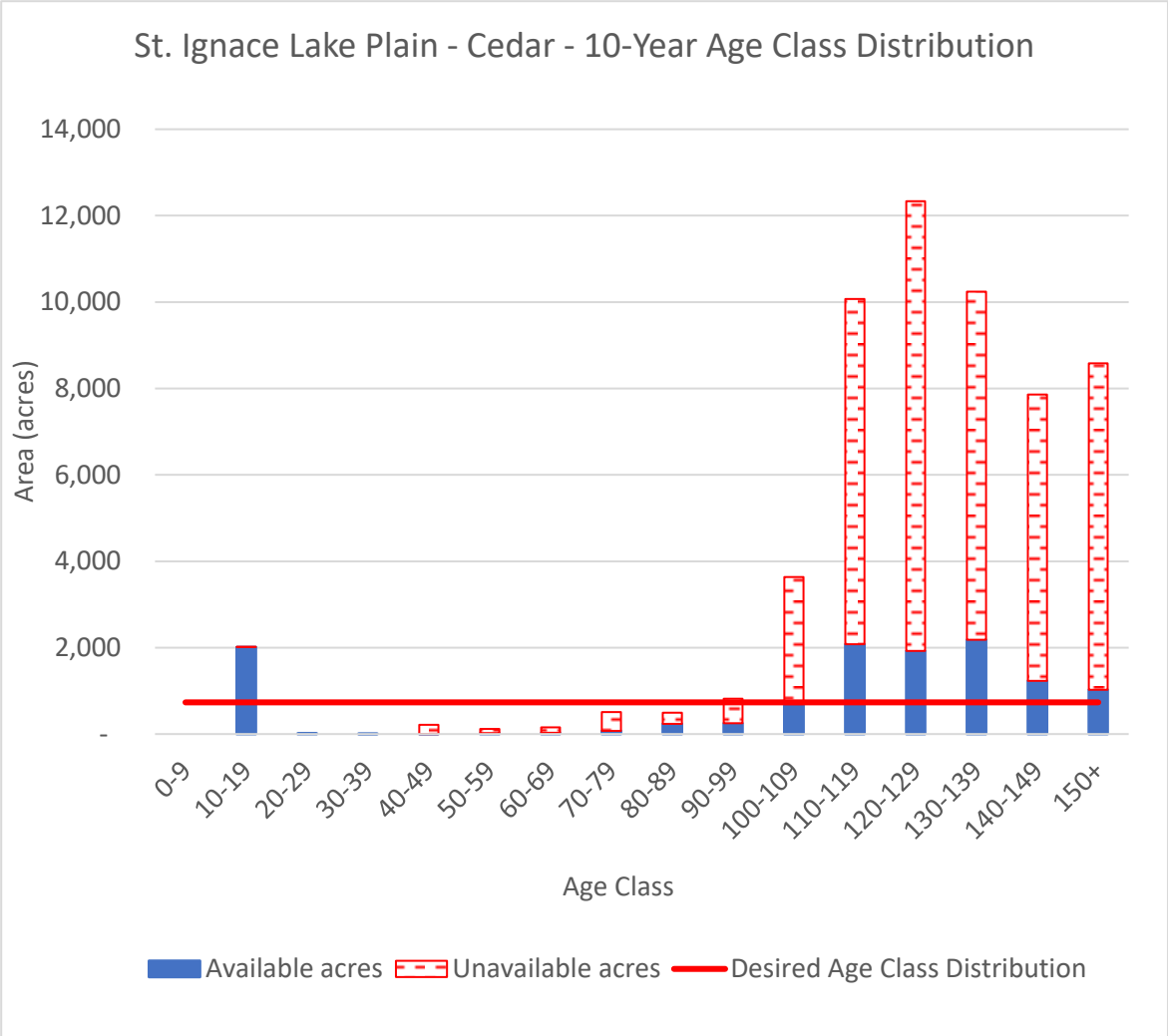


Figure 22. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The midterm age class distribution shows the population of cedar acres beginning to reach the desired future condition (Figure 23).

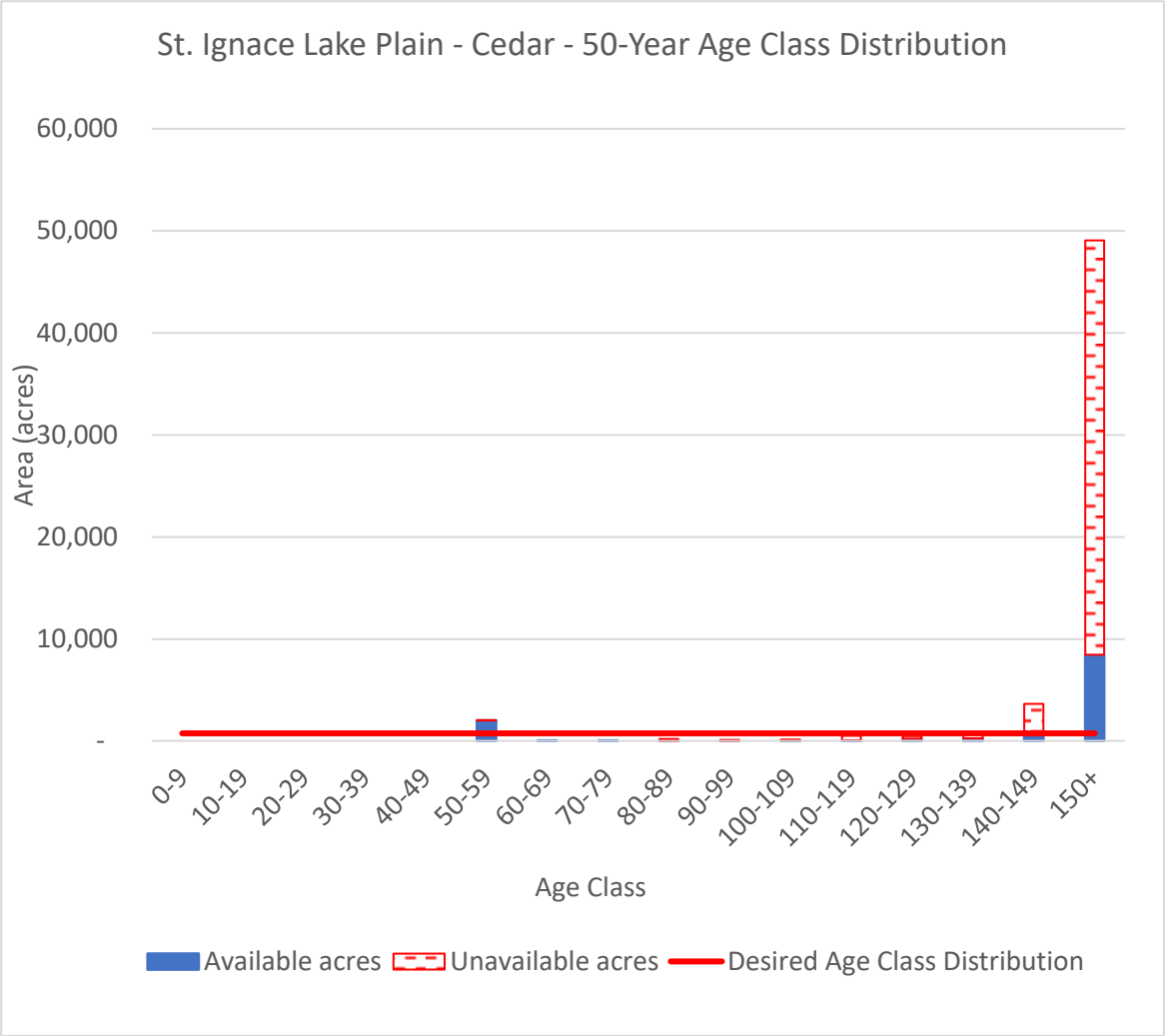


Figure 23. Projected midterm age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 24) will concentrate on the management of cedar within the deer wintering complex plans to provide a wide variety of wildlife habitat conditions across the landscape in mature forest.



Figure 24. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

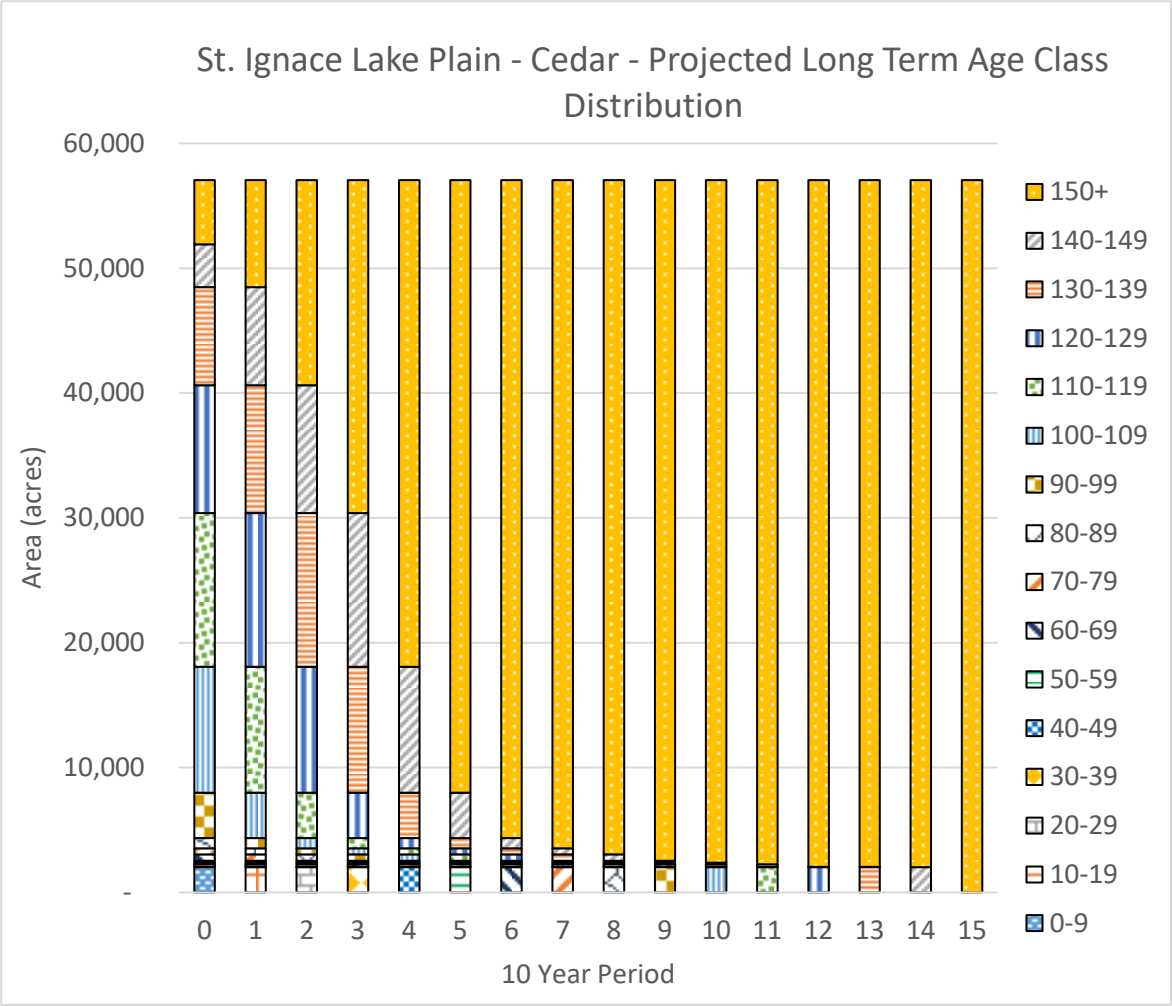


Figure 25. Projected age class distribution for all acres of cedar over the next 150 years in the St. Ignace Lake Plain Management Area.

Management actions

Maintaining this cover type where it exists on the landscape will be the primary action for this planning period. This cover type provides the best functional shelter habitat related to overwintering deer and deer wintering complexes (see Section 5) and can be a difficult cover type to recruit through commercial harvest. Continued understanding of how to recruit the cover type should be considered as emerging research becomes available.

Conservation Area Network

High conservation value areas

There are up to nine different high conservation value area types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas within the St. Ignace Lake Plain Management Area.

High Conservation Value Area Type and Name	Acres
Coastal environmental areas	**272**
	272
Critical coastal habitat (piping plover)	**612**
	612
Critical dunes	**2,226**
	2,226
Deer wintering complex	**115,392**
	115,392
Forest habitat core interior	**16,826**
	16,826
Natural areas legally dedicated	**537**
	537
Natural rivers vegetative buffer	**42**
	42
Natural rivers zoning district	**91**
	91
Northern long-eared bat hibernacula 0.25-mile buffer	**25**
Hendrie River Water Cave	25
State wildlife management areas	**2,722**
Black Creek Flooding SWMA	2,637
Cranberry Lake Flooding SWMA	84
Verified Type 1 and Type 2 old growth	**27**
Type 1 old growth	27
Grouse Enhanced Management Sites	**2,167**
Strickler GEMS	2,167
Grand total	**140,939**

Ecological reference areas

Ecological reference areas, a type of HCVA, are higher-quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 14. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure

Element Occurrence Rank	State Rank	Global Rank
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 15. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	AB		S4	1
Existing ERA	Bog	C	G3G5	S4	1
Existing ERA	Cave	A	G4	S1	1
Existing ERA	Great Lakes marsh	BC			2
Existing ERA	Great Lakes marsh	C			1
Existing ERA	Interdunal wetland	AB			1
Existing ERA	Intermittent wetland	AB	G2	S3	1
Existing ERA	Limestone bedrock glade	C	G2G4	S2	1
Existing ERA	Limestone cobble shore	B			2
Existing ERA	Mesic northern forest	C			1
Existing ERA	Mesic northern forest	D			1
Existing ERA	Muskeg	B		S3	1
Existing ERA	Muskeg	B	G4G5	S3	1
Existing ERA	Muskeg	C	G4G5	S3	1
Existing ERA	Northern shrub thicket	AB	G4	S5	2
Existing ERA	Open dunes	B			1
Existing ERA	Poor conifer swamp	B	G4	S4	2
Existing ERA	Poor fen	AB	G3	S3	1
Existing ERA	Poor fen	BC	G3	S3	1
Existing ERA	Poor fen	C			1
Existing ERA	Rich conifer swamp	AB			1
Existing ERA	Rich conifer swamp	BC	G4	S3	1
Existing ERA	Rich conifer swamp	C	G4	S3	1
Existing ERA	Wooded dune and swale complex	AB			2
Existing ERA	Wooded dune and swale complex	B			4
Existing ERA	Wooded dune and swale complex	B			1
Existing ERA	Wooded dune and swale complex	BC			2

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Wooded dune and swale complex	BC	G3	S3	1
Proposed ERA	Interdunal wetland	B	G2?	S2	
Proposed ERA	Intermittent wetland	C	G2	S3	1
Proposed ERA	Limestone bedrock glade	C	G2G4	S2	1
Proposed ERA	Patterned fen		GU	S2	1
Proposed ERA	Poor fen	C	G3	S3	1
Proposed ERA	Wooded dune and swale complex	C	G3	S3	1
Grand total					**42**

Special conservation areas

Reviewable special conservation areas (Table 16) are those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) are those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the St. Ignace Lake Plain Management Area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated recreational area	**176**
Big Knob Campground	12
Black River Campground	8
Detour State Forest Campground	19
Dunkles Landing	2
Garnet Lake Campground	2
Hog Island Point Campground	36
Little Brevoort Lake North Campground	20
Little Brevoort Lake South Campground	23
Milakokia Lake Campground	28
Milikokia Lake State Forest Campground	13
South Manistique Lake Campground	12
Cultural or customary area	**30**
Flower Creek Road Sugar Bush	12
Sand Ridge Sugar Bush	4
Winberg Road Sugar Bush	8
Zieglar Road Sugar Bush	6
Habitat area or habitat corridor	**4,053**
Scott Point	920
Scotty Bay Mesic Northern Forest	118
Seiner's Point	1,872
--	1,143

Reviewable Special Conservation Area Type and Name	Acres
Mineral resource area	**37**
Chippewa County Road Commission	2
Mackinac County Road Commission	35
Visual management area	**400**
Big Knob	270
Cut River Bridge	130
Total	**4,695**

Table 17. Static special conservation areas within the St. Ignace Lake Plain Management Area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common natural heritage element occurrences		**3,394**
Mesic northern forest		236
Muskeg		3,158
Designated trout and coldwater stream buffer		**6,120**
Unnamed tributary		2,840
Albany Creek		44
Anguilm Creek		21
Bark Creek		43
Beaver Tail Creek		94
Black River		162
Borgstrom Creek		55
Brevoort River		320
Carp River		190
Cataract River		49
Crow River		55
Cut River		52
Davenport Creek		164
East Branch Black River		112
East Branch Sage River		124
East Mile Creek		63
First Creek		13
Flowers Creek		19
Hog Island Creek		207
Hudson Creek		30
Locke Creek		45
Mackinac Creek		17
Mattix Creek		14
McAlpine Creek		69
McKay Creek		50
Newton Creek		16
Norton Creek		27
O'Niel Creek		48

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Ozark Creek		45
Paquin Creek		124
Pearson Creek		48
Peters Creek		47
Point Patterson Creek		52
Prentiss Creek		7
Rapson Creek		9
Schwesinger Creek		37
Seiners Creek		66
Silver Creek		25
Skunk Creek		49
South Branch Carp River		191
South Branch Hendrie River		106
Taylor Creek		15
Third Creek		23
Trout Creek		21
Upper Black Creek		85
Upper Millecoquins River		59
West Branch Hendrie River		125
West Branch Sage River		41
Designated trout and coldwater streams	**235.4**	
Unnamed tributary	107.2	
Albany Creek	1.8	
Anguilm Creek	0.8	
Bark Creek	1.6	
Beaver Tail Creek	7.0	
Black River	6.2	
Borgstrom Creek	2.1	
Brevoort River	12.1	
Carp River	7.3	
Cataract River	1.9	
Crow River	2.1	
Cut River	1.9	
Davenport Creek	6.2	
East Branch Black River	4.3	
East Branch Sage River	4.6	
East Mile Creek	2.3	
First Creek	0.5	
Flowers Creek	0.7	
Hog Island Creek	7.7	
Hudson Creek	1.1	
Locke Creek	1.6	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Mackinac Creek	0.6	
Mattix Creek	0.5	
McAlpine Creek	2.6	
McKay Creek	1.9	
Newton Creek	0.5	
Norton Creek	1.0	
O'Niel Creek	2.0	
Ozark Creek	1.7	
Paquin Creek	5.0	
Pearson Creek	1.7	
Peters Creek	1.7	
Point Patterson Creek	1.9	
Prentiss Creek	0.2	
Rapson Creek	0.4	
Schwesinger Creek	1.4	
Seiners Creek	2.4	
Silver Creek	0.9	
Skunk Creek	1.9	
South Branch Carp River	7.4	
South Branch Hendrie River	4.3	
Taylor Creek	0.6	
Third Creek	1.0	
Trout Creek	0.9	
Upper Black Creek	3.3	
Upper Millecoquins River	2.2	
West Branch Hendrie River	4.9	
West Branch Sage River	1.6	
Great Lakes islands		**5**
Important bird areas		**1,565**
Helmet Shoal and Saddlebag Island		1
Lower St. Mary's River and Potagannissing Bay		80
Port Inland		0
Raco Plains and Wilwin Wetland		1,393
Rudyard Clay Plain		0
Sand Products and Epoufette Island shoal		0
Seney National Wildlife Refuge		63
St. Vital Point beaches (piping plover)		27
Mussel stream Group 2 - state threatened or endangered	**0.2**	
Locke Creek-Manistique Lake	0.2	
Nondedicated natural areas		**3,523**
Natural area Crow River Mouth		518

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Natural area inholding		11
Natural area Seiner's Point		2,994
Wild and scenic rivers	**0.0**	
Carp Wild and Scenic River	0.0	
Wood turtle stream 100-foot buffer		**71**
Manistique River		30
Mead Creek		42
Wood turtle stream 660-foot buffer		**432**
Manistique River		184
Mead Creek		243
North Branch Milakokia River		4
Grand total	**235.5**	**15,110**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Table 19, **Error! Reference source not found.**, **Error! Reference source not found.**) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 18. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal species occurrence within the St. Ignace Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T		3
Animal	Alasmidonta viridis	Slippershell	T		1
Animal	Alces alces	Moose	SC		2
Animal	Bombus borealis	Northern amber bumble bee	SC		2
Animal	Bombus sandersoni	Sanderson's bumble bee	SC		1
Animal	Bombus terricola	Yellow banded bumble bee	SC		5
Animal	Botaurus lentiginosus	American bittern	SC		2
Animal	Buteo lineatus	Red-shouldered hawk	SC		14

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Canachites canadensis	Spruce grouse	T		1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Charadrius melodus	Piping plover	E	LE	2
Animal	Cistothorus palustris	Marsh wren	SC		2
Animal	Coregonus artedi	Lake herring or cisco	T		2
Animal	Cottus ricei	Spoonhead sculpin	SC		1
Animal	Elliptio complanata	Eastern elliptio	SC		2
Animal	Euconulus alderi	A land snail (no common name)	T		1
Animal	Falco columbarius	Merlin	SC		1
Animal	Gavia immer	Common loon	T		16
Animal	Glyptemys insculpta	Wood turtle	T		1
Animal	Haliaeetus leucocephalus	Bald eagle	SC		21
Animal	Ixobrychus exilis	Least bittern	T		1
Animal	Lasmigona costata	Flutedshell	SC		1
Animal	Lithobates palustris	Pickerel frog	SC		2
Animal	Myotis lucifugus	Little brown bat	T		2
Animal	Necturus maculosus	Mudpuppy	SC		5
Animal	Nycticorax nycticorax	Black-crowned night-heron	SC		1
Animal	Opheodrys vernalis	Smooth green snake	SC		2
Animal	Pandion haliaetus	Osprey	SC		18
Animal	Planogyra asteriscus	Eastern flat-whorl	SC		1
Animal	Pupilla muscorum	Widespread column	SC		1
Animal	Sterna hirundo	Common tern	T		1
Animal	Trimerotropis huroniana	Lake Huron locust	T		12
Animal	Vertigo elatior	Tapered vertigo	SC		2
Animal	Vertigo nylanderi	Deep-throat vertigo	E		1
Grand total	-	-	-	-	130

**Occurrence information provided by field staff.*

Table 20. Rare plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 21. Rare plant species occurrence within the St. Ignace Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Asplenium rhizophyllum	Walking fern	T		4
Plant	Asplenium viride	Green spleenwort	SC		1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T		2
Plant	Cirsium pitcheri	Pitcher's thistle	T	LT	10
Plant	Coptidium lapponicum	Lapland buttercup	T		1
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC		3
Plant	Draba arabisans	Rock whitlow grass	SC		1
Plant	Huperzia selago	Fir clubmoss	SC		1
Plant	Iris lacustris	Dwarf lake iris	T	LT	7
Plant	Juncus stygius	Moor rush	E		1
Plant	Mimulus michiganensis	Michigan monkey flower	E	LE	1
Plant	Pinguicula vulgaris	Butterwort	SC		2
Plant	Platanthera unalascensis	Alaska orchid	SC		2
Plant	Potamogeton confervoides	Alga pondweed	SC		1
Plant	Potamogeton hillii	Hill's pondweed	T		1
Plant	Solidago houghtonii	Houghton's goldenrod	T	LT	9
Plant	Stellaria longipes	Stitchwort	SC		7
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC		11
Plant	Woodsia obtusa	Blunt-lobed woodsia	T		1
Total	-	-	-	-	**66**

Table 22. Other rare occurrence within the St. Ignace Lake Plain Management Area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great blue heron rookery	Great blue heron rookery			6
Other	Multiple bat hibernacula	Multiple bat hibernacula			1
Total	-	-	-	-	7

Non-ecological reference area community types

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation, are recognized and managed accordingly (Table 23).

Table 23. Non-ecological reference area community types ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 24. Non-ecological reference area community types within the St. Ignace Lake Plain Management Area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Mesic northern forest	BC	S3	G4	1
Muskeg	AB	S3	G4G5	1
Northern wet meadow	C	S4	G4G5	2
Grand total				**4**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 19) and diseases (Table 20) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 25. Defoliating insects of concern in the St. Ignace Lake Plain Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Hemlock woolly adelgid	Adelges tsugae	Non-native	No

Table 26. Maladies of concern in the St. Ignace Lake Plain Management Area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker (stem infections)	Nectria cinnabarina	Native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No
Oak Wilt	Bretziella fagacearum	Non-native	No
Armillaria root rot	Armillaria mellea	Native	Yes

Aquatic resources

Riparian habitat

Approximately 235 miles of streams and rivers are found in the management area (Table 27). Streams/rivers classified as cold types comprise approximately 77% of the riverine mileage.

Table 27. Classification type and length of streams/rivers found within the management area

Type	Length (miles)
Cold stream	146
Cold small river	0
Cold transitional stream	35
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	46
Warm transitional small river	1
Warm transitional large river	0
Warm stream	6
Warm small river	1
Warm large river	<1

Lacustrine habitat

A total of 80 lakes and ponds of at least 1 surface acre are found in the management area (Table 28).

Table 28. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	64
100-499	11
500+	5

Wetlands

A total of 116,298 acres of wetlands are found in the management area (Table 29). Forested wetlands comprise approximately 95% of wetland types found in the management area.

Table 29. Area of emergent, forested and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	4,796
Forested	110,853
Riverine	649

Vernal pools and seeps

A total of 808 acres of vernal pools have been inventoried in the management area, while 608 acres of seeps have been identified.

Riparian vegetation cover

Lowland shrub, cedar and aspen are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 30).

Table 30. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	6,474
Cedar	6,312
Aspen	4,154
Lowland conifers	2,857
Northern hardwood	2,647
Marsh	2,564
Mixed upland deciduous	1,454
Upland conifers	1,274
Planted red pine	1,243
Upland mixed forest	774

Watershed vegetation cover

The management area includes portions of important watersheds of the Tahquamenon River and Manistique River (Table 31 and Table 32). Aspen and cedar are major cover types of the state forest in each watershed.

Table 31. Largest vegetative cover types (i.e., top five) and area for the area of the Tahquamenon River watershed located within the management area.

Cover Type	Acres
Aspen	5,062
Lowland shrub	2,468
Cedar	2,457
Northern hardwood	1,681
Planted red pine	1,525

Table 32. Largest vegetative cover types (i.e., top five) and area for the area of the Manistique River watershed located within the management area.

Cover Type	Acres
Cedar	3,565
Tamarack	276
Lowland conifer	260
Aspen	233

Cover Type	Acres
Northern hardwood	218

Recreation

Access for recreation is generally good throughout a large portion of the St Ignace Lake Plain Management Area, which sees heavy recreational use due to the proximity of Newberry, Naubinway and other communities. Most of the area is accessible by gravel and dirt two-track roads, although the Batty Doe Deer Yard area has limited access, and motorized access is restricted in the Strickler Grouse Enhanced Management Site to promote walk-in hunting opportunities. Illegal off-road vehicle activities are an issue within this management area, especially along the Lake Michigan shoreline.

Motorized recreation trails in the St Ignace Lake Plain Management Area include snowmobile and ORV trails and several trails restricted to motorcycle use: the Brevort-Trout Lake Motorcycle Trail, Sandtown Motorcycle Trail and Newberry-Rexton Motorcycle Trail. The St. Ignace-Trout Lake Rail-Trail, designated for snowmobile and ORV use, passes through this management area (Table 33).

Hiking trails include Big Knob-Crow Lake Pathway, Canada Lakes Ski Trail/Pathway, Marsh Lake Pathway and Switchback Ridge Pathway. Canada Lakes and Marsh Lake pathways are also open to biking. The biking route of the Iron Belle trail follows U.S. 2 along the lakeshore.

There are eight state forest campgrounds (rustic) within the management area, primarily located in the vicinity of the U.S. 2 corridor, which parallels the Lake Michigan shoreline and is part of the Lake Michigan Circle Tour. Dispersed camping is also popular in locations along the lakeshore. There are also a significant number of private campgrounds and resorts around the lakes in this management area, which contribute to the use of recreation facilities and support the local economy year-round (Table 34).

Table 33. Designated recreation trails by type.

Recreation Category	Recreation Type	# of Miles
Motorized recreation trails	Off-road vehicle (all types)	262.3
	Snowmobile	140.1
Nonmotorized recreation trails	Hiking	32.3
	Equestrian	0
	Biking	25.2
	Hunter access trails	6.8
Total		**466.7**

Note: Trail use types may overlap.

Table 34. State forest campgrounds.

Name	# of sites
Big Knob	23
Black River	12
DeTour	21
Hog Island Point	42
Little Brevort Lake, North	20
Mead Creek	9

Milakokia Lake	35
South Manistique Lake	30

Black Creek Flooding, on the east side of Manistique Lake, is an area managed for wildlife, with access off Manistique Lakes Road. The area includes branches of the Upper Black Creek and Portage Creek and is primarily wetland.

The Strickler Grouse Enhanced Management Site, east of Naubinway, provides access to intensively managed grouse habitat via hunter walking trails. The entire area is closed to motorized vehicles by a DNR director's order (Table 35).

Recreation opportunities within this management area are wide-ranging, including snowshoe hare, deer, bear, bobcat, waterfowl and ruffed grouse hunting, trapping, foraging for berries and mushrooms, fishing, horse riding, canoeing and kayaking, bird-watching, and sightseeing at the scenic overlooks.

Table 35. Areas managed for hunting.

Type	Name	Acres
State wildlife management areas	Black Creek Flooding SWMA	2,635.4
	Cranberry Lake Flooding SWMA	84.3
Grouse Enhanced Management Sites	Strickler GEMS	2,116.2
Total		**4,835.9**

Table 36. Boating access sites.

Name	Body of water
Bay City State Forest Campground	Bay City Lake
Cranberry Flooding	Cranberry Flooding
Kennedy Lake	Kennedy Lake
Little Brevort Lake – South	Little Brevort Lake
Little Brevort Lake State Forest Campground – North	Little Brevort Lake
Mead Creak State Forest Campground	Mead Creak
Milakokia Lake State Forest Campground	Milakokia Lake
Portage Creek	Portage Creek
Upper Millecoquin River	Upper Millecoquin River

Eco-Region

Western Upper Peninsula

State Forest Area:

882,630 acres

Location:

Alger (western half), Baraga, Delta, Dickinson, Houghton, Iron, Keweenaw, Marquette, Menominee and Ontonagon counties

Population Centers:

Escanaba, Houghton, Iron Mountain, Marquette and Menominee

Landcover:

Forested: 781,760 acres

Non-forested: 100,780 acres

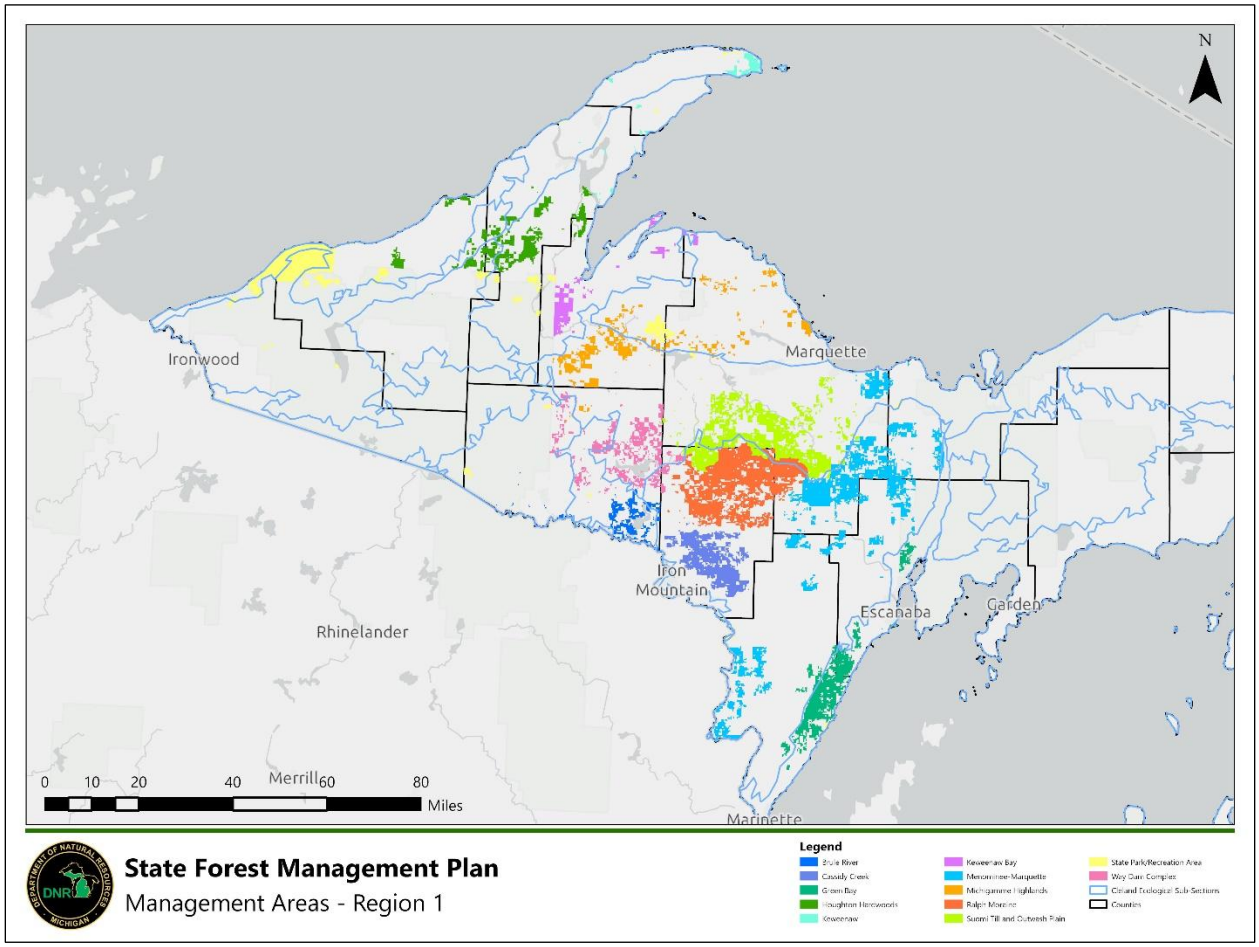


Figure 1. Western Upper Peninsula Management Areas.

Forested landscape

Current and projected future condition

The Western Upper Peninsula State Forest is dominated by forested cover types, with 89 percent of the area covered in forested stands (Table 1). The upland deciduous portion of that is 48 percent of the management area and comprised mostly of aspen and northern hardwood. Lowland shrub is the most common non-forested cover type in this management area, representing 5 percent of the landscape.

There are 561,349 acres (63 percent of the total WUP State Forest area and 77 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest (Table 2). Of that, over 29 percent is in the aspen cover type, 17 percent in northern hardwood, 5 percent in cedar, and 3 percent in lowland conifer. The remaining 21 cover types represent less than 23 percent of the forested and available land in the Western Upper Peninsula eco-region.

Table 1. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	244,209	426,217	542,772	781,760
			Northern Hardwood	146,236			
			Black-Red Hybrid Oak	442			
			Northern Red Oak	5,230			
			Oak Mix	2,106			
			Mixed Upland Deciduous	27,992			
		Mixed	Upland Mixed Forest	27,139	27,139		
		Coniferous	Planted Red Pine	12,264	89,416		
			Planted Jack Pine	13,164			
			Planted White Pine	168			
			Planted Mixed Pine	636			
			Natural Red Pine	6,255			
			Natural Jack Pine	12,854			
			Natural White Pine	6,201			
			Natural Mixed Pines	7,457			
			Upland Spruce/Fir	6,861			
			Upland Conifers	15,450			
			Hemlock	8,107			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	6,606	28,673	238,988	
			Lowland Deciduous	22,067			
		Mixed	Lowland Mixed Forest	19,022	19,022		
		Coniferous	Cedar	98,493	191,293		
			Lowland Conifers	47,855			
			Lowland Spruce/Fir	31,111			
			Tamarack	13,834			
Nonforested	Upland	N/A	Herbaceous Openland	9,215	N/A	23,000	100,870
			Upland Shrub	5,997			
			Low Density Trees	2,206			
			Bare/Sparsely Vegetated	1,978			
			Cropland	1,451			
			Urban	2,153			
	Lowland	N/A	Lowland Shrub	45,522	N/A	77,870	
			Marsh	7,511			
			Bog	5,264			
			Treed Bog	9,971			
			Water	9,602			
						Grand Total:	**882,630**

Table 2. Summary table describing the current cover type composition by management availability.

Western Upper Peninsula Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	212,972	29.1%	8,353	1.1%	221,325	30.3%
Black-Red Hybrid Oak	270	0.0%	174	0.0%	443	0.1%
Cedar	34,390	4.7%	60,614	8.3%	95,003	13.0%
Hemlock	3,994	0.5%	4,007	0.5%	8,001	1.1%
Lowland Aspen/Balsam Poplar	5,452	0.7%	1,083	0.1%	6,535	0.9%
Lowland Conifers	20,757	2.8%	24,295	3.3%	45,052	6.2%
Lowland Deciduous	11,581	1.6%	9,818	1.3%	21,399	2.9%
Lowland Mixed Forest	12,166	1.7%	6,239	0.9%	18,406	2.5%
Lowland Spruce/Fir	15,716	2.1%	13,419	1.8%	29,135	4.0%
Mixed Upland Deciduous	19,741	2.7%	6,809	0.9%	26,551	3.6%
Natural Jack Pine	12,339	1.7%	437	0.1%	12,776	1.7%
Natural Mixed Pines	5,325	0.7%	2,002	0.3%	7,327	1.0%
Natural Red Pine	4,075	0.6%	1,963	0.3%	6,038	0.8%
Natural White Pine	4,966	0.7%	1,006	0.1%	5,972	0.8%
Northern Hardwood	125,988	17.2%	10,359	1.4%	136,347	18.6%
Northern Red Oak	3,716	0.5%	1,497	0.2%	5,213	0.7%
Oak Mix	2,000	0.3%	106	0.0%	2,106	0.3%
Planted Jack Pine	13,089	1.8%	38	0.0%	13,127	1.8%
Planted Mixed Pine	539	0.1%	0	0.0%	539	0.1%
Planted Red Pine	11,878	1.6%	71	0.0%	11,949	1.6%
Planted White Pine	161	0.0%	7	0.0%	168	0.0%
Tamarack	6,935	0.9%	6,187	0.8%	13,122	1.8%
Upland Conifers	9,474	1.3%	4,761	0.7%	14,235	1.9%
Upland Mixed Forest	19,621	2.7%	4,941	0.7%	24,562	3.4%
Upland Spruce/Fir	4,206	0.6%	1,924	0.3%	6,129	0.8%
Grand Total	**561,349**	**76.7%**	**170,112**	**23.3%**	**731,462**	**100.0%**

Table 3. Site conditions (reason area is unavailable for commercial harvest) for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
BMPs	35,465	20.8%
Wildlife Concerns	28,560	16.8%
Deer Wintering Area	22,432	13.2%
Too Wet	17,625	10.4%
Conservation Values	16,967	10.0%
Unproductive	10,978	6.5%
Cannot Regenerate	10,279	6.0%
Too Steep	8,264	4.9%
Blocked by Obstacle	5,302	3.1%
Long-Term Retention	2,342	1.4%
Natural/Quiet/Wilderness Area	2,239	1.3%
Other Dept./Div. Processes	1,649	1.0%
Rare Landforms	1,615	0.9%
Recreational/Scenic	1,461	0.9%
Other Influence Zones	1,215	0.7%
Denied Access	1,179	0.7%
Species of special concern or T&E	1,013	0.6%
Total Unavailable	**170,112**	**100.0%**

Projected 10-year cover type management actions

Each cover type in this eco-region has a unique age class and basal area class goals that describe the long-term desired future conditions. The calculated harvest levels that are needed during the first 10-year planning period are summarized in Table 4. These harvest levels are necessary to begin achieving long-term planning goals. This will help establish a desirable amount of regeneration for even-aged cover types over the 10-year period or help achieve desired basal area distribution among uneven-aged cover types such as northern hardwoods.

Table 4. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern Hardwood	852	48,759	-	278	355	-	-	50,244
Aspen	36,704	-	-	-	-	-	-	36,704
Mixed Upland Deciduous	2,497	1,120	-	-	409	-	-	4,026
Lowland Spruce/Fir	2,808	-	-	-	-	-	-	2,808
Lowland Conifers	2,477	-	-	-	-	-	-	2,477
Upland Mixed Forest	2,393	-	-	-	-	-	-	2,393
Planted Red Pine	51	-	1,695	-	-	-	-	1,745
Upland Conifers	1,509	-	9	-	157	-	-	1,675
Lowland Deciduous	1,085	81	-	-	29	-	-	1,195
Natural Jack Pine	1,107	-	-	-	-	-	-	1,107
Lowland Aspen/Balsam Poplar	1,051	-	-	-	-	-	-	1,051
Lowland Mixed Forest	887	-	-	-	-	-	-	887
Natural Mixed Pines	-	-	426	-	327	-	-	753
Upland Spruce/Fir	599	-	-	-	-	-	-	599
Planted Jack Pine	557	-	-	-	-	-	-	557
Tamarack	534	-	-	-	-	-	-	534
Natural White Pine	-	-	174	-	95	-	-	269
Hemlock	-	198	-	-	-	-	-	198
Natural Red Pine	-	-	41	-	120	-	-	161
Planted White Pine	-	-	143	-	-	-	-	143
Oak Mix	126	-	-	-	-	-	-	126
Northern Red Oak	9	-	-	-	-	-	-	9
Black Red Hybrid Oak	7	-	-	-	-	-	-	7
Totals	**55,253**	**50,157**	**2,488**	**278**	**1,492**	**-**	**-**	**109,668**

A few cover type transitions are projected for this eco-region (Table 5). The managed area of each cover type is projected to remain fairly stable as treatment regimes will not significantly change the amount of area in each cover type. The largest decrease forecasted is in the aspen cover type, where approximately 2,134 acres will convert to other cover types through forest management and

regeneration activities. The largest increase occurs on the upland mixed forest cover type where 1,974 acres are projected to convert into this cover type.

Table 5. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	244,209	242,075	-2,134
Northern Hardwood	146,236	146,029	-208
Cedar	98,493	98,493	0
Lowland Conifers	47,855	47,945	90
Lowland Spruce/Fir	31,111	30,183	-928
Mixed Upland Deciduous	27,992	27,814	-179
Upland Mixed Forest	27,139	29,113	1,974
Lowland Deciduous	22,067	21,657	-410
Lowland Mixed Forest	19,022	20,406	1,384
Upland Conifers	15,450	14,558	-892
Tamarack	13,834	13,655	-179
Planted Jack Pine	13,164	13,377	213
Natural Jack Pine	12,854	12,774	-80
Planted Red Pine	12,264	13,610	1,347
Hemlock	8,107	8,107	0
Natural Mixed Pines	7,457	7,457	0
Upland Spruce/Fir	6,861	6,445	-416
Lowland Aspen/Balsam Poplar	6,606	6,648	42
Natural Red Pine	6,255	6,255	0
Natural White Pine	6,201	6,357	156
Planted Mixed Pine	636	791	155
Black Red Hybrid Oak	442	444	1
Northern Red Oak	5,230	5,230	0
Oak Mix	2,106	2,118	12
Planted White Pine	168	218	50
Lowland Shrub	45,522	45,522	0
Treed Bog	9,971	9,971	0
Herbaceous Openland	9,215	9,215	0
Marsh	7,511	7,511	0
Upland Shrub	5,997	5,997	0
Bog	5,264	5,264	0
Low Density Trees	2,206	2,206	0
Urban	2,153	2,153	0
Bare/Sparsely Vegetated	1,978	1,978	0
Cropland	1,451	1,451	0
Water	9,602	9,602	0

	Total:	**882,630**	**882,630**	**0**

WUP Management Areas

Brule River

State Forest Area: 27,116 acres	Location: Wisconsin Michigan Border	Population Centers: Crystal Falls
Sub-Section: Crystal Falls Till and Outwash	Landforms: Bedrock knobs surrounded by extensive outwash plains	Landcover: Forested: 24,399 acres Non-forested: 2,717 acres

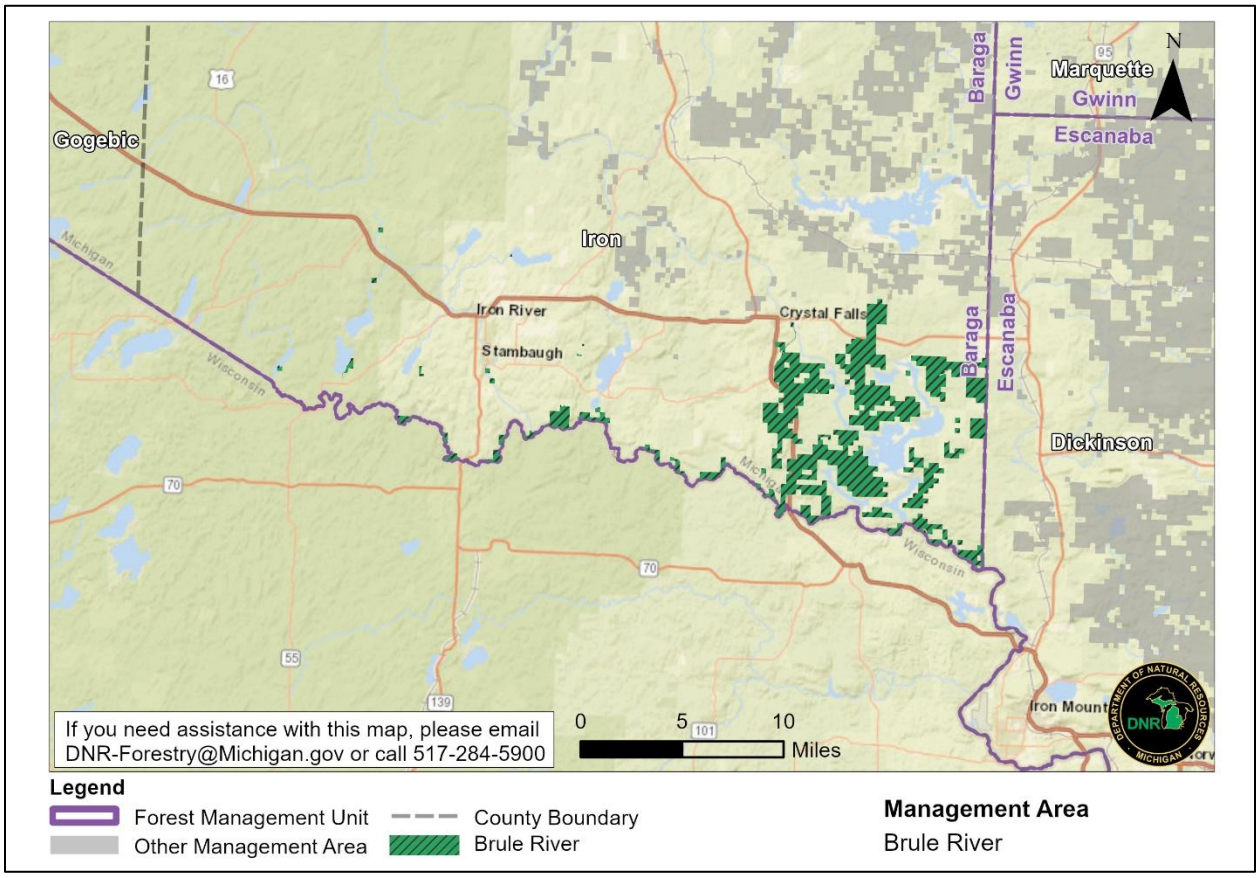


Figure 1. Map of the Brule River management area.

Forested Landscape

Current and projected future condition

The Brule River management area is dominated by young, shade-intolerant cover types that are largely upland and available. Intolerant deciduous cover types are relatively evenly distributed across age categories. Unavailable upland and lowland acres are more prevalent in the older age category.

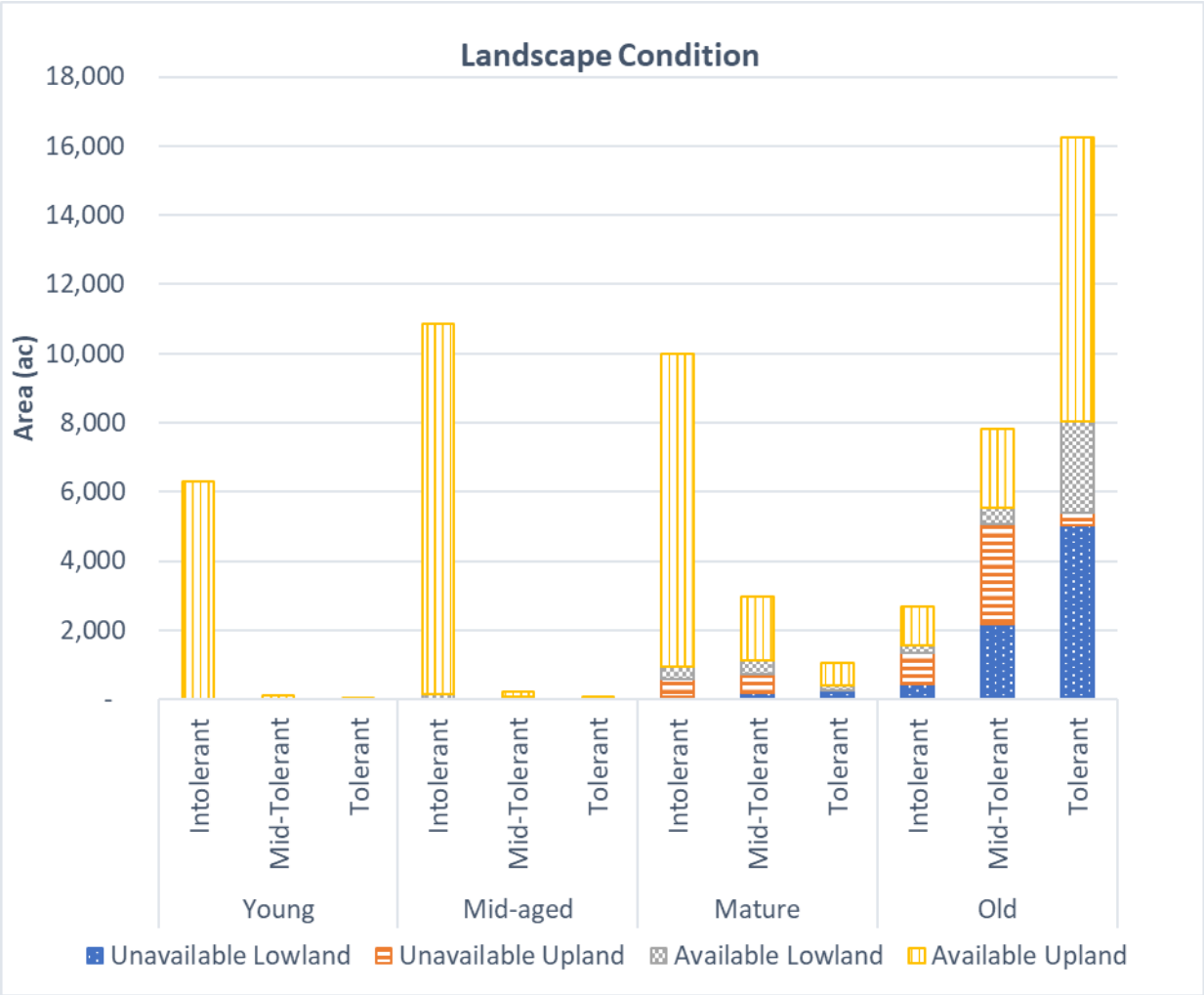


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in Aspen and Jack Pine	3,254
Mature forest	Acres of 80+ year stands across cover types	7,667
Mature forest	Acres of 120+ year stands across cover types	798
Mesic conifer cover types	Acres of mesic conifer cover types	1,132
Mesic conifers in other cover types	Average canopy occupancy	40%
Mast – oak cover types	Acres of Oak cover types	1,234
Mast tree species in other cover types	Total Acres of Canopy Occupancy of Mast Tree Acres (Trace-100%)	5,219
Big trees	Acres of Total Canopy Stand Occupancy of Species in Sawlog or Greater Size Class	8,239
Non-forested openings	Total Acres of herbaceous open land, upland shrub and cropland	1,119
Landscape forest matrix	Percent Deciduous Forest	65%
Landscape forest matrix	Percent Coniferous Forest	33%

The Brule River management area has the following Special Analysis Units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the MA, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer Wintering Complex (DWC)-Iron-Floodwood

The Brule River Management Area is dominated by forested cover types with 90 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 57 percent of the management area and comprised mostly of aspen and northern hardwood. Upland shrub is the most common non-forested cover type in this management area, representing 3 percent of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	11,562	15,408	21,691	24,399
			Northern hardwood	2,396			
			Black-red ybrid oak	180			
			Northern red oak	811			
			Oak mix	285			
			Mixed upland deciduous	174			
		Mixed	Upland mixed forest	436	436		
		Coniferous	Planted red pine	1,999	5,848		
			Planted jack pine	696			
			Planted white pine	0			
			Planted mixed pine	69			
			Natural red pine	376			
			Natural jack pine	1,575			
			Natural white pine	167			
			Natural mixed pines	694			
			Upland spruce/fir	85			
			Upland conifers	144			
			Hemlock	43			
	Lowland	Deciduous	Lowland aspen/balsam poplar	31	426	2,708	
			Lowland deciduous	395			
		Mixed	Lowland mixed forest	83	83		
		Coniferous	Cedar	610	2,199		
			Lowland conifers	586			
			Lowland spruce/fir	765			
			Tamarack	239			
Nonforested	Upland	N/A	Herbaceous openland	160	N/A	1,618	2,717
			Upland shrub	857			
			Low density trees	15			
			Bare/sparsely vegetated	30			
			Cropland	102			
			Urban	454			
	Lowland	N/A	Lowland shrub	614	N/A	1,099	
			Marsh	61			
			Bog	115			
			Treed bog	23			
			Water	285			
						Grand Total:	**27,116**

There are 20,511 acres (76 percent of the total management area and 84 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Brule River Management Area (Table 3). More than 45 percent is in the aspen cover type, 10 percent in northern hardwood, 8 percent in planted red pine, and 7 percent in natural jack pine. The remaining 20 cover types represent less than 15 percent each of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

BRULE RIVER Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	10,997	45.1%	565	2.3%	11,562	47.4%
Black-red hybrid oak	49	0.2%	131	0.5%	180	0.7%
Cedar	30	0.1%	580	2.4%	610	2.5%
Hemlock	0	0.0%	43	0.2%	43	0.2%
Lowland aspen/balsam poplar	0	0.0%	31	0.1%	31	0.1%
Lowland conifers	212	0.9%	374	1.5%	586	2.4%
Lowland deciduous	13	0.1%	382	1.6%	395	1.6%
Lowland mixed forest	28	0.1%	55	0.2%	83	0.3%
Lowland spruce/fir	96	0.4%	669	2.7%	765	3.1%
Mixed upland deciduous	23	0.1%	150	0.6%	174	0.7%
Natural jack pine	1,575	6.5%	0	0.0%	1,575	6.5%
Natural mixed pines	527	2.2%	167	0.7%	694	2.8%
Natural red pine	246	1.0%	131	0.5%	376	1.5%
Natural white pine	120	0.5%	47	0.2%	167	0.7%
Northern hardwood	2,320	9.5%	77	0.3%	2,396	9.8%
Northern red oak	235	1.0%	576	2.4%	811	3.3%
Oak mix	241	1.0%	45	0.2%	285	1.2%
Planted jack pine	696	2.9%	0	0.0%	696	2.9%
Planted mixed pine	69	0.3%	0	0.0%	69	0.3%
Planted red rine	1,999	8.2%	0	0.0%	1,999	8.2%
Tamarack	73	0.3%	166	0.7%	239	1.0%
Upland conifers	83	0.3%	61	0.3%	144	0.6%
Upland mixed forest	379	1.6%	57	0.2%	436	1.8%
Upland spruce/fir	6	0.0%	79	0.3%	85	0.3%
Grand Total	**20,016**	**82.0%**	**4,383**	**18.0%**	**24,400**	**100.0%**

Table 4. Site conditions (reason area is unavailable for commercial harvest) for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Wildlife concerns	1,948	44.4%
Too wet	731	16.7%
Deer wintering area	679	15.5%
BMPs	569	13.0%
Non-military lease/easement	178	4.1%
Denied access	110	2.5%
Historical/archaeological	50	1.1%
Too steep	43	1.0%
Long-term retention	38	0.9%
Recreational/scenic	17	0.4%
Unproductive	13	0.3%
Blocked by obstacle	5	0.1%
Total unavailable	**4,383**	**100.0%**

Management actions

Each cover type in the Brule River area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 53,714 cords of wood, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Aspen	1,824	-	-	-	-	-	-	1,824
Northern hardwood	-	669	-	-	-	-	-	669
Planted red pine	-	-	360	-	-	-	-	360
Natural jack pine	107	-	-	-	-	-	-	107
Natural mixed pines	-	-	38	-	48	-	-	85
Lowland conifers	40	-	-	-	-	-	-	40
Oak mix	35	-	-	-	-	-	-	35
Upland conifers	14	-	-	-	-	-	-	14
Mixed upland deciduous	5	-	-	-	-	-	-	5
Natural red pine	-	-	-	-	4	-	-	4
Totals	**2,024**	**669**	**398**	**-**	**52**	**-**	**-**	**3,142**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection Brule River Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed aspen	16,984	15,965
	Mixed hardwood	6,884	6,471
	Mixed spruce	2,640	2,481
	Jack pine	2,581	2,426
	Red pine	2,361	2,220
	Mixed softwood	1,025	963
	Mixed oak	499	469
	White pine	424	399
	Pulpwood Total	**33,398**	**31,394**
Sawtimber (MBF)	Mixed aspen	2,501	2,351
	Red pine	2,397	2,253
	Sugar maple	2,215	2,082
	Red maple	942	885
	White pine	603	567
	Red oak	354	333
	Basswood	182	172
	Mixed oak	113	106
	White oak	21	20
	Sawtimber Total	**9,328**	**8,769**
	Total Sawtimber Harvest Volume in Cords	**20,316**	**19,097**
	Grand Total Harvest Volume in Cords	**53,714**	**50,491**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are very few cover type transitions projected in the Brule River area (Table 7). The managed area of each cover type is projected to remain relatively stable. The largest decrease forecasted is in the aspen cover type where 102 acres are expected to convert to other cover types through forest management activities. The largest increase is in red pine where 67 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Aspen	11,562	11,460	-102
Northern hardwood	2,396	2,395	-1
Planted red pine	1,999	2,066	67
Natural jack pine	1,575	1,538	-37
Northern red oak	811	810	0
Lowland spruce/fir	765	765	0
Planted jack pine	696	736	40
Natural mixed pines	694	694	0
Cedar	610	610	0
Lowland conifers	586	586	0
Upland mixed forest	436	440	4
Lowland deciduous	395	393	-2
Natural red pine	376	376	0
Oak mix	285	285	0
Tamarack	239	236	-3
Black-red hybrid oak	180	180	0
Mixed upland deciduous	174	173	0
Natural white pine	167	168	1
Upland conifers	144	137	-7
Upland spruce/fir	85	85	0
Lowland mixed forest	83	87	4
Planted mixed pine	69	104	35
Hemlock	43	43	0
Lowland aspen/balsam poplar	31	31	0
Planted white pine	0	0	0
Upland shrub	857	857	0
Lowland shrub	614	614	0
Urban	454	454	0
Water	285	285	0
Herbaceous openland	160	160	0
Bog	115	115	0

Cover Type	Current Acreage	Projected Acreage at End of 10-Year Planning Period	Projected 10-Year Change in Acreage
Cropland	102	102	0
Marsh	61	61	0
Bare/sparsely vegetated	30	30	0
Treed Bog	23	23	0
Low Density Trees	15	15	0
Total	**27,116**	**27,116**	**0**

Featured species current and projected habitat acres

There are nine featured species in this management area that span various cover types, age classes, and stand level conditions.

As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. The modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. The current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years. This is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Two of these species were not included in the SFMP model but are included here to inform management decisions over the decade. White-tailed deer habitat acres are not limited to deer wintering complexes.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Covertypes	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black bear	Generalist/mast	5,219	--	--	--
Golden-winged warbler	Aspen, black/red hybrid oak, northern red oak, oak mix, tamarack	4,000	3,623	3,322	3,329

Featured Species	Priority Covertypes	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	3,390	4,128	3,252	4,494
Moose	To be determined	--	--	--	--
Ruffed grouse	Aspen	3,901	3,463	3,294	3,268
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	5,363	4,826	3,947	3,952
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	16,352	16,255	15,963	15,812
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	5,537	5,635	6,132	6,592
Wild turkey	Non-forested openings	175	--	--	--
Wood turtle	Non-forested openings	--	--	--	--

Deer Wintering Complexes (DWCs) that are greater than 15,000 acres are modeled as a Special Analysis Unit (SAU) and information on them can be found in Section 5 of the plan. In DWCs less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated featured species

Aspen

Current condition

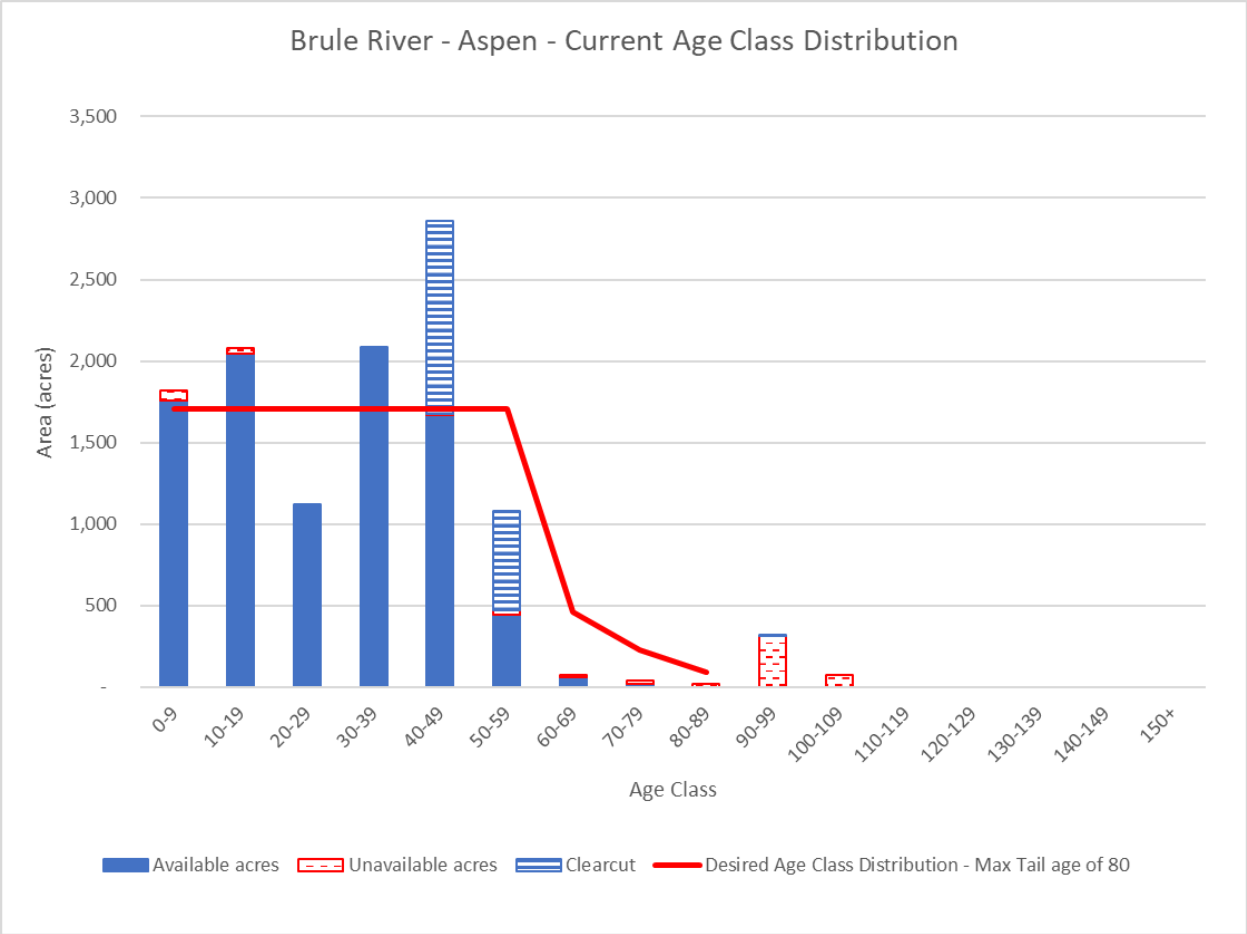


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is somewhat unbalanced with a deficit of acres in ages 20-39 years old and a surplus of acres in the 4049-year-old age class. The younger age classes are in pretty good shape with only a slight surplus in each. Limited merchantable acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse, snowshoe hare and white-tailed deer.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: Sapling	3,901	98
Ruffed grouse	Age category: 0-19 Size class: sapling	3,901	98
Snowshoe hare	Age category: 0-19 Size class: sapling	3,901	98
White-tailed deer	All ages and size classes	11,562	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 7 percent of the acres in an age class tail out to a maximum of 80-year age class.

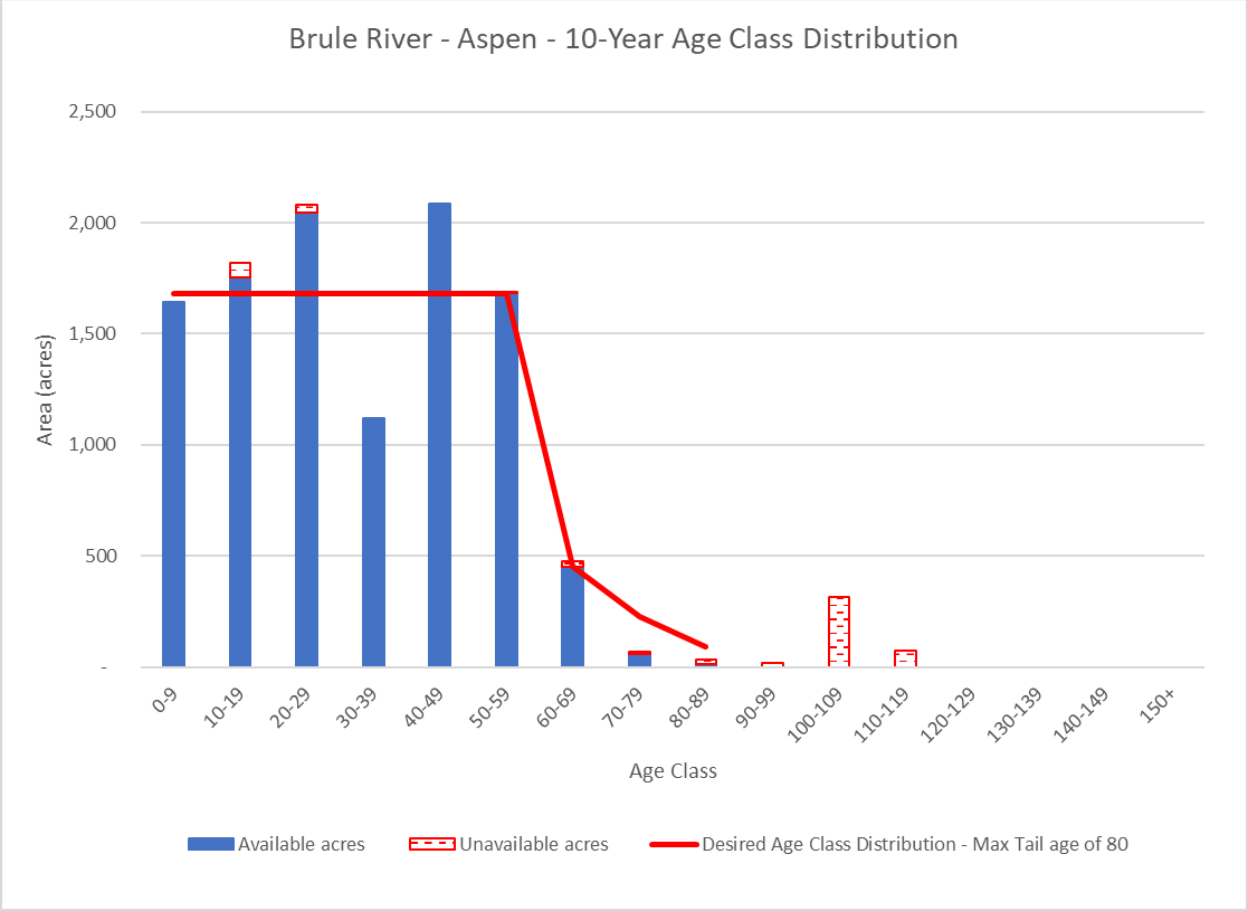


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of as many acres as possible in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take many decades in this management area.

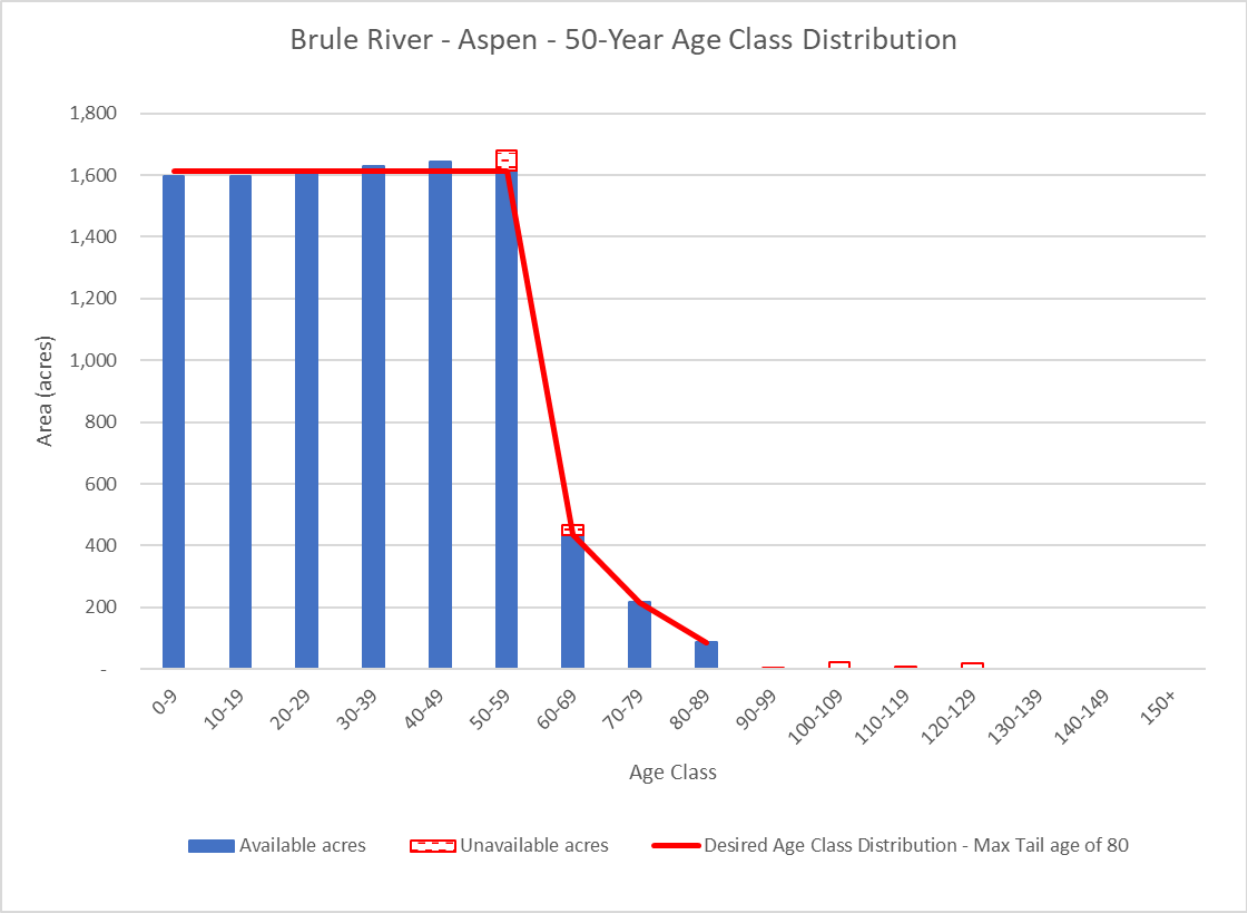


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 5).

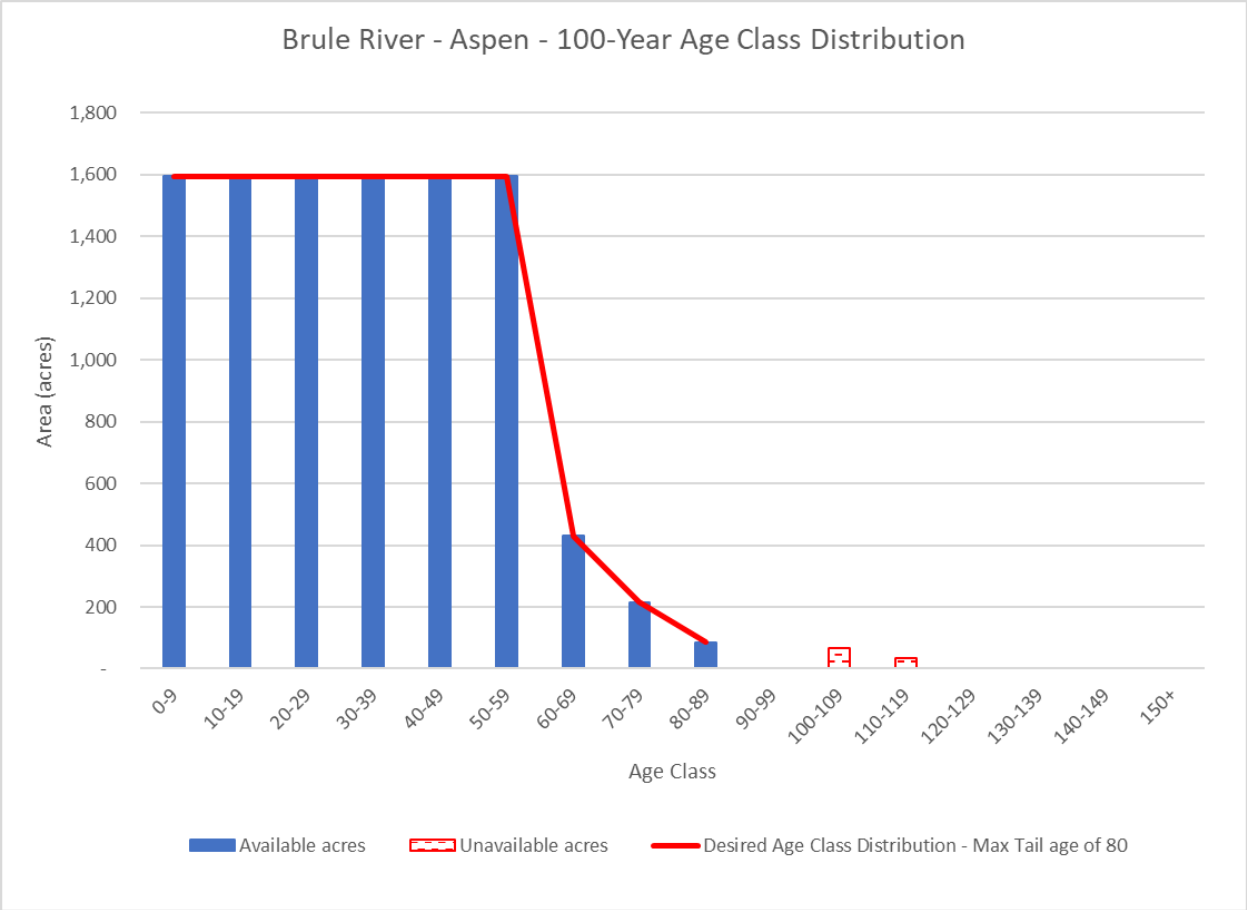


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 1,824 acres of projected clearcut harvest in the aspen cover type. It is expected that about 102 acres of aspen will be converted to other cover types. These add up to an expected 1,722 acres of regeneration in the aspen cover type over the next 10 years.

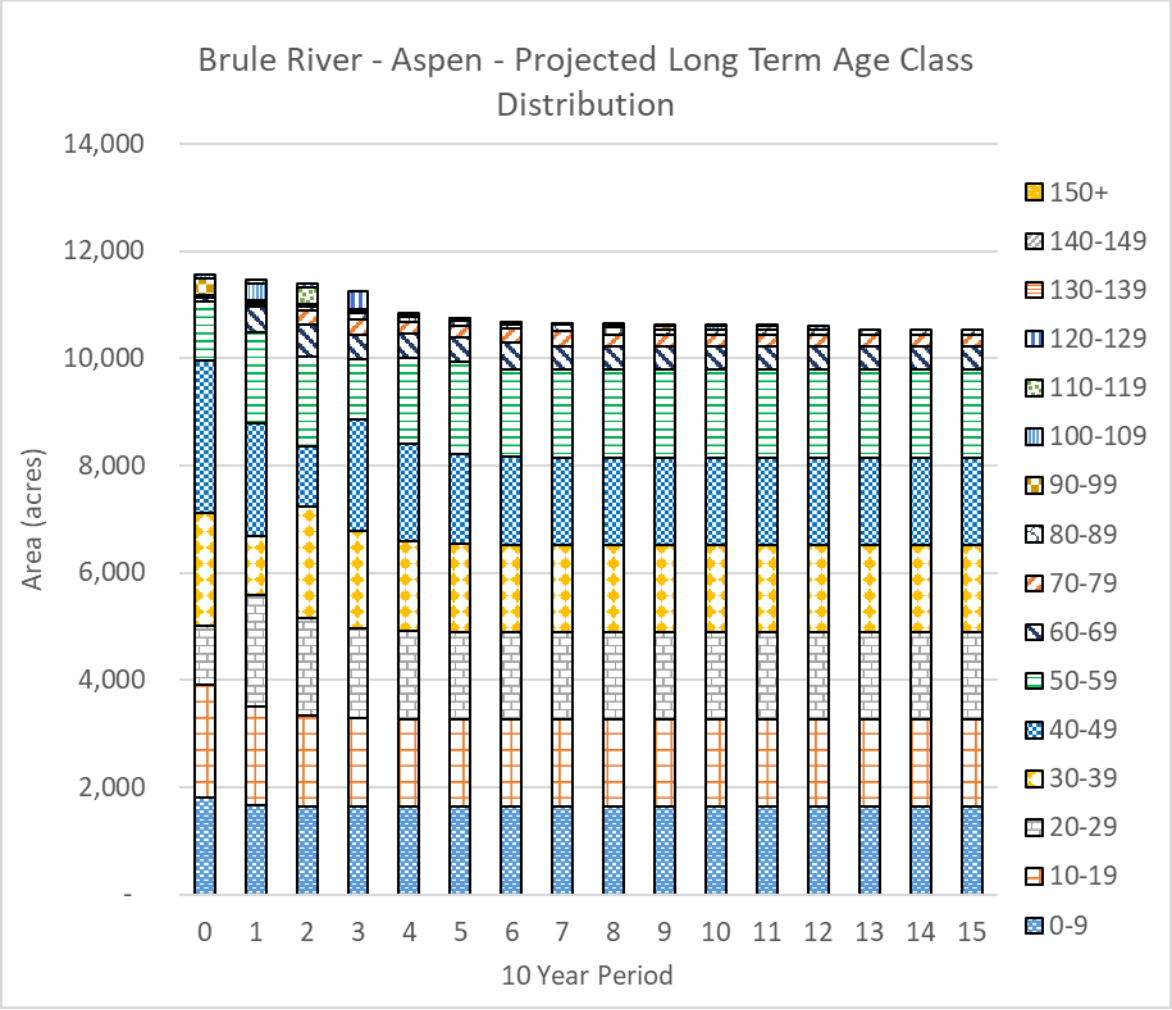


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type in the Brule River area is currently between a stand age of 90 and 110 years old (Figure 8). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10).

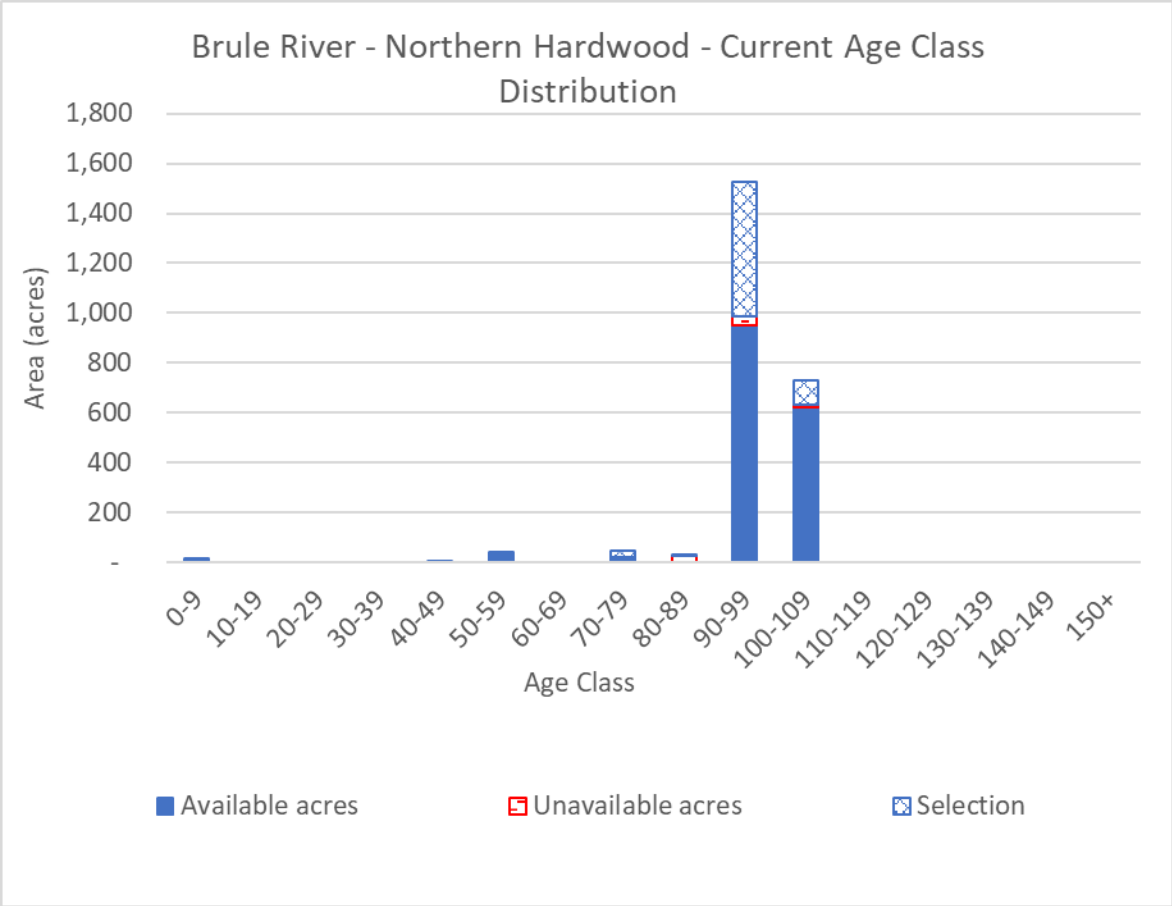


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the Brule River management area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Bule River management area (Figure 9). Current conditions are a result of a well-regulated selection harvest regime that has been in place in this management area for decades.

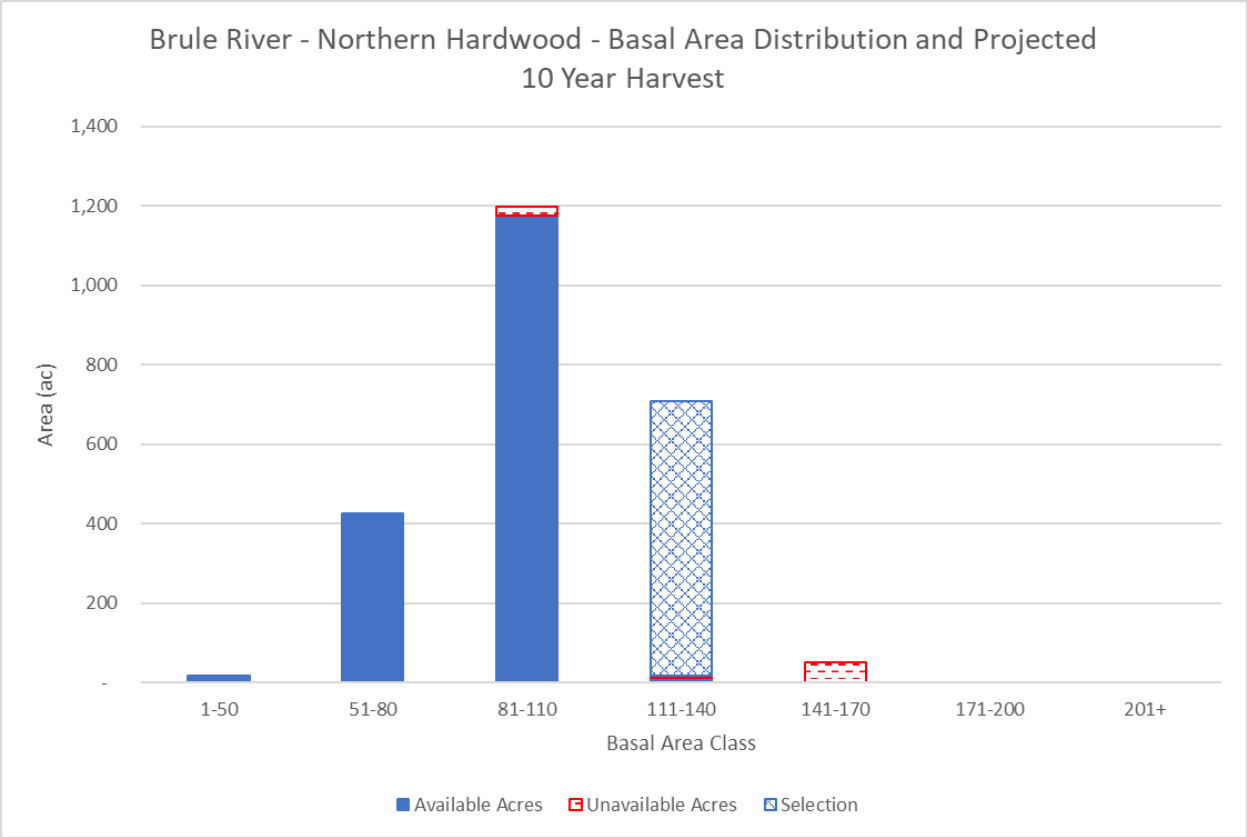


Figure 9 Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	1,817	77
White-tailed deer	All ages and size classes	2,396	--

Desired future condition

The projected long-term cover type trend for northern hardwood is stable in the Brule River management area. There are no transitions to or from this cover type expected in this management area in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that

are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An un-even aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog-sized.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole- and saw-log classes. Northern hardwood in the Brule River management area has regeneration and recruitment challenges due to cervid herbivory and competition from sedge.

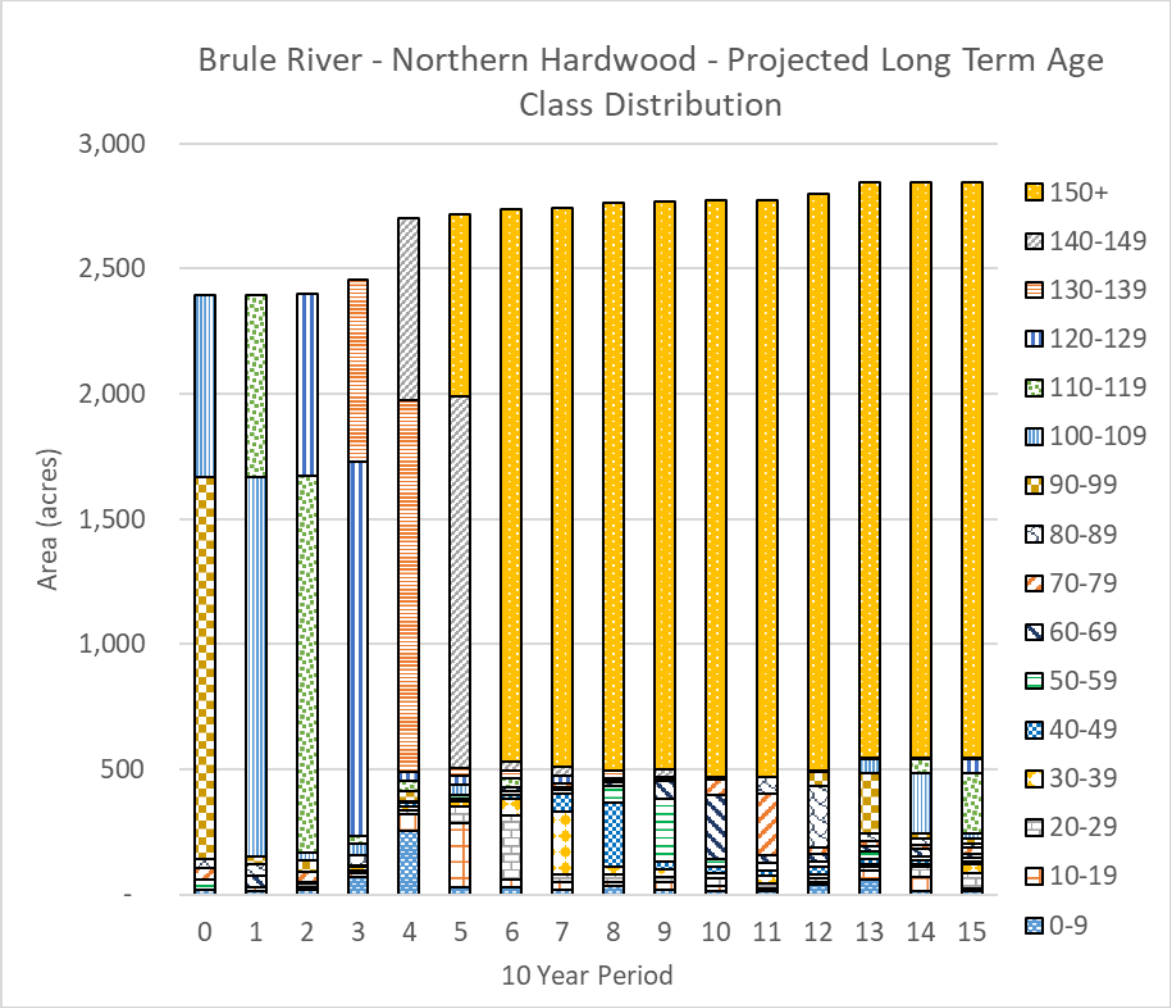


Figure 10. Projected age class distribution over 15,10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 669 acres (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term, mature forest, closed canopy landscape condition. A small portion of the stands may need to be clearcut to get adequate regeneration; this is estimated to be about 8 acres.

Planted red pine

Current condition

The current age class distribution is very unbalanced with a surplus of acres in the 60-69- and 70–79-year-old age classes. The younger age classes have very few acres and are poorly distributed.

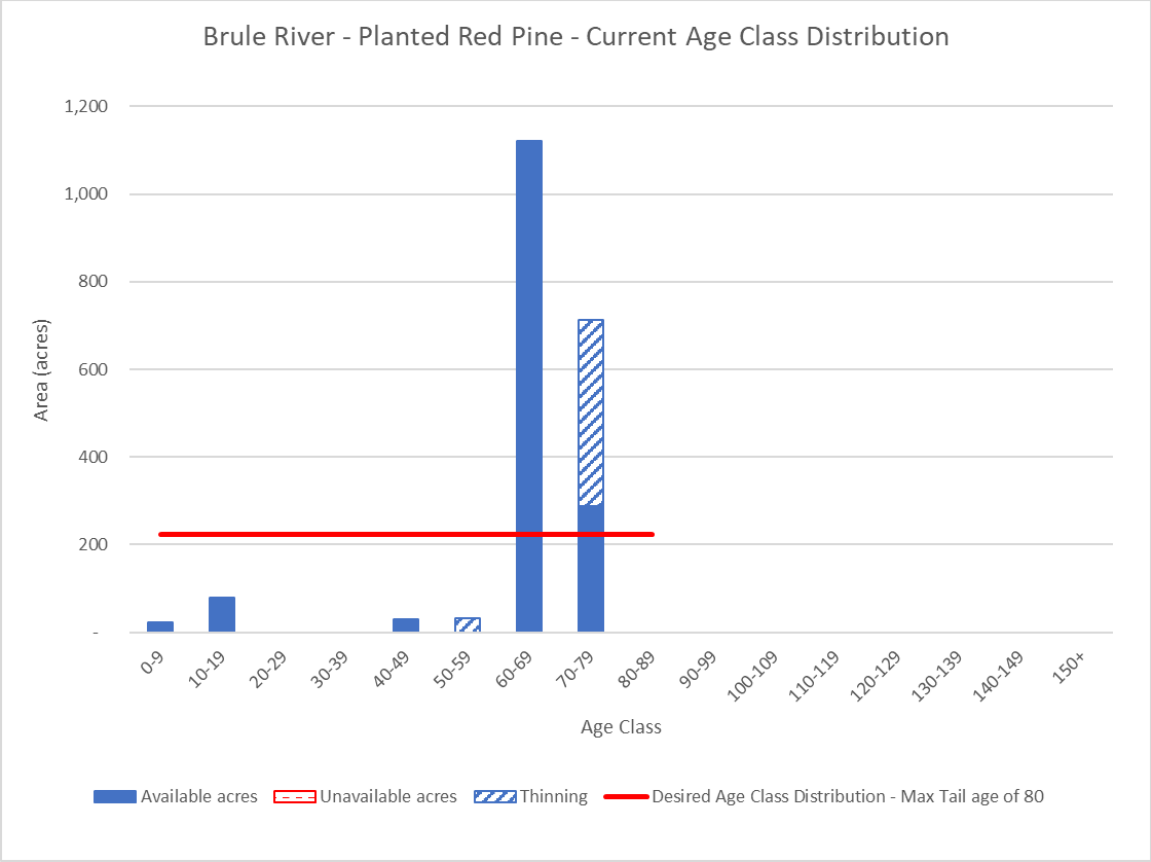


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in the planted red pine cover type over the 10-year planning period.

Desired future condition

The desired future condition is to have an even age class distribution with a rotation age of 80 years.

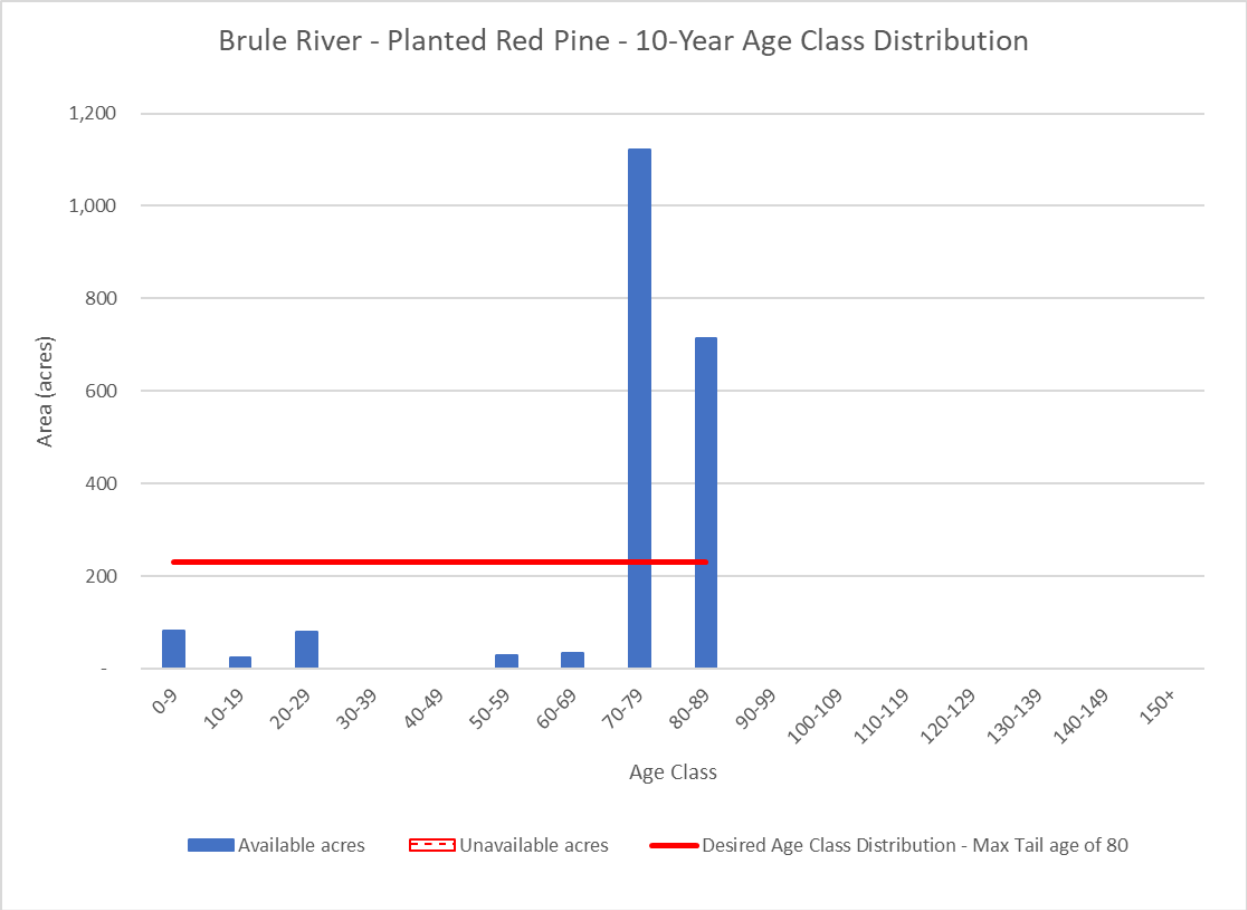


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 67 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of planted red pine will take many decades.

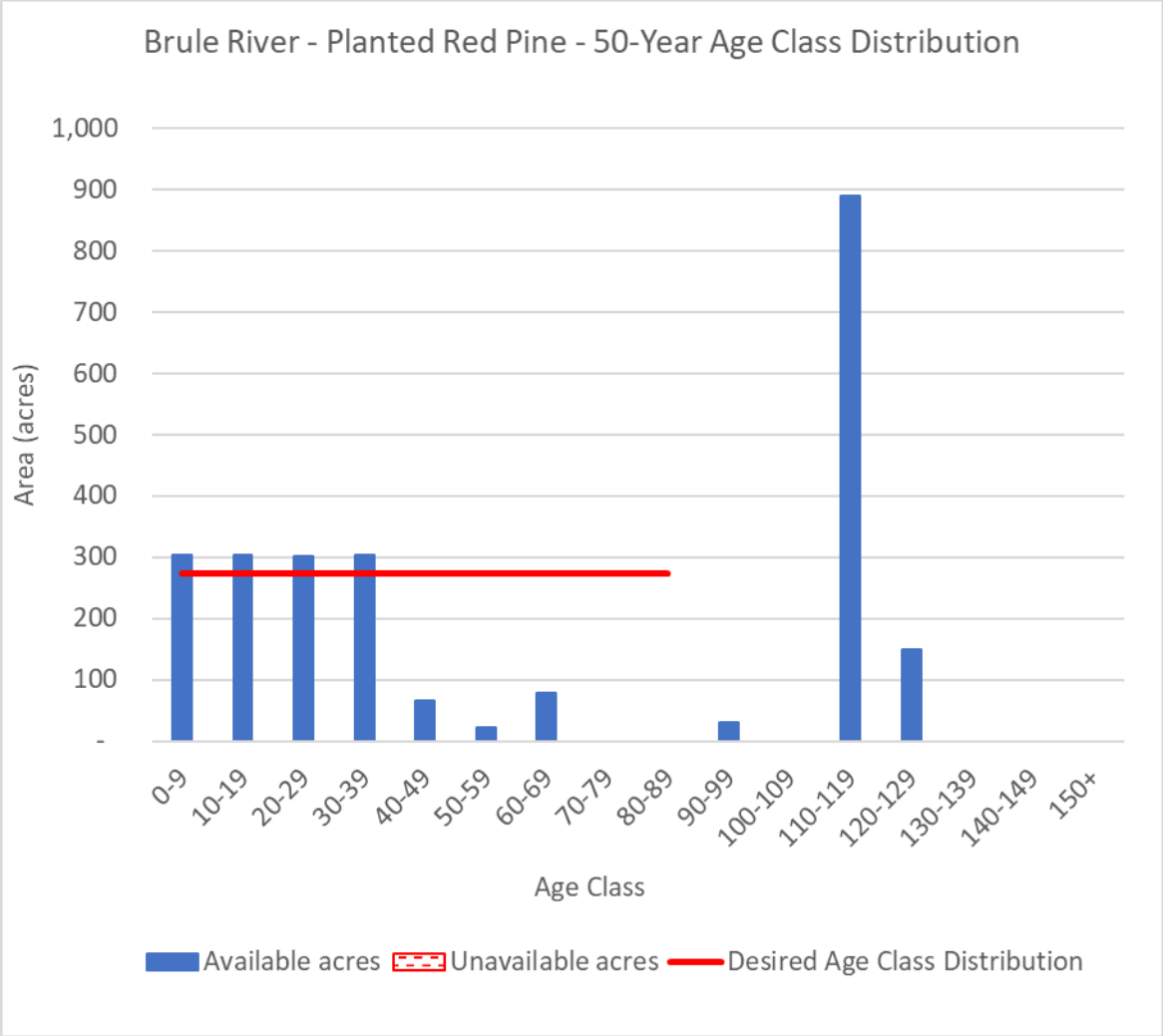


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 13).

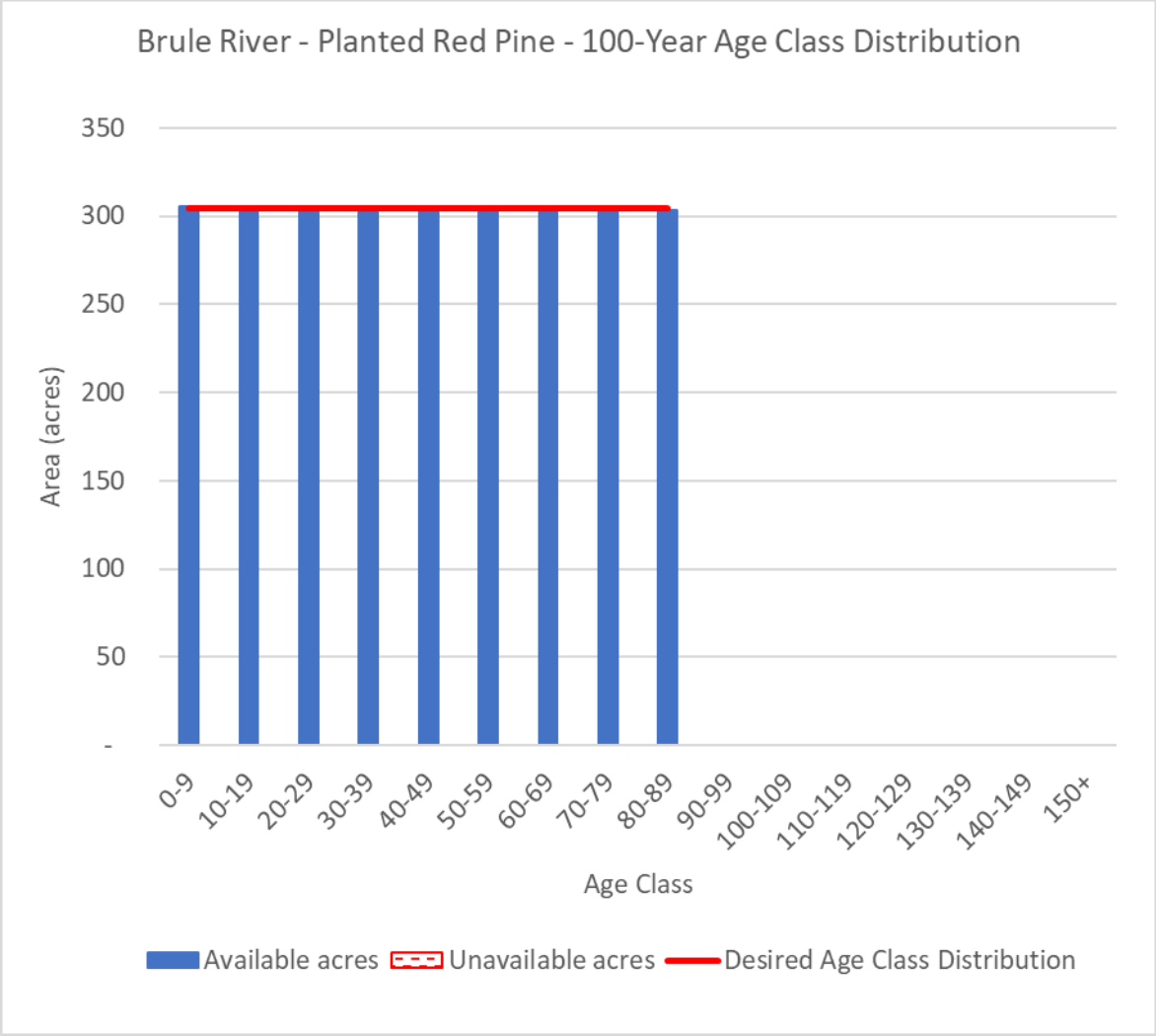


Figure 13. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 360 acres of projected thinning harvests in the red pine cover type. It is expected that about 67 acres of planted red pine will be converted from other cover types. These total an expected 67 acres of regeneration in the planted red pine cover type over the next 10 years.

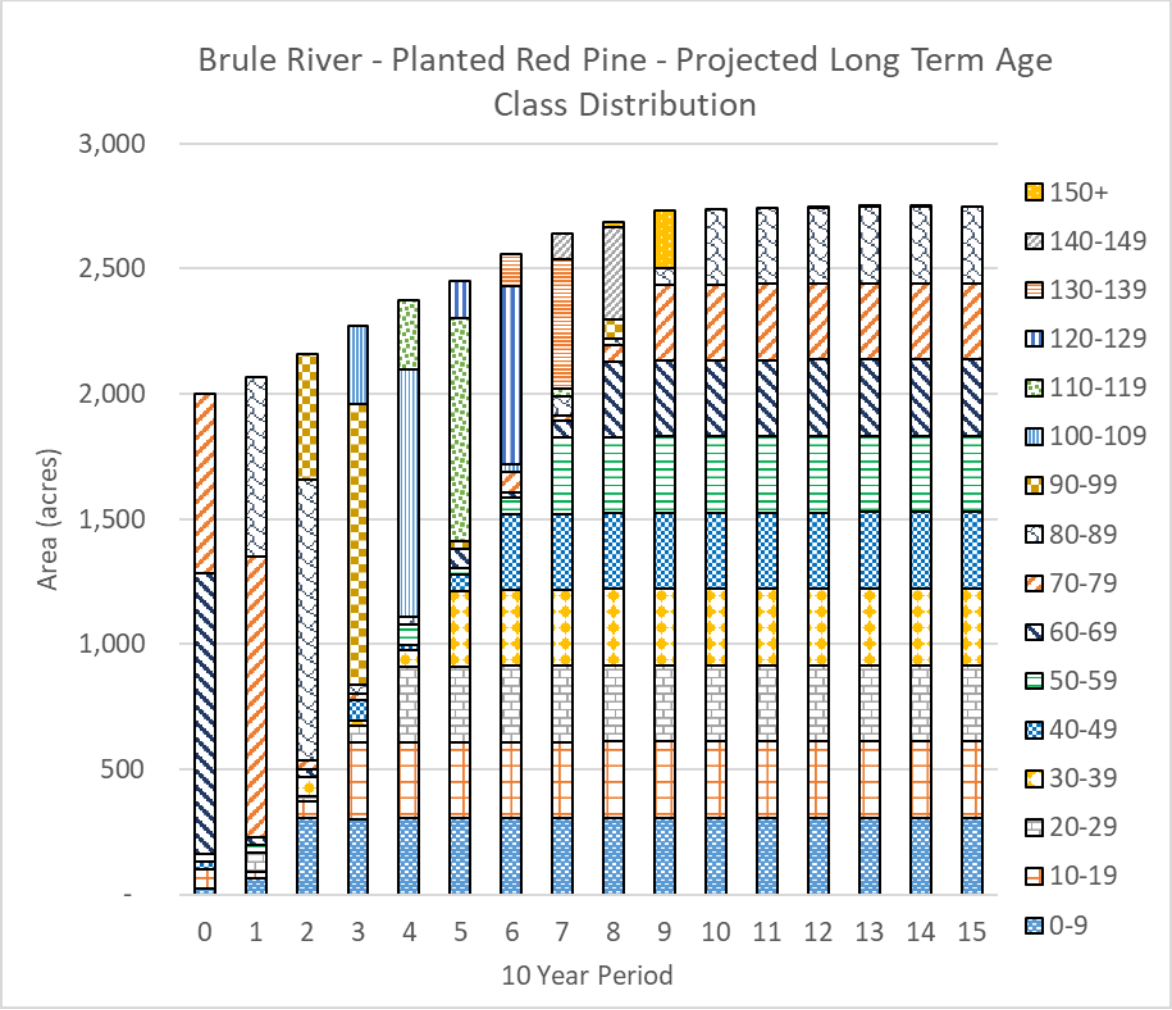


Figure 14. Projected age class distribution over 15, 10-year planning periods.

Natural jack pine

Current condition

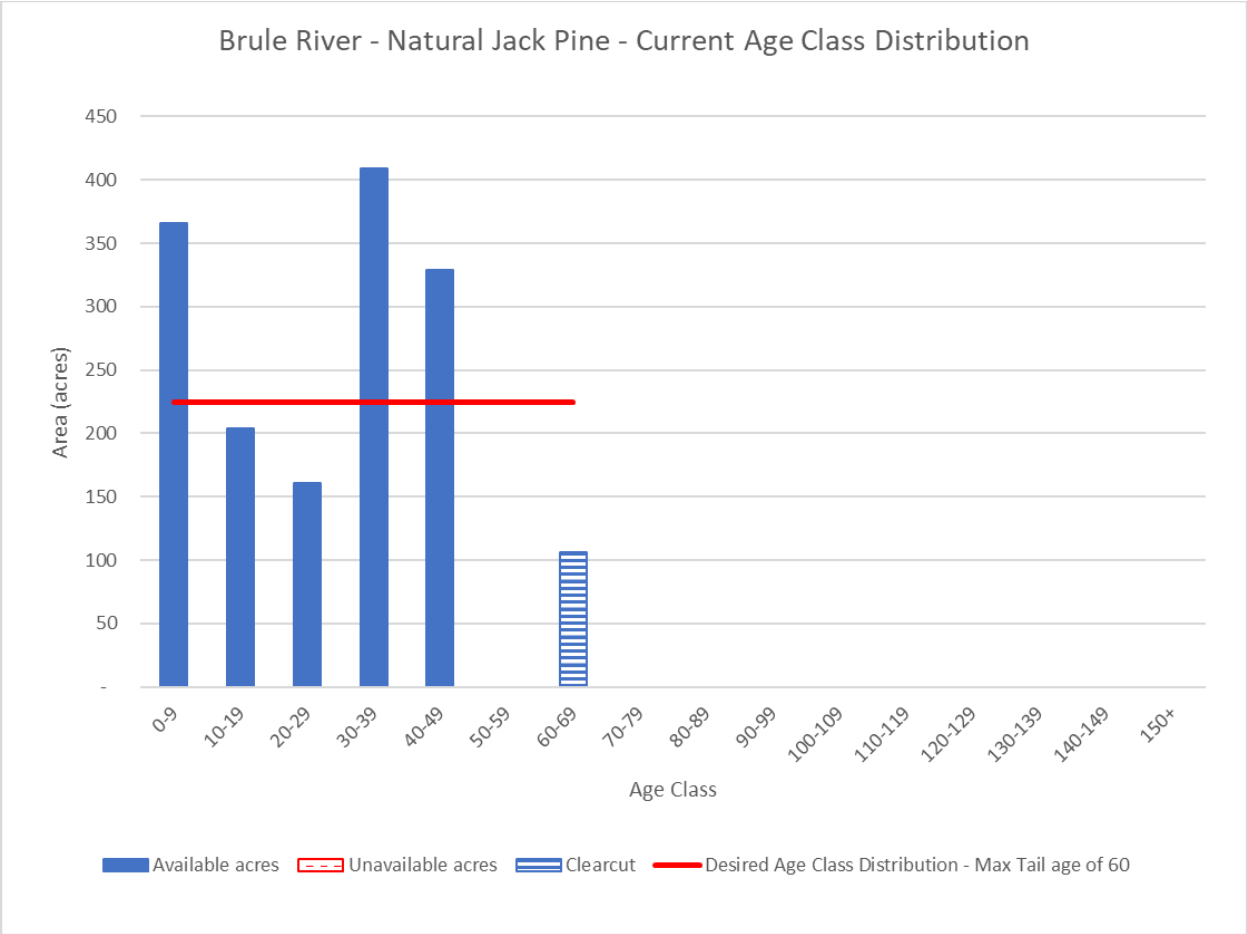


Figure 15. Current age class distribution, the desired age class distribution, and the projected harvests in the natural jack pine cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in ages 10-29 years old and a surplus of acres in the 0-9 and in the 30-49 year-old age classes. Limited merchantable acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period. A portion of this cover type meets the habitat requirements for snowshoe hare.

Table 10. Featured species with natural jack pine as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat - Natural Jack Pine	Natural Jack Pine Habitat Acres - Available	Natural Jack Pine Habitat Acres - Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	569	0

Desired future condition

The desired age class distribution is to have a rotation age of 60 years.

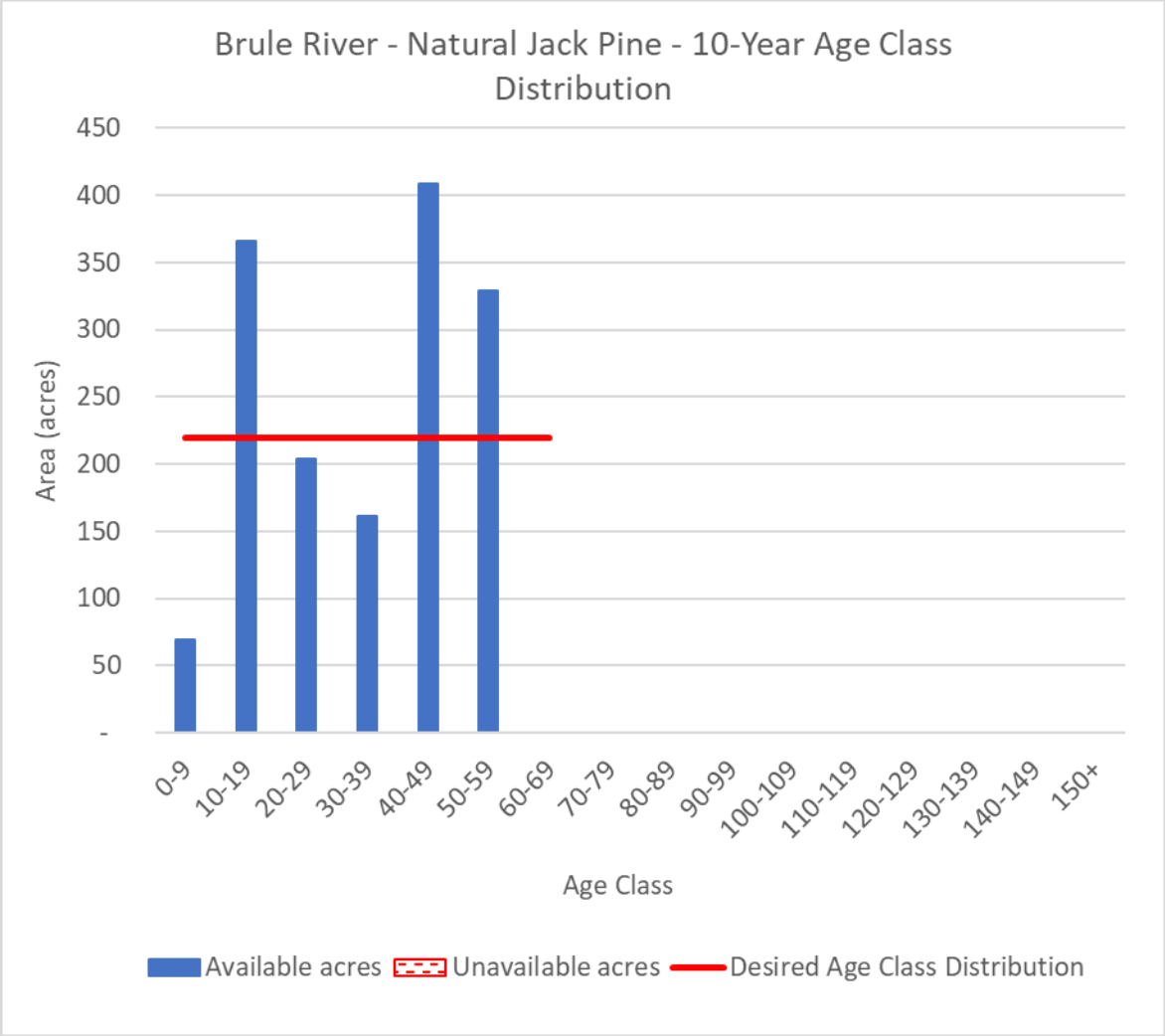


Figure 16. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 69 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of natural jack pine will take many decades in this management area.

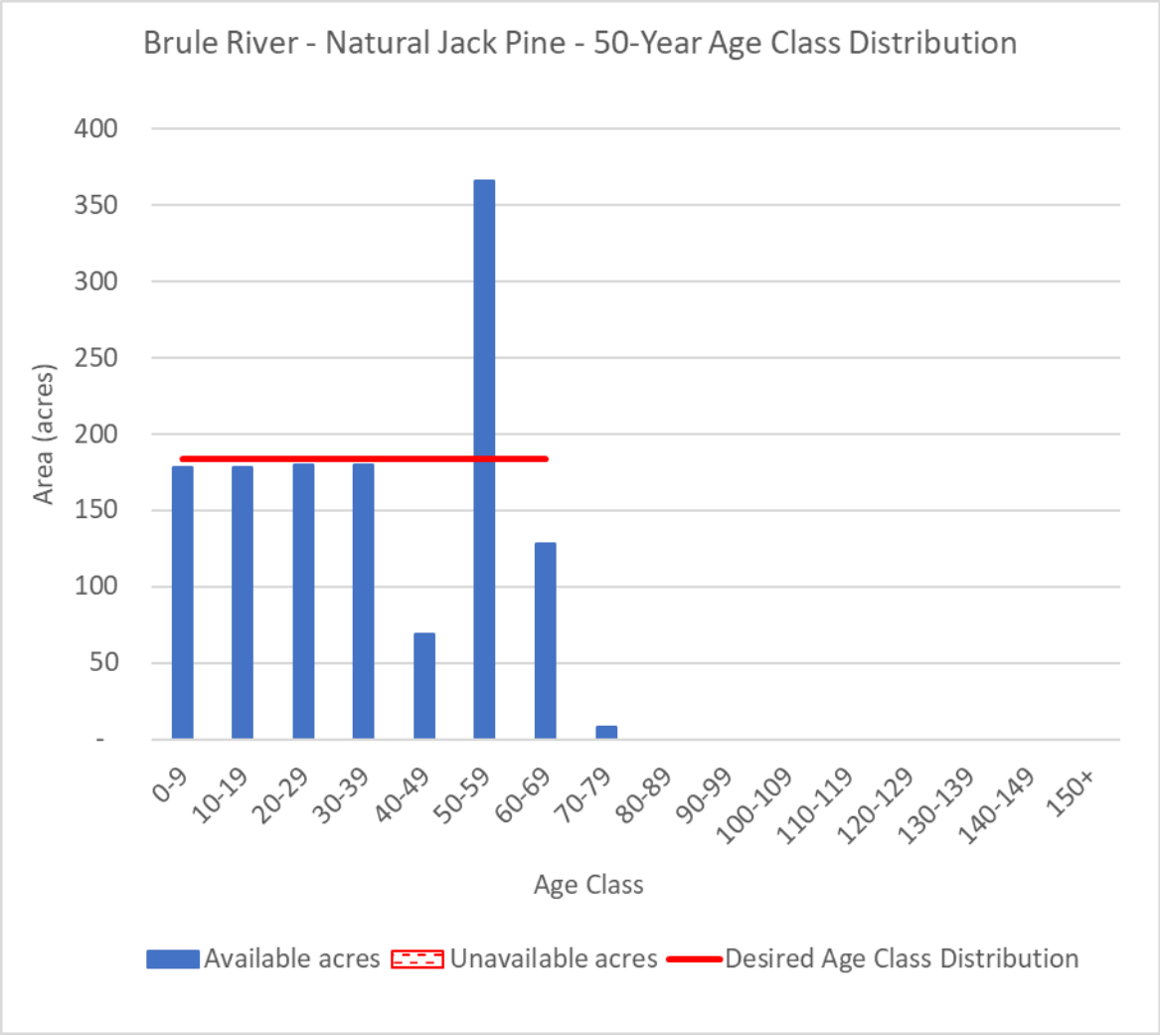


Figure 17. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of natural jack pine acres reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 18).

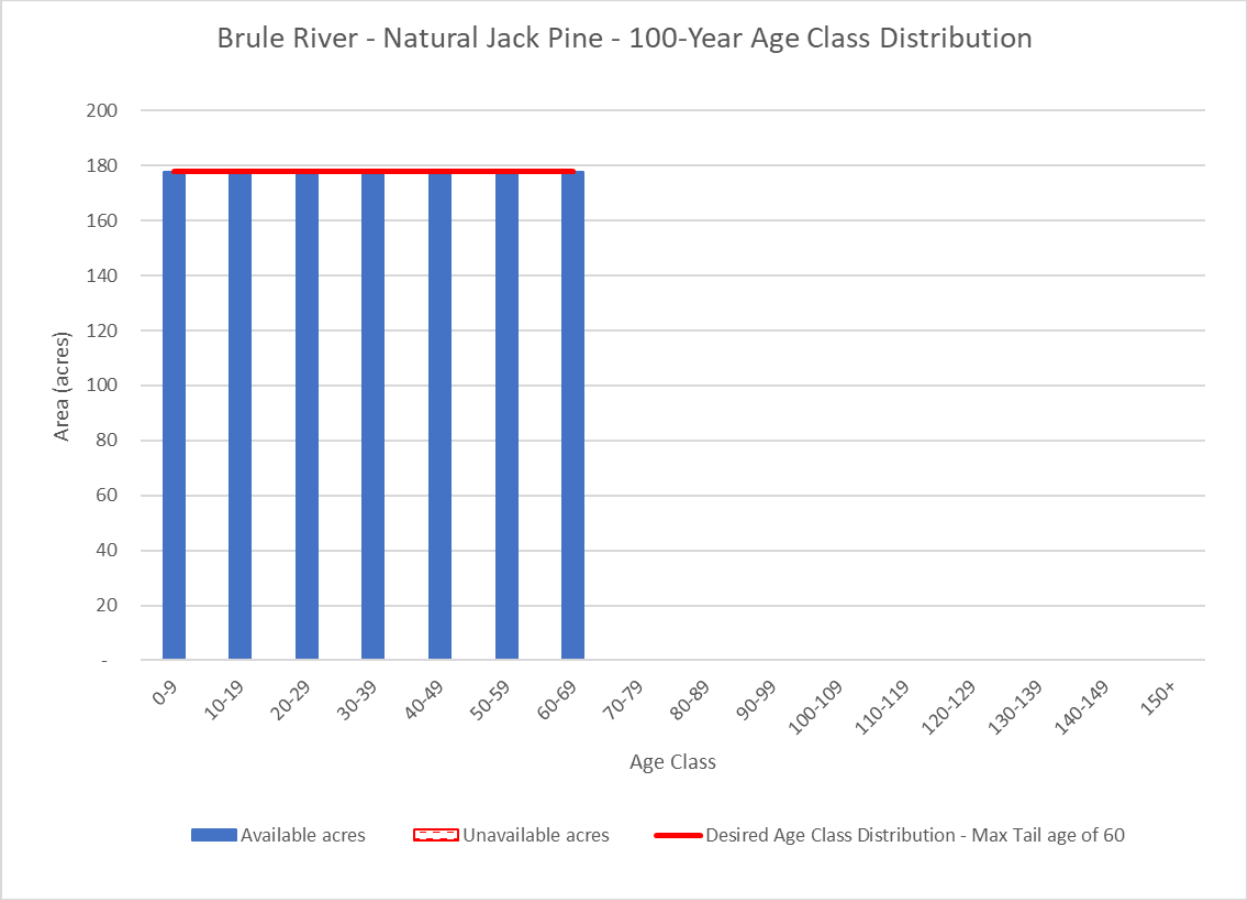


Figure 18. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of natural jack pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 107 acres of projected clearcut harvest in the natural jack pine cover type. It is expected that about 37 acres of natural jack pine will be converted to other cover types. These add up to an expected 70 acres of regeneration in the natural jack pine cover type over the next 10 years.

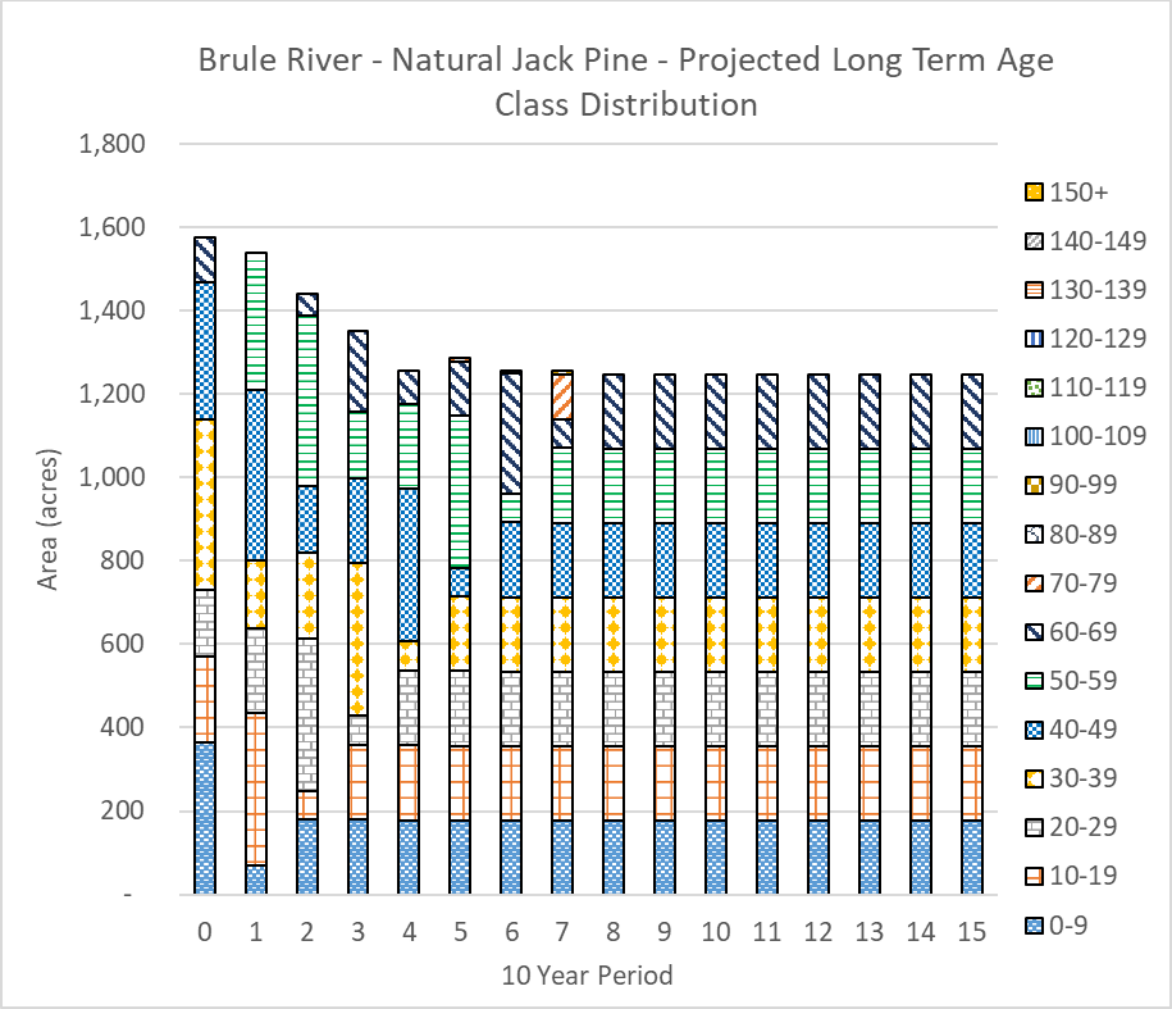


Figure 19. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 20; see Biodiversity in Section 3 for more information).

Table 11. High conservation value areas within the Brule River management area.

High Conservation Value Area Type and Name	Acres
Deer Wintering Complex	**4,453**
	4,453
Grand Total	**4,453**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes. There are no ERAs within this management area.

Special conservation areas

Reviewable special conservation areas (SCAs; Table 13) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 14) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 13. Reviewable Special Conservation Areas within the Brule River management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**129**
	129
Grand Total	**129**

Table 14. Static Special Conservation Areas within the Brule River management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Deer Winter Range - Obligate and Conditional		**13,815**
Conditional		13,815
Designated Trout and Coldwater Stream Buffer		**648**
		229
Armstrong Creek		9

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Brule River		101
Camp Five Creek		12
Camp Six Creek		53
First Creek		26
Gages Creek		27
Iron River		15
Larson Creek		21
McGoverns Creek		2
North Branch Iron River		4
Olson Creek		16
Seven Springs Creek		15
South Branch Iron River		4
South Slough		15
Stager Creek		67
Sunset Creek		2
Tim Bowers Creek		26
Waterworks Creek		2
West Branch Armstrong Creek		2
Designated Trout and Coldwater Streams	**24.0**	
	8.3	
Armstrong Creek	0.3	
Brule River	3.8	
Camp Five Creek	0.5	
Camp Six Creek	2.0	
First Creek	1.0	
Gages Creek	1.0	
Iron River	0.6	
Larson Creek	0.9	
McGoverns Creek	0.1	
North Branch Iron River	0.1	
Olson Creek	0.6	
Seven Springs Creek	0.6	
South Branch Iron River	0.2	
South Slough	0.6	
Stager Creek	2.3	
Sunset Creek	0.1	
Tim Bowers Creek	0.9	
Waterworks Creek	0.1	
West Branch Armstrong Creek	0.1	
Important Bird Areas		**13**
Lauterman Lake		8

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Winegar Moraine & Iron Co. Northern Goshawk IBA		5
Mussel Stream Group 1 - State special concern	**0.8**	
Twin Falls Dam-Menominee River	0.8	
Wood Turtle Stream 100-foot buffer		**197**
		1
Brule River		98
Menominee River		36
Paint River		62
Wood Turtle Stream 660-foot buffer		**1,311**
		18
Brule River		599
Menominee River		269
Michigamme River		0
Paint River		425
Grand Total	**24.8**	**15,983**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 16) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 15. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 16. Rare animal species occurrence within the Brule River management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alces alces*	Moose	SC	--	--
Animal	Boloria freija	Freija fritillary	SC	--	1
Animal	Boloria frigga	Frigga fritillary	SC	--	1
Animal	Bombus borealis	Northern amber bumble bee	SC	--	2
Animal	Bombus sandersoni	Sanderson's bumble bee	SC	--	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Bombus terricola	Yellow-banded bumble bee	SC	--	2
Animal	Canis Lupus*	Gray wolf	SC	LE	--
Animal	Erebia discoidalis	Red-disked alpine	SC	--	1
Animal	Gavia immer	Common loon	T	--	7
Animal	Glyptemys insculpta	Wood turtle	T	--	1
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	8
Animal	Lasmigona compressa	Creek heelsplitter	SC	--	1
Animal	Opheodrys vernalis	Smooth green snake	SC	--	1
Animal	Ophiogomphus anomalus	Extra-striped snaketail	SC	--	1
Animal	Pandion haliaetus	Osprey	SC	--	7
Total	--	--	--	--	**34**

*Occurrence information provided by field staff.

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation are recognized and managed accordingly. There are no non-ERA natural communities in this management area.

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 17) and diseases (Table 18) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 17. Defoliating insects of concern in the Brule River management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce Budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer as impacts increase.

Table 18. Maladies of concern in the Brule River management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak wilt	Bretziella fagacearum	Non-native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No

Report surviving mature beech trees that may be resistant to beech bark disease.

Aquatic resources

Riparian habitat

A total of 29 miles of streams and rivers are found in the management area (Table 19). Streams/rivers classified as cold types comprise approximately 76 percent of the riverine mileage.

Table 19. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	11
Cold small river	1
Cold transitional stream	7
Cold transitional small river	3
Cold transitional large river	0
Warm transitional stream	2
Warm transitional small river	0
Warm transitional large river	5
Warm stream	0
Warm small river	0
Warm large river	0

Lacustrine habitat

A total of 15 lakes and ponds of at least 1 surface acre are found in the management area (Table 20).

Table 20. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	9
100-499	4
500+	1

Wetlands

A total of 3,887 acres of wetlands lie in the management area (Table 21). Forested wetlands comprise approximately 91 percent of wetland types found in the management area.

Table 21. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	136
Forested	3,546
Riverine	205

Vernal pools and seeps

A total of 437 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Aspen is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 22).

Table 22. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Aspen	1,694
Lowland Shrub	333
Lowland Spruce/Fir	294
Lowland Conifers	242
Cedar	237
Northern Hardwood	206
Natural Mixed Pines	163
Lowland Deciduous	143
Planted Red Pine	124
Upland Shrub	102

Watershed vegetation cover

The management area includes portions of important watersheds of the Michigamme River and Iron River (Tables 23 and 24). Aspen is a major cover type of the state forest in each watershed.

Table 23. Largest vegetative cover types (i.e., top 5) and area of the Michigamme River watershed located within the management area.

Cover Type	Acres
Aspen	5,068
Northern hardwood	1,501
Planted red pine	578
Natural jack pine	553
Natural red pine	497

Table 24. Largest vegetative cover types (i.e., top 5) and area of the Iron River watershed located within the management area.

Cover Type	Acres
Aspen	79
Lowland conifer	61
Natural mixed pine	20
Northern hardwood	20
Lowland deciduous	7

Recreation

The Brule River area has variable access, with some isolated parcels. Several snowmobile and ORV trails cross the area. The Crystal Falls to Stager Rail Trail and Stateline Route are designated for ORV and snowmobile use and open to all non-motorized uses. The Glidden Lake State Forest Campground provides rustic camping opportunities and access to the Lake Mary Plains Ski Trail/Pathway, which is also open to mountain bikes.

Table 25. Designated recreation trails by type.

Recreation Category	Number of Miles
Motorized Recreation Trails	**54.8**
ORV (all types)	24.1
Snowmobile	30.7
Non-motorized Recreation Trails	**17.6**
Hiking	8.8
Equestrian	0
Biking	8.8
Total	**72.4**

Note: Trail use types may overlap.

Table 26. State Forest Campgrounds (SFCG).

Name	Number of Sites
Glidden Lake SFCG	23

There are no state wildlife management/research areas or areas managed specifically for hunting located within the MA.

The Brule River forms the southern boundary of this area and the border with Wisconsin. It is popular for canoeing and fishing.

Table 27. Boating access sites.

Name	Waterbody
Carney Dam	Brule River
Glidden Lake SFCG	Glidden Lake
Paint River Bridge	Paint River

Cassidy Creek

State Forest Area: 67,774 acres	Location: Southern Dickinson County	Population Centers: Norway, Kingsford, Iron Mountain
Sub-Section: West Green Bay Till and Lake Plain	Landforms: Bedrock knobs surrounded by extensive outwash plains	Landcover: Forested: 60,203 acres Non-forested: 7,571 acres

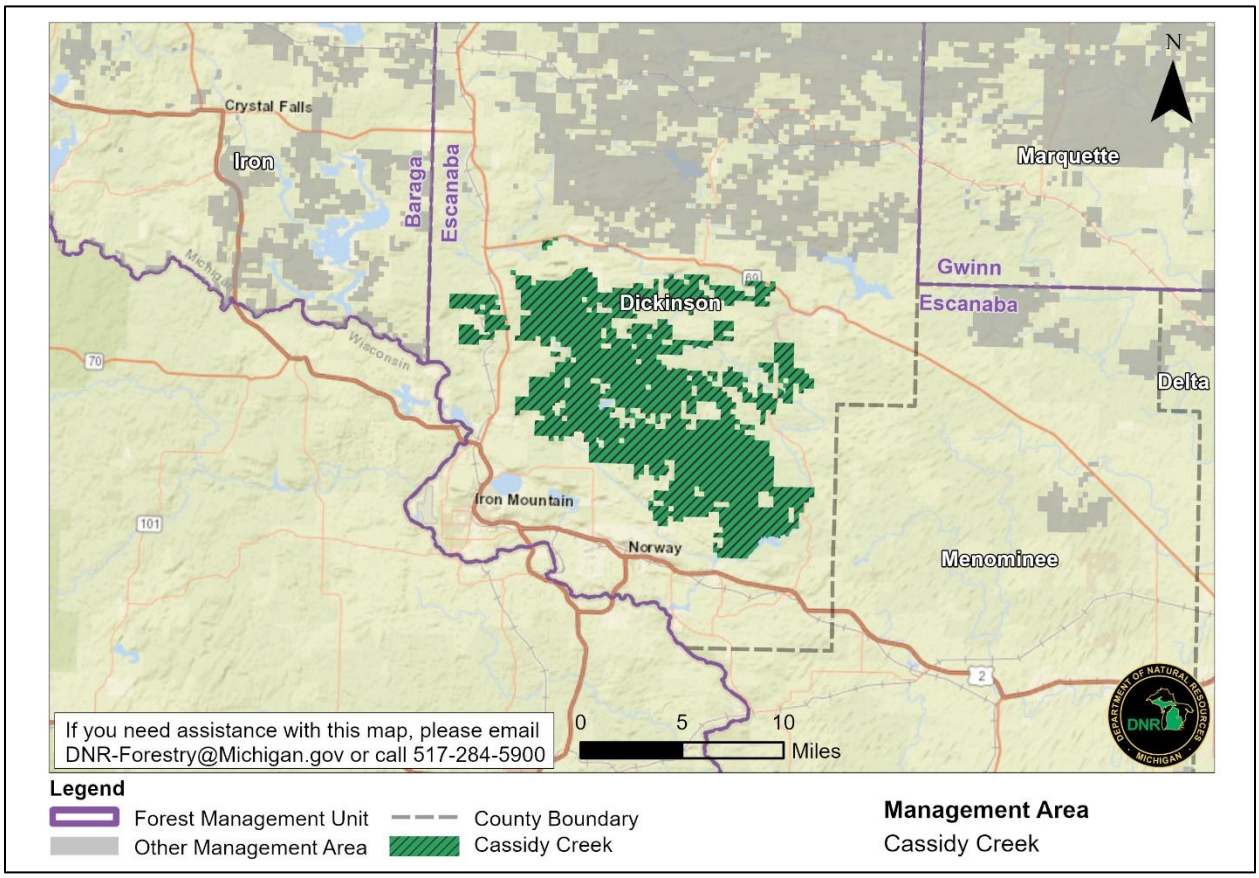


Figure 1. Map of the Cassidy Creek management area.

Forested landscape

Current and projected future condition

The Cassidy Creek management area is dominated by shade-intolerant cover types that are largely upland and available. Intolerant deciduous cover types are relatively evenly distributed across the age categories, while the unavailable upland and lowland acres are more prevalent in the older age category.

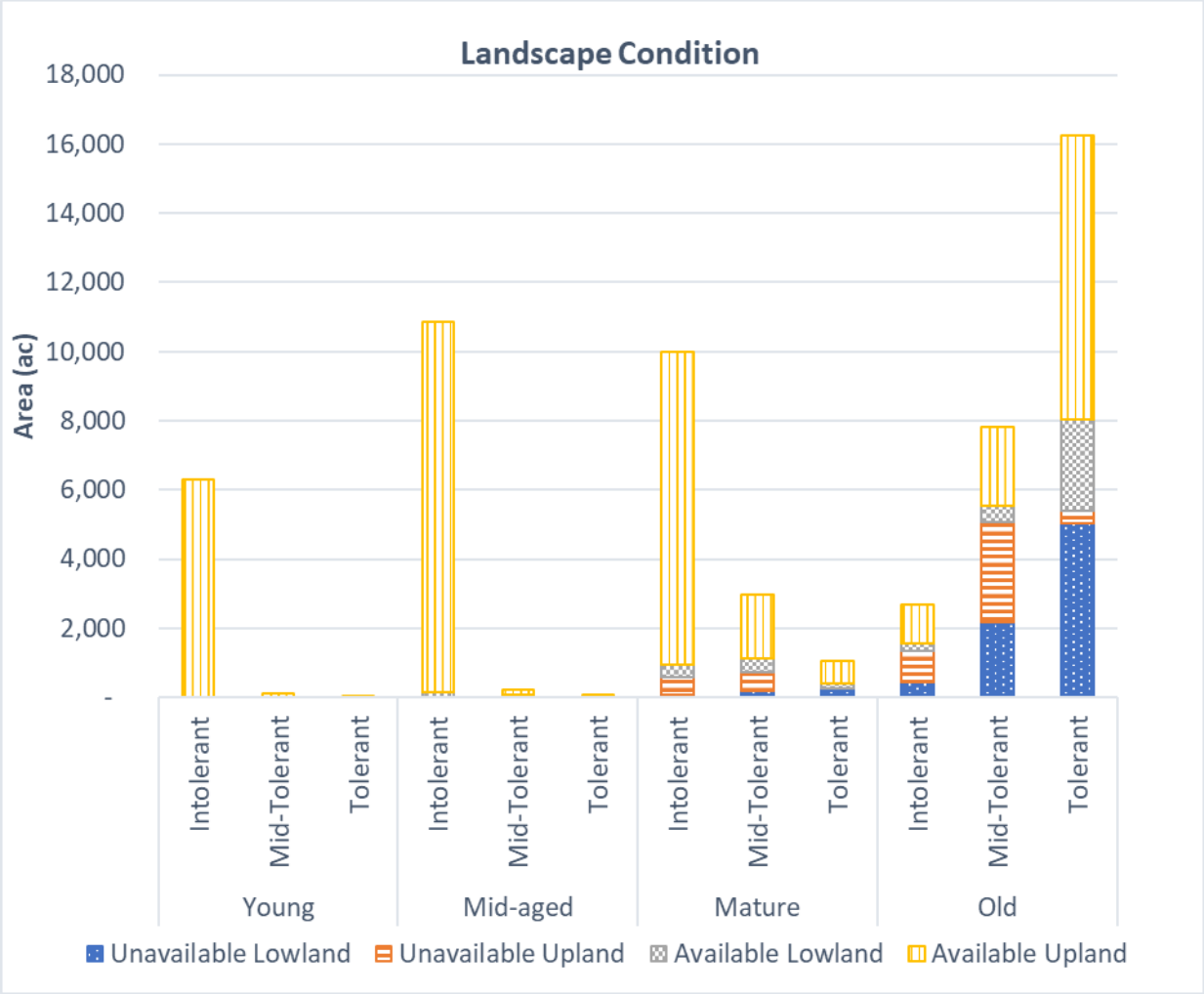


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack pine	6,428
Mature forest	Acres of 80+ year stands across cover types	26,771
Mature forest	Acres of 120+ year stands across cover types	9,718
Mesic conifer cover types	Acres of mesic conifer cover types	3,690
Mesic conifers in other cover types	Average canopy occupancy	35%
Mast – oak cover types	Acres of oak cover types	493
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	10,231
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	25,087
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	640
Landscape forest matrix	Percent deciduous forest	71%
Landscape forest matrix	Percent coniferous forest	24%

The Cassidy Creek management area is dominated by forested cover types with 89 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 59 percent of the management area and comprised mostly of aspen and northern hardwood. Lowland shrub is the most common non-forested cover type in this management area, representing 5 percent of the landscape.

Table 2. Current landscape context and distribution of cover types.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	29,254	39,657	47,393	60,203
			Northern hardwood	8,387			
			Black-red hybrid oak	0			
			Northern red oak	216			
			Oak mix	277			
			Mixed upland deciduous	1,523			
		Mixed	Upland mixed forest	1,743	1,743		
		Coniferous	Planted red pine	520	5,992		
			Planted jack pine	0			
			Planted white pine	151			
			Planted mixed pine	0			
			Natural red pine	1,605			
			Natural jack pine	27			
			Natural white pine	713			
			Natural mixed pines	1,632			
			Upland spruce/fir	211			
			Upland conifers	1,065			
			Hemlock	69			
	Lowland	Deciduous	Lowland aspen/balsam poplar	711	3,129	12,810	
			Lowland ceciduous	2,417			
		Mixed	Lowland mixed forest	1,040	1,040		
		Coniferous	Cedar	5,574	8,641		
			Lowland conifers	2,512			
			Lowland spruce/fir	329			
			Tamarack	226			
Nonforested	Upland	N/A	Herbaceous openland	496	N/A	1,698	7,571
			Upland shrub	121			
			Low density trees	37			
			Bare/sparsely vegetated	819			
			Cropland	23			
			Urban	203			
	Lowland	N/A	Lowland shrub	3,375	N/A	5,873	
			Marsh	489			
			Bog	136			
			Treed bog	74			
			Water	1,800			
						Grand Total:	**67,774**

There are 46,573 acres (68.7 percent of the total management area and 73.4 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest (Table 3). Acres unavailable for management are categorized by site condition (Table 4). Of that, over 46 percent is in the aspen cover type, 14 percent in northern hardwood, 4 percent in cedar, and 2 percent in upland mixed forest. The remaining 20 cover types represent about 12 percent of the forested and available land in the management area.

Table 3. Current cover type composition by management availability.

Cassidy Creek Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	27,707	46.0%	1,547	2.6%	29,254	48.6%
Cedar	2,245	3.7%	3,330	5.5%	5,574	9.3%
Hemlock	37	0.1%	31	0.1%	69	0.1%
Lowland aspen/balsam poplar	526	0.9%	185	0.3%	711	1.2%
Lowland conifers	573	1.0%	1,939	3.2%	2,512	4.2%
Lowland deciduous	617	1.0%	1,801	3.0%	2,418	4.0%
Lowland mixed forest	434	0.7%	606	1.0%	1,040	1.7%
Lowland spruce/fir	157	0.3%	172	0.3%	329	0.5%
Mixed upland deciduous	875	1.5%	649	1.1%	1,524	2.5%
Natural jack pine	27	0.0%	0	0.0%	27	0.0%
Natural mixed pines	704	1.2%	928	1.5%	1,632	2.7%
Natural red pine	963	1.6%	641	1.1%	1,605	2.7%
Natural white pine	479	0.8%	234	0.4%	713	1.2%
Northern hardwood	8,175	13.6%	213	0.4%	8,387	13.9%
Northern red oak	182	0.3%	34	0.1%	216	0.4%
Oak mix	260	0.4%	18	0.0%	277	0.5%
Planted red pine	488	0.8%	32	0.1%	520	0.9%
Planted white pine	151	0.3%	0	0.0%	151	0.3%
Tamarack	49	0.1%	177	0.3%	226	0.4%
Upland conifers	567	0.9%	499	0.8%	1,065	1.8%
Upland mixed forest	1,164	1.9%	579	1.0%	1,743	2.9%
Upland spruce/fir	194	0.3%	17	0.0%	211	0.4%
Grand Total	**46,575**	**77.4%**	**13,630**	**22.6%**	**60,204**	**100.0%**

Table 4. Site Conditions (reason area is unavailable for commercial harvest) for unavailable acres.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too wet	2,869	21.0%
Cannot regenerate	2,686	19.7%
Too steep	2,417	17.7%
BMPs	2,106	15.5%
Wildlife concerns	1,348	9.9%
Blocked by obstacle	683	5.0%
Long-term retention	589	4.3%
Conservation values	224	1.6%
Other influence zones	176	1.3%
Recreational/scenic	174	1.3%
Deer wintering area	146	1.1%
Unproductive	96	0.7%
Denied access	46	0.3%
Other dept./div. processes	28	0.2%
Non-military lease/easement	23	0.2%
Species of special concern or T&E	20	0.1%
Total Unavailable	**13,630**	**100.0%**

Projected 10-year cover type management actions

Each cover type in the Cassidy Creek management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. Implementing these silvicultural regimes will yield 150,322 cords, the planned harvest volume for the decade (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Aspen	4,335	-	-	-	-	-	-	4,335
Northern hardwood	111	2,702	-	170	37	-	-	3,020
Natural mixed pines	-	-	131	-	162	-	-	293
Lowland aspen/balsam poplar	191	-	-	-	-	-	-	191
Planted white pine	-	-	143	-	-	-	-	143
Mixed upland deciduous	94	6	-	-	16	-	-	117
Lowland deciduous	110	-	-	-	-	-	-	110
Planted red pine	-	-	107	-	-	-	-	107
Lowland mixed forest	107	-	-	-	-	-	-	107
Upland conifers	107	-	-	-	-	-	-	107
Lowland conifers	105	-	-	-	-	-	-	105
Lowland spruce/fir	49	-	-	-	-	-	-	49
Natural red pine	-	-	2	-	30	-	-	33
Upland spruce/fir	25	-	-	-	-	-	-	25
Tamarack	7	-	-	-	-	-	-	7
Totals	**5,241**	**2,708**	**384**	**170**	**245**	**-**	**-**	**8,748**

Table 6. Projected 10-year harvest volume by product and species.

10-Year Estimated Harvest Volume Projection			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed aspen	40,473	38,045
	Mixed hardwood	26,578	24,983
	Mixed spruce	7,130	6,702
	Mixed softwood	6,177	5,806
	White pine	3,347	3,146
	Red pine	1,936	1,820
	Jack pine	1,134	1,066
	Mixed oak	913	859
	Pulpwood Total	**87,687**	**82,426**
Sawtimber (MBF)	Mixed aspen	8,796	8,269
	Sugar maple	7,847	7,376
	Red maple	3,770	3,544
	White pine	3,337	3,137
	Red pine	2,612	2,455
	Red oak	1,721	1,617
	Basswood	828	778
	Mixed oak	116	109
	White oak	83	78
	Sawtimber Total	**29,110**	**27,363**
	Total Sawtimber Harvest Volume in Cords	**62,634**	**58,876**
	Grand Total Harvest Volume in Cords	**150,322**	**141,302**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are very few cover type transitions projected in the Cassidy Creek management area (Table 7). The managed area of each cover type is projected to remain relatively stable. The largest expected decrease is in the aspen cover type, where 201 acres are forecasted to convert to other cover types

through forest management activities. The largest increase is in upland mixed forest where 270 acres are expected to convert into that cover type.

Table7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	29,254	29,053	-201
Northern hardwood	8,387	8,387	0
Cedar	5,574	5,574	0
Lowland conifers	2,512	2,494	-18
Lowland deciduous	2,417	2,388	-29
Upland mixed forest	1,743	2,013	270
Natural mixed pines	1,632	1,632	0
Natural red pine	1,605	1,605	0
Mixed upland deciduous	1,523	1,537	13
Upland conifers	1,065	991	-74
Lowland mixed forest	1,040	1,101	61
Natural white pine	713	725	12
Lowland aspen/balsam poplar	711	713	2
Planted red pine	520	523	3
Lowland spruce/fir	329	316	-13
Oak mix	277	277	0
Tamarack	226	224	-2
Northern red oak	216	216	0
Upland sruce/fir	211	188	-24
Planted white pine	151	151	0
Hemlock	69	69	0
Natural jack pine	27	27	0
Lowland shrub	3,375	3,375	0
Water	1,800	1,800	0
Bare/sparsely vegetated	819	819	0
Herbaceous openland	496	496	0
Marsh	489	489	0
Urban	203	203	0
Bog	136	136	0
Upland shrub	121	121	0
Treed bog	74	74	0
Low density trees	37	37	0
Cropland	23	23	0
Total:	**67,774**	**67,774**	**0**

Featured species: current and projected habitat acres

There are 12 featured species in this management area that span various cover types, age classes, and stand-level conditions.

It is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, habitat acres refers to is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81. Because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the SFMP model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black bear	Mast	--	--	--	--
Black-backed woodpecker	Natural disturbance	--	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	10,692	12,662	9,565	12,878
Cerulean warbler breeding	Northern hardwoods, mixed upland deciduous, lowland deciduous	10,621	10,980	10,359	10,281
Golden-winged warbler young	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	8,097	8,563	8,184	8,196
Marten UP	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	7,416	20,172	16,839	20,006
Moose	To be determined	--	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Snowshoe hare forest	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	8,572	9,609	8,906	8,897
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	45,569	45,687	46,939	46,094
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	14,381	14,265	14,023	13,876
Wood thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	10,032	11,469	7,758	12,290
Wood turtle	Non-forested openings	--	--	--	--

Cover type composition and associated featured species

Aspen

Current Condition

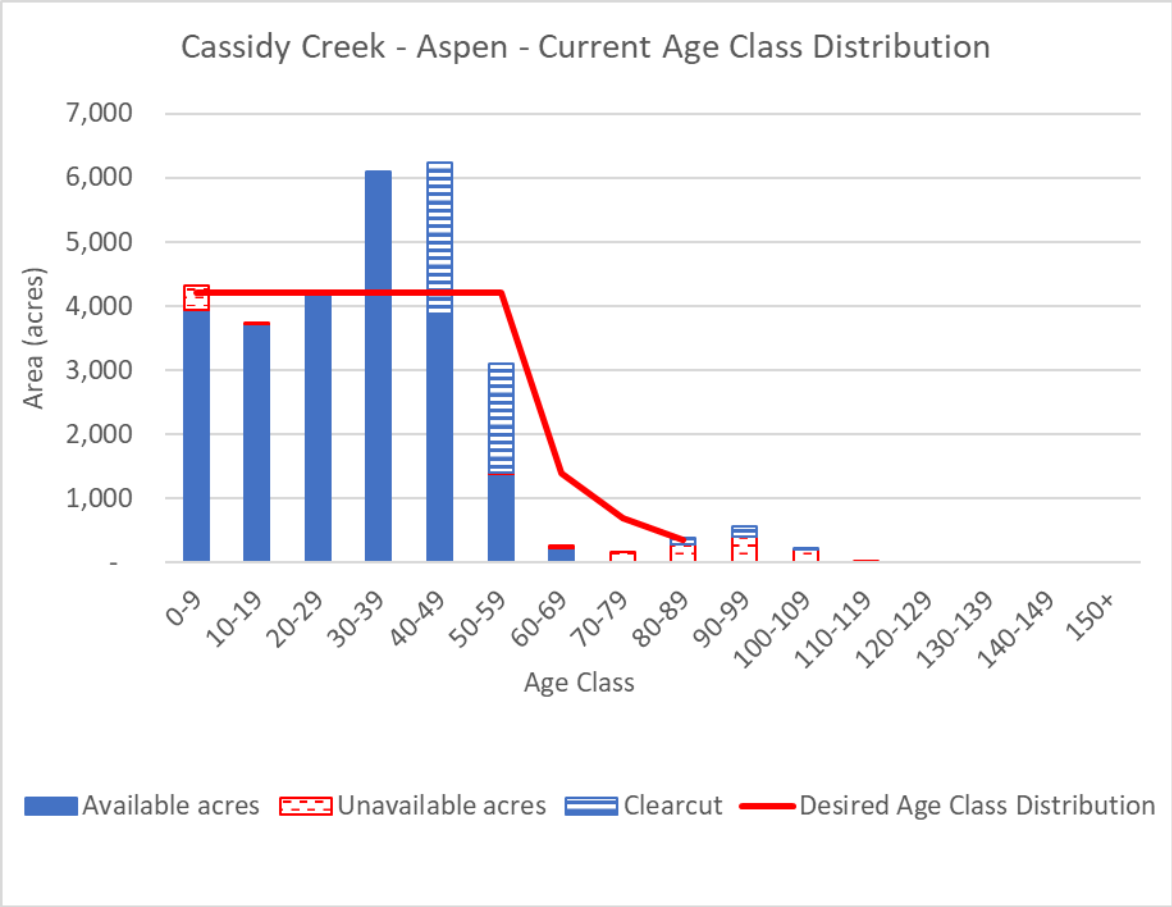


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is somewhat unbalanced, with a deficit of acres in ages 60-79 years old tails and a surplus of acres in the 30-49 year-old age classes. The younger age classes are in pretty good shape with only a slight deficit in each. Limited merchantable acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse, snowshoe hare and white-tailed deer.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: Sapling	7,645	400
Ruffed grouse	Age category: 0-19 Size class: Sapling	7,645	400
Snowshoe hare	Age category: 0-19 Size class: Sapling	7,645	400
White-tailed deer	All ages and size classes	29,254	--

Desired Future Condition

The desired age class distribution is a rotation age of 50 years with approximately 9 percent of the acres in an age class tail to a maximum of 80-year age class.

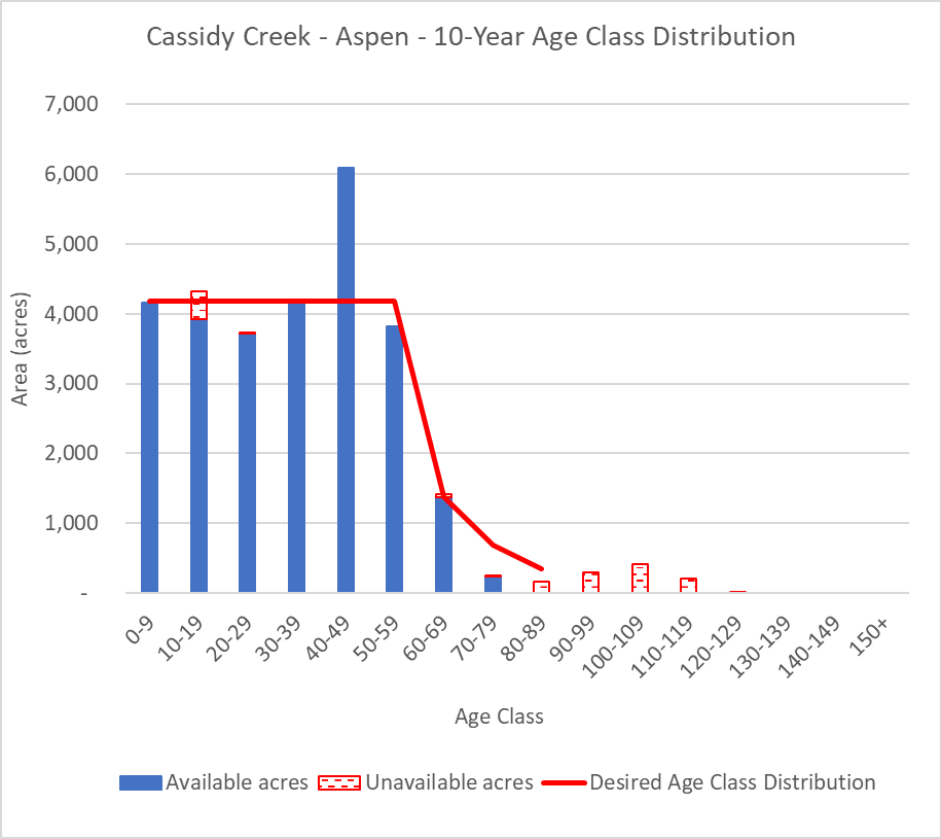


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of about 4,152 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will only take a few decades in this management area.

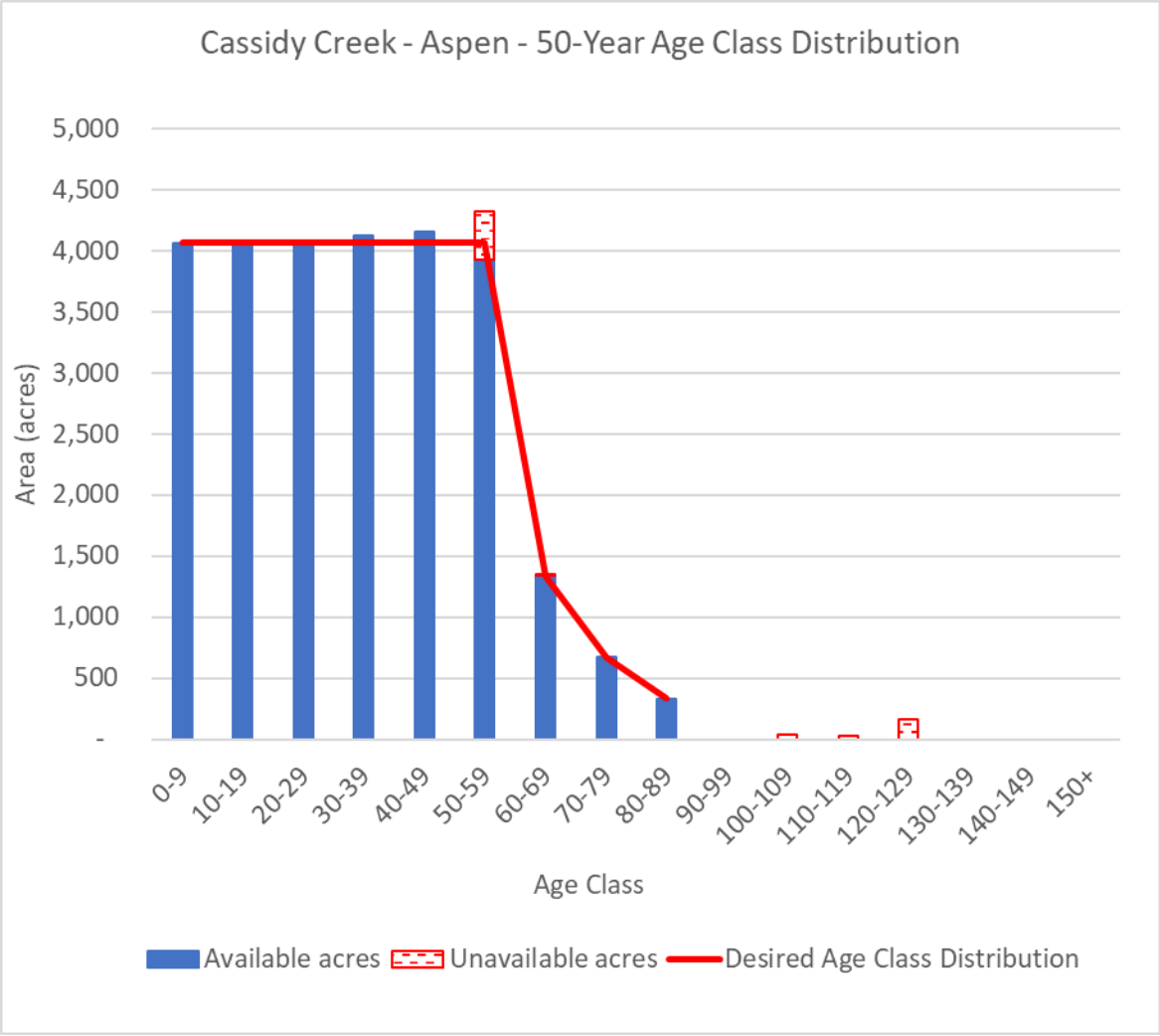


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 5).

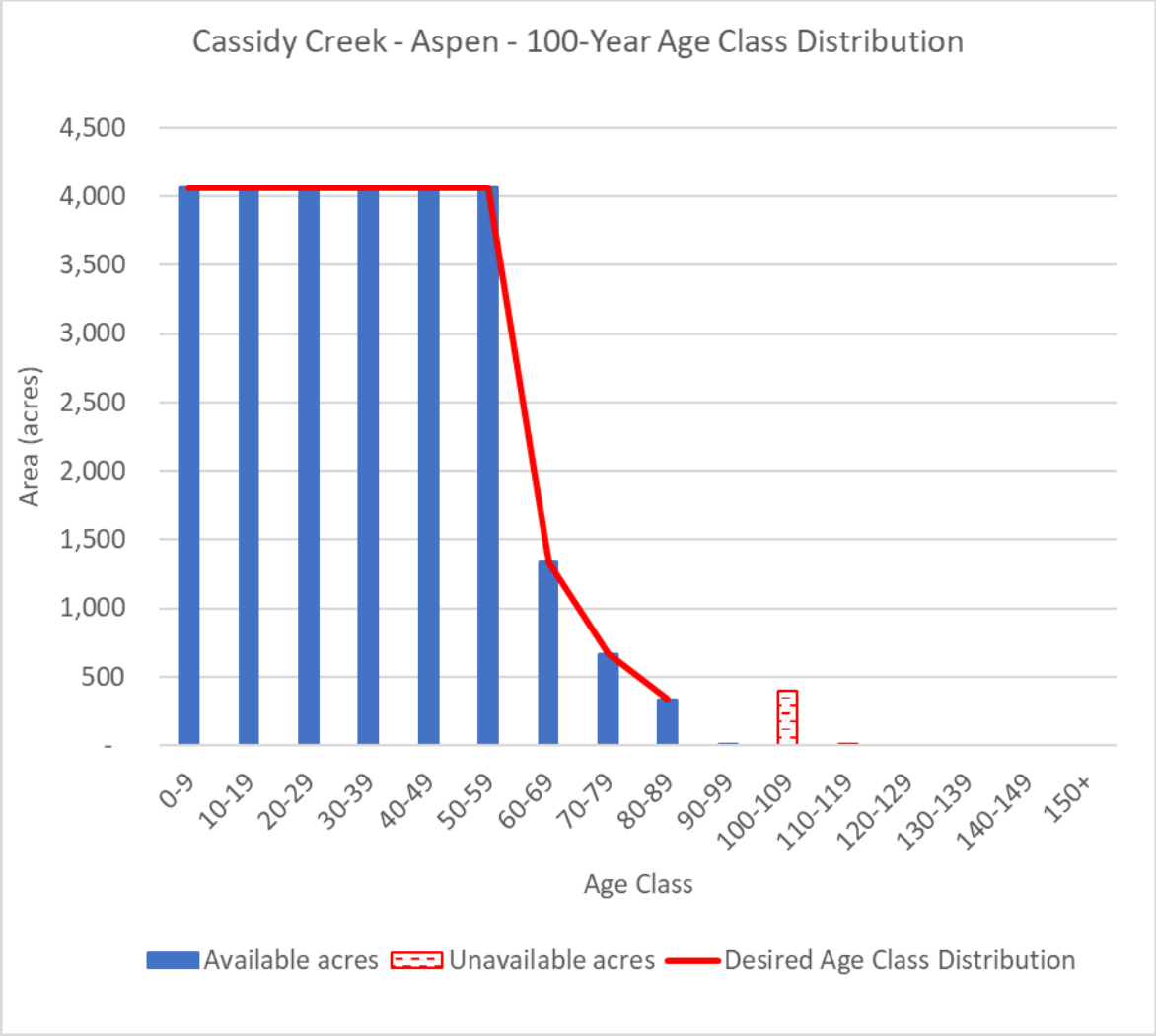


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management Actions

There are 4,335 acres of projected clearcut harvest in the aspen cover type. It is expected that about 210 acres of aspen will be converted to other cover types. These total to an expected 4,125 acres of regeneration in the aspen cover type over the next 10 years.

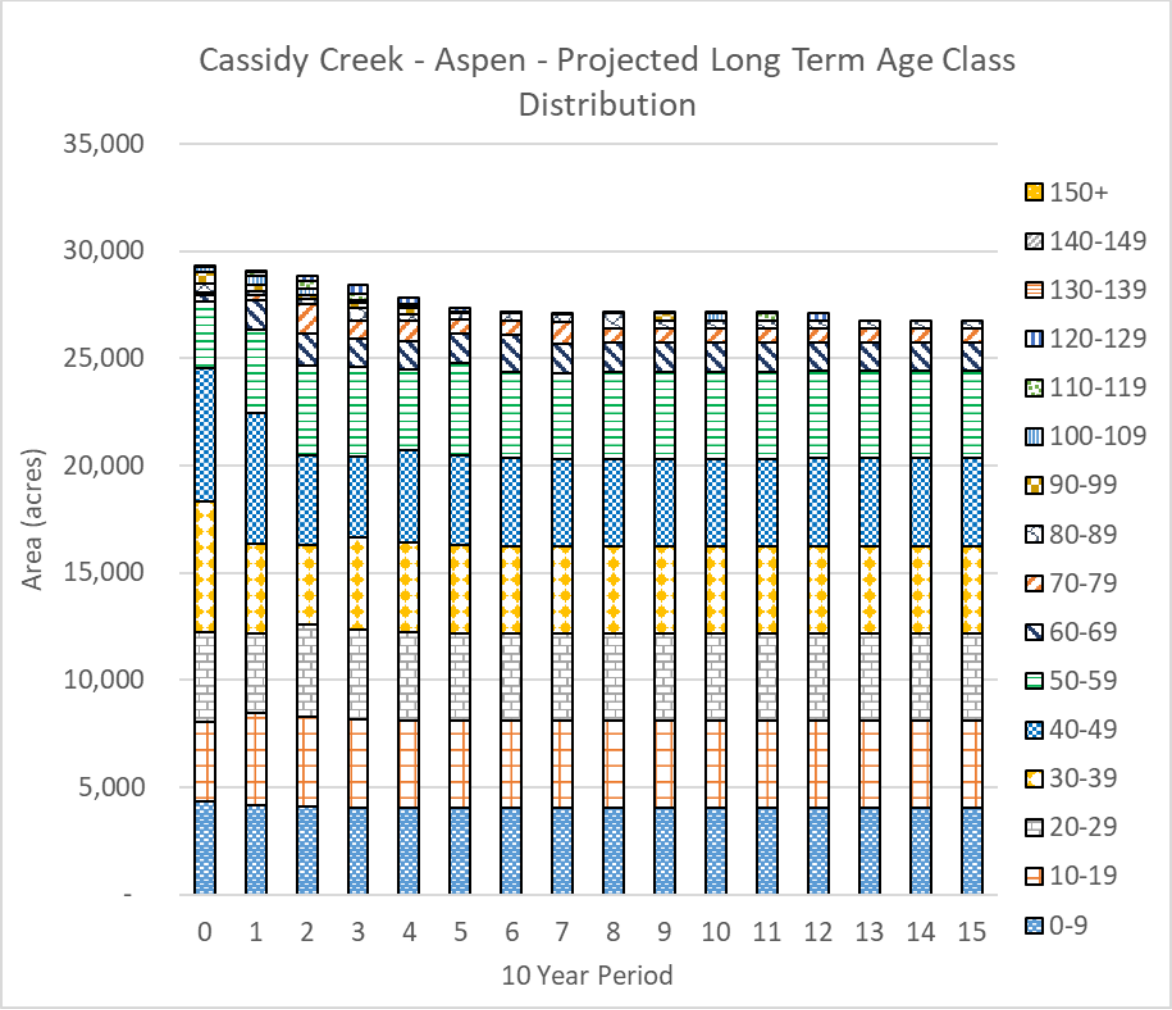


Figure 7. Projected age class distribution over 15 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type in the Cassidy Creek management area is currently between a stand age of 90 and 119 years old (Figure 8). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase overtime. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10).

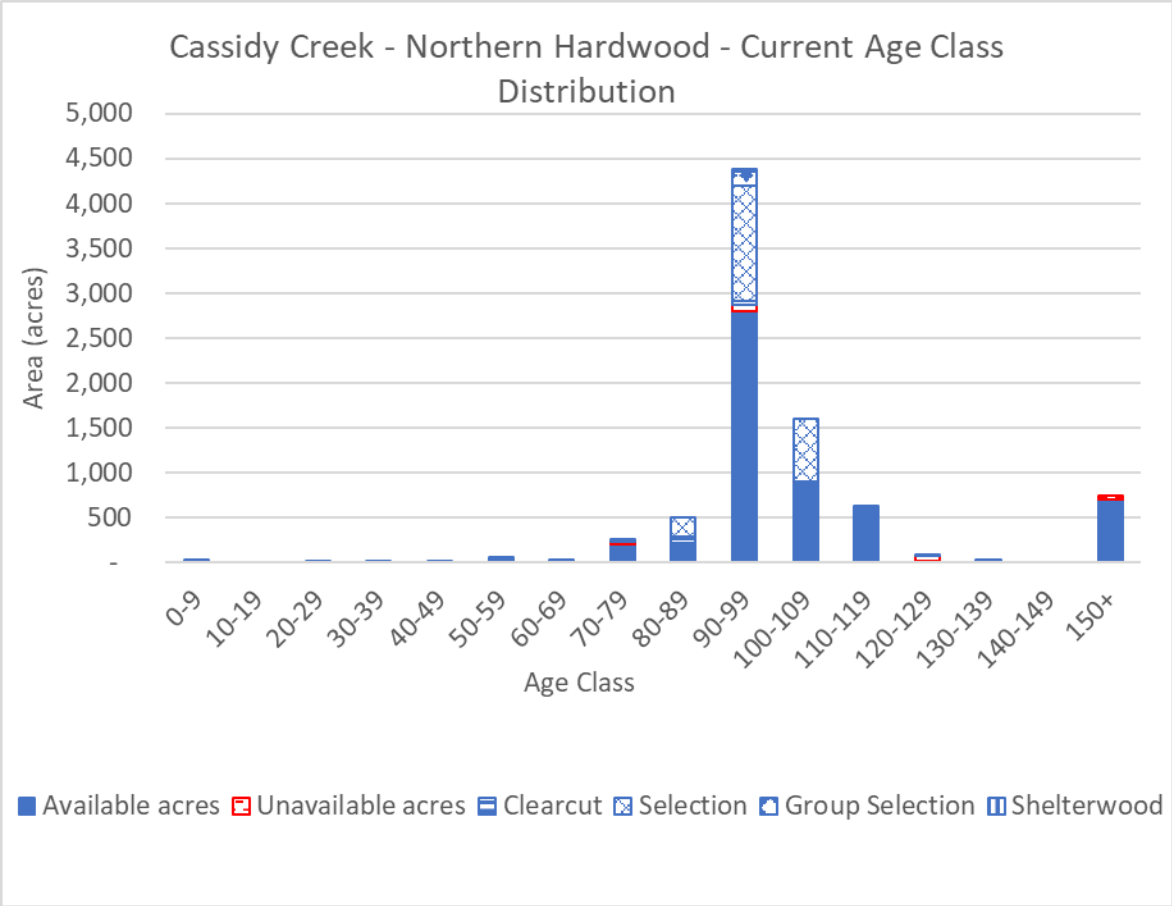


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the Cassidy Creek management area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Cassidy Creek management area (Figure 9). Current conditions are a result of a selection harvest regime that has been in place in this management area for decades.

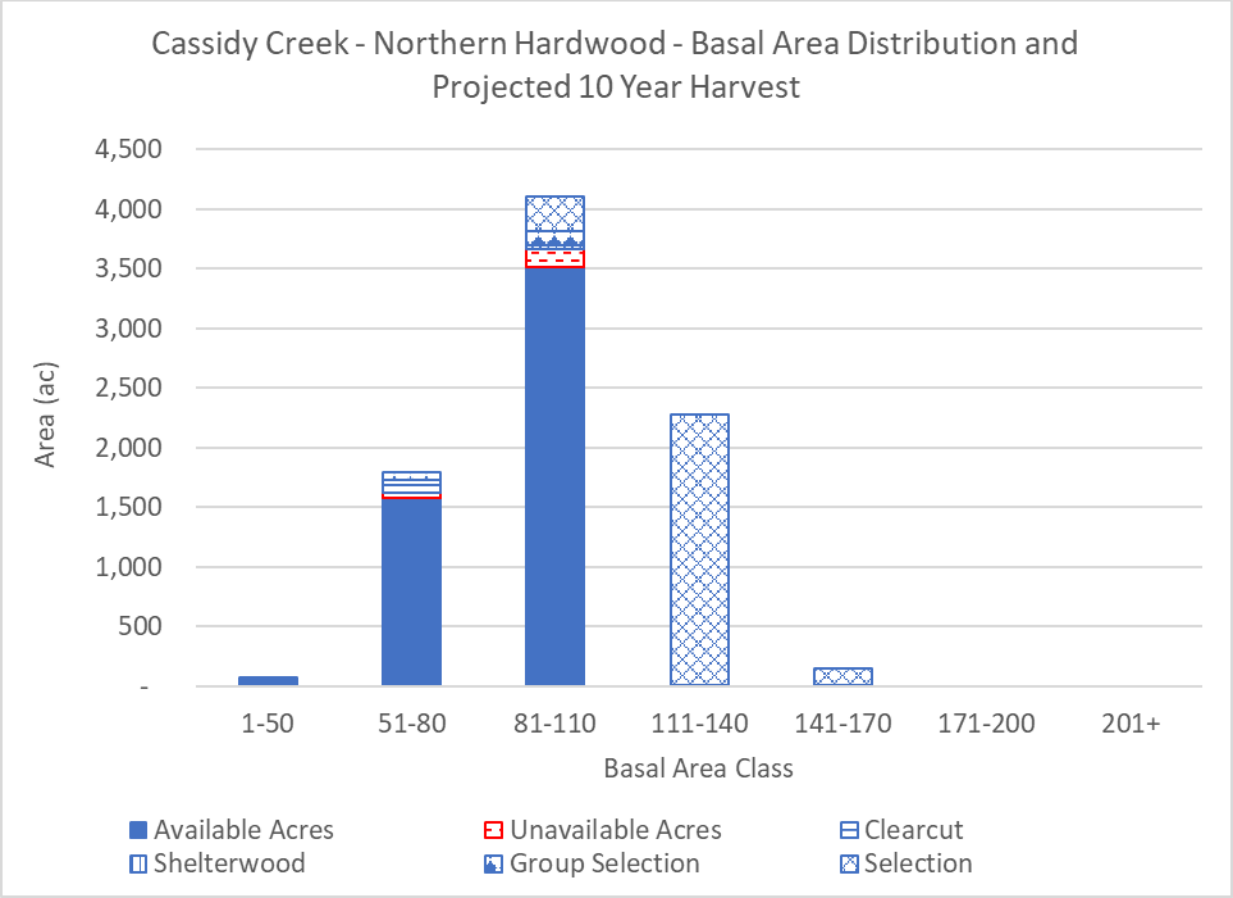


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
Blackburnian warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	6,260	129
Cerulean warbler	Age category: 50+ Size category: sawlog Basal area: 81+	7,787	176
Wood thrush	Age category: 40+ Size category: sawlog Basal area: 81+	6,547	166
Marten	Age category: 40+ Size category: pole, sawlog Basal Area: 81+	6,260	129

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres - Available	Northern Hardwood Habitat Acres - Unavailable
White-tailed deer	All ages and size classes	8,387	--

Desired Future Condition

The projected long-term cover type trend for northern hardwood is stable. There are no transitions to or from this cover type forecasted in this management area in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings and poles. Eventually remaining stems become sawlog-sized over time.

Several patches ranging from 250 acres to greater than 500 acres with a closed canopy condition exist in this management area, which are suitable to species like blackburnian warbler, cerulean warbler and American Marten.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime depends on successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. Northern hardwoods in the Cassidy Creek management area are challenged in regeneration and recruitment due the cervid herbivory and competition from sedge.

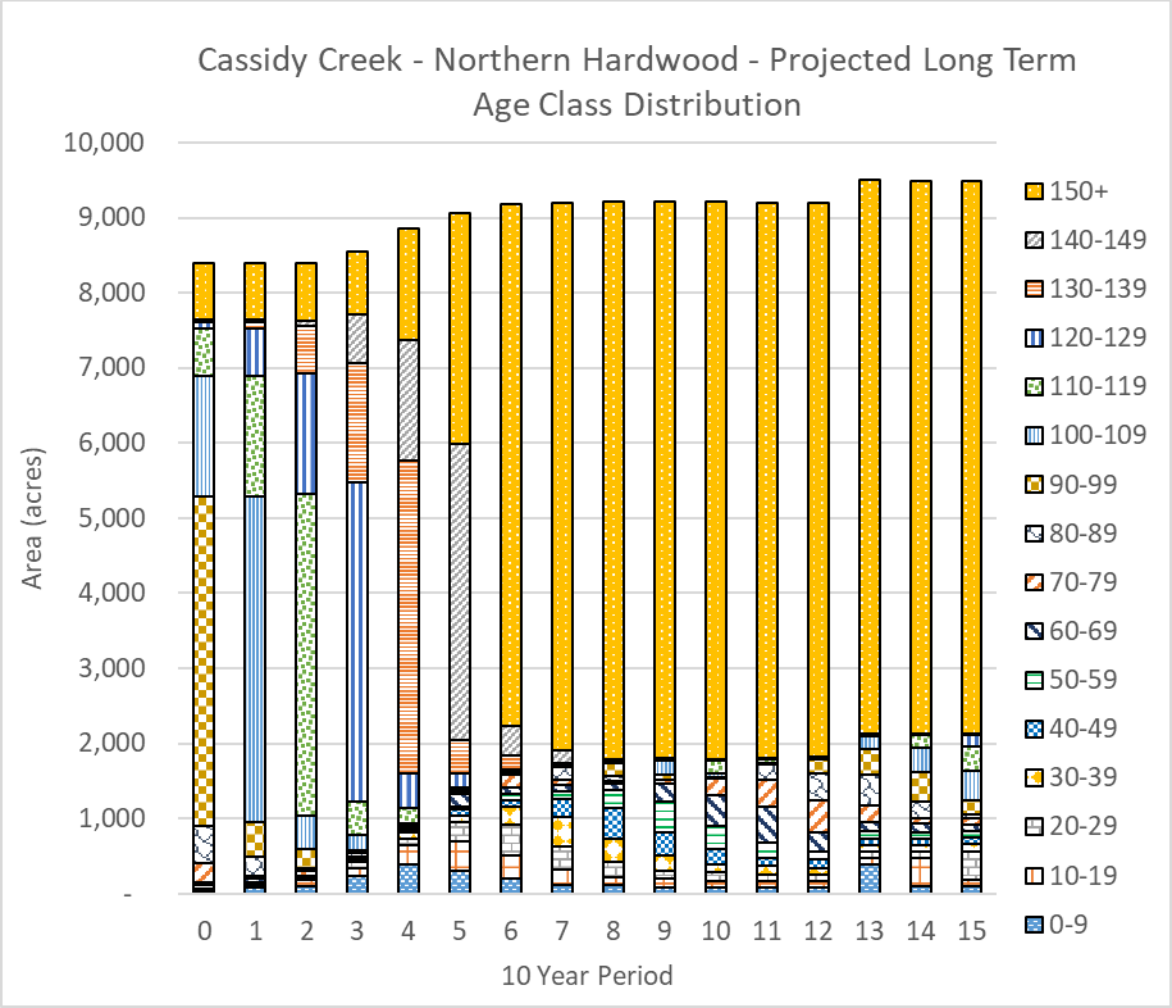


Figure 10. Projected age class distribution over fifteen 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 2,908 acres, with some of those acres harvested through a group selection or shelterwood method to improve stand quality (Table 5). About 111 acres of lower-quality northern hardwood may be harvested to improve stand quality. Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition. Treatments should be considered to reduce sedge mat competition with regeneration and cervid herbivory.

Cedar

Current condition

The current age class distribution shows a classic bell curve on an unmanaged even-aged stand with a surplus of acres in the 100-109-year-old age classes. The younger age classes have few to no acres. The reasons for this are not well understood, but many factors contribute to the lack of regeneration of the cover type. These include but are not limited to cervid herbivory, suppression of fire and the relatively young age of the stands.

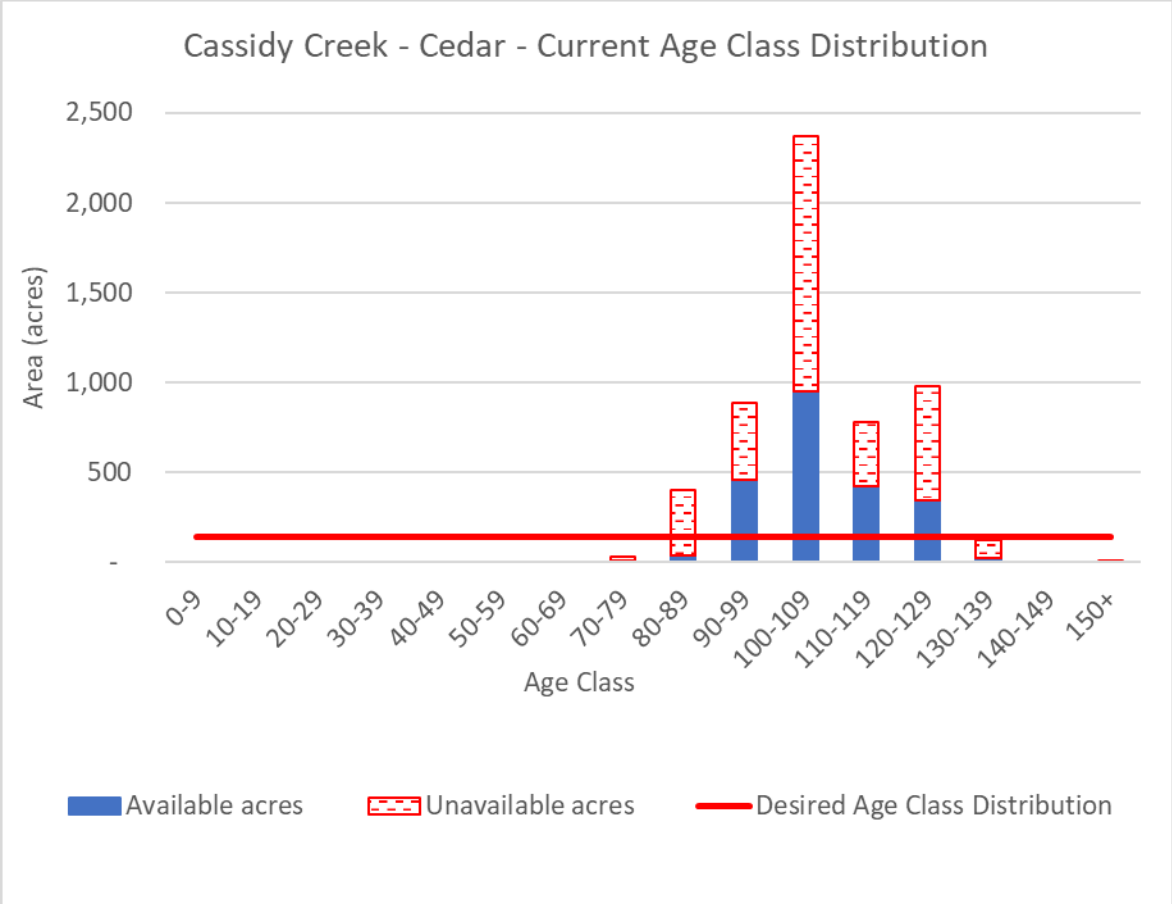


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in the cedar cover type over the 10-year planning period.

Desired future condition

The desired future condition is to have an even age class distribution with a rotation age of 150+ years.

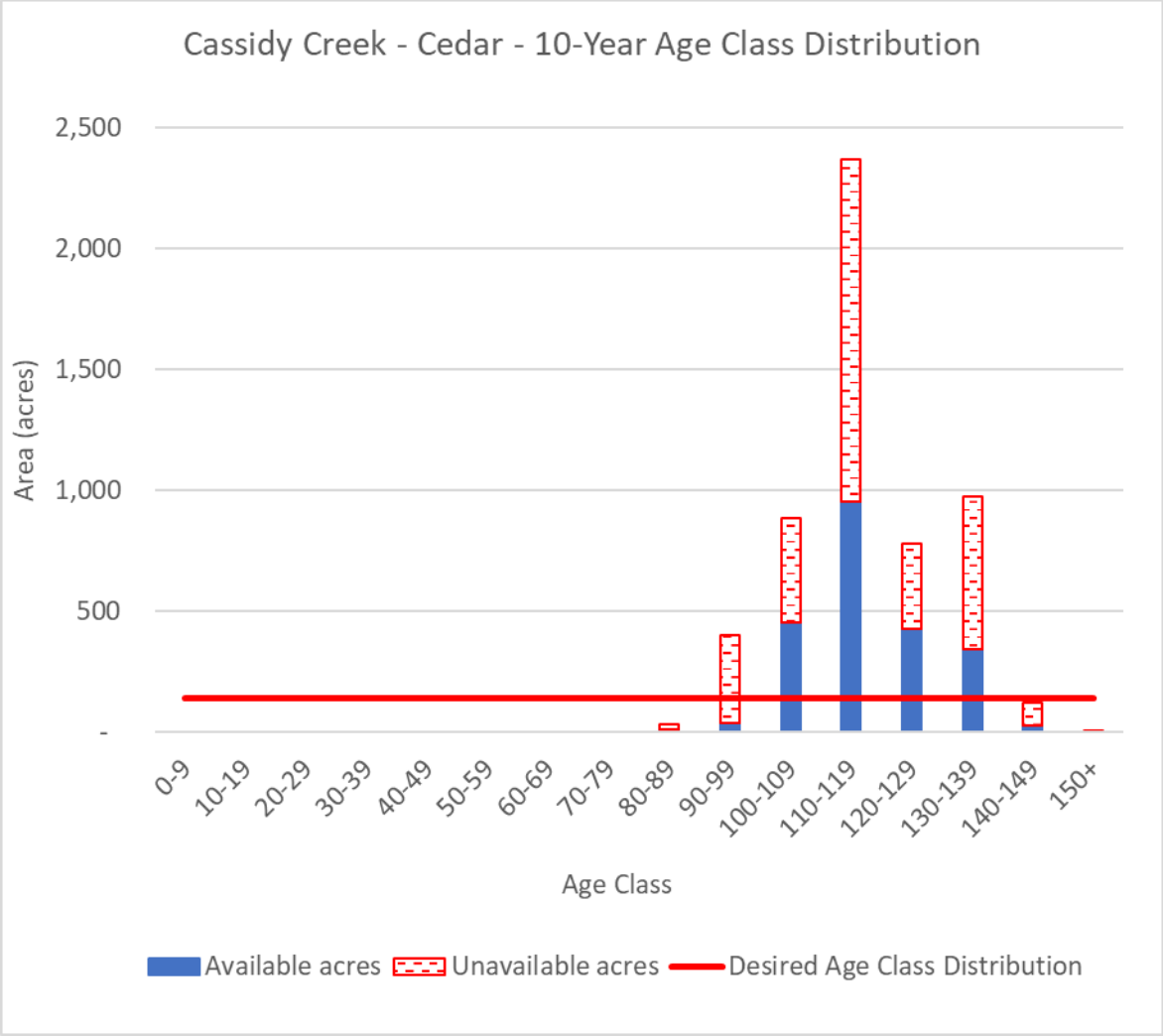


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of limited acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of cedar will take many decades in this management area. A portion of this cover type meets the habitat requirements for marten and white-tailed deer.

Table 11. Featured species with Cedar as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat - Cedar	Cedar Habitat Acres - Available	Cedar Habitat Acres - Unavailable
Snowshoe hare	Age category: 0-19 Size category: Sapling	0	0
Marten	Age category: 40+ Size category: Pole, Sawlog Basal area: 81+	1,960	2,900
White-tailed deer	All ages and size classes	5,574	--

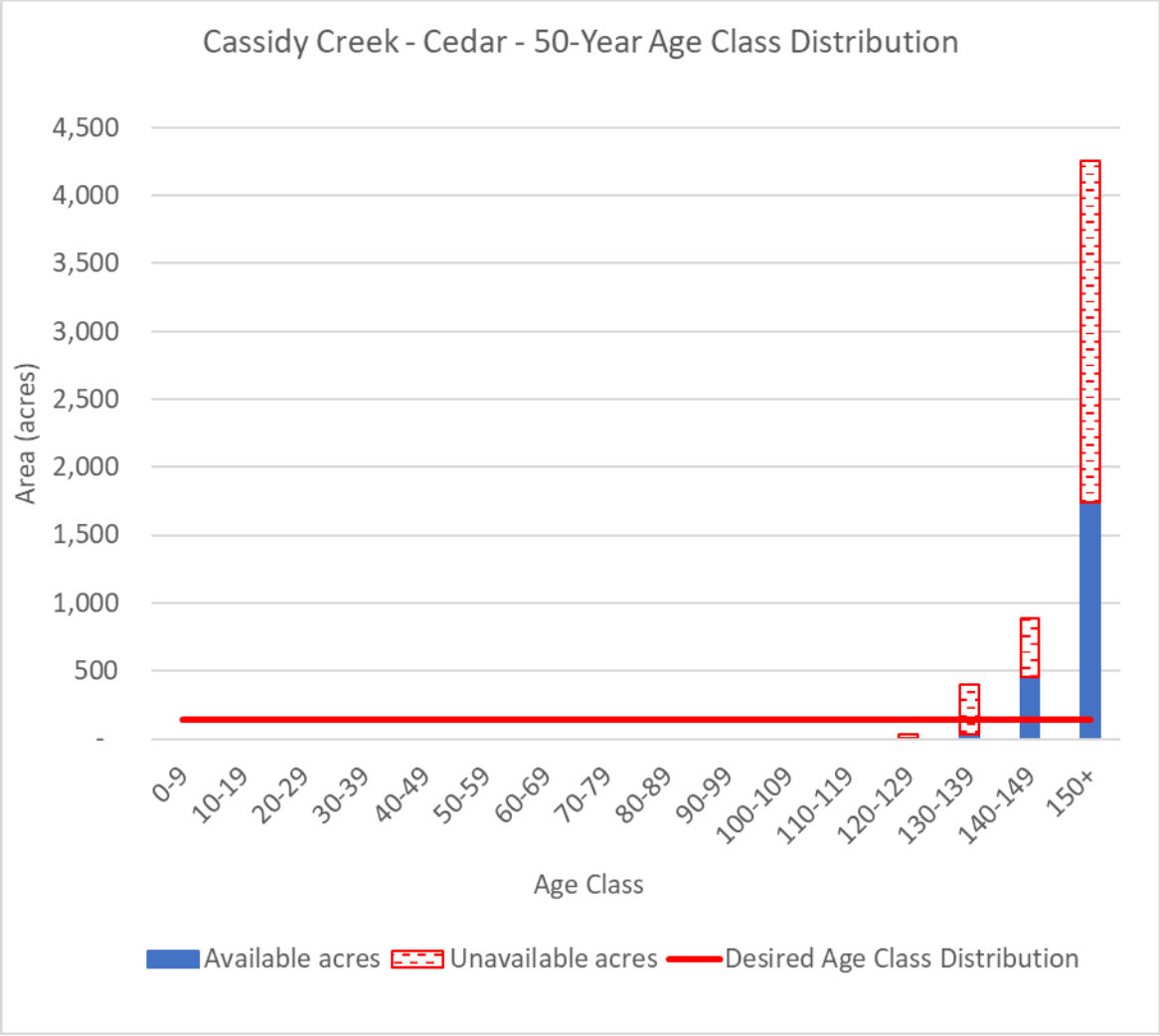


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of cedar acres aging with no acres regenerating (Figure 13).



Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of cedar in productive growing conditions while providing a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are no acres of projected harvests in the cedar cover type. It is expected some cedar will be cut in ongoing research and field trials as staff determines how to best regenerate this species as a cover type.

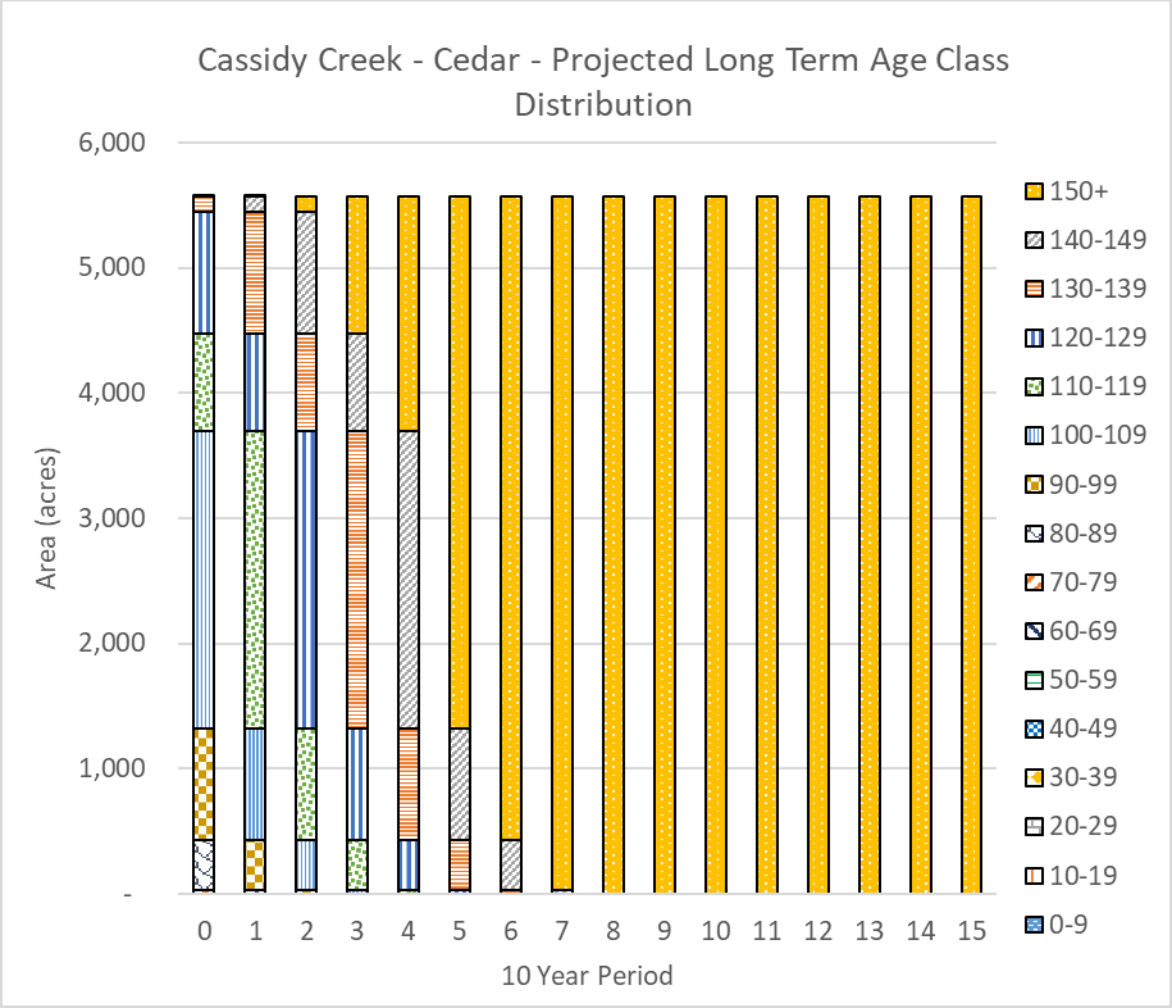


Figure 15. Projected age class distribution over 15, 10-year planning periods.

Upland mixed forest

Current condition

The current age class distribution is unbalanced with a deficit of acres in ages 10-79 years old and a surplus of acres in the 0-9 and in the 80–99-year-old age classes. Limited merchantable acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period.

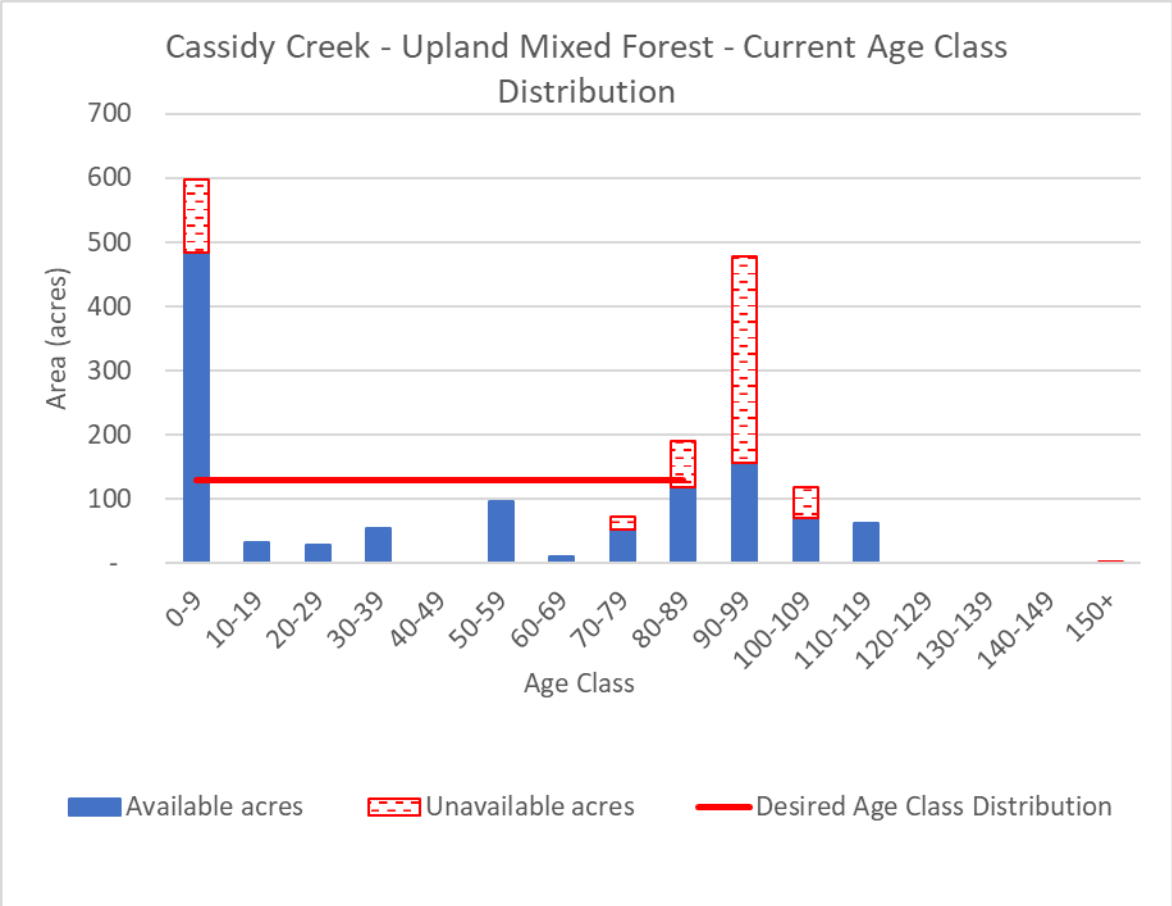


Figure 16. Current age class distribution, the desired age class distribution, and the projected harvests in the upland mixed forest cover type over the 10-year planning period.

Desired future condition

The desired age class distribution is to have a rotation age of 80 years.

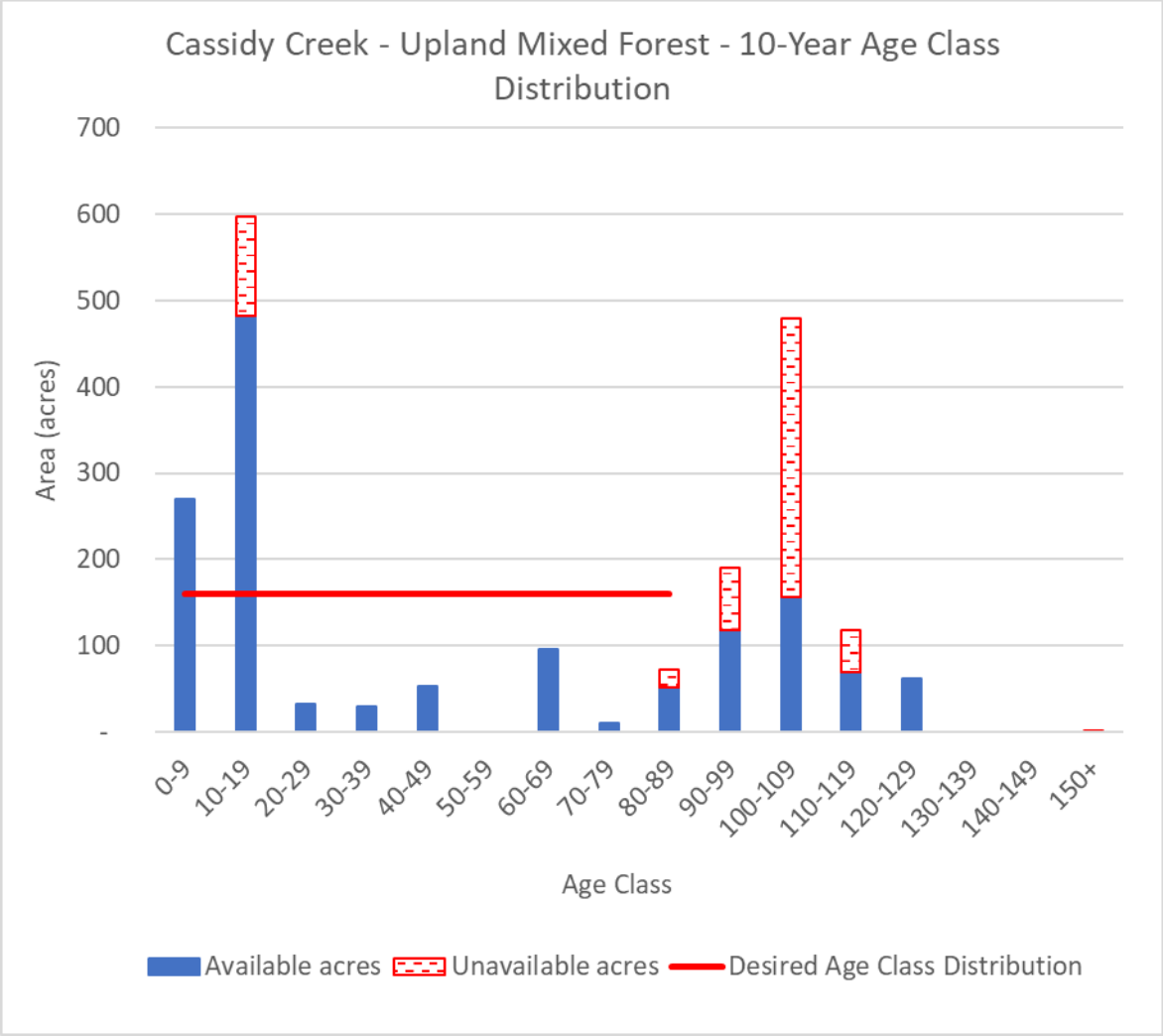


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 270 acres in the upcoming 0-9 age class. This will primarily come from other cover types. Progress toward the long-term desired age class distribution of upland mixed forest will take many decades in this management area. A portion of this cover type meets the habitat requirements for blackburnian warbler and marten.

Table 12. Featured species with upland mixed forest as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Upland Mixed Forest	Upland Mixed Forest Habitat Acres - Available	Upland Mixed Forest Habitat Acres - Unavailable
Blackburnian warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	247	436

Featured Species	Featured Species Habitat – Upland Mixed Forest	Upland Mixed Forest Habitat Acres - Available	Upland Mixed Forest Habitat Acres - Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	247	436

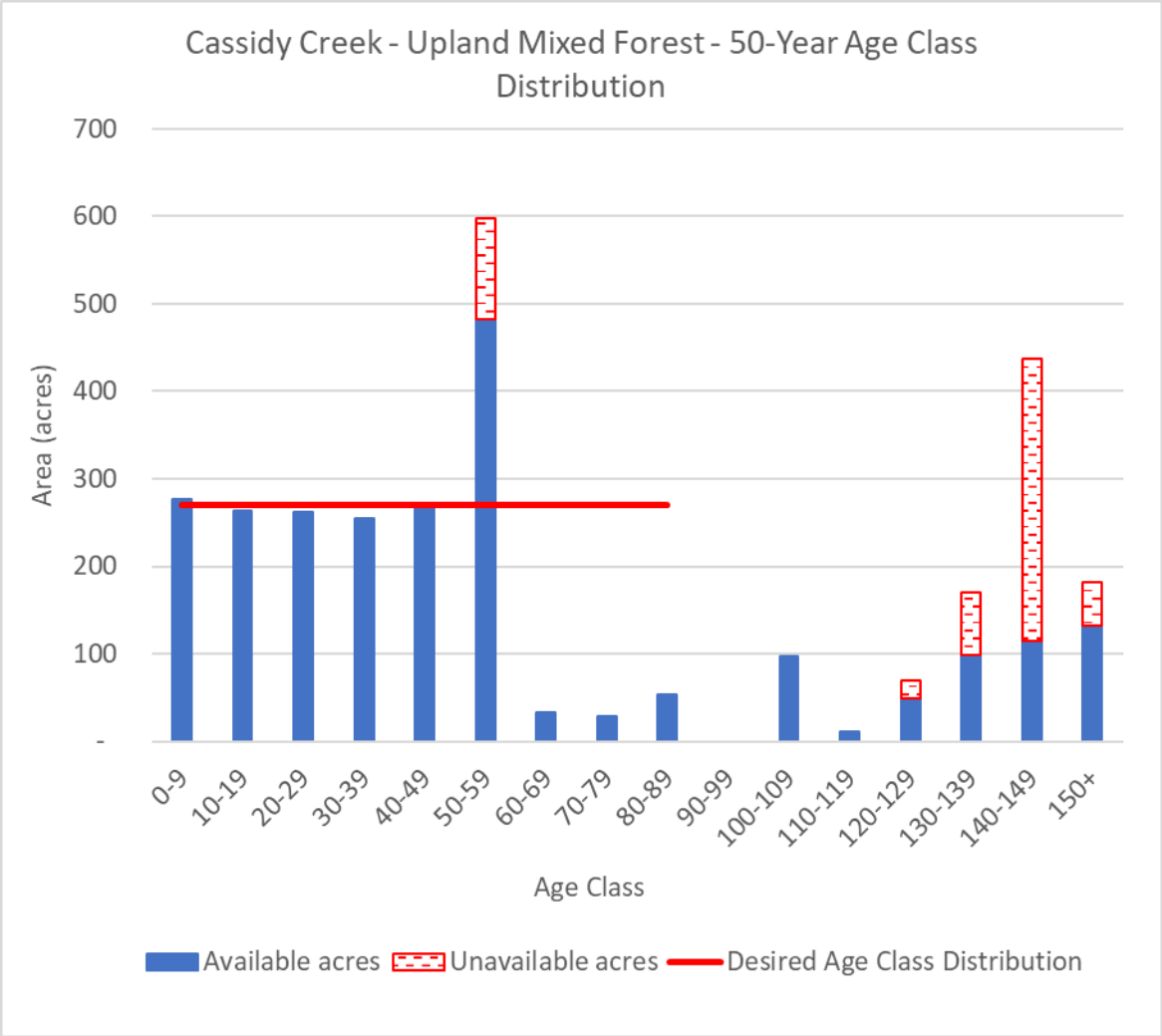


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of upland mixed forest acres working toward the desired future condition as the older age classes are treated (Figure 18).

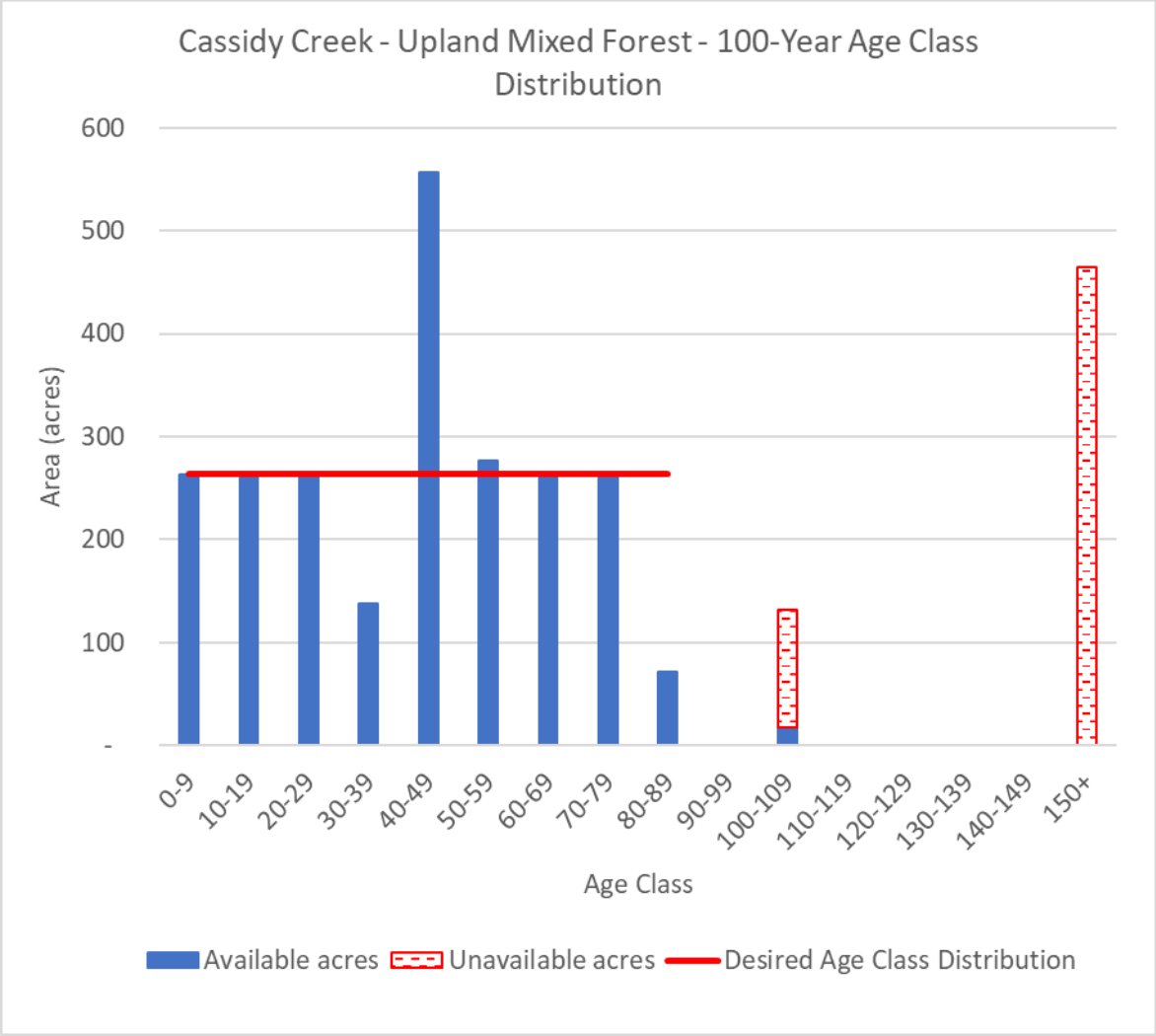


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of upland mixed forest in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are no acres of projected harvest in the upland mixed forest cover type. It is expected that about 270 acres of upland mixed forest will be converted from other cover types. These total to an expected 270 acres of regeneration in the upland mixed forest cover type over the next 10 years.

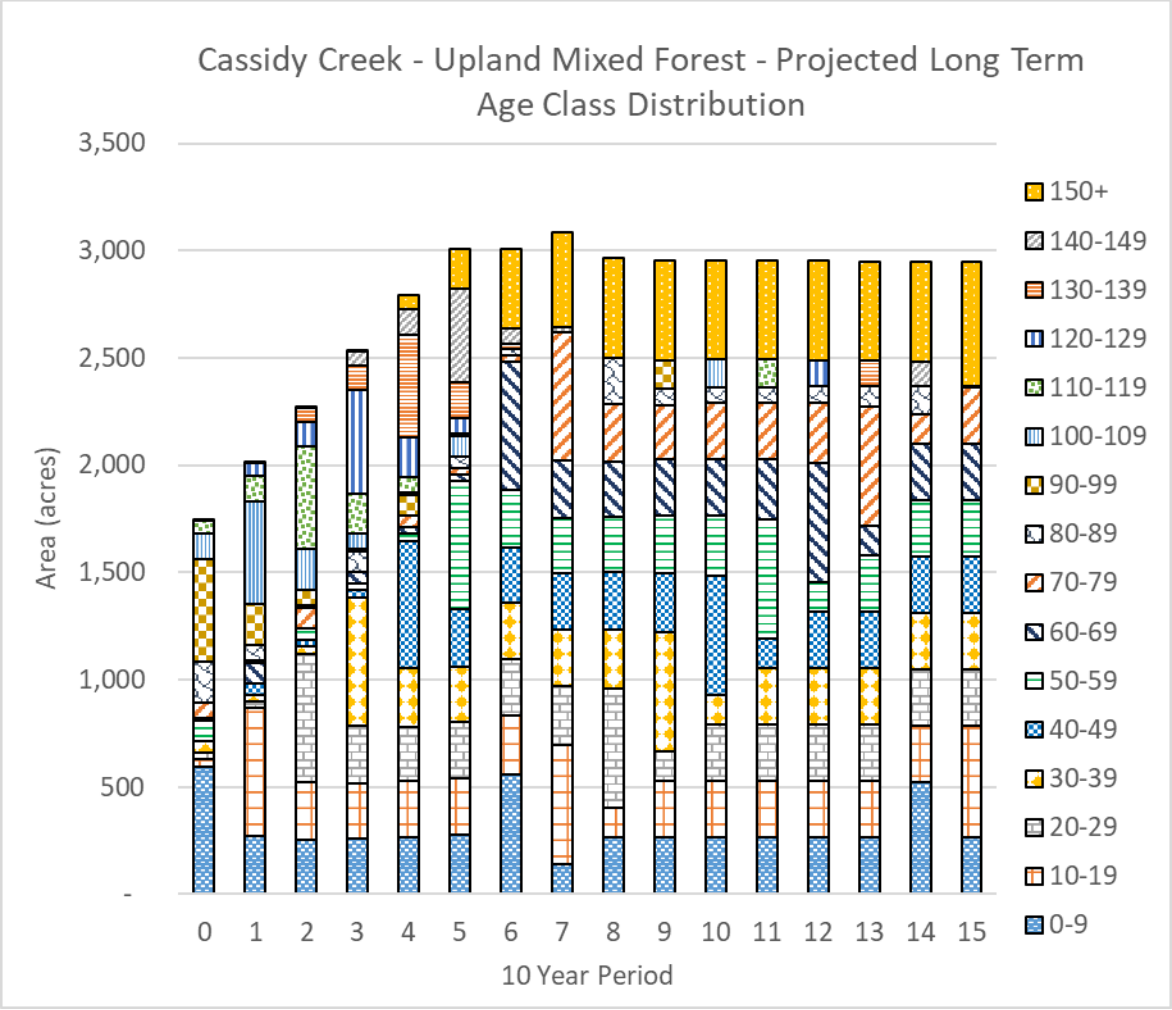


Figure 20. Projected age class distribution over 15,10-year planning periods.

Conservation Area Network

High Conservation Value Areas

There are up to eight different high conservation value area (HCVA) types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information).

Table 13. High conservation value areas within the Cassidy Creek management area.

High Conservation Value Area Type and Name	Acres
Forest Habitat Core Interior	**899**
	899
Northern Long-Eared Bat Hibernacula 2.5 mile Buffer	**4,366**
Iron Mountain Iron Mine (Tourist Mine)	705
Jones' Adit	630
Norway Mine	560
Randville Quarry Mine	2,313
Trader's Mine	158
State Wildlife Management Areas	**8,135**
Blomgrens' Marsh SWMA	582
Groveland Mine Flooding SWMA	6,867
Hancock Creek Flooding SWMA	686
Grand Total	**13,399**

Ecological reference areas

Ecological reference areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 12. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 13. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Dry-mesic northern forest	B			5
Existing ERA	Dry-mesic northern forest	B	G4	S3	1
Existing ERA	Granite bedrock glade	A	G3G5	S2	1
Existing ERA	Granite bedrock glade	AB	G3G5	S2	4
Existing ERA	Granite cliff	AB	G4G5	S2	2
Existing ERA	Submergent marsh	AB	GU	S4	2
Proposed ERA	Granite bedrock glade	B	G3G5	S2	1
Proposed ERA	Granite cliff	A	G4G5	S2	1
Proposed ERA	Granite cliff	AB	G4G5	S2	3
Proposed ERA	Northern hardwood swamp	B	G4	S3	1
Proposed ERA	Poor fen	AB	G3	S3	2
Grand Total					**23**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 16) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 22) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the Cassidy Creek management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**49**
Carney Lake Campground	23
East Pond Landing	1
North Pond Landing	19
South Pond landing	2
Unofficial landing	1
West Pond Landing	3
Habitat Area or Habitat Corridor	**14**
Cedar/Hemlock	2
Hemlock	12
Grand Total	**62**

Table 17. Static special conservation areas within the Cassidy Creek management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**49**
Carney Lake Campground	23
East Pond Landing	1
North Pond Landing	19
South Pond landing	2
Unofficial landing	1
West Pond Landing	3
Habitat Area or Habitat Corridor	**14**
Cedar/Hemlock	2
Hemlock	12
Grand Total	**62**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 19, 20 and 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 14. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal species occurrence within the Cassidy Creek management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alasmidonta viridis	Slippershell	T	--	1
Animal	Alces alces*	Moose	SC	--	--
Animal	Bombus borealis	Northern amber bumble bee	SC	--	3
Animal	Bombus terricola	Yellow-banded bumble bee	SC	--	1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Gavia immer	Common loon	T	--	4
Animal	Glaucomys sabrinus	Northern flying squirrel	SC	--	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Glyptemys insculpta	Wood turtle	T	--	2
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	5
Animal	Lasmigona compressa	Creek heelsplitter	SC	--	3
Animal	Lasmigona costata	Flutedshell	SC	--	3
Animal	Ligumia recta	Black sandshell	T	--	1
Animal	Myotis lucifugus	Little brown bat	T	--	1
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC	--	2
Animal	Pandion haliaetus	Osprey	SC	--	3
Total	--	--	--	--	**31**

**Occurrence information provided by field staff.*

Table 20. Rare plant species occurrence within the Cassidy Creek management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Botrychium mormo	Goblin moonwort	E	--	1
Plant	Dryopteris fragrans	Fragrant cliff woodfern	SC	--	1
Plant	Pellaea atropurpurea	Purple cliff brake	T	--	1
Total	--	--	--	--	**3**

Table 21. Other rare occurrence within the Cassidy Creek management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	3
Total	--	--	--	--	**3**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 23).

Table 15. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non-ERA natural communities in the management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Northern Wet Meadow	AB	S4	G4G5	3
Northern Wet Meadow	B	S4	G4G5	1
Northern Hardwood Swamp	B	S3		2
Grand Total				**6**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Cassidy Creek management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer as impacts to ash increase.

Table 25. Maladies of concern in the Cassidy Creek management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak Wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

A total of 97 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as warm types comprise approximately 72 percent of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	12
Cold small river	0
Cold transitional stream	15
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	57
Warm transitional small river	12
Warm transitional large river	1
Warm stream	0
Warm small river	0
Warm large river	0

Lacustrine habitat

A total of 20 lakes and ponds of at least one surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	14
100-499	6
500+	0

Wetlands

The management area contains a total of 15,855 acres of wetlands (Table 28). Forested wetlands comprise approximately 89 percent of wetland types found in the management area.

Table 28. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,619
Forested	14,134
Riverine	102

Vernal pools and seeps

A total of 1,024 acres of vernal pools and seeps have been inventoried and 800 acres of seeps have been identified.

Riparian vegetation cover

Aspen, lowland shrub and cedar are the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 29).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Aspen	3,551
Lowland shrub	2,222
Cedar	1,089
Lowland conifers	690
Lowland deciduous	672
Mixed upland deciduous	539
Northern hardwood	460
Natural mixed pines	443
Upland mixed forest	401
Marsh	368

Watershed vegetation cover

The management area includes portions of important watersheds of the Pine Creek and Sturgeon River (Tables 30 and 31). Aspen and northern hardwoods are major cover types of the state forest in each watershed.

Table 30. Largest vegetative cover types (i.e., top 5) and area of the Pine Creek watershed located within the management area.

Cover Type	Acres
Aspen	19,579
Northern hardwood	5,111
Cedar	3,895
Lowland shrub	2,251
Lowland conifer	1,628

Table 31. Largest vegetative cover types (i.e., top 5) and area of the Sturgeon River watershed located within the management area.

Cover Type	Acres
Aspen	8,680
Northern hardwood	2,313
Cedar	1,434
Mixed upland deciduous	1,263
Lowland shrub	1,038

Recreation

The Cassidy Creek area has generally good public recreation and management access. Snowmobile and off-road vehicle routes cross the area, including the Felch and Norway ORV routes. The Merriman East Pathway is a bike and hike trail in the Groveland Mines area. There is one state forest campground (rustic) within the management area, Carney Lake.

Table 32. Designated Recreation Trails by type

Recreation Category	Recreation Type
Motorized Recreation Trails	**104.9**
ORV (all types)	57.9
Snowmobiles	47.0
Non-motorized Recreation Trails	**17**
Hiking	8.5
Equestrian	0
Biking	8.5
Grand Total	**121**.9

Note: Trail use types may overlap.

Table 33. State forest campgrounds (SFCG).

Name	Number of Sites	ORV Access
Carney Lake SFCG	16	--

Within the Cassidy Creek area there are two areas managed for hunting. The flooding at Bloomgren's Marsh wildlife management area is used extensively by hunters, trappers, and for bird watching and wildlife viewing. Hancock Creek flooding provides several access points for hunting and wildlife viewing.

Table 34. Areas managed for hunting.

Type	Number of Acres
State Wildlife Management Areas	--
Bloomgren's Marsh Flooding SWMA	580.8
Hancock Creek Flooding SWMA	685.4
Total	**1,266.2**

There are six boating access sites on the ponds of the former Groveland Iron Mine, acquired by the state of Michigan in the mid-1990s. These ponds are popular for fishing. Other boating access sites provide access to small inland lakes and the West Branch of the Sturgeon River.

Table 35. Boating access sites (BAS).

Name	Waterbody
Benton Lake	Benton Lake
Carney Lake SFCG	Carney Lake
Groveland Mine East Pond	East Pond (Groveland Mine)
Groveland Mine Island Pond	Island Pond (Groveland Mine)
Groveland Mine West Pond	West Pond (Groveland Mine)
Pond #1	Pond #1 (Groveland Mine)
Rock Lake	Rock Lake
South Pond	South Lake (Groveland Mine)
West Branch Sturgeon River	West Branch Sturgeon River

Green Bay

State Forest Area: 67,045 acres	**Location:** Shores of Green Bay	**Population Centers:** Escanaba, Gladstone, Menominee
Sub-Section: Green Bay Sandy Plain	**Landforms:** Flat lake bed, deltaic deposits of sand, parabolic dune fields, and shallow embayments containing transverse dunes	**Landcover:** Forested: 57,596 acres Non-forested: 9,449 acres

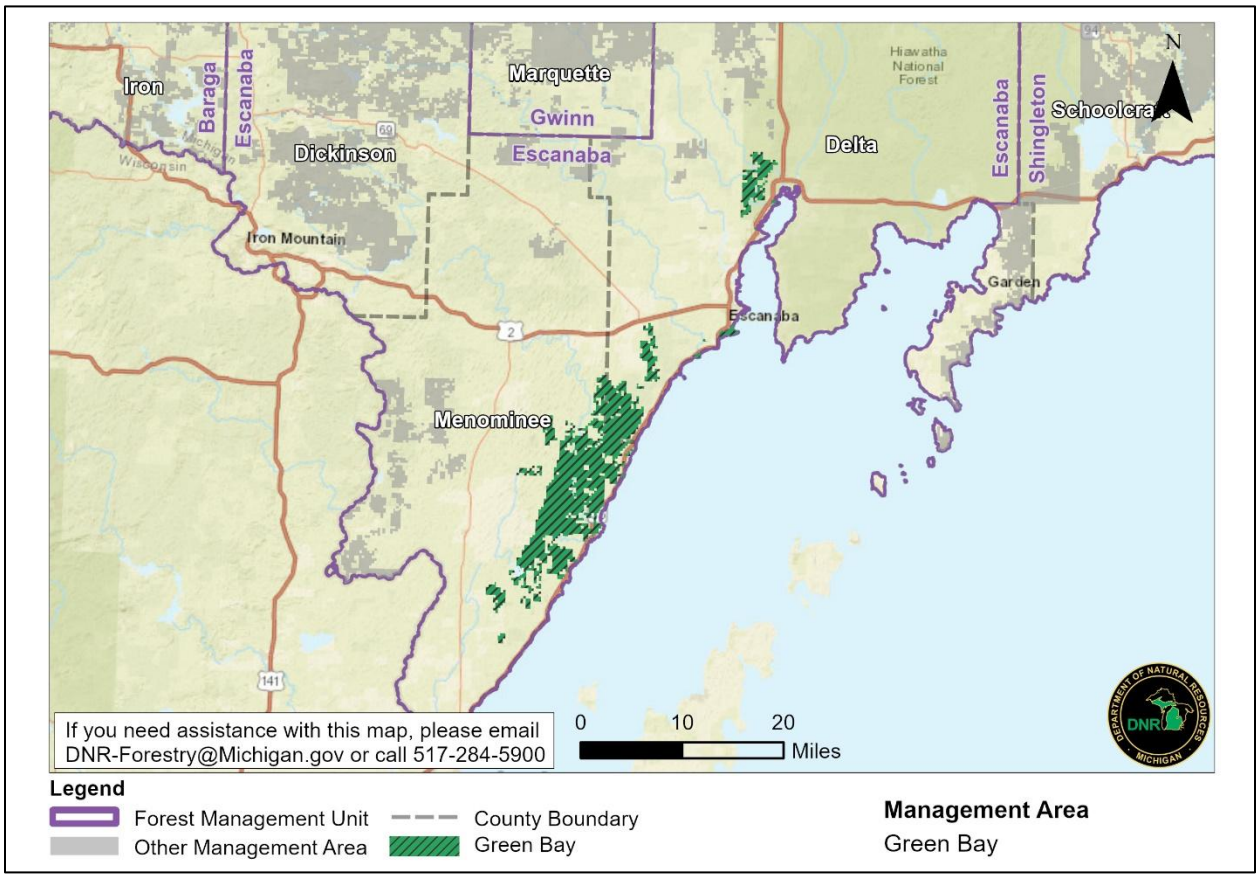


Figure 1. Map of the Green Bay management area.

Forested landscape

Current and projected future condition

The Green Bay management area is dominated by shade-tolerant cover types. Intolerant deciduous cover types are relatively evenly distributed across age categories, while the unavailable upland and lowland acres are more prevalent in the older age category.

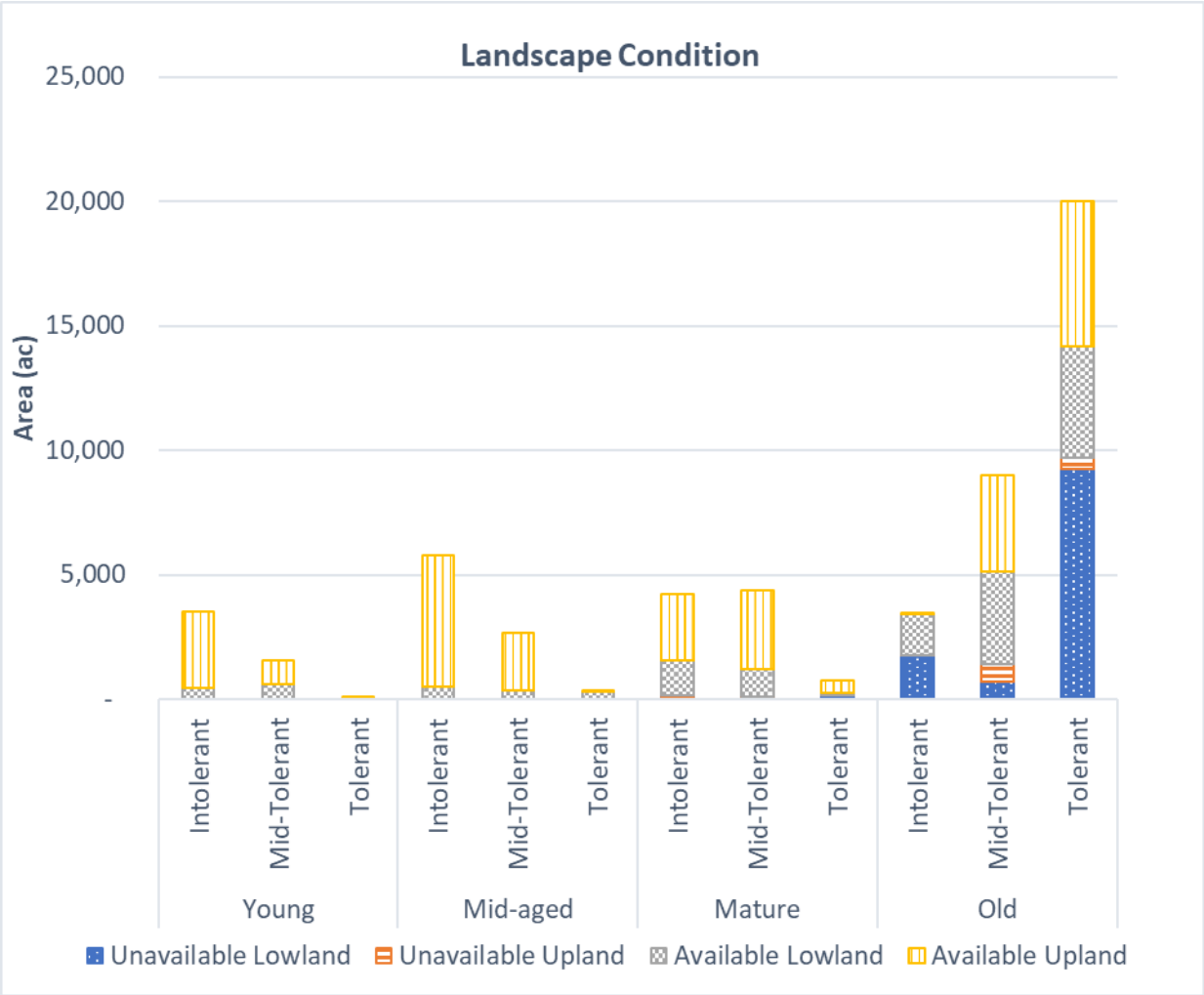


Figure 2. Forest diversity matrix showing current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack pine	3,041
Mature forest	Acres of 80+ year stands across cover types	32,332
Mature forest	Acres of 120+ year stands across cover types	19,102
Mesic conifer cover types	Acres of mesic conifer cover types	5,695
Mesic conifers in other cover types	Average canopy occupancy	35%
Mast – oak cover types	Acres of oak cover types	2
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	7,290
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	27,893
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	553
Landscape forest matrix	Percent ceciduous forest	44%
Landscape forest matrix	Percent coniferous forest	47%

Another important landscape level habitat in this management area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, landbirds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls, and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed, and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provides unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas (IBAs). The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Green Bay management area has the following Special Analysis Units (SAUs). These SAUs have specific cover type goals typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to ensure cover type goals across the area are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management (GEM)-Cedar River

The Green Bay management area is dominated by forested cover types with 86 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 29 percent of the

management area and comprised mostly of aspen. The lowland coniferous portion is 29 percent of the management area and comprised mostly of cedar. Lowland shrub is the most common non-forested cover type in this management area, representing 8 percent of the landscape.

Table 2. Summary table describing the landscape conditions and distribution of cover types in the Green Bay management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	11,134	19,401	29,548	57,596
			Northern hardwood	4,877			
			Black-red hybrid oak	0			
			Northern red oak	2			
			Oak mix	0			
			Mixed upland deciduous	3,389			
		Mixed	Upland mixed forest	2,675	2,675		
		Coniferous	Planted red pine	1,194	7,472		
			Planted jack pine	42			
			Planted white pine	7			
			Planted mixed pine	0			
			Natural eed pine	534			
			Natural jack pine	0			
			Natural white pine	585			
			Natural mixed pines	754			
			Upland spruce/fir	435			
			Upland conifers	2,234			
			Hemlock	1,687			
	Lowland	Deciduous	Lowland aspen/balsam poplar	1,147	5,832	28,048	
			Lowland deciduous	4,686			
		Mixed	Lowland mixed forest	2,675	2,675		
		Coniferous	Cedar	11,601	19,541		
			Lowland conifers	2,806			
			Lowland spruce/fir	4,153			

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
			Tamarack	981			
Nonforested	Upland	N/A	Herbaceous openland	445	N/A	754	9,449
			Upland shrub	107			
			Low density trees	57			
			Bare/sparsely vegetated	75			
			Cropland	1			
			Urban	69			
	Lowland	N/A	Lowland shrub	5,673	N/A	8,695	
			Marsh	1,100			
			Bog	330			
			Treed bog	1,000			
			Water	592			
						Grand Total:	67,045

Table 3. Summary table describing the landscape conditions and cover type composition of the Green Bay management area.

Green Bay Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	11,066	19.2%	68	0.1%	11,134	19.3%
Cedar	3,238	5.6%	8,363	14.5%	11,601	20.1%
Hemlock	1,429	2.5%	258	0.4%	1,687	2.9%
Lowland aspen/balsam poplar	1,147	2.0%	0	0.0%	1,147	2.0%
Lowland conifers	1,923	3.3%	883	1.5%	2,806	4.9%
Lowland deciduous	3,961	6.9%	725	1.3%	4,686	8.1%
Lowland mixed forest	2,338	4.1%	337	0.6%	2,675	4.6%

Green Bay Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Lowland spruce/fir	2,499	4.3%	1,655	2.9%	4,154	7.2%
Mixed upland deciduous	3,067	5.3%	322	0.6%	3,389	5.9%
Natural mixed pines	754	1.3%	0	0.0%	754	1.3%
Natural red pine	489	0.8%	45	0.1%	534	0.9%
Natural white pine	585	1.0%	0	0.0%	585	1.0%
Northern hardwood	4,678	8.1%	200	0.3%	4,878	8.5%
Northern red oak	2	0.0%	0	0.0%	2	0.0%
Planted jack pine	42	0.1%	0	0.0%	42	0.1%
Planted red pine	1,194	2.1%	0	0.0%	1,194	2.1%
Planted white pine	0	0.0%	7	0.0%	7	0.0%
Tamarack	762	1.3%	219	0.4%	981	1.7%
Upland conifers	2,059	3.6%	175	0.3%	2,234	3.9%
Upland mixed forest	2,455	4.3%	220	0.4%	2,675	4.6%
Upland spruce/fir	435	0.8%	0	0.0%	435	0.8%
Grand Total	**44,121**	**76.6%**	**13,477**	**23.4%**	**57,599**	**100%**

Table 4. Site Condition (reason area is unavailable for commercial harvest) acres for the Green Bay Management Area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Wildlife concerns	9,402	61.1%
BMPs	1,554	10.1%
Conservation values	1,457	9.5%
Unproductive	928	6.0%
Species of special concern or T&E	793	5.2%
Other dept./div. processes	289	1.9%
Long-term retention	275	1.8%
Blocked by obstacle	155	1.0%

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Neighbor or interest group	142	0.9%
Too wet	122	0.8%
Recreational/scenic	80	0.5%
Denied access	79	0.5%
Deer wintering area	39	0.3%
Cannot regenerate	28	0.2%
Other influence zones	26	0.2%
Too steep	15	0.1%
Total unavailable	**15,384**	**100.0%**

Management actions

Each cover type in the Green Bay management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5).

Silvicultural Regimes

Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Aspen	2,024	-	-	-	-	-	-	2,024
Northern hardwood	74	889	-	-	21	-	-	983
Lowland spruce/fir	588	-	-	-	-	-	-	588
Lowland deciduous	404	59	-	-	14	-	-	477
Planted red ine	-	-	442	-	-	-	-	442
Mixed upland deciduous	390	-	-	-	19	-	-	410
Upland conifers	337	-	1	-	60	-	-	399
Upland mixed forest	188	-	-	-	-	-	-	188
Lowland aspen/balsam poplar	185	-	-	-	-	-	-	185
Lowland conifers	163	-	-	-	-	-	-	163
Tamarack	98	-	-	-	-	-	-	98
Upland spruce/fir	63	-	-	-	-	-	-	63

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Natural Mixed pines	-	-	25	-	15	-	-	40
Lowland Mixed forest	38	-	-	-	-	-	-	38
Totals	**4,552**	**948**	**469**	**-**	**129**	**-**	**-**	**6,097**

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

These harvests will help establish a desirable amount of regeneration for even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. The following sections will provide additional details for each of the significant cover types in the Green Bay management area.

Table 6. Ten-year estimated harvest volume by product and species.

10-Year Estimated Harvest Volume Projection Green Bay Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed aspen	18,619	17,502
	Mixed hardwood	18,037	16,955
	Mixed softwood	11,847	11,136
	Mixed spruce	8,119	7,632
	Red pine	3,379	3,176
	White pine	1,551	1,458
	Mixed oak	1,330	1,251
	Jack pine	387	364
	Pulpwood Total	**63,269**	**59,473**
Sawtimber (MBF)	White pine	3,446	3,239
	Mixed aspen	3,274	3,078
	Red pine	3,054	2,870
	Sugar maple	2,982	2,803
	Red maple	2,224	2,091
	Red oak	1,693	1,592
	Basswood	347	327
	White oak	327	308
	Mixed oak	69	65
	Sawtimber Total	**17,417**	**16,372**
	Total Sawtimber Harvest Volume in Cords	**36,228**	**34,054**
	Grand Total Harvest Volume in Cords	**99,497**	**93,527**

10-Year Estimated Harvest Volume Projection Green Bay Management Area Product	Species	Volume Planned*	Volume Prepared**
* Volume estimates based on 100% of the projected harvests for the 10 year planning period. ** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are very few cover type transitions projected in the Green Bay area. The managed area of each cover type is projected to remain relatively stable. The largest decrease expected is in the upland conifer cover type, where 180 acres are forecasted to convert to other cover types through forest management activities. The largest increase is in Lowland mixed forest where 246 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Cedar	11,601	11,601	0
Aspen	11,134	11,081	-52
Northern hardwood	4,877	4,889	12
Lowland deciduous	4,686	4,551	-135
Lowland spruce/fir	4,153	3,999	-155
Mixed upland deciduous	3,389	3,342	-47
Lowland conifers	2,806	2,867	61
Upland mixed forest	2,675	2,903	228
Lowland mixed forest	2,675	2,921	246

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Upland conifers	2,234	2,054	-180
Hemlock	1,687	1,687	0
Planted red pine	1,194	1,246	52
Lowland aspen/balsam poplar	1,147	1,159	12
Tamarack	981	950	-31
Natural mixed pines	754	754	0
Natural white pine	585	619	34
Natural red pine	534	534	0
Upland spruce/fir	435	388	-47
Planted jack pine	42	42	0
Planted white pine	7	7	0
Northern red pak	2	2	0
Lowland shrub	5,673	5,673	0
Marsh	1,100	1,100	0
Treed bog	1,000	1,000	0
Water	592	592	0
Herbaceous openland	445	445	0
Bog	330	330	0
Upland shrub	107	107	0
Bare/Sparsely vegetated	75	75	0
Urban	69	69	0
Low density trees	57	57	0
Cropland	1	1	0
Total:	**67,045**	**67,045**	**0**

Featured species current and projected habitat acres.

There are seven featured species in this management area that span various cover types, age classes, and stand level conditions.

It is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81 but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Two of these species were not included in the SFMP model and don't show projected habitat acres but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	6,434	6,739	4,409	4,837
Black bear	Mast/lowland conifer	7,290 / 2,806	--	--	--
Black-backed woodpecker	Natural Disturbance	--	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	6,694	7,313	5,631	8,404
Ruffed grouse	Aspen	3,938	4,146	3,787	3,857
Wood thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	5,491	6,333	7,702	8,695
Wood turtle	Non-forested openings	--	--	--	--

Cover type composition and associated wildlife species

Aspen

Current Condition

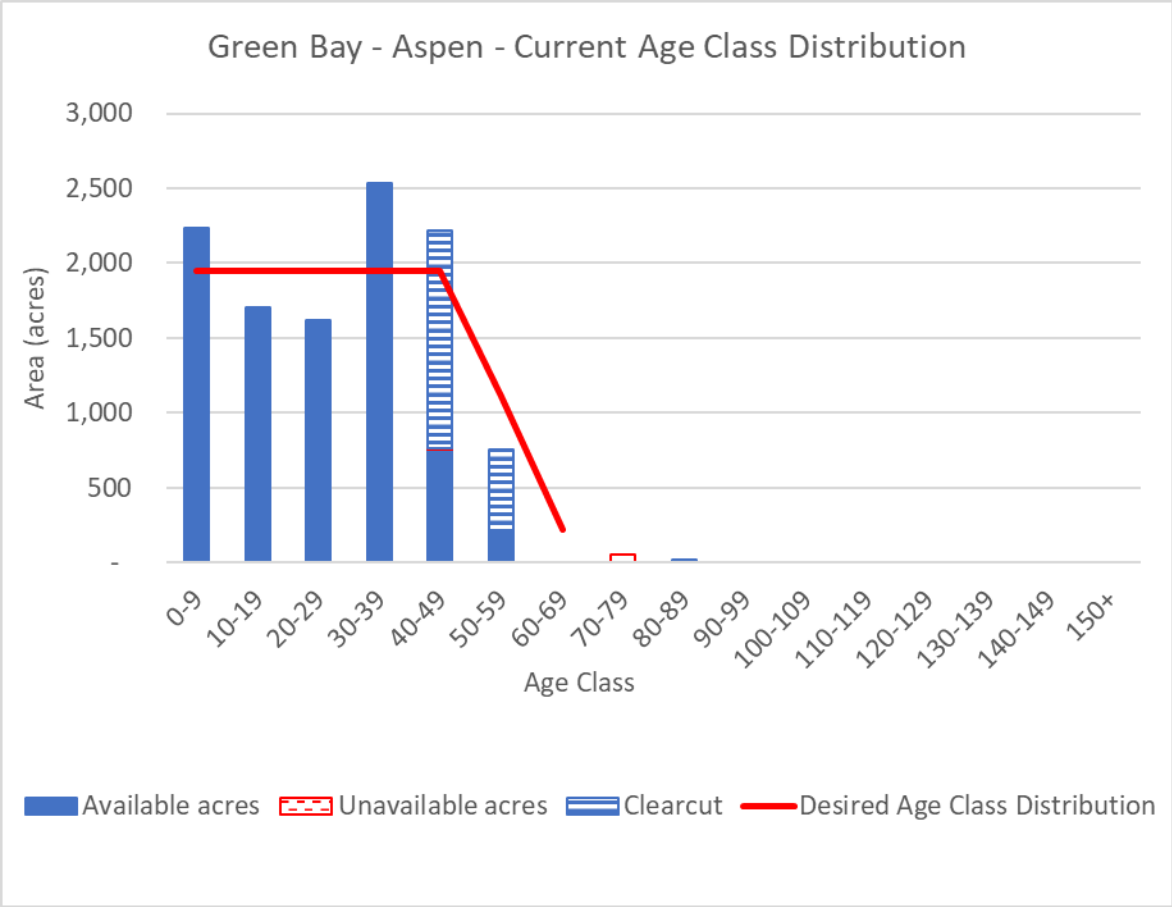


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is somewhat unbalanced with a deficit of acres in ages 10-29 years old and a surplus of acres in the 0-9 and the 30-49-year-old age classes.

The end of the planning period will result in the establishment of about 1,913 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age-class distribution of aspen will only take a few decades in this management area. A portion of this cover type meets the habitat requirements for American woodcock and ruffed grouse.

Table 6. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American woodcock	Age category: 0-19 Size class: Sapling	3,938	0
Ruffed grouse	Age category: 0-19 Size class: Sapling	3,938	0

Desired future condition

The desired age class distribution is to have a rotation age of 40 years with approximately 12 percent of the acres in an age class tail out to a maximum of 60-year age class.

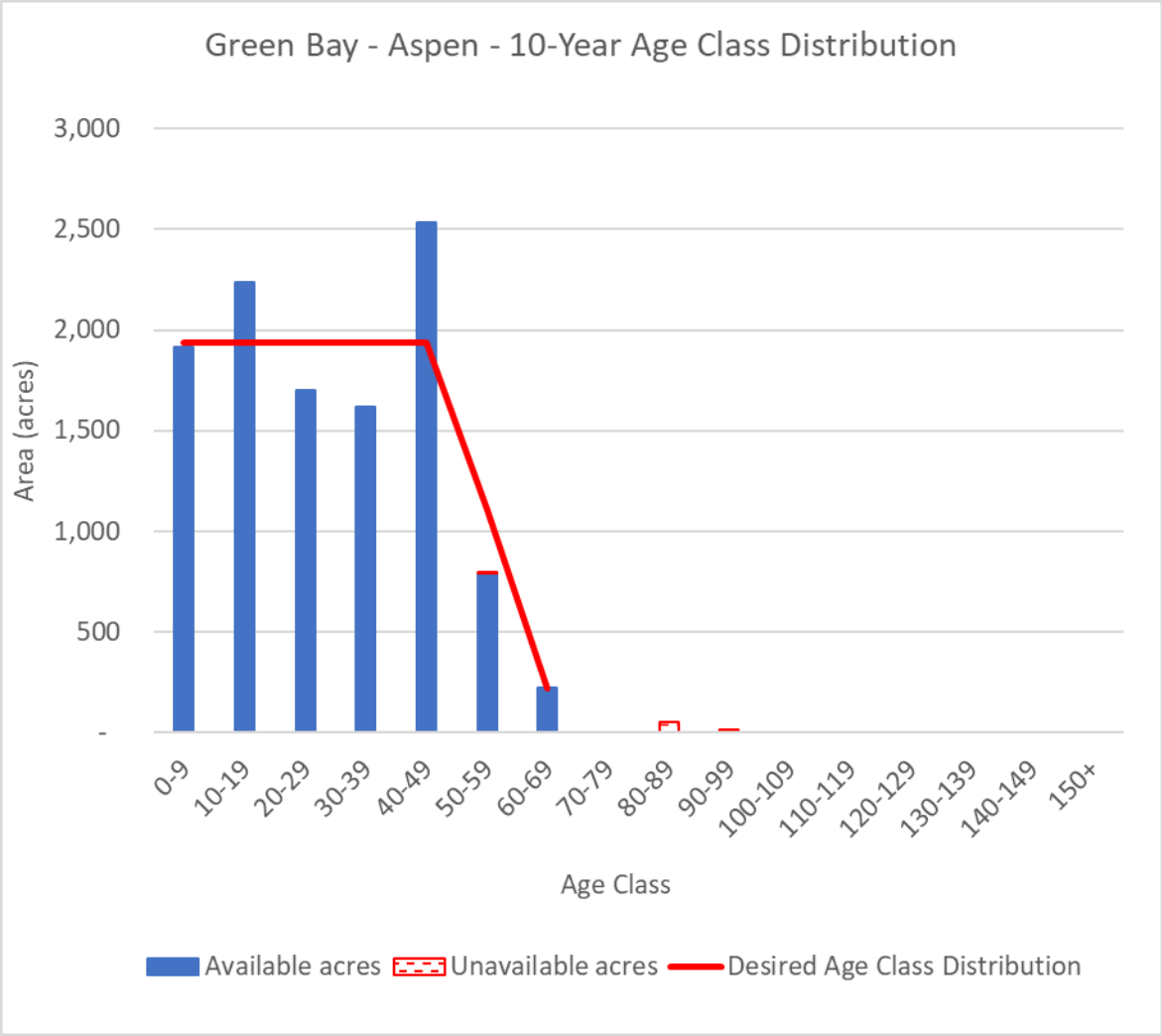


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

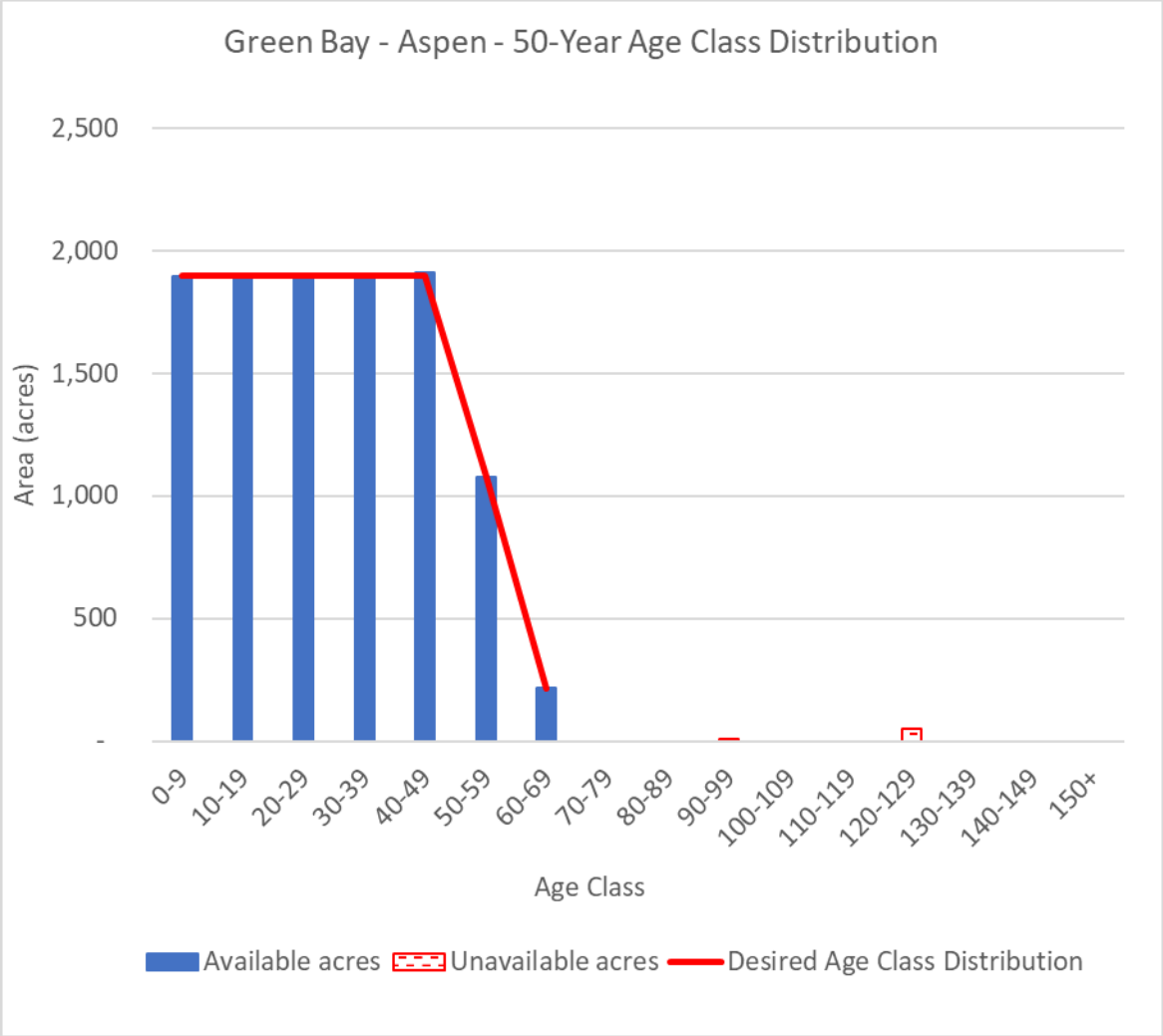


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 5).

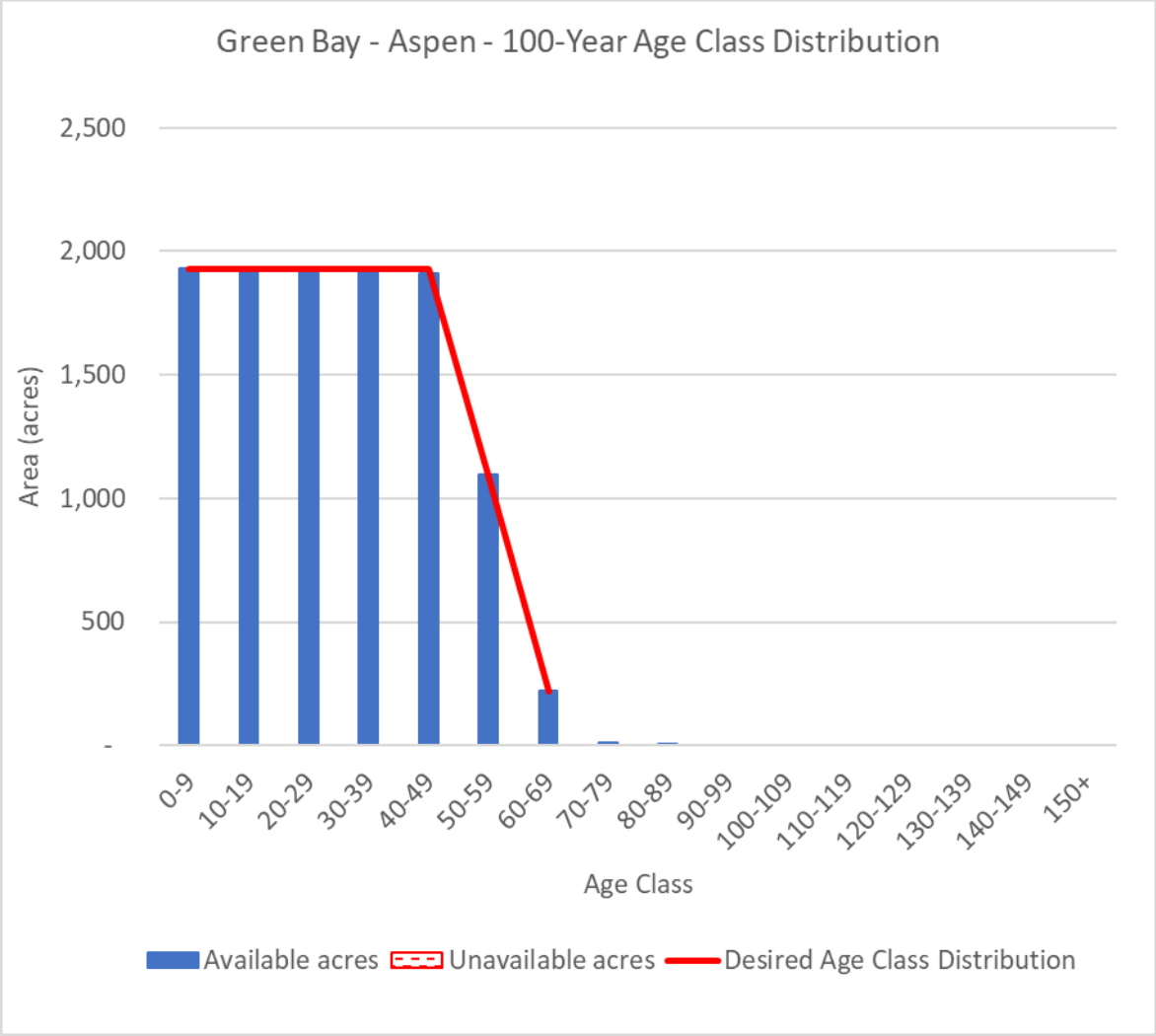


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age-class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forests.

Management actions

There are 2,024 acres of projected clearcut harvest in the aspen cover type. It is expected that about 52 acres of aspen will be converted to other cover types. These total to an expected 1,972 acres of regeneration in the aspen cover type over the next 10 years.

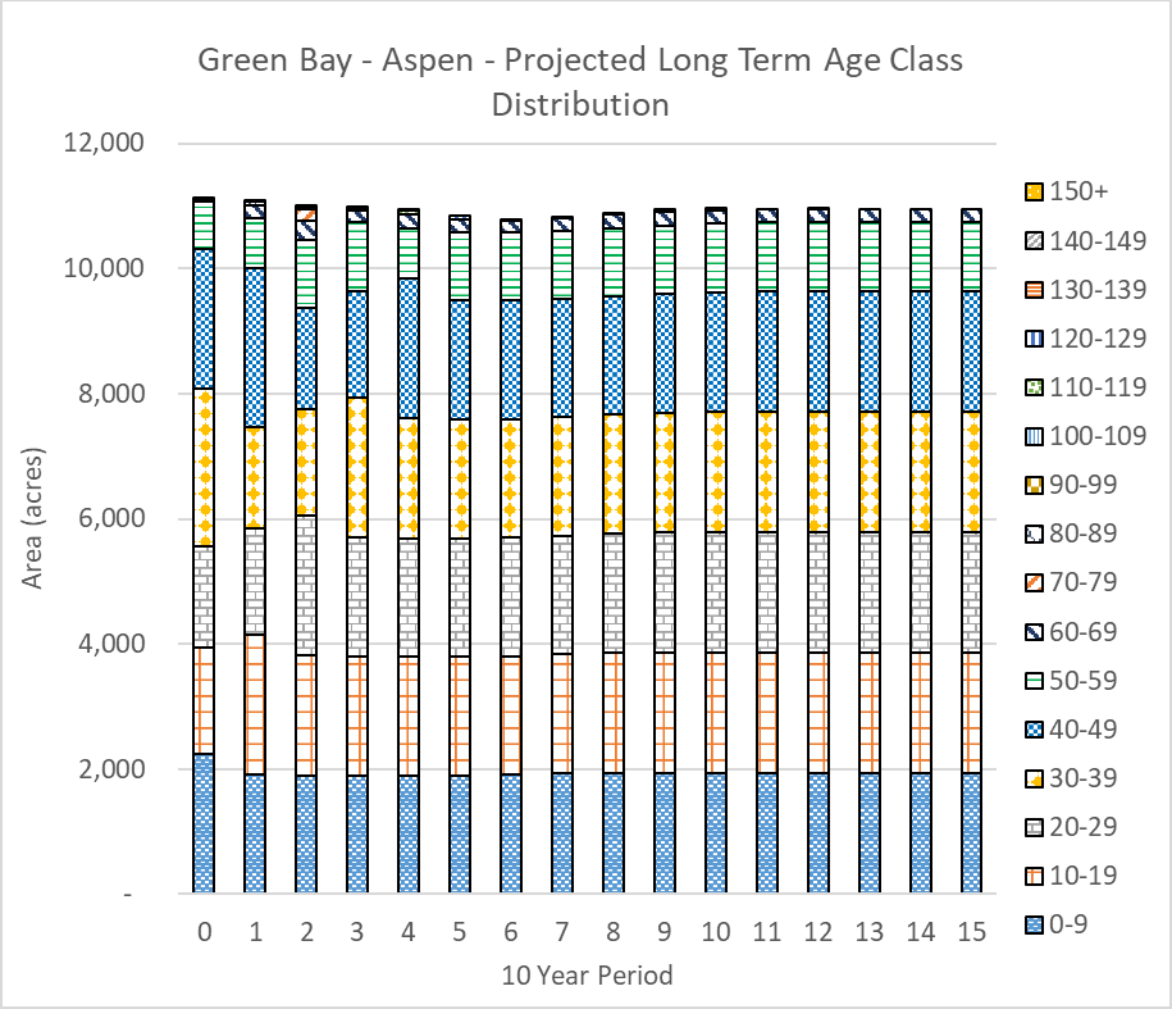


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 99 years old in the Green Bay management area (Figure 8). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase overtime. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10). A portion of the stand have been managed under an even-aged system due to poor quality stands or a predominance of red maple in those stands.

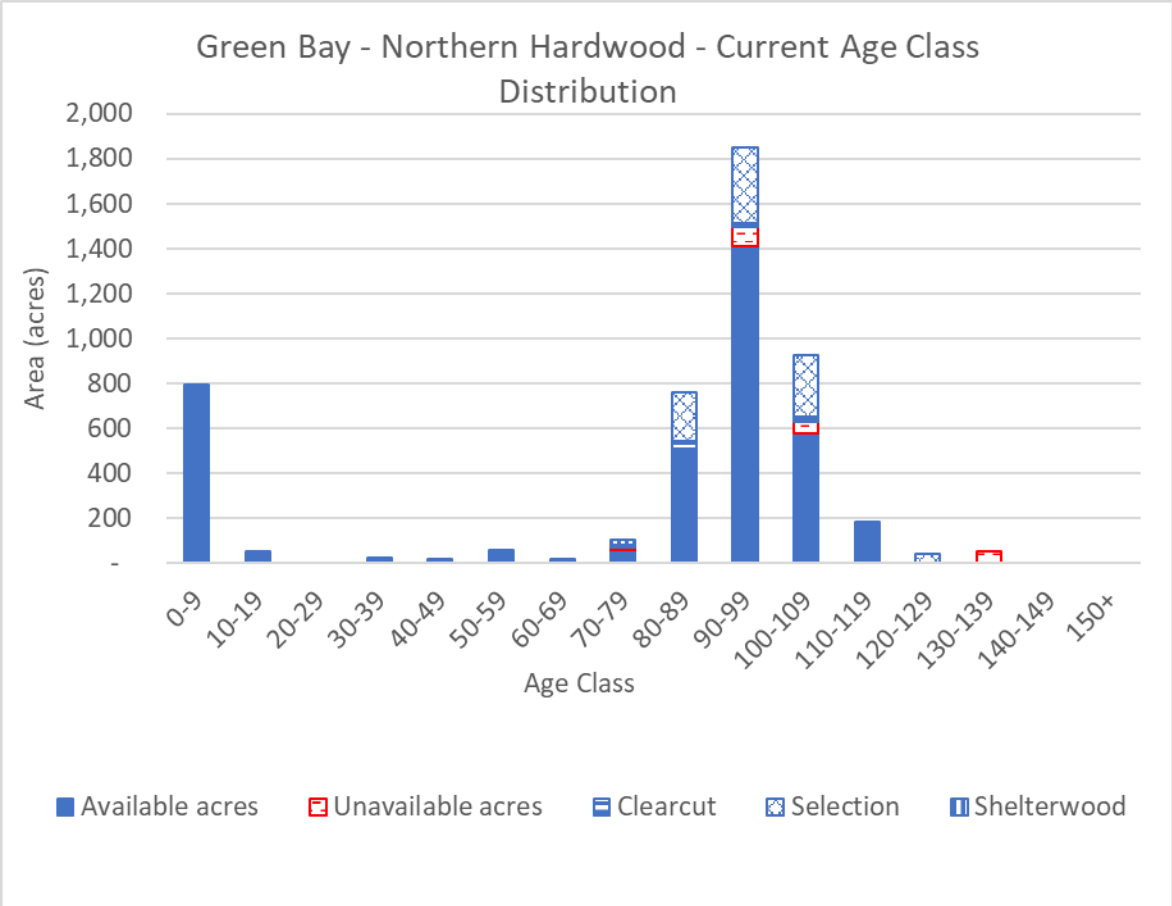


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the Green Bay management area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Green Bay management area (Figure 9). Current conditions are a result of a selection harvest regime that has been in place in this management area for decades. A portion of this cover type meets the habitat requirements for blackburnian warbler and marten including patches of contiguous habitat that are greater than 250 acres in size.

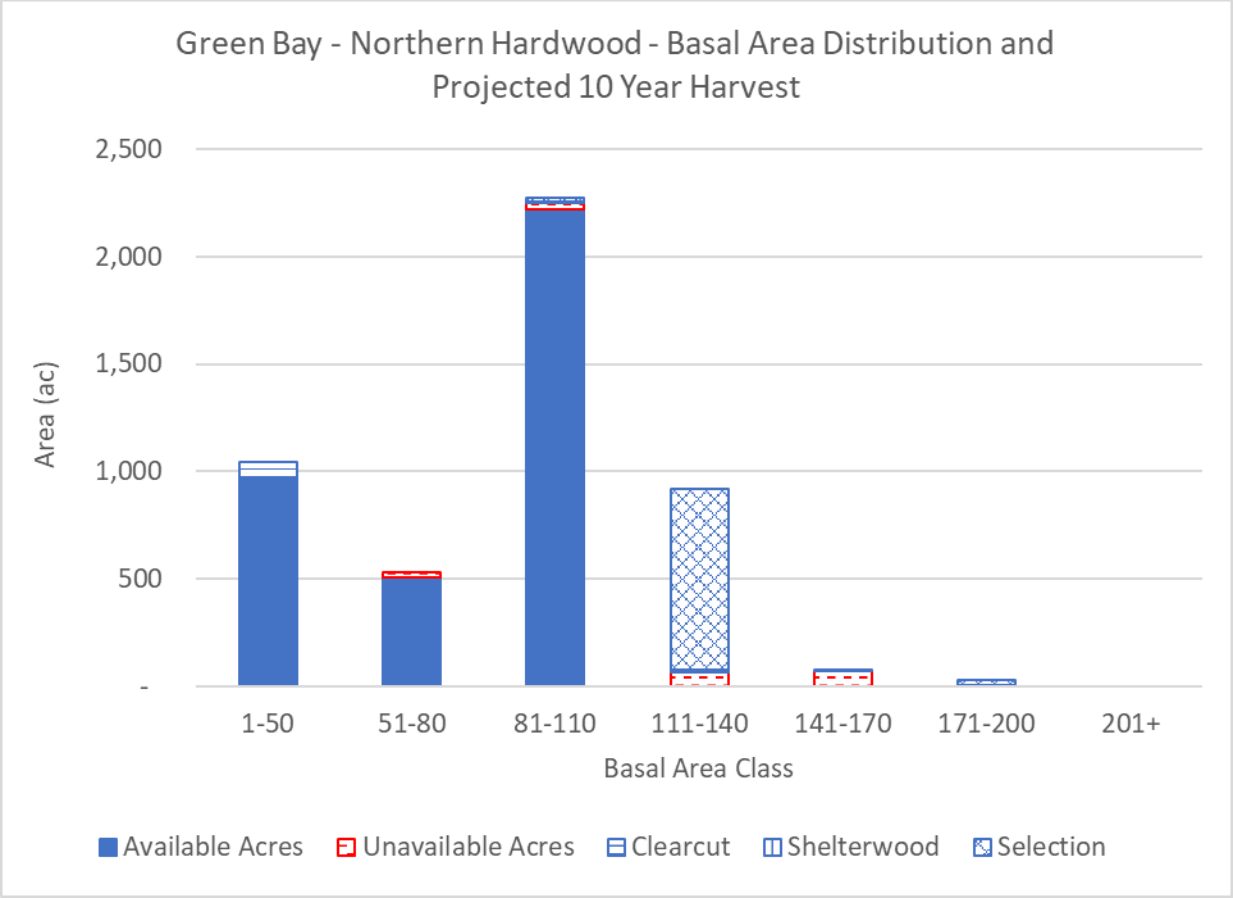


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	2,991	108
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	2,991	108
Wood thrush	Age category: 40+ Size category: sawlog Basal area: 81+	3,105	119

Desired future condition

The projected long-term cover type trend for northern hardwood is stable in the Green Bay management area. There are about 12 acres transitioning to this cover type in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition. Some lower quality northern hardwood stands that aren't able to support high quality hardwoods will continue to be managed under an even-aged system.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles and eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime depends on the successful establishment of northern hardwood species as well as recruitment of those seedlings and saplings into the pole and saw log classes. Northern hardwood in the Green Bay management area has challenges in regeneration and recruitment due to cervid herbivory and the poor potential of many of the stands.

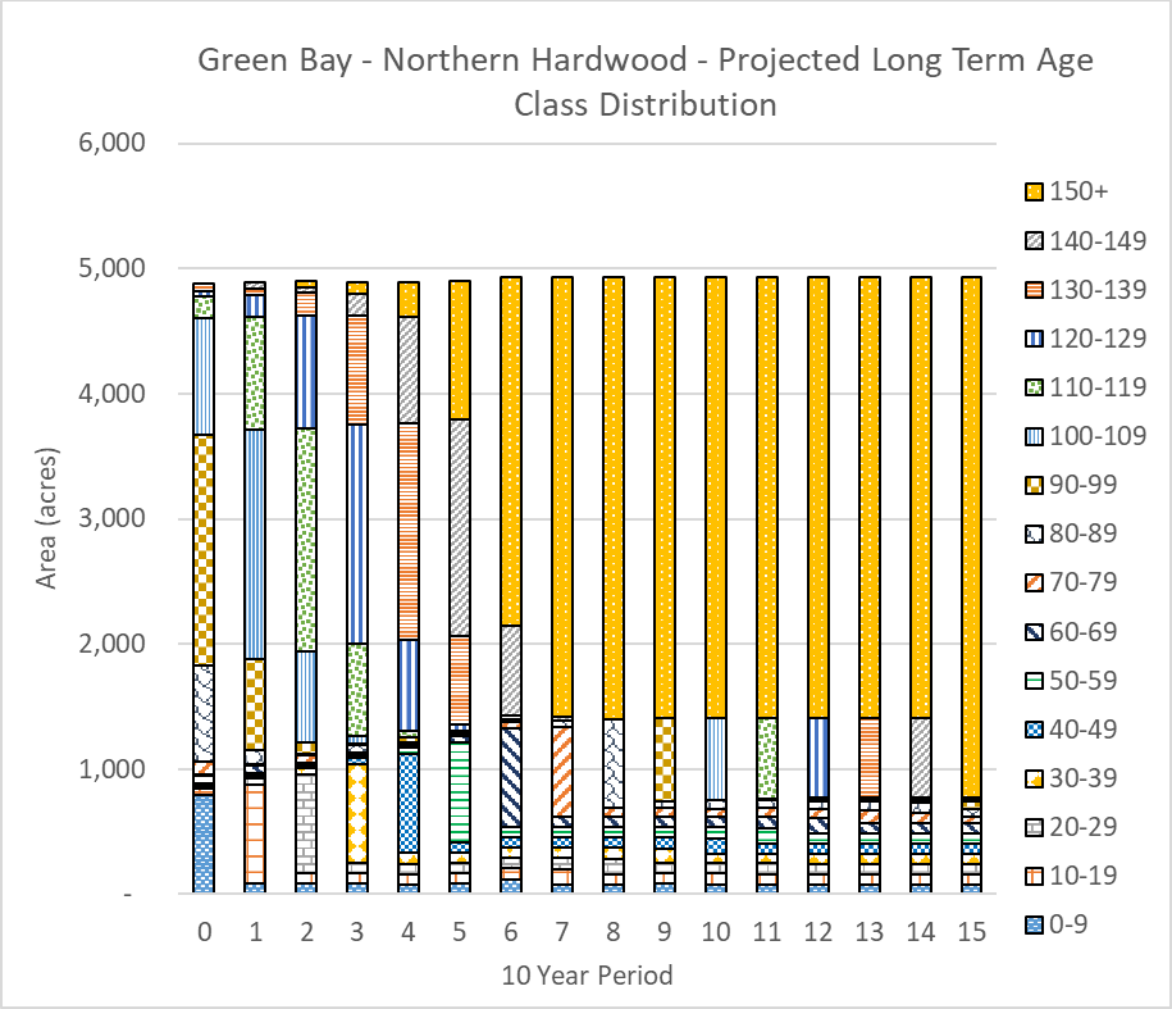


Figure 10. Projected age class distribution over 15, 10-year planning periods.

Management actions

The desired future conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 889 acres. About 74 acres will be managed under an even-aged system with some of those acres harvested through a clearcut or shelterwood method to improve stand quality (Table 4). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition.

Lowland deciduous

Current condition

The current age class distribution is unbalanced with a deficit of acres in ages 10-79 years old and a surplus of acres in the 0-9 and in the 80-99-year-old age classes. Limited merchantable acres in the older age classes will present managers with a challenge in achieving desired regeneration during this planning period. Much of this has been clearcut over the last 10 years due to salvage operations related emerald ash borer infestations.

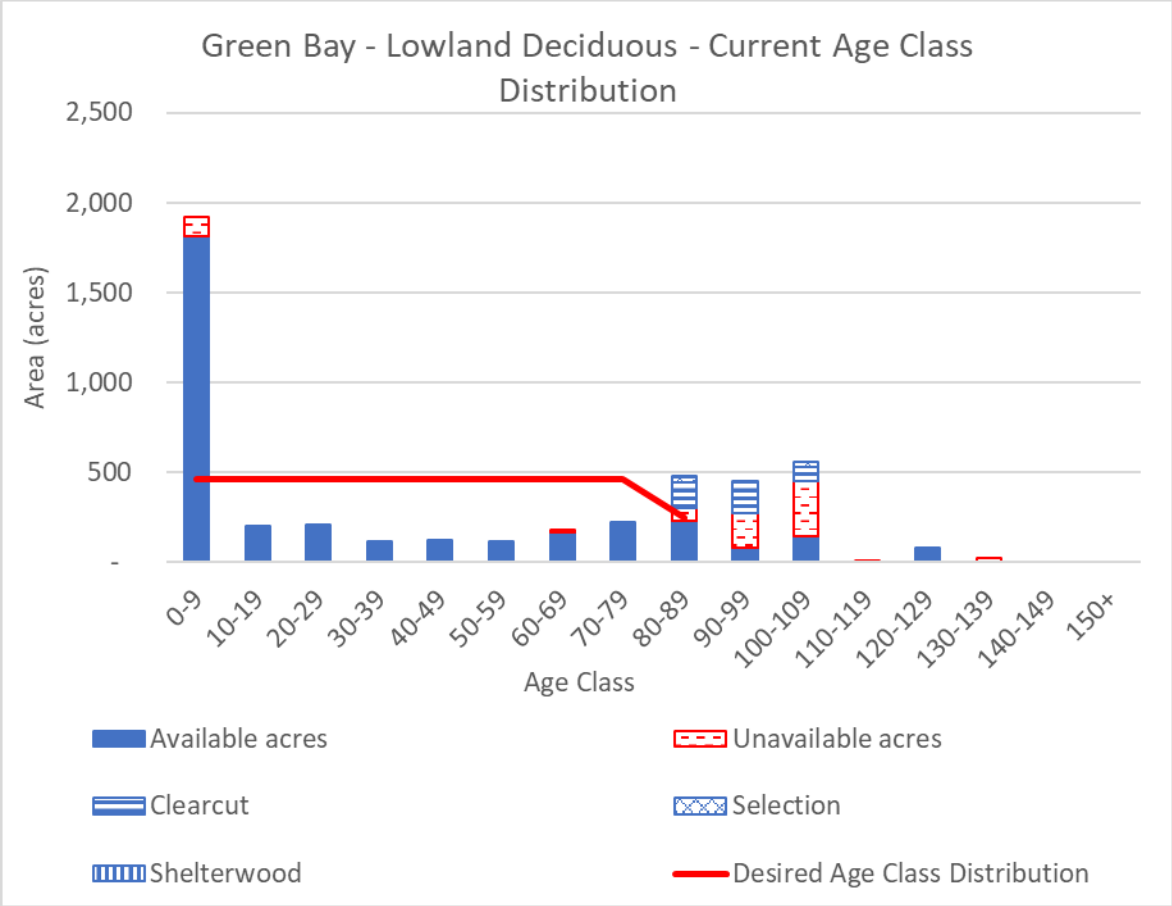


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in the lowland deciduous cover type over the 10-year planning period.

Table 10. Featured species with lowland deciduous as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – lowland deciduous	Lowland deciduous Habitat Acres - Available	Lowland deciduous Habitat Acres - Unavailable
American woodcock	Age category: 0-19 Size class: Sapling	2,001	109

Featured Species	Featured Species Habitat – lowland deciduous	Lowland deciduous Habitat Acres - Available	Lowland deciduous Habitat Acres - Unavailable
Wood thrush	Age category: 40+ Size category: Sawlog Basal area: 81+	656	477

Desired future condition

The desired age class distribution is to have a rotation age of 70 years with approximately 6 percent of the acres in an age class tail out to a maximum of 60-year age class.



Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 256 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of lowland deciduous cover types will

take many decades. A portion of this cover type meets the habitat requirements for American woodcock.

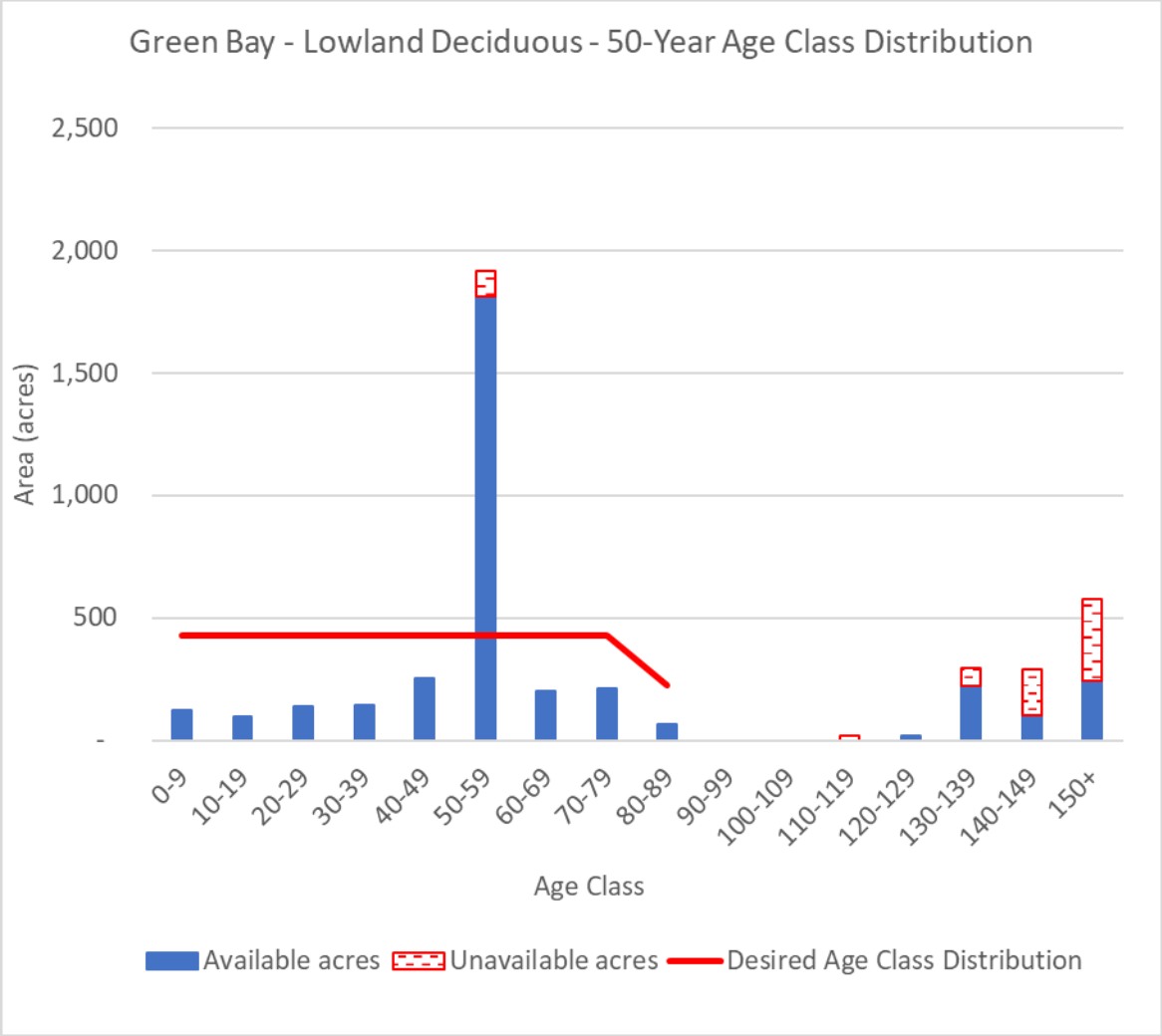


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age-class distribution shows the population of lowland deciduous acres working toward the desired future condition as the older age classes are treated (Figure 13).

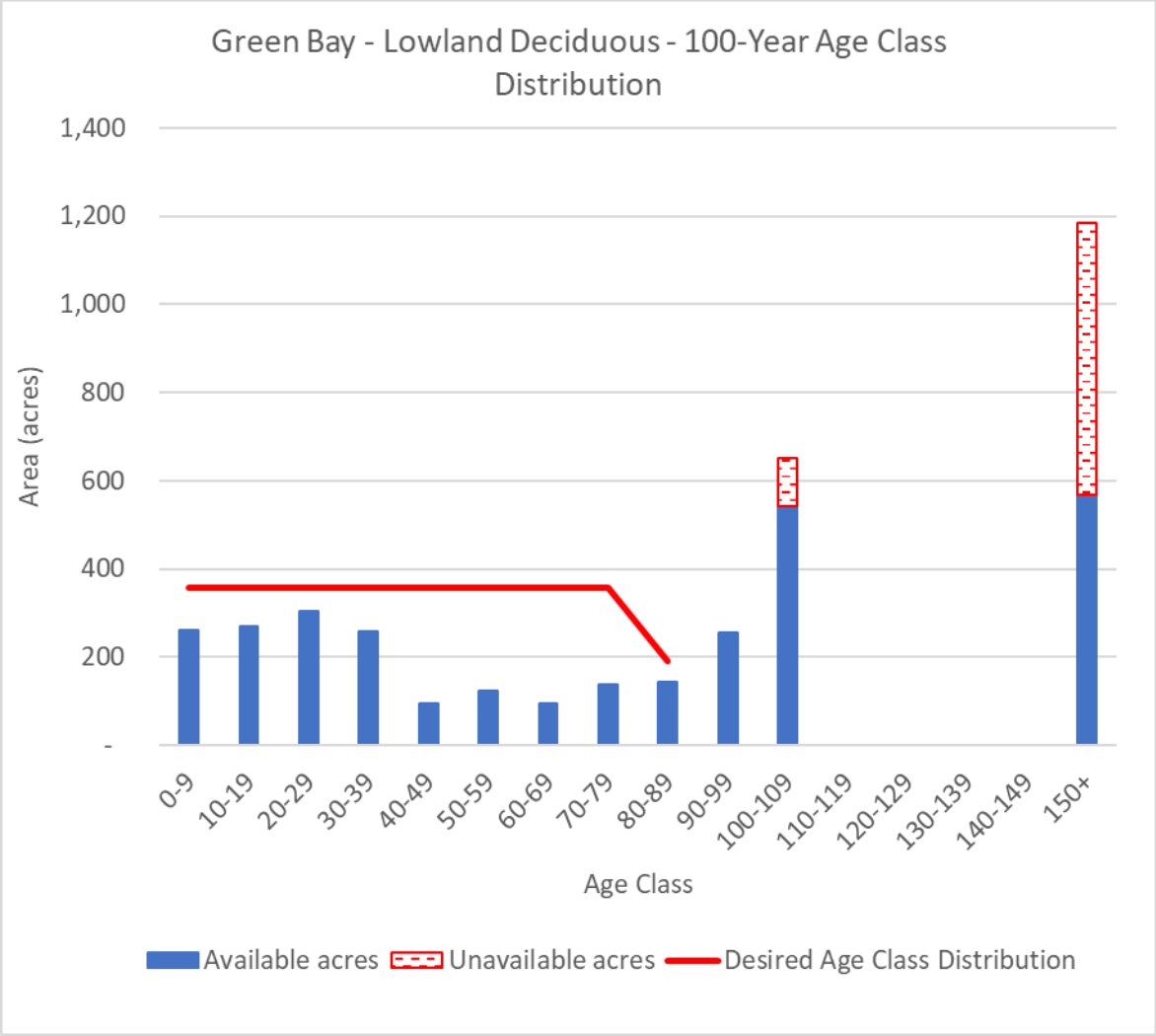


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of upland mixed forest in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 477 acres of projected harvest in the lowland deciduous cover type. It is expected that about 135 acres of lowland deciduous will convert to other cover types. These total to an expected 342 acres of regeneration in the lowland deciduous cover type over the next 10 years.

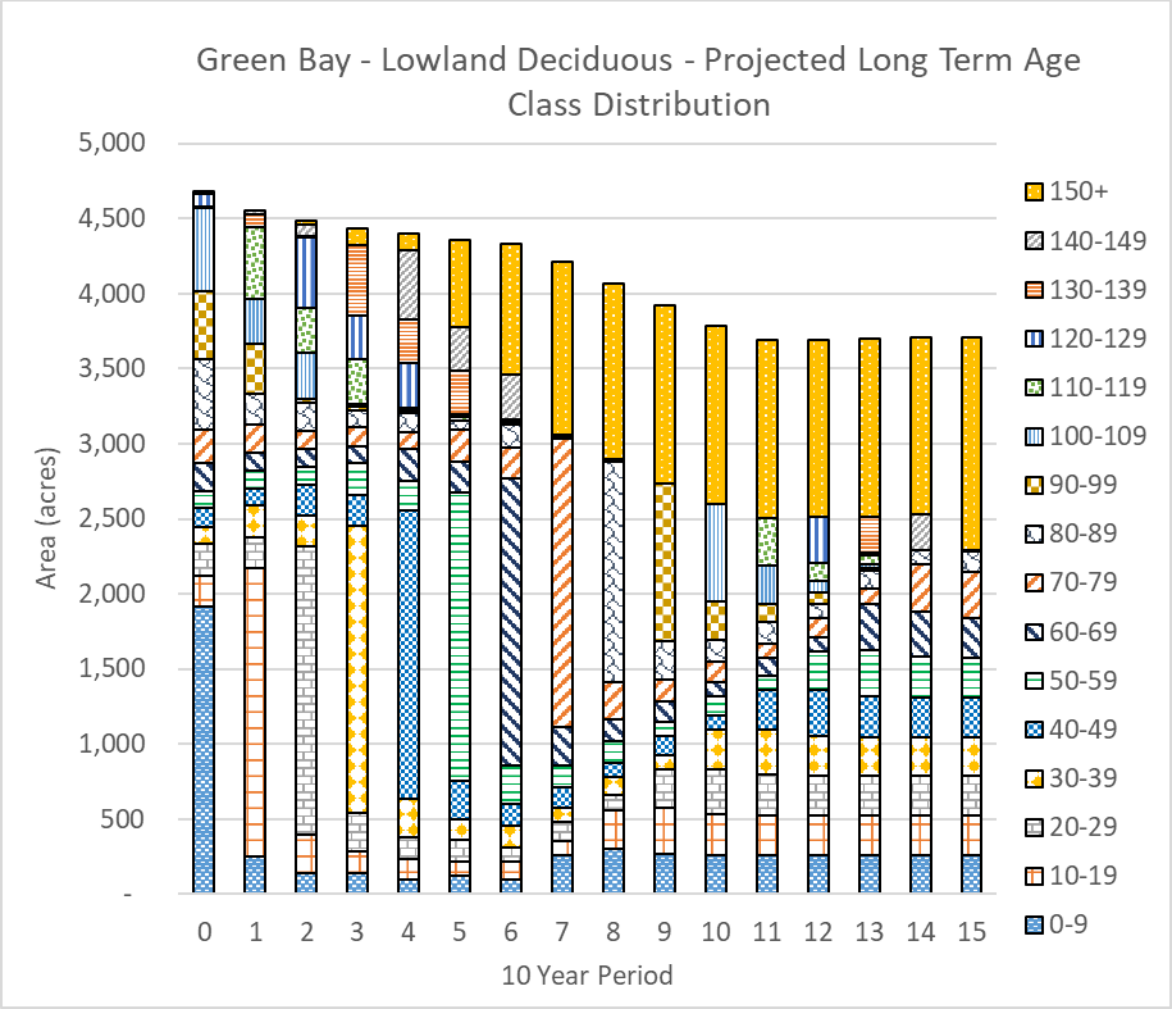


Figure 15. Projected age class distribution over 15, 10-year planning periods.

Cedar

Current condition

The current age class distribution shows a classic bell curve, an unmanaged even-aged stand with a surplus of acres in the 110-119-year-old age classes. The younger age classes have few to no acres. The reasons for this are not well understood, but many factors contribute to the lack of regeneration of the cover type. These include but are not limited to cervid herbivory, suppression of fire and the relatively young age of the stands.

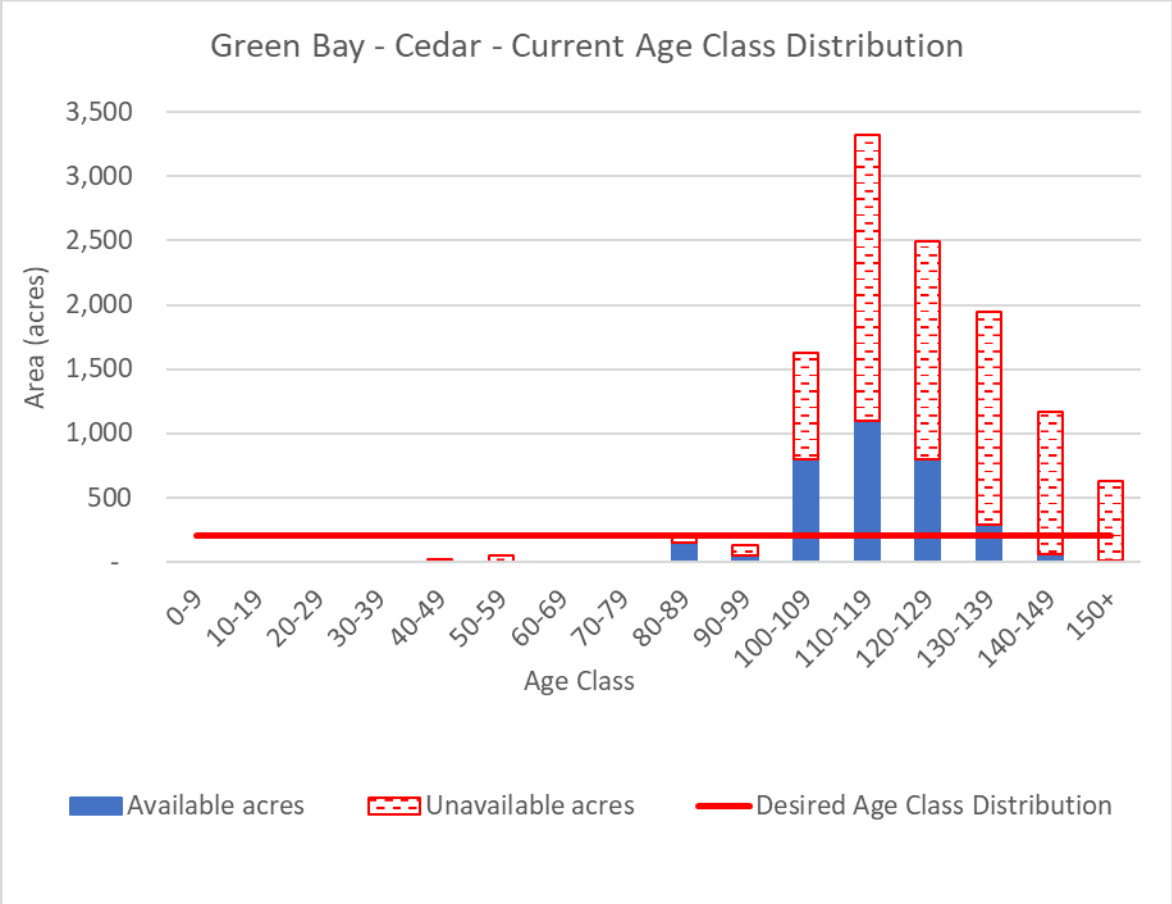


Figure 16. Current age class distribution, the desired age class distribution, and the projected harvests in the cedar cover type over the 10-year planning period.

While there are no featured species chosen in this MA that use the cedar cover type, it should be noted that northern white-cedar stands support 84 species of animals: 47 birds, 34 mammals, and three herptiles. 51 species are permanent residents of cedar stands, 30 reside there only in summer, two are migrants, and white-tailed deer is exclusively a winter resident. A total of 16 rare plants and 15 rare animals appear here. Conifer swamps especially rich with white cedar provide habitat for many types of amphibians, songbirds, reptiles, and mammals seeking water, insects, and dense cover.

Desired future condition

The desired future condition is to have an even-age class distribution with a rotation age of 150+ years.



Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in establishing limited acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of cedar will take many decades in this management area.

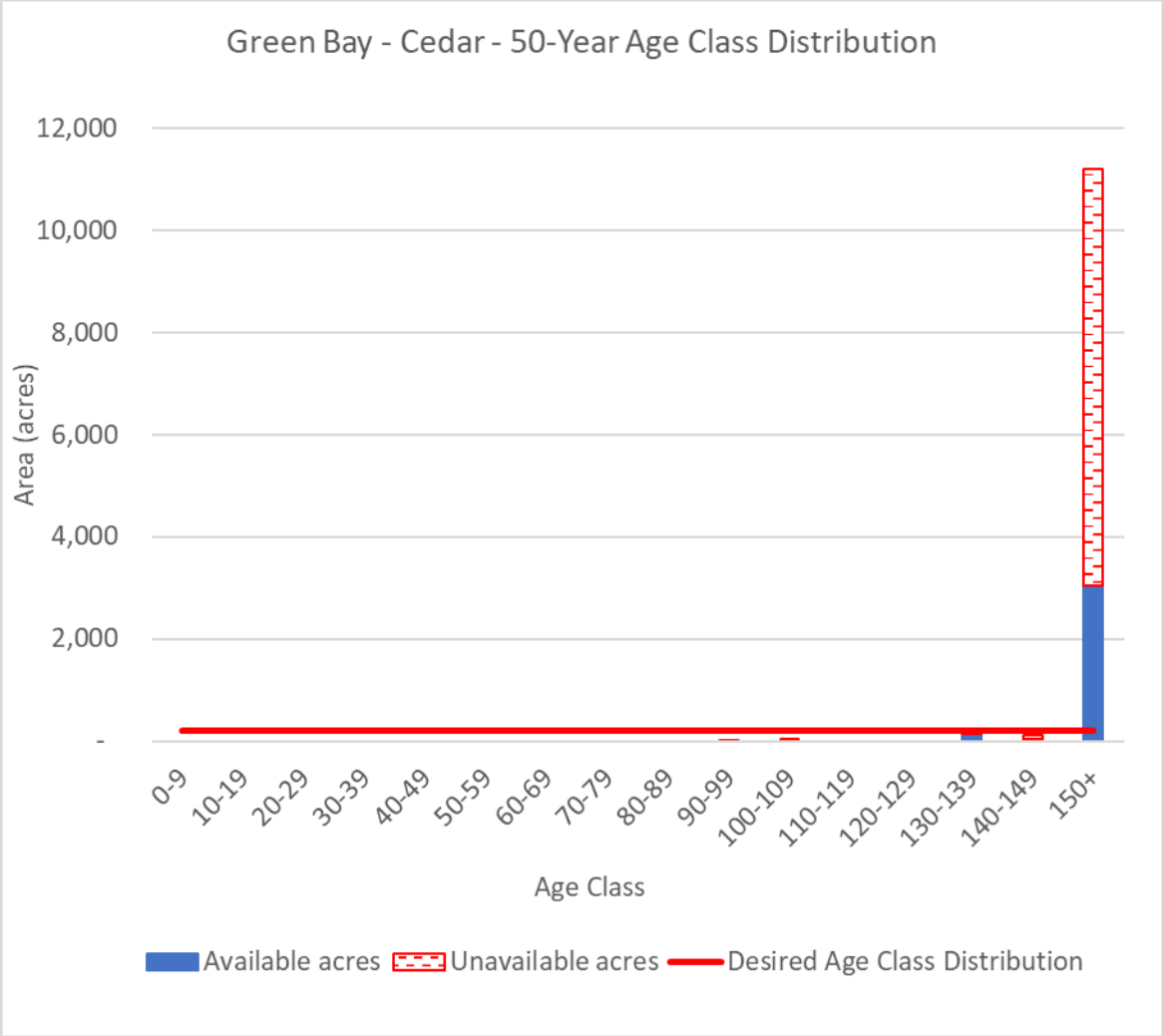


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of cedar acres aging with only a few acres regenerating (Figure 18).

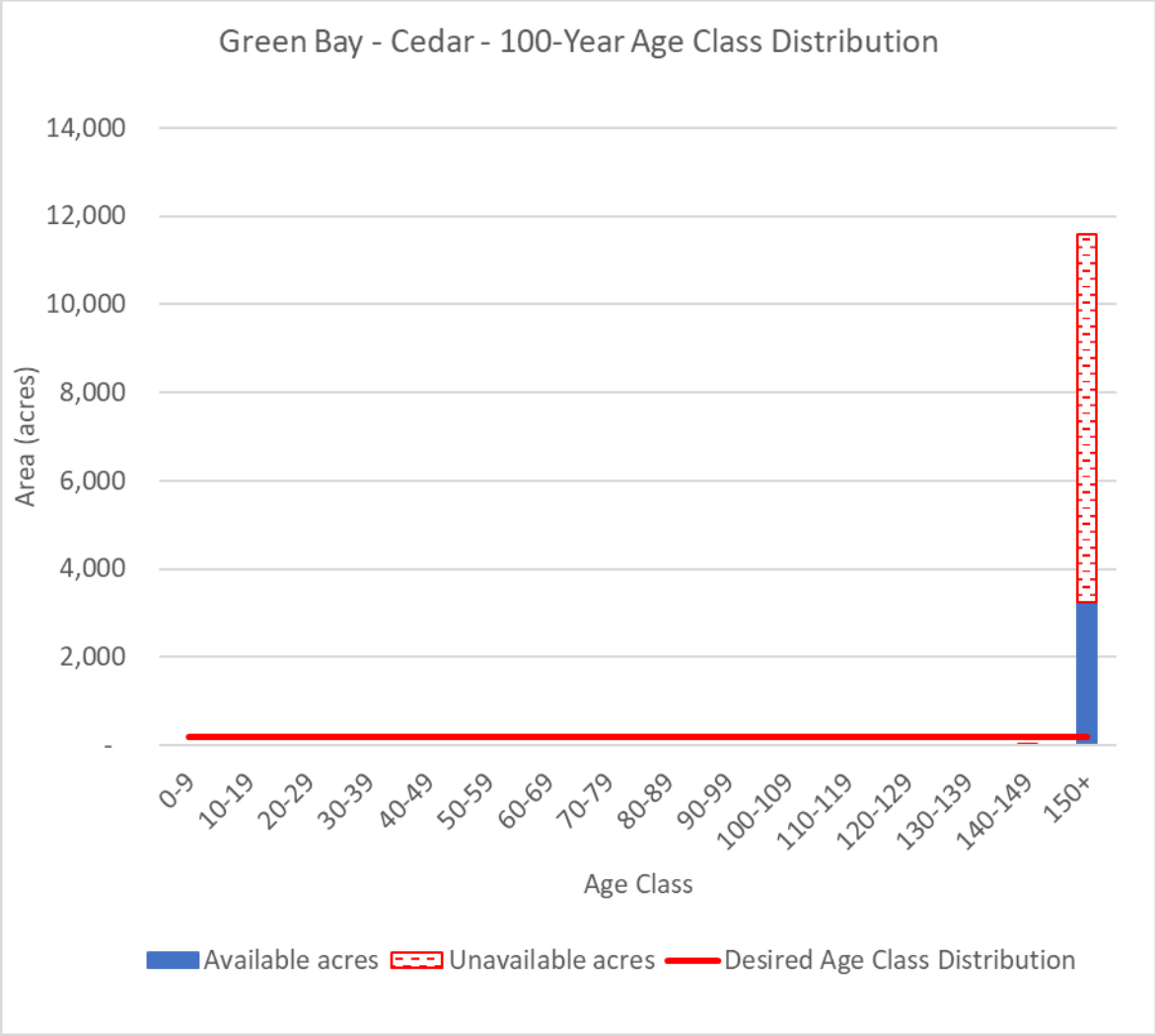


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age-class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of cedar in productive growing conditions while providing some forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are no acres of projected harvests in the cedar cover type. It is expected some cedar will be cut in ongoing research and field trials as it learned how to best regenerate this species as a cover type.

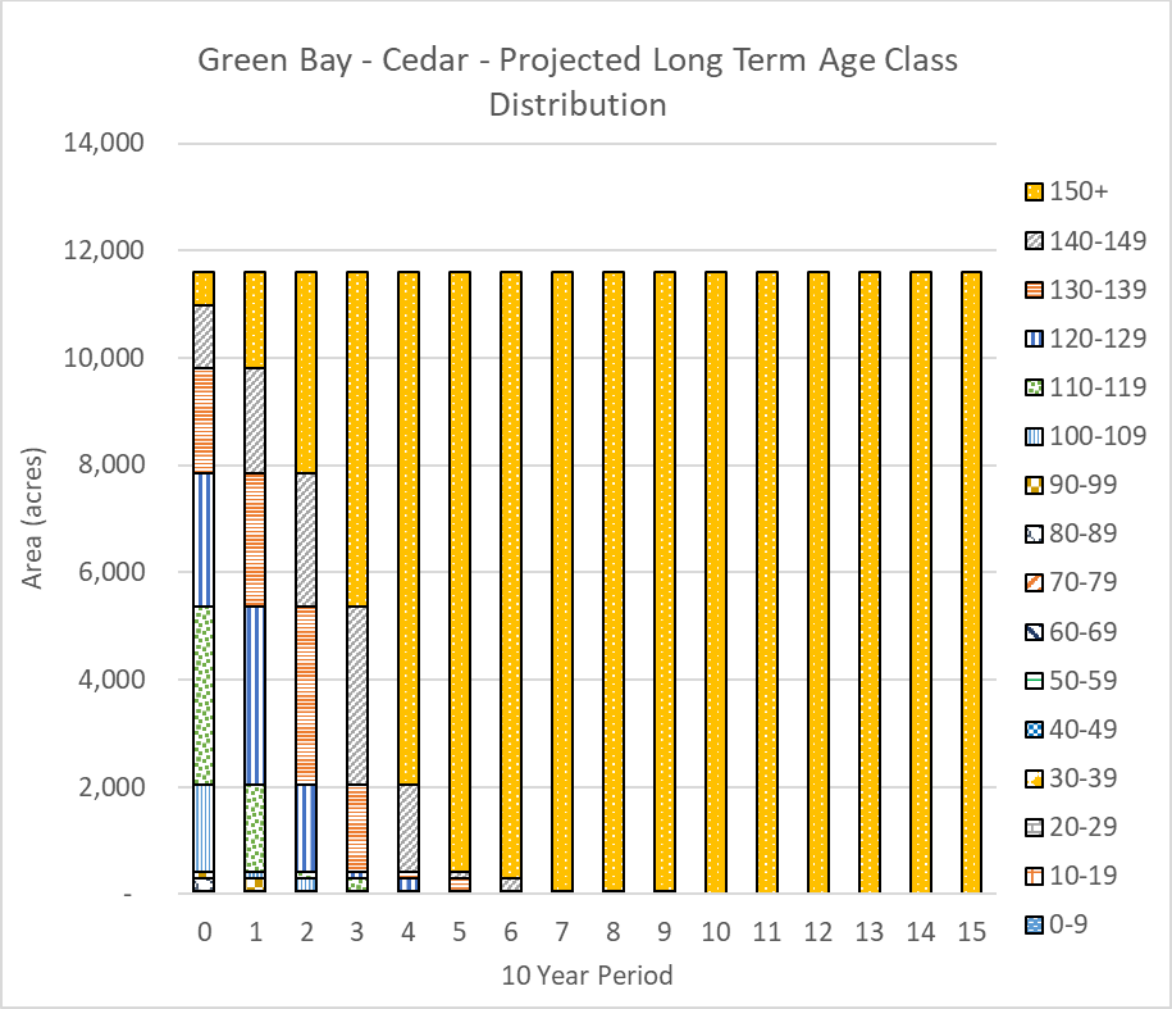


Figure 20. Projected age class distribution over 15, 10-year planning periods.

Mixed upland deciduous

Current condition

The current age-class distribution is unbalanced, with a deficit of acres in the 10-29-year-old and 60-69-year-old age classes and a surplus of acres in the 0-9 year-old age classes.

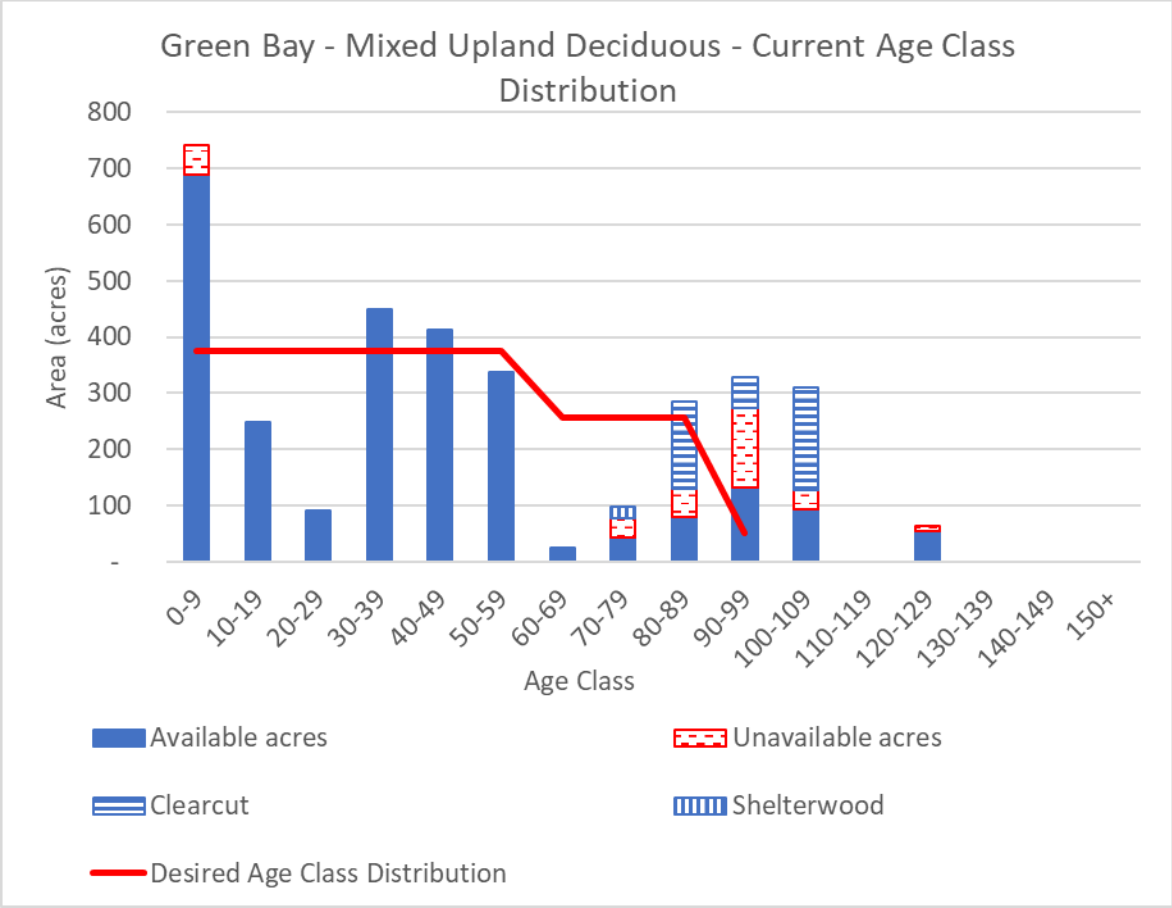


Figure 21. Current age class distribution, desired age class distribution and projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

Table 10. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – lowland deciduous	Lowland deciduous Habitat Acres - Available	Lowland deciduous Habitat Acres - Unavailable
Wood thrush	Age category: 40+ Size category: sawlog Basal area: 81+	862	270

Desired future condition

The desired age class distribution is to have a rotation age of 50 years for 73 percent of the population, with an age class tail of 80 year for 25 percent of the population, and an age class tail of 90 year for the last 2 percent of the population.

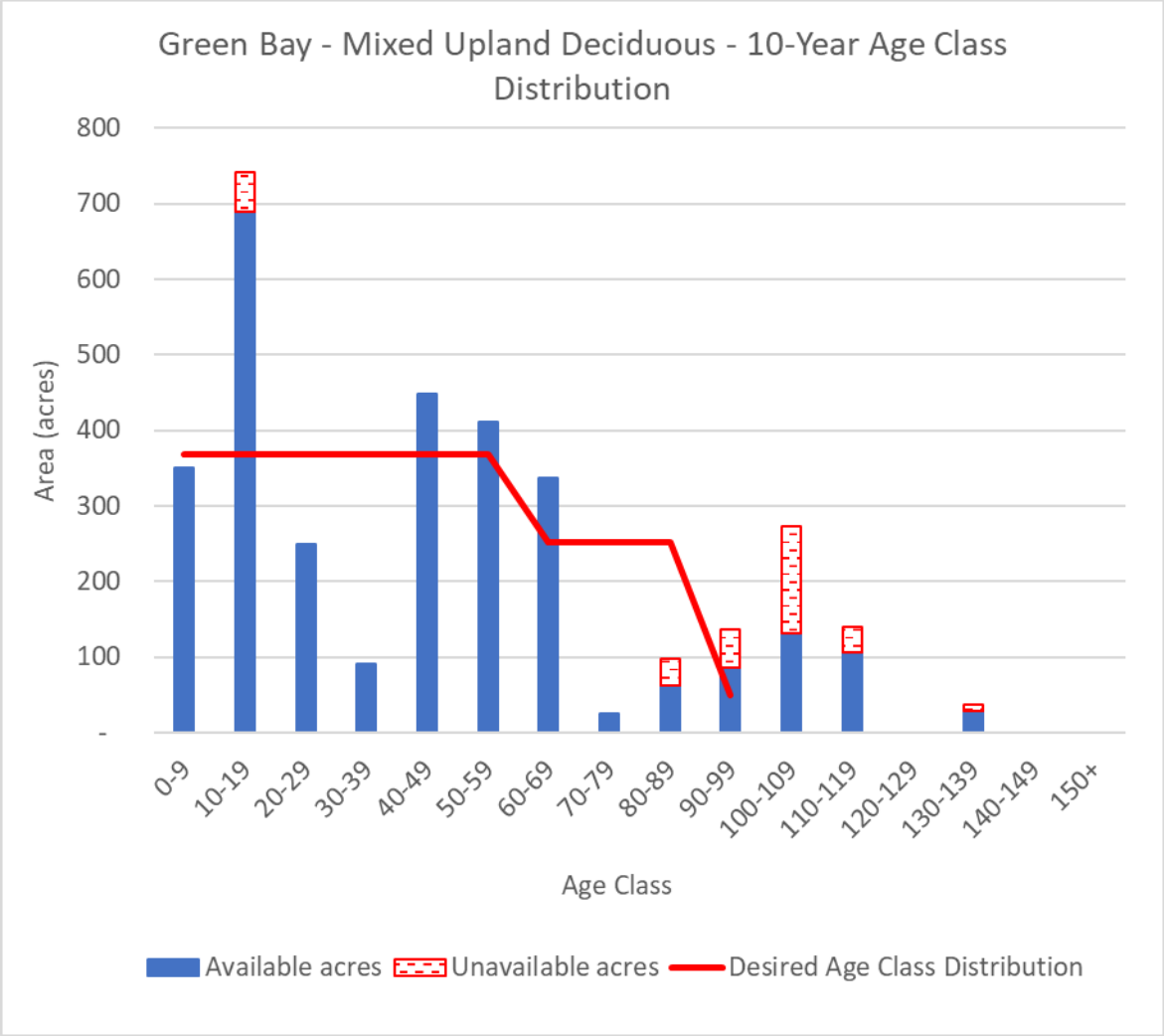


Figure 22. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 351 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of upland mixed forest will take many decades in this management area.

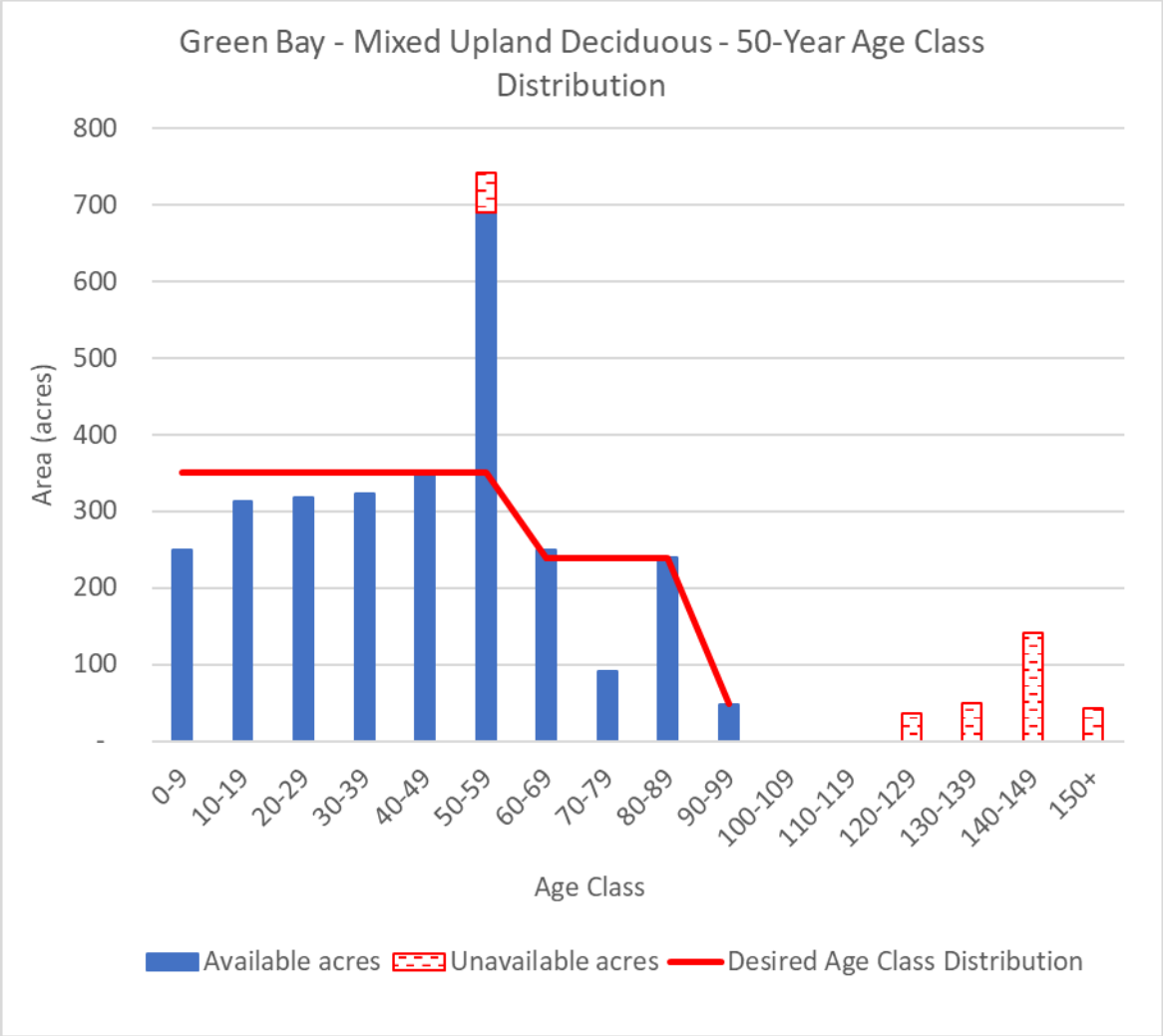


Figure 23. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed upland deciduous acres working toward the desired future condition as the older age classes are treated (Figure 23).

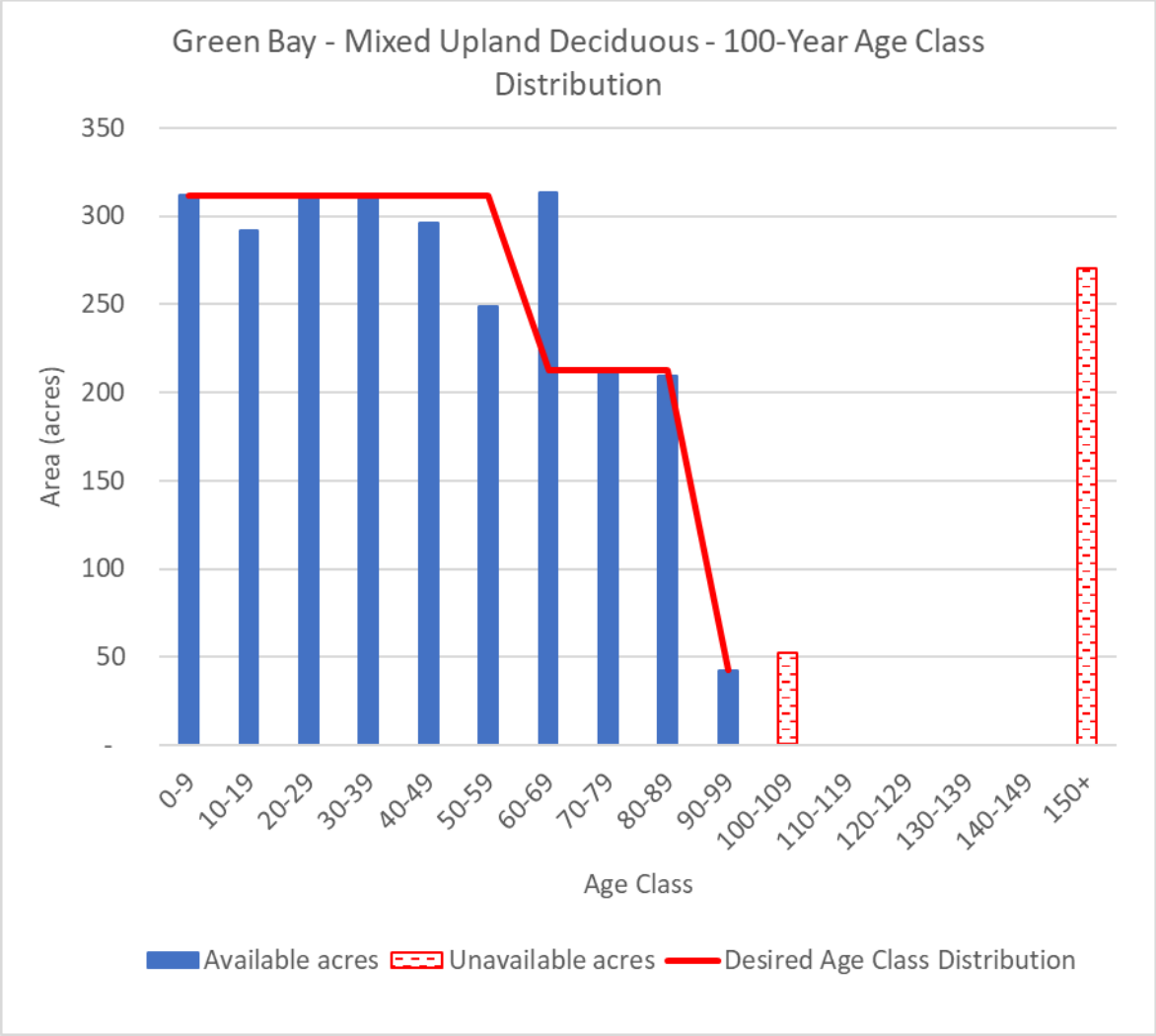


Figure 24. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 24) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 410 acres of projected harvest in the mixed upland deciduous cover type. It is expected that about 47 acres of upland mixed forest will convert to other cover types. These total to an expected 363 acres of regeneration in the mixed upland deciduous cover type over the next 10 years.

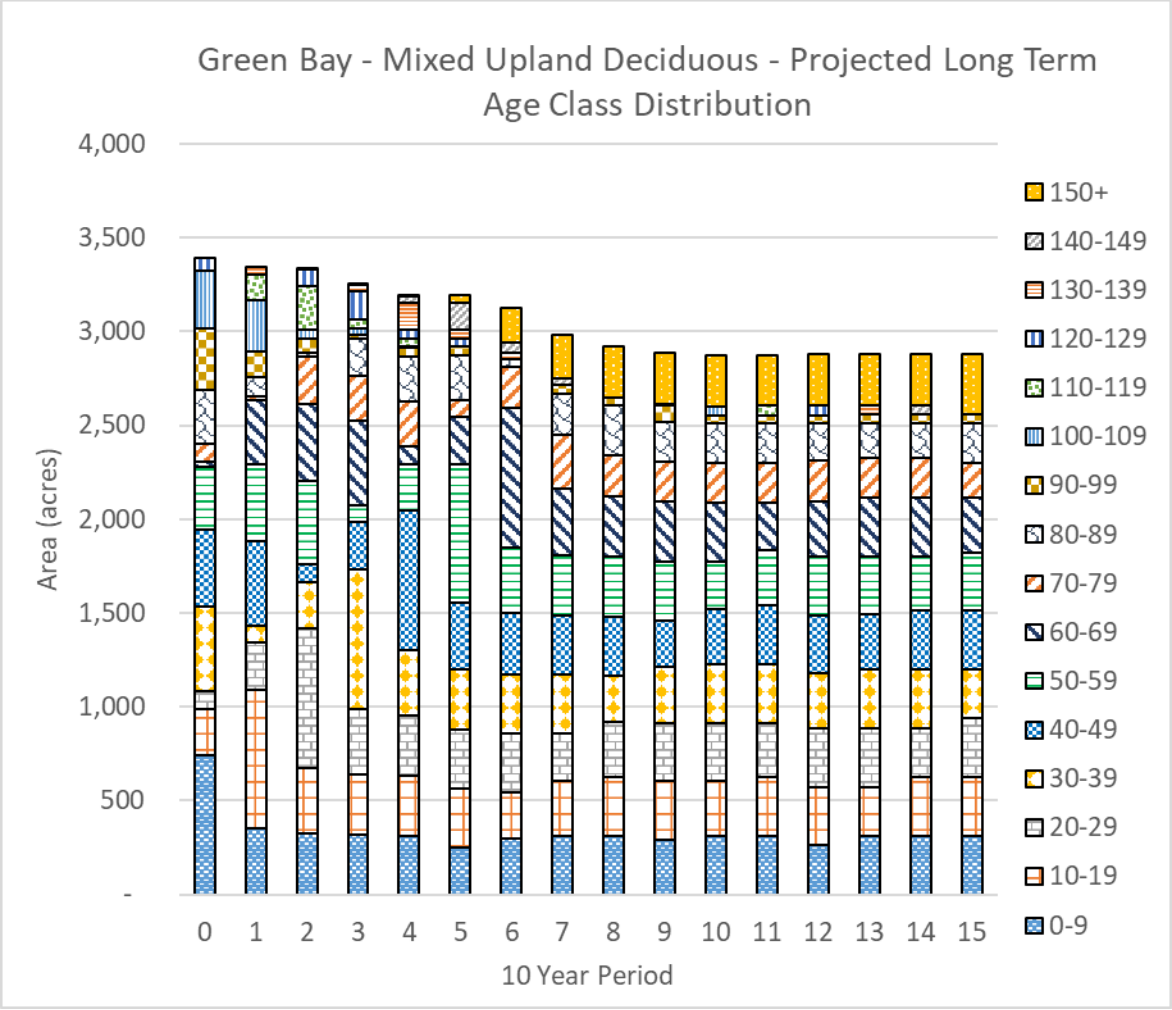


Figure 25. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 11; see Biodiversity in Section 3 for more information).

Table 11. High conservation value areas within the Green Bay management area.

High Conservation Value Area Type and Name	Acres
Coastal Environmental Areas	**166**
	166
State Wildlife Management Areas	**273**
Portage Marsh SWMA unit of Waterloo SRA	273
GEMS	**3,088**
Cedar River	3,088
Grand Total	**3,527**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 16. Ecological reference area natural community ranking based on NatureServe .

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 17. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	AB	G3G5	S4	1
Existing ERA	Mesic northern forest	C	<Null>		1
Existing ERA	Muskeg	B	G4G5	S3	2

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Muskeg	BC	G4G5	S3	1
Existing ERA	Poor fen	BC	G3	S3	2
Existing ERA	Rich conifer swamp	C	G4	S3	2
Grand Total					**9**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 14) refers to those that may be reviewed or updated through the compartment review process. Static SCAs (Table 15) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 14. Reviewable special conservation areas within the Green Bay management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**883**
Days River Pathway Recreation Area	883
Habitat Area or Habitat Corridor	**3,555**
33046014	23
33046020	92
33046023	6
33046026	23
33046027	4
33046028	34
33083046	46
33083049	2
33083054	5
7 Mile Marsh complex	626
Durow Marsh	670
Hayward Lake Management Area	2,027
Mineral Resource Area	**3**
Limpert Pit	3
Possible Type 1 or Type 2 Old Growth	**6**
--	6
Spring, Wetlands, or Riparian Areas	**1,535**
33046036	91
33046037	91
33046043	22
33046045	42
33046047	35

Reviewable Special Conservation Area Type and Name	Acres
33046049	46
33046050	21
33046051	143
33046052	27
33046053	66
33046054	13
Area 1	8
Area 2	40
Area 3	49
Escanaba 45 1	37
Escanaba 45 3	35
Peterson Pond	647
SCA No. 1	12
SCA No. 2	27
SCA No. 3	83
Grand Total	**5,982**

Table 15. Static special conservation areas within the Green Bay management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Deer Winter Range - Obligate and Conditional		**73,383**
Conditional		73,383
Designated Trout and Cold Water Stream Buffer		**310**
		294
Laraby Creek		16
Designated Trout and Coldwater Streams	**10.8**	
	10.2	
Laraby Creek	0.6	
Great Lakes Islands		**10**
Unknown		10
Important Bird Areas		**370**
Little Bay de Noc (inc. Portage Marsh & Aronson Island sandbar)		370
Mussel Stream Group 2 - State threatened or endangered	**1.7**	
Devils Creek	1.3	
Elwood Creek-Cedar River	0.5	
Wood Turtle Stream 100-foot Buffer		**288**
		19
Cedar River		270

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Wood Turtle Stream 660-foot Buffer		**1,692**
		107
Cedar River		1,585
Grand Total	**12.5**	**76,053**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 17 and 18) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 16. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 17. Rare animal species occurrence within the Green Bay management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	--	2
Animal	Alasmidonta viridis	Slippershell	T	--	3
Animal	Bombus borealis	Northern amber bumble bee	SC	--	2
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	2
Animal	Botaurus lentiginosus	American bittern	SC	--	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	--	3
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Chlidonias niger	Black tern	T	--	1
Animal	Circus hudsonius	Northern harrier	SC	--	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Cistothorus palustris	Marsh wren	SC	--	2
Animal	Cottus ricei	Spoonhead sculpin	SC	--	1
Animal	Coturnicops noveboracensis	Yellow rail	T	--	1
Animal	Elliptio complanata	Eastern elliptio	SC	--	1
Animal	Falco columbarius	Merlin	SC	--	1
Animal	Gallinula galeata	Common gallinule	T	--	1
Animal	Gavia immer	Common loon	T	--	1
Animal	Glyptemys insculpta	Wood turtle	T	--	1
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	9
Animal	Hydroprogne caspia	Caspian tern	T	--	1
Animal	Ixobrychus exilis	Least bittern	T	--	1
Animal	Lasmigona costata	Flutedshell	SC	--	1
Animal	Lithobates palustris	Pickerel frog	SC	--	1
Animal	Myotis lucifugus	Little brown bat	T	--	1
Animal	Necturus maculosus	Mudpuppy	SC	--	4
Animal	Nycticorax nycticorax	Black-crowned night-heron	SC	--	2
Animal	Pandion haliaetus	Osprey	SC	--	1
Animal	Sterna hirundo	Common tern	T	--	1
Total	--	--	--	--	**46**

**Occurrence information provided by field staff.*

Table 18. Other rare occurrence within the Green Bay management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	3
Total	**--**	**--**	**--**	**--**	**3**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 20.)

Table 19. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 20. Non-ERA Natural Communities within the Green Bay management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Muskeg	C	S3		2
Northern Shrub Thicket	C	S5	G4	2
Grand Total				**4**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 21) and diseases (Table 22) could have an impact on management during the planning period and may need to be monitored and/or addressed

Table 21. Defoliating insects of concern in the Green Bay management area.

Common Name	Scientific Name	Native/Non-native	Known Presence

Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Hemlock woolly adelgid	Adelges tsugae	Non-native	No

Watch for lingering ash with potential resistance to emerald ash borer.

Table 22. Maladies of concern in the Green Bay management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Heterobasidion root disease	Heterobasidion annosum	Native	No

Aquatic resources

Riparian habitat

A total of 75 miles of streams and rivers are found in the management area (Table 23). Streams/rivers classified as warm types comprise 100 percent of the riverine mileage.

Table 23. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	0
Cold small river	0
Cold transitional stream	0
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	31
Warm transitional small river	0
Warm transitional large river	1
Warm stream	32
Warm small river	<1
Warm large river	11

Lacustrine Habitat

A total of seven lakes and ponds of at least one surface acre are found in the management area (Table 24).

Table 24. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	5
100-499	2
500+	0

Wetlands

A total of 50,256 acres of wetlands lie in the management area (Table 25). Forested wetlands comprise approximately 96 percent of wetland types found in the management area.

Table 25. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,871
Forested	48,213
Riverine	172

Vernal pools and seeps

A total of 75 acres of vernal pools have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub, aspen, lowland deciduous, cedar and mixed upland deciduous are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 26).

Table 26. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	1,804
Aspen	1,433
Lowland deciduous	1,022
Cedar	960
Mixed upland deciduous	917
Marsh	768
Northern hardwood	529
Upland conifers	368
Lowland mixed forest	331

Cover Type	Acres
Upland mixed forest	292

Watershed vegetation cover

The management area includes portions of important watersheds of the Cedar River and Days River (Tables 27 and 28). Aspen is a major cover type of the state forest in each watershed.

Table 27. Largest vegetative cover types (i.e., top 5) and area of the Cedar River watershed located within the management area.

Cover Type	Acres
Aspen	7,056
Cedar	5,834
Lowland shrub	3,360
Northern hardwood	3,217
Lowland deciduous	2,456

Table 28. Largest vegetative cover types (i.e., top 5) and area of the Days River watershed located within the management area.

Cover Type	Acres
Aspen	967
Planted red pine	536
Cedar	440
Natural red pine	392
Lowland conifer	228

Recreation

The Green Bay area has good access for public recreation and management. The Forest Islands ORV Trail and Route is in this area. The Cedar River Pathway, open to hiking, biking and equestrian use, is located adjacent to the Cedar River North state forest campground. The Days River Pathway, northeast of Gladstone, provides opportunities for hiking, biking and skiing on a variety of terrain.

The Cedar River North rustic campground offers sites for tents or small trailers and six equestrian sites with horse corrals. It is situated on the Cedar River, which offers excellent paddling and fishing opportunities. Additional recreation opportunities are provided by J.W. Wells State Park, which is adjacent to state forest land on the shores of Green Bay.

Table 29. Designated recreation trails by type.

Recreation Category	Number of Miles
Motorized Recreation Trails	**57.6**
ORV (all types)	47.7
Snowmobiles	9.9

Recreation Category	Number of Miles
Non-motorized Recreation Trails	**55.1**
Hiking	19.8
Equestrian	8.1
Biking	19.8
Hunter Walking Trails	7.4
Total	**112.7**

Note: Trail use types may overlap.

Table 30. State Forest Campgrounds (SFCGs).

Name	Number of Sites	Equestrian Sites
Cedar River North SFCG and Trail Camp	18	6

The Cedar River GEM, about 4.5 miles northwest of Cedar River, provides hundreds of acres of aspen and miles of beautiful rivers and streams with hunting for grouse and woodcock accessible via over seven miles of walking trails. Boating access sites provide access to the Cedar River, Ford River and Lake Michigan.

Table 31. Areas managed for hunting

Type	Name	Number of Acres
Grouse Enhancement Management Sites	Cedar River GEM	3,085.8

Table 32. Boating access sites (BAS).

Name	Waterbody
Cedar River Mouth	Cedar River/Lake Michigan
Cedar River North SFCG	Cedar River
Ford River Mouth	Ford River/Lake Michigan

Houghton Hardwoods

State Forest Area: 63,406 acres	Location: Base of Keweenaw Peninsula	Population Centers: Houghton Baraga
Sub-Section: Keweenaw Coarse Till and Lake Plain	Landforms: Ground moraine ridges Lake plain Water reworked moraine	Landcover: Forested: (acres) Non-forested: (acres)

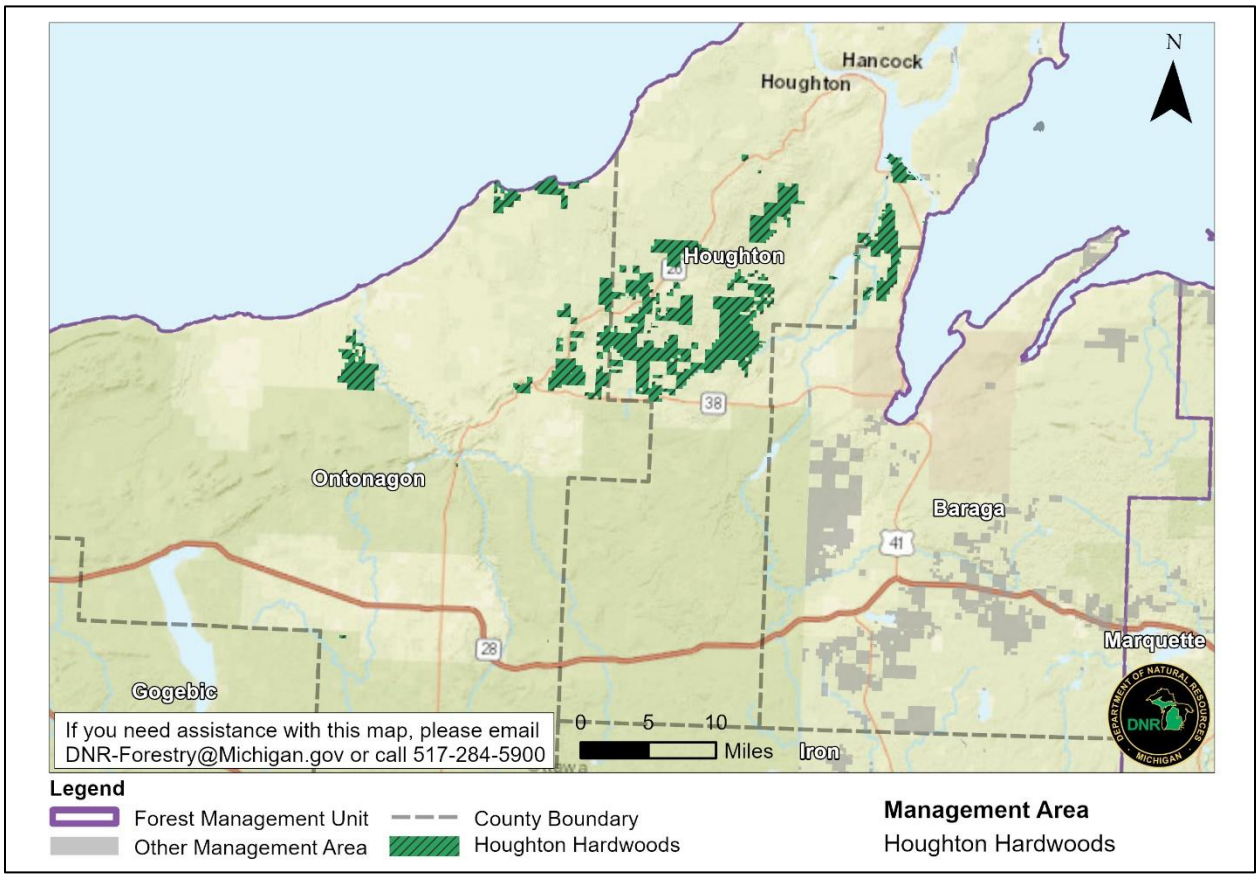


Figure 1. Map of the Houghton Hardwoods management area.

Forested landscape

Current and projected future condition

The Houghton Hardwoods management area is dominated by old, tolerant cover types that are largely upland and available. Intolerant deciduous cover types are relatively evenly distributed across the age categories, while unavailable upland and lowland acres are more prevalent in the old age category.

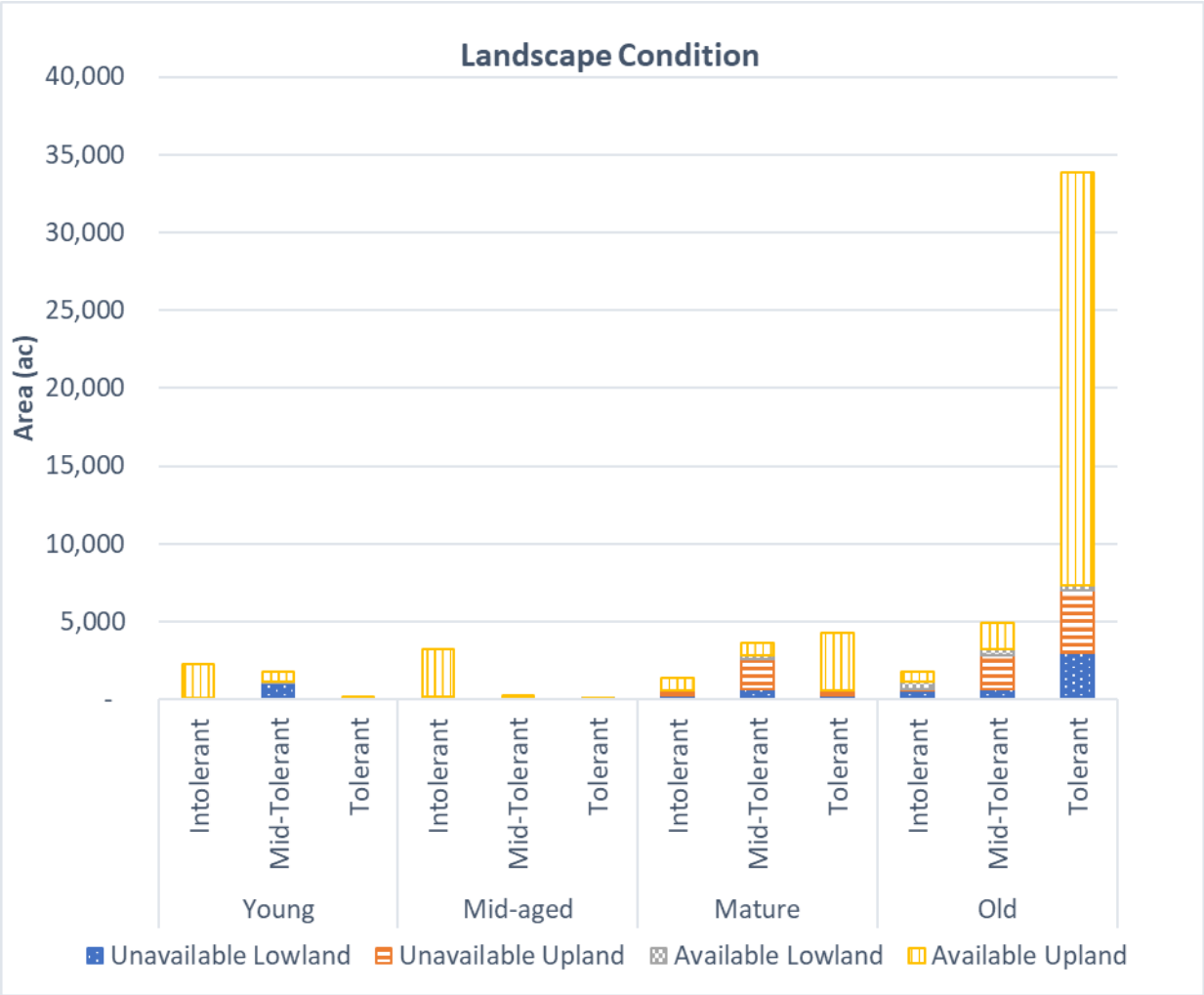


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack pine	2,156
Mature forest	Acres of 80+ year stands across cover types	40,504
Mature Ffrest	Acres of 120+ year stands across cover types	21,566
Mesic conifer cover types	Acres of mesic conifer cover types	3,093
Mesic conifers in other cover types	Average canopy occupancy	15%
Mast – oak cover types	Acres of oak cover types	710
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	28,628
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	48,743
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	1,250
Landscape forest matrix	Percent deciduous forest	81%
Landscape forest matrix	Percent coniferous forest	14%

Another important landscape level habitat in the management area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, landbirds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls, and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed, and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provides unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas (IBAs). The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Houghton Hardwoods management area has the following Special Analysis Units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the MA, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Grouse Enhanced Management (GEM)-Hazel Swamp

The Houghton Hardwoods management area is dominated by forested cover types with 91% of the area covered in forested stands (Table 2). The upland deciduous portion of that is 68% of the management area and comprised mostly of northern hardwood, aspen, and mixed upland deciduous. Lowland shrub

is the most common non-forested cover type in this management area, representing 4 percent of the landscape.

Table 2. Summary table describing the landscape conditions and distribution of cover types in the Houghton Hardwoods management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	6,557	43,342	49,002	57,550
			Northern hardwood	32,423			
			Blackred hybrid oak	0			
			Northern red oak	666			
			Oak mix	51			
			Mixed upland deciduous	3,645			
		Mixed	Upland mixed forest	2,552	2,552		
		Coniferous	Planted red pine	0	3,107		
			Planted jack pine	15			
			Planted white pine	0			
			Planted mixed pine	0			
			Natural red pine	0			
			Natural jack pine	0			
			Natural white pine	6			
			Natural mixed pines	0			
			Upland spruce/fir	73			
			Upland conifers	1,482			
			Hemlock	1,531			
	Lowland	Deciduous	Lowland aspen/balsam poplar	337	3,004	8,548	
			Lowland deciduous	2,666			
		Mixed	Lowland mixed forest	488	488		
		Coniferous	Cedar	460	5,057		
			Lowland conifers	3,315			
			Lowland spruce/fir	269			
			Tamarack	1,013			
Nonforested	Upland	N/A	Herbaceous openland	927	N/A	1,524	5,850
			Upland shrub	149			
			Low density trees	8			
			Bare/sparsely vegetated	100			
			Cropland	174			
			Urban	165			
	Lowland	N/A	Lowland shrub	2,811	N/A	4,327	
			Marsh	694			
			Bog	38			
			Treed bog	52			
			Water	732			
						Grand Total:	**63,400**

There are 42,166 acres (66 percent of the total management area and 73 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Houghton Hardwoods management area (Table 2). Of that, more than 50 percent is in the northern hardwood cover type, 11 percent in aspen, and 3.5 percent in mixed upland deciduous. The remaining 15 cover types represent less than 2 percent each of the forested and available land in the management area.

Table 3. Landscape conditions and cover type composition of the Houghton Hardwoods management area.

HOUGHTON HARDWOODS Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	6,275	10.9%	281	0.5%	6,557	11.4%
Cedar	128	0.2%	332	0.6%	460	0.8%
Hemlock	481	0.8%	1,050	1.8%	1,531	2.7%
Lowland aspen/balsam poplar	251	0.4%	87	0.2%	337	0.6%
Lowland conifers	306	0.5%	3,009	5.2%	3,315	5.8%
Lowland deciduous	576	1.0%	2,090	3.6%	2,667	4.6%
Lowland mixed forest	222	0.4%	266	0.5%	488	0.8%
Lowland spruce/fir	29	0.1%	240	0.4%	269	0.5%
Mixed upland deciduous	2,025	3.5%	1,621	2.8%	3,646	6.3%
Natural white pine	6	0.0%	0	0.0%	6	0.0%
Northern hardwood	29,221	50.8%	3,203	5.6%	32,425	56.3%
Northern red oak	635	1.1%	31	0.1%	666	1.2%
Oak mix	7	0.0%	44	0.1%	51	0.1%
Planted jack pine	15	0.0%	0	0.0%	15	0.0%
Tamarack	461	0.8%	553	1.0%	1,013	1.8%
Upland conifers	706	1.2%	776	1.3%	1,482	2.6%
Upland mixed forest	824	1.4%	1,729	3.0%	2,552	4.4%
Upland spruce/fir	0	0.0%	73	0.1%	73	0.1%
Grand Total	**42,168**	**73.3%**	**15,384**	**26.7%**	**57,552**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvest) acres for the Houghton Hardwoods Management Area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
BMPs	6,032	39.2%
Wildlife concerns	3,112	20.2%
Too wet	3,090	20.1%
Too steep	1,606	10.4%
Other influence zones	391	2.5%
Rare landforms	339	2.2%
Conservation values	218	1.4%
Species of special concern or T&E	155	1.0%
Denied access	143	0.9%
Blocked by obstacle	106	0.7%
Other dept./div. processes	82	0.5%
Deer wintering area	41	0.3%
Non-military lease/easement	23	0.1%
Long-term retention	18	0.1%
Unproductive	12	0.1%
Federal/state/local law	7	0.0%
Historical/Archaeological	6	0.0%
Recreational/scenic	4	0.0%
Total unavailable	**15,384**	**100.0%**

Management actions

Each cover type in the Houghton Hardwoods management area has unique age class and basal area class goals that describe the long-term desired future conditions. The harvest levels needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5)

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern hardwood	-	12,934	-	-	-	-	-	12,934
Mixed upland deciduous	145	915	-	-	166	-	-	1,225
Aspen	646	-	-	-	-	-	-	646
Upland mixed forest	281	-	-	-	-	-	-	281
Upland conifers	251	-	-	-	5	-	-	256
Lowland deciduous	59	-	-	-	-	-	-	59
Hemlock	-	52	-	-	-	-	-	52
Lowland aspen/balsam poplar	41	-	-	-	-	-	-	41
Tamarack	10	-	-	-	-	-	-	10
Lowland conifers	5	-	-	-	-	-	-	5
Totals	**1,439**	**13,900**	**-**	**-**	**171**	**-**	**-**	**15,510**

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types such as northern hardwoods. The following sections will provide additional details for each of the significant cover types in the Houghton Hardwoods management area.

Table 6. Ten-year estimated harvest volume by product and species for the Houghton Hardwoods Management Area.

10-Year Estimated Harvest Volume Projection Houghton Hardwoods Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed hardwood	72,757	68,392
	Mixed softwood	14,399	13,535
	Mixed aspen	6,232	5,858
	Mixed spruce	2,488	2,339
	Red pine	1,725	1,621
	White pine	1,422	1,336
	Mixed oak	944	887
	Jack pine	131	123
	Pulpwood Total	**100,097**	**94,091**
Sawtimber (MBF)	Sugar maple	47,160	44,330
	Red maple	7,498	7,048
	Basswood	4,647	4,368
	White pine	3,908	3,673
	Mixed aspen	3,485	3,276
	Red pine	3,362	3,160
	Red oak	2,813	2,644
	White oak	253	238
	Mixed oak	71	67
	Sawtimber Total	**73,196**	**68,804**
	Total Sawtimber Harvest Volume in Cords	**154,509**	**145,238**
	Grand Total Harvest Volume in Cords	**254,606**	**239,329**
* Volume estimates based on 100% of the projected harvests for the 10-year planning period. ** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.			

There are very few cover type transitions projected in the Houghton hardwoods management area. The managed area of each cover type is projected to remain relatively stable as treatment regimens will not change the amount of area in each cover type more than 0.8 percent. The largest expected decrease is

in the upland conifer cover type, where 145 acres are forecasted to convert to other cover types through forest management activities. The largest increase is in aspen, where 68 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Northern hardwood	32,423	32,423	0
Aspen	6,557	6,625	68
Mixed upland deciduous	3,645	3,702	57
Lowland conifers	3,315	3,323	7
Lowland deciduous	2,666	2,633	-33
Upland mixed forest	2,552	2,539	-13
Hemlock	1,531	1,531	0
Upland conifers	1,482	1,337	-145
Tamarack	1,013	996	-17
Northern red oak	666	666	0
Lowland mixed forest	488	529	41
Cedar	460	460	0
Lowland aspen/balsam poplar	337	341	3
Lowland spruce/fir	269	267	-1
Upland spruce/fir	73	73	0
Oak mix	51	51	0
Planted jack pine	15	15	0
Natural white pine	6	28	22
Planted red pine	0	11	11
Lowland shrub	2,811	2,811	0
Herbaceous openland	927	927	0
Water	732	732	0
Marsh	694	694	0
Cropland	174	174	0
Urban	165	165	0
Upland shrub	149	149	0
Bare/sparsely vegetated	100	100	0
Treed bog	52	52	0
Bog	38	38	0
Low density trees	8	8	0
Total:	**63,400**	**63,400**	**0**

Featured species current and projected habitat acres

There are 11 featured species in this management area that span various cover types, age classes, and stand-level conditions.

It is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. When referring to habitat acres, the true reference is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81. Because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Black bear was not included in the SFMP model, so only has current habitat acres. That is included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	2,296	2,027	2,297	2,284
Black bear	Generalist/mast	28,628	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	32,014	34,927	23,556	36,612
Black-throated blue warbler	Northern hardwoods, mixed upland deciduous	29,148	33,059	22,097	35,204
Golden-winged warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	2,210	1,892	2,161	2,209
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland	36,423	40,363	29,916	43,138

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
	spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar				
Moose	To be determined	--	--	--	--
Ruffed Grouse	Aspen	2,159	1,788	2,062	2,109
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	3,010	2,686	2,589	2,584
White-tailed deer (food)	Food: Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	49,386	49,510	49,637	49,765
White-tailed deer (shelter)*	Shelter: hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	7,136	7,030	6,970	6,874
Wood turtle	Non-forested openings	--	--	--	--

Deer Wintering Complexes (DWCs) that are greater than 15,000 acres are modeled as Special Analysis Units and information on them can be found in Section 5 of the plan. In DWCs less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated wildlife species

Northern hardwoods

Current condition

Most of the northern hardwood cover type in this management area is currently between a stand age of 70 and 110 years old (Figure 3). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old before a younger age cohort becomes the prominent component of these stands (Figure 5).

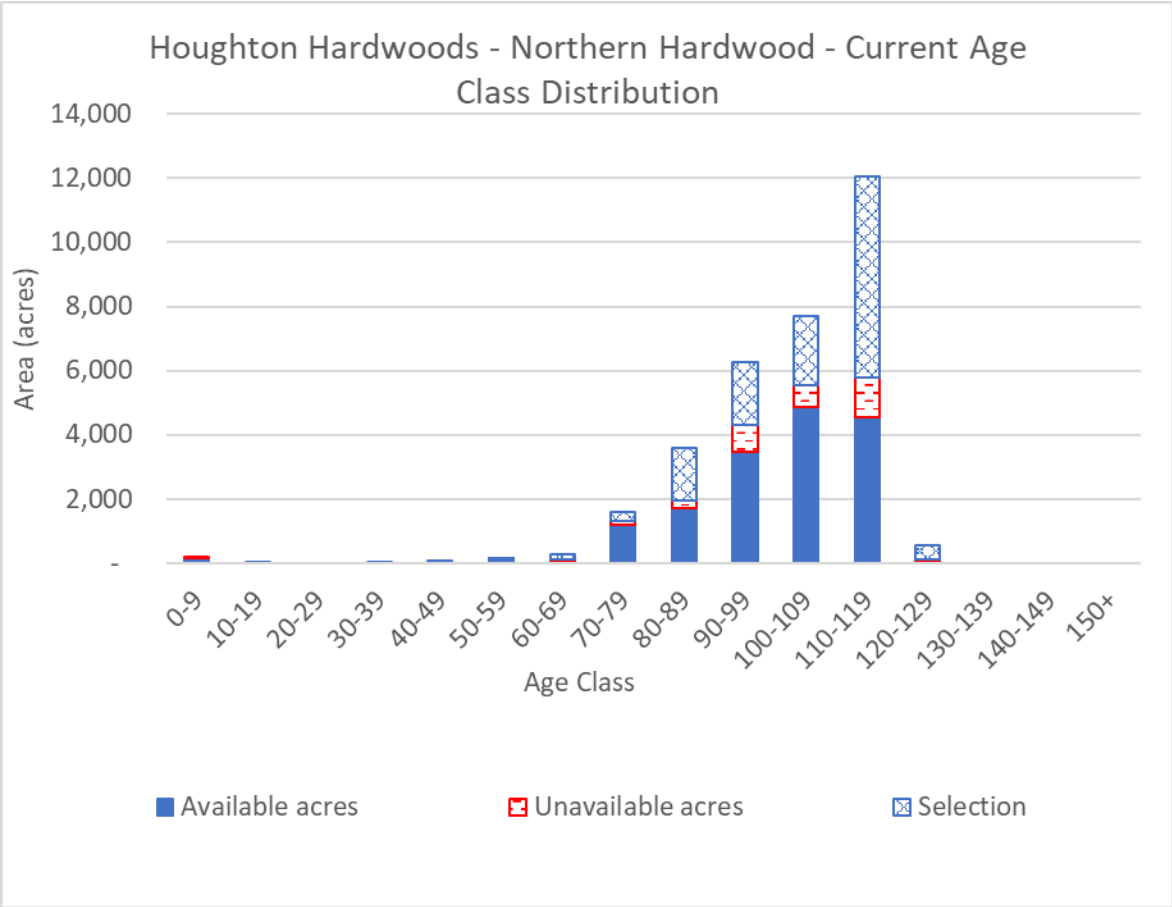


Figure 3. Current age class distribution and projected harvests in the northern hardwood cover type in the Houghton Hardwoods management area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Houghton hardwoods management area (Figure 3). Current conditions are a result of a well-regulated selection harvest regime that has been in place in this management area for decades. A

portion of this cover type meets the habitat requirements for blackburnian warbler, black-throated blue warbler and marten.

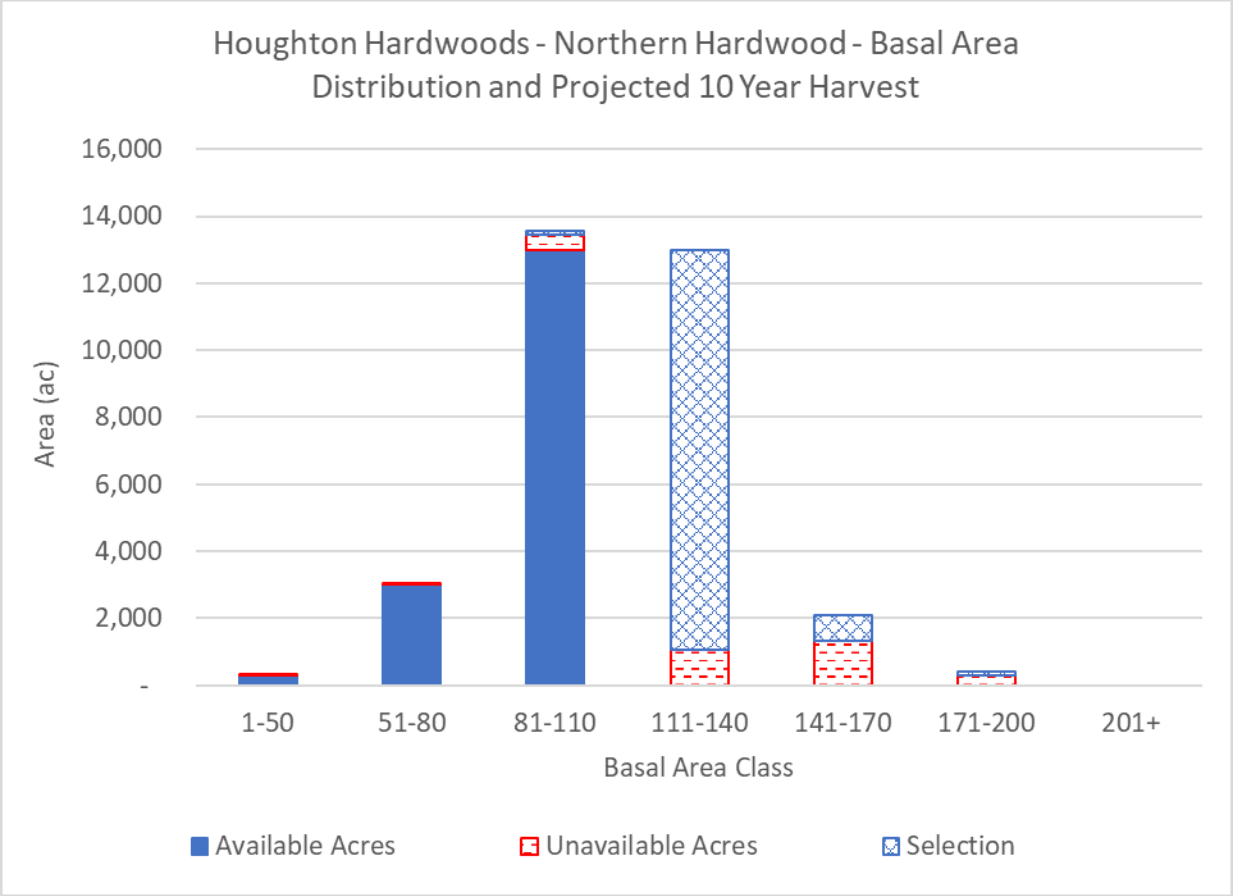


Figure 4. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Blackburnian warbler	Age category: 80+ Size category: Pole, Sawlog Basal area: 81+	24,476	2,980
Black-throated blue warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	24,476	2,980
Marten	Age category: 40+ Size category: Pole, Sawlog	24,476	2,980

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
	Basal area: 81+		
White-tailed deer	All sizes and age classes	49,385	--

Desired future condition

The projected long-term cover type trend for northern hardwood in this management area is stable. There are very few transitions into this cover type from other cover types forecasted in this management area and equally few transitions from northern hardwoods to other cover types.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime depends on successful establishment of northern hardwood species as well as recruitment of those seedlings and saplings into the pole and saw log classes. The Houghton Hardwoods management area is considered to be a step ahead of other management areas dominated by northern hardwoods because it is west of the native range of American beech. Additionally, most areas have a reduced impact from cervid herbivory because of a greater average winter snow depth.

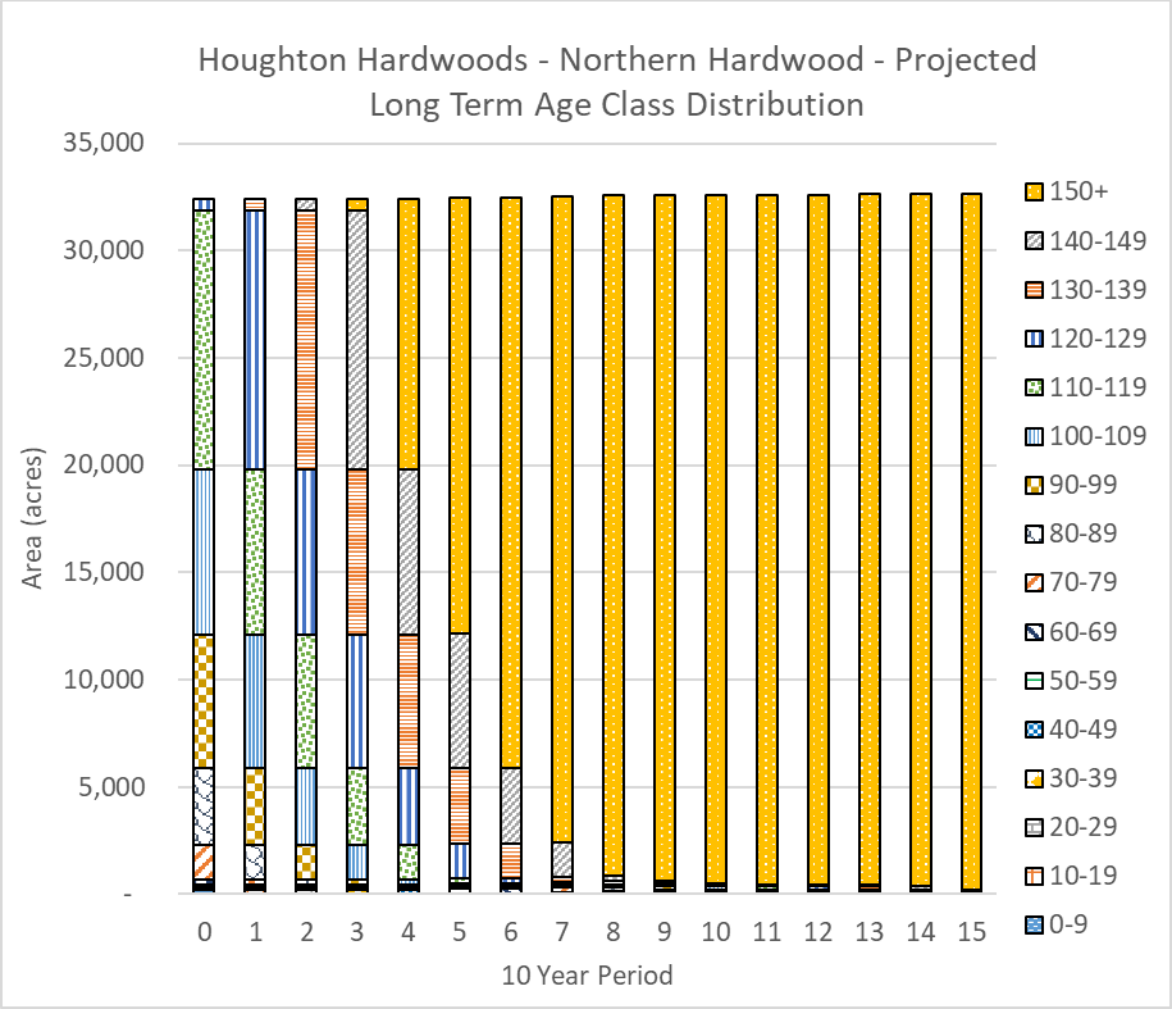


Figure 5. Projected age class distribution over 15, 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 12,934 acres (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Aspen

Current Condition

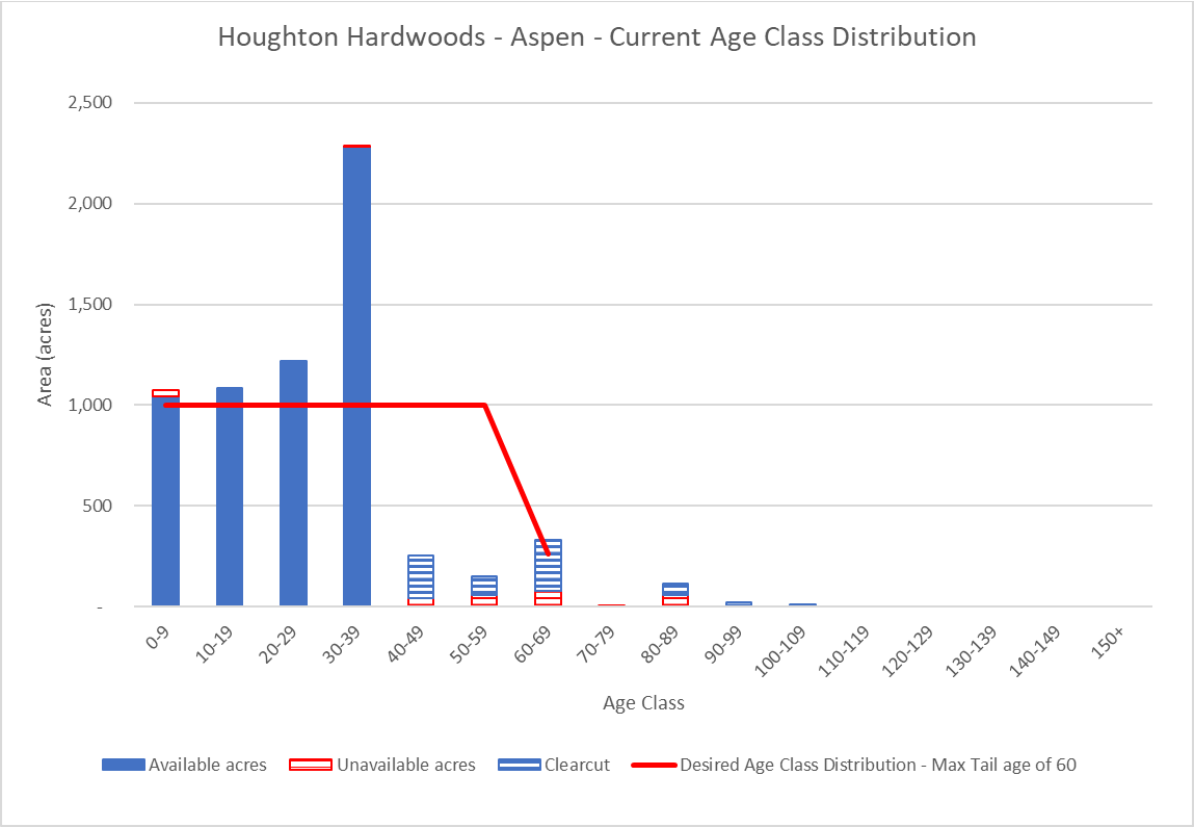


Figure 6. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is quite unbalanced, with a deficit of acres in ages greater than 40 years old and a surplus of acres in the 30–-9-year-old age class. The younger age classes are in pretty good shape with only a slight surplus in each. Limited merchantable acres in the older age classes will present managers with a challenge in achieving the desired regeneration during this planning period. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse and American woodcock.

Table 10. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: sapling	2,131	28
Ruffed grouse	Age category: 0-19 Size class: sapling	2,131	28

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
American woodcock	Age category: 0-19 Size class: sapling	2,131	28
White-tailed deer	All ages and size classes	6,557	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 4 percent of the acres in an age class tail out to a maximum of 60-year age class.

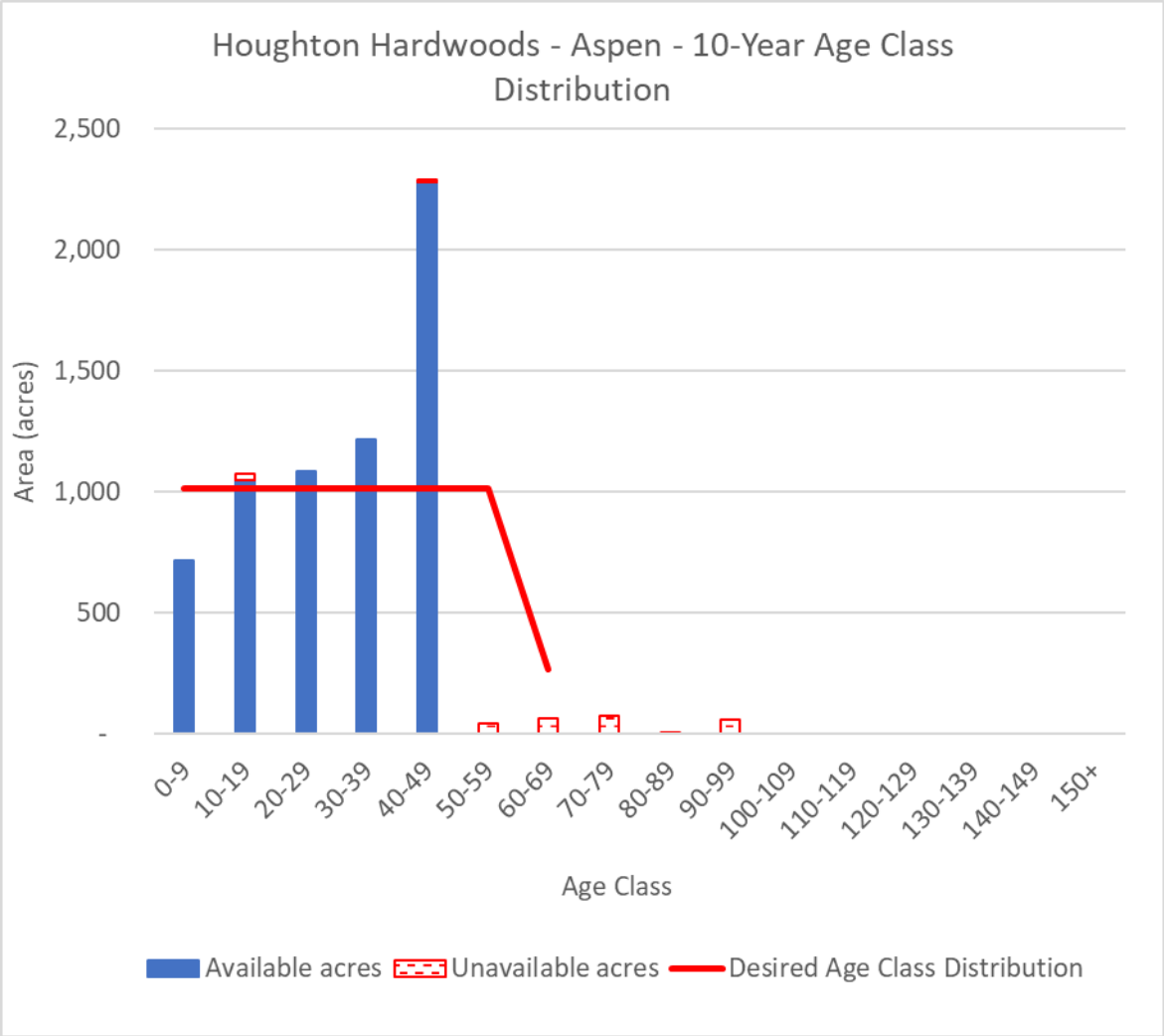


Figure 7. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 714 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take many decades.

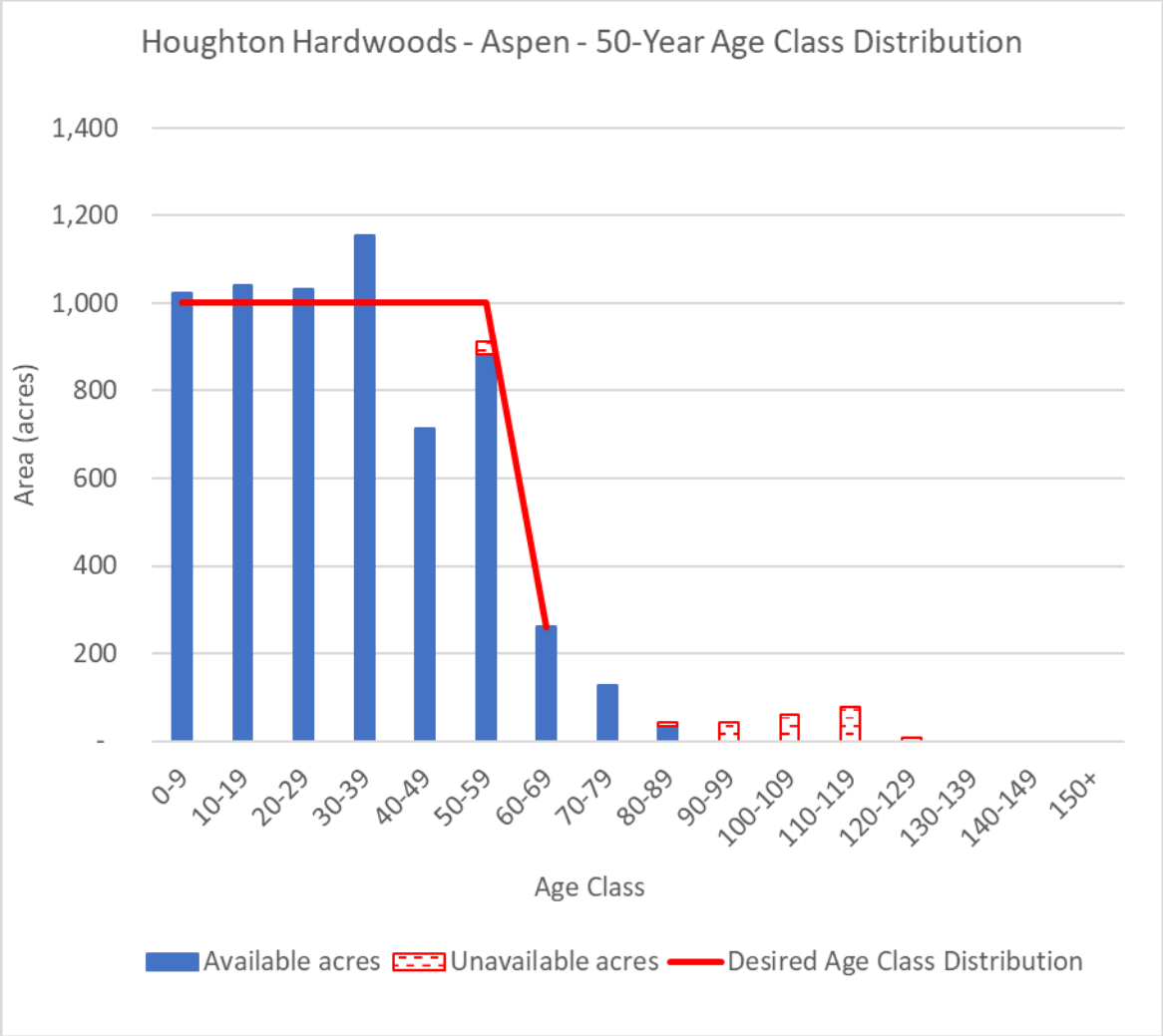


Figure 8. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows aspen acres nearly reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 8). As is often the case, an extremely un-balanced condition in the first planning period can result in the need to carry some acres slightly longer into older age classes in future years to smooth out the distribution and achieve age class goals as seen in Figure 9.

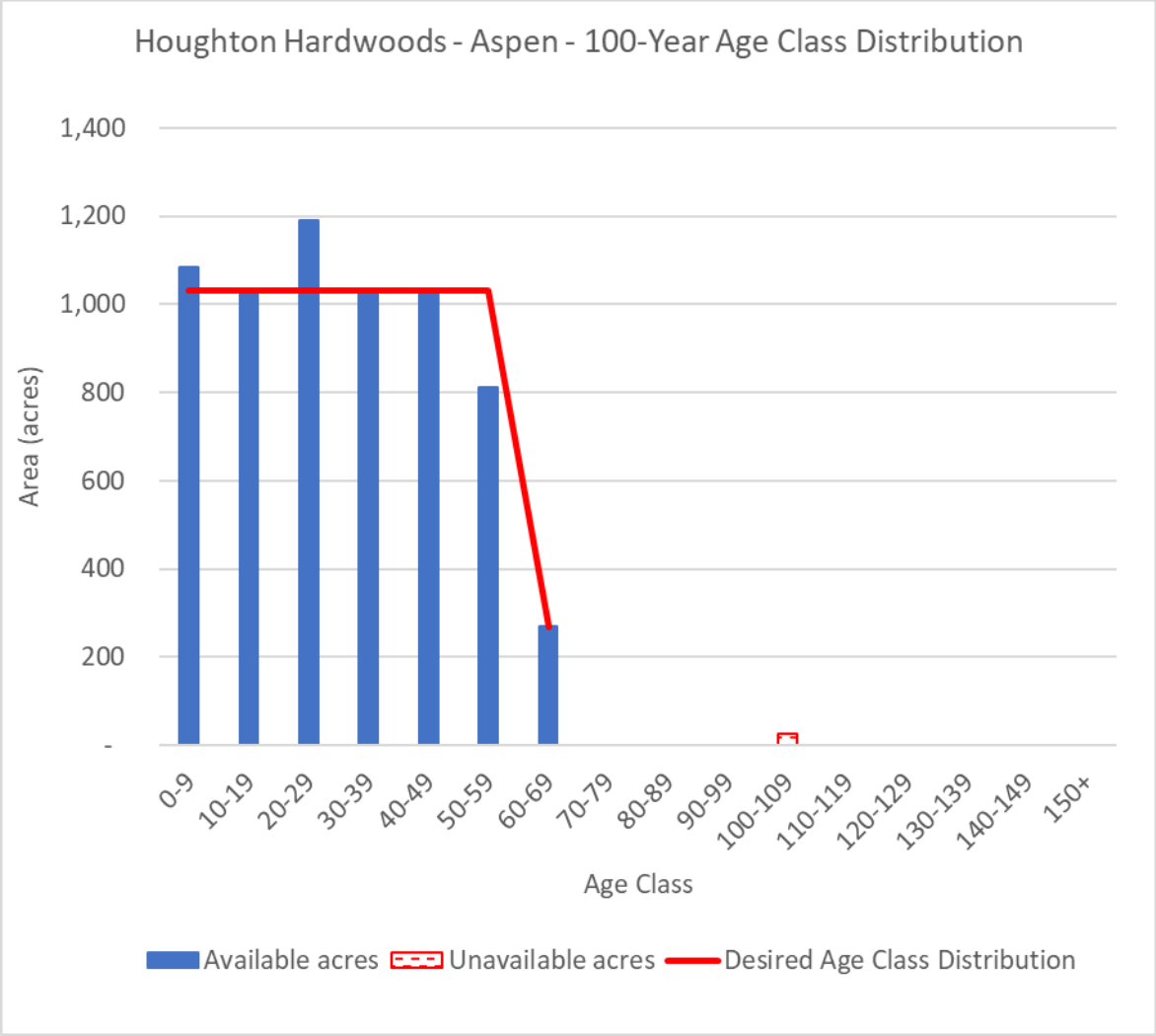


Figure 9. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 9) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There is clearcut harvest totaling a projected 646 acres in the aspen cover type and 68 more acres that will be converting to aspen from other cover types. These are expected to total 714 acres of regeneration in the aspen cover type over the next 10 years. This falls slightly short of the desired establishment of 1,030 acres per decade because of the current unbalanced condition resulting in a low amount of merchantable timber to regenerate.

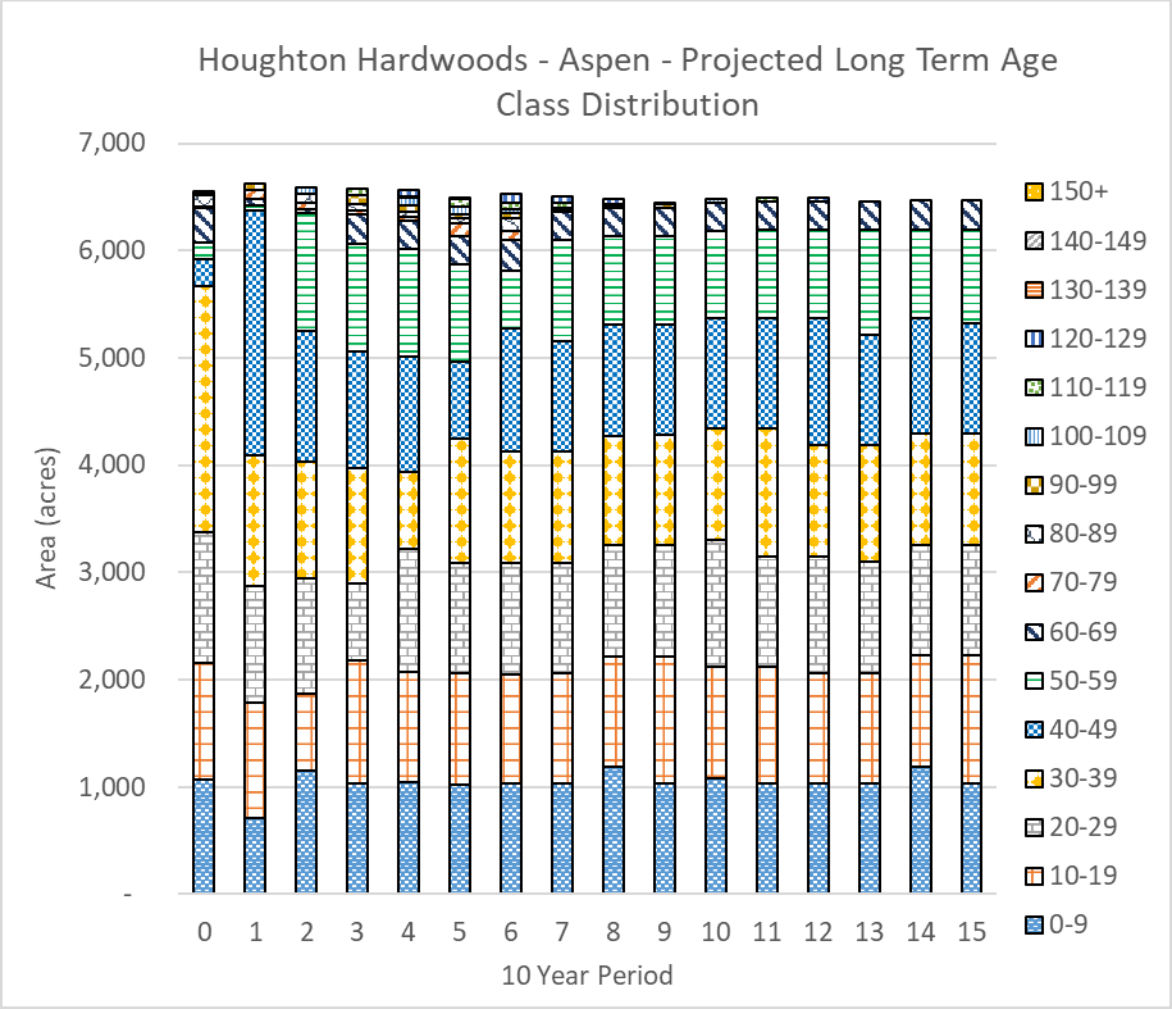


Figure 10. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 11; see Biodiversity in Section 3 for more information).

Table 11. High conservation value areas within the Houghton Hardwoods management area.

High Conservation Value Area Type and Name	Acres
Deer Wintering Complex	**5,475**
	5,475
Northern Long Eared Bat Hibernacula 0.25mi Buffer	**499**
Adventure Adit	25
Adventure Mine	5
Aztec Mine	124
Hilton Shaft 1	111
Indiana Mine	125
Merchant Mine	15
Merchant's Adit North	17
Merchant's Adit South	17
South Lake Mine	60
Toltec Mine	0
Northern Long Eared Bat Hibernacula 2.5mi Buffer	**23,390**
Adventure Adit	687
Adventure Mine	687
Algonquin Adit #2 (Mark's Adit)	3,787
Aztec Mine	1,125
Belt Mine	2,156
Caledonia Mine Complex	18
Hilton Shaft 1	838
Indiana Mine	4,093
Mass C Adit	444
Merchant Mine	687
Merchant's Adit North	687
Merchant's Adit South	687
Ogimaw Adit	416
Ogimaw Mine	484
Old Flintsteel River Adit B	53
Piscatauqau Mine	2,663
Ridge Adit	687
South Lake Mine	1,581
Toltec Mine	1,063
West Evergreen Bluff Mine	547

High Conservation Value Area Type and Name	Acres
State Wildlife Management Areas	**7,455**
Sturgeon River Sloughs SWMA	7,455
GEMS	**2,375**
Hazel Swamp	2,375
Grand Total	**39,194**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 18. Ecological reference area natural community ranking based on NatureServe .

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 19. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Great Lakes Marsh	B			2
Existing ERA	Mesic Northern Forest	BC			1
Existing ERA	Northern Hardwood Swamp	B			1
Existing ERA	Northern Shrub Thicket	AB			1
Existing ERA	Northern Shrub Thicket	AB	G4	S5	2
Existing ERA	Sand and Gravel Beach	B			1
Existing ERA	Sandstone Bedrock Lakeshore	AB	G4G5	S2	2
Existing ERA	Sandstone Cobble Shore	AB			3
Grand Total					**13**

Special Conservation Areas

Reviewable special conservation areas (SCAs; Table 14) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 15) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 14. Reviewable special conservation areas within the Houghton Hardwoods management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**1,762**
Arnhiem Tamarack Complex.	1,317
Clear Lake & Horseshoe Lake	14
Emily Lake	0
Greenier Creek	29
Pike Lake Access Site	3
Pike Lake Flooding WLD	7
Sandy Lake	10
Sturgeon River wildlife travel corridor.	91
Unspecified	292
Habitat Area or Habitat Corridor	**843**
11057045	45
Bear Creek	451
Otter River	177
Sleepy Creek	170
Mineral Resource Area	**24**
Simar Sand Pit	24
Spring, Wetlands, or Riparian Areas	**951**
11068030	82
Black Creek	138
Bruno Creek	89
Otter River tributaries	241
West branch of the Otter River	401
Visual Management Areas	**66**
11068002	66
Grand Total	**3,647**

Table 15. Static special conservation areas within the Houghton Hardwoods management area.

Static SCA Type and Name	Acres	Sum of Length (miles)
High Priority Trout Streams	**--**	**29**
Adventure Creek	--	3
Ahola Creek	--	0.03
Black Creek	--	1
Butch Creek	--	2
Clear Creek	--	2
East Branch Firesteel River	--	0.14
East Sleeping River	--	1
Elm River	--	2
Holland Creek	--	3
Little Misery River	--	0.01
Misery River	--	0.15
Otter River	--	3
Portage River	--	0.43
Red Creek	--	0.50
Salmon Trout River	--	5
Senecal Creek	--	0.33
Shawmut Creek	--	1
Sleepy Creek	--	1
Snake River	--	3
West Branch Firesteel River	--	0.83
West Branch Otter River	--	0.23
West Sleeping River	--	0.34
Long-Eared Bat Hibernacula	**374**	**--**
Adventure Adit	25	--
Adventure Mine	5	--
Aztec Mine	124	--
Hilton Shaft 1	111	--
Merchant Mine	15	--
Merchant's Adit North	17	--
Merchant's Adit South	17	--
South Lake Mine	60	--
Toltec Mine	0.42	--
State Wildlife Management Areas	**7,455**	**--**
Sturgeon River Sloughs SWMA	7,455	--
Grand Total	**7,828**	**29**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 17, 18 and 19) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 16. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 17. Rare animal species occurrence within the Houghton Hardwoods management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Acipenser fulvescens	Lake sturgeon	T	--	2
Animal	Alces alces*	Moose	SC	--	--
Animal	Bombus borealis	Northern amber bumble bee	SC	--	1
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	1
Animal	Botaurus lentiginosus	American bittern	SC	--	1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Coregonus artedi	Lake herring or Cisco	T	--	2
Animal	Elliptio complanata	Eastern elliptio	SC	--	1
Animal	Gallinula galeata	Common gallinule	T	--	1
Animal	Gavia immer	Common loon	T	--	4
Animal	Glyptemys insculpta	Wood turtle	T	--	1
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	5
Animal	Ixobrychus exilis	Least bittern	T	--	1
Animal	Ligumia recta	Black sandshell	T	--	1
Animal	Lithobates palustris	Pickerel frog	SC	--	1
Animal	Myotis lucifugus	Little brown bat	T	--	2
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC	--	2

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Notropis dorsalis	Bigmouth shiner	T	--	3
Animal	Perimyotis subflavus	Tricolored bat	T	--	1
Animal	Sander canadensis	Sauger	E	--	2
Total	--	--	--	--	**33**

**Occurrence information provided by field staff.*

Table 18. Rare plant species occurrence within the Houghton Hardwoods management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Asplenium rhizophyllum	C	S2S3	G5	1
Astragalus canadensis	H	S1S2	G5	1
Callitriche hermaphroditica	H	S2	G5	1
Crataegus douglasii	H	S3S4	G5	1
Cystopteris laurentiana	E	S1S2	G3	1
Mertensia paniculata	H	SNR	G5	1
Potamogeton vaseyi	E	S1S2	G4	1
Ribes oxyacanthoides	H	S3	G5	1
Trisetum spicatum	E	S2S3	G5	1
Grand Total	-	-	-	9

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation. They are recognized and managed accordingly. There are no non-ERA natural communities in the management area.

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 20) and diseases (Table 21) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 20. Defoliating insects of concern in the Houghton Hardwoods management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes

Spruce budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 21. Maladies of concern in the Houghton Hardwoods management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak Wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

A total of 153 miles of streams and rivers are found in the management area (Table 22). Streams/rivers classified as cold types comprise approximately 65 percent of the riverine mileage.

Table 22. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	99
Cold small river	1
Cold transitional stream	0
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	45
Warm transitional small river	1
Warm transitional large river	5
Warm stream	1
Warm small river	1
Warm large river	<1

Lacustrine habitat

A total of 17 lakes and ponds of at least 1 acre of surface area are found in this management area (Table 23).

Table 23. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	12
100-499	2
500+	3

Wetlands

A total of 12,141 acres of wetlands can be found in the management area (Table 24). Forested wetlands comprise approximately 81 percent of wetland types found in the management area.

Table 24. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,612
Forested	9,878
Riverine	651

Vernal pools and seeps

A total of 16 acres of vernal pools have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Northern hardwood is the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 25).

Table 25. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Northern hardwood	6,017
Mixed upland deciduous	1,620
Upland mixed forest	1,398
Lowland conifers	1,314
Lowland shrub	1,236
Aspen	1,193
Lowland deciduous	800
Upland conifers	604
Hemlock	372
Lowland mixed forest	239

Watershed vegetation cover

The management area includes portions of important watersheds of the Otter and Sturgeon rivers (Tables 26 and 27). Aspen is a major cover type of the state forest in each watershed.

Table 26. Largest vegetative cover types (i.e., top 5) and area of the Otter watershed located within the management area.

Cover Type	Acres
Aspen	18,966
Northern Hardwood	3,133
Cedar	1,624
Lowland Shrub	1,150
Lowland Conifer	924

Table 27. Largest vegetative cover types (i.e., top 5) and area of the Sturgeon River watershed located within the management area.

Cover Type	Acres
Aspen	1,873
Northern Hardwood	1,035
Cedar	941
Mixed Upland Deciduous	858
Lowland Shrub	690

Recreation

Access in the Houghton Hardwoods varies, with some very remote areas with few roads. In other areas, a complex network of forest roads supplies public access for hunting and fishing, as well as timber harvest, sometimes across large industrial or small private ownerships. Rail trails include the Baraga-

Chassell trail, which crosses the area from south to north and the Bill Nicholls Route, designated for off-road vehicle and snowmobile use and open to all non-motorized uses.

There is one state forest campground (rustic) within the management area at Emily Lake.

Table 28. Designated Recreation Trails by type.

Recreation Category	Number of Miles
Motorized Recreation Trails	**30.3**
ORV (all types)	10.6
Snowmobile	19.7
Non-motorized Recreation Trails	**7.8**
Hiking	0
Equestrian	0
Biking	0
Hunter walking trails	7.8
Total	**38.1**

Note: Trail use types may overlap.

Table 29. State Forest Campgrounds.

Name	Number of sites
Emily Lake campground	9

Bordered on the west by the Sturgeon River and on the north by Portage Lake and the Portage River, Sturgeon River Sloughs SWMA offers excellent duck and goose hunting opportunities, as well as wildlife viewing, birding, canoeing/kayaking and fishing. A 1.75-mile hiking trail is present on the northern part of the property with an observation platform overlooking the marsh. A portion of the site is a wildlife refuge closed to the public.

The Hazel Swamp GEM, approximately 15 miles northwest of Baraga, provides hunter walking trails through stands of aspen with changing elevations, providing a unique hunting experience for grouse and woodcock.

Several boating access sites are scattered around area lakes and provide access to the Portage and Misery rivers.

Table 30. Areas managed for hunting.

Type	Name	Number of Acres
State Wildlife Management Areas	Sturgeon River Sloughs SWMA	7,450.8
Grouse Enhancement Management Sites	Hazel Swamp GEM	2,375.1
Total	--	**9,825.9**

Table 31. Boating access sites (BAS).

Name	Waterbody
Clear Lake	Clear Lake
Emily Lake SFCG	Emily Lake
Lake Perrault	Lake Perrault
Misery River Mouth	Misery River Mouth/Lake Superior
Otter Lake Dam	Otter Lake
Pike Lake	Pike Lake
Sandy Lake	Sandy Lake
Sturgeon River Sloughs	Portage River

Keweenaw

State Forest Area: 12,030 acres	Location: Keweenaw Peninsula	Population Centers: Hancock, Copper Harbor
Sub-Section: Sisu Copper Range	Landforms: Exposed bedrock knobs, ground- and end-moraines	Landcover: Forested: 10,694 acres Non-forested: 1,336 acres

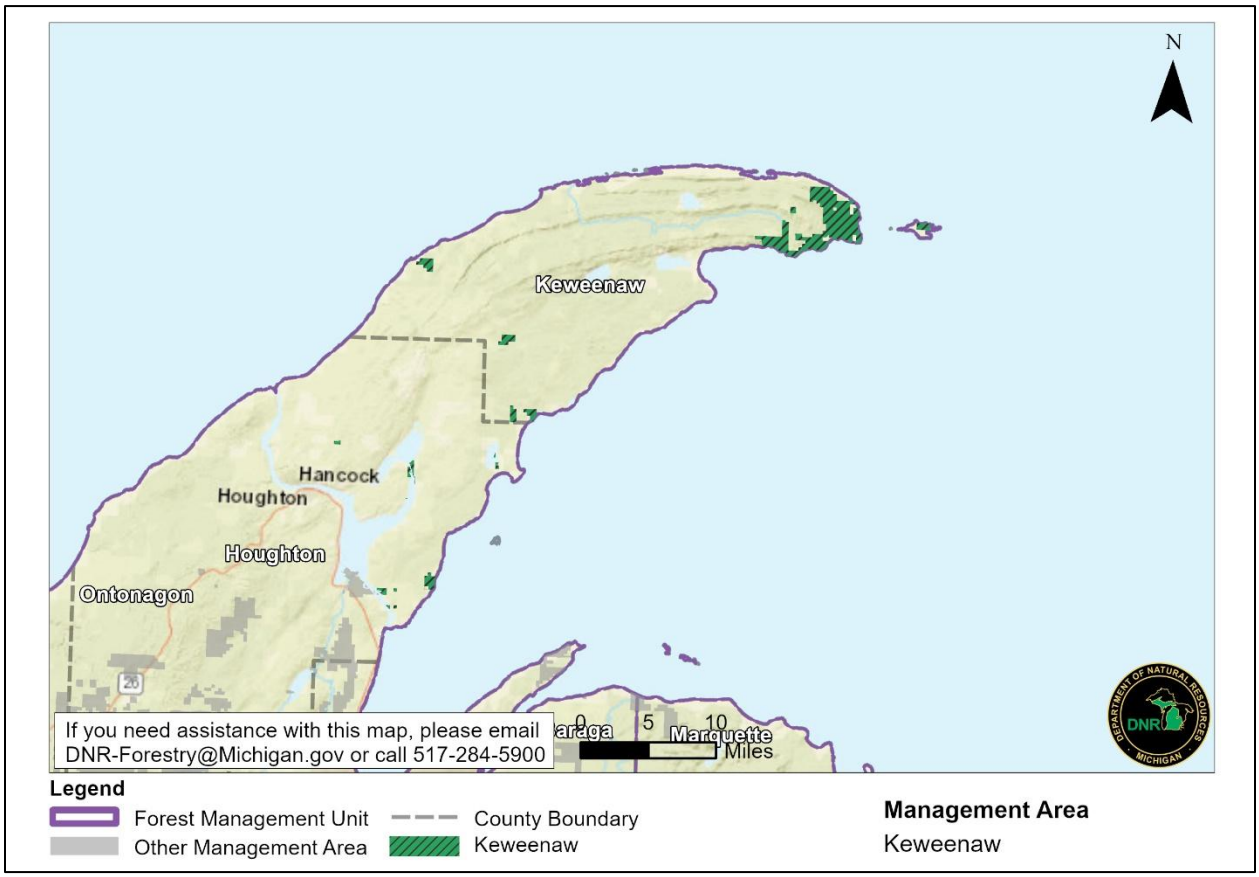


Figure 1. Map of the Keweenaw management area.

Forested andscape

Current and projected future condition

The Keweenaw management area is dominated by shade-tolerant and mid-tolerant cover types and many unavailable acres. Tolerant upland cover types are relatively evenly distributed across the age categories, while unavailable upland and lowland acres are more prevalent in the older age category.

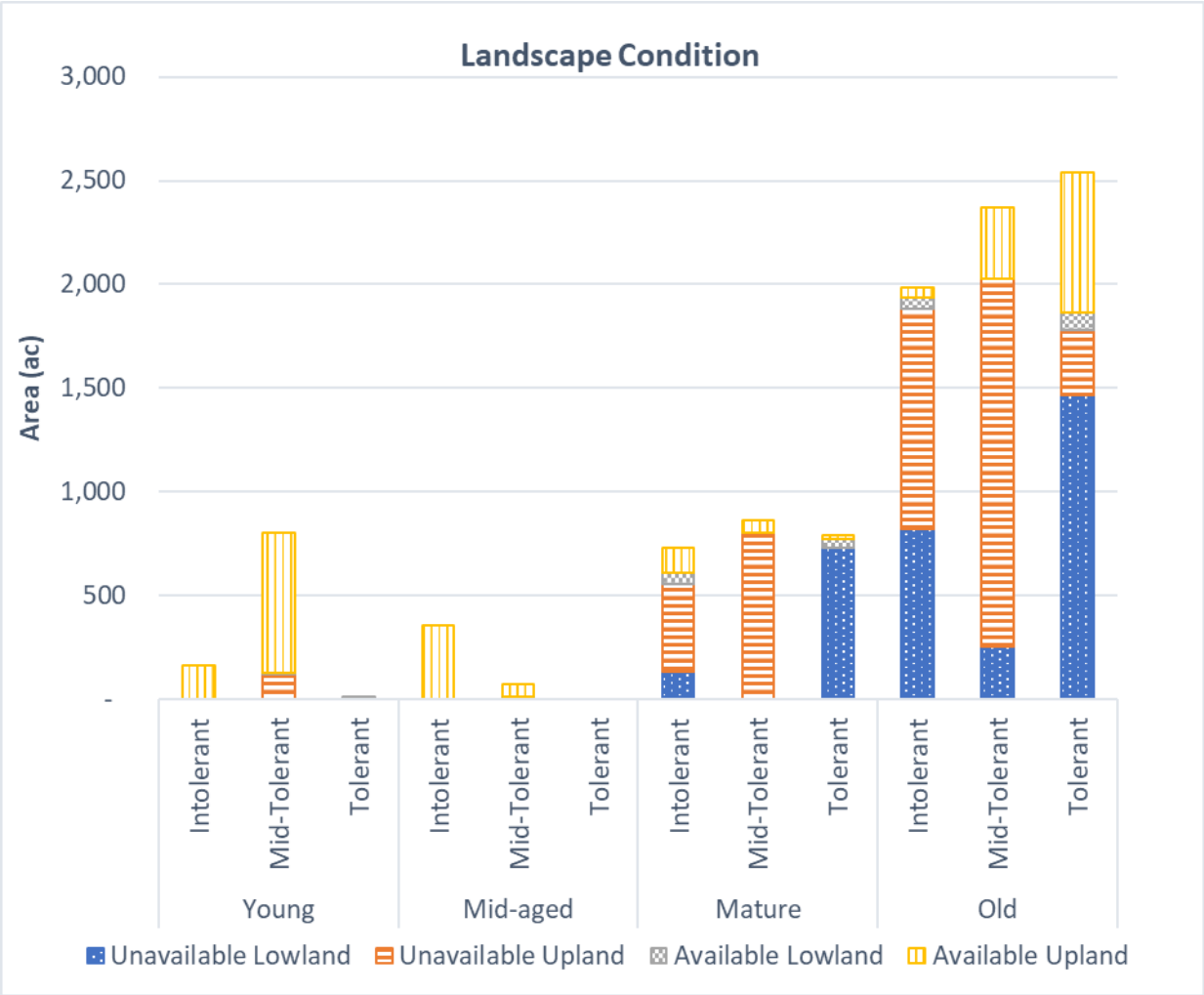


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack pine	978
Mature forest	Acres of 80+ year stands across cover types	6,514
Mature forest	Acres of 120+ year stands across cover types	3,460
Mesic conifer cover types	Acres of mesic conifer cover types	1,617
Mesic conifers in other cover types	Average canopy occupancy	26%
Mast – oak cover types	Acres of oak cover types	102
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	3,279
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size Class	15,138
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	4
Landscape forest matrix	Percent deciduous forest	45%
Landscape Forest Matrix	Percent coniferous forest	47%

Coastal habitat is important within the management area. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, landbirds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls, and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed, and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provides unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas (IBAs). The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Keweenaw management area is dominated by forested cover types, with 89 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 39 percent of the management area and comprised mostly of aspen. The lowland conifer portion is 31 percent of the management area and comprised mostly of lowland conifer. Lowland shrub is the most common non-forested cover type in this management area, representing 4 percent of the landscape.

Table 2. Landscape conditions and distribution of cover types in the Keweenaw management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	2,051	4,669	7,024	10,694
			Northern Hardwood	760			
			Black Red Hybrid Oak	0			
			Northern Red Oak	102			
			Oak Mix	0			
			Mixed Upland Deciduous	1,756			
		Mixed	Upland Mixed Forest	660	660		
		Coniferous	Planted Red Pine	0	1,696		
			Planted Jack Pine	0			
			Planted White Pine	0			
			Planted Mixed Pine	0			
			Natural Red Pine	78			
			Natural Jack Pine	0			
			Natural White Pine	63			
			Natural Mixed Pines	0			
			Upland Spruce/Fir	390			
			Upland Conifers	1,164			
			Hemlock	0			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	39	184	3,670	
			Lowland Deciduous	145			
		Mixed	Lowland Mixed Forest	135	135		
		Coniferous	Cedar	976	3,351		
			Lowland Conifers	1,353			
			Lowland Spruce/Fir	798			
			Tamarack	223			
Nonforested	Upland	N/A	Herbaceous Openland	4	N/A	57	1,336
			Upland Shrub	0			
			Low Density Trees	0			
			Bare/Sparsely Vegetated	49			
			Cropland	0			
			Urban	4			
	Lowland	N/A	Lowland Shrub	428	N/A	1,279	
			Marsh	64			
			Bog	115			
			Treed Bog	19			
			Water	654			
						Grand Total	12,030

There are 2,780 acres (23.1 percent of the total management area and 26.0 percent of the forested area) that can be managed toward desired future conditions through commercial timber harvest in the Keweenaw management area (Table 3). Of that, more than 9 percent is in the aspen cover type, 7 percent is mixed upland deciduous, and 5 percent is in northern hardwood. The remaining 13 cover types represent about 5 percent of the forested and available land in the management area.

Table 3. Landscape conditions and cover type composition of the Keweenaw management area.

Keweenaw Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	997	9.3%	1,053	9.8%	2,051	19.2%
Cedar	83	0.8%	893	8.4%	976	9.1%
Lowland aspen/balsam poplar	39	0.4%	0	0.0%	39	0.4%
Lowland conifers	49	0.5%	1,305	12.2%	1,353	12.7%
Lowland deciduous	12	0.1%	133	1.2%	145	1.4%
Lowland mixed forest	0	0.0%	135	1.3%	135	1.3%
Lowland spruce/fir	71	0.7%	727	6.8%	798	7.5%
Mixed upland deciduous	715	6.7%	1,041	9.7%	1,756	16.4%
Natural red pine	55	0.5%	23	0.2%	78	0.7%
Natural white pine	4	0.0%	59	0.5%	63	0.6%
Northern hardwood	502	4.7%	259	2.4%	760	7.1%
Northern red oak	8	0.1%	95	0.9%	102	1.0%
Tamarack	0	0.0%	223	2.1%	223	2.1%
Upland conifers	33	0.3%	1,131	10.6%	1,164	10.9%
Upland mixed forest	162	1.5%	499	4.7%	660	6.2%
Upland spruce/fir	50	0.5%	340	3.2%	390	3.6%
Grand Total	**2,780**	**26.0%**	**7,914**	**74.0%**	**10,694**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvest) acres for the Keweenaw Management Area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Conservation values	3,639	46.0%
Too wet	1,110	14.0%
Rare landforms	1,024	12.9%
Recreational/scenic	667	8.4%
Federal/state/local law	421	5.3%
Blocked by obstacle	313	4.0%
BMPs	238	3.0%
Too steep	212	2.7%
Other influence zones	139	1.8%

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Denied access	106	1.3%
Wildlife concerns	19	0.2%
Non-military lease/easement	13	0.2%
Deer wintering area	12	0.2%
Long-term retention	2	0.0%
Total Unavailable	**7,914**	**100.0%**

Management actions

Each cover type in the Keweenaw management area has a unique age class and basal area class goals that describe the long term desired future conditions. The Keweenaw management area is being managed under a carbon sequestration project. No harvests are planned over the lifetime of the project (Table 5). There are no cover type transitions projected in this area. The managed area of each cover type is projected to remain stable except for natural disturbance (Table 6).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime (no harvests)

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern red oak	-	-	-	-	-	-	-	-
Upland mixed forest	-	-	-	-	-	-	-	-
Planted red pine	-	-	-	-	-	-	-	-
Black Red hybrid oak	-	-	-	-	-	-	-	-
Natural white pine	-	-	-	-	-	-	-	-
Cedar	-	-	-	-	-	-	-	-
Planted jack pine	-	-	-	-	-	-	-	-
Hemlock	-	-	-	-	-	-	-	-
Tamarack	-	-	-	-	-	-	-	-
Lowland aspen/balsam poplar	-	-	-	-	-	-	-	-
Aspen	-	-	-	-	-	-	-	-
Lowland conifers	-	-	-	-	-	-	-	-
Northern hardwood	-	-	-	-	-	-	-	-
Lowland deciduous	-	-	-	-	-	-	-	-
Oak mix	-	-	-	-	-	-	-	-
Lowland mixed forest	-	-	-	-	-	-	-	-
Planted mixed pine	-	-	-	-	-	-	-	-
Lowland spruce/fir	-	-	-	-	-	-	-	-
Planted white pine	-	-	-	-	-	-	-	-
Mixed upland deciduous	-	-	-	-	-	-	-	-
Upland conifers	-	-	-	-	-	-	-	-
Natural jack pine	-	-	-	-	-	-	-	-
Upland spruce/fir	-	-	-	-	-	-	-	-
Natural mixed pines	-	-	-	-	-	-	-	-
Natural red pine	-	-	-	-	-	-	-	-
Totals	-	-	-	-	-	-	-	-

Table 6. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	2,051	2,051	0
Mixed upland deciduous	1,756	1,756	0
Lowland conifers	1,353	1,353	0
Upland conifers	1,164	1,164	0
Cedar	976	976	0
Lowland spruce/fir	798	798	0
Northern hardwood	760	760	0
Upland mixed forest	660	660	0
Upland spruce/fir	390	390	0
Tamarack	223	223	0
Lowland deciduous	145	145	0
Lowland mixed forest	135	135	0
Northern red oak	102	102	0
Natural red pine	78	78	0
Natural white pine	63	63	0
Lowland aspen/balsam poplar	39	39	0
Water	654	654	0
Lowland shrub	428	428	0
Bog	115	115	0
Marsh	64	64	0
Bare/sparsely vegetated	49	49	0
Treed Bog	19	19	0
Urban	4	4	0
Herbaceous openland	4	4	0
Total:	**12,030**	**12,030**	**0**

Featured species current and projected habitat acres

There are six featured species in this management area that span various cover types, age classes, and stand level conditions.

As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors

including the simplification of habitat attributes into MiFI variables. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 7). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40 to 60 years; this is due to the basal area dropping below 81. Because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Black bear is not included in the model so shows only current potential habitat acres. It is included here to inform management decisions over the decade.

Table 7. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black bear	Generalist/mast	3,279	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	1,720	1,892	2,444	2,987
Marten UP	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	4,041	4,626	5,808	7,120
Ruffed Grouse	Aspen	504	482	--	--
Snowshoe hare forest	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	1,223	777	--	--
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	5,647	5,647	5,542	5,542

Featured Species	Priority Cover types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
White-tailed deer (shelter)*	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	4,823	4,823	4,929	4,929

Deer Wintering Complexes (DWC) that are greater than 15,000 acres are modeled as a special analysis unit and information on them can be found in Section 5 of the plan. In DWCs less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated wildlife species

Aspen

Current condition

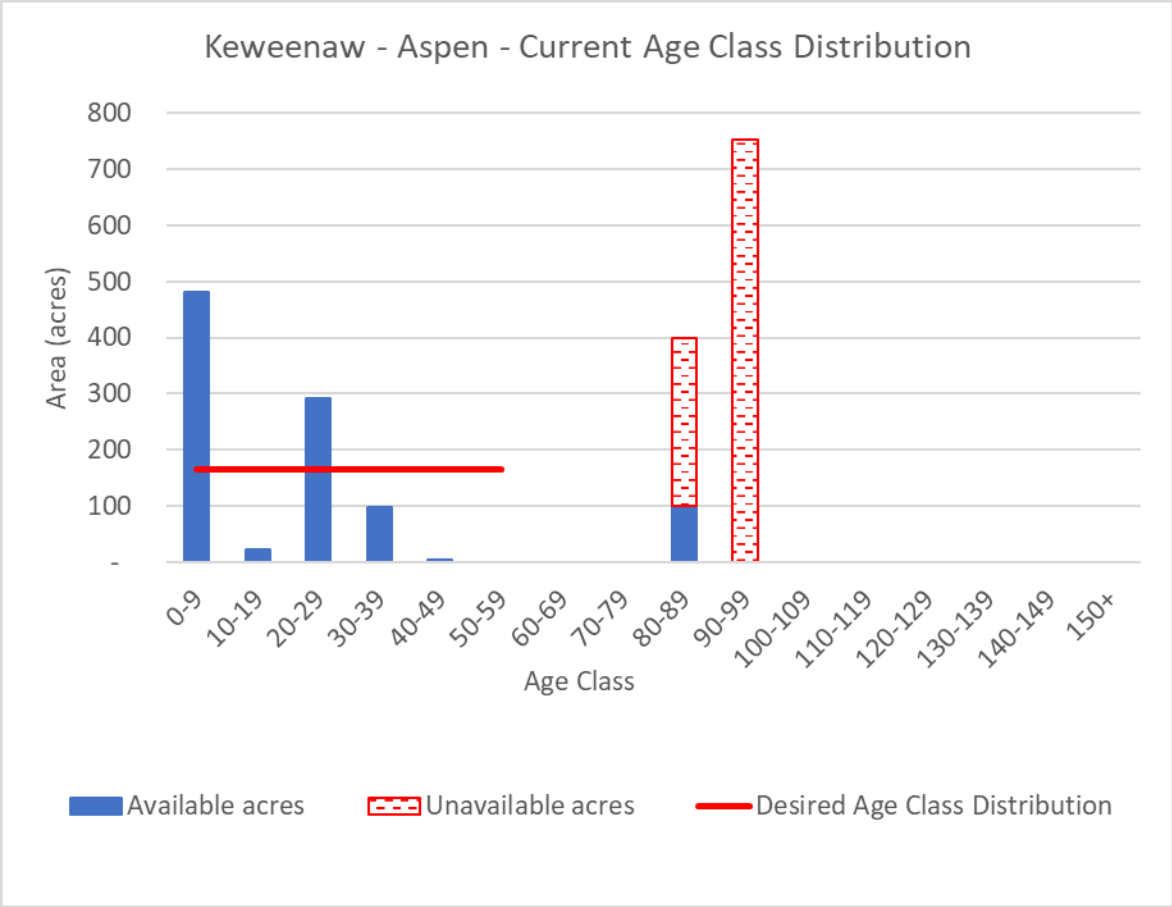


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is very unbalanced with a deficit of acres in the 10-19 and the 30-59-year-old age classes and a surplus of acres in the 0-9 and the 20-29-year-old age classes. This aspen in this area will be allowed to age naturally and allowed to senesce into more long-lived cover types. A portion of this cover type currently meets the habitat requirements for ruffed grouse and snowshoe hare for the next decade.

Table 8. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres-Available	Aspen Habitat Acres-Unavailable
Ruffed grouse	Age category: 0-19 Size category: sapling	504	0
Snowshoe hare	Age category: 0-19 Size category: sapling	504	0
White-tailed deer	All ages and size classes	2,051	0

Desired Future Condition

The aspen in this area will be allowed to age naturally and allowed to senesce into more long-lived cover types.

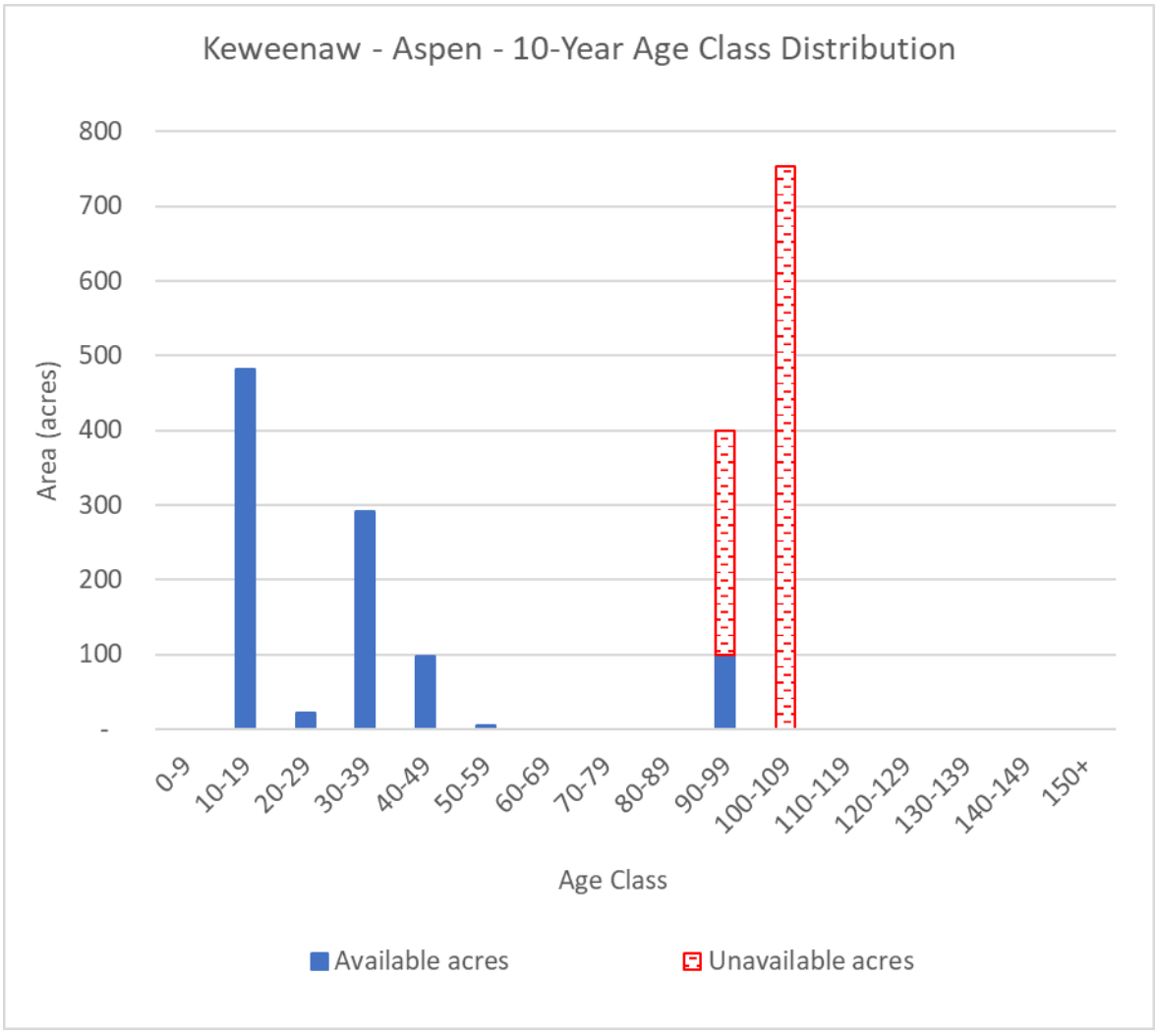


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in no acres of aspen in the upcoming 0-9 age class, eliminating the small amount of available habitat for snowshoe hare and ruffed grouse in this cover type.

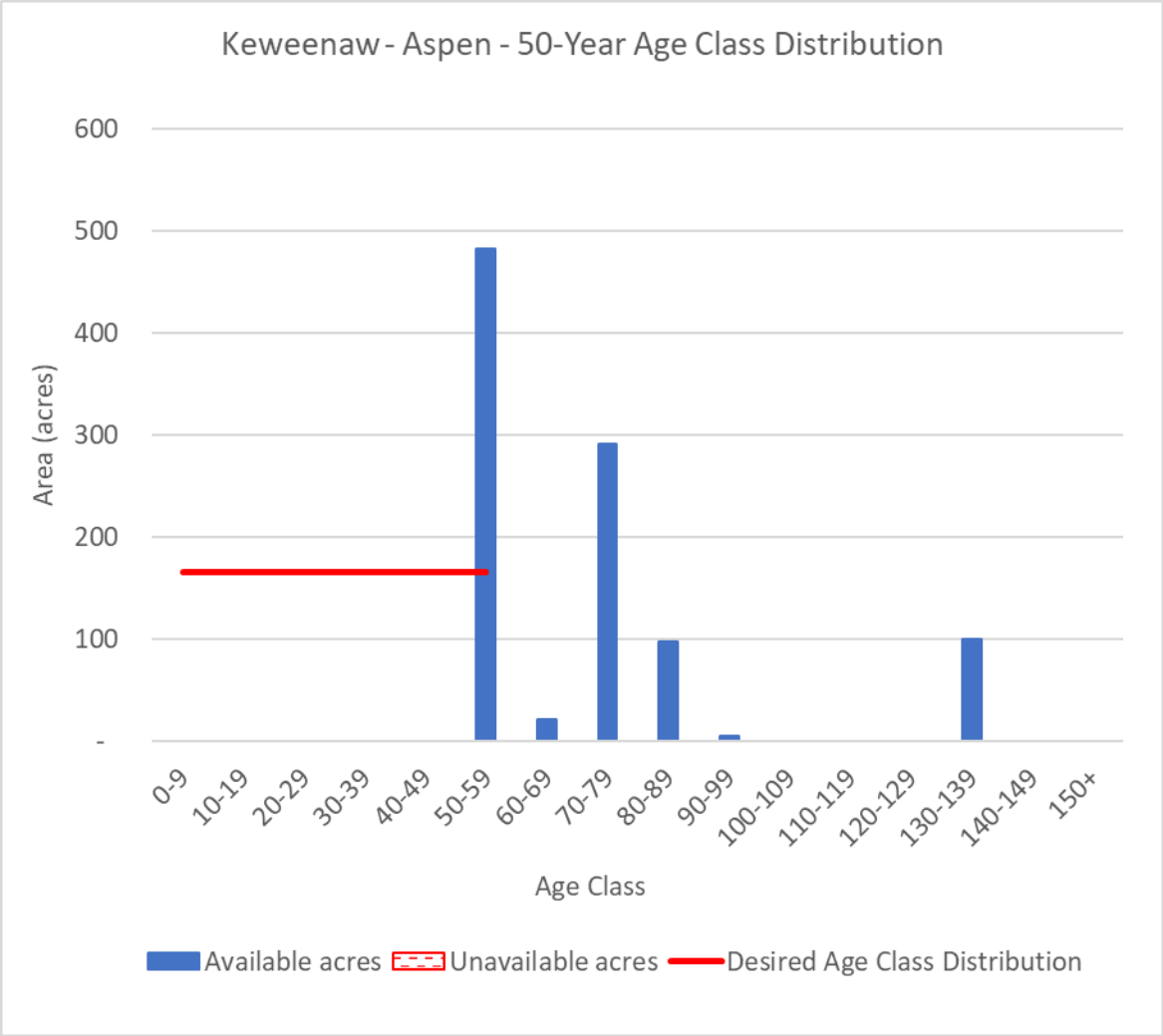


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age-class distribution shows the population of aspen acres reaching the end of their natural life span and senescing into other cover types (Figure 5).



Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

Management Actions

There are no acres of projected harvests in the aspen cover type. It is expected that no acres of aspen will be converted to other cover types through management action. No acres of aspen will be regenerated over the next 10 years.

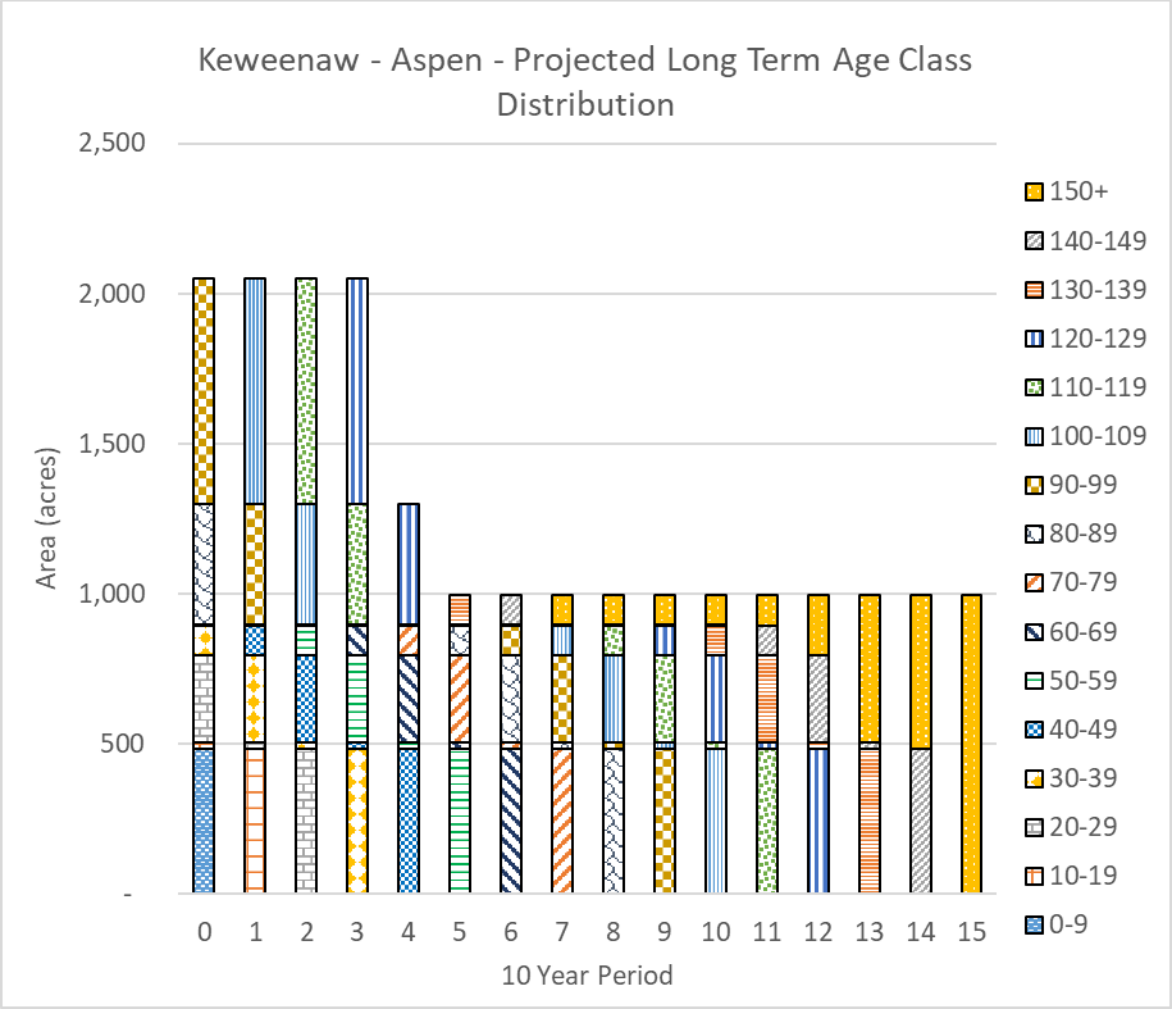


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Mixed upland deciduous

Current condition

The current age class distribution is unbalanced with a deficit of acres in the 40-99 year-old age classes, and a surplus of acres in the 0-19-year-old age classes.

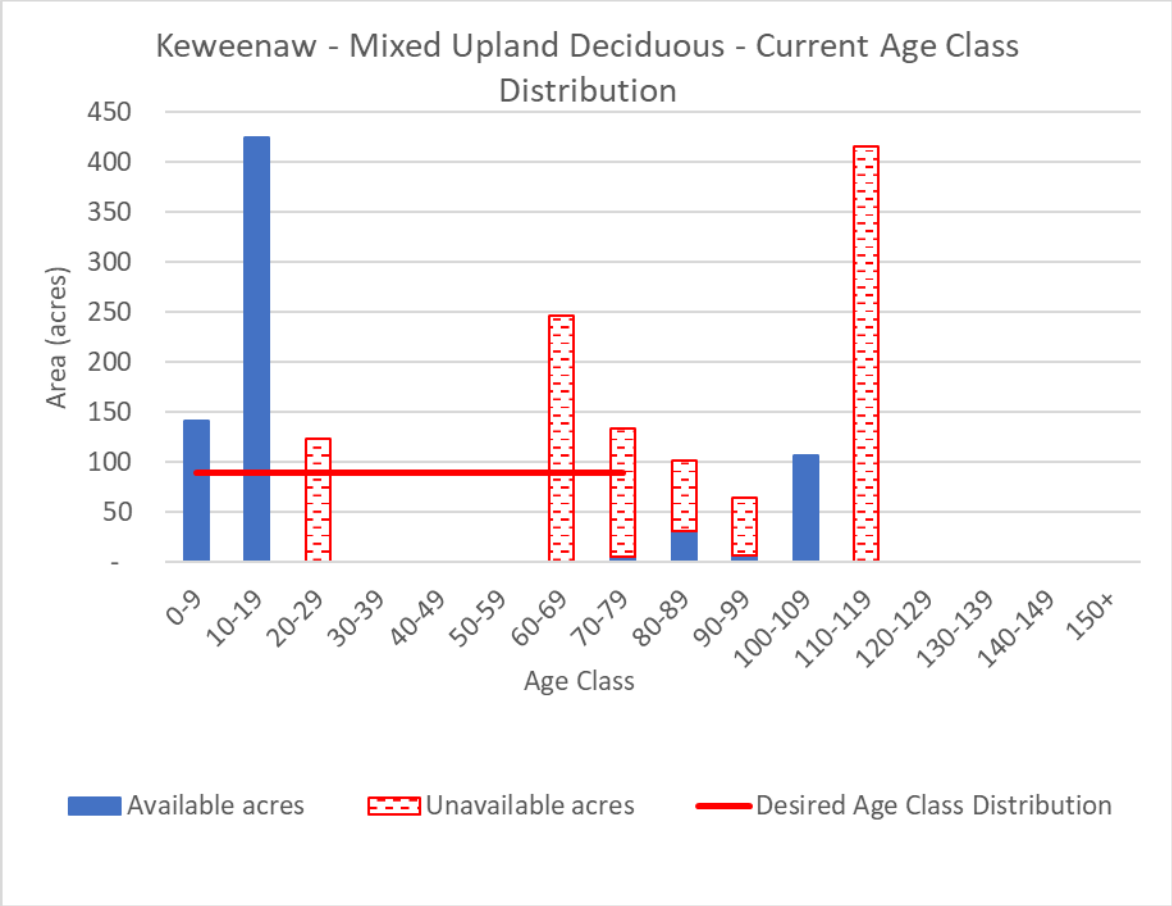


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the mixed upland deciduous cover type over the 10-year planning period.

Table 9. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres- Available	Mixed Upland Deciduous Habitat Acres- Unavailable
Marten	Age category: 40+ Size category: pole, sawlog	144	545
Snowshoe hare	Age category: 0-19 Size category: Sapling	566	0

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres- Available	Mixed Upland Deciduous Habitat Acres- Unavailable
White-tailed deer	All ages and size classes	1,756	--

Desired future condition

Mixed upland deciduous in this area will be allowed to age naturally and senesce into more long-lived cover types.

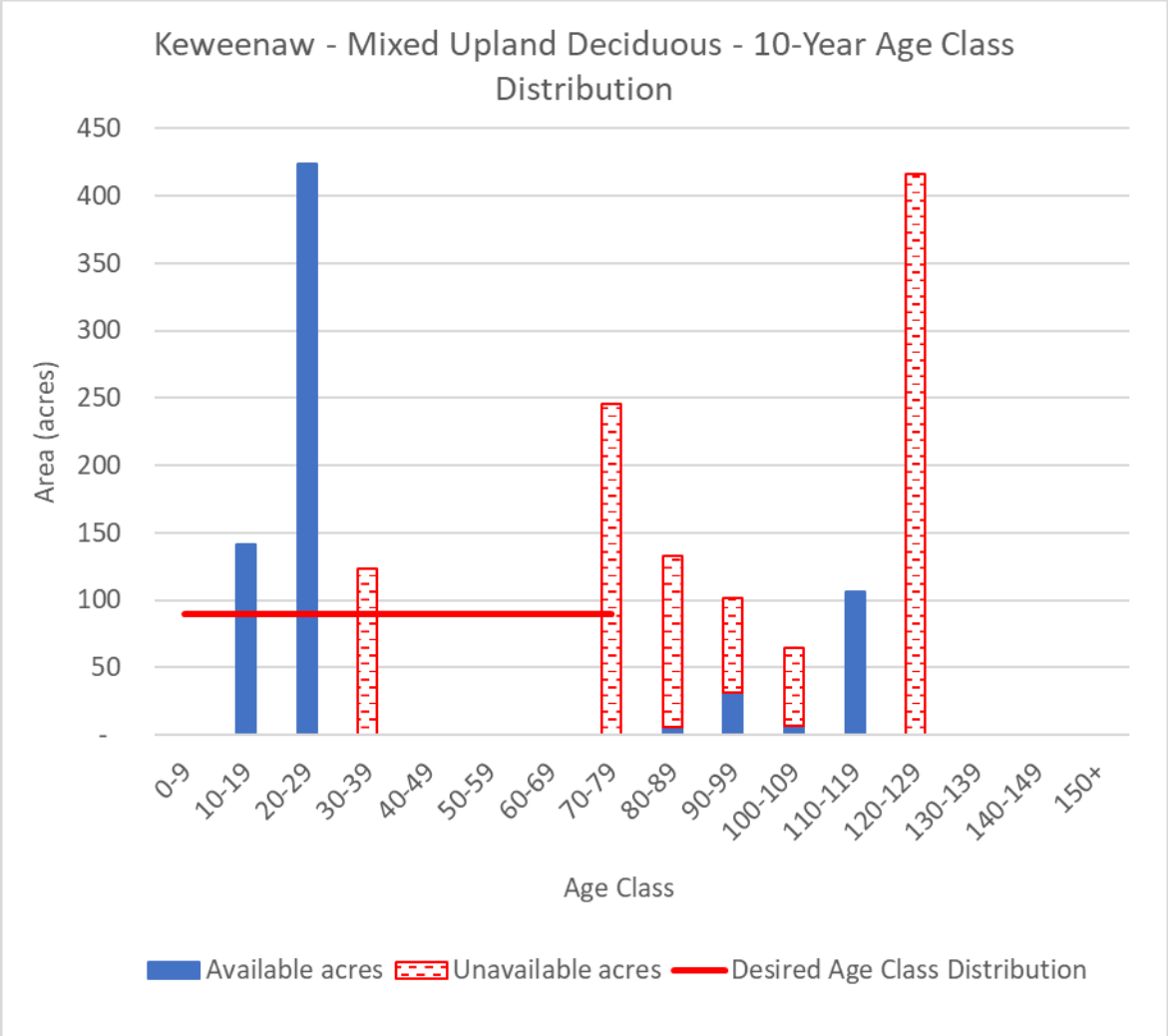


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in having zero acres in the upcoming 0-9 age class.



Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed upland deciduous acres reaching the end of their natural life span and senescing into other cover types. Most likely these acres will grade into a more northern hardwood cover type as shorter-lived species fall out of the mix (Figure 10).

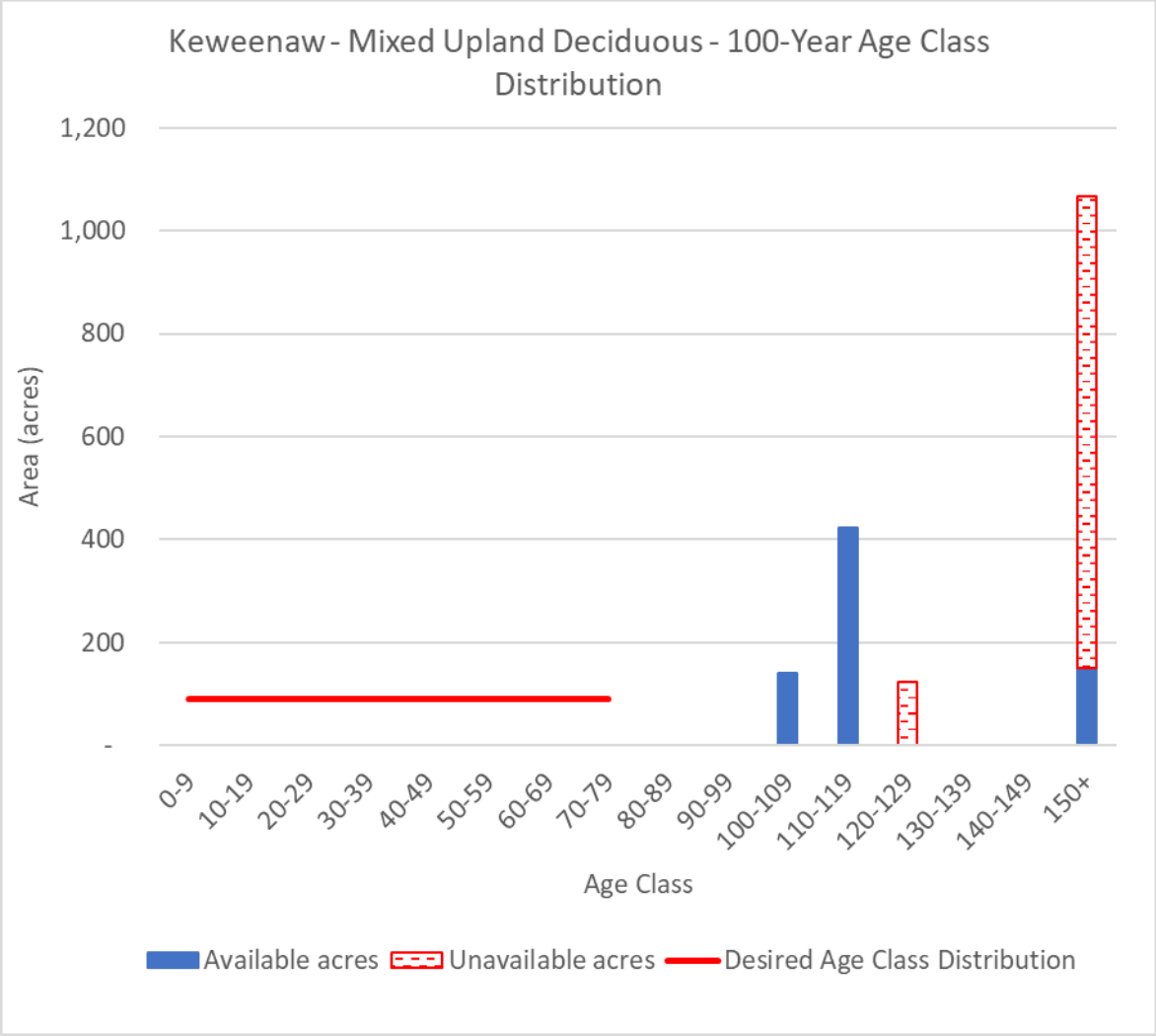


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing carbon sequestration and a wide variety of wildlife habitat conditions across the landscape in mid aged and mature forests.

Management actions

There are no acres of projected harvest in the mixed upland deciduous cover type. No acres of regeneration are expected over the next 10 years.

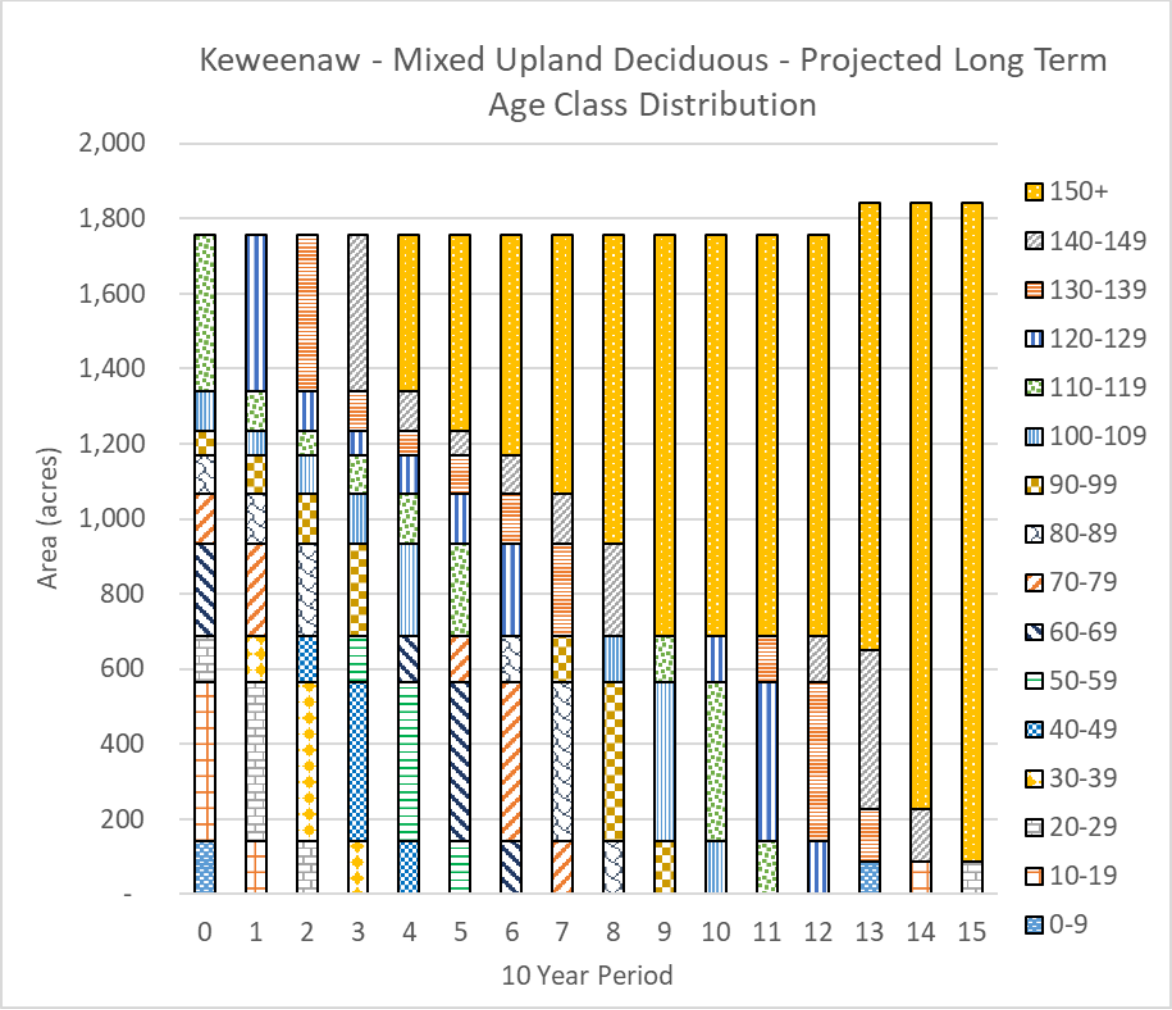


Figure 12. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type in the management area is between the ages of 100 and 109 years old (Figure 4). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old before a younger age cohort becomes the prominent component of these stands (Figure 15). A portion of the stand has been managed under an even-aged system due to poor quality stands or a predominance of red maple in those stands.

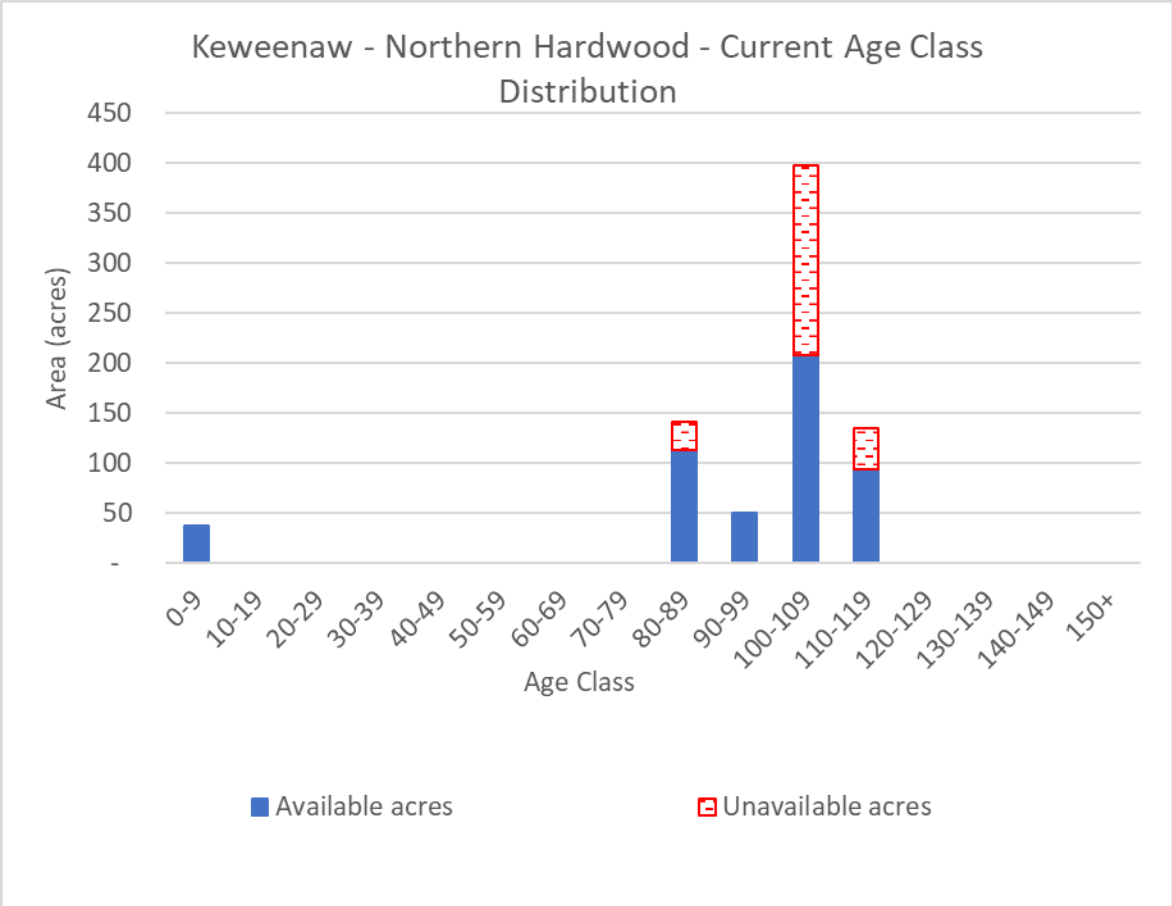


Figure 13. Current age class distribution and projected harvests in the northern hardwood cover type in the Keweenaw management area.

The area of northern hardwood is not well distributed in the ideal basal area classes for optimal growing conditions (Figure 13). Current conditions are a result of heavy cutting by industrial owners before the state acquired the land in 2006. Little active management is expected for many decades.

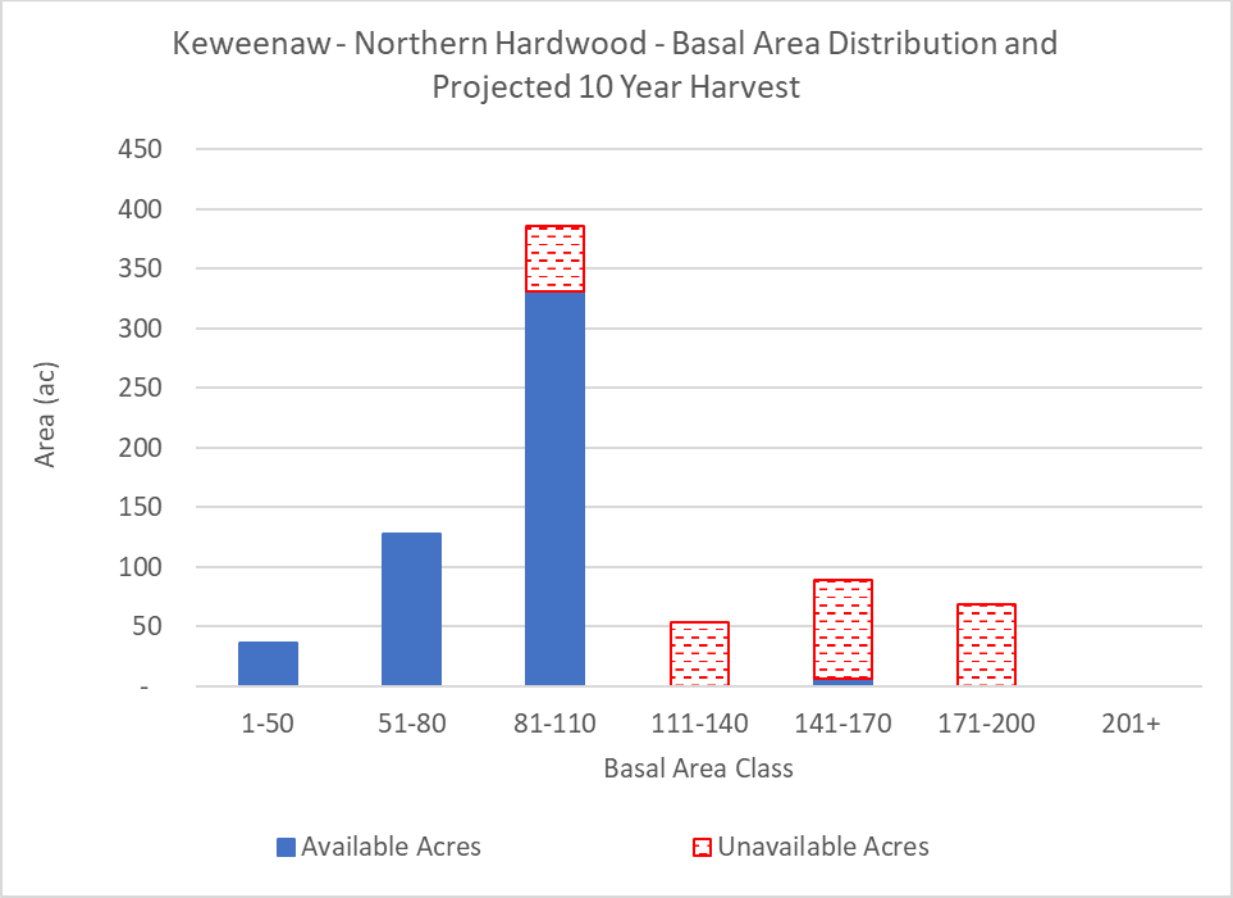


Figure 14. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Blackburnian warbler	Age category: 80+ Size category: pole, sawlog Basal area: 81+	337	259
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	337	259
White-tailed deer	All ages and size classes	760	--

Desired future condition

The projected long-term cover type trend for northern hardwood is stable to increasing in the Keweenaw management area as other cover types age and grade into northern hardwood.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes.

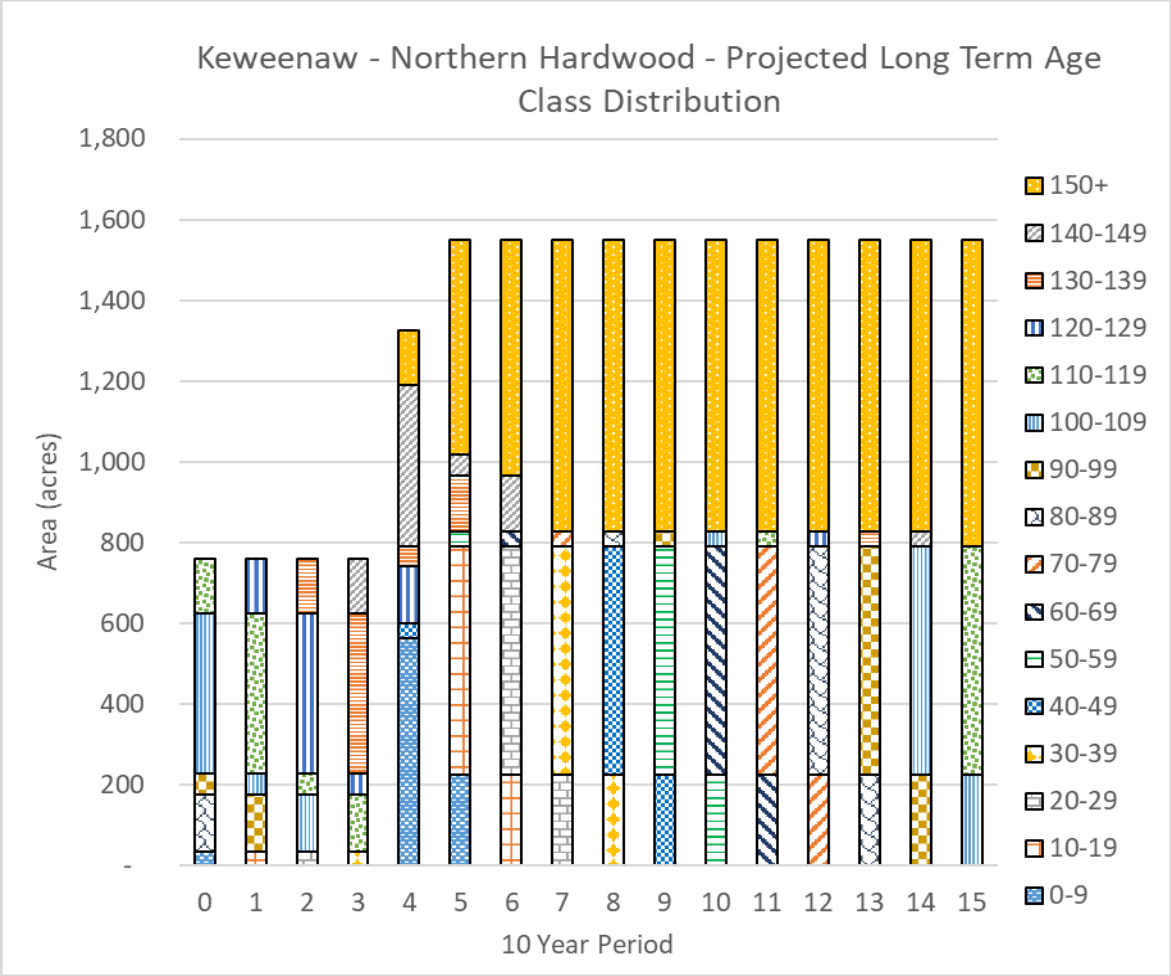


Figure 15. Graph showing the projected age class distribution over 15, 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be allowed to mature through natural processes.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 11; see Biodiversity in Section 3 for more information)

Table 11. High conservation value areas within the Keweenaw management area.

High Conservation Value Area Type and Name	Acres
Deer Wintering Complex	**5,160**
Forest Habitat Core Interior	**755**
Northern Long Eared Bat Hibernacula 2.5mi Buffer	**4,362**
Lac LaBelle Mine	4,362
State Wildlife Management Areas	**167**
Sturgeon River Sloughs SWMA	167
Verified Type 1 and Type 2 Old Growth	**2,591**
Type 1 Old Growth	6
Type 2 Old Growth	2,585
Grand Total	**13,035**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 20. Ecological reference area natural community ranking based on NatureServe .

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 21. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	B	G3G5	S4	1
Existing ERA	Boreal forest	AB	GU	S3	4
Existing ERA	Dry-mesic northern forest	B	G4	S3	1
Existing ERA	Emergent marsh	AB	GU	S4	2
Existing ERA	Great Lakes marsh	B			1
Existing ERA	Northern fen	AB	G3	S3	1
Existing ERA	Patterned Fen	AB	GU	S2	2
Existing ERA	Rich Conifer swamp	AB	G4	S3	1
Existing ERA	Rich Conifer swamp	B	G4	S3	1
Existing ERA	Sand and gravel beach	AB	G3?	S3	2
Existing ERA	Sandstone lakeshore cliff	AB			1
Existing ERA	Submergent marsh	AB	GU	S4	1
Existing ERA	Volcanic bedrock glade	A	GU	S2	2
Existing ERA	Volcanic bedrock glade	AB	GU	S2	1
Existing ERA	Volcanic bedrock Lakeshore	A	G4G5	S2	10
Existing ERA	Volcanic cliff	B	G4G5	S2	1
Existing ERA	Volcanic cobble shore	A	G4G5	S3	5
Existing ERA	Wooded dune and swale complex	B	G3	S3	1
Existing ERA	Wooded dune and swale Complex	BC	G3	S3	1
Proposed ERA	Boreal forest	AB	GU	S3	1
Proposed ERA	Volcanic bedrock glade	AB	GU	S2	
Proposed ERA	Volcanic bedrock glade	BC	GU	S2	1
Proposed ERA	Volcanic lakeshore cliff	AB	GU	S1	
Grand Total					**41**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 14) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 15) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 14. Reviewable special conservation areas within the Keweenaw management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**179**
Traverse River	48
Unspecified River	132
Habitat Area or Habitat Corridor	**39**

Reviewable Special Conservation Area Type and Name	Acres
Lake Shore Raptor Nesting Area	
Possible Type 1 or Type 2 Old Growth	**4,534**
--	4,534
Grand Total	**4,752**

Table 15. Static special conservation areas within the Keweenaw management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**194**
Poor Conifer Swamp		188
Volcanic Cobble Shore		7
Designated Trout and Cold Water Stream Buffer		**272**
<Null>		77
Boston Creek		6
Camp Creek		5
Copper Creek		11
Finns Creek		6
Hoar Creek		19
Le Chance Creek		6
Montreal River		89
Silver Creek		9
Tobacco River		6
Union Creek		38
Designated Trout and Coldwater Streams	**9.9**	
	2.9	
Boston Creek	0.2	
Camp Creek	0.2	
Copper Creek	0.4	
Finns Creek	0.2	
Hoar Creek	0.7	
Le Chance Creek	0.2	
Montreal River	3.3	
Silver Creek	0.3	
Tobacco River	0.2	
Union Creek	1.3	
Great Lakes Islands		**314**
Manitou Island		314
Wood Turtle Stream 660ft Buffer		**18**
Portage River		18
Grand Total	**9.9**	**798**

Rare Species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 17 and 18) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 22. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 17. Rare species occurrence within the Keweenaw management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	1
Animal	Canis lupus	Gray wolf	SC	LE	--
Animal	Elliptio complanata	Eastern elliptio	SC	--	1
Animal	Gavia immer	Common loon	T	--	2
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	6
Total	--	--	--	--	**10**

Table 18. Rare plant species occurrence within the Keweenaw management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Arnica cordifolia	Heart-leaved arnica	E	--	1
Plant	Bistorta vivipara	Alpine bistort	T	--	1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T	--	1
Plant	Carex atratiformis	Sedge	T	--	1
Plant	Carex rossii	Ross's sedge	T	--	1
Plant	Castilleja septentrionalis	Pale Indian paintbrush	T	--	3

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Collinsia parviflora	Small blue-eyed Mary	SC	--	1
Plant	Crataegus douglasii	Douglas's hawthorn	SC	--	1
Plant	Drosera anglica	English sundew	SC	--	1
Plant	Dryopteris filix-mas	Male fern	SC	--	1
Plant	Elymus glaucus	Blue wild-rye	SC	--	1
Plant	Empetrum nigrum	Black crowberry	T	--	1
Plant	Gentiana linearis	Narrow-leaved gentian	T	--	1
Plant	Littorella uniflora	American shore-grass	SC	--	3
Plant	Mertensia paniculata	Northern Bluebell	SC	--	1
Plant	Moehringia macrophylla	Big-leaf sandwort	T	--	1
Plant	Myriophyllum alterniflorum	Alternate-leaved water-milfoil	SC	--	1
Plant	Neottia auriculata	Auricled twayblade	SC	--	1
Plant	Packera indecora	Northern ragwort	T	--	1
Plant	Phleum alpinum	Mountain timothy	X	--	1
Plant	Poa alpina	Alpine bluegrass	T	--	2
Plant	Sagina nodosa	Pearlwort	T	--	1
Plant	Trisetum spicatum	Downy oat-grass	SC	--	3
Plant	Vaccinium cespitosum	Dwarf bilberry	T	--	1
Plant	Viola epipsila	Northern marsh violet	X	--	1
Total	--	--	--	--	**32**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 20).

Table 19. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 20. Non-ERA Natural Communities within the Keweenaw management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Poor conifer swamp	AB	S4	G4	1
Poor conifer swamp	B	S4	G4	1
Volcanic cobble shore	A	S3		1
Grand Total				**3**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 21) and diseases (Table 22) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 21. Defoliating insects of concern in the Keweenaw management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Spongy moth	Lymantria dispar	Yes
Forest tent caterpillar	Forest tent caterpillar	Malacosoma disstria	Yes
Large aspen tortrix	Large aspen tortrix	Choristoneura conflictana	Yes
Spruce budworm	Spruce budworm	Choristoneura fumiferana	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 22. Maladies of concern in the Keweenaw management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	*Armillaria spp.*	Native	Yes

Aquatic Resources

Riparian Habitat

A total of 13 miles of streams and rivers are found in the management area (Table 23). Streams/rivers classified as cold types comprise approximately 69 percent of the riverine mileage.

Table 23. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	9
Cold small river	0
Cold transitional stream	0
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	4
Warm transitional small river	0
Warm transitional large river	0
Warm stream	0
Warm small river	<1
Warm large river	0

Lacustrine habitat

A total of two lakes and ponds of at least one surface acre are found in the management area (Table 24).

Table 24. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	2
100-499	0
500+	0

Wetlands

A total of 3,567 acres of wetlands is found in the management area (Table 25). Forested wetlands comprise approximately 94 percent of wetland types found in the management area.

Table 25. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	204
Forested	3,345
Riverine	18

Vernal pools and seeps

No vernal pools and seeps have been inventoried in the management area.

Riparian vegetation cover

Upland conifers, cedar, and lowland conifers are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 26).

Table 26. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Upland conifers	416
Cedar	317
Lowland conifers	233
Lowland shrub	221
Mixed upland deciduous	140
Northern hardwood	82
Upland spruce/fir	73
Lowland deciduous	65
Lowland mixed forest	63
Lowland spruce/Ffr	62

Watershed vegetation cover

The management area includes portions of important watersheds of the Otter and Sturgeon rivers (Tables 27and 28). Major cover types in the Otter River watershed include mixed upland deciduous and upland conifers; major cover types in the Sturgeon River watershed include aspen and cedar.

Table 27. Largest vegetative cover types (i.e., top five) and area of the Otter River watershed located within the management area.

Cover Type	Acres
Mixed upland deciduous	383
Upland conifers	319
Lowland deciduous	124
Cedar	64
Lowland conifer	40

Table 28. Largest vegetative cover types (i.e., top 5) and area of the Sturgeon River watershed located within the management area.

Cover Type	Acres
Aspen	117
Cedar	107
Lowland shrub	59
Lowland conifer	55
Mixed upland deciduous	44

Recreation

Despite its remote location, the tip of the Keweenaw Peninsula has a fair amount of public recreation and management access via state forest roads. The Keweenaw Peninsula is a popular snowmobiling destination, with a snowmobile trail providing access through the management area to the tip of the peninsula. The remainder of the area consists of isolated parcels with limited public access. There are no designated non-motorized trails or state forest campgrounds within the management area. However, the Copper Harbor Trails Club supports a renowned network of mountain bike trails in the area and Fort Wilkins State Park at Copper Harbor provides modern camping facilities. A network of rail trails and snowmobile routes are primarily on private land.

Table 29. Designated recreation trails by type:

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	ORV (all types)	1.9
Motorized recreation trails	Snowmobile	6.1
Non-motorized recreation trails	Hiking	0
Non-motorized recreation trails	Equestrian	0
Non-motorized recreation trails	Biking	0
Non-motorized recreation trails	Hunter Walking Trails	0
Total	--	**8**

Note: Trail use types may overlap.

Table 30. Areas managed for hunting.

Type	Name	Number of Acres
State Wildlife Management Areas	Sturgeon River Sloughs SWMA	165

Table 31. Boating access sites (BAS).

Name	Waterbody
Boston Pond	Boston Pond
Rice Lake	Rice Lake
Thayer Lake	Thayer Lake

Keweenaw Bay

State Forest Area: 27,563 acres	Location: Keweenaw Bay Shore	Population Centers: Baraga, L'Ance
Sub-Section: Keweenaw Coarse Till and Lake Plain	Landforms: large broad ridges 150 to 500 feet high	Landcover: Forested: 25,286 acres Non-forested: 2,277 acres

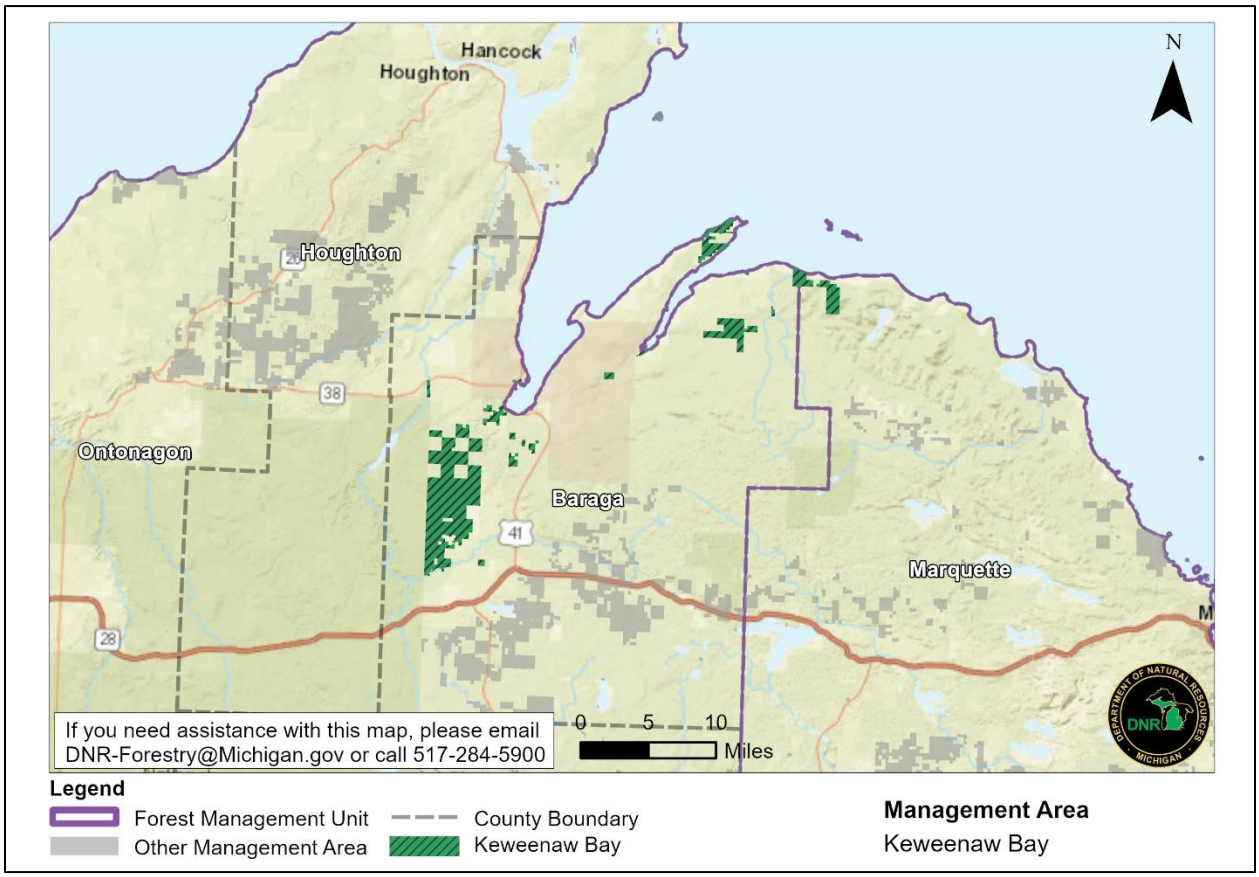


Figure 1. Map of the Keweenaw Bay management area.

Forested landscape

Current condition

The Keweenaw Bay management area is dominated by shade-intolerant cover types. Tolerant upland cover types are relatively evenly distributed across the age categories, while the unavailable upland and lowland acres are more prevalent in the older age category.

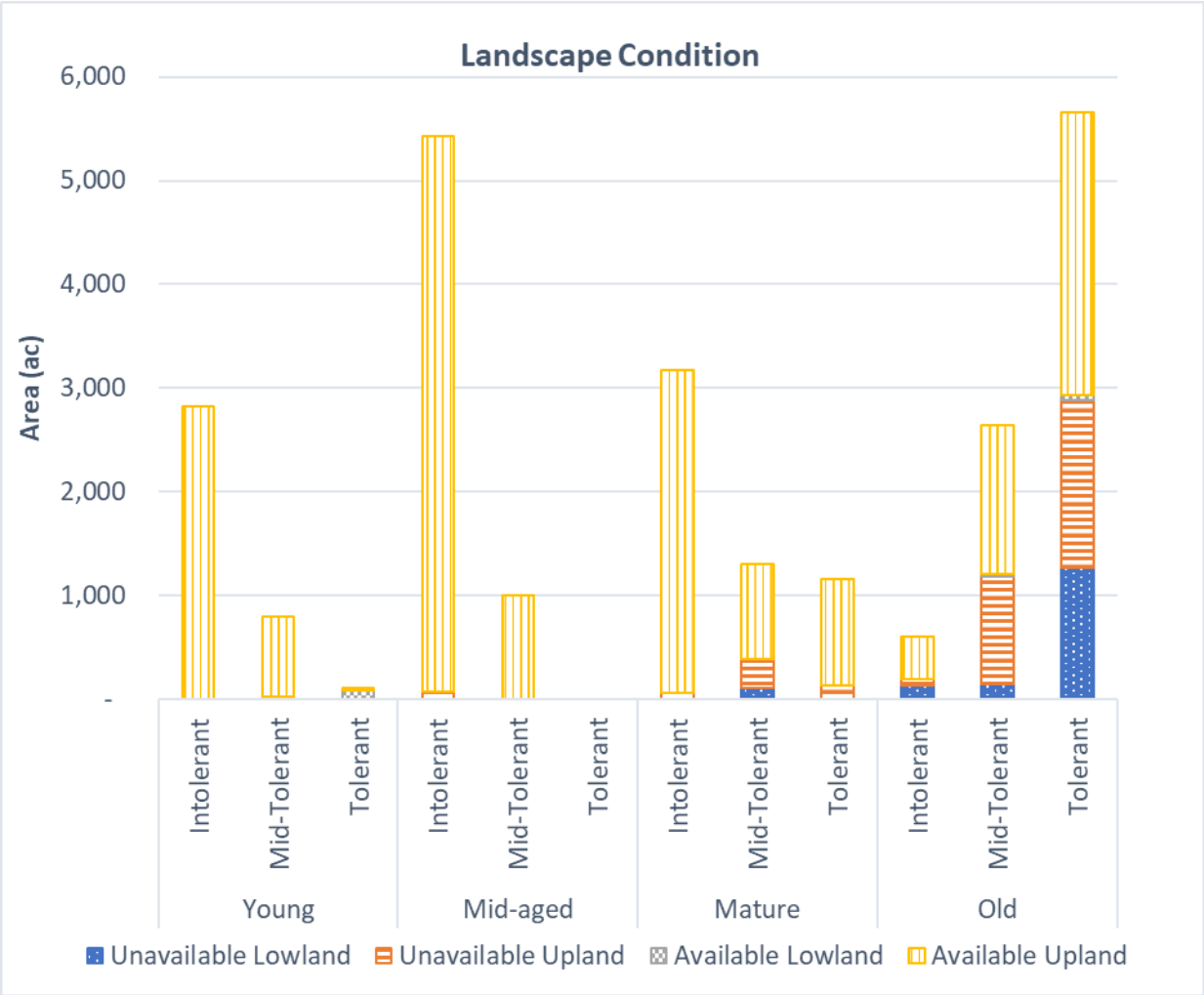


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape in the context of featured species habitat. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in Aspen and Jack Pine	2,779
Mature forest	Acres of 80+ year stands across cover types	8,912
Mature forest	Acres of 120+ year stands across cover types	6,184
Mesic conifer cover types	Acres of mesic conifer cover types	3,425
Mesic conifers in other cover types	Average canopy occupancy	26%
Mast – oak cover types	Acres of Oak cover types	244
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	11,633
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	15,138
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	1,215
Landscape forest matrix	Percent deciduous forest	47%
Landscape forest matrix	Percent coniferous forest	48%

Another important landscape level habitat in the Management Area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, landbirds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls, and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed, and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provides unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas (IBAs). The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Keweenaw Bay management area is dominated by forested cover types with 85 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 42 percent of the management area and comprised mostly of aspen. The upland coniferous portion is 38 percent of the management area and comprised mostly of natural jack pine. Herbaceous openland and cropland are the most common non-forested cover types in this management area, representing 4 percent of the landscape.

Table 2. Summary table describing the landscape conditions and distribution of cover types in the Keweenaw Bay management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	5,042	11,705	23,410	25,286
			Northern hardwood	3,518			
			Black Red rybrid oak	0			
			Northern red oak	211			
			Oak mix	33			
			Mixed upland deciduous	2,901			
		Mixed	Upland mixed forest	1,206	1,206		
		Coniferous	Planted red pine	28	10,499		
			Planted jack pine	2,782			
			Planted white pine	0			
			Planted mixed pine	0			
			Natural red pine	142			
			Natural jack pine	4,123			
			Natural white pine	120			
			Natural mixed pines	536			
			Upland spruce/fir	10			
			Upland conifers	875			
			Hemlock	1,884			
	Lowland	Deciduous	Lowland aspen/balsam poplar	0	138	1,876	
			Lowland deciduous	138			
		Mixed	Lowland mixed forest	171	171		
		Coniferous	Cedar	282	1,567		
			Lowland conifers	1,140			
			Lowland spruce/fir	33			
			Tamarack	112			
Nonforested	Upland	N/A	Herbaceous openland	591	N/A	1,449	2,277
			Upland shrub	3			
			Low density trees	123			
			Bare/sparsely vegetated	71			
			Cropland	621			
			Urban	41			
	Lowland	N/A	Lowland shrub	129	N/A	827	
			Marsh	468			
			Bog	19			
			Treed bog	75			
			Water	136			
						Grand Total:	**27,563**

There are 20,356 acres (73.9 percent of the total management area and 80.5 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Keweenaw Bay management area (Table 3). Of that, over 19 percent is in the aspen cover type, 16 percent is in natural jack pine, 11 percent in northern hardwood, 11 percent in planted jack pine, and 10% in mixed upland deciduous. The remaining 16 cover types represent about 13 percent of the forested and available land in the management area.

Table 3. Summary table describing the landscape conditions and cover type composition of the Keweenaw Bay management area.

Keweenaw Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	4,900	19.4%	142	0.6%	5,042	19.9%
Cedar	32	0.1%	250	1.0%	282	1.1%
Hemlock	880	3.5%	1,004	4.0%	1,884	7.4%
Lowland conifers	114	0.4%	1,027	4.1%	1,140	4.5%
Lowland deciduous	25	0.1%	113	0.4%	138	0.5%
Lowland mixed forest	28	0.1%	143	0.6%	171	0.7%
Lowland spruce/fir	4	0.0%	29	0.1%	33	0.1%
Mixed upland deciduous	2,455	9.7%	446	1.8%	2,901	11.5%
Natural jack pine	4,100	16.2%	23	0.1%	4,123	16.3%
Natural mixed pines	450	1.8%	86	0.3%	536	2.1%
Natural Red Pine	119	0.5%	23	0.1%	142	0.6%
Natural white pine	107	0.4%	14	0.1%	120	0.5%
Northern hardwood	2,792	11.0%	727	2.9%	3,518	13.9%
Northern red oak	181	0.7%	29	0.1%	211	0.8%
Oak Mix	33	0.1%	0	0.0%	33	0.1%
Planted jack pine	2,782	11.0%	0	0.0%	2,782	11.0%
Planted red pine	28	0.1%	0	0.0%	28	0.1%
Tamarack	0	0.0%	113	0.4%	113	0.4%
Upland conifers	474	1.9%	401	1.6%	875	3.5%
Upland mixed forest	847	3.3%	359	1.4%	1,206	4.8%
Upland spruce/fir	6	0.0%	4	0.0%	10	0.0%
Grand Total	**20,356**	**80.5%**	**4,931**	**19.5%**	**25,287**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvest) acres for the Keweenaw Bay Management Area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Too steep	1,670	33.9%
BMPs	1,059	21.5%
Deer wintering area	907	18.4%
Too wet	669	13.6%
Other dept./div. processes	149	3.0%
Rare landforms	127	2.6%
Denied access	124	2.5%
Wildlife concerns	78	1.6%
Other influence zones	51	1.0%
Recreational/scenic	46	0.9%
Non-Military lease/easement	23	0.5%
Blocked by obstacle	15	0.3%
Long-term retention	13	0.3%
Total unavailable	**4,931**	**100.0%**

Management actions

Each cover type in the Keweenaw Bay management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5). These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period and help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. The following sections will provide additional details for each of the significant cover types in the Keweenaw Bay management area.

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern hardwood	-	1,452	-	-	-	-	-	1,452
Aspen	790	-	-	-	-	-	-	790
Mixed upland deciduous	347	53	-	-	-	-	-	400
Natural jack pine	197	-	-	-	-	-	-	197
Upland Mixed Forest	98	-	-	-	-	-	-	98
Hemlock	-	49	-	-	-	-	-	49
Planted jack pine	21	-	-	-	-	-	-	21
Upland spruce/fir	6	-	-	-	-	-	-	6
Lowland conifers	4	-	-	-	-	-	-	4
Totals	**1,462**	**1,554**	**-**	**-**	**-**	**-**	**-**	**3,017**

Table 6. Ten-year estimated harvest volume by product and species for the Keweenaw Bay management area.

10-Year Estimated Harvest Volume Projection Keweenaw Bay Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed hardwood	12,339	11,599
	Mixed aspen	6,267	5,891
	Mixed softwood	2,629	2,471
	Jack pine	2,305	2,167
	Mixed spruce	1,822	1,712
	White pine	658	619
	Mixed oak	640	602
	Red pine	214	201
	Pulpwood Total	**26,874**	**25,261**
Sawtimber (MBF)	Sugar maple	3,821	3,592
	Mixed aspen	2,438	2,292
	Red maple	2,351	2,210
	White pine	1,782	1,675
	Red oak	1,358	1,276
	Red pine	585	550
	Basswood	510	479
	White oak	233	219
	Mixed oak	18	17
	Sawtimber Total	**13,096**	**12,310**
	Total Sawtimber Harvest Volume in Cords	**27,657**	**25,997**
	Grand Total Harvest Volume in Cords	**54,531**	**51,259**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are very few cover type transitions projected in this management area. The managed area of each cover type is expected to remain relatively stable. The largest decrease forecasted is in the aspen cover type, where 38 acres are expected to convert to other cover types through forest management activities. The largest increase is in mixed upland deciduous. where 85 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	5,042	5,002	-40
Natural jack pine	4,123	4,090	-33
Northern hardwood	3,518	3,518	0
Mixed upland deciduous	2,901	2,984	84
Planted jack pine	2,782	2,815	33
Hemlock	1,884	1,884	0
Upland mixed forest	1,206	1,183	-23
Lowland conifers	1,140	1,140	-1
Upland conifers	875	855	-20
Natural mixed pines	536	536	0
Cedar	282	282	0
Northern red oak	211	211	0
Lowland mixed forest	171	174	3
Natural red pine	142	142	0
Lowland deciduous	138	136	-2
Natural white pine	120	124	3
Tamarack	112	112	0
Oak mix	33	33	0
Lowland spruce/fir	33	33	0
Planted red pine	28	28	1
Upland spruce/fir	10	6	-4
Lowland aspen/balsam poplar	0	0	0
Cropland	621	621	0
Herbaceous openland	591	591	0
Marsh	468	468	0
Water	136	136	0
Lowland shrub	129	129	0
Low density trees	123	123	0
Treed bog	75	75	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Bare/sparsely vegetated	71	71	0
Urban	41	41	0
Bog	19	19	0
Upland shrub	3	3	0
Total:	**27,563**	**27,563**	**0**

Current and projected habitat acres for featured species

There are 11featured species in this management area spanning various cover types, age classes, and stand level conditions.

It is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. When referring to habitat acres, this document refers to potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81. Because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the SFMP model but are included here with their current acres of potential habitat.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	2,296	2,027	2,297	2,284
Black bear	Mast	11,633	--	--	--
Black-backed woodpecker	Natural Disturbance	--	--	--	--
Kirtland's warbler	Natural jack pine, planted jack pine in Baraga Outwash Plains	779	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Moose	To be determined	--	--	--	--
Ruffed Grouse	Aspen	2,159	1,788	2,062	2,109
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	3,010	2,686	2,589	2,584
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	13,220	13,240	13,405	13,494
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	5,050	5,029	4,870	4,782
Wild turkey	Non-forested openings	714	--	--	--
Wood turtle	Non-forested openings	--	--	--	--

Cover type composition and associated wildlife species

Aspen

Current Condition

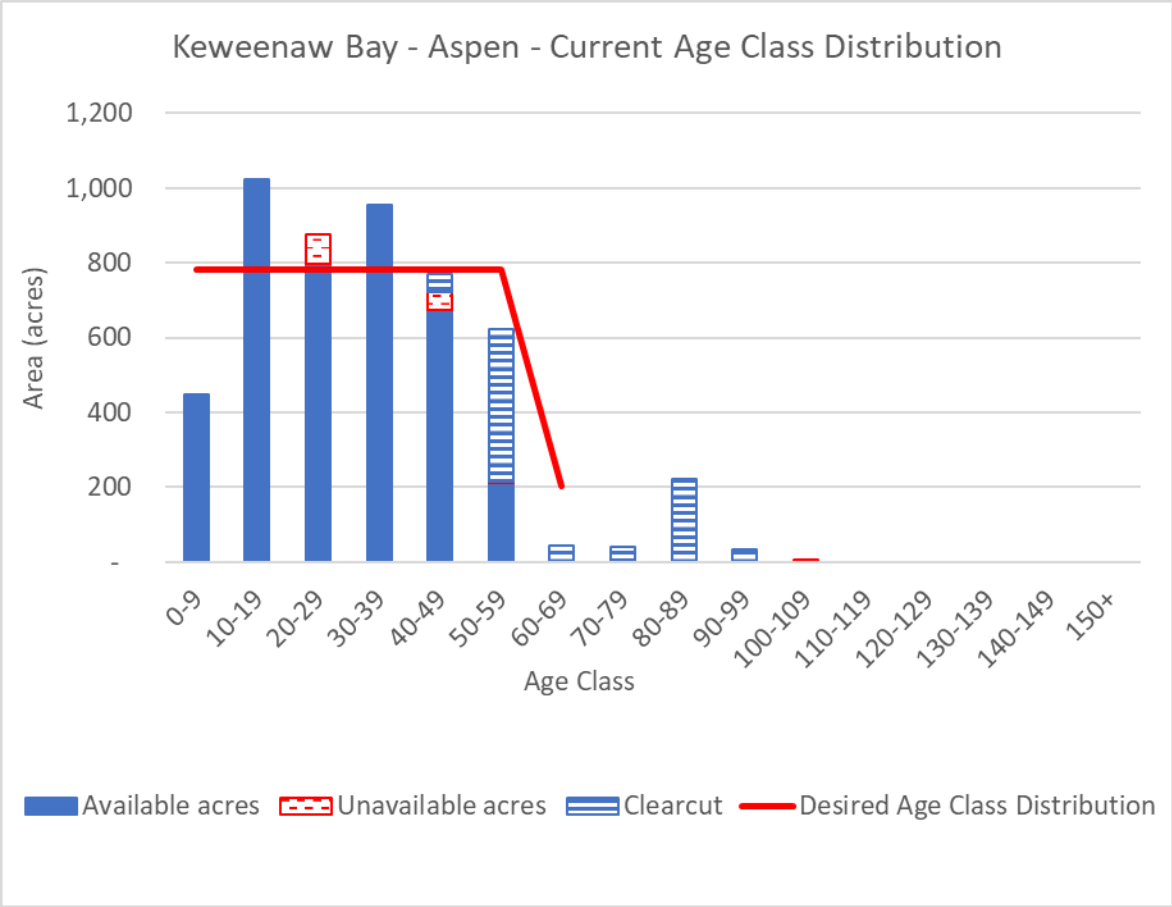


Figure 3. Current age class distribution, desired age class distribution, and projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in the 0-9 and the 50-59-year-old age classes and a surplus of acres in the 10-19 and the 30-39-year-old age classes. A portion of this cover type meets the habitat requirements for ruffed grouse, American woodcock, and snowshoe hare.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres-Available	Aspen Habitat Acres-Unavailable
Ruffed grouse	Age category: 0-19 Size category: Sapling	1,472	0

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres-Available	Aspen Habitat Acres-Unavailable
American woodcock	Age category: 0-19 Size category: sapling	1,472	0
Snowshoe hare	Age category: 0-19 Size category: Sapling	1,472	0
White-tailed deer	All ages and size classes	5,042	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 4 percent of the acres in an age class tail out to a maximum of 60-year age class.

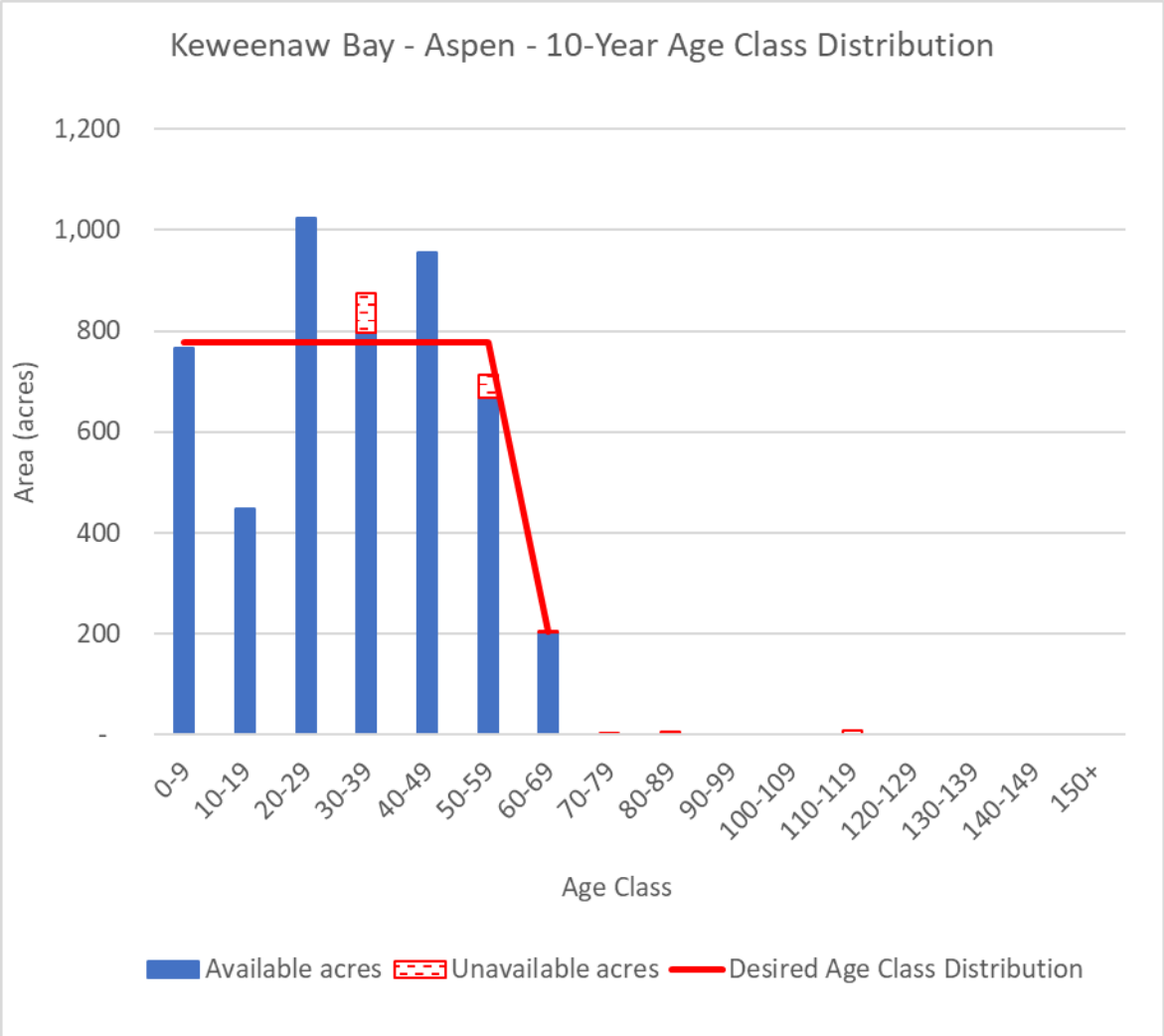


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 766 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take a few decades in this management area.

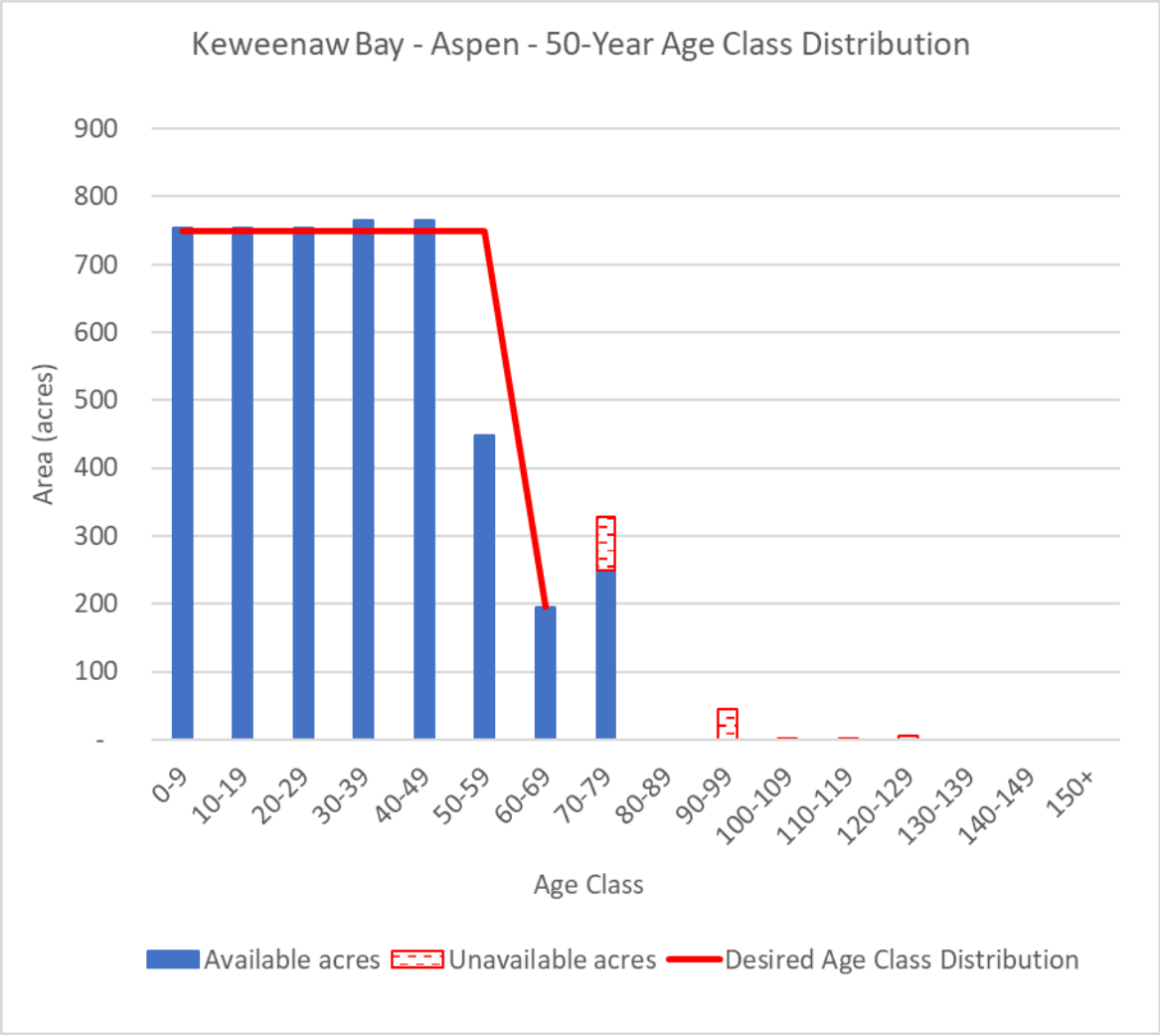


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres nearly reaching the desired future condition with only a few age classes deviating from the target proportions (Figure 5).

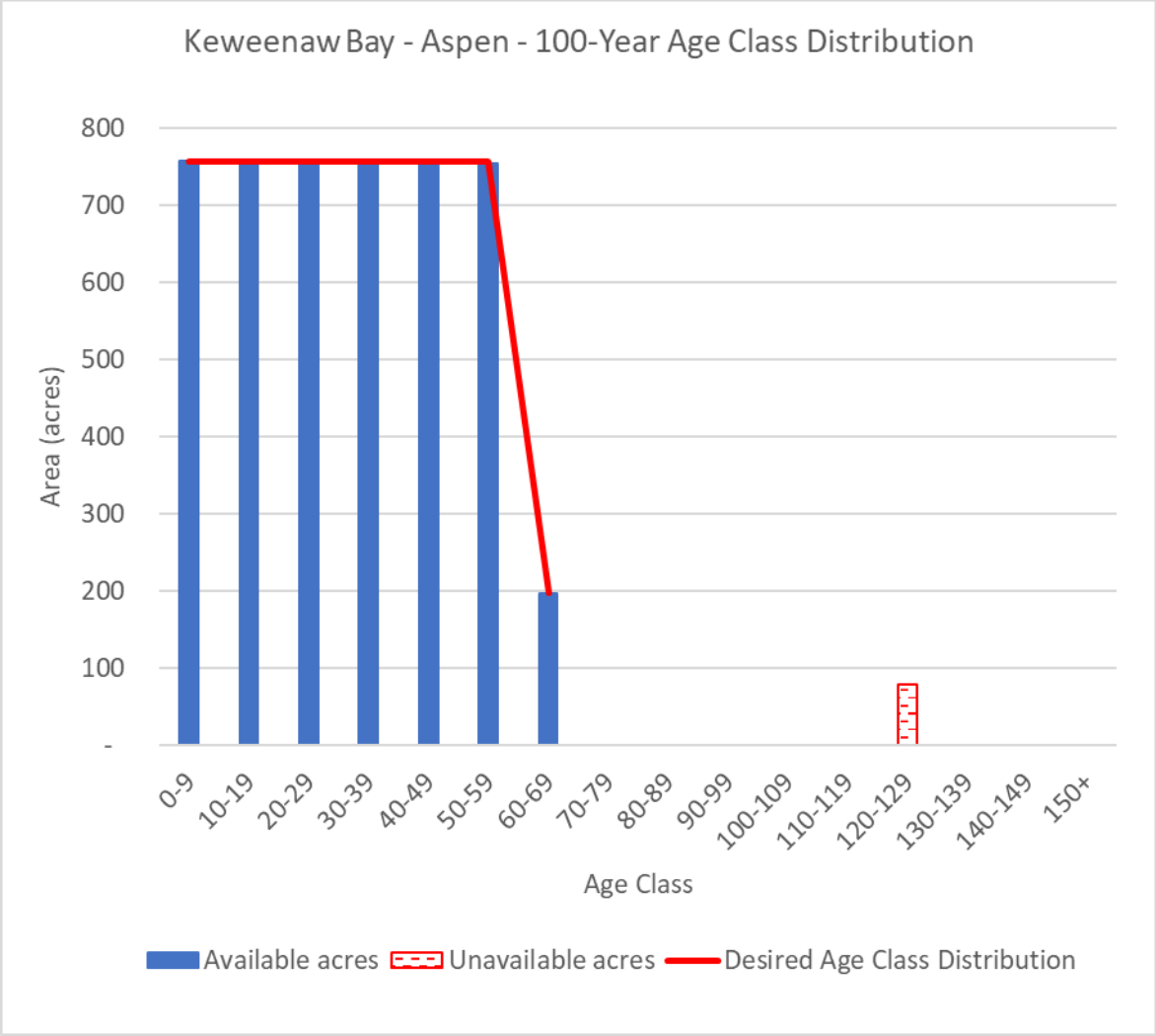


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 790 acres of projected clearcut harvest in the aspen cover type. It is expected that about 40 acres of aspen will be converted to other cover types. These total to an expected 750 acres of regeneration in the aspen cover type over the next 10 years.

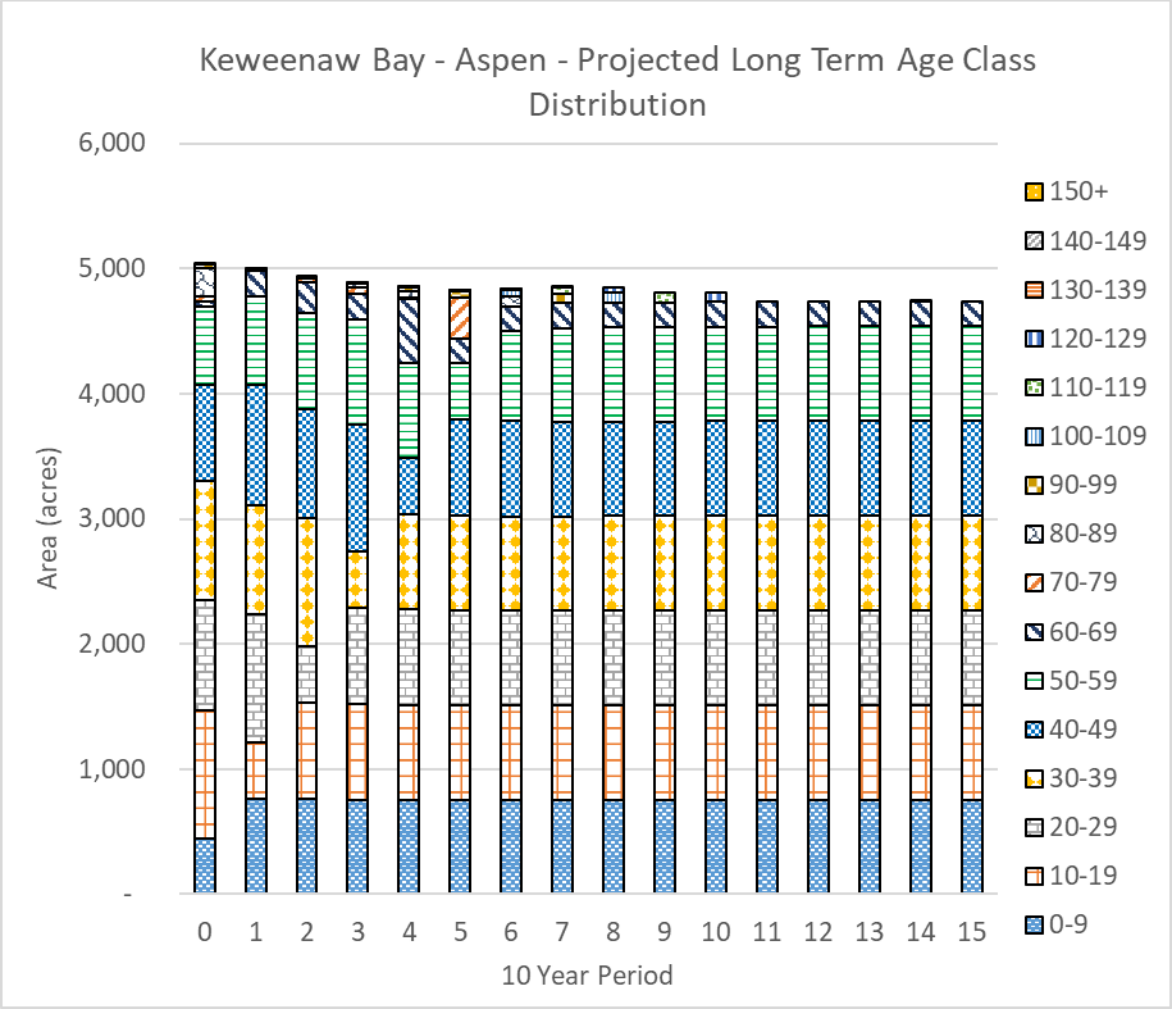


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Natural jack pine

Current condition

The current age class distribution is unbalanced with a deficit of acres in the 0-29 year-old age classes, and a surplus of acres in the 30-49-year-old age classes.

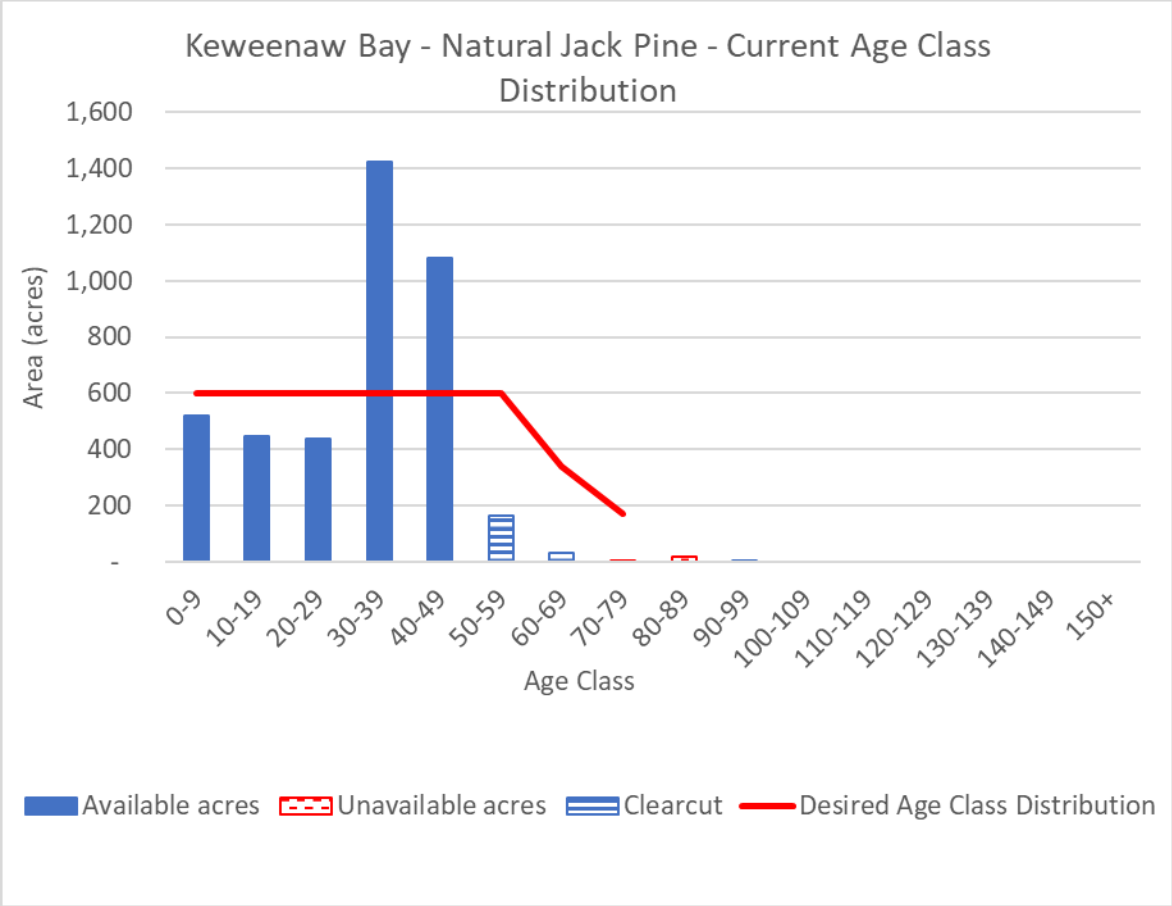


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the natural jack pine cover type over the 10-year planning period.

A portion of this cover type meets the habitat requirements for Kirtland's warbler and snowshoe hare. Jack pine habitat acres calculated for Kirtland's warbler are those acres found within outwash plains in the Baraga Plains and will be managed in a minimum 200-acre patch size.

Table 10. Featured species with natural jack pine as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Jackpine	Jack Pine Habitat Acres- Available	Jack Pine Habitat Acres- Unavailable
Kirtland's warbler	Age category: 5-15 Size category: sapling	779 (included planted)	0

Featured Species	Featured Species Habitat – Jackpine	Jack Pine Habitat Acres- Available	Jack Pine Habitat Acres- Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	963	0

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 8 percent of the acres in an age class tail out to the 60-year age class, and 4 percent of the acres in an age class tail out to the 70-year age class.

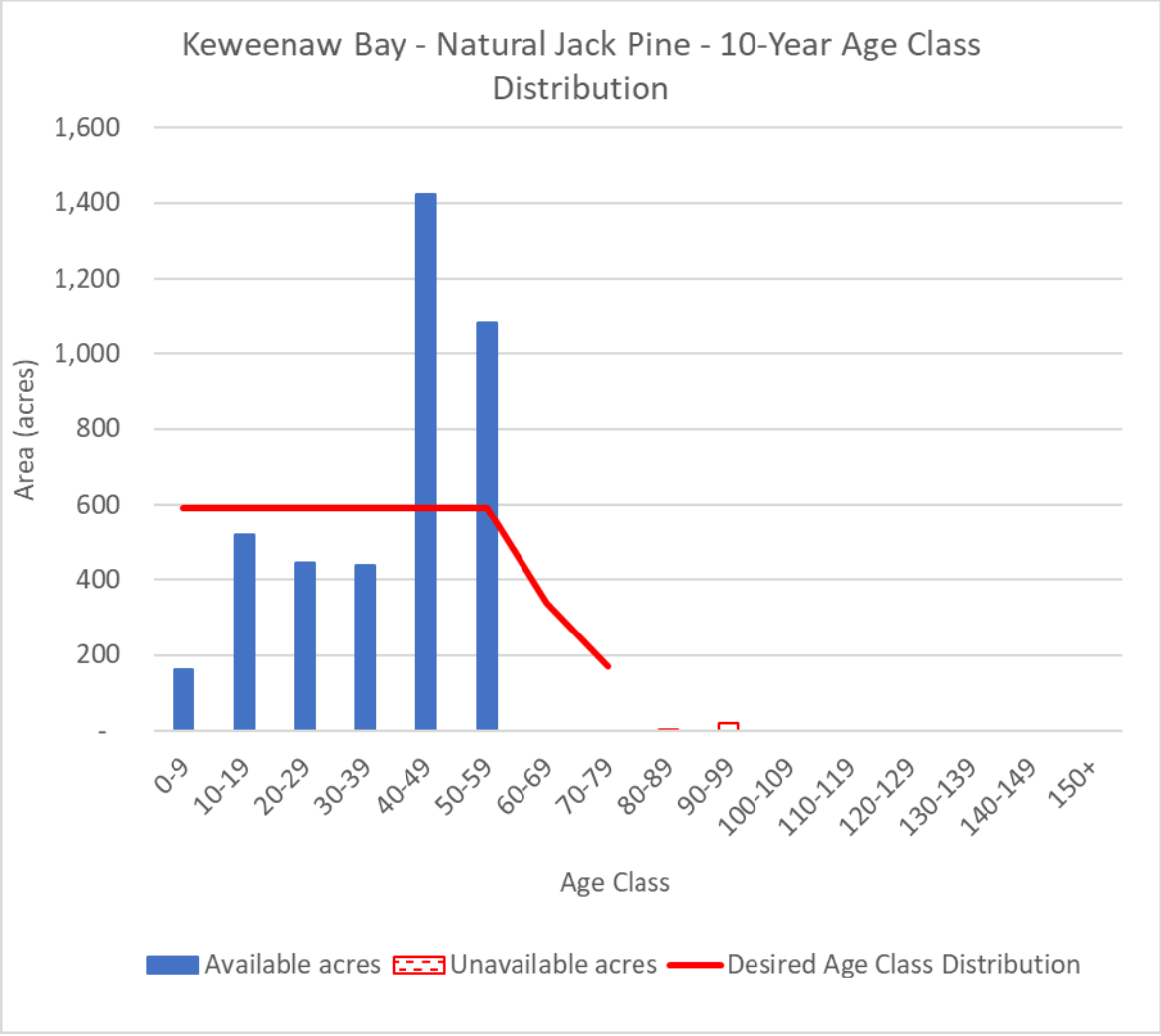


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 163 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of natural jack pine will take many decades in this management area.

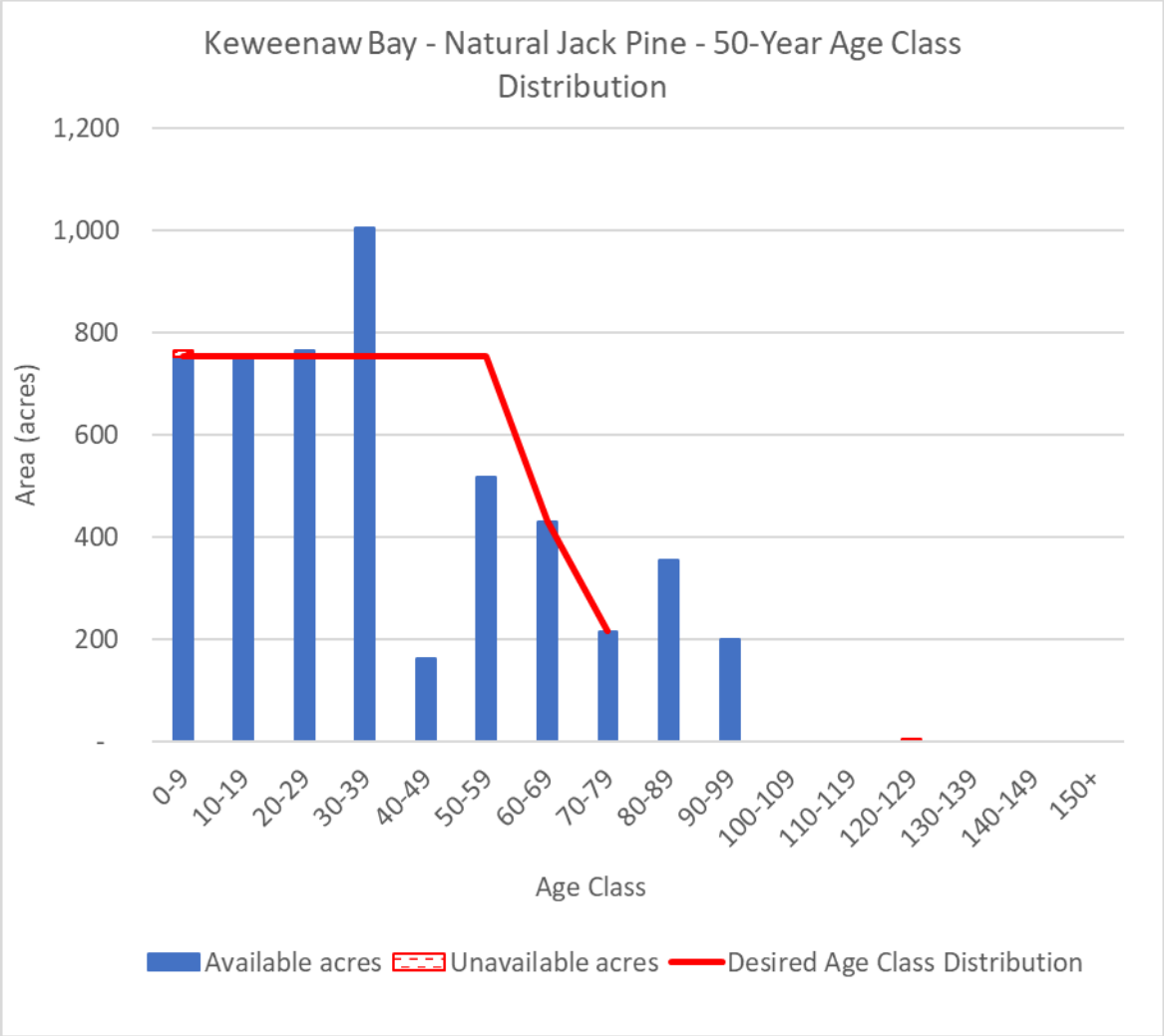


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of natural jack pine acres, working toward the desired future condition as the older age classes are treated (Figure 10).

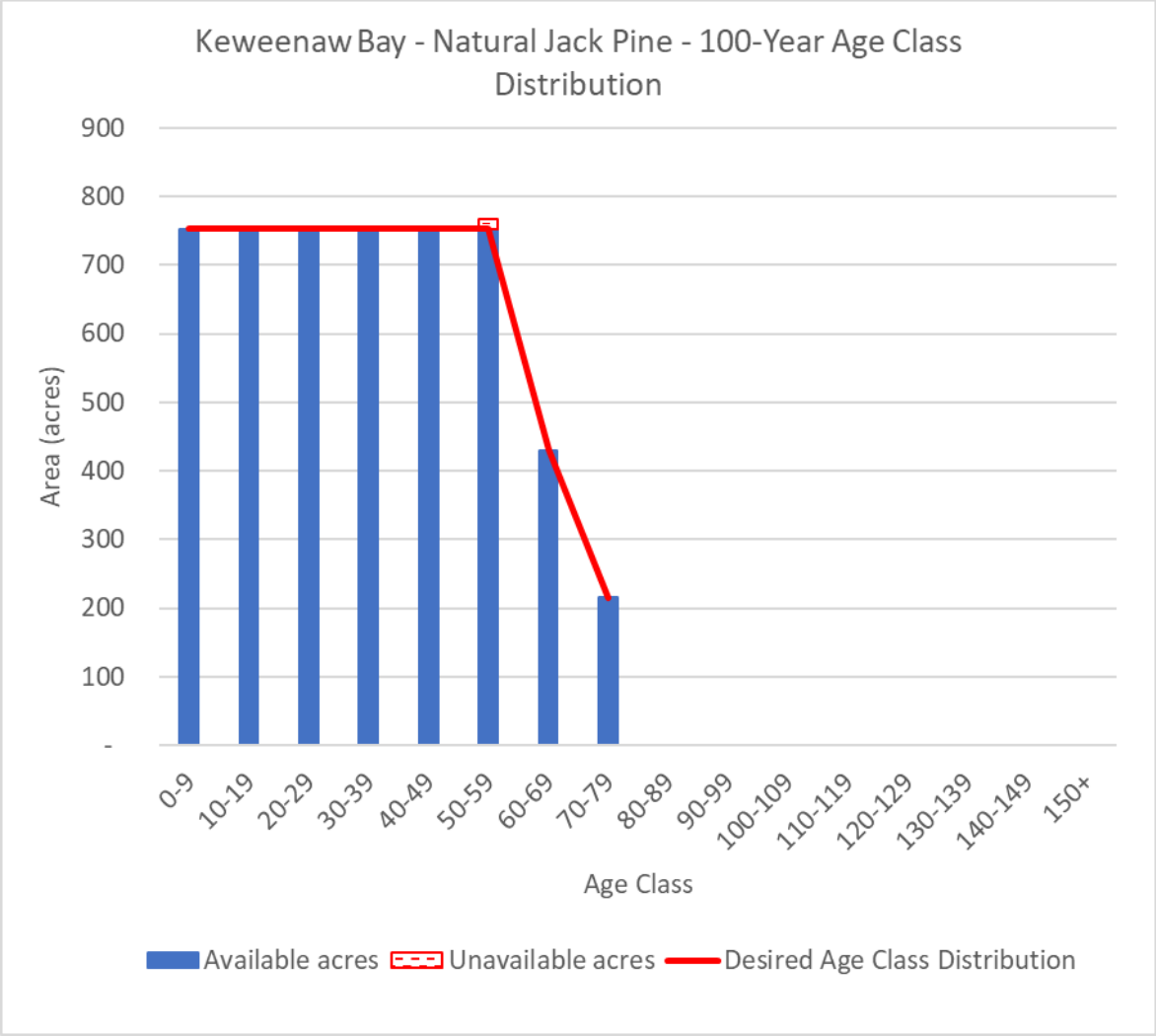


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate the manageable acres of natural jack pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management Aations

There are 197 acres of projected harvest in the natural jack pine cover type. It is expected that about 33 acres of natural jack pine will convert to other cover types. These total to an expected 164 acres of regeneration in the natural jack pine cover type over the next 10 years.

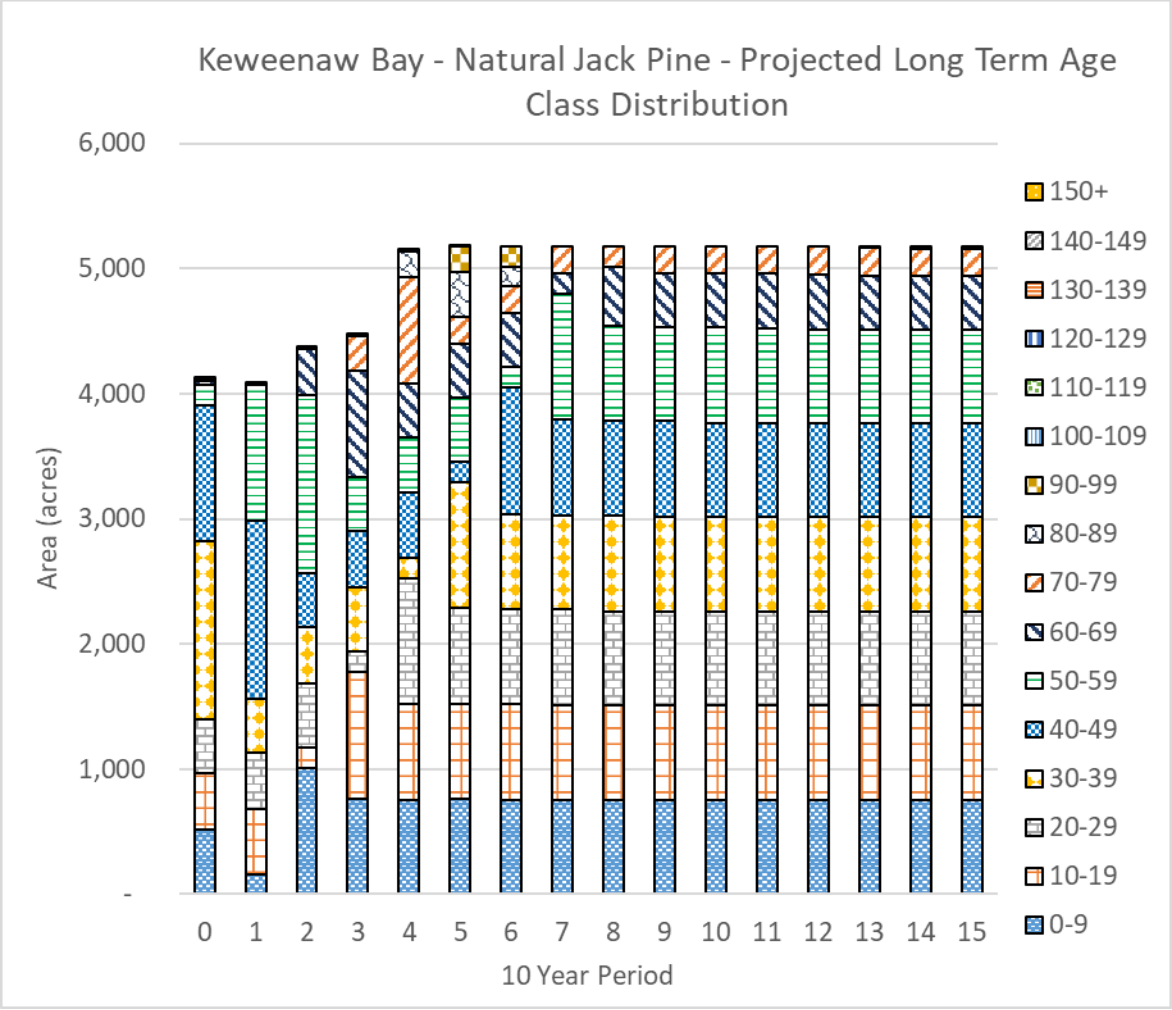


Figure 12. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type in the management area is currently between a stand age of 100 -119 years old (Figure 13). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase overtime. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old before a younger age cohort becomes the prominent component of these stands (Figure 15).

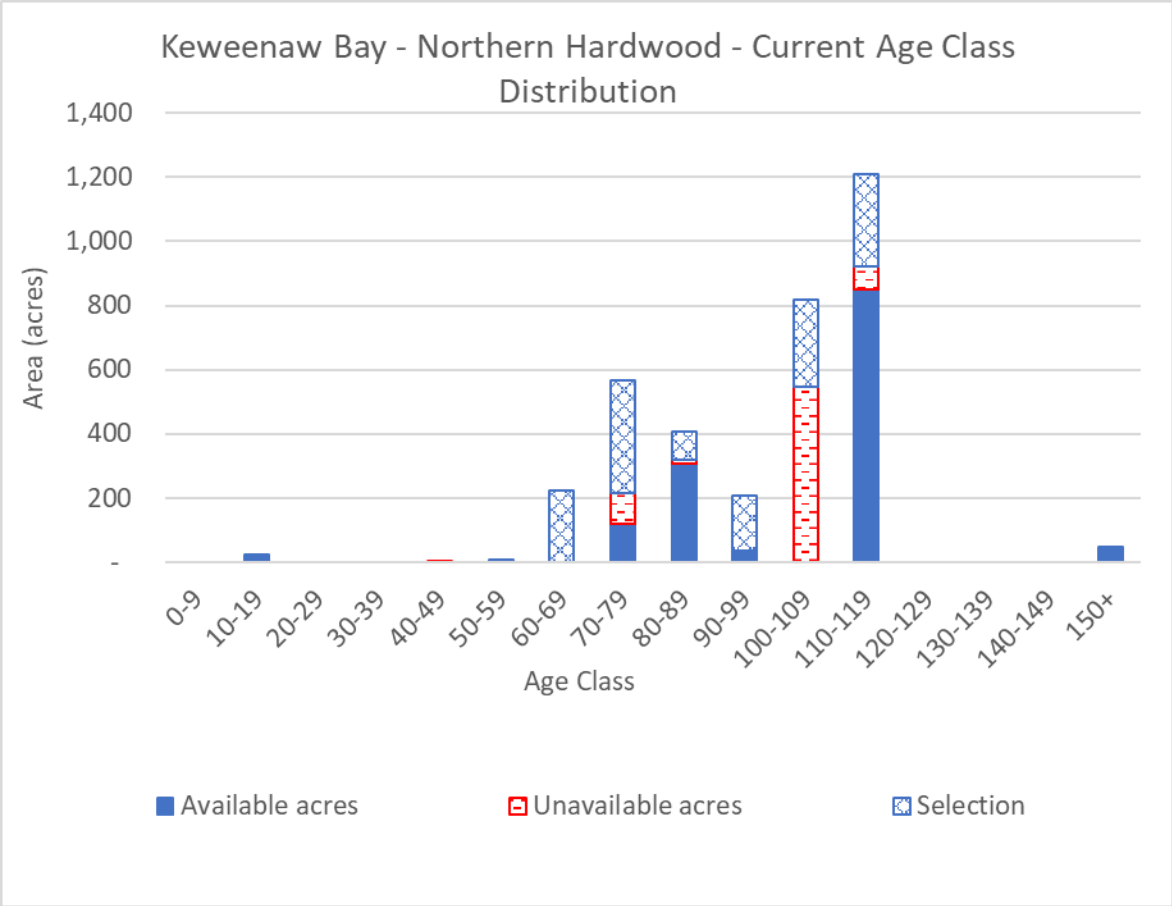


Figure 13. Current age class distribution and projected harvests in the northern hardwood cover type in the Keweenaw Bay management area.

The area of northern hardwood in this area is well distributed in the ideal basal area classes for optimal growing conditions (Figure 14). Current conditions are a result of a selection harvest regime that has been in place in this management area for decades.

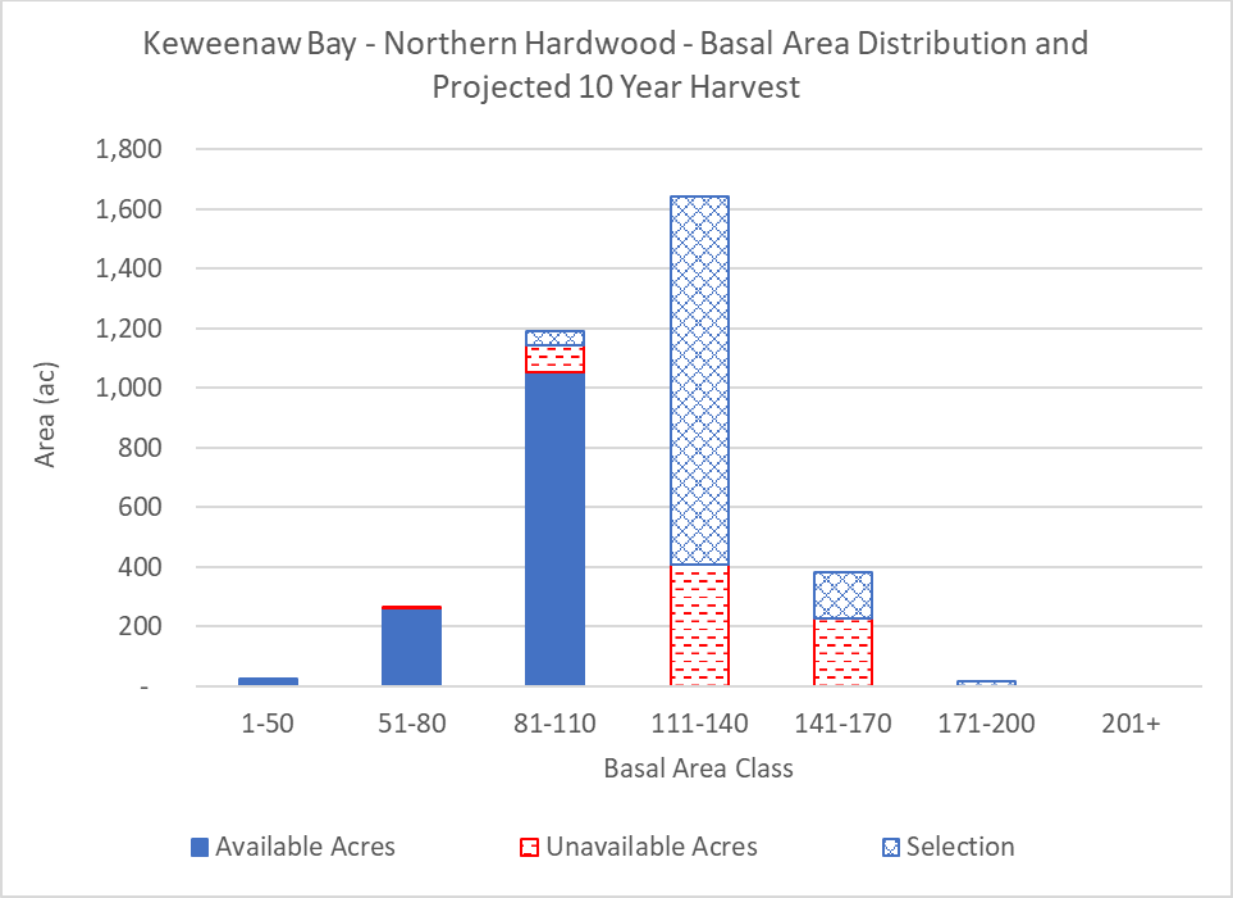


Figure 14. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

A portion of this cover type meets the habitat requirements for marten and white-tailed deer.

Table 11. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres-Available	Northern Hardwood Habitat Acres-Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	1,802	631
White-tailed deer	All ages and size classes	3,518	--

Desired future condition

The projected long-term cover type trend for northern hardwood in this management area is stable. There are no acres transitioning from this cover type in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and remaining stems become sawlogsized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes.

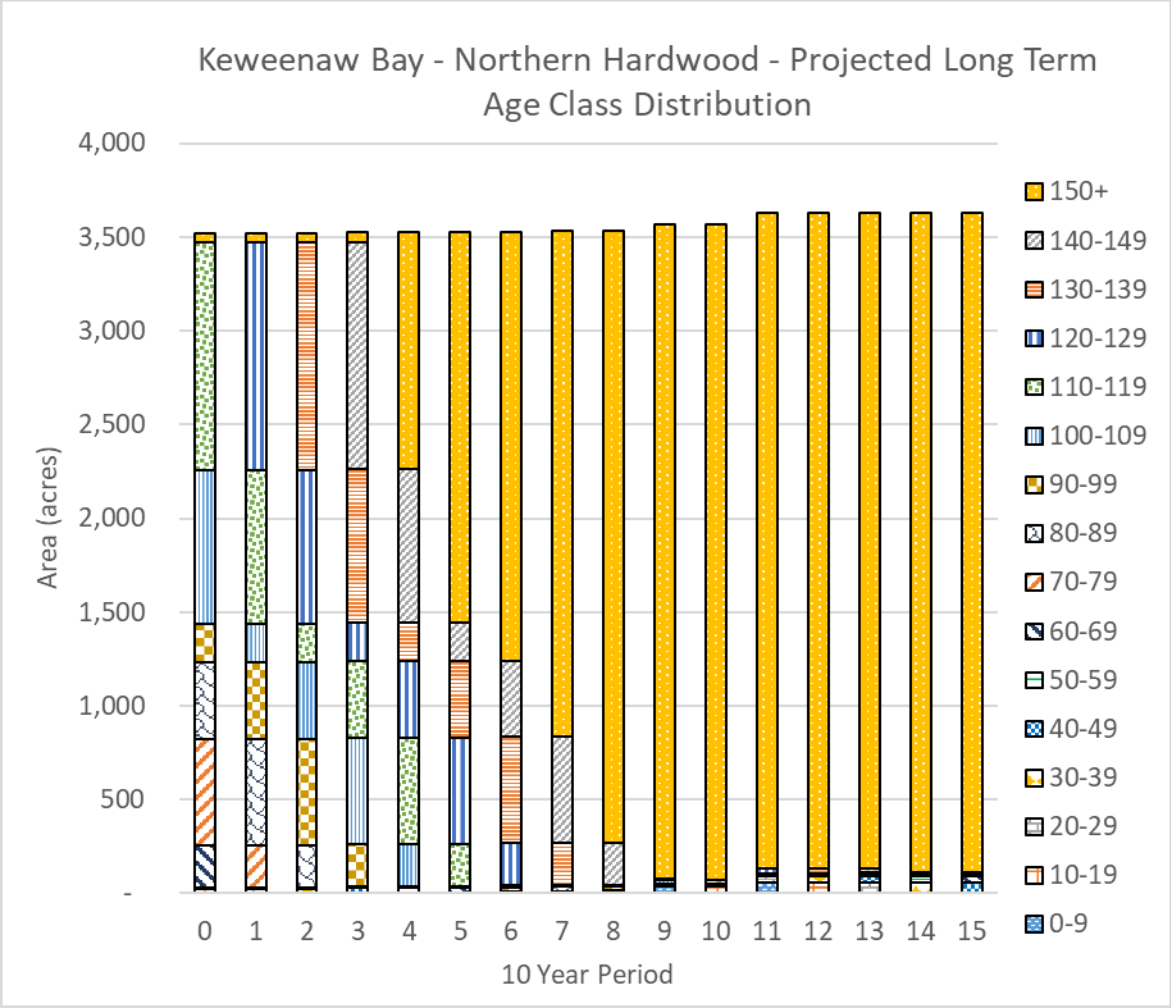


Figure 15. Projected age class distribution over 15, 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 1,452 acres (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Planted jack pine

Current condition

The current age class distribution is somewhat unbalanced with a deficit of acres in the 0-19-year old age classes and a surplus of acres in the 40-49-year-old age classes.

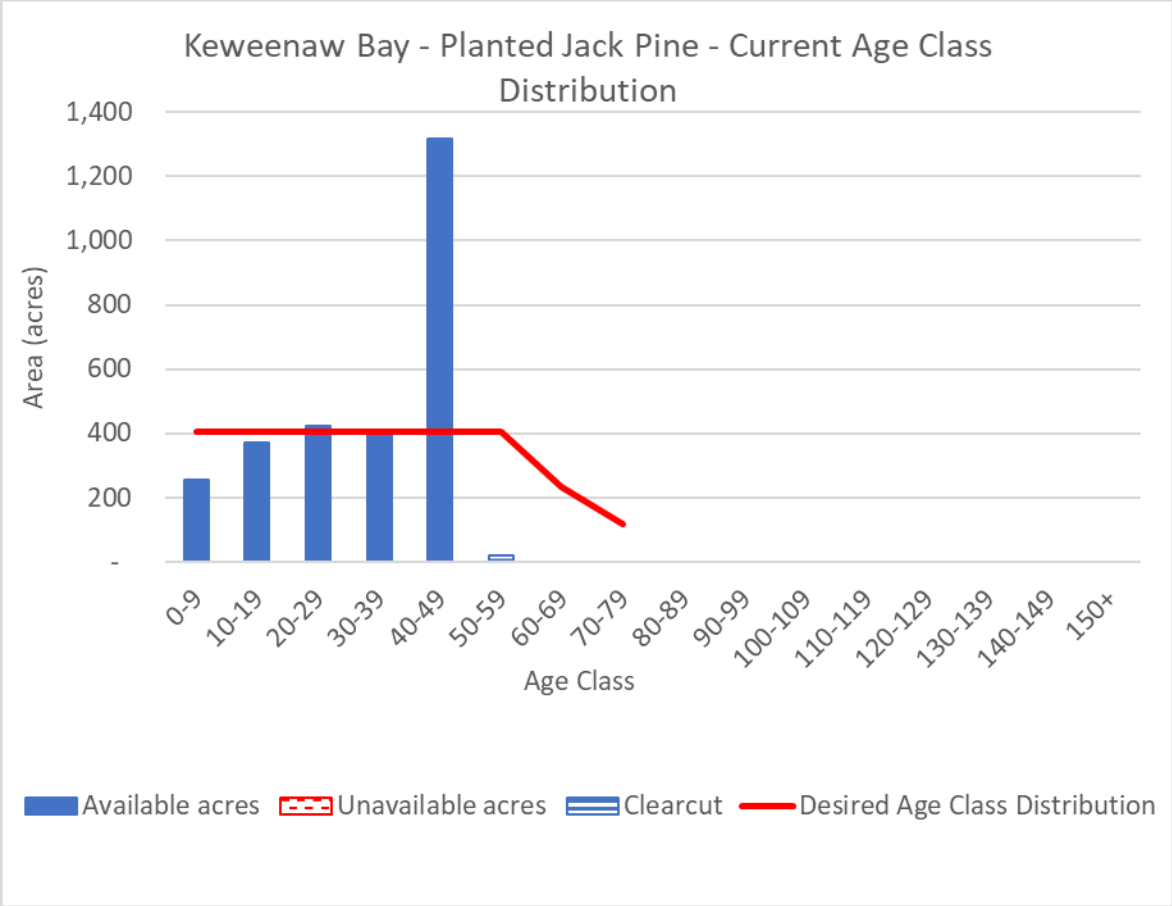


Figure 16. Current age class distribution, the desired age class distribution, and the projected harvests in the planted Jack pine cover type over the 10-year planning period.

A portion of this cover type meets the habitat requirements for Kirtland's warbler and snowshoe hare. Jack pine habitat acres calculated for Kirtland's warbler are those acres found within outwash plains in the Baraga Plains and will be managed in a minimum 200-acre patch size.

Table 12. Featured species with planted jack pine as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Jackpine	Jack Pine Habitat Acres- Available	Jack Pine Habitat Acres- Unavailable
Kirtland's warbler	Age category: 5-15 Size category: sapling	779 (includes natural)	0

Featured Species	Featured Species Habitat – Jackpine	Jack Pine Habitat Acres- Available	Jack Pine Habitat Acres- Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	625	0

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 8 percent of the acres in an age class tail out to the 60-year age class, and 4 percent of the acres in an age class tail out to the 70-year age class.

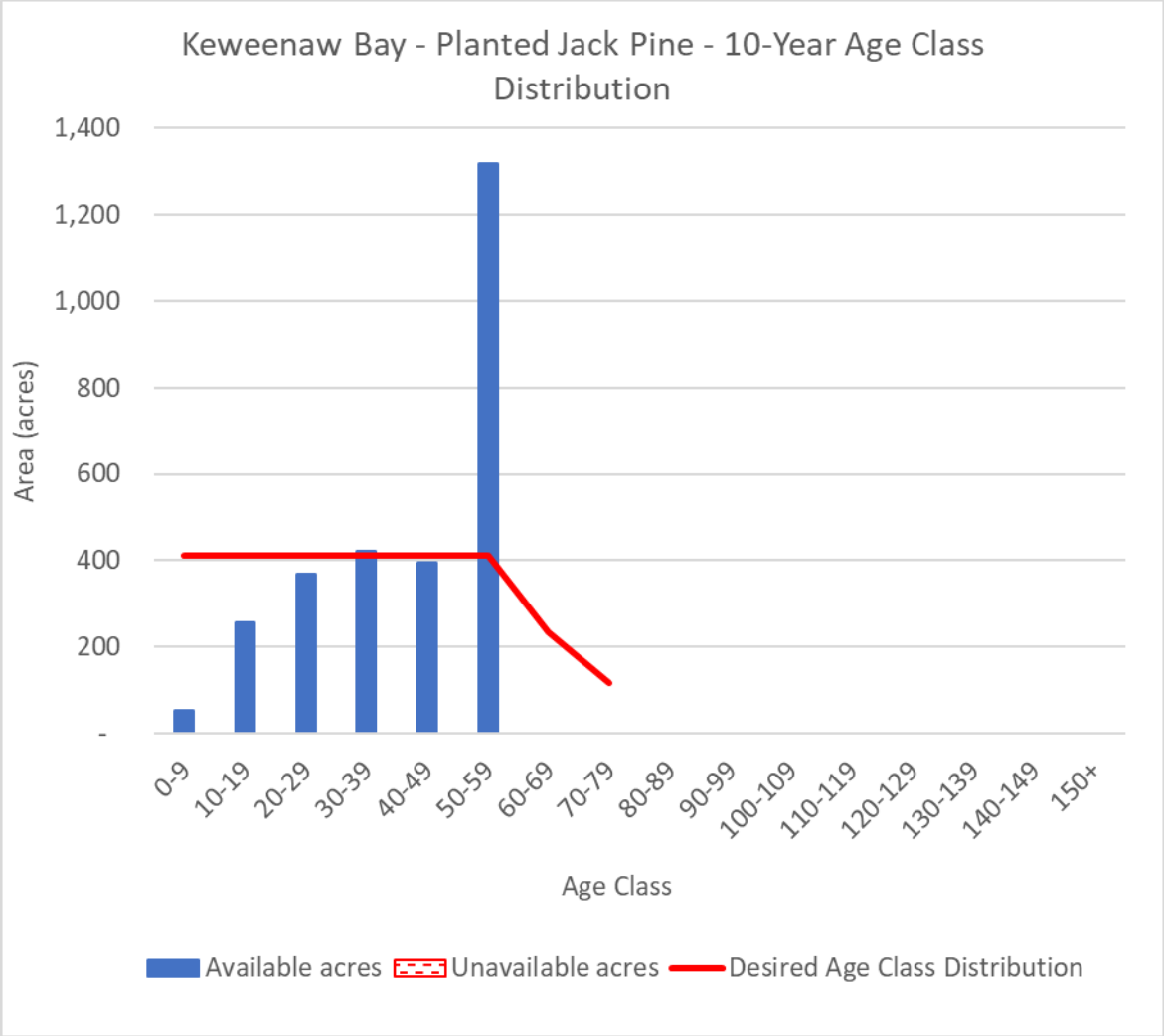


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 54 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of planted jack pine will take many decades.

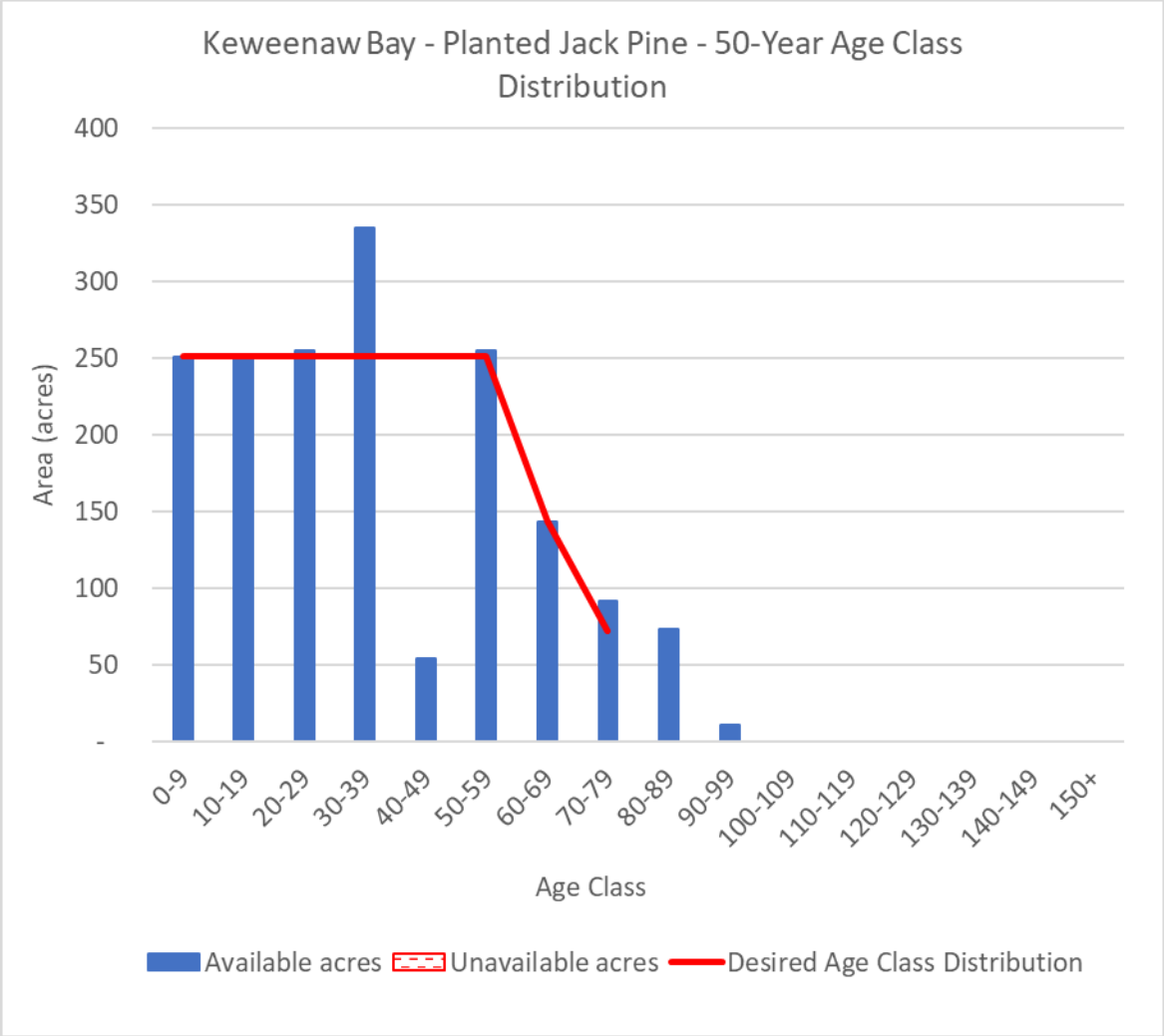


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age-class distribution shows the population of planted jack pine acres working toward the desired future condition ats the older age classes are treated (Figure 18).

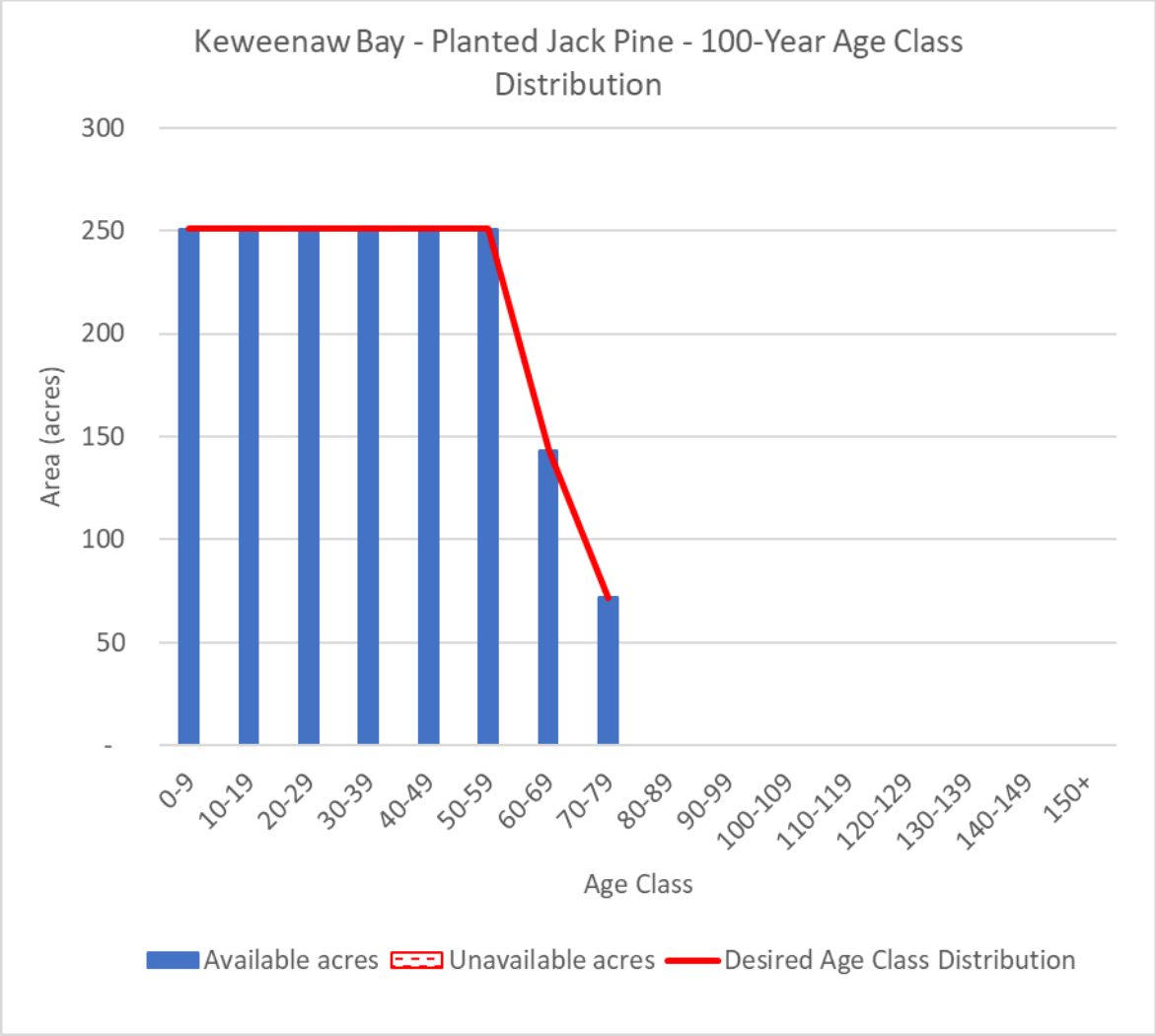


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of planted jack pine in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 21 acres of projected harvest in the planted jack pine cover type. It is expected that about 33 acres of planted jack pine will be converted from other cover types. These total to an expected 54 acres of regeneration in the planted jack pine cover type over the next 10 years.

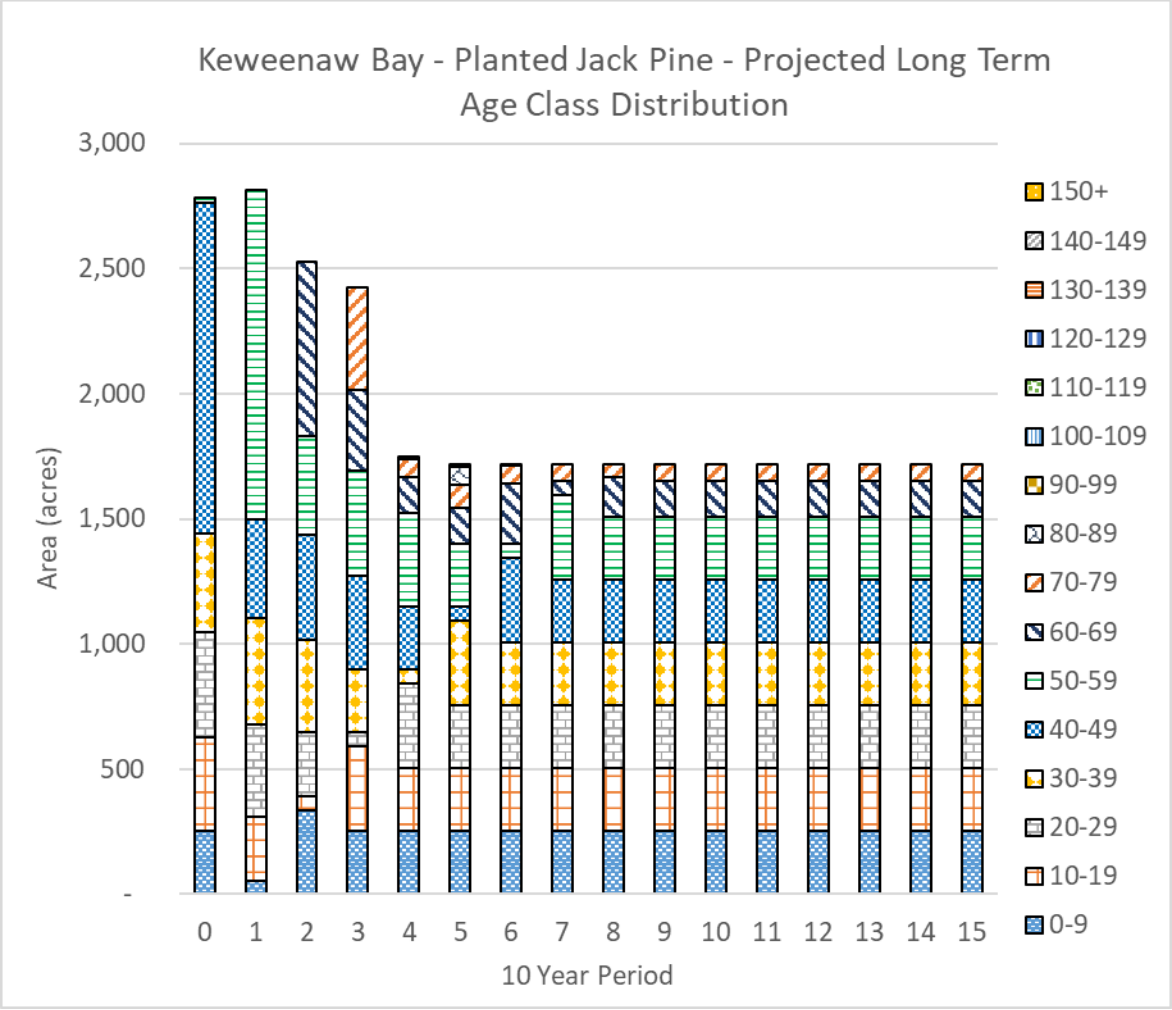


Figure 20. Projected age class distribution over 15, 10-year planning periods.

Mixed upland deciduous

Current condition

The current age class distribution is somewhat unbalanced with a deficit of acres in the 20-39-year-old age classes, and a surplus of acres in the 0-9- and 110-119-year-old age classes.

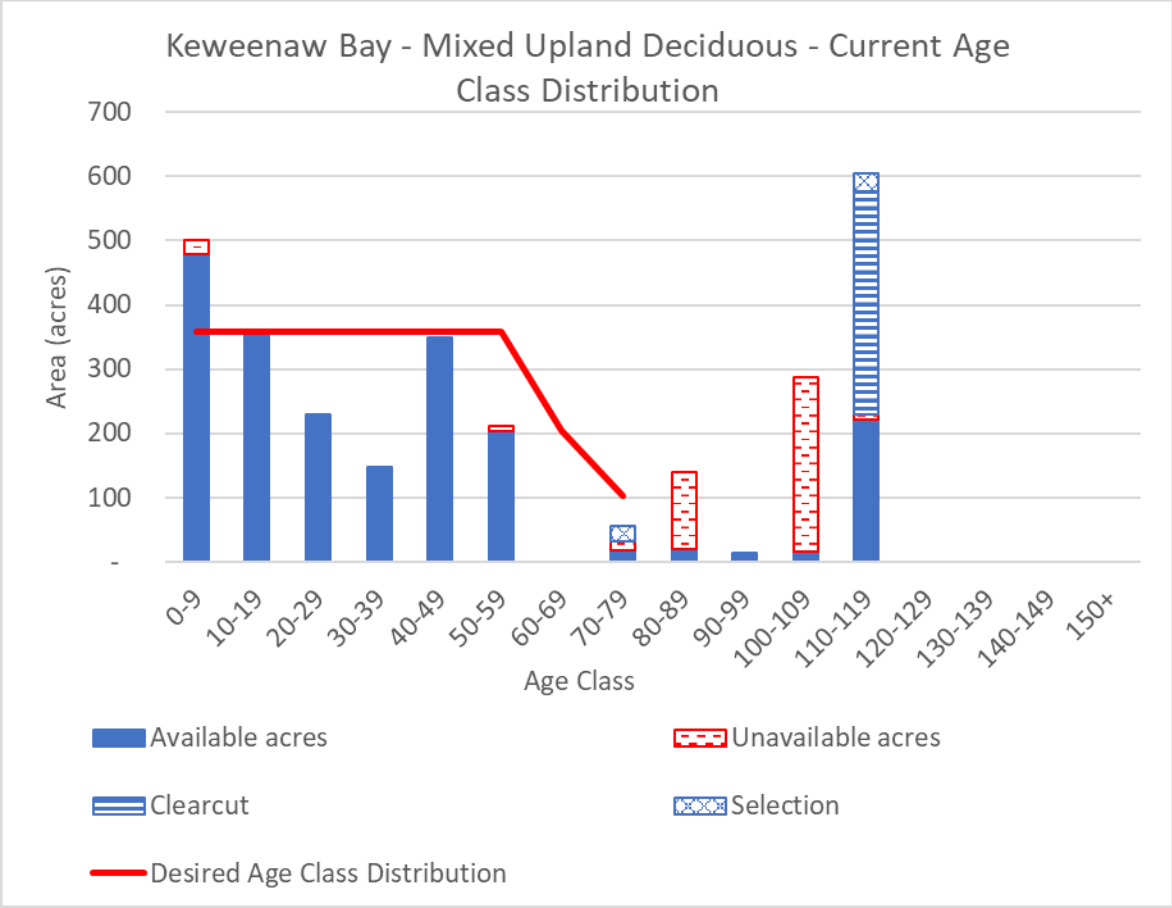


Figure 21. Current age class distribution, the desired age class distribution, and the projected harvests in mixed upland deciduous cover type over the 10-year planning period.

The current age class distribution is somewhat unbalanced with a deficit of acres in the 20-39-year-old age classes, and a surplus of acres in the 0-9- and 110-119-year-old age classes. A portion of this cover type meets the habitat requirements for marten and snowshoe hare.

Table 13. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres- Available	Mixed Upland Deciduous Habitat Acres- Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	434	385
Snowshoe hare	Age category: 0-19 Size category: sapling	841	23
White-tailed deer	All ages and size classes	2,901	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 8 percent of the acres in an age class tail out to the 60-year age class, and 4 percent of the acres in an age class tail out to the 70-year age class.

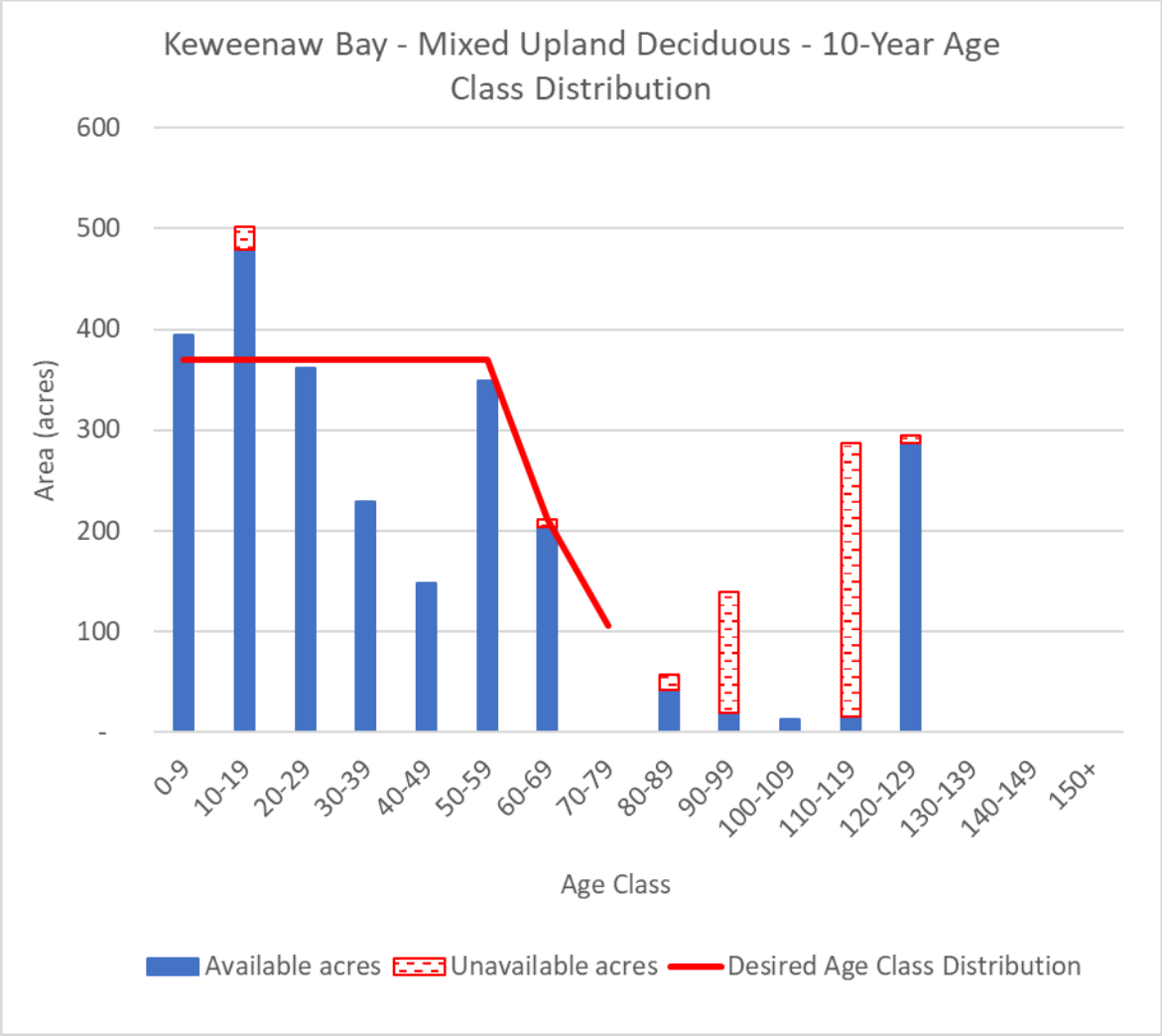


Figure 22. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 395 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of mixed upland deciduous will take many decades.

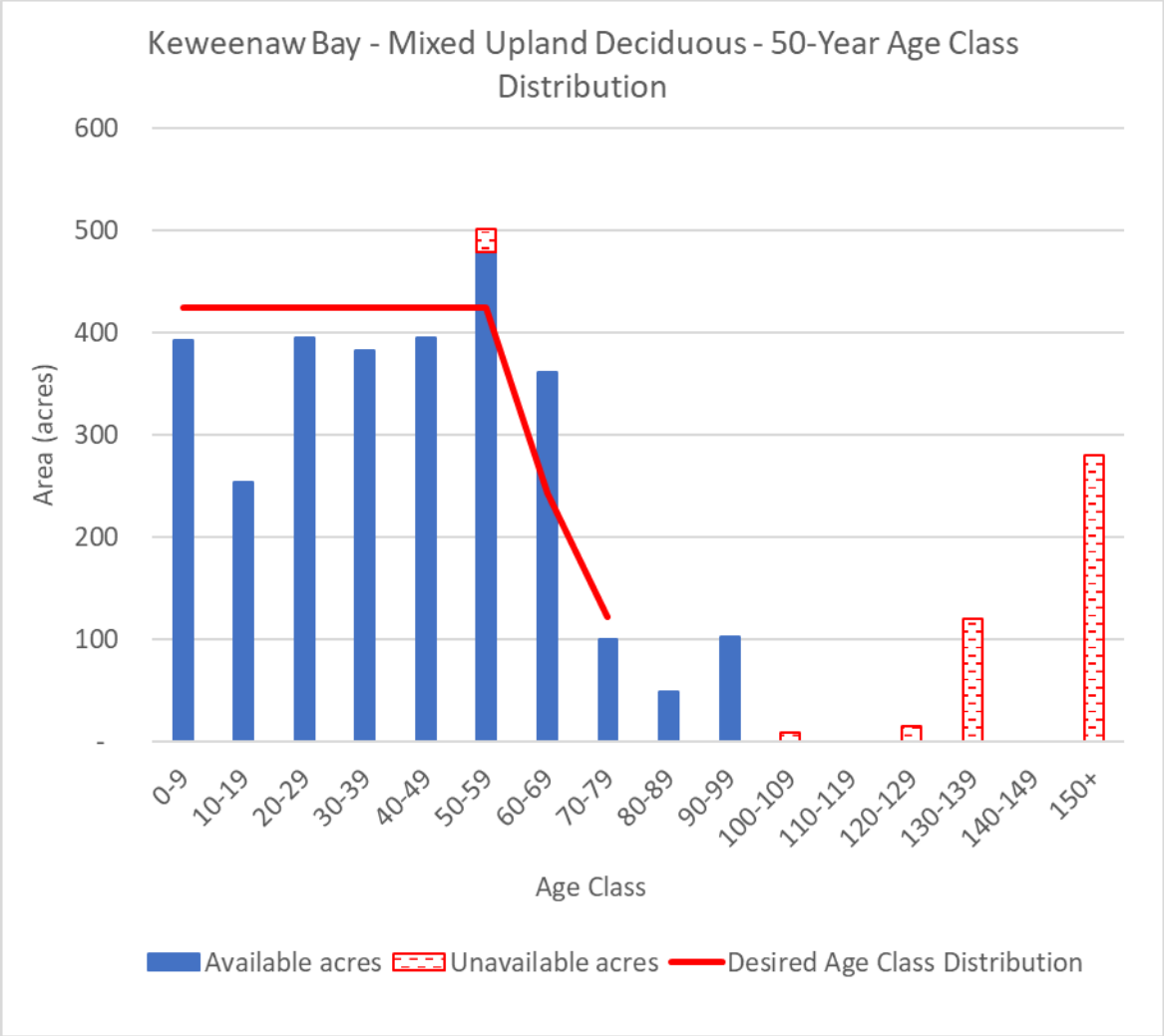


Figure 23. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed upland deciduous acres working toward the desired future condition as the older age classes are treated (Figure 23).

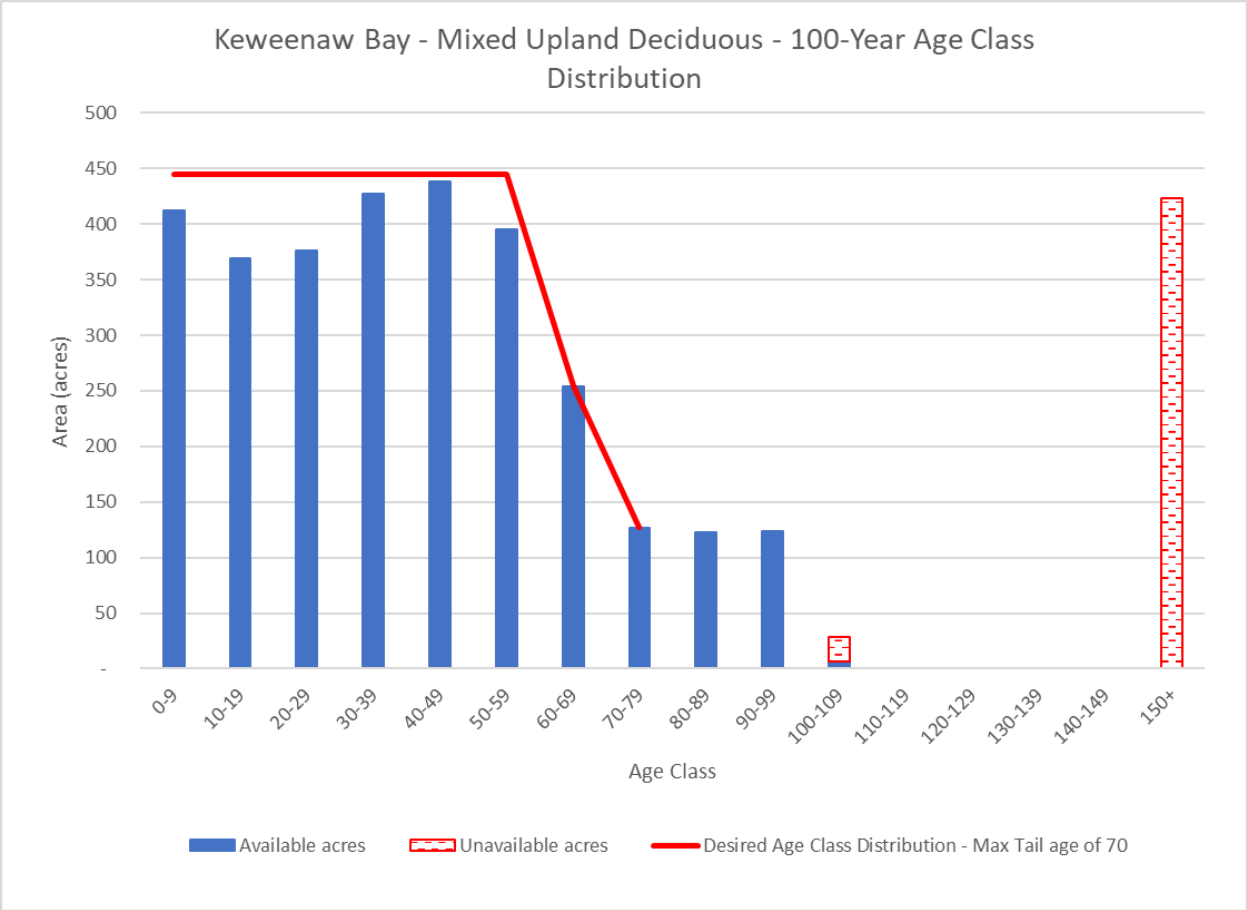


Figure 24. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 24) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 347 acres of clearcut, and 53 acres of selection harvests projected in the mixed upland deciduous cover type. It is expected that about 84 acres of mixed upland deciduous will be converted from other cover types. These total to an expected 484 acres of regeneration in the mixed upland deciduous cover type over the next 10 years.

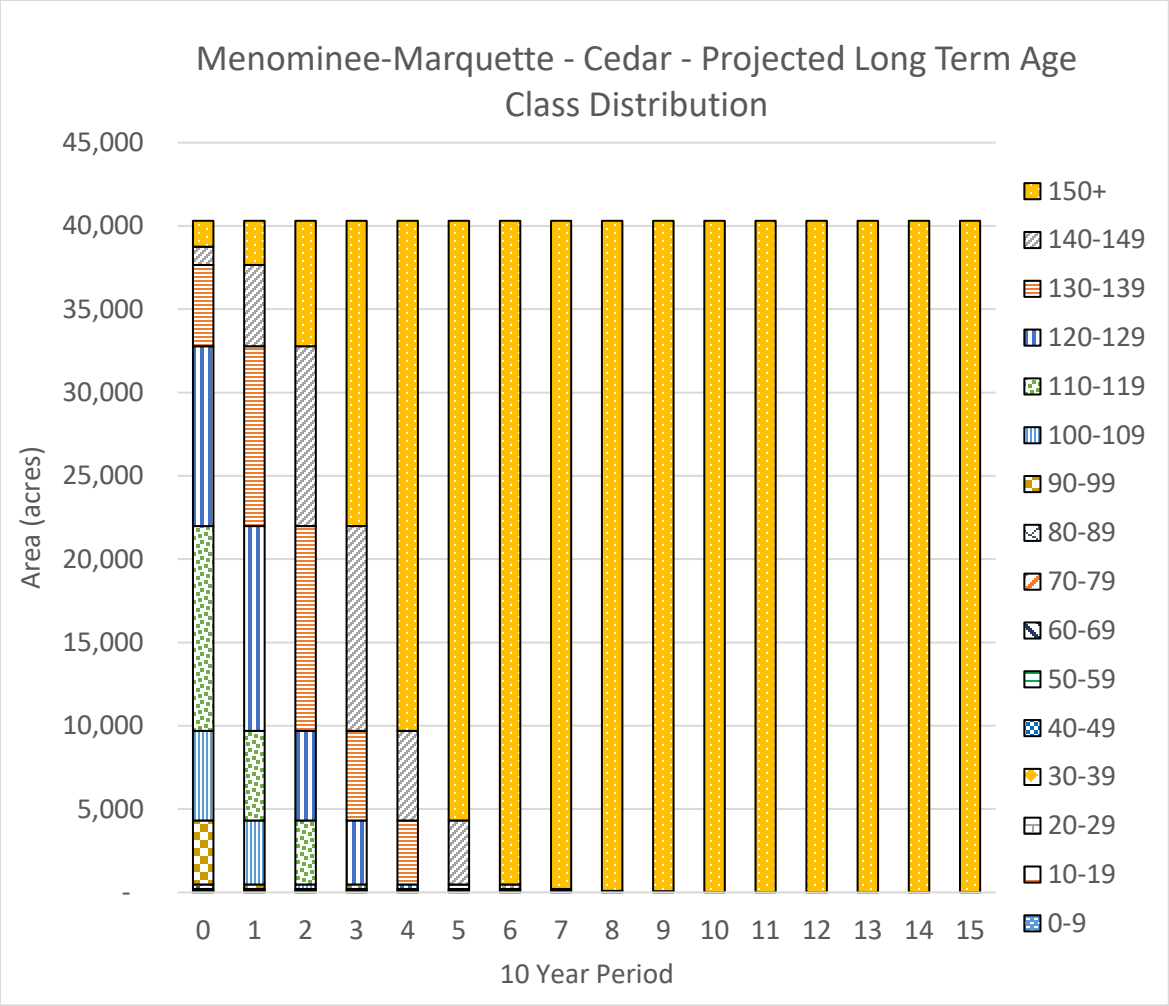


Figure 25. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 14; see Biodiversity in Section 3 for more information).

Table 14. High conservation value areas within the Keweenaw Bay management area.

High Conservation Value Area Type and Name	Acres
Coastal Environmental Areas	**39**
Dedicated Management Areas	**2,268**
Deer Wintering Complex	**9,733**
Northern Long-Eared Bat Hibernacula 2.5 mile Buffer	**1**
Taylor Adit	1
Grand Total	**12,041**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 23. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 24. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Boreal forest		GU	S3	1
Existing ERA	Great Lakes marsh	B			1
Existing ERA	Intermittent wetland	AB			1

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Pine barrens	D	G3	S2	1
Existing ERA	Sandstone bedrock lakeshore	AB			4
Existing ERA	Sandstone bedrock lakeshore	B			1
Existing ERA	Sandstone cobble shore	AB			2
Existing ERA	Sandstone lakeshore cliff	AB			2
Proposed ERA	Boreal forest	BC	GU	S3	2
Proposed ERA	Granite bedrock glade	A	G3G5	S2	1
Proposed ERA	Sandstone cobble shore	B	G2G3	S2	
Proposed ERA	Sandstone lakeshore cliff	AB	G3	S2	1
Grand Total					**17**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 17) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 18) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 17. Reviewable special conservation areas within the Keweenaw Bay management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**36**
Big Eric's Bridge Campground	6
Sturgeon River	30
Mineral Resource Area	**30**
Baraga County Road Commission	30
Spring, Wetlands, or Riparian Areas	**91**
Six Mile Creek	91
Grand Total	**156**

Table 18. Static special conservation areas within the Keweenaw Bay management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**31**
Mesic Northern Forest		31
Designated Trout and Cold Water Stream Buffer		**865**
Unnamed		397
Black Creek		37
Boyles Creek		6
Burns Creek		26
East Branch Huron River		6

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Falls River		25
Fossom Creek		50
Gristmill Creek		9
Hazel Creek		17
Hershley Creek		22
Huron River		49
Little Huron River		19
Menge Creek		12
Mustard Creek		10
Nesters Creek		29
Ogemaw Creek		2
Silver River		19
Sixmile Creek		113
Taylor Creek		16
West Branch Huron River		3
Designated Trout and Coldwater Streams	**32.1**	
	14.7	
Black Creek	1.4	
Boyles Creek	0.2	
Burns Creek	0.9	
East Branch Huron River	0.3	
Falls River	1.0	
Fossom Creek	1.8	
Gristmill Creek	0.3	
Hazel Creek	0.6	
Hershley Creek	0.8	
Huron River	1.7	
Little Huron River	0.8	
Menge Creek	0.4	
Mustard Creek	0.4	
Nesters Creek	1.0	
Silver River	0.8	
Sixmile Creek	4.1	
Taylor Creek	0.6	
West Branch Huron River	0.1	
Important Bird Areas		**5,822**
Baraga Plains		5,822
Wild and Scenic Rivers	**0.0**	
Sturgeon Wild and Scenic River	0.0	
Wood Turtle Stream 100ft Buffer		**73**
Nesters Creek		27
Sturgeon River		42

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
West Branch Huron River		4
Wood Turtle Stream 660-foot buffer		**429**
Nesters Creek		189
Sturgeon River		212
West Branch Huron River		27
Grand Total	**32.1**	**7,220**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 20 and 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 25. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 20. Rare animal species occurrence within the Keweenaw Bay management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alces alces*	Moose	SC	--	--
Animal	Boloria freija	Freija fritillary	SC	--	1
Animal	Boloria frigga	Frigga fritillary	SC	--	1
Animal	Bombus borealis	Northern amber bumble bee	SC	--	2
Animal	Bombus sandersoni	Sanderson's bumble bee	SC	--	1
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	3
Animal	Brachionycha borealis	Boreal brachionyncha	SC	--	1
Animal	Canachites canadensis	Spruce grouse	T	--	1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Erebia discoidalis	Red-disked alpine	SC	--	1
Animal	Glyptemys insculpta	Wood turtle	T	--	2

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Lithobates palustris	Pickerel frog	SC	--	1
Animal	Necturus maculosus	Mudpuppy	SC	--	2
Animal	Opheodrys vernalis	Smooth green snake	SC	--	2
Animal	Picoides arcticus	Black-backed woodpecker	SC	--	1
Animal	Setophaga kirtlandii	Kirtland's warbler	E	--	1
Total	--	--	--	--	**20**

Table 21. Rare plant species occurrence within the Keweenaw Bay management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Cerastium brachypodum	Shortstalk chickweed	T	--	1
Plant	Galearis spectabilis	Showy orchis	T	--	1
Plant	Littorella uniflora	American shore-grass	SC	--	1
Plant	Piptatherum canadense	Canada rice grass	T	--	1
Plant	Ribes oxyacanthoides	Northern gooseberry	SC	--	1
Total	--	--	--	--	**5**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 23).

Table 26. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non-ERA natural communities within the Keweenaw Bay management area

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Mesic Northern Forest	**AB**	S3		1
Grand Total				**1**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Keweenaw Bay management area.

Common Name	Scientific Name	Native/non-native	
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes
Redheaded pine sawfly	Neodiprion sertifer	Non-native	No

Watch for lingering ash with potential resistance to emerald ash borer.

Table 25. Maladies of concern in the Keweenaw Bay management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

A total of 27 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as cold types comprise approximately 78 percent of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	20
Cold small river	1
Cold transitional stream	0
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	1
Warm transitional small river	3
Warm transitional large river	2
Warm stream	0
Warm small river	0
Warm large river	0

Lacustrine Habitat

A total of two lakes and ponds of at least one surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	1
100-499	1
500+	0

Wetlands

A total of 2,313 acres of wetlands are found in the management area (Table 28). Forested wetlands comprise approximately 86 percent of wetland types found in the management area.

Table 28. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	222
Forested	1,991
Riverine	100

Vernal pools and seeps

A total of 217 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Northern hardwood, aspen, mixed upland deciduous and upland mixed forest are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 29).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Northern Hardwood	730
Aspen	537
Mixed Upland Deciduous	416
Lowland Conifers	338
Upland Mixed Forest	281
Hemlock	276
Upland Conifers	271
Cedar	143
Marsh	127
Natural Mixed Pines	80

Watershed vegetation cover

The management area includes portions of important watersheds of the Huron River and Sturgeon River (Tables 30 and 31). Northern hardwood and aspen are major cover types of the state forest in each watershed.

Table 30. Largest vegetative cover types (i.e., top 5) and area of the Huron River watershed located within the management area.

Cover Type	Acres
Northern Hardwood	980
Lowland Conifer	485
Aspen	474

Cover Type	Acres
Mixed Upland Deciduous	244
Upland Conifer	156

Table 31. Largest vegetative cover types (i.e., top 5) and area of the Sturgeon River watershed located within the management area.

Cover Type	Acres
Aspen	2,601
Natural Jack Pine	2,565
Northern Hardwood	2,190
Planted Jack Pine	1,525
Upland Mixed Forest	960

Recreation

Most of this management area has good access for public recreation and management, although there are some smaller, isolated parcels. Motorized vehicle trails include multiple snowmobile trails and the Baraga Plains ORV trail that loops through the area. Nearly 10 miles of the North Country National Scenic Trail/Iron Belle Trail crosses the south end of this MA. There are state forest campgrounds (rustic) at Big Lake and on the Huron River.

Table 32. Designated recreation trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized Recreation Trails	ORV (all types)	28
Motorized Recreation Trails	Snowmobile	19.9
Non-motorized Recreation Trails	Hiking	9.9
Non-motorized Recreation Trails	Equestrian	0
Non-motorized Recreation Trails	Biking	0
Non-motorized Recreation Trails	Hunter Walking Trails	0
Total	--	**58.3**

Note: Trail use types may overlap.

Table 33. State forest campgrounds

Name	Number of Sites	ORV Access
Big Eric's Bridge campground	21	--
Big Lake campground	15	--

Baraga Plains State Waterfowl (Wildlife) Management Area is located adjacent to USDA Forest Service land. The wildlife management area includes clearings for goose management and a wildlife refuge which is closed seasonally. The area is well-used by waterfowl hunters in the fall.

Boating access sites provide access to the Huron, Sturgeon and Silver rivers, as well as at Big Lake campground.

Table 34. Areas Managed for Hunting

Type	Name	Number of Acres
State Wildlife Management Areas	Baraga Plains SWMA	12,844.8

Table 35. Boating access sites (BAS).

Name	Waterbody
Big Eric's Bridge campground	Huron River
Big Lake campground	Big Lake
Silver River Falls	Silver River
Silver River	Silver River
Sturgeon River	Sturgeon River

Menominee-Marquette

State Forest Area: 196,600 acres	Location: Central Upper Peninsula	Population Centers: Marquette, Menominee
Sub-Section: West Green Bay Till Plain	Landforms: Broad till plain (ground moraine), drumlins oriented northeast-southwest	Landcover: Forested: 177,784 acres Non-forested: 18,816 acres

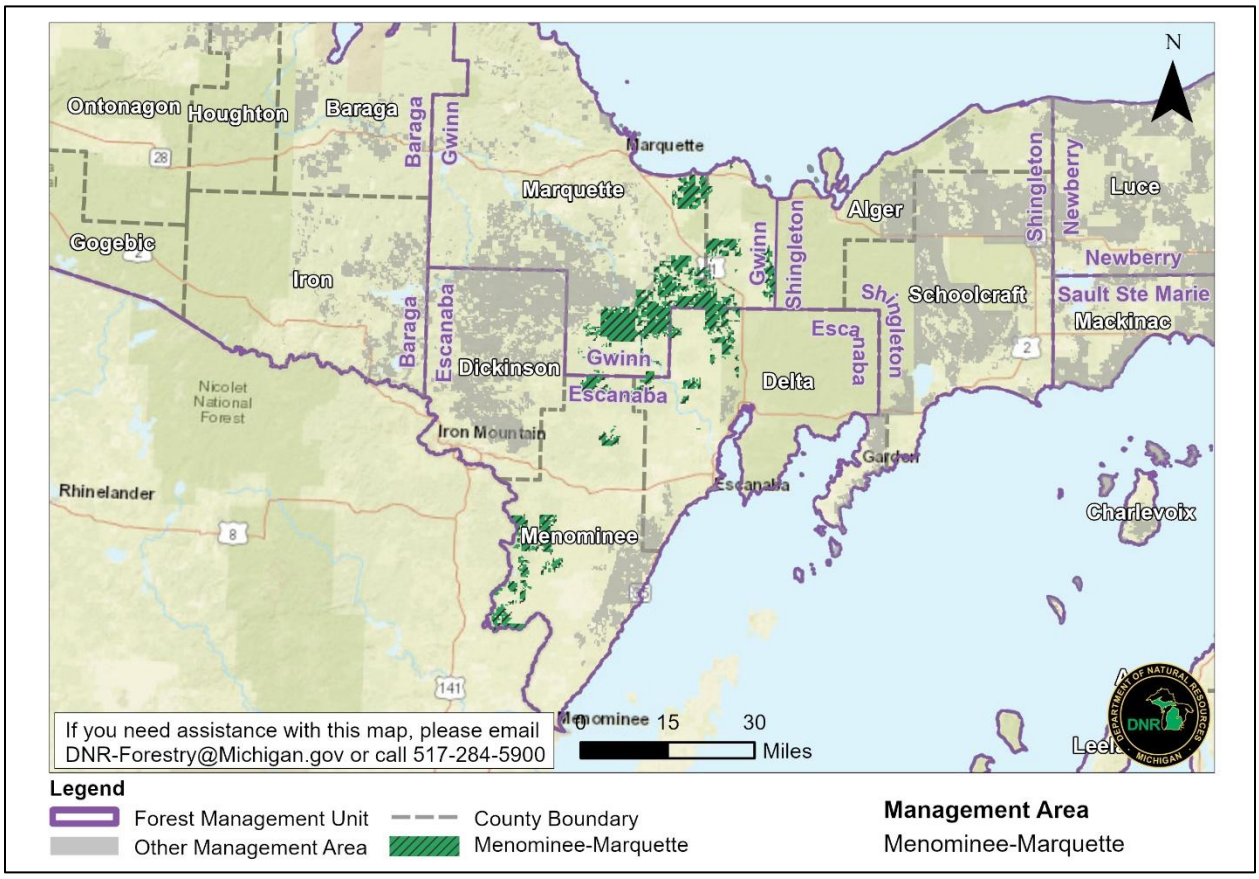


Figure 1. Map of the Menominee-Marquette management area.

Forested landscape

Current condition

The Menominee-Marquette management area is dominated by shade-tolerant cover types. Intolerant upland cover types are relatively evenly distributed across the age categories, while the unavailable upland and lowland acres are more prevalent in the older age category.

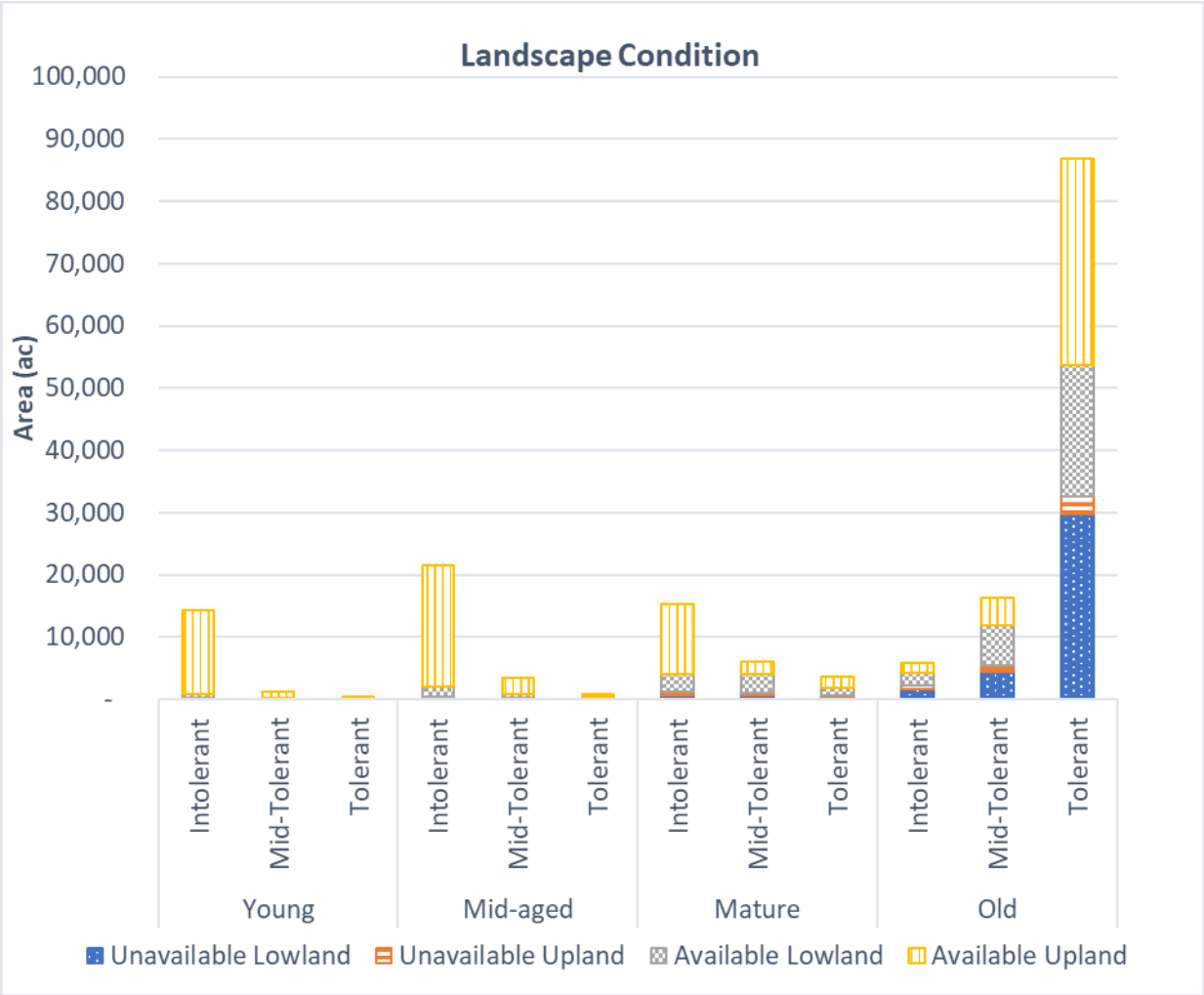


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the management priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack pine	13,475
Mature forest	Acres of 80+ year stands across cover types	109,033
Mature forest	Acres of 120+ year stands across cover types	62,750
Mesic conifer cover types	Acres of mesic conifer cover types	6,045
Mesic conifers in other cover types	Average canopy occupancy	18%
Mast – oak cover types	Acres of oak cover types	1,546
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	45,615
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	70,841
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	3,618
Landscape forest matrix	Percent deciduous forest	54%
Landscape forest matrix	Percent coniferous forest	38%

Another important landscape level habitat in the area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, landbirds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls, and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed, and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provides unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas. The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Menominee-Marquette management area has the following Special Analysis Units. These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the management area.

- Deer Wintering Complex -Arnold-Ford River
- Deer Wintering Complex -Dead Horse-North Perkins

The Menominee-Marquette management area is dominated by forested cover types, with 90 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 44 percent of the

management area and is comprised mostly of aspen. The upland coniferous portion is 4 percent and comprised mostly of upland conifer. Lowland shrub is the most common non-forested cover type in this management area, representing 5 percent of the landscape.

Table 2. Summary table describing the landscape conditions and distribution of cover types in the Menominee-Marquette management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	45,266	86,364	98,022	177,784
			Northern Hardwood	35,323			
			Black Red Hybrid Oak	94			
			Northern Red Oak	842			
			Oak Mix	611			
			Mixed Upland Deciduous	4,229			
		Mixed	Upland Mixed Forest	4,269	4,269		
		Coniferous	Planted Red Pine	665	7,389		
			Planted Jack Pine	153			
			Planted White Pine	0			
			Planted Mixed Pine	0			
			Natural Red Pine	495			
			Natural Jack Pine	24			
			Natural White Pine	1,016			
			Natural Mixed Pines	409			
			Upland Spruce/Fir	1,077			
			Upland Conifers	1,810			
			Hemlock	1,742			
	Lowland	Deciduous	Lowland Aspen/Balsam Poplar	1,791	9,946	79,762	
			Lowland Deciduous	8,155			
		Mixed	Lowland Mixed Forest	8,813	8,813		
		Coniferous	Cedar	40,304	61,003		
			Lowland Conifers	12,971			
			Lowland Spruce/Fir	3,952			
			Tamarack	3,775			
Nonforested	Upland	N/A	Herbaceous Openland	2,666	N/A	4,401	18,816
			Upland Shrub	563			
			Low Density Trees	397			
			Bare/Sparsely Vegetated	126			
			Cropland	389			
			Urban	259			
	Lowland	N/A	Lowland Shrub	8,978	N/A	14,415	
			Marsh	1,473			
			Bog	546			
			Treed Bog	2,359			
			Water	1,059			
						Grand Total	196,600

There are 133,611 acres (68.4 percent of the total management area and 75.6 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the area (Table 3). Of that, 25 percent is in the aspen cover type, 19 percent is in northern hardwood, 9 percent in cedar, and 5 percent in lowland conifer. The remaining 19 cover types represent about 42 percent of the forested and available land in the management area.

Table 3. Summary table describing the landscape conditions and cover type composition of the Menominee-Marquette management area.

MENOMINEE-MARQUETTE						
Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	43,863	24.7%	1,407	0.8%	45,270	25.5%
Black-red hybrid oak	94	0.1%	0	0.0%	94	0.1%
Cedar	15,467	8.7%	24,839	14.0%	40,306	22.7%
Hemlock	954	0.5%	788	0.4%	1,742	1.0%
Lowland aspen/balsam poplar	1,684	0.9%	108	0.1%	1,791	1.0%
Lowland conifers	7,795	4.4%	5,178	2.9%	12,972	7.3%
Lowland deciduous	5,145	2.9%	3,011	1.7%	8,156	4.6%
Lowland mixed forest	6,237	3.5%	2,577	1.4%	8,814	5.0%
Lowland spruce/fir	2,658	1.5%	1,295	0.7%	3,953	2.2%
Mixed upland deciduous	3,618	2.0%	612	0.3%	4,231	2.4%
Natural jack pine	0	0.0%	24	0.0%	24	0.0%
Natural mixed pines	409	0.2%	0	0.0%	409	0.2%
Natural red pine	478	0.3%	18	0.0%	495	0.3%
Natural white pine	1,000	0.6%	15	0.0%	1,016	0.6%
Northern hardwood	33,071	18.6%	2,255	1.3%	35,326	19.9%
Northern red oak	764	0.4%	78	0.0%	842	0.5%
Oak mix	611	0.3%	0	0.0%	611	0.3%
Planted jack pine	153	0.1%	0	0.0%	153	0.1%
Planted red pine	665	0.4%	0	0.0%	665	0.4%
Tamarack	2,859	1.6%	917	0.5%	3,776	2.1%
Upland conifers	1,279	0.7%	532	0.3%	1,811	1.0%
Upland mixed forest	3,972	2.2%	297	0.2%	4,270	2.4%
Upland spruce/fir	835	0.5%	242	0.1%	1,077	0.6%
Grand Total	**133,611**	**75.1%**	**44,191**	**24.9%**	**177,802**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvest) acres for the Menominee-Marquette management area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Wildlife concerns	13,657	30.9%
BMPs	7,887	17.8%
Conservation values	6,434	14.6%
Deer wintering area	4,267	9.7%
Unproductive	3,249	7.4%
Natural/quiet/wilderness area	2,432	5.5%
Too wet	2,028	4.6%
Cannot regenerate	1,530	3.5%
Blocked by obstacle	1,234	2.8%
Long-term retention	815	1.8%
Other influence zones	274	0.6%
Other dept./div. Processes	223	0.5%
Historical/archaeological	66	0.1%
Too steep	50	0.1%
Denied access	34	0.1%
Species of special concern or T&E	11	0.0%
Total unavailable	**44,191**	**100.0%**

Management actions

Each cover type in the Menominee-Marquette management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern hardwood	458	8,210	-	-	227	-	-	8,895
Aspen	6,663	-	-	-	-	-	-	6,663
Lowland conifers	947	-	-	-	-	-	-	947
Mixed upland deciduous	803	44	-	-	78	-	-	925
Upland mixed forest	918	-	-	-	-	-	-	918
Lowland mixed forest	659	-	-	-	-	-	-	659
Lowland deciduous	409	20	-	-	11	-	-	440
Lowland aspen/balsam poplar	401	-	-	-	-	-	-	401
Upland spruce/fir	160	-	-	-	-	-	-	160
Upland conifers	75	-	-	-	22	-	-	97
Planted red pine	-	-	89	-	-	-	-	89
Hemlock	-	82	-	-	-	-	-	82
Natural white pine	-	-	44	-	22	-	-	66
Natural mixed pines	-	-	58	-	6	-	-	64
Northern red oak	9	-	-	-	-	-	-	9
Black-red hybrid oak	6	-	-	-	-	-	-	6
Tamarack	6	-	-	-	-	-	-	6
Totals	**11,515**	**8,356**	**190**	**-**	**367**	**-**	**-**	**20,427**

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. The following sections will provide additional details for each of the significant cover types in the area.

Table 6. Ten-year 10 year estimated harvest volume by product and species for the Menominee-Marquette management area.

10-Year Estimated Harvest Volume Projection Menominee-Marquette Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed Hardwood	73,904	69,470
	Mixed Aspen	59,970	56,372
	Mixed Softwood	28,432	26,726
	Mixed Spruce	14,292	13,434
	White Pine	3,055	2,872
	Mixed Oak	2,720	2,557
	Red Pine	2,641	2,482
	Jack Pine	1,335	1,255
	Pulpwood Total	**186,350**	**175,169**
Sawtimber (MBF)	Sugar Maple	24,512	23,041
	Red Maple	11,824	11,114
	Mixed Aspen	10,952	10,295
	White Pine	7,630	7,172
	Red Pine	5,619	5,282
	Red Oak	4,589	4,313
	Basswood	3,025	2,843
	White Oak	795	748
	Mixed Oak	318	299
	Sawtimber Total	**69,263**	**65,107**
	Total Sawtimber Harvest Volume in Cords	**146,123**	**137,356**
	Grand Total Harvest Volume in Cords	**332,473**	**312,524**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are very few cover type transitions projected in the Menominee-Marquette management area. The managed area of each cover type is projected to remain relatively stable. The largest decrease forecasted is in the mixed upland deciduous cover type, where 192 acres are expected to convert to other cover types through forest management activities. The largest increase is in upland mixed forest, where 320 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	45,266	45,429	163
Cedar	40,304	40,304	0
Northern hardwood	35,323	35,148	-175
Lowland conifers	12,971	12,782	-189
Lowland mixed forest	8,813	9,080	267
Lowland deciduous	8,155	7,991	-164
Upland mixed forest	4,269	4,589	320
Mixed upland deciduous	4,229	4,037	-192
Lowland spruce/fir	3,952	4,008	55
Tamarack	3,775	3,774	-1
Upland conifers	1,810	1,703	-107
Lowland aspen/balsam Poplar	1,791	1,823	32
Hemlock	1,742	1,742	0
Upland spruce/fir	1,077	968	-109
Natural white pine	1,016	1,034	19
Northern redoOak	842	841	-1
Planted red pine	665	715	50
Oak mix	611	611	0
Natural red pine	495	495	0
Natural mixed pines	409	409	0
Planted jack pine	153	153	0
Black-red hybrid oak	94	94	0
Natural jack pine	24	24	0
Planted mixed pine	0	16	16
Planted white pine	0	16	16
Lowland shrub	8,978	8,978	0
Herbaceous openland	2,666	2,666	0
Treed bog	2,359	2,359	0
Marsh	1,473	1,473	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Water	1,059	1,059	0
Upland shrub	563	563	0
Bog	546	546	0
Low density trees	397	397	0
Cropland	389	389	0
Urban	259	259	0
Bare/sparsely vegetated	126	126	0
Total:	**196,600**	**196,600**	**0**

Featured species current and projected habitat acres

There are 13 featured species in this management area that span various cover types, age classes, and stand-level conditions.

It is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. The current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81. Because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the SFMP model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	18,214	17,194	14,899	15,187
Black bear	Generalist/mast	45,615	--	--	--
Black-backed woodpecker	Natural Disturbance	--	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Cerulean warbler	Northern hardwoods, mixed upland deciduous, lowland deciduous	36,322	37,824	36,033	35,753
Golden-winged warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	18,564	16,468	14,101	14,205
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	79,758	85,788	71,300	84,352
Moose	To be determined	--	--	--	--
Ruffed Grouse	Aspen	16,603	14,947	13,652	13,756
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	24,414	24,753	18,757	19,005
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	103,392	109,589	110,393	110,778
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	64,440	64,243	63,689	63,720
Wild turkey	Non-forested openings	3,064	--	--	--
Wood turtle	Non-forested openings	--	--	--	--

Cover type composition and associated wildlife species

Aspen

Current condition

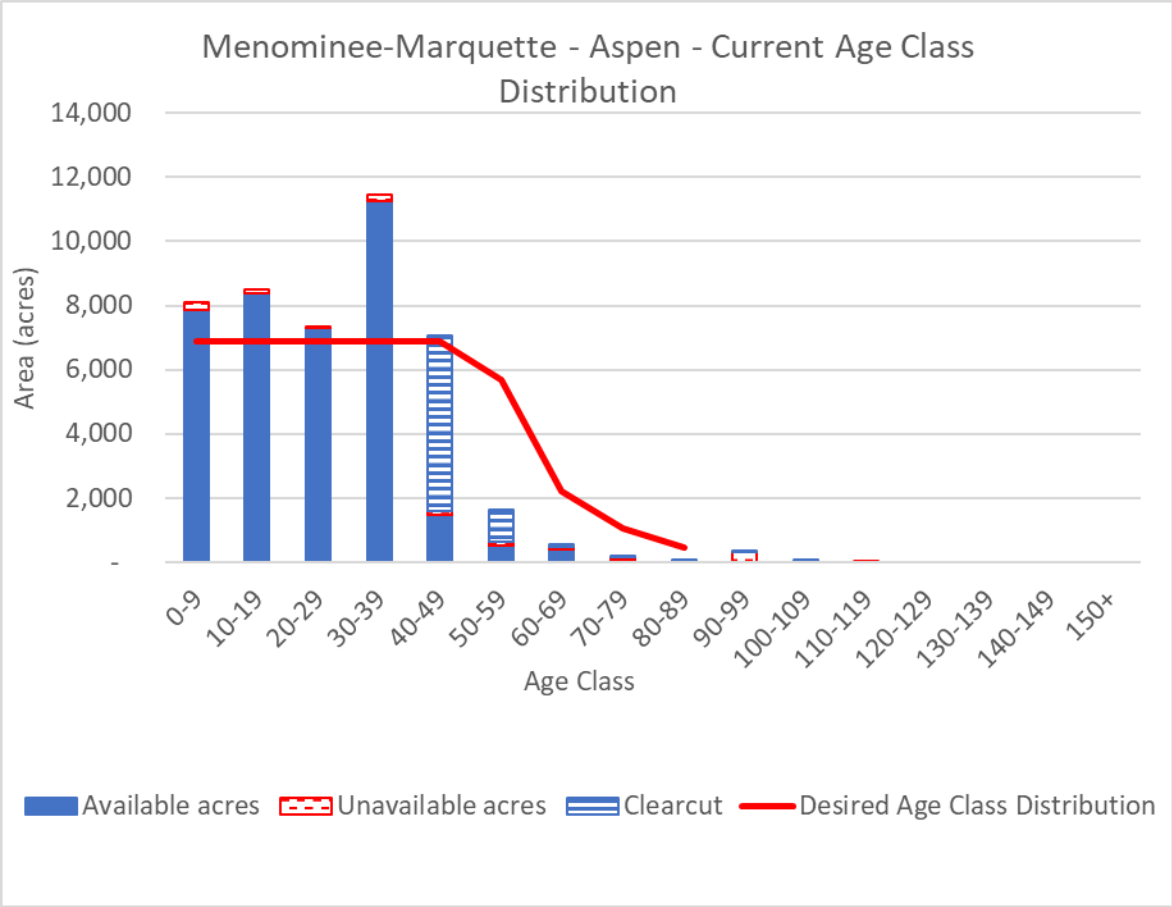


Figure 3. Current age-class distribution, the desired age-class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in the 50-89-year-old age classes and a surplus of acres in the 0-49-year-old age classes.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: Sapling	16,221	382
American woodcock	Age category: 0-19 Size class: Sapling	16,221	382

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Ruffed grouse	Age category: 0-19 Size class: sapling	16,221	382
Snowshoe hare	Age category: 0-19 Size class: sapling	16,221	382
White-tailed deer	All ages and size classes	46,266	--

Desired future condition

The desired age class distribution is to have a rotation age of 40 years with approximately 13 percent of the acres in an age class tail out to the 50 year age class, 5 percent of the acres in an age class tail out to the 60 year age class, 2 percent of the acres in an age class tail out to the 70 year age class and 1 percent of the acres in an age class tail out to the 80-year age class.

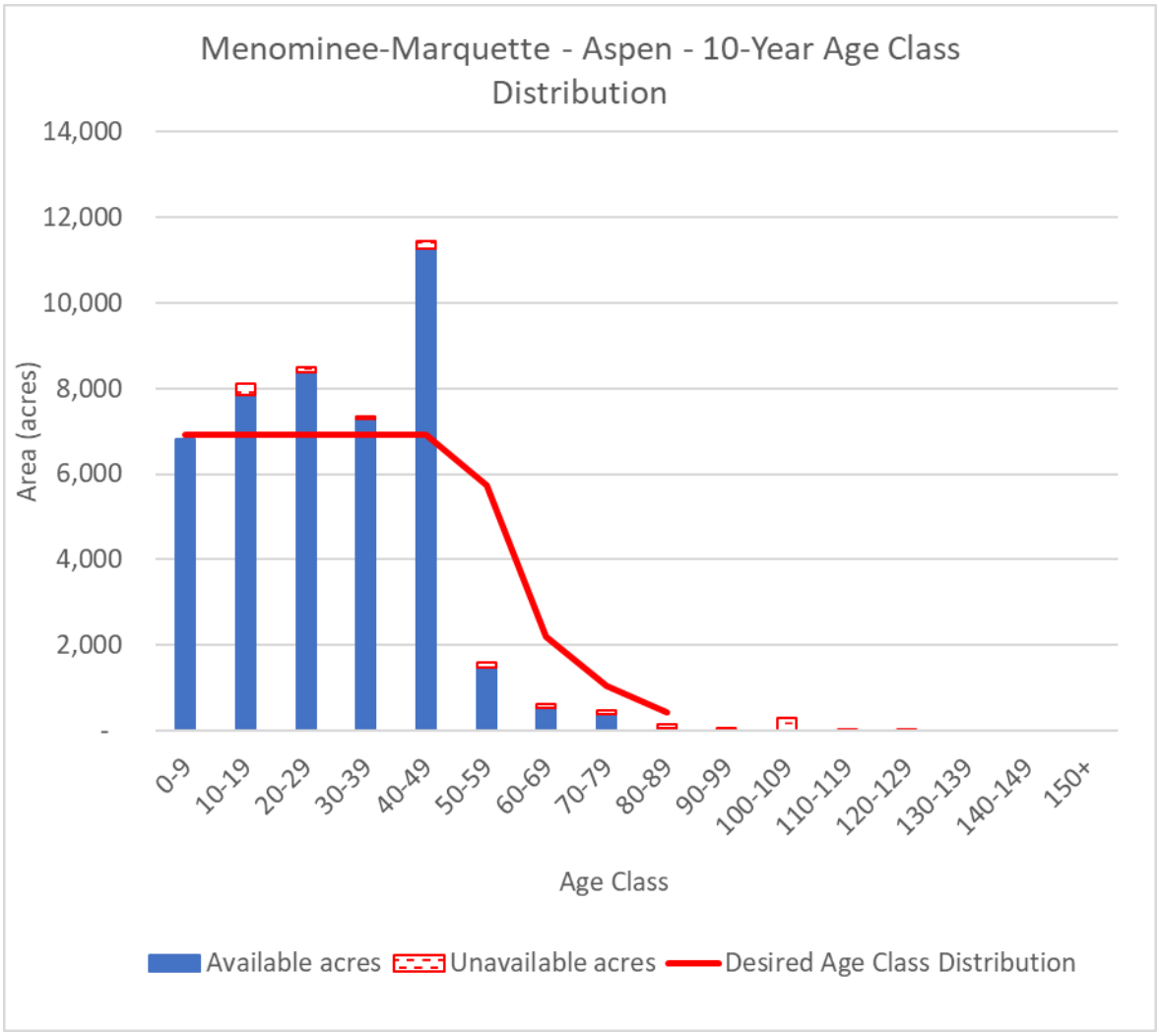


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 6,825 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take a few decades in this management area.

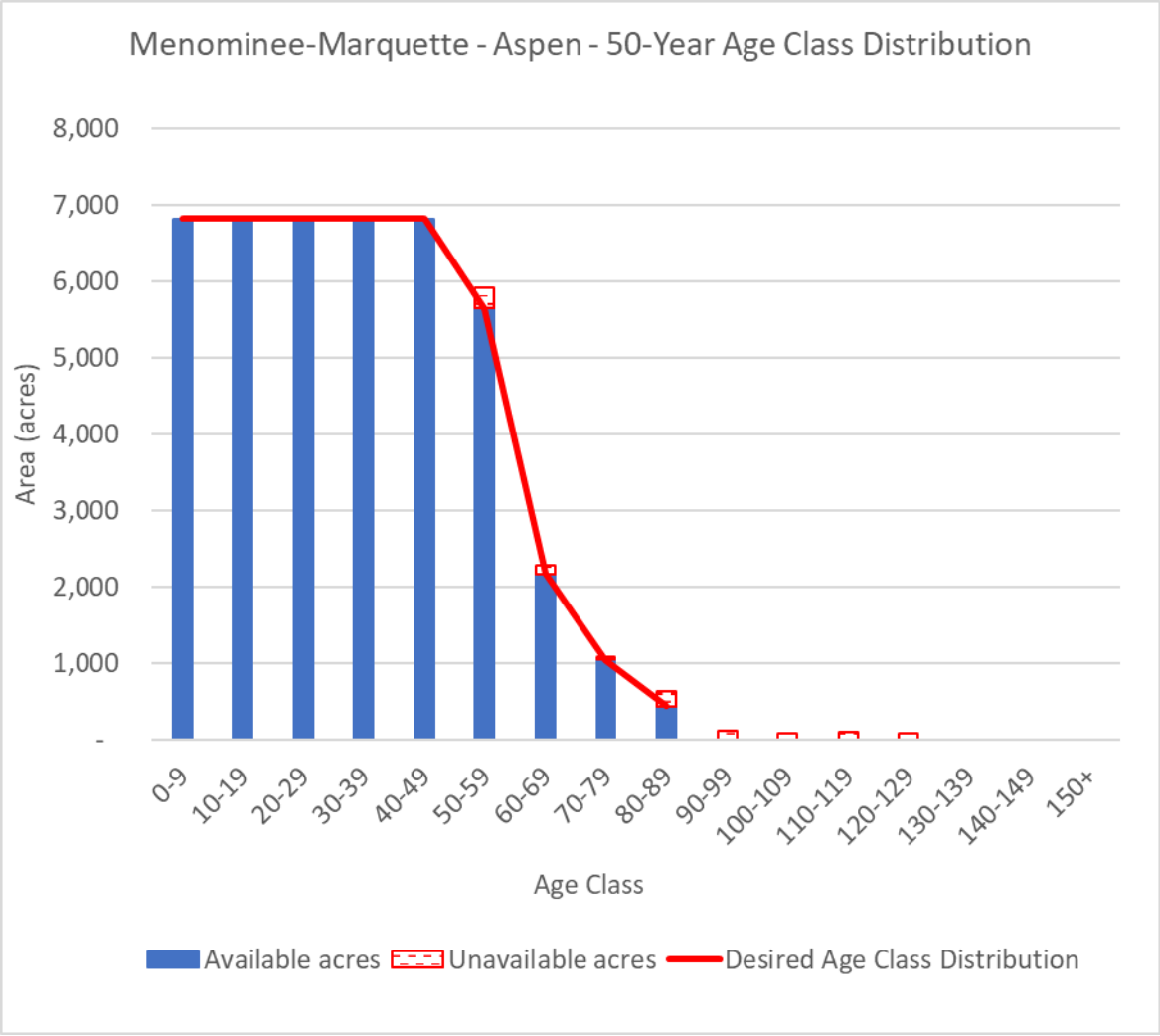


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres nearly reaching the desired future condition with few age classes deviating from the target proportions (Figure 5).

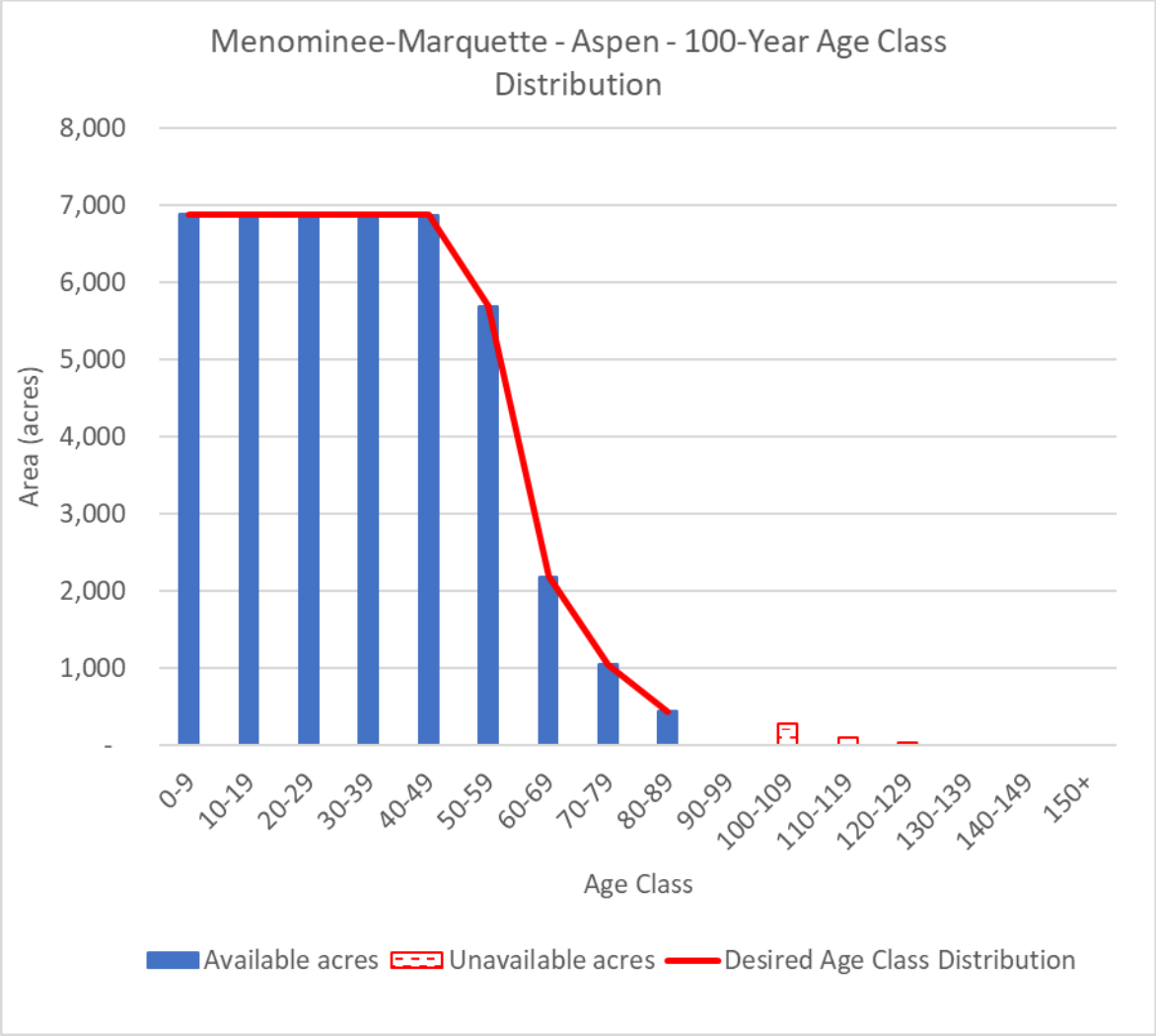


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 6,663 acres of projected clearcut harvest in the aspen cover type. It is expected that about 163 acres of aspen will be converted from other cover types. These total to an expected 6,826 acres of regeneration in the aspen cover type over the next 10 years.

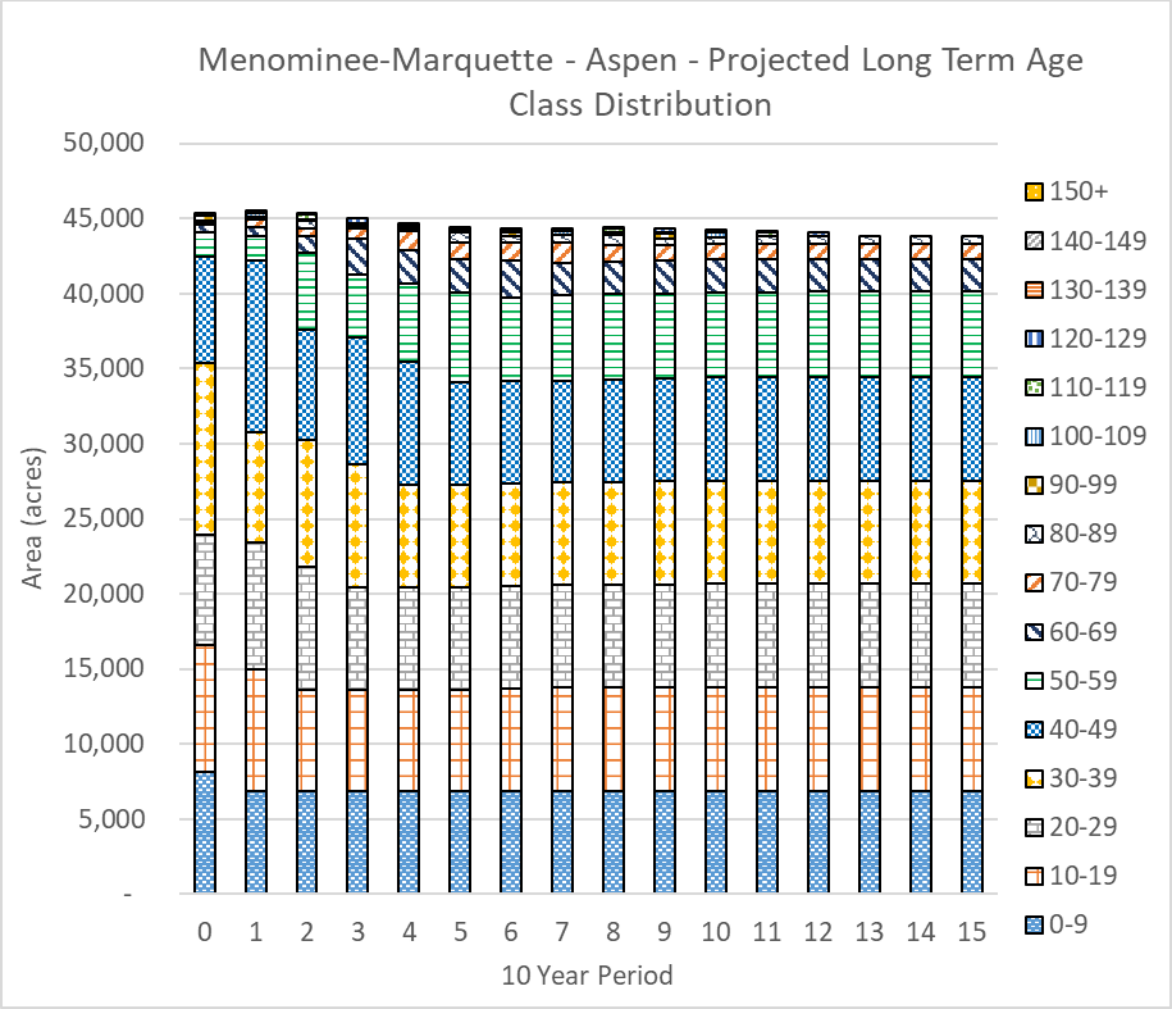


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover typein the Menominee-Marquette management area is between a stand age of 100-119 years (Figure 8). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stands age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10). A portion of the stands have been managed under an even-aged system due to poor quality stands or a predominance of red maple in those stands. A portion of this cover type meets the habitat requirements for marten, blackburnian warbler, cerulean warbler and white-tailed deer.

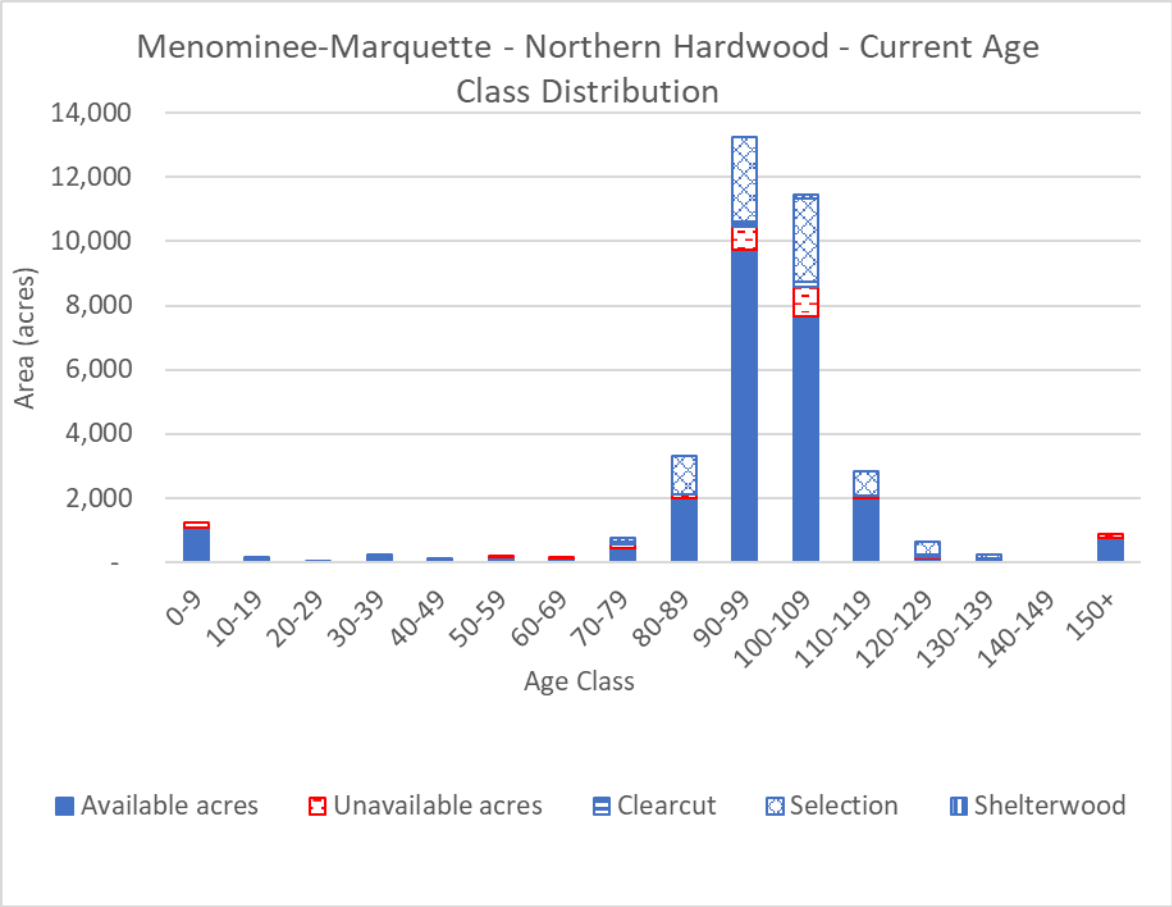


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the Menominee-Marquette management area.

The area of northern hardwood is well distributed in the ideal basal area classes for optimal growing conditions in the Menominee-Marquette management area (Figure 9).

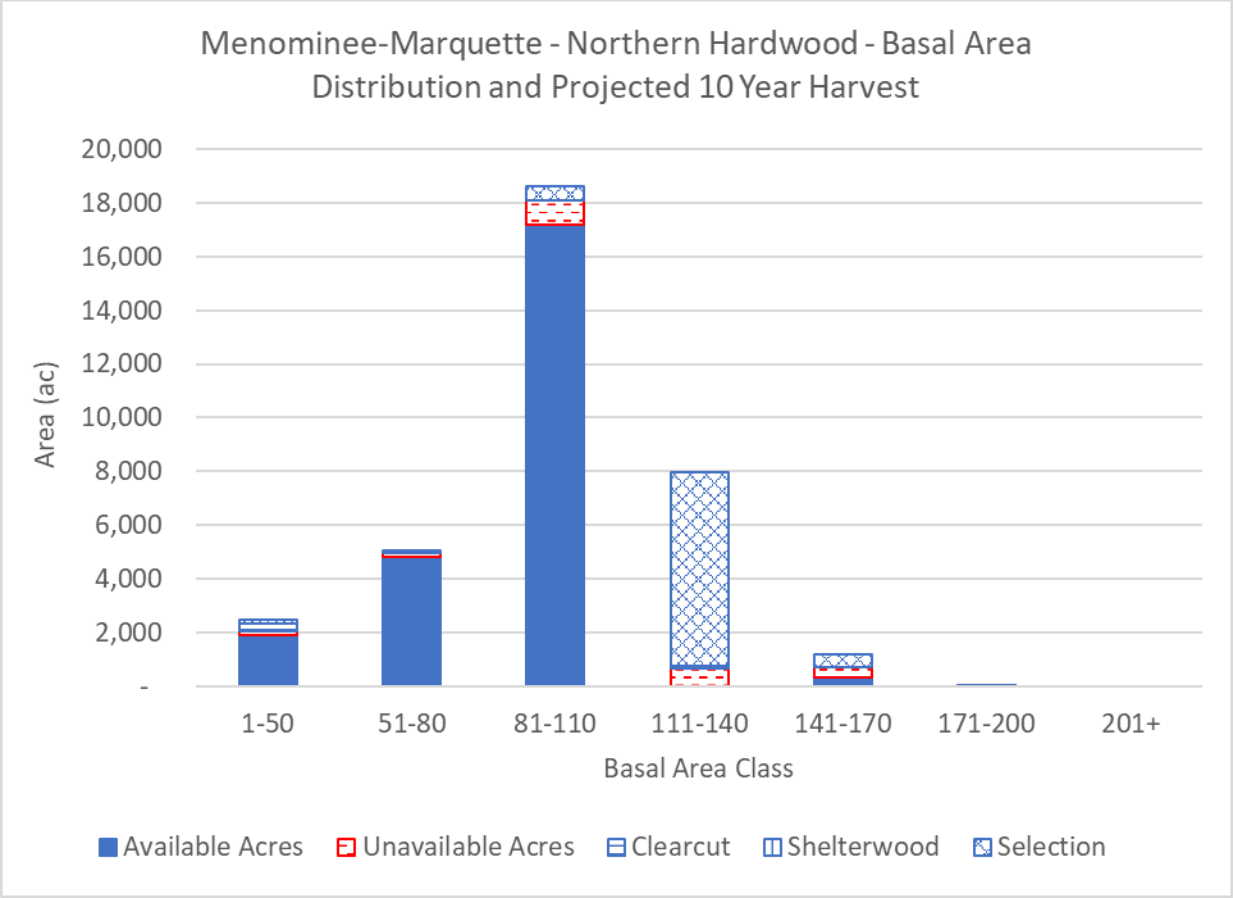


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Cerulean warbler	Age category: 50+ Size category: pole, sawlog Basal area: 81+	29,833	1,937
Black-throated blue warbler	Age category: 80+ Size category: sawlog Basal area: 81+	25,010	1,794
Marten	Age category: 40+ Size category: Pole, Sawlog Basal area: 81+	25,010	1,794
White-tailed deer	All ages and size classes	35,323	--

Desired future condition

The projected long-term cover type trend for northern hardwood is somewhat stable in the management area. There are 175 acres transitioning from this cover type in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 basal area class and stands that are ready for harvest occupy the 111-140 class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles and eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. Northern hardwood in the Menominee-Marquette management area has challenges in regeneration and recruitment due to cervid herbivory and the poor potential of many of the stands.

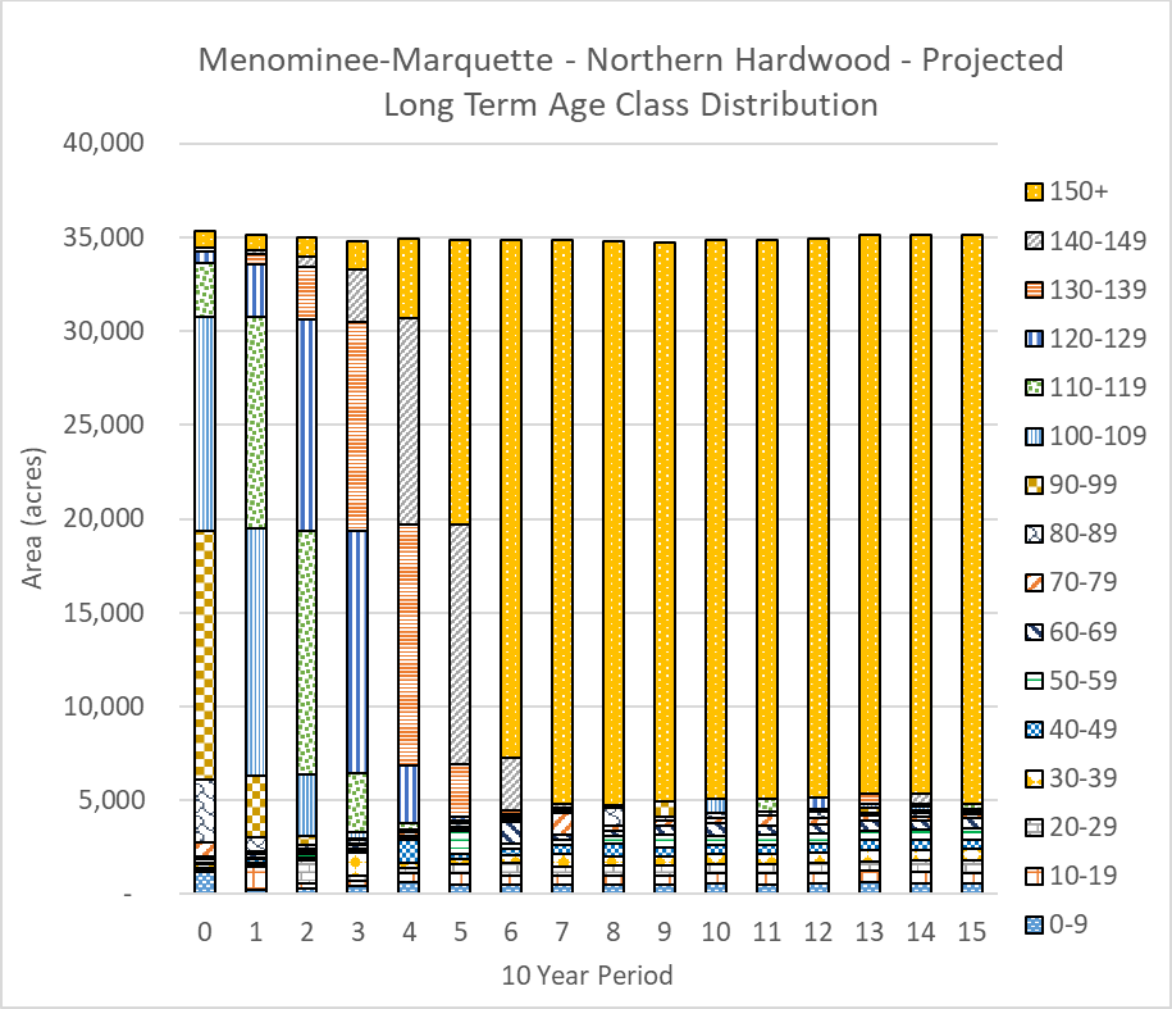


Figure 10. Projected age class distribution over 15, 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 8,210 acres. About 458 acres will be managed under an even-aged system with some of those acres harvested through a clearcut or shelterwood method to improve stand quality (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long term mature forest closed canopy landscape condition.

Cedar

Current condition

The current age class distribution shows a classic bell curve: an unmanaged even-aged stand with a surplus of acres in the 110-129-year-old age classes. The younger age classes have few to no acres. The reasons for this are not well understood, but many factors contribute to the lack of regeneration of the cover type including cervid herbivory, suppression of fire and the relatively young age of the stands. A portion of this cover type meets the habitat requirements for marten and white-tailed deer, but not for snowshoe hare because the stands are not in younger age classes (Table 11).

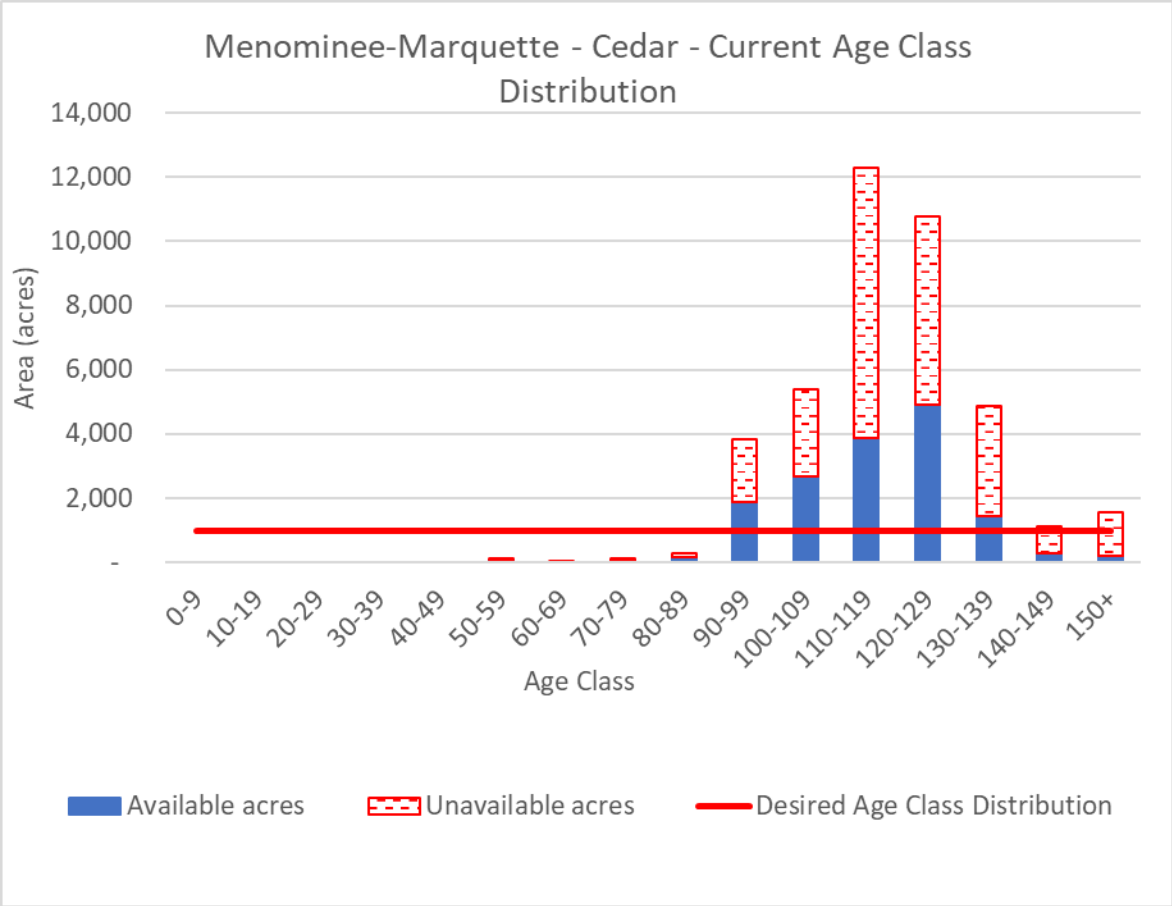


Figure 11. Current age class distribution, desired age class distribution and projected harvests in the cedar cover type over the 10-year planning period.

Table 11. Featured species with cedar as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat - Cedar	Cedar Habitat Acres - Available	Cedar Habitat Acres - Unavailable
Snowshoe hare	Age category: 0-19 Size category: Sapling	0	0

Featured Species	Featured Species Habitat - Cedar	Cedar Habitat Acres - Available	Cedar Habitat Acres - Unavailable
Marten	Age category: 40+ Size category: pole, Sswlog Basal area: 81+	14,282	24,131
White-tailed deer	All ages and size classes	--	40,304

Desired future condition

The desired future condition is to have an even age class distribution with a rotation age of 150+ years.

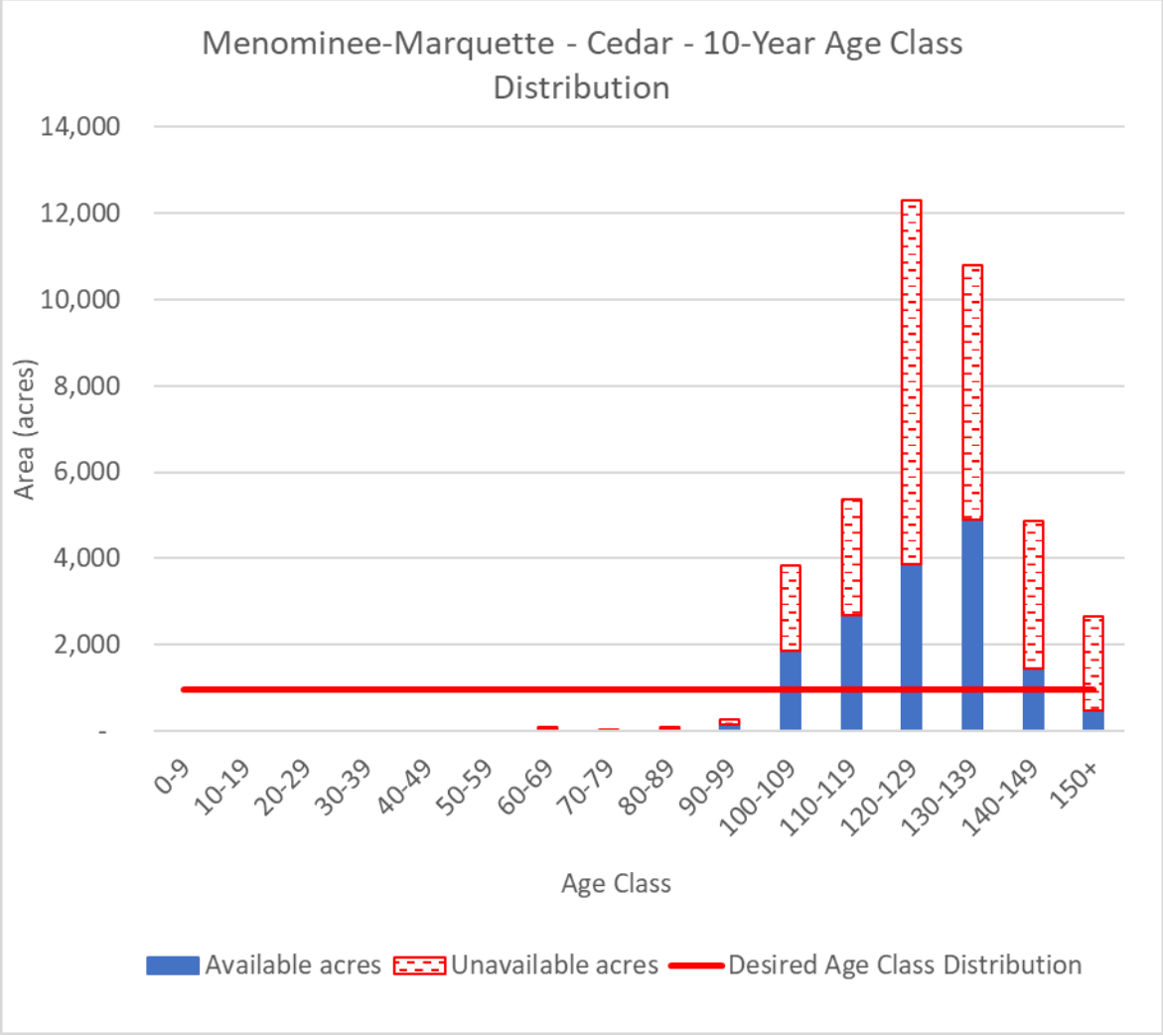


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of limited acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of cedar will take many decades in this management area.

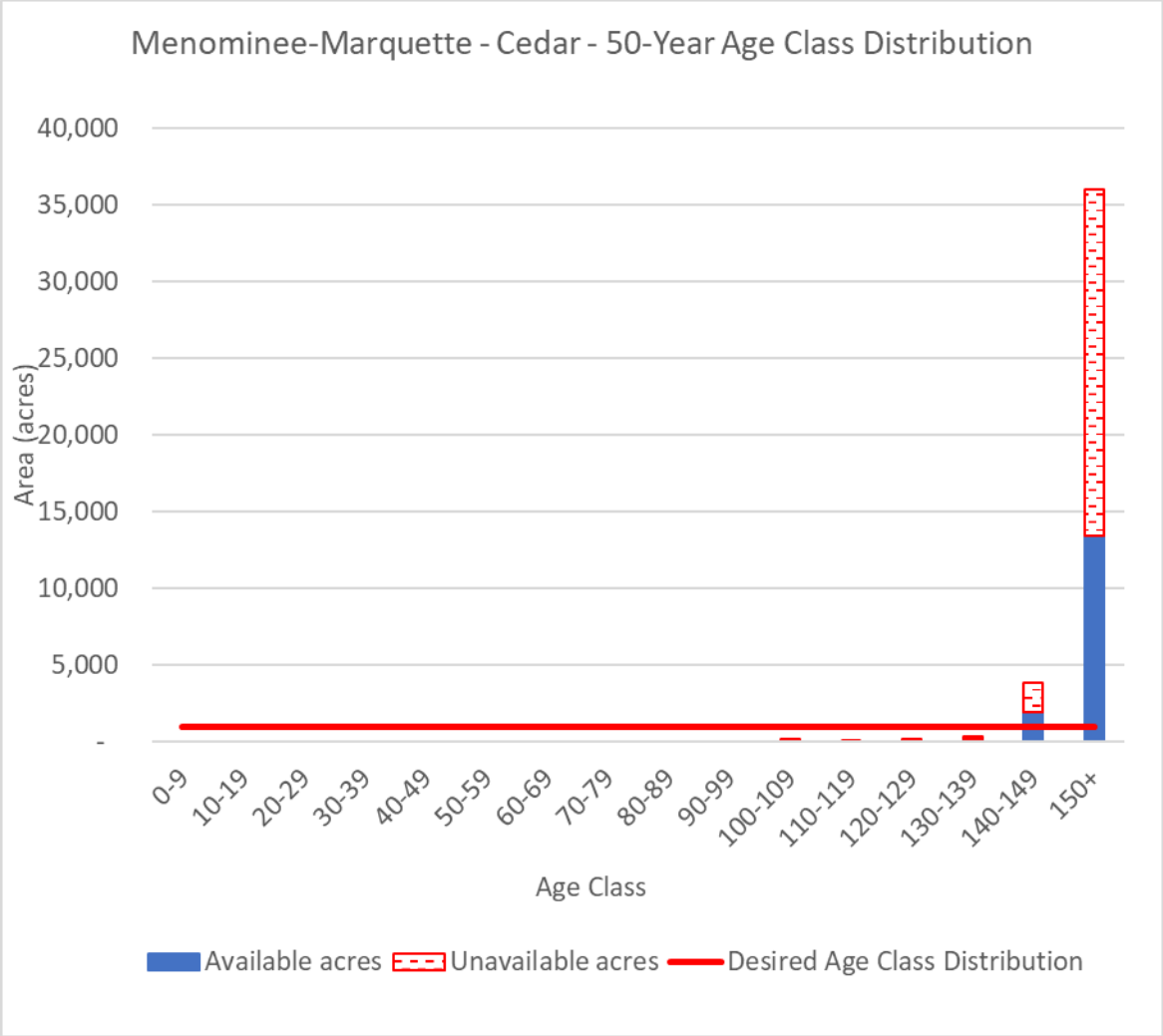


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of cedar acres aging with no acres recruiting (Figure 13).

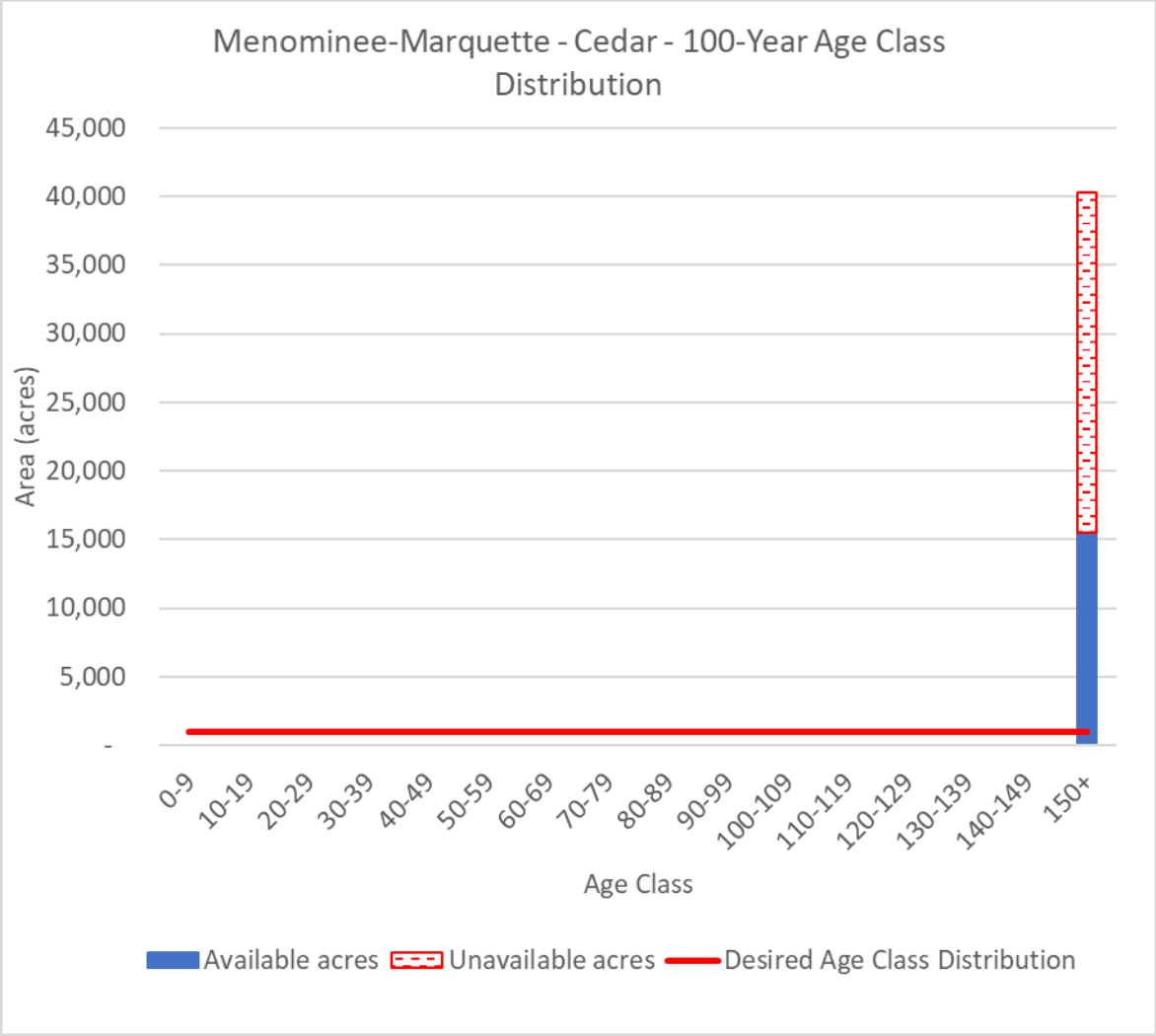


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of cedar in productive growing conditions while providing some forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are no acres of projected harvests in the cedar cover type. It is expected some cedar will be cut in ongoing research and field trials as staff researches how to best recruit this species as a cover type.

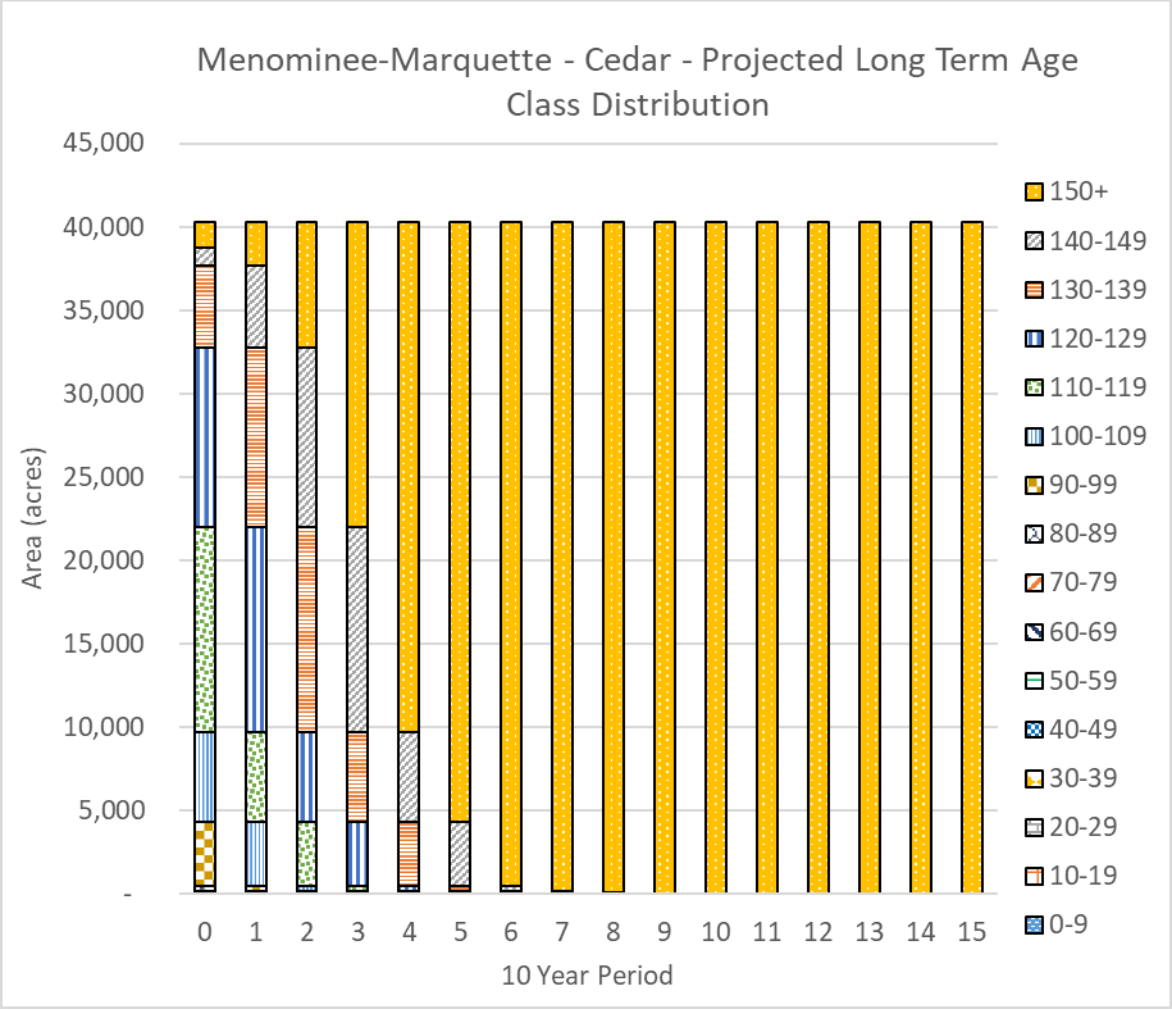


Figure 15. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 12; see Biodiversity in Section 3 for more information).

Table 12. High conservation value areas within the Menominee-Marquette management area.

High Conservation Value Area Type and Name	Acres
Deer Wintering Complex	**40,107**
	40,107
Forest Habitat Core Interior	**7,641**
	7,641
Natural Area's Legally Dedicated	**2,328**
	2,328
State Wildlife Research Areas	**5,502**
Au Train Basin SWMA	5,502
Grand Total	**55,579**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 27. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 28. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Alvar	BC		S1	1

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Floodplain Forest	BC	G3?	S3	1
Existing ERA	Hardwood-Conifer Swamp	B	G4	S3	1
Existing ERA	Mesic Northern Forest	B			2
Existing ERA	Mesic Northern Forest	BC	G4	S3	4
Existing ERA	Northern Fen	B	G3	S3	2
Existing ERA	Oak-Pine Barrens	CD			1
Existing ERA	Poor Conifer Swamp	B	G4	S4	1
Existing ERA	Rich Conifer Swamp	BC	G4	S3	2
Proposed ERA	Rich Conifer Swamp	AB	G4	S3	1
Proposed ERA	Rich Conifer Swamp	B	G4	S3	1
Grand Total					**17**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 15) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 16) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 15. Reviewable special conservation areas within the Menominee-Marquette management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**961**
Unspecified	959
Whitefish river Boating Access Site	2
Contiguous Resource Area	**183**
33003017	25
33003020	39
33003021	11
33003022	10
33003024	1
33003025	98
Cultural or Customary Area	**21**
Unspecified	22
Habitat Area or Habitat Corridor	**3,213**
33066029	759
33066031	7
33066034	11
33066035	16

Reviewable Special Conservation Area Type and Name	Acres
33066039	35
33066041	12
33066047	10
33066048	51
33066049	357
Bear Point	156
Habitat Area Removal	76
Habitat Area Removal	208
Hardwood island 1	7
Hardwood island 2	10
Hunter's Brook	202
Hunter’s Brook Riparian Corridor	86
Johnson Creek island grass	8
Longrie Lake	125
Sawmill	415
Sawmill Creek	252
Sawmill Swamp	178
sca1	17
sca2	40
sca3	26
sca4	5
sca5	40
Unspecified	89
Watson cut across hemlock	18
Mineral Resource Area	**0**
Forest Service Pit	0
Spring, Wetlands, or Riparian Areas	**3,167**
1	41
2	42
3	15
4	14
5	9
10	245
11	500
12	39
13	151
14	42
15	48
16	199
17	26
32008	78
33066051	16

Reviewable Special Conservation Area Type and Name	Acres
33066054	15
33101009	299
along Deer Creek	17
Basin hardwoods	22
Deer Creek	54
DeHaas Creek riparian corridor	19
Ford River riparian corridor	21
Friday Creek riparian area	128
Johnson Creek and tributary	71
Johnson Creek brush	41
Johnson Creek tributary buffer	56
Lone Pine Creek brush	5
Lone Pine Creek deciduous	37
Lone Pine Creek N	28
Lone Pine Creek SE	27
Lone Pine Creek SW	24
Lone Pine Creek travel	29
Middle Deer Creek tributary	40
Mud Creek	3
Mud Creek 2	8
Mud Creek 3	11
Mud Creek 4	12
Mud Creek confluence	95
Mud Creek headwaters	104
N. werners Creek tributary	15
Pemene Creek riparian corridor	47
Raid River pools	34
Rapid River corridor N.	40
Rapid River drainage	12
Rapid River mid pools	12
Rapid River North	25
Rapid River pool	1
Rapid River wetlands	27
Ross Creek	54
S. Werners Creek tributary	42
Sawmill shrub	4
Shakey River riparian area	227
Visual Management Areas	**6**
KC Hemlock visual	6
Grand Total	**7,552**

Table 16. Static special conservation areas within the Menominee-Marquette management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**181**
Hardwood-conifer swamp		101
Mesic northern forest		79
Deer Winter Range - Obligate and Conditional		**51,682**
Conditional		51,682
Designated Trout and Cold Water Stream Buffer		**2,328**
<Null>		1,426
Black Creek		16
Blom Creek		28
Boudreau Creek		26
Burke Creek		45
Chocolay River		58
Deer Creek		5
DeHaas Creek		39
Dorow Creek		17
East Branch Sand River		22
East Branch Whitefish River		9
Hammond Brook		24
Huber Creek		13
Johnson Creek		74
Leisner Creek		17
Little Shakey Creek		71
Miscauna Creek		37
North Branch Deer Creek		89
Pemene Creek		116
Rapid River		19
Reno Creek		14
Ross Creek		25
Sand River		79
Shakey River		20
Spring Creek		39
Designated Trout and Coldwater Streams	**87.2**	
<Null>	53.0	
Black Creek	0.6	
Blom Creek	1.0	
Boudreau Creek	1.0	
Burke Creek	1.7	
Chocolay River	2.1	
Deer Creek	0.2	
DeHaas Creek	1.4	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Dorow Creek	0.6	
East Branch Sand River	1.0	
East Branch Whitefish River	0.4	
Hammond Brook	0.9	
Huber Creek	0.5	
Johnson Creek	3.2	
Leisner Creek	0.6	
Little Shakey Creek	2.8	
Miscauna Creek	1.4	
North Branch Deer Creek	3.2	
Pemene Creek	4.5	
Rapid River	0.7	
Reno Creek	0.5	
Ross Creek	0.9	
Sand River	3.1	
Shakey River	0.7	
Spring Creek	1.4	
Mussel Stream Group 2 - state threatened or endangered	**3.6**	
Grand Rapid Dam-Menominee River	2.5	
The Oxbow-Menominee River	1.1	
Non-dedicated Natural Areas		**1,512**
Natural Area Shakey Lakes		1,512
Wild and Scenic Rivers	**0.8**	
Whitefish Wild and Scenic River	0.8	
Wood Turtle Stream 100-foot buffer		**139**
Elm Creek		13
Ford River		127
Wood Turtle Stream 660-foot buffer		**828**
Elm Creek		106
Ford River		722
Grand Total	**91.7**	**56,670**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 19,019 and 20) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 29. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered

T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 18. Rare animal species occurrence within the Menominee-Marquette management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	--	3
Animal	Acipenser fulvescens	Lake sturgeon	T	--	1
Animal	Alasmidonta marginata	Elktoe	SC	--	1
Animal	Alasmidonta viridis	Slippershell	T	--	2
Animal	Alces alces	Moose	SC	--	1
Animal	Ammodramus savannarum	Grasshopper sparrow	SC	--	1
Animal	Bombus borealis	Northern amber bumble bee	SC	--	2
Animal	Bombus terricola	Yellow-banded bumble bee	SC	--	5
Animal	Buteo lineatus	Red-shouldered hawk	SC	--	3
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Emydoidea blandingii	Blanding's turtle	SC	--	1
Animal	Gavia immer	Common loon	T	--	1
Animal	Glyptemys insculpta	Wood turtle	T	--	6
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	11
Animal	Lasmigona compressa	Creek heelsplitter	SC	--	2
Animal	Ligumia recta	Black sandshell	T	--	1
Animal	Lithobates palustris	Pickerel frog	SC	--	1
Animal	Myotis lucifugus	Little brown bat	T	--	2
Animal	Necturus maculosus	Mudpuppy	SC	--	4

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Nicrophorus americanus	American burying beetle	X	LE	2
Animal	Obovaria olivaria	Hickorynut	E	--	2
Animal	Opheodrys vernalis	Smooth green snake	SC	--	1
Animal	Pandion haliaetus	Osprey	SC	--	2
Animal	Pleurobema sintoxia	Round pigtoe	SC	--	1
Animal	Rallus elegans	King rail	E	--	1
Animal	Sphaerium fabale	River fingernail clam	SC	--	1
Animal	Spiza americana	Dickcissel	SC	--	1
Total	--	--	--	--	**59**

**Occurrence information provided by field staff.*

Table 19. Rare plant species occurrence within the Menominee-Marquette management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Allium schoenoprasum	Chives	T	--	1
Plant	Amerorchis rotundifolia	Small round-leaved orchis	E	--	2
Plant	Asclepias ovalifolia	Dwarf milkweed	E	--	4
Plant	Astragalus canadensis	Canadian milk vetch	SC	--	1
Plant	Astragalus neglectus	Cooper's milk vetch	SC	--	1
Plant	Calypso bulbosa	Calypso or fairy-slipper	T	--	2
Plant	Carex assiniboinensis	Assiniboia sedge	T	--	1
Plant	Carex richardsonii	Richardson's sedge	SC	--	1
Plant	Cirsium hillii	Hill's thistle	SC	--	2
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC	--	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Graphephorummelicoides	Purple false oats	SC	--	1
Plant	Iris lacustris	Dwarf lake iris	T	LT	2
Plant	Juncus vaseyi	Vasey's rush	T	--	3
Plant	Parnassia palustris	Marsh grass-of-parnassus	T	--	1
Plant	Rumex occidentalis	Western dock	E	--	2
Plant	Tanacetum bipinnatum ssp. huronense	Lake Huron tansy	SC	--	1
Plant	Trisetum spicatum	Downy oat-grass	SC	--	1
Plant	Viola novae-angliae	New England violet	T	--	1
Total	--	--	--	--	**28**

Table 20. Other rare occurrence within the Menominee-Marquette management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	2
Total	--	--	--	--	**2**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 22).

Table 30. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure

Element Occurrence Rank	State Rank	Global Rank
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 22. Non-ERA Natural Communities within the Menominee-Marquette management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Hardwood-conifer swamp	BC	S3		1
Hardwood-conifer swamp	C	S3		2
Mesic northern forest	AB	S3		1
Mesic northern forest	CD	S3		2
Grand Total				**6**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 23) and diseases (Table 24) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 23. Defoliating insects of concern in the Menominee-Marquette management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 24. Maladies of concern in the Menominee-Marquette management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak wilt	Bretziella fagacearum	Non-native	Yes

Aquatic resources

Riparian habitat

A total of 187 miles of streams and rivers are found in the management area (Table 25). Streams/rivers classified as warm types comprise approximately 81 percent of the riverine mileage.

Table 25. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	6
Cold small river	0
Cold transitional stream	29
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	83
Warm transitional small river	6
Warm transitional large river	10
Warm stream	47
Warm small river	4
Warm large river	2

Lacustrine habitat

A total of 10 lakes and ponds of at least 1 surface acre are found in the management area (Table 26).

Table 26. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	9
100-499	1
500+	0

Wetlands

A total of 92,739 acres of wetlands are found in the management area (Table 23). Forested wetlands comprise approximately 97 percent of wetland types found in the management area.

Table 27. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,797
Forested	90,120
Riverine	822

Vernal pools and seeps

A total of 2,035 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub, cedar and northern hardwood are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 28).

Table 28. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland Shrub	4,386
Cedar	3,599
Northern Hardwood	3,281
Aspen	2,504
Lowland Conifers	1,719
Lowland Deciduous	1,441
Lowland Mixed Forest	1,089
Water	810
Marsh	568
Mixed Upland Deciduous	451

Watershed vegetation cover

The management area includes portions of important watersheds of the Escanaba River and Ford River (Tables 29 and 30). Cedar, aspen, and northern hardwood are major cover types of the state forest in each watershed.

Table 29. Largest vegetative cover types (i.e., top 5) and area of the Escanaba River watershed located within the management area.

Cover Type	Acres
Cedar	17,494
Aspen	12,776
Northern Hardwood	6,007
Lowland Conifer	3,342
Lowland Shrub	2,551

Table 30. Largest vegetative cover types (i.e., top 5) and area of the Ford River watershed located within the management area.

Cover Type	Acres
Cedar	5,315
Aspen	2,895
Northern Hardwood	1,453
Tamarack	1,042
Lowland Spruce/Fir	852

Recreation

The Menominee-Marquette management area, which covers an area from the Wisconsin border along the Menominee River to Lake Superior, has variable levels of access for public recreation and management. The area along the Menominee River generally has good access from county and state forest roads. In other areas, scattered parcels have limited access.

Several offroad-vehicle routes and snowmobile trails cross through this management area. The Marquette-Munising Junction Trail (rail trail) provides motorized and non-motorized uses on a paved shoulder along M-28 with views of Lake Superior. The North Country National Scenic Trail/Iron Belle Trail also passes through the management area close to the Lake Superior shoreline. The Tyoga Historical Pathway, located near Deerton, runs along the Laughing Whitefish River through the old logging town of Tyoga.

There are no state forest campgrounds on state land in this area. However, Forest Lake State Forest Campground is leased by the DNR from Green Leaf Timber Holding Inc. and provides 26 rustic sites on Forest Lake south of Au Train, as well as a boating access site.

Table 31. Designated Recreation Trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	ORV (all types)	15
Motorized recreation trails	Snowmobile	15
Non-motorized recreation trails	Hiking	7.8
Non-motorized recreation trails	Equestrian	0
Non-motorized recreation trails	Biking	0
Non-motorized recreation trails	Hunter Walking Trails	0
Total	--	**37.8**

Note: Trail use types may overlap.

Au Train Basin Waterfowl Project, located south of Au Train, includes state forest land as well as local cooperators of UP Power Company and the USDA Forest Service. The project area includes a wildlife refuge which is closed seasonally in the fall to support migrating waterfowl. The area is managed for goose hunting and to provide habitat for featured species. The SWMA provides a host of recreational opportunities, including hunting, trapping, snowmobiling, hiking, bird watching and wildlife viewing.

Table 32. Areas Managed for Hunting

Type	Name	Number of Acres
State Wildlife Management Areas	Au Train Basin SWMA	5,498.2
Total	**--**	**5,498.2**

There are numerous boating access sites within the management area, providing access to the Escanaba, Whitefish, Menominee and Rapid rivers, as well as several inland lakes and creeks, providing ample opportunities for canoeing and fishing. The adjacent Menominee River State Recreation Area provides additional access to the Menominee River.

Table 33. Boating Access Sites.

Name	Waterbody
Escanaba River	Escanaba River
Lake Ann	Lake Ann
Lake Le Vasseur	Lake Le Vasseur
Laughing Whitefish River (John H. Hammer)	Laughing Whitefish River
Old Menominee River	Menominee River
Rapid River	Rapid River
Sand River Flooding (or Sand Lake Flooding)	Sand River Flooding
Sawmill Creek	Sawmill Creek
Sturgeon Landing	Menominee River
West Branch of Whitefish River	West Branch of Whitefish River
Whitefish River	Whitefish River

Michigamme Highlands

State Forest Area: 63,877 acres	Location: North Western Marquette and South Eastern Baraga Counties	Population Centers: Ishpeming, Negaunee, Covington
Sub-Section: Michigamme Highlands	Landforms: Generally bedrock controlled topography, the character of the topography is variable	Landcover: Forested: 53,629 acres Non-forested: 10,248 acres

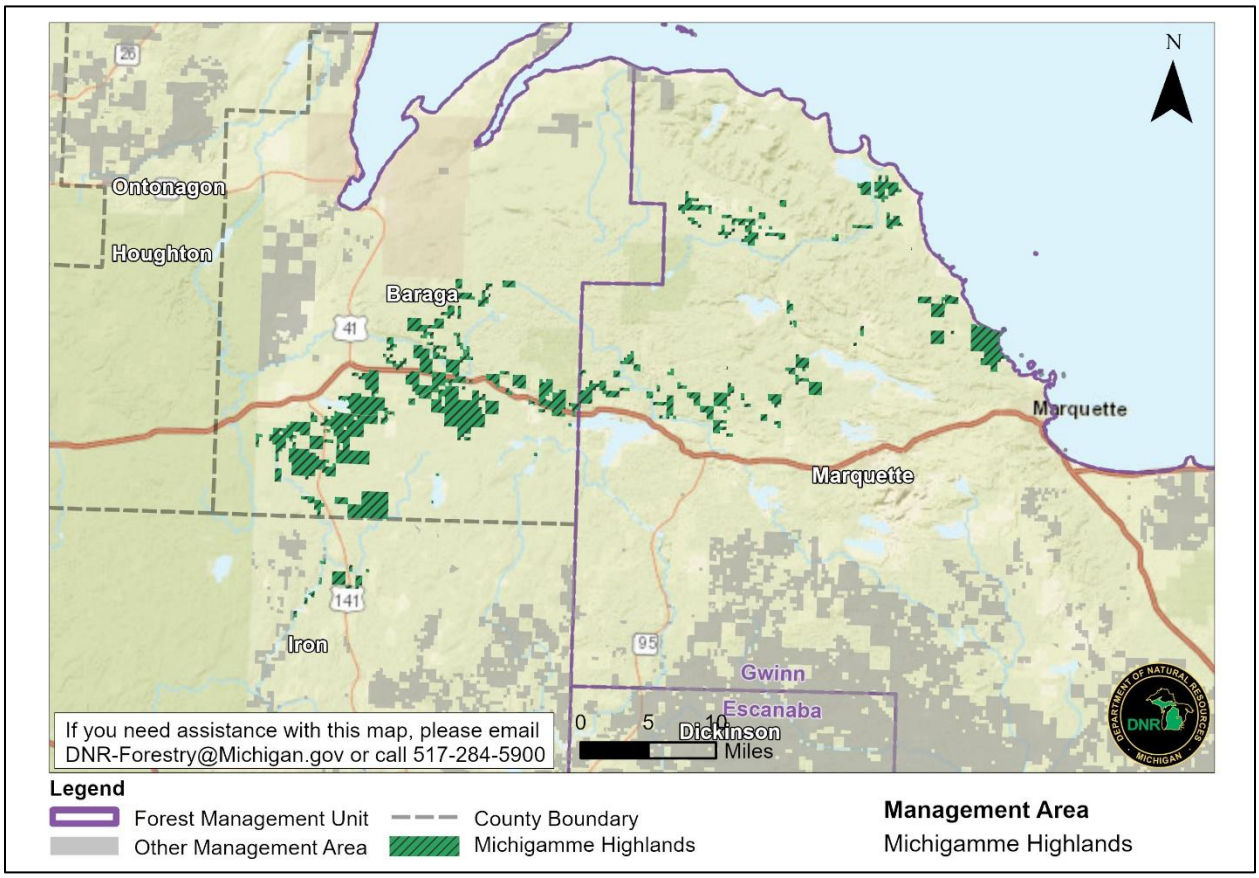


Figure 1. Map of the Michigamme Highlands management area.

Forested landscape

Current and projected future condition

The Michigamme Highlands management area is dominated by shade-tolerant cover types. Intolerant upland cover types are relatively evenly distributed across the age categories, while the unavailable upland and lowland acres are more prevalent in the older age category.

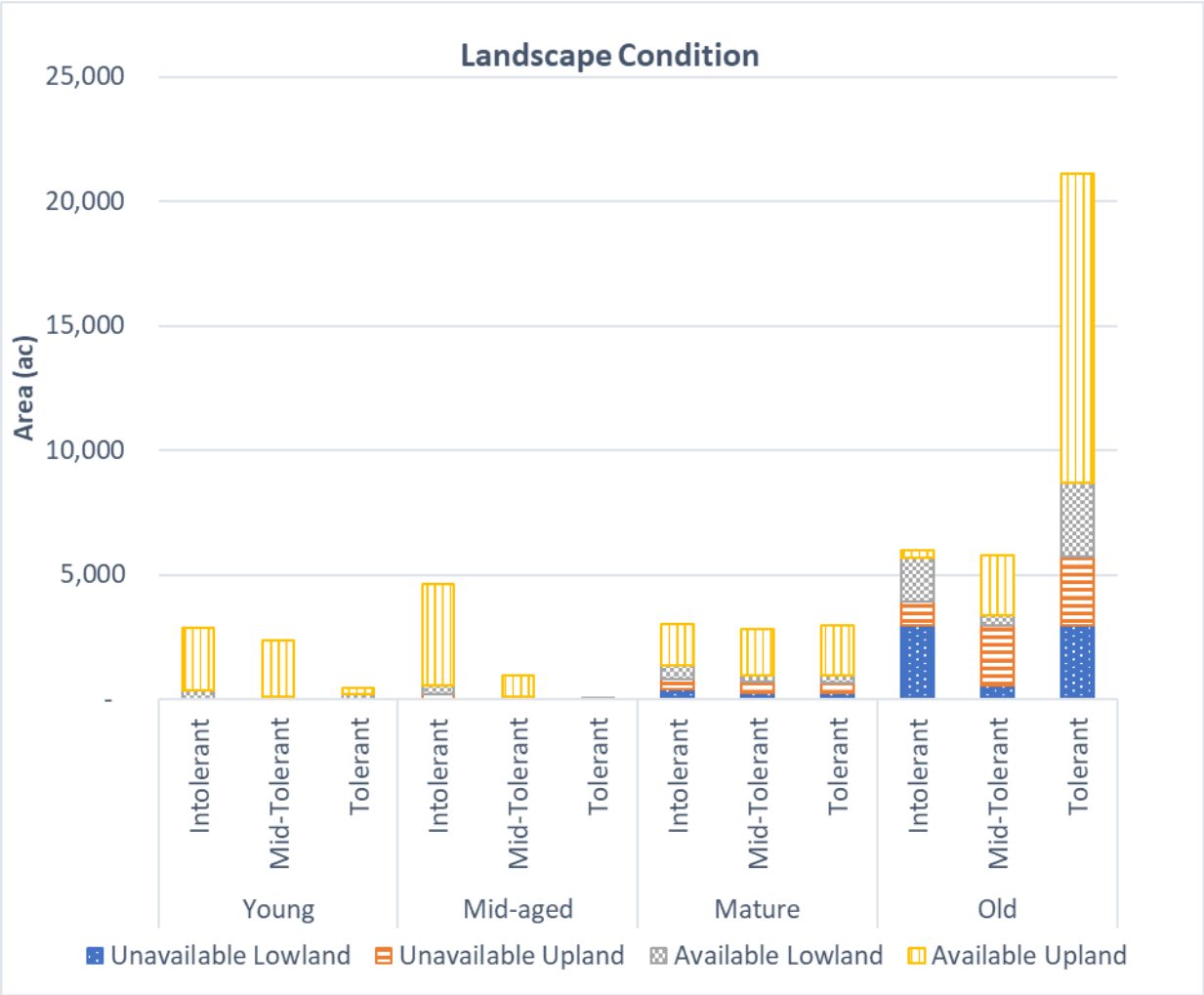


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack pine	2,279
Mature forest	Acres of 80+ year stands across cover types	32,879
Mature forest	Acres of 120+ year stands across cover types	16,618
Mesic conifer cover types	Acres of mesic conifer cover types	5,427
Mesic conifers in other cover types	Average canopy occupancy	24%
Mast – oak cover types	Acres of oak cover types	1,546
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (Trace-100%)	45,615
Big trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	36,983
Non-forested Openings	Acres of total herbaceous open land, upland shrub and cropland	550
Landscape forest matrix	Percent deciduous forest	54%
Landscape forest matrix	Percent coniferous forest	37%

Another important landscape level habitat in this management area is coastal habitat. The Great Lakes, particularly coastal and nearshore areas, provide globally or continentally important stopover sites for all groups of migratory birds: waterfowl, shorebirds, landbirds (defined here as songbirds and raptors), and waterbirds (loons, grebes, cormorants, herons, rails, cranes, gulls, and terns) (Ewert, et. Al 2012). The Great Lakes shoreline provides essential stopover habitat for birds to rest, feed, and shelter during migration. In addition to migration, the diverse coastal habitats where water and land meet provides unique habitats for breeding birds. Some of these areas are classified by Michigan Audubon as Important Bird Areas. The Great Lakes shoreline is habitat for several rare plant species that are endemic to the Great Lakes.

Forest management and other intrusive activities within a mile of the coastline need to consider the potential impacts to migratory birds and breeding bird habitat.

The Michigamme Highlands management area is dominated by forested cover types with 84 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 43% and comprised mostly of Northern hardwood. The upland coniferous portion is 12% and comprised mostly of the upland conifer cover type. Lowland shrub is the most common non-forested cover type in this management area representing 7 percent of the landscape.

Table 2. Landscape conditions and distribution of cover types in the Michigamme Highlands management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	6,480	27,501	38,774	53,629
			Northern hardwood	15,863			
			Black-red hybrid oak	0			
			Northern red oak	451			
			Oak mix	188			
			Mixed upland deciduous	4,520			
		Mixed	Upland mixed forest	3,416	3,416		
		Coniferous	Planted red pine	148	7,857		
			Planted jack pine	1,066			
			Planted white pine	0			
			Planted mixed pine	0			
			Natural red pine	686			
			Natural jack pine	1,434			
			Natural white pine	644			
			Natural mixed pines	259			
			Upland spruce/fir	1,206			
			Upland conifers	1,536			
			Hemlock	879			
	Lowland	Deciduous	Lowland aspen/balsam poplar	489	1,329	14,855	
			Lowland deciduous	840			
		Mixed	Lowland mixed forest	1,433	1,433		
		Coniferous	Cedar	2,229	12,093		
			Lowland conifers	4,355			
			Lowland spruce/fir	4,794			
			Tamarack	715			
Nonforested	Upland	N/A	Herbaceous openland	347	N/A	1,814	10,248
			Upland shrub	203			
			Low-density trees	473			
			Bare/sparsely vegetated	458			
			Cropland	0			
			Urban	332			
	Lowland	N/A	Lowland shrub	4,754	N/A	8,434	
			Marsh	1,858			
			Bog	310			
			Treed bog	131			
			Water	1,381			
						Grand Total:	**63,877**

There are 38,509 acres (60.3 percent of the total area and 71.8 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Michigamme management area (Table 3). Of that, over 25 percent is in the northern hardwood cover type, 11 percent is in aspen, 7 percent in mixed upland deciduous, and 6 percent in upland mixed forest. The remaining 18 cover types represent about 24 percent of the forested and available land in the management area.

Table 3. Landscape conditions and cover type composition of the Michigamme Highlands management area.

MICHIGAMME HIGHLANDS Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	5,710	10.6%	770	1.4%	6,480	12.1%
Cedar	1,319	2.5%	911	1.7%	2,229	4.2%
Hemlock	86	0.2%	792	1.5%	879	1.6%
Lowland Aspen/Balsam Poplar	479	0.9%	10	0.0%	489	0.9%
Lowland Conifers	2,043	3.8%	2,313	4.3%	4,355	8.1%
Lowland Deciduous	345	0.6%	495	0.9%	840	1.6%
Lowland Mixed Forest	1,138	2.1%	295	0.6%	1,433	2.7%
Lowland Spruce/Fir	2,060	3.8%	2,735	5.1%	4,794	8.9%
Mixed Upland Deciduous	3,463	6.5%	1,058	2.0%	4,520	8.4%
Natural Jack Pine	1,382	2.6%	52	0.1%	1,434	2.7%
Natural Mixed Pines	43	0.1%	217	0.4%	259	0.5%
Natural Red Pine	0	0.0%	686	1.3%	686	1.3%
Natural White Pine	597	1.1%	50	0.1%	647	1.2%
Northern Hardwood	13,462	25.1%	2,403	4.5%	15,864	29.6%
Northern Red Oak	65	0.1%	386	0.7%	451	0.8%
Oak Mix	188	0.3%	0	0.0%	188	0.3%
Planted Jack Pine	1,054	2.0%	12	0.0%	1,066	2.0%
Planted Red Pine	148	0.3%	0	0.0%	148	0.3%
Tamarack	110	0.2%	605	1.1%	715	1.3%
Upland Conifers	1,079	2.0%	457	0.9%	1,537	2.9%
Upland Mixed Forest	2,978	5.6%	438	0.8%	3,416	6.4%
Upland Spruce/Fir	768	1.4%	437	0.8%	1,206	2.2%
Grand Total	**38,514**	**71.8%**	**15,121**	**28.2%**	**53,635**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvest) acres for the Michigamme Highlands management area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Conservation values	3,384	22.4%
Too wet	3,211	21.2%
BMPs	2,768	18.3%
Unproductive	1,692	11.2%
Too steep	1,658	11.0%
Blocked by obstacle	491	3.2%
Denied access	464	3.1%
Recreational/scenic	457	3.0%
Deer wintering area	217	1.4%
Non-military lease/easement	160	1.1%
Other dept./div. processes	159	1.1%
Wildlife concerns	145	1.0%
Rare landforms	127	0.8%
Other influence zones	119	0.8%
Long-term retention	47	0.3%
Blocked by railroad	20	0.1%
Cannot regenerate	2	0.0%
Total unavailable	**15,121**	**100.0%**

Management actions

Each cover type in the Michigamme Highlands has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvest levels needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Northern hardwood	102	4,831	-	-	63	-	-	4,996
Aspen	820	-	-	-	-	-	-	820
Upland mixed forest	518	-	-	-	-	-	-	518
Lowland spruce/fir	367	-	-	-	-	-	-	367
Mixed upland deciduous	208	88	-	-	48	-	-	344
Lowland conifers	194	-	-	-	-	-	-	194
Natural jack pine	190	-	-	-	-	-	-	190
Lowland deciduous	59	-	-	-	4	-	-	63
Planted jack pine	25	-	-	-	-	-	-	25
Hemlock	-	15	-	-	-	-	-	15
Tamarack	8	-	-	-	-	-	-	8
Totals	**2,491**	**4,934**	**-**	**-**	**114**	**-**	**-**	**7,540**

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. The following sections will provide additional details for each of the significant cover types in the management area.

Table 6. Ten-year estimated harvest volume by product and species for the Michigamme Highlands management area.

10-Year Estimated Harvest Volume Projection Michigamme Highlands Management Area			
Product	**Species**	**Volume Planned***	**Volume Prepared****
Pulpwood (cords)	Mixed hardwood	32,635	30,677
	Mixed softwood	10,703	10,061
	Mixed aspen	8,043	7,560
	Mixed spruce	4,737	4,453
	Jack pine	3,117	2,930
	White pine	855	803
	Mixed oak	835	785
	Red Pine	550	517
	Pulpwood Total	**61,475**	**57,786**
Sawtimber (MBF)	Sugar maple	15,993	15,033
	Red maple	4,385	4,122
	Basswood	1,903	1,789
	Red oak	1,661	1,561
	Mixed aspen	1,390	1,307
	White pine	1,120	1,053
	Red pine	1,024	963
	White oak	329	309
	Mixed oak	145	136
	Sawtimber Total	**27,949**	**26,272**
	Total Sawtimber Harvest Volume in Cords	**58,531**	**55,019**
	Grand Total Harvest Volume in Cords	**120,006**	**112,806**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

Few cover type transitions are projected in the management area. The managed area of each cover type is projected to remain relatively stable.The largest decrease forecasted is in the lowland spruce/fir cover type, where 307 acres are expected to convert to other cover types through forest management activities. The largest increase is in lowland mixed forest where 250 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Northern hardwood	15,863	15,794	-68
Aspen	6,480	6,555	75
Lowland spruce/fir	4,794	4,486	-307
Mixed upland deciduous	4,520	4,610	89
Lowland conifers	4,355	4,431	75
Upland mixed forest	3,416	3,264	-151
Cedar	2,229	2,229	0
Upland conifers	1,536	1,573	37
Natural jack pine	1,434	1,380	-54
Lowland mixed forest	1,433	1,682	250
Upland spruce/fir	1,206	1,206	0
Planted jack pine	1,066	1,060	-6
Hemlock	879	879	0
Lowland deciduous	840	822	-18
Tamarack	715	713	-2
Natural red pine	686	686	0
Natural white pine	644	644	0
Lowland aspen/balsam Poplar	489	491	3
Northern red oak	451	450	0
Natural mixed pines	259	259	0
Oak mix	188	200	12
Planted red pine	148	213	64
Black-red hybrid oak	0	1	1
Lowland shrub	4,754	4,754	0
Marsh	1,858	1,858	0
Water	1,381	1,381	0
Low density trees	473	473	0
Bare/sparsely vegetated	458	458	0
Herbaceous openland	347	347	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Urban	332	332	0
Bog	310	310	0
Upland shrub	203	203	0
Treed bog	131	131	0
Total:	**63,877**	**63,877**	**0**

Featured species current and projected habitat acres

There are 16 featured species in this management area that span various cover types, age classes, and stand-level conditions.

As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. The modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. When referring to habitat acres what is being referred to is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81. Bbecause it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the SFMP model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black bear	Mast	45,615	--	--	--
Black-backed woodpecker	Natural disturbance	--	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines,	14,743	17,588	10,269	18,456

Featured Species	Priority Cover types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
	upland conifers, upland spruce/fir, hemlock				
Black-throated blue warbler	Northern hardwoods, mixed upland deciduous	12,512	15,434	8,194	15,964
Cerulean warbler	Northern hardwoods, mixed upland deciduous, lowland deciduous	15,114	16,956	16,346	16,513
Kirtland's warbler	Planted jack pine, natural jack pine	347	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	19,341	22,900	15,417	24,515
Moose	To be determined	--	--	--	--
Red crossbill	Natural red pine, natural white pine, natural mixed pine, planted red pine	697	601	418	498
Ruffed grouse	Aspen	1,747	1,807	1,926	2,010
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	7,485	7,303	4,641	4,985
Spruce grouse mature forest	Natural jack pine, natural white pine, natural mixed pine, upland conifer, upland spruce/fir, lowland spruce/fir, lowland conifer, tamarack	6,010	6,951	8,405	9,484
Spruce grouse young jack pine	Jack pine (natural and planted)	765	536	574	556
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland	33,678	33,870	35,110	35,539

Featured Species	Priority Cover types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
	aspen/balsam poplar, lowland mixed forest				
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	16,735	16,605	15,667	15,439
Wild turkey	Non-forested openings	820	--	--	--
Wood turtle	Non-forested openings	--	--	--	--
Wood thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	15,239	16,594	10,971	18,745

Deer wintering complexes that are greater than 15,000 acres are modeled as special analysis units and information on them can be found in Section 5 of the plan. In DWCs less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated wildlife species

Northern hardwoods

Current condition

Most of the northern hardwood cover type in this management area is currently between a stand age of 100-119-years-old (Figure 3). The past management regime has been primarily single-tree selection. which allows for stand age to continue to increase over time. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old before a younger age cohort becomes the prominent component (Figure 5). A portion of the stands has been managed under an even-aged system due to poor quality stands or a predominance of red maple in those stands. A portion of this cover type meets the habitat requirements for blackburnian warbler, black-throated blue warbler, cerulean warbler, marten, wood thrush and white-tailed deer.

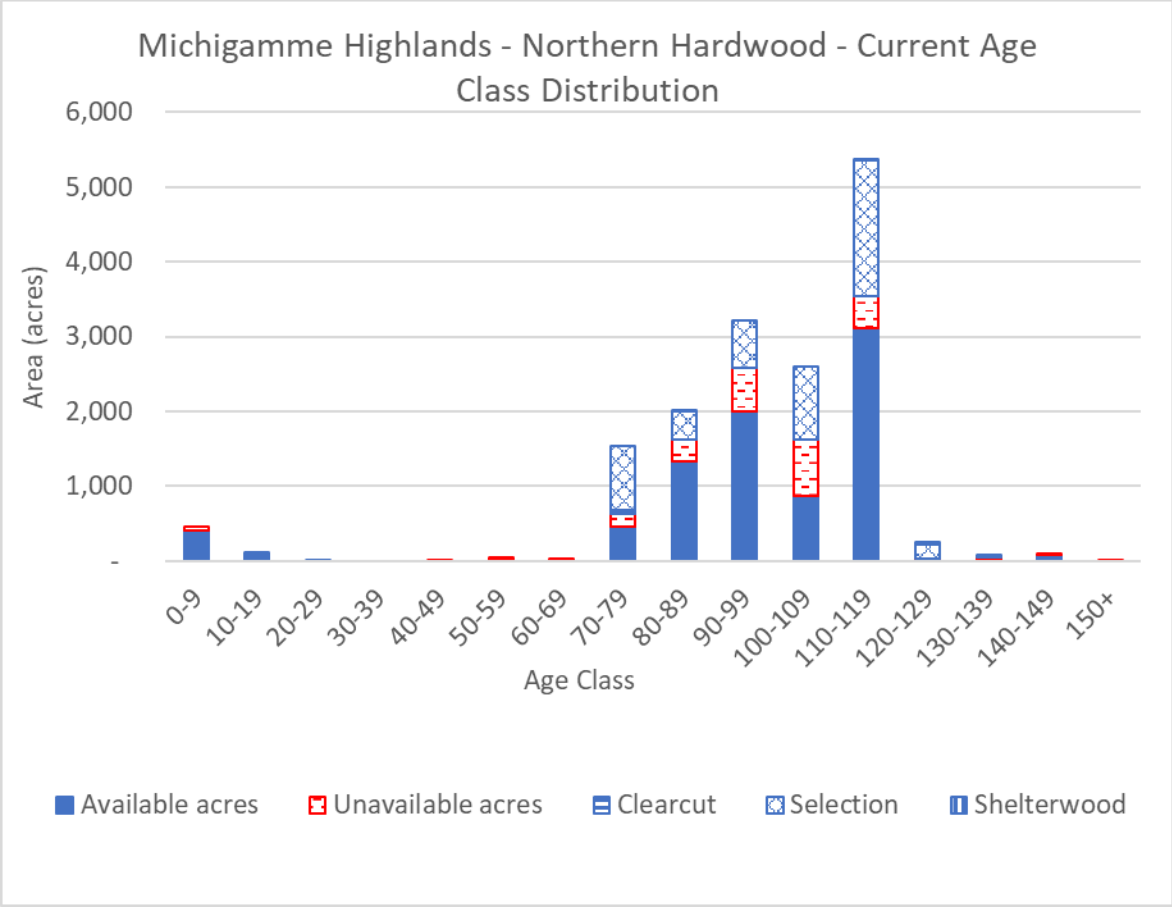


Figure 3. Current age class distribution and projected harvests in the northern hardwood cover type in the Michigamme Highlands management area.

The area of northern hardwood is fairly well distributed in the ideal basal area classes for optimal growing conditions in this management area (Figure 4).

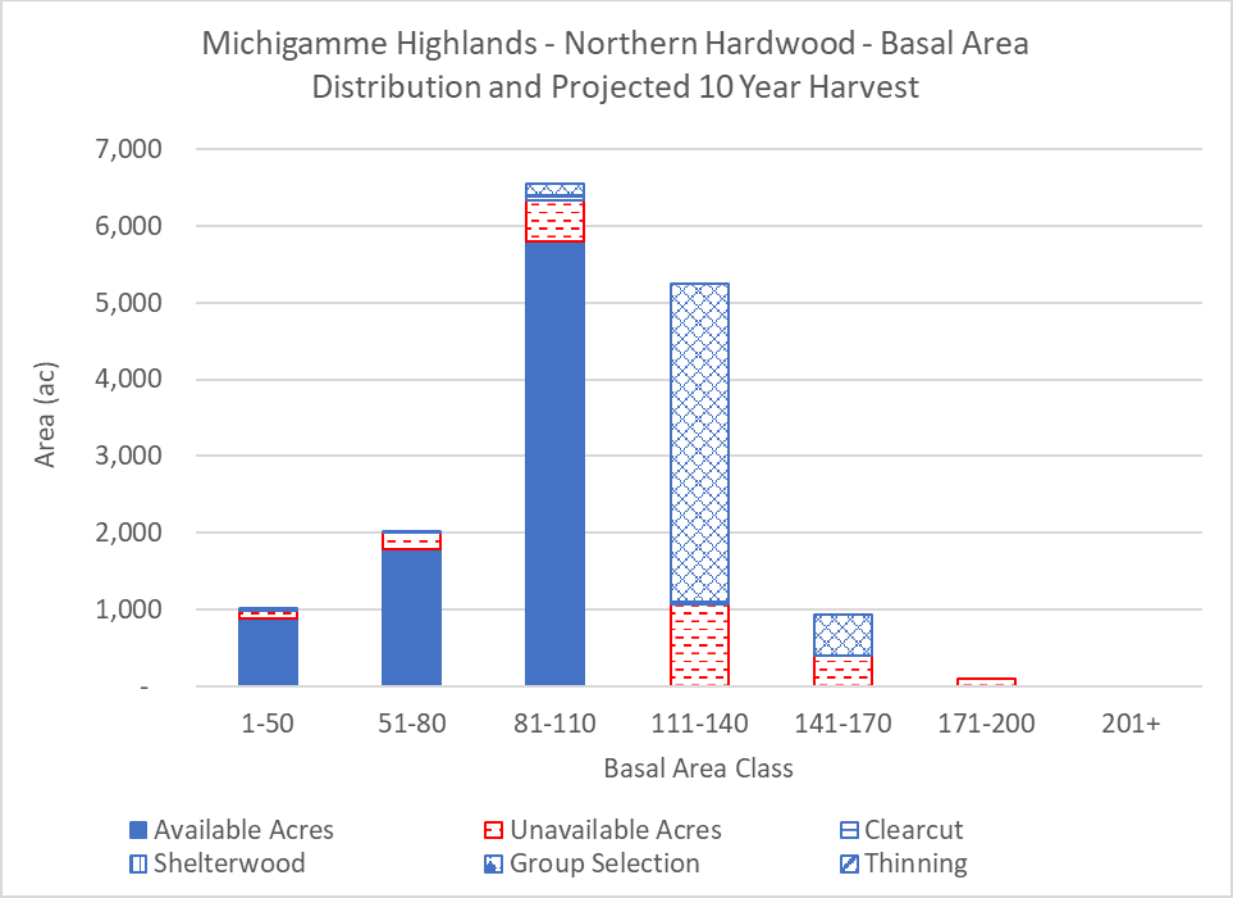


Figure 4. Current basal area distribution of the northern hardwood cover type and projected harvests from each basal area class.

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Cerulean warbler	Age category: 50+ Size category: Pole, Sawlog Basal area: 81+	11,343	2,127
Blackburnian warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	9,471	1939
Black-throated blue warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	9,471	1939
Wood thrush	Age category: 40+ Size category: Sawlog Basal area: 81+	10,778	2,067

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	9,471	1,939
White-tailed deer	All ages and size classes	15,683	--

Desired future condition

The projected long- term cover type trend for northern hardwood is somewhat stable. There are 68 acres transitioning from this cover type in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings amdpoles/ Eventually remaining stems become sawlog-sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime depends on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. Northern hardwood in the Michigamme Highlands management area has challenges in regeneration and recruitment due to cervid herbivory and poor site conditions of some stands.

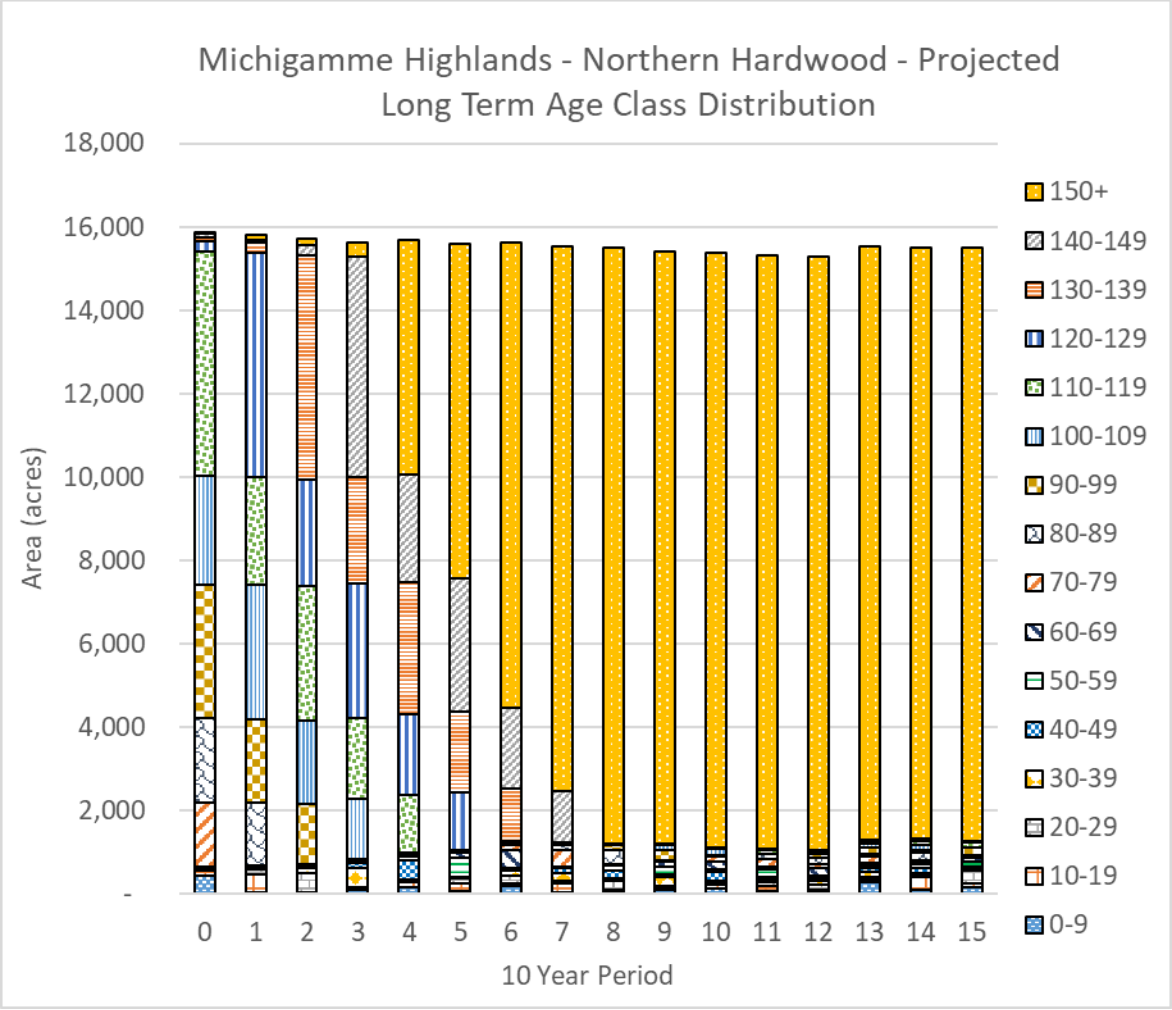


Figure 5. Projected age class distribution over 15. 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 4,831 acres. About 165 acres will be managed under an even-aged system, with some of those acres harvested through a clearcut or shelterwood method to improve stand quality (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest, closed-canopy landscape condition.

Aspen

Current condition

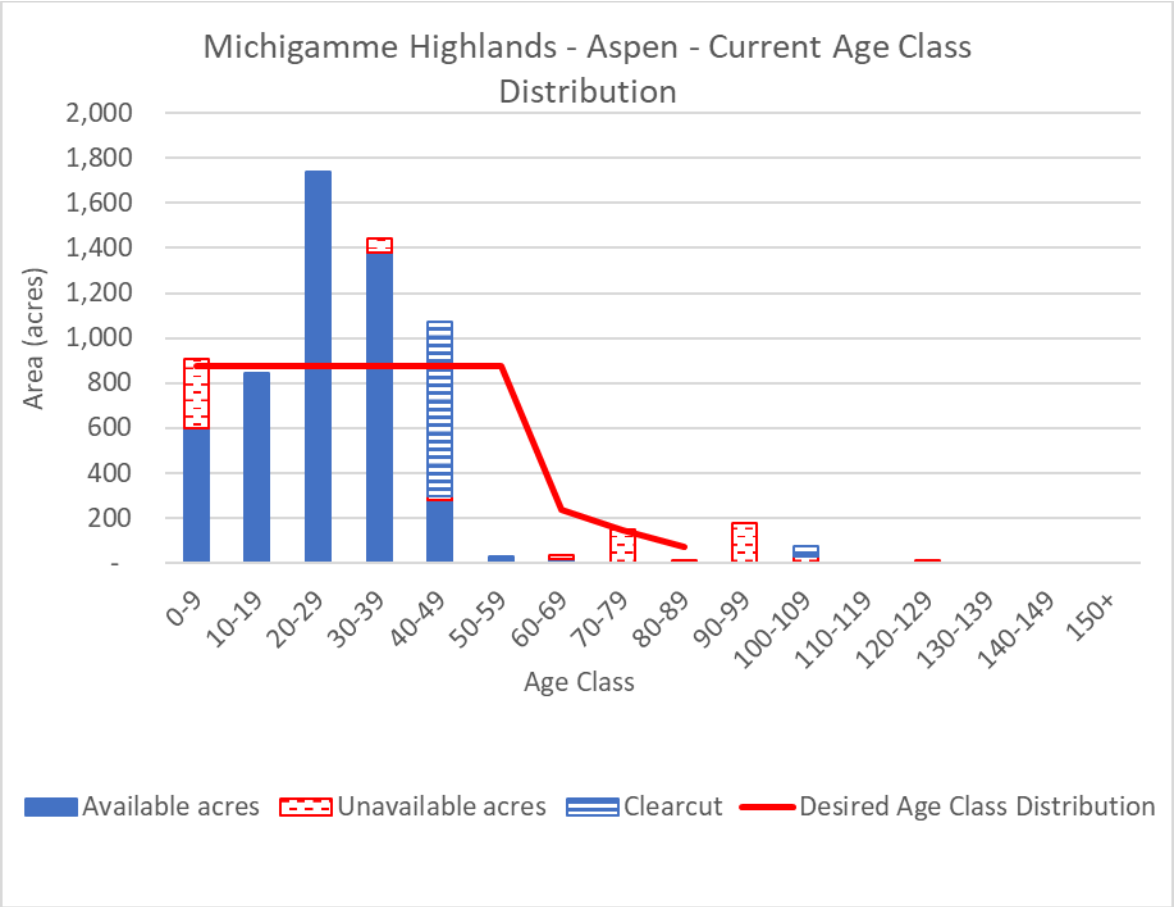


Figure 6. Current age class distribution, desired age class distribution, and projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in the 50-89 and the 0-19-year-old age classes and a surplus of acres in the 20-49 year-old age classes. A portion of this cover type meets the habitat requirements for ruffed grouse and snowshoe hare (Table 7).

Table 10. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Snowshoe hare	Age category: 0-19 Size class: sapling	1,443	305
Ruffed grouse	Age category: 0-19 Size class: sapling	1,443	305
White-tailed deer	All ages and size classes	6,480	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years for approximately 92 percent of the acres, then 4 percent of the acres in an age class tail out to the 60-year age class, 3 percent of the acres in an age class tail out to the 70-year age class, and 1 percent in an age class tail out to the 80-year age class.

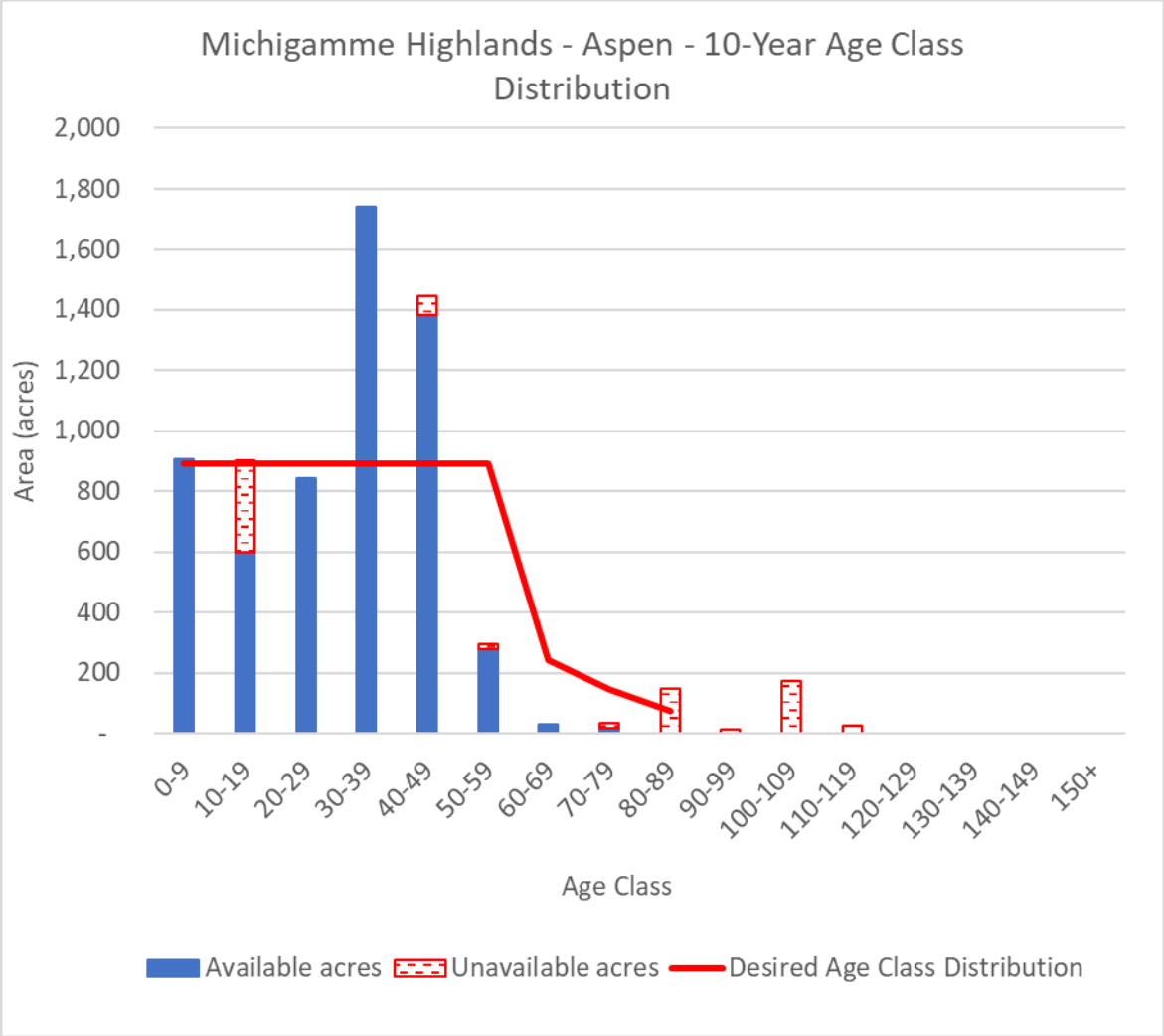


Figure 7. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 903 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take a few decades.

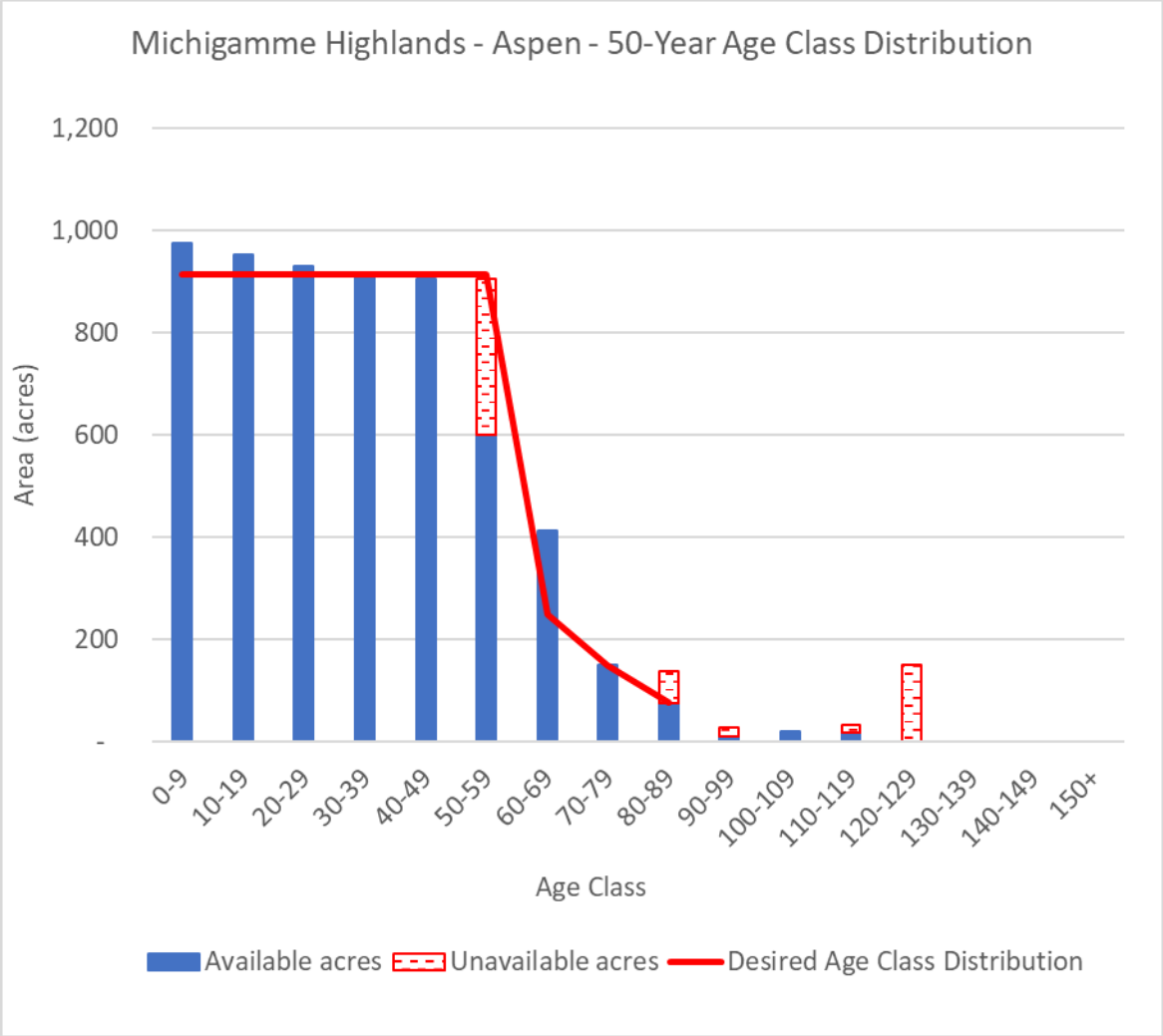


Figure 8. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows aspen acres nearly reaching the desired future condition with few age classes deviating from the target proportions (Figure 8).

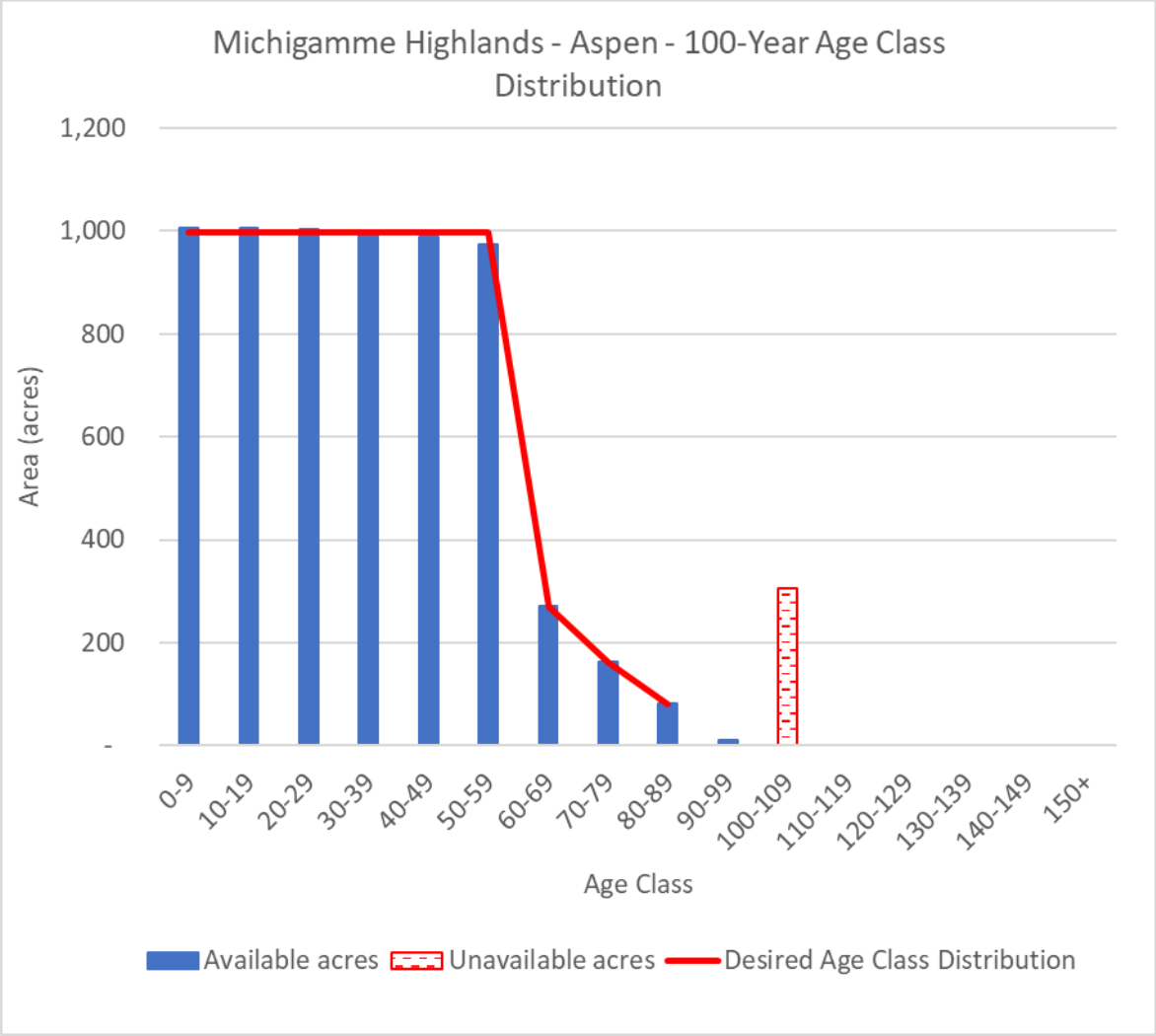


Figure 9. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 9) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 820 acres of projected clearcut harvest in the aspen cover type. bout 75 acres of aspen is expected to be converted from other cover types. These total to an expected 895 acres of regeneration in the aspen cover type over the next 10 years.

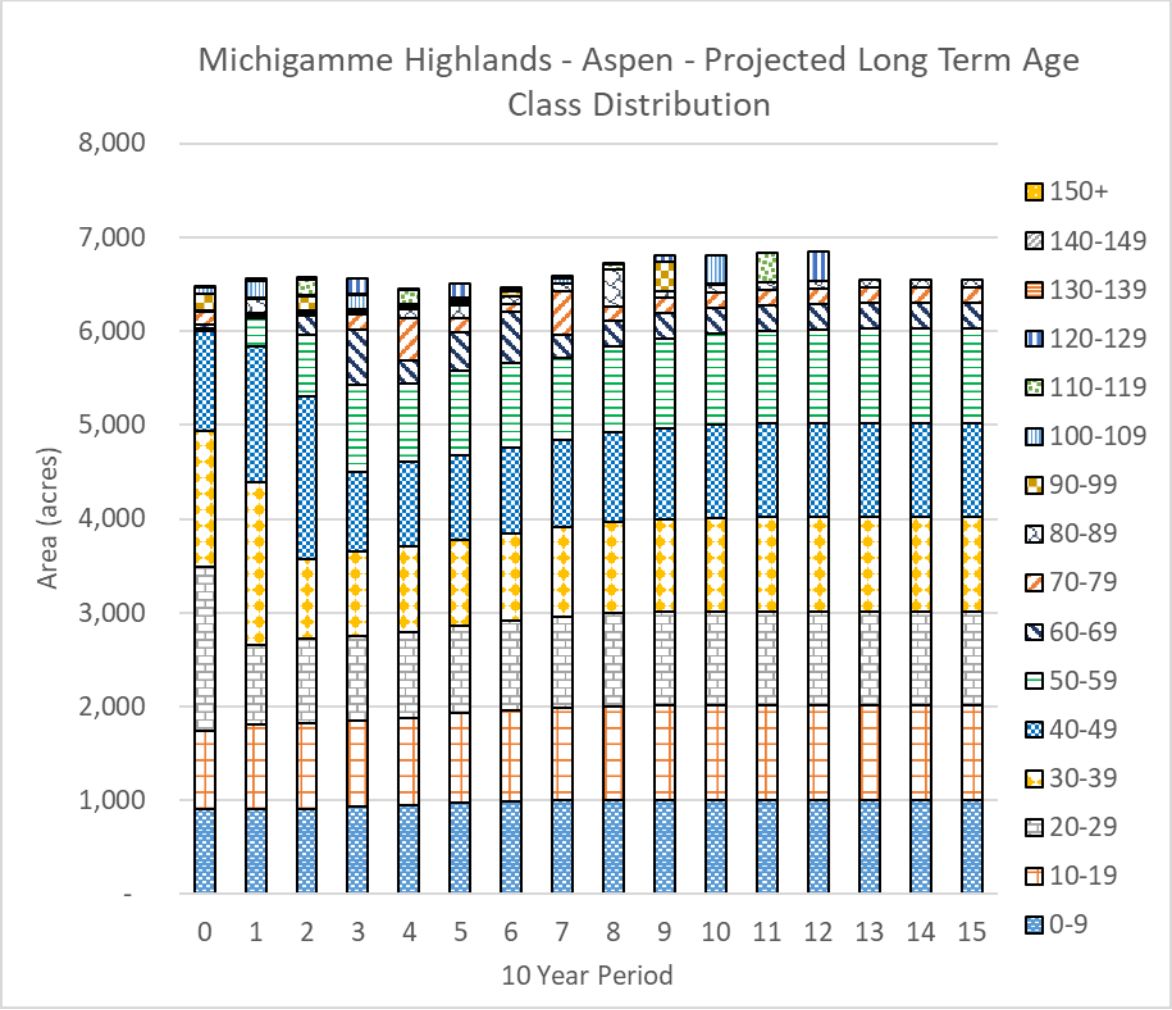


Figure 10. Projected age class distribution over 15, 10-year planning periods.

Mixed upland deciduous

Current condition

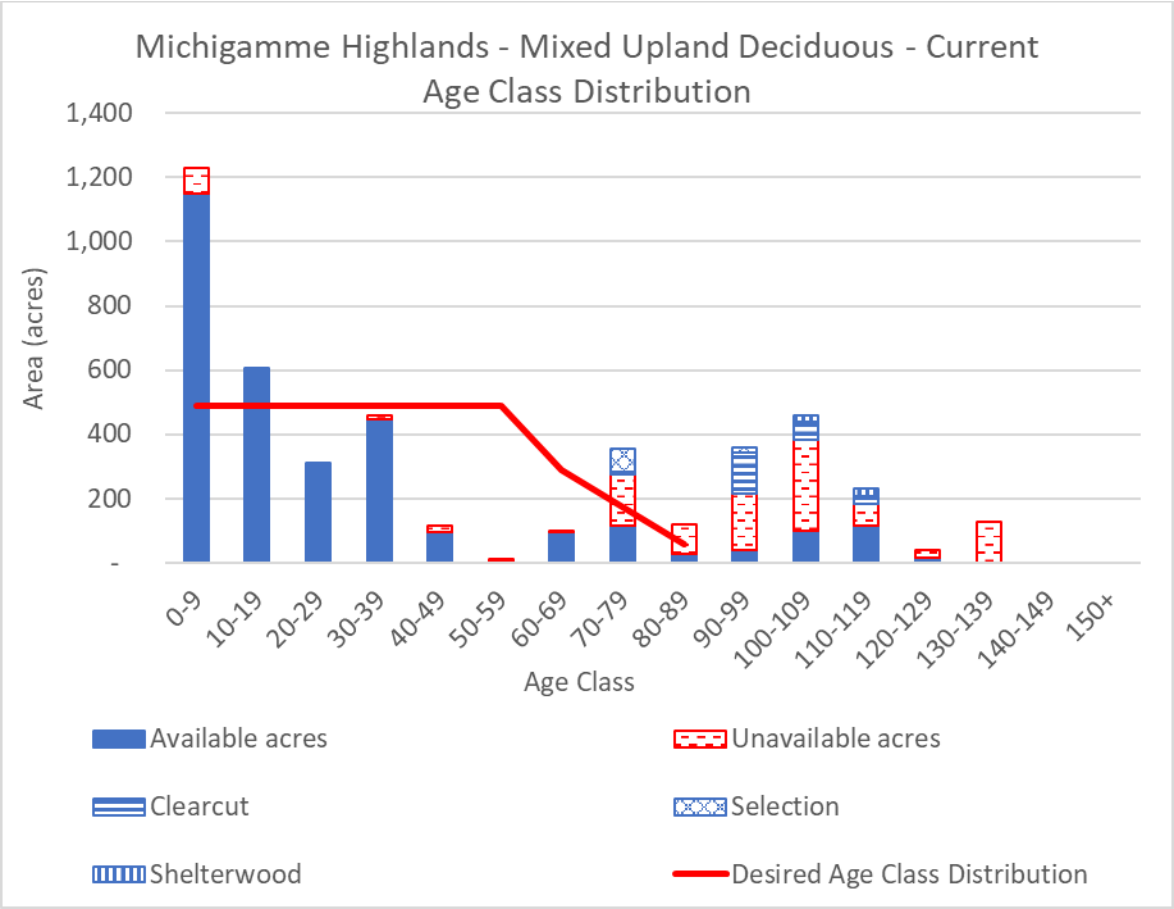


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in mixed upland deciduous cover type over the 10-year planning period.

The current age class distribution is unbalanced, with a deficit of acres in the 20-69-year-old age classes, and a surplus of acres in the 0-19 and 70+ age classes. A portion of this cover type meets the habitat requirements for cerulean warbler, snowshoe hare, marten, and white-tailed deer.

Table 11. Featured species with mixed upland deciduous as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres- Available	Mixed Upland Deciduous Habitat Acres- Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	398	703

Featured Species	Featured Species Habitat – Mixed Upland Deciduous	Mixed Upland Deciduous Habitat Acres- Available	Mixed Upland Deciduous Habitat Acres- Unavailable
Cerulean warbler	Age category: 50+ Size category: pole, sawlog Basal Area: 81+	423	749
Snowshoe hare	Age category: 0-19 Size category: sapling	1,756	78
White-tailed deer	All ages and size classes	4,520	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years with approximately 8 percent of the acres in an age class tail out to the 60-year age class, 5 percent tail out to the 70-year age class, and 2 percent tail out to the 80-year age class.

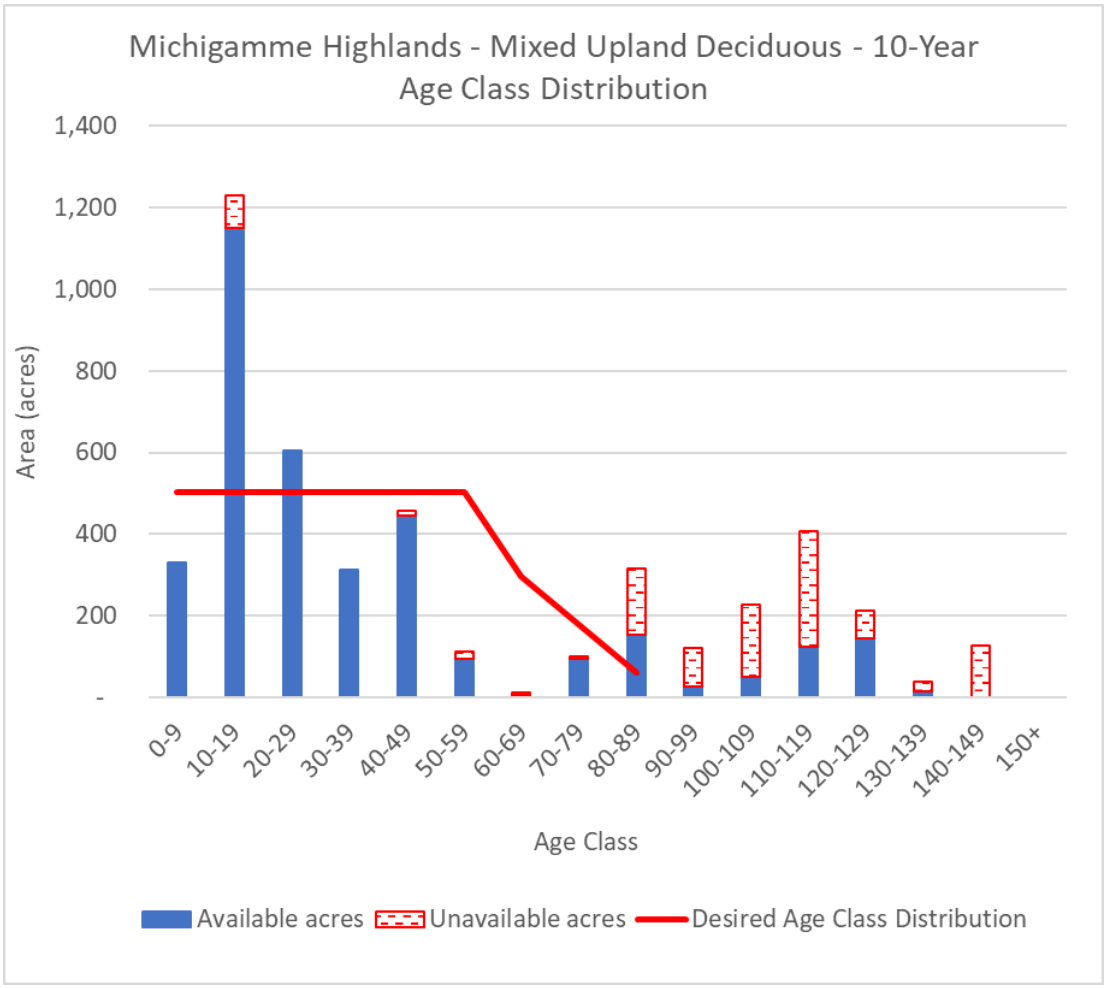


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 329 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of mixed upland deciduous will take many decades.

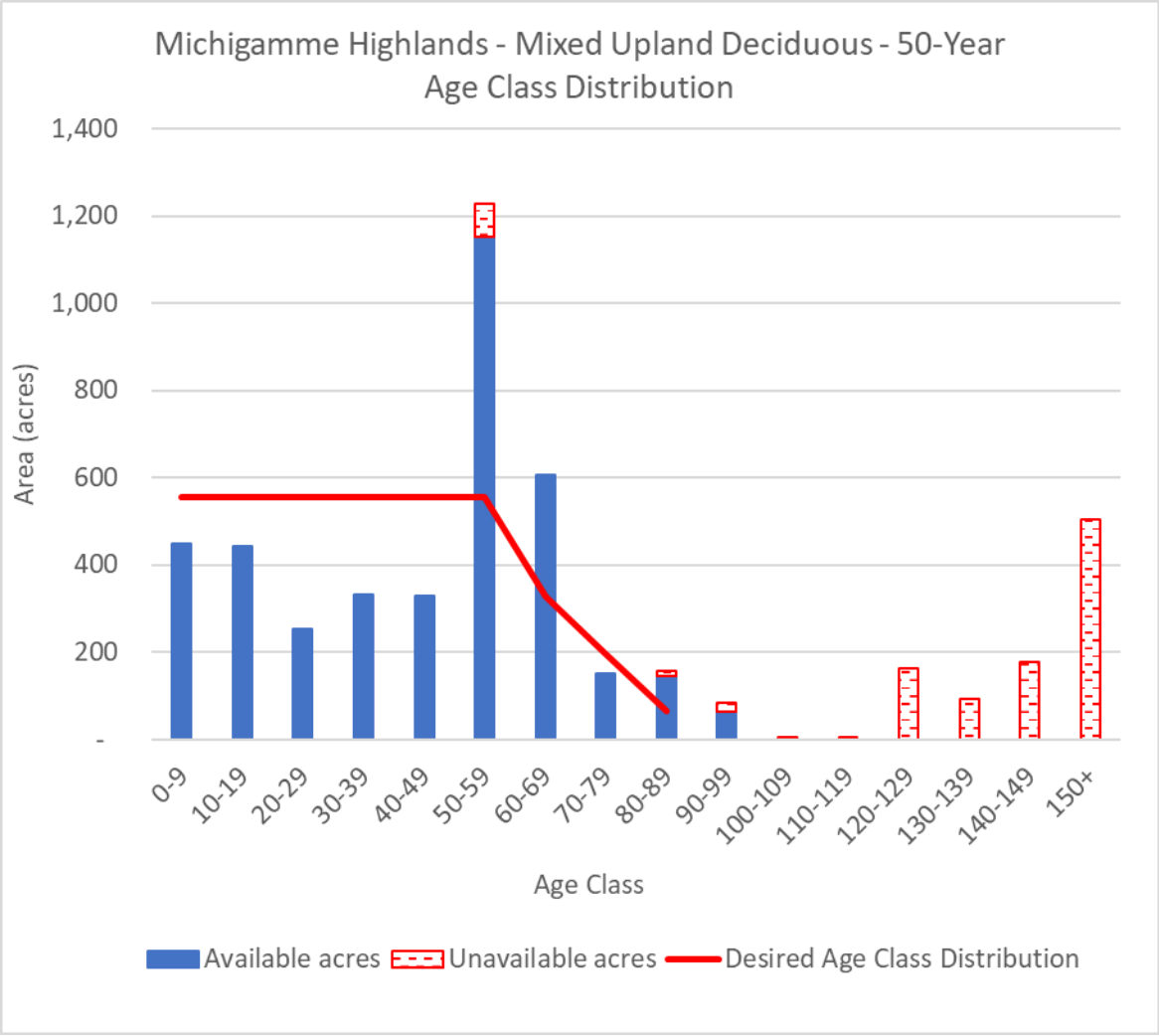


Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of mixed upland deciduous acres working toward the desired future condition as older age classes are treated (Figure 13).

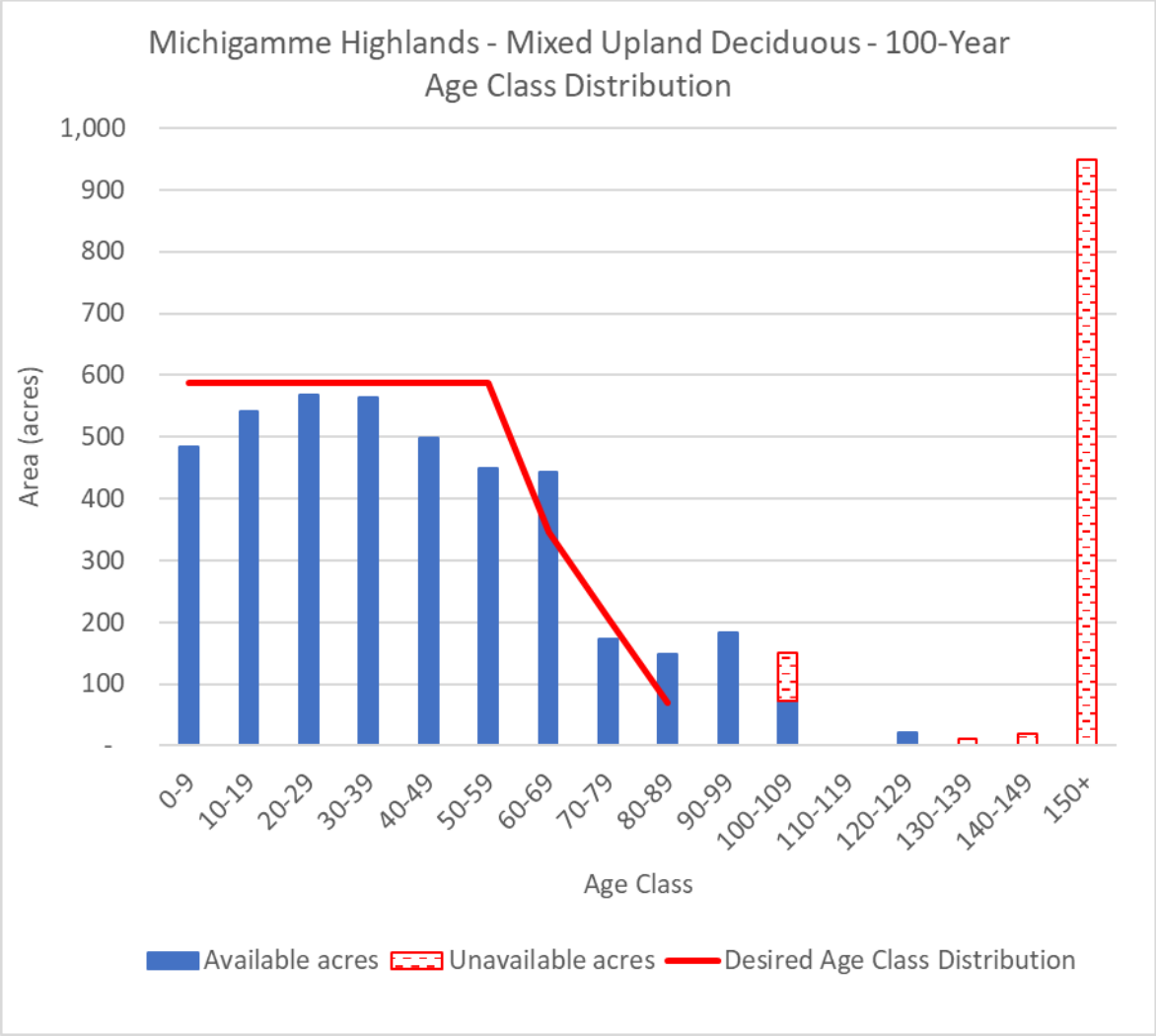


Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 208 acres of clearcut, 88 acres of selection, and 48 acres of shelterwood method harvests projected in the mixed upland deciduous cover type. It is expected that about 91 acres of mixed upland deciduous will be converted from other cover types. These total to an expected 435 acres of regeneration in the cover type over the next 10 years.

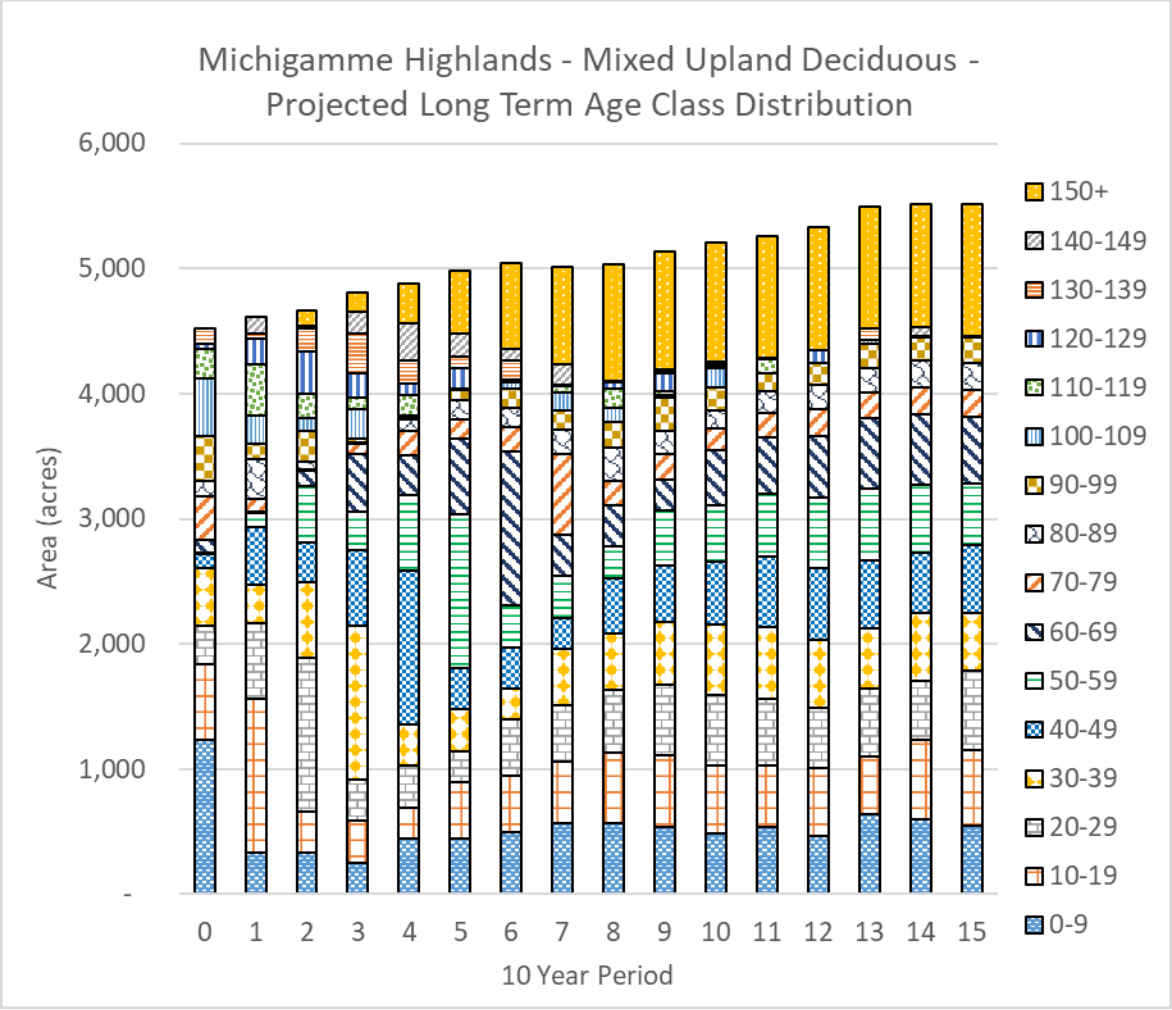


Figure 15. Projected age class distribution over 15, 10-year planning periods.

Upland mixed forest

Current condition

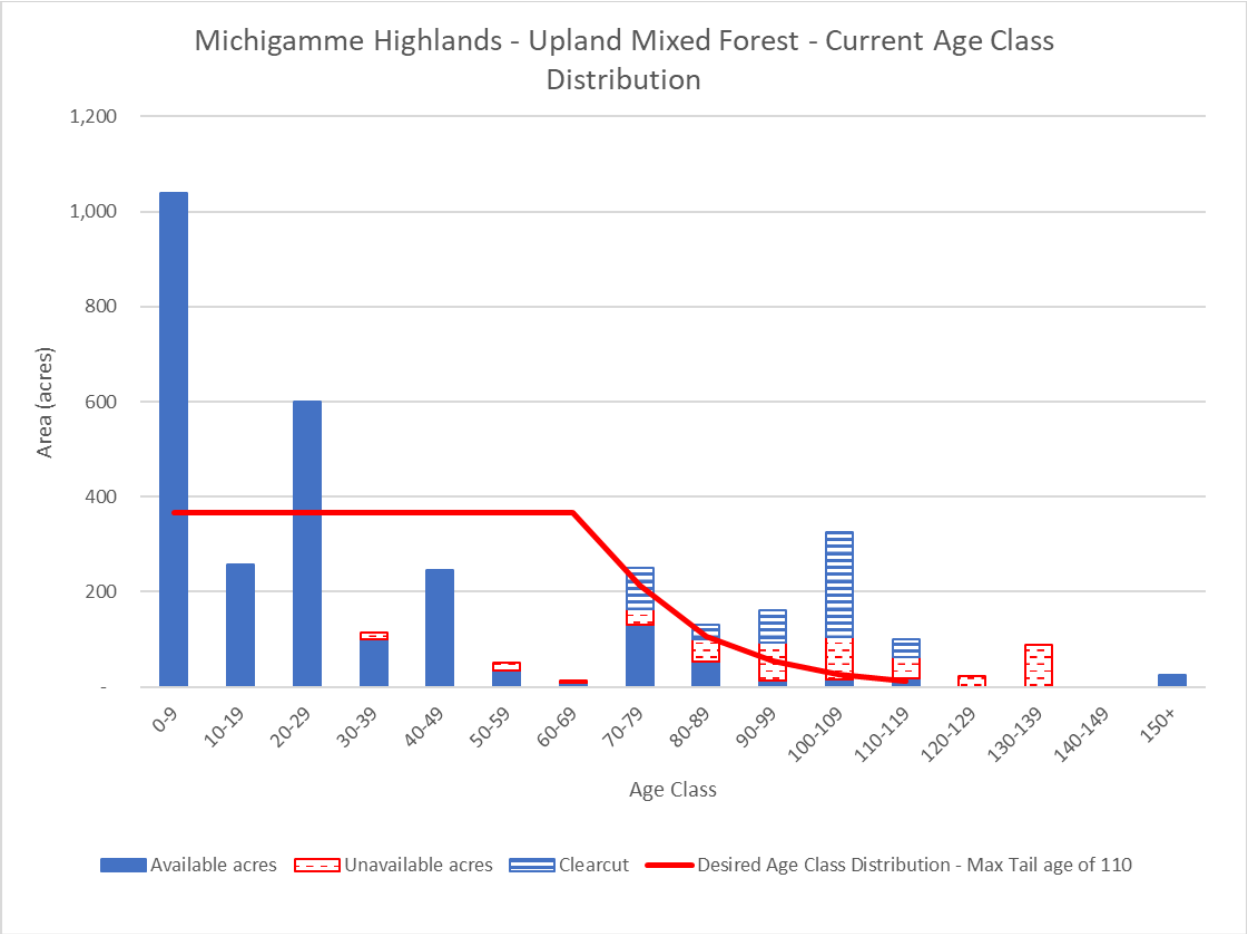


Figure 16. Current age class distribution, desired age class distribution and projected harvests in upland mixed forest cover type over the 10-year planning period.

The current age class distribution is very unbalanced with a deficit of acres in the 10-19- and 30-69-year-old age classes, and a surplus of acres in the 0-9-, 30-69-, and 70+ classes. A portion of this cover type meets the habitat requirements for marten and blackburnian warbler.

Table 12. Featured species with upland mixed forest as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Upland Mixed Forest	Upland Mixed Forest Habitat Acres - Available	Upland Mixed Forest Habitat Acres - Unavailable
Blackburnian warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	274	349

Featured Species	Featured Species Habitat – Upland Mixed Forest	Upland Mixed Forest Habitat Acres - Available	Upland Mixed Forest Habitat Acres - Unavailable
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	274	349

Desired future condition

The desired age class distribution is to have a rotation age of 60 years with approximately 7 percent of the acres in an age class tail out to the 70-year age class, 4 percent tail out to the 80-year age class, 2 percent tail out to the 90-year age class, and 1 percent tail out to the 100-year age class.

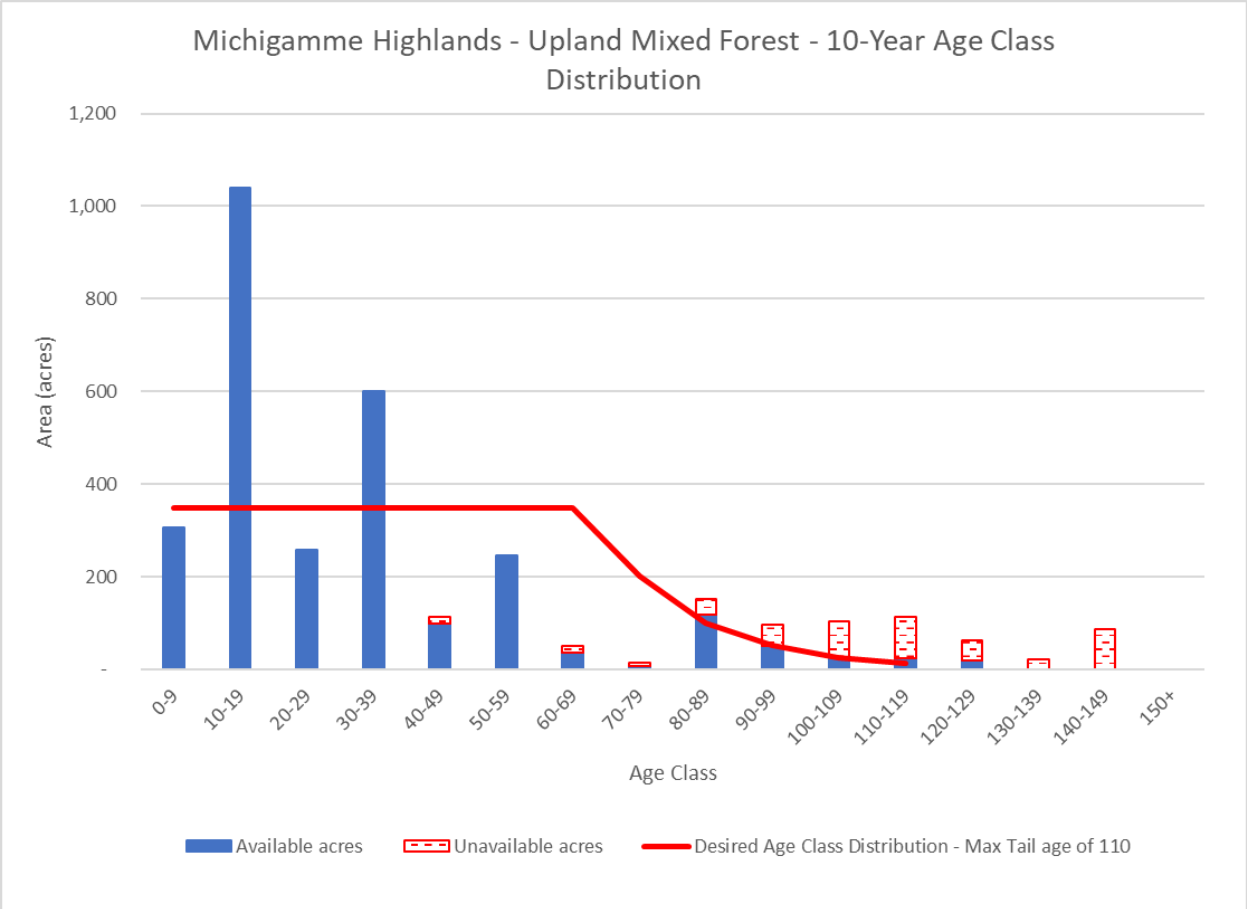


Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 331 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of upland mixed forest will take many decades in this management area.

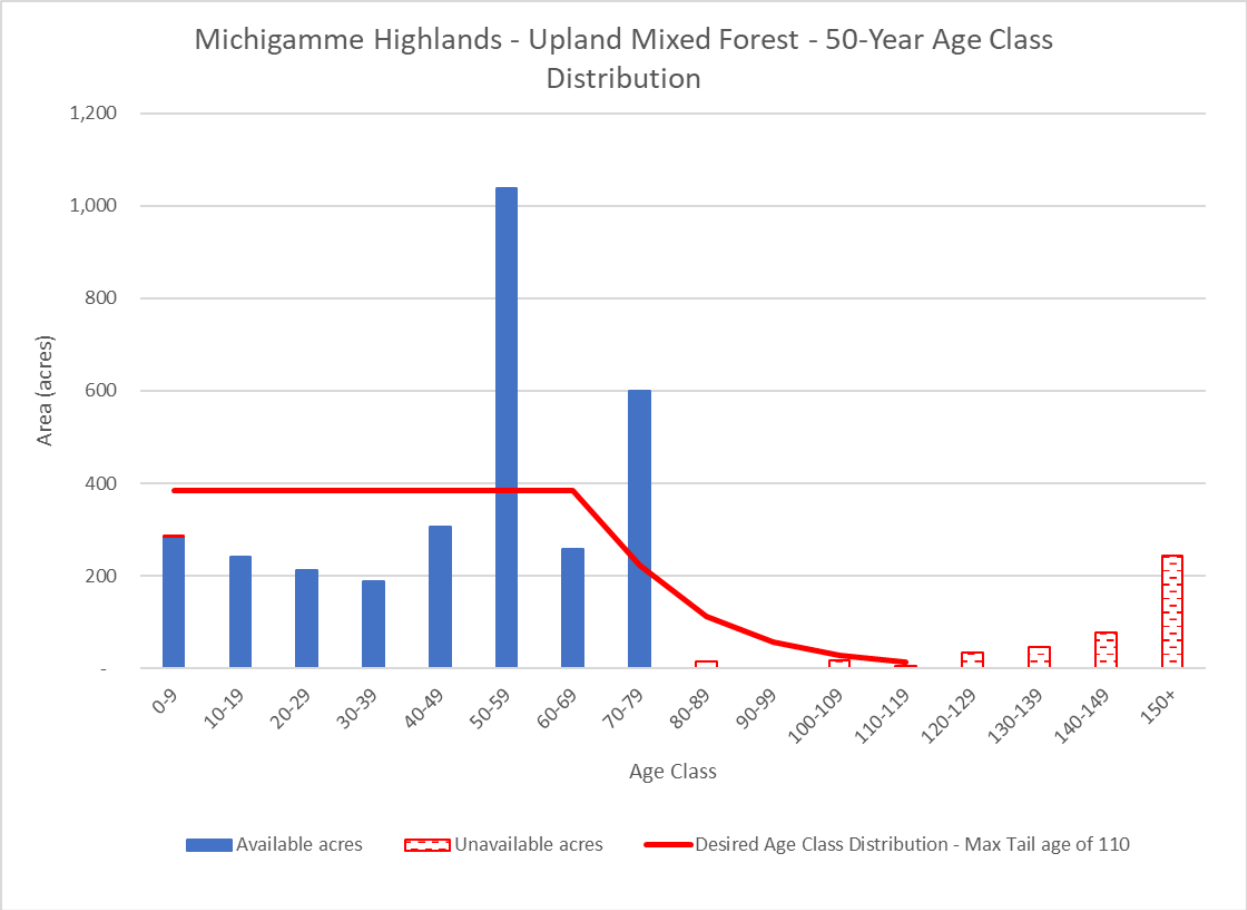


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of upland mixed forest acres working toward the desired future condition as the older age classes are treated (Figure 18).

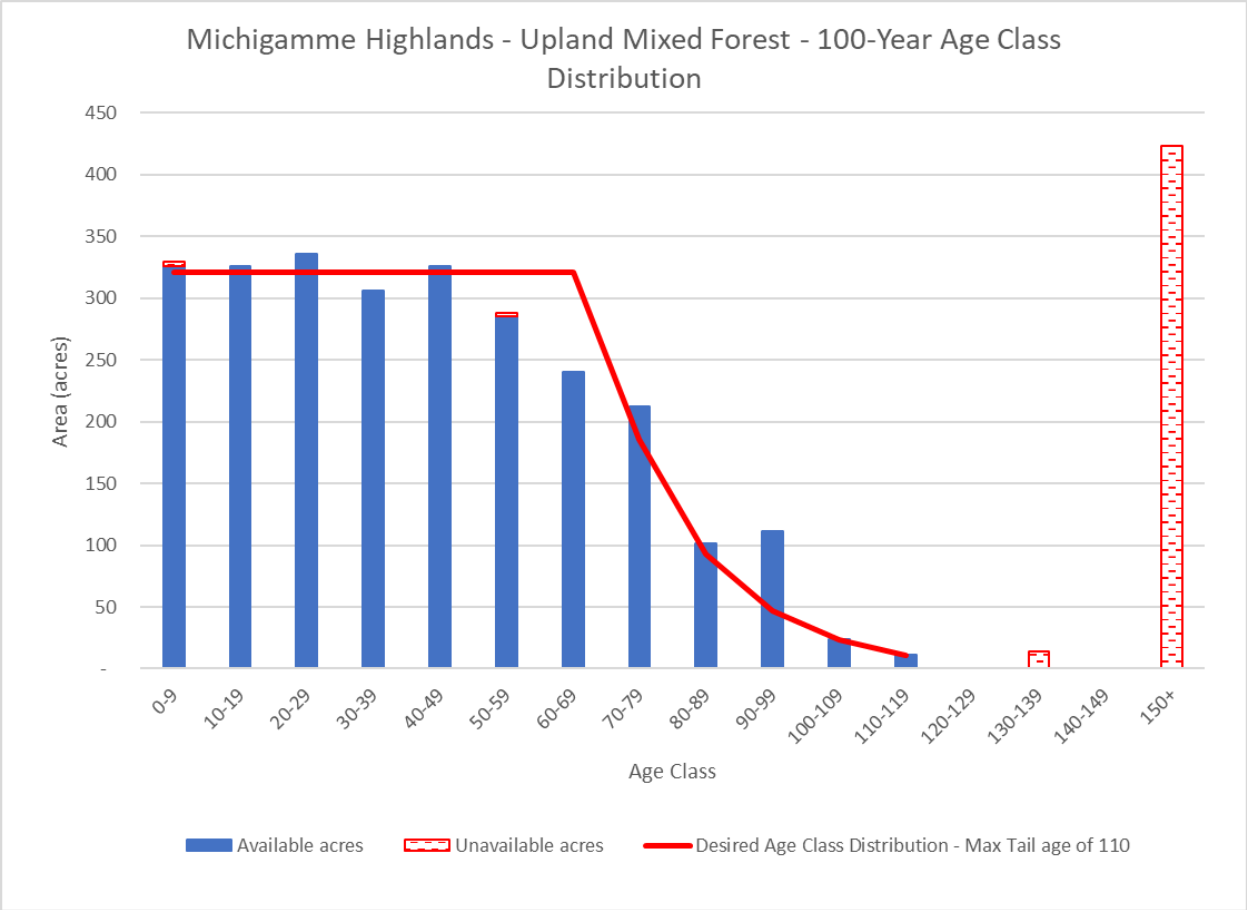


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of mixed upland deciduous in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 445 acres of clearcut harvests projected in the upland mixed forest cover type. It is expected that about 155 acres of upland mixed forest will be converted to other cover types. These total to an expected 290 acres of regeneration in the upland mixed forest cover type over the next 10 years.

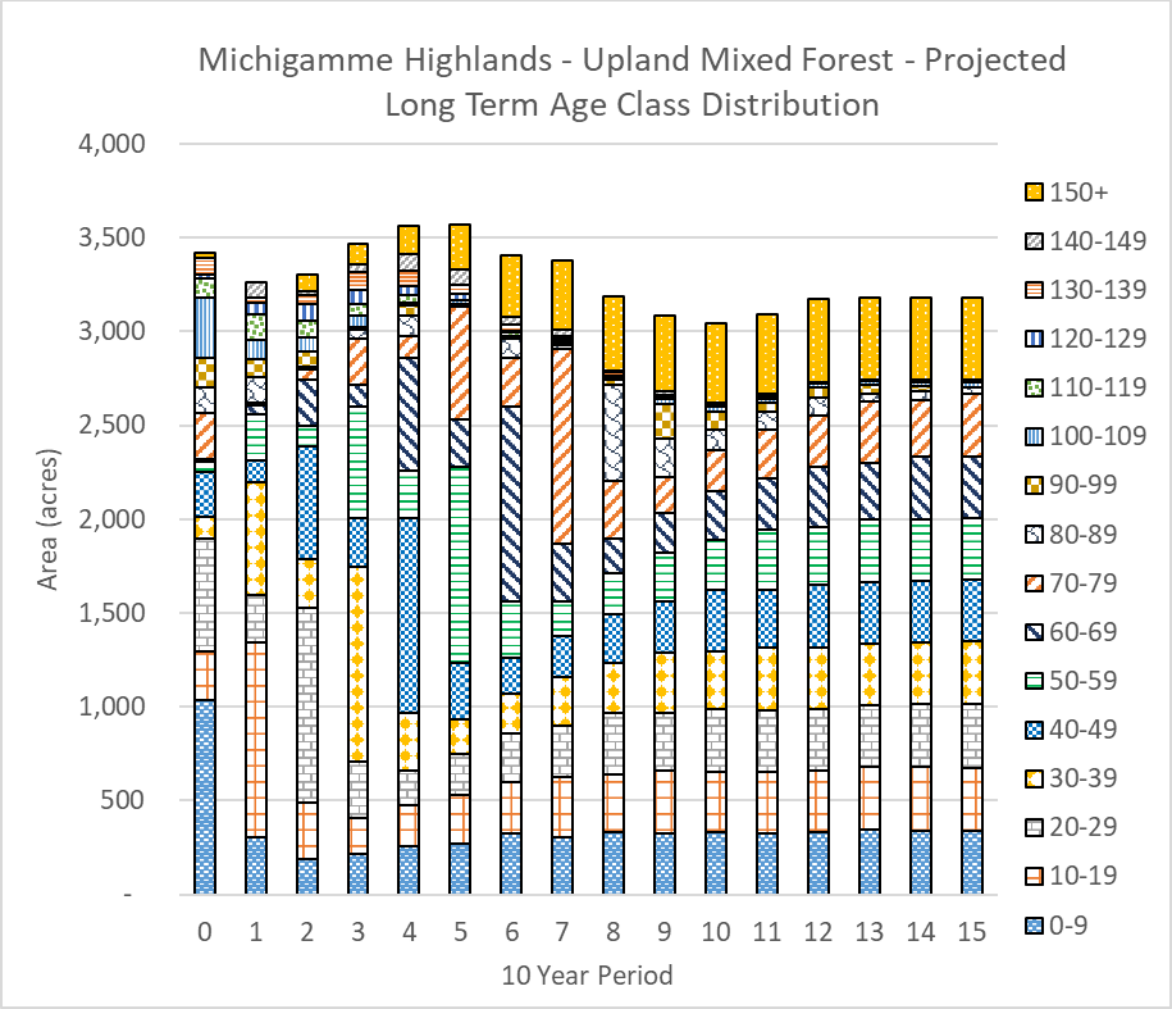


Figure 20. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information)

Table 13. High conservation value areas within the Michigamme Highlands management area.

High Conservation Value Area Type and Name	Acres
Dedicated Management Areas	**16**
	16
Deer Wintering Complex	**5,842**
	5,842
Forest Habitat Core Interior	**4,012**
	4,012
Northern Long-Eared Bat Hibernacula 2.5 mile buffer	**12**
Goodrich Adit B	12
Verified Type 1 and Type 2 Old Growth	**163**
Type 1 Old Growth	20
Type 2 Old Growth	144
Grand Total	**10,044**

Ecological reference areas

Ecological Reference Areas (ERAs) are a type of HCVA and are higher quality examples of functioning ecosystems primarily influenced by natural ecological processes.

Table 31. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 32. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Bog	B			1
Existing ERA	Dry-mesic northern forest	A	G4	S3	1
Existing ERA	Dry-mesic northern forest	B			5
Existing ERA	Dry-mesic northern forest	C	G4	S3	1
Existing ERA	Granite bedrock glade	AB			2
Existing ERA	Granite bedrock glade	AB		S2	1
Existing ERA	Granite bedrock glade	AB	G3G5	S2	2
Existing ERA	Granite bedrock glade	B	G3G5	S2	1
Existing ERA	Granite cliff	A	G4G5	S2	4
Existing ERA	Granite cliff	AB			2
Existing ERA	Granite cliff	AB	G4G5	S2	1
Existing ERA	Granite cliff	B	G4G5	S2	3
Existing ERA	Mesic northern forest	AB	G4	S3	2
Existing ERA	Mesic northern forest	B			2
Existing ERA	Mesic northern forest	B	G4	S3	3
Existing ERA	Mesic northern forest	BC	G4	S3	3
Existing ERA	Northern shrub thicket	AB			1
Existing ERA	Northern shrub thicket	AB	G4	S5	1
Existing ERA	Northern wet meadow	AB	G4G5	S4	1
Existing ERA	Northern wet meadow	B			1
Existing ERA	Poor fen	B			1
Existing ERA	Rich conifer swamp	BC	G4	S3	1
Existing ERA	Sandstone lakeshore cliff	AB	G3	S2	1
Existing ERA	Submergent marsh	A	GU	S4	2
Existing ERA	Wooded dune and swale complex	BC			1
Existing ERA	Wooded dune and swale complex	BC	G3	S3	1
Proposed ERA	Dry northern forest	B	G3?	S3	1
Proposed ERA	Granite bedrock glade		G3G5	S2	1
Proposed ERA	Granite bedrock glade	AB	G3G5	S2	1
Proposed ERA	Granite cliff	B	G4G5	S2	3
Proposed ERA	Poor fen	B	G3	S3	1
Proposed ERA	Sand and gravel beach	AB	G3?	S3	1
Proposed ERA	Granite bedrock lakeshore	AB	G4G5	S2	3
Proposed ERA	Granite lakeshore cliff	AB	GU	S1	2
Grand Total					**58**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 16) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 17) refers to those SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 16. Reviewable special conservation areas within the Michigamme Highlands management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**84**
Unspecified	1
Beaufort Lake Campground	2
King Lake Boat Launch	0
Unspecified	81
Cultural or Customary Area	**7**
Eagle Rock	7
Habitat Area or Habitat Corridor	**546**
Unspecified	49
Sturgeon River	309
Unspecified	189
Mineral Resource Area	**29**
Baraga County Road Commission	15
North Nestoria Pits	14
Possible Type 1 or Type 2 Old Growth	**246**
--	246
Spring, Wetlands, or Riparian Areas	**212**
2	52
11	36
32202014	37
32202022	9
32202038	28
Unspecified	50
Visual Management Areas	**508**
Islands	14
LPI Lakeside	492
LPI parking	2
Grand Total	**1,632**

Table 17. Static special conservation areas within the Michigamme Highlands management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Common Natural Heritage Element Occurrences		**200**
Dry-mesic northern forest		20
Hardwood-conifer swamp		35
Mesic northern forest		135
Northern wet meadow		10
Designated Trout and Cold Water Stream Buffer		**1,392**
		691
Barnhardt Creek		58
Bismark Creek		19
Brown Creek		18
County Line Creek		10
Dead River		1
Deer Creek		17
East Branch Fence River		1
East Branch Net River		18
Fox Farm Creek		5
Gilbert Creek		7
Harlow Creek		66
Johnson Creek		71
Koops Creek		7
Little Garlic River		87
Lost Creek		4
Mulligan Creek		24
Nash Creek		21
Salmon Trout River		5
Second River		10
Start Creek		19
Tracy Creek		30
West Branch Net River		169
Wilson Creek		2
Yellow Dog River		32
Designated Trout and Coldwater Streams	**51.4**	
	25.3	
Barnhardt Creek	2.1	
Bismark Creek	0.7	
Brown Creek	0.6	
County Line Creek	0.4	
Deer Creek	0.6	
East Branch Fence River	0.0	
East Branch Net River	0.7	
Fox Farm Creek	0.2	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Gilbert Creek	0.3	
Harlow Creek	2.5	
Johnson Creek	2.6	
Koops Creek	0.2	
Little Garlic River	3.3	
Lost Creek	0.2	
Mulligan Creek	0.9	
Nash Creek	0.8	
Salmon Trout River	0.2	
Second River	0.3	
Start Creek	0.7	
Tracy Creek	1.1	
West Branch Net River	6.3	
Wilson Creek	0.1	
Yellow Dog River	1.2	
Great Lakes Islands		**15**
Little Presque Isle		15
Important Bird Areas		**18,181**
Peshekee HIghlands LTA		14,912
Yellow Dog Plains		3,269
Non-dedicated Natural Areas		**696**
Natural Area Little Presque Isle Natural Area		452
Natural Area Little Presque Isle Wilderness Area		15
Natural Area Rocking Chair Lakes Natural Area		229
Wood Turtle Stream 100ft Buffer		**10**
Sturgeon River		10
Wood Turtle Stream 660ft Buffer		**73**
Sturgeon River		73
Grand Total	**51.4**	**20,567**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 19, 20 and 21) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 33. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 19. Rare animal species occurrence within the Michigamme Highlands management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	--	1
Animal	Alces alces*	Moose	SC	--	--
Animal	Boloria freija	Freija fritillary	SC	--	1
Animal	Boloria frigga	Frigga fritillary	SC	--	1
Animal	Bombus borealis	Northern amber bumble bee	SC	--	1
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	7
Animal	Canachites canadensis	Spruce grouse	T	--	1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Coregonus artedi	Lake herring or Cisco	T	--	1
Animal	Elliptio complanata	Eastern elliptio	SC	--	1
Animal	Erebia discoidalis	Red-disked alpine	SC	--	1
Animal	Gavia immer	Common loon	T	--	6
Animal	Glyptemys insculpta	Wood turtle	T	--	1
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	4
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Opheodrys vernalis	Smooth green snake	SC	--	1
Animal	Pandion haliaetus	Osprey	SC	--	5
Animal	Setophaga kirtlandii	Kirtland's warbler	E	--	1
Total	--	--	--	--	**34**

**Occurrence information provided by field staff*

Table 20. Rare plant species occurrence within the Michigamme Highlands management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Cypripedium arietinum	Ram's head lady's-slipper	SC	--	1
Plant	Draba arabisans	Rock whitlow grass	SC	--	1
Plant	Gentiana linearis	Narrow-leaved gentian	T	--	3
Plant	Juncus stygius	Moor rush	E	--	1
Plant	Mertensia paniculata	Northern Bluebell	SC	--	1
Plant	Piptatherum canadense	Canada rice grass	T	--	2
Plant	Pterospora andromedea	Pine-drops	T	--	1
Plant	Ribes oxyacanthoides	Northern gooseberry	SC	--	1
Plant	Salix pellita	Satiny willow	T	--	1
Total	--	--	--	--	**12**

Table 21. Other rare occurrence within the Michigamme Highlands management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	1
Other	Multiple Bat Hibernacula	Multiple Bat Hibernacula	--	--	1
Total	--	--	--	--	**2**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 23).

Table 34. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 23. Non-ERA Natural Community Occurrence within the Michigamme Highlands management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Dry-mesic northern forest	B	S3		1
Dry-mesic northern forest	BC	S3		1
Hardwood-conifer swamp	B	S3		1
Mesic northern forest	BC	S3		2
Mesic northern forest	C	S3		2
Northern wet meadow	AB	S4	G4G5	1
Northern wet meadow	B	S4	G4G5	2
Poor conifer swamp	C	S4	G4	2
Grand Total				**12**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 24) and diseases (Table 25 could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 24. Defoliating insects of concern in the Michigamme Highlands management area.

Common Name	Scientific Name	Native/Non-native	Known Presence

Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 25. Maladies of concern in the Michigamme Highlands management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak Wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

A total of 109 miles of streams and rivers are found in the management area (Table 26). Streams/rivers classified as warm types comprise approximately 61 percent of the riverine mileage.

Table 26. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	35
Cold small river	0
Cold transitional stream	7
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	66
Warm transitional small river	1
Warm transitional large river	0
Warm stream	0
Warm small river	0
Warm large river	0

Lacustrine habitat

A total of 29 lakes and ponds of at least one surface acre are found in the management area (Table 27).

Table 27. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	19
100-499	6

Lake Size Class (acres)	Number
500+	4

Wetlands

A total of 22,777 acres of wetlands are found in the management area (Table 28). Forested wetlands comprise approximately 97 percent of wetland types found in the management area.

Table 28. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	686
Forested	21,980
Riverine	111

Vernal pools and seeps

A total of 202 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub and northern hardwood are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 26).

Table 29. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	2,836
Northern hardwood	1,537
Lowland conifers	981
Lowland spruce/fir	807
Marsh	704
Mixed upland deciduous	691
Aspen	634
Upland mixed forest	476
Cedar	444
Upland spruce/fir	441

Watershed vegetation cover

The management area includes portions of important watersheds of the Peshekee River and Yellow Dog River (Tables 30 and 31). Northern hardwood is a major cover type in the Peshekee River watershed of the state forest while Jack Pine is a major cover type in the Yellow Dog River watershed of the state forest.

Table 30. Largest vegetative cover types (i.e., top 5) and area of the Peshekee River watershed located within the management area.

Cover Type	Acres
Northern hardwood	640
Mixed upland forest	338
Mixed upland deciduous	195
Lowland conifer	188
Lowland spruce/fir	173

Table 31. Largest vegetative cover types (i.e., top five) and area of the Yellow Dog River watershed located within the management area.

Cover Type	Acres
Natural jack pine	951
Cedar	484
Northern hardwood	425
Lowland shrub	395
Aspen	350

Recreation

The Michigamme Highlands management area is made up of a number of fragmented parcels north and west of Marquette. Non-motorized recreation opportunities are concentrated in Little Presque Isle, set along the Lake Superior shoreline just a few miles from Marquette. This popular area contains over 18 miles of trails for hiking, biking, and snowshoeing, six rustic cabins available for rent (the only such amenity on state fprest land) and access to Harlow Lake for boating and fishing. The North Country National Scenic Trail/ Iron Belle Trail passes through this area along the lakeshore. The mouth of the Huron River is also a popular area for beachgoers.

Access varies across the remainder of the management area, with snowmobile trails, a portion of the Clowry-Nestoria Rail-Trail open to ORVs and snowmobiles, two small state forest campgrounds and boating access sites on several small inland lakes. The expansive Craig Lake State Park provides additional recreation opportunities adjacent to state forest land. There are no areas managed specifically for hunting in this management area.

Table 32. Designated Recreation Trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	ORV (all types)	2.6
Motorized recreation trails	Snowmobile	14.5
Non-motorized recreation trails	Hiking	45.1
Non-motorized recreation trails	Equestrian	0
Non-motorized recreation trails	Biking	32.8
Non-motorized recreation trails	Hunter Walking Trails	0
Total	--	**95**

Note: Trail use types may overlap.

Table 33. State forest campgrounds.

Name	Number of Sites
Little Presque Isle cabins	6
Beaufort Lake campground	7
King Lake campground	6

Table 34. Boating Access Sites.

Name	Waterbody
Deer Lake	Deer Lake
Harlow Lake	Harlow Lake
King Lake campground	King Lake
Net River Flooding	Net River Flooding
Parent Lake	Parent Lake
Ruth Lake	Ruth Lake
Silver Lake	Silver Lake

Ralph Moraine

State Forest Area: 155,418 acres	Location: North Dickinson and Portions of South Western Marquette Counties	Population Centers: Ralph, Sagola
Sub-Section: West Green Bay Till Plain	Landforms: Broad Till Plain, and ground moraine	Landcover: Forested: 139,688 acres Non-forested: 15,729 acres

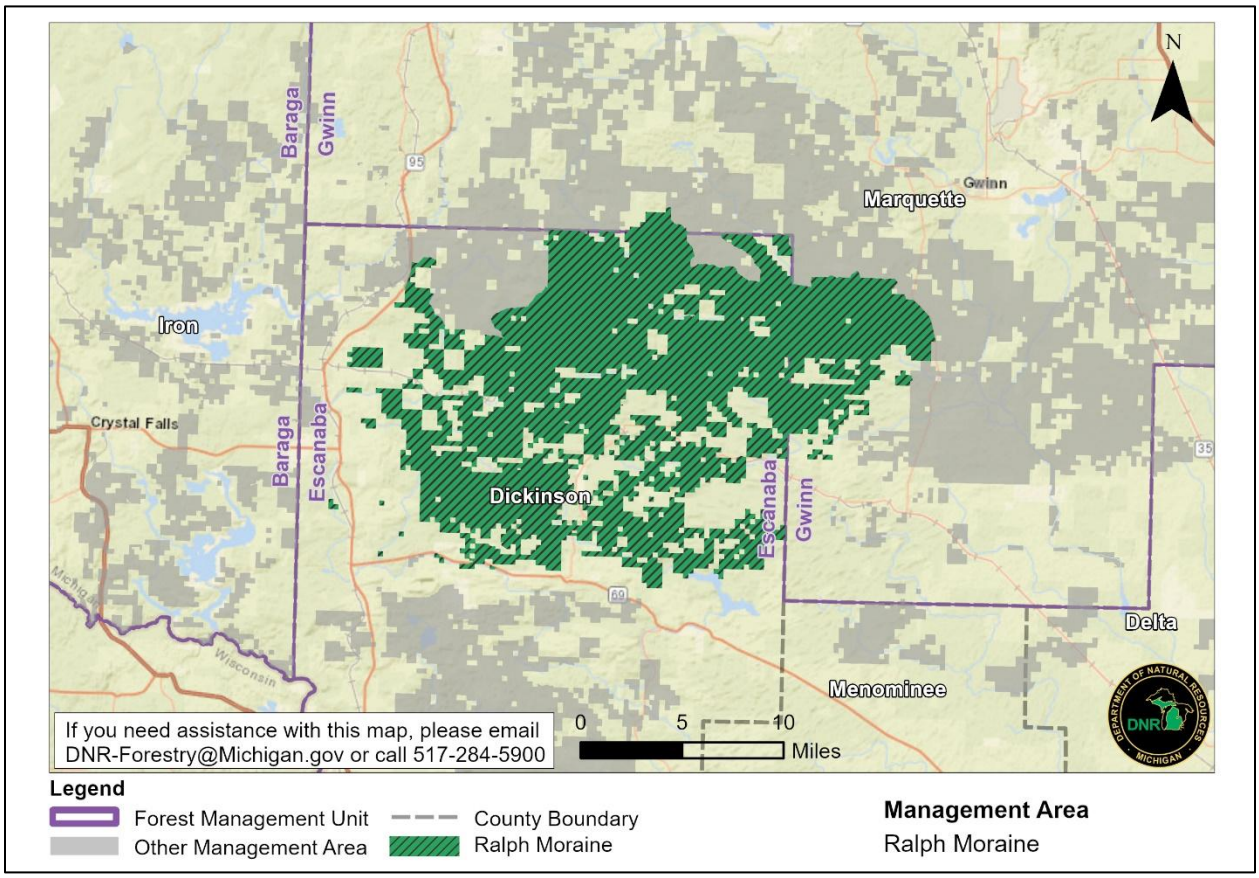


Figure 1. Map of the Ralph Moraine management area.

Forested landscape

Current and projected future condition

The Ralph Moraine management area is dominated by shade-intolerant cover types in the young and mid-aged categories. Intolerant upland cover types dominate the older age categories, while the unavailable lowland acres are more prevalent in the old age category.

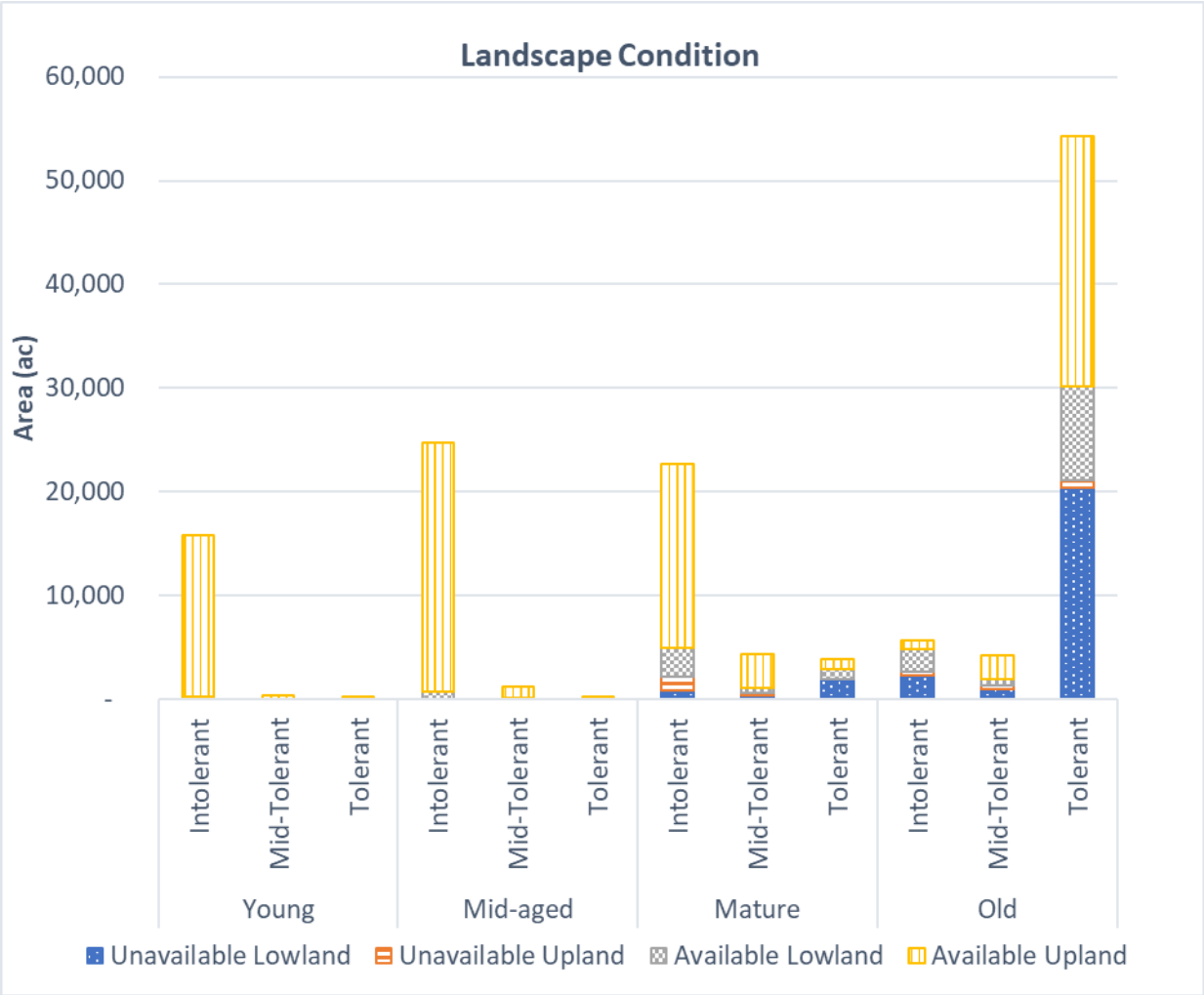


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for Landscape Habitat Conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in aspen and jack Pine	16,038
Mature forest	Acres of 80+ year stands across cover types	63,809
Mature forest	Acres of 120+ year stands across cover types	25,306
Mesic conifer cover types	Acres of mesic conifer cover types	3,596
Mesic conifers in other Cover types	Average canopy occupancy	24%
Mast – oak cover Types	Acres of oak cover types	326
Mast tree species in other cover types	Acres of total canopy occupancy of mast tree acres (trace-100%)	11,834
Big Trees	Acres of total canopy stand occupancy of species in sawlog or greater size class	50,169
Non-forested openings	Acres of total herbaceous open land, upland shrub and cropland	3,578
Landscape forest matrix	Percent deciduous forest	63%
Landscape forest matrix	Percent coniferous forest	34%

The Ralph Moraine management area has the following Special Analysis Units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the MA. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer Wintering Complex: Arnold-Ford River
- Deer Wintering Complex: Iron-Floodwood
- Grouse Enhanced Management: Bill Rollo Memorial GEMS
- Grouse Enhanced Management: Ralph

The Ralph Moraine management area is dominated by forested cover types with 90 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 55 percent of the management area and comprised mostly of aspen. The upland coniferous portion is 4 percent of the management area and comprised mostly of planted and natural red pine. Cedar is the most common lowland conifer in this management area, representing 15 percent of the landscape. Lowland shrub is the most common non-forested cover type in this management area, representing 7 percent of the landscape.

Table 2. Landscape conditions and distribution of cover types in the Ralph Moraine management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	58,946	85,336	94,696	139,688
			Northern hardwood	24,568			
			Black-red hybrid oak	0			
			Northern red oak	326			
			Oak mix	0			
			Mixed upland deciduous	1,496			
		Mixed	Upland mixed forest	2,468	2,468		
		Coniferous	Planted red pine	1,570	6,892		
			Planted jack pine	200			
			Planted white pine	0			
			Planted mixed pine	9			
			Natural red pine	1,120			
			Natural jack pine	398			
			Natural white pine	767			
			Natural mixed pines	625			
			Upland spruce/fir	1,121			
			Upland conifers	970			
			Hemlock	112			
	Lowland	Deciduous	Lowland aspen/balsam poplar	1,701	3,175	44,992	
			Lowland deciduous	1,474			
		Mixed	Lowland mixed forest	1,810	1,810		
		Coniferous	Cedar	22,872	40,007		
			Lowland conifers	8,828			
			Lowland spruce/fir	4,915			
			Tamarack	3,392			
Nonforested	Upland	N/A	Herbaceous openland	1,857	N/A	3,578	15,729
			Upland shrub	1,094			
			Low density trees	345			
			Bare/sparsely vegetated	131			
			Cropland	44			
			Urban	107			
	Lowland	N/A	Lowland shrub	9,097	N/A	12,151	
			Marsh	338			
			Bog	215			
			Treed bog	1,545			
			Water	956			
						Grand Total:	**155,418**

There are 109,579 acres (71.1 percent of the total management area and 78.4 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest (Table 3). Of that, over 41 percent is in the aspen cover type, 18% is in northern hardwood, and 5% in cedar. The remaining 19 cover types represent about 19% of the forested and available land in the management area.

Table 3. Summary table describing the landscape conditions and cover type composition of the Michigamme Highlands management area.

RALPH MORAINE Forested Cover Type	Available Acres	Available %	Unavailable Acres	Unavailable %	Total Acres	Total %
Aspen	57,559	41.2%	1,393	1.0%	58,952	42.2%
Cedar	6,748	4.8%	16,116	11.5%	22,863	16.4%
Hemlock	81	0.1%	31	0.0%	112	0.1%
Lowland aspen/balsam poplar	1,083	0.8%	619	0.4%	1,702	1.2%
Lowland conifers	3,886	2.8%	4,942	3.5%	8,828	6.3%
Lowland deciduous	596	0.4%	878	0.6%	1,474	1.1%
Lowland mixed forest	1,290	0.9%	521	0.4%	1,811	1.3%
Lowland spruce/fir	3,269	2.3%	1,647	1.2%	4,915	3.5%
Mixed upland deciduous	1,354	1.0%	142	0.1%	1,496	1.1%
Natural jack pine	396	0.3%	2	0.0%	398	0.3%
Natural mixed pines	535	0.4%	90	0.1%	625	0.4%
Natural red pine	927	0.7%	194	0.1%	1,120	0.8%
Natural white pine	344	0.2%	424	0.3%	768	0.6%
Northern hardwood	24,445	17.5%	123	0.1%	24,569	17.6%
Northern red oak	115	0.1%	211	0.2%	326	0.2%
Planted jack pine	200	0.1%	0	0.0%	200	0.1%
Planted Mixed Pine	9	0.0%	0	0.0%	9	0.0%
Planted red pine	1,570	1.1%	0	0.0%	1,570	1.1%
Tamarack	1,309	0.9%	2,084	1.5%	3,392	2.4%
Upland conifers	800	0.6%	170	0.1%	970	0.7%
Upland mixed forest	2,232	1.6%	236	0.2%	2,468	1.8%
Upland spruce/fir	830	0.6%	291	0.2%	1,121	0.8%
Grand Total	**109,579**	**78.4%**	**30,111**	**21.6%**	**139,690**	**100.0%**

Table 4. Site Condition (reason area is unavailable for commercial harvest) acres for the Ralph Moraine management area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Deer wintering area	10,615	35.3%
Cannot regenerate	6,820	22.6%
BMPs	4,929	16.4%
Unproductive	2,393	7.9%
Too wet	2,041	6.8%
Wildlife concerns	1,164	3.9%
Other dept./div. processes	792	2.6%
Long-term retention	457	1.5%
Conservation values	455	1.5%
Species of special concern or T&E	139	0.5%
Blocked by obstacle	114	0.4%
Too steep	90	0.3%
Other influence zones	65	0.2%
Non-military lease/easement	34	0.1%
Denied access	5	0.0%
Total Unavailable	**30,111**	**100.0%**

Management actions

Each cover type in the Ralph Moraine management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 4).

These harvests will help establish a desirable amount of regeneration for the even-aged cover types over the 10-year period or help to achieve desired basal area distribution among un-even aged cover types like northern hardwoods. The following sections will provide additional details for each significant cover type in the Ralph Moraine management area.

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern hardwood	49	11,057	-	-	-	-	-	11,106
Aspen	8,130	-	-	-	-	-	-	8,130
Lowland spruce/fir	712	-	-	-	-	-	-	712
Lowland conifers	562	-	-	-	-	-	-	562
Upland mixed forest	343	-	-	-	-	-	-	343
Planted red pine	-	-	326	-	-	-	-	326
Mixed upland deciduous	288	-	-	-	34	-	-	322
Lowland aspen/balsam poplar	201	-	-	-	-	-	-	201
Tamarack	188	-	-	-	-	-	-	188
Natural mixed pines	-	-	119	-	46	-	-	165
Upland Ssruce/fir	148	-	-	-	-	-	-	148
Natural jack pine	99	-	-	-	-	-	-	99
Natural red pine	-	-	10	-	51	-	-	61
Natural white pine	-	-	21	-	-	-	-	21
Upland conifers	19	-	-	-	-	-	-	19
Planted jack pine	12	-	-	-	-	-	-	12
Lowland mixed forest	7	-	-	-	-	-	-	7
Lowland deciduous	3	-	-	-	-	-	-	3
Totals	**10,761**	**11,057**	**476**	**-**	**130**	**-**	**-**	**22,424**

Table 6. Ten-year 10 year estimated harvest volume by product and species for the Ralph Moraine management area.

10-Year Estimated Harvest Volume Projection Ralph Moraine Management Area Product	Species	Volume Planned*	Volume Prepared**
Pulpwood (cords)	Mixed hardwood	75,619	71,082
	Mixed aspen	62,241	58,507
	Mixed softwood	29,331	27,571
	Mixed spruce	18,543	17,430
	Jack pine	3,015	2,834
	Red pine	2,881	2,708
	Mixed oak	1,797	1,689
	White pine	1,776	1,669
	Pulpwood Total	**195,203**	**183,491**
Sawtimber (MBF)	Sugar maple	30,576	28,742
	Mixed aspen	16,741	15,737
	Red maple	11,414	10,729
	Red pine	3,875	3,642
	Basswood	3,713	3,490
	White pine	3,500	3,290
	Red oak	3,368	3,166
	Mixed oak	191	180
	White oak	181	171
	Sawtimber Total	**73,560**	**69,147**
	Total sawtimber varvest volume in cords	**156,619**	**147,222**
	Grand total harvest volume in cords	**351,822**	**330,713**

* Volume estimates based on 100% of the projected harvests for the 10-year planning period.

** Volume estimates based on 94% of the projected harvests for the 10-year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

Few cover type transitions are projected. The managed area of each cover type is projected to remain relatively stable. The largest decrease forecasted is in the lowland spruce/fir cover type, where 366 acres are forecasted to convert to other cover types through forest management activities. The largest increase is in lowland mixed forest, where 304 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	58,946	58,977	30
Northern hardwood	24,568	24,575	7
Cedar	22,872	22,872	0
Lowland conifers	8,828	8,884	56
Lowland spruce/fir	4,915	4,725	-191
Tamarack	3,392	3,341	-51
Upland mixed forest	2,468	2,516	49
Lowland Mixed Forest	1,810	2,014	204
Lowland aspen/balsam poplar	1,701	1,693	-8
Planted red pine	1,570	1,661	90
Mixed upland deciduous	1,496	1,407	-89
Lowland deciduous	1,474	1,464	-10
Upland spruce/fir	1,121	1,022	-99
Natural red pine	1,120	1,120	0
Upland conifers	970	971	1
Natural white pine	767	769	2
Natural mixed pines	625	625	0
Natural jack pine	398	374	-24
Northern red oak	326	326	0
Planted jack pine	200	194	-6
Hemlock	112	112	0
Planted mixed pine	9	29	20
Planted white pine	0	20	20
Lowland shrub	9,097	9,097	0
Herbaceous openland	1,857	1,857	0
Treed bog	1,545	1,545	0
Upland shrub	1,094	1,094	0
Water	956	956	0
Low density trees	345	345	0
Marsh	338	338	0
Bog	215	215	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Bare/sparsely vegetated	131	131	0
Urban	107	107	0
Cropland	44	44	0
Total:	**155,418**	**155,418**	**0**

Featured species current and projected habitat acres

There are 14 featured species in this management area that span various cover types, age classes and stand level conditions.

As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years. This is due to the basal area dropping below 81. but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Three of these species were not included in the SFMP model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
American woodcock	Aspen, lowland aspen, lowland deciduous	1,924	1,977	2,155	2,246
Black bear	Mast	11,834	--	--	--
Black-backed woodpecker	Natural disturbance	--	--	--	--
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	14,743	17,588	10,269	18,456

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Golden-winged warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	1,827	1,917	2,003	2,101
Kirtland's warbler	Natural jack pine, planted jack pine (Voelker Outwash Plains)	42	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	19,341	22,900	15,417	24,515
Moose	To be determined	--	--	--	--
Ruffed grouse	Aspen	1,747	1,807	1,926	2,010
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	7,485	7,303	4,641	4,985
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	92,789	92,954	93,581	93,993
White-tailed deer (shelter)	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	42,909	42,825	42,480	42,273
Wild turkey	Non-forested openings	2,202	--	--	--
Wood turtle	Non-forested openings	--	--	--	--
Wood thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	15,239	16,594	10,971	18,745

Cover type composition and associated wildlife species

Aspen

Current condition

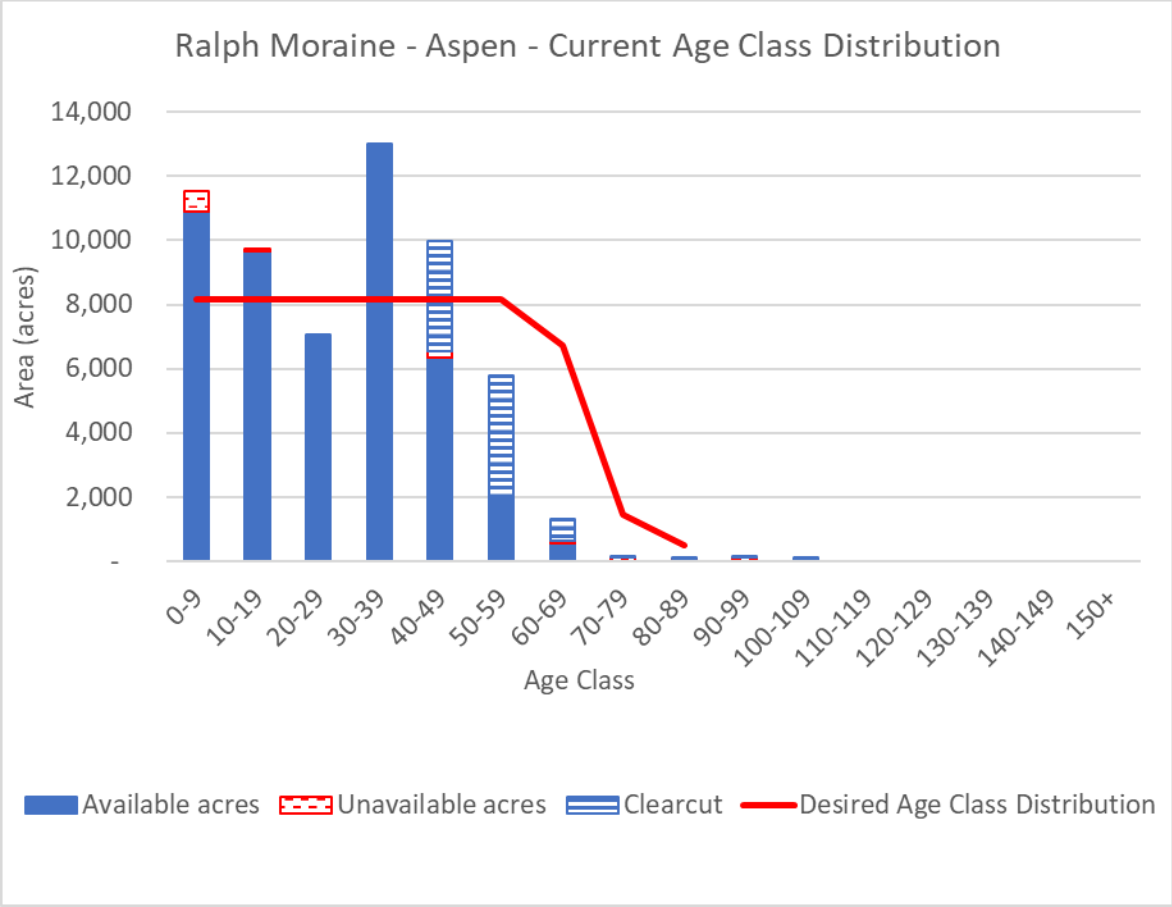


Figure 3. Current age class distribution, desired age class distribution and projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in the 20-29- and the 50-89-year-old age classes and a surplus of acres in the 0-19- and 30-49-year-old age classes. A portion of this cover type meets the habitat requirements for golden-winged warbler, woodcock, ruffed grouse and snowshoe hare (Table 6).

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables, and current potential acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Potential Habitat Acres - Available	Aspen Potential Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: sapling	20,589	714
American woodcock	Age category: 0-19 Size class: sapling	20,589	714
Ruffed grouse	Age category: 0-19 Size class: sapling	20,589	714
Snowshoe hare	Age category: 0-19 Size class: sapling	20,589	714
White-tailed deer	All ages and size classes	58,946	--

Desired future condition

The desired age class distribution is to have a rotation age of 50 years for approximately 85% of the acres, then 12 percent of the acres in an age class tail out to the 60-year age class, 3 percent of the acres in an age class tail out to the 70-year age class, and 1 percent of the acres in an age class tail out to the 80-year age class.

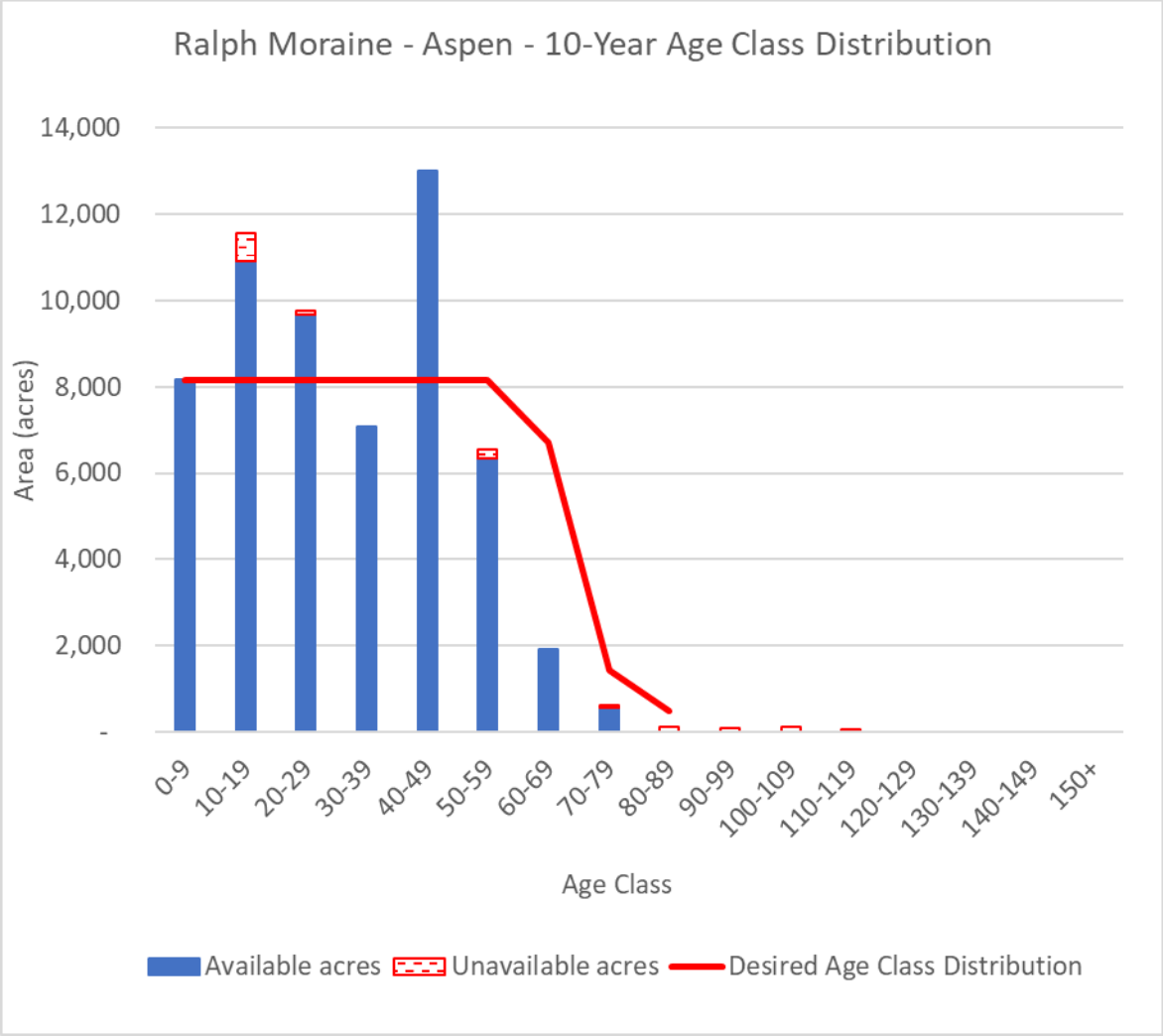


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 8,160 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take a few decades in this management area.

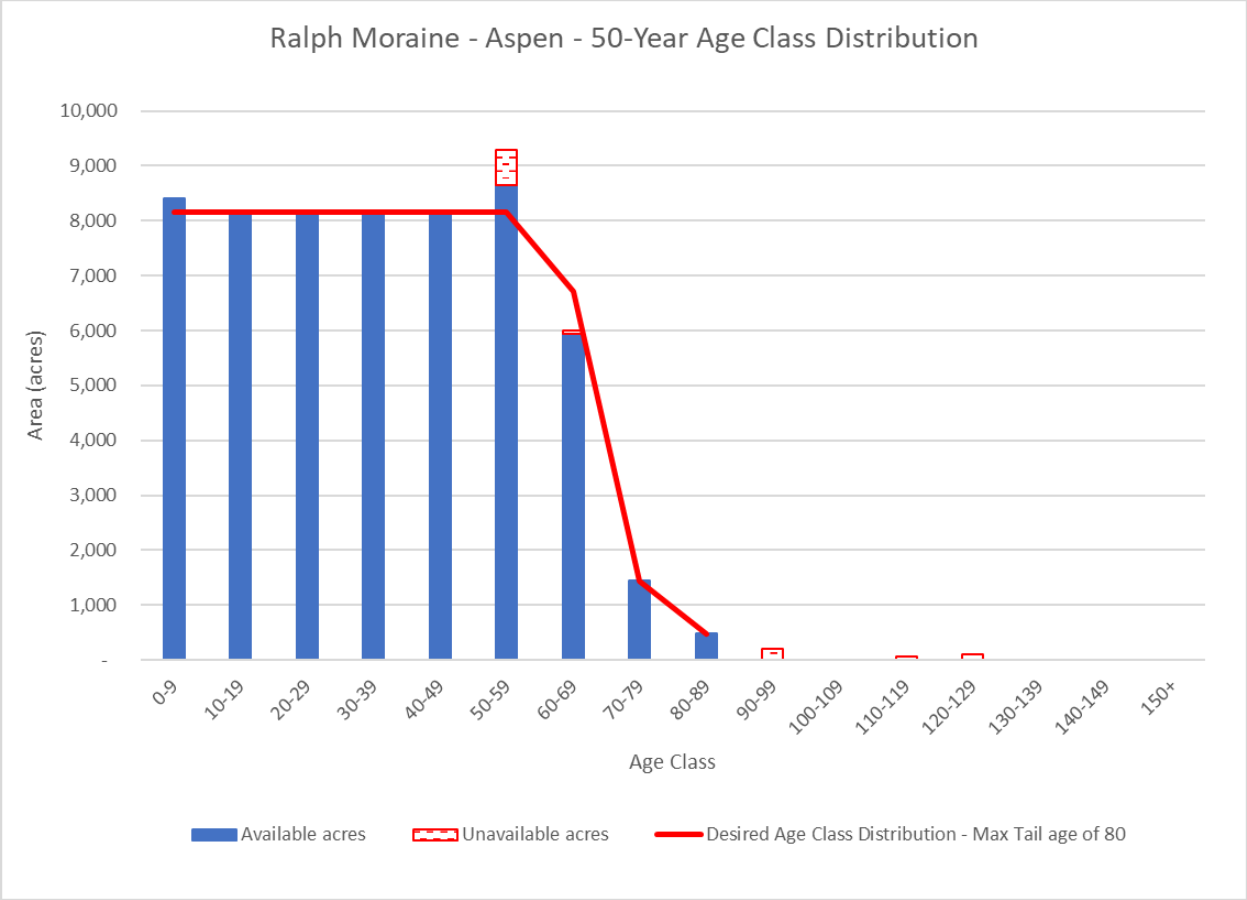


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres nearly reaching the desired future condition with few age classes deviating from the target proportions (Figure 5).

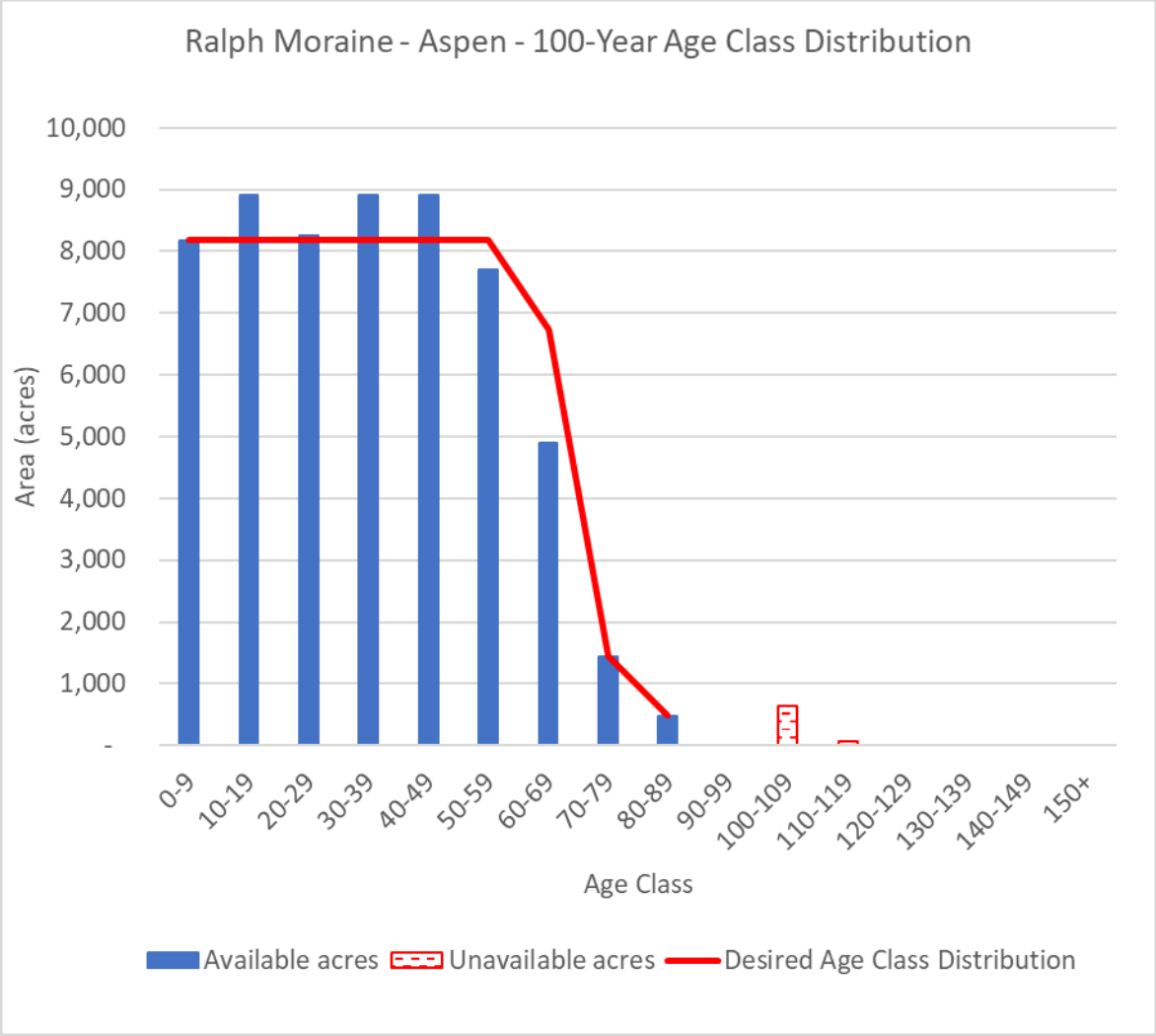


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 8,130 acres of projected clearcut harvest in the aspen cover type. It is expected that about 44 acres of aspen will be converted from other cover types. These total to an expected 8,154 acres of regeneration over the next 10 years.

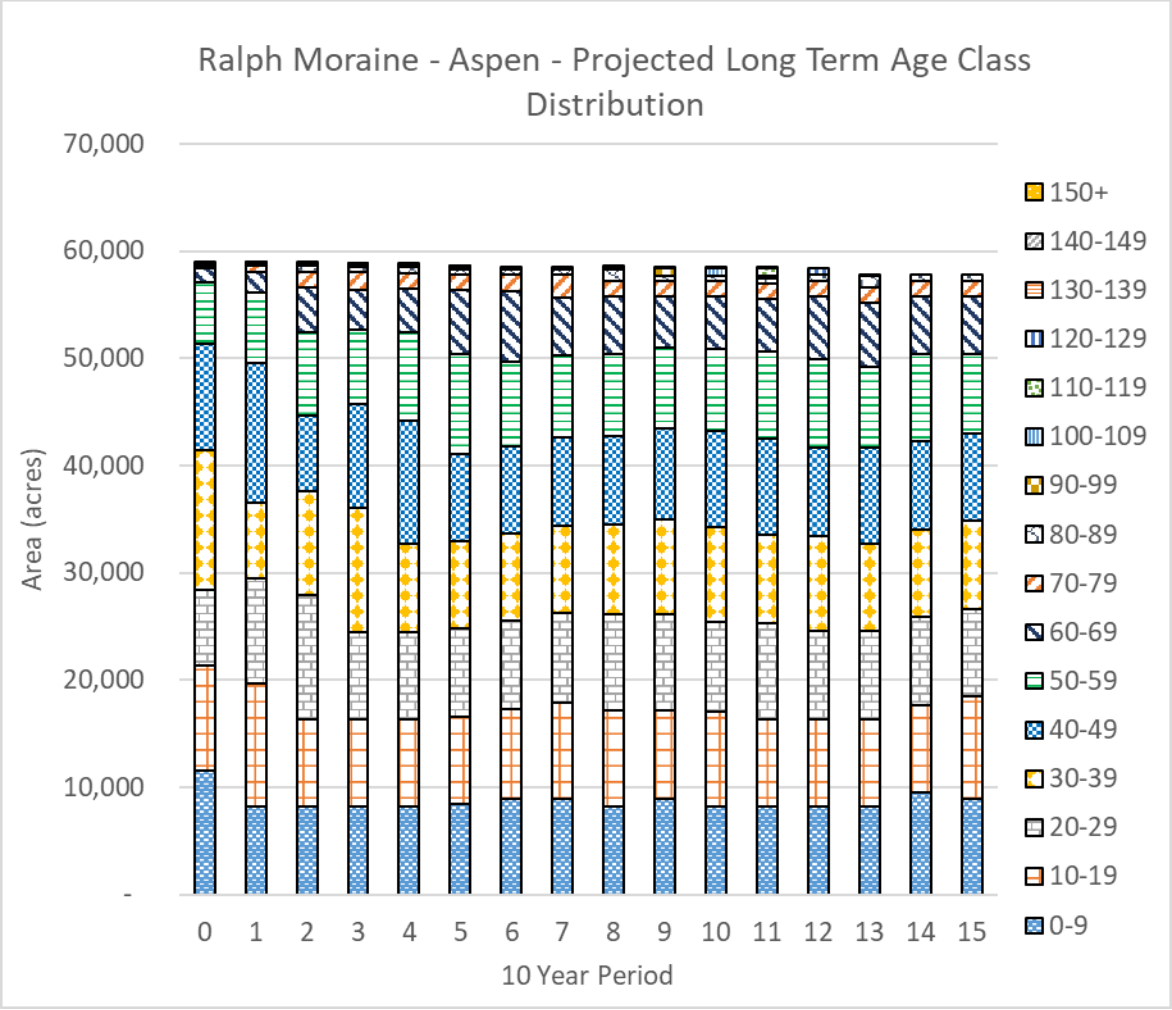


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current Condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 109 years old in the Ralph Moraine management area (Figure 8). The past management regime has been primarily single-tree selection which allows stand age to increase overtime. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10).

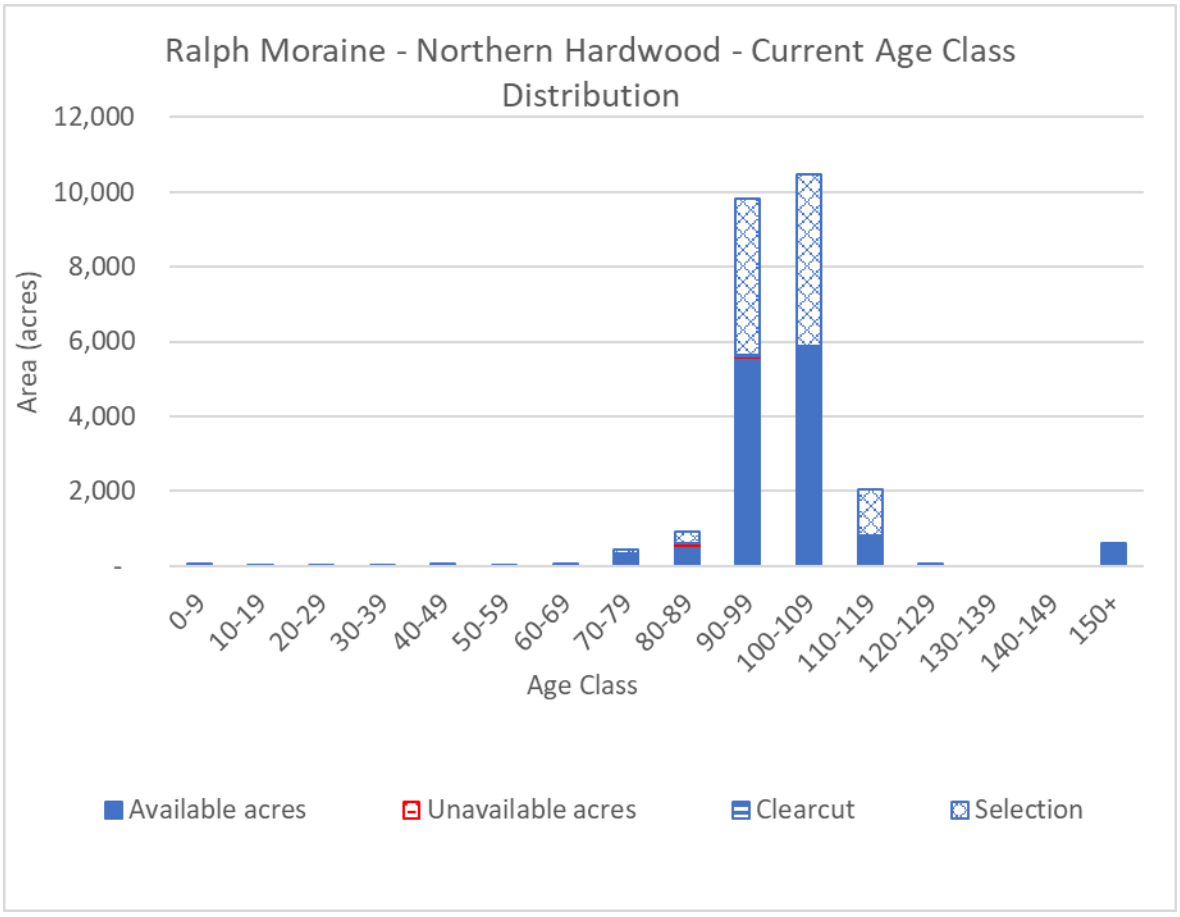


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the Ralph Moraine management area.

The area of northern hardwood is fairly well distributed in the ideal basal area classes for optimal growing conditions in the Ralph Moraine management area (Figure 9). A portion of this cover type meets the habitat requirements for blackburnian warbler, wood thrush, marten and white-tailed deer (Table 7).

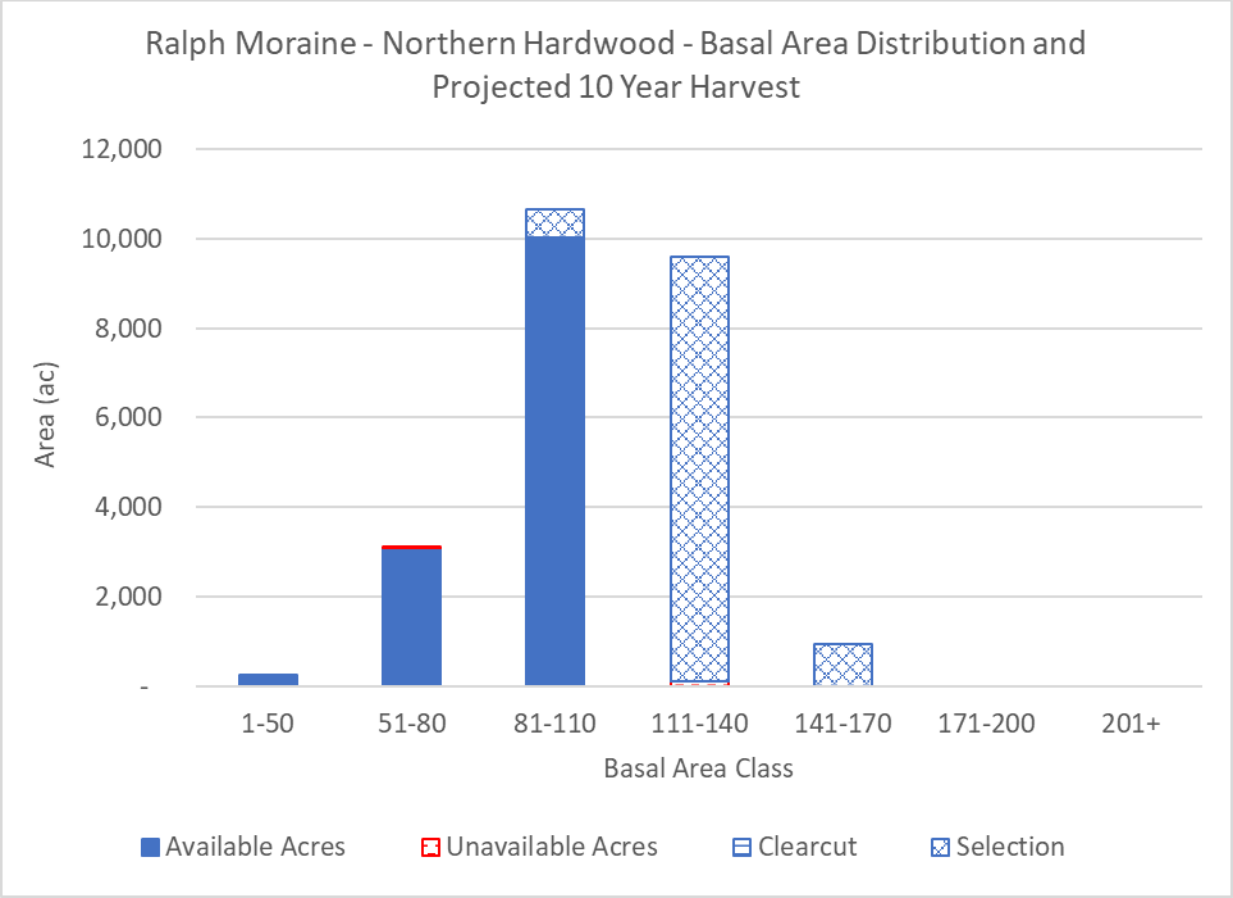


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 10. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Potential Habitat Acres- Available	Northern Hardwood Potential Habitat Acres- Unavailable
Blackburnian warbler	Age category: 80+ Size category: Sawlog Basal area: 81+	20,664	104
Wood thrush	Age category: 40+ Size category: sawlog Basal Area: 81+	21,107	104
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	20,664	104
White-tailed deer	All ages and size classes	24,568	--

Desired future condition

The projected long-term cover type trend for northern hardwood is somewhat stable. There are 8 acres transitioning to this cover type in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupying the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an un-even aged silvicultural regime is dependent on the successful establishment of northern hardwood species as well as the recruitment of those seedlings and saplings into the pole and saw log classes. Northern hardwood in the Ralph Moraine management area is challenged in regeneration and recruitment due to cervid herbivory and poor site conditions in some of the stands.

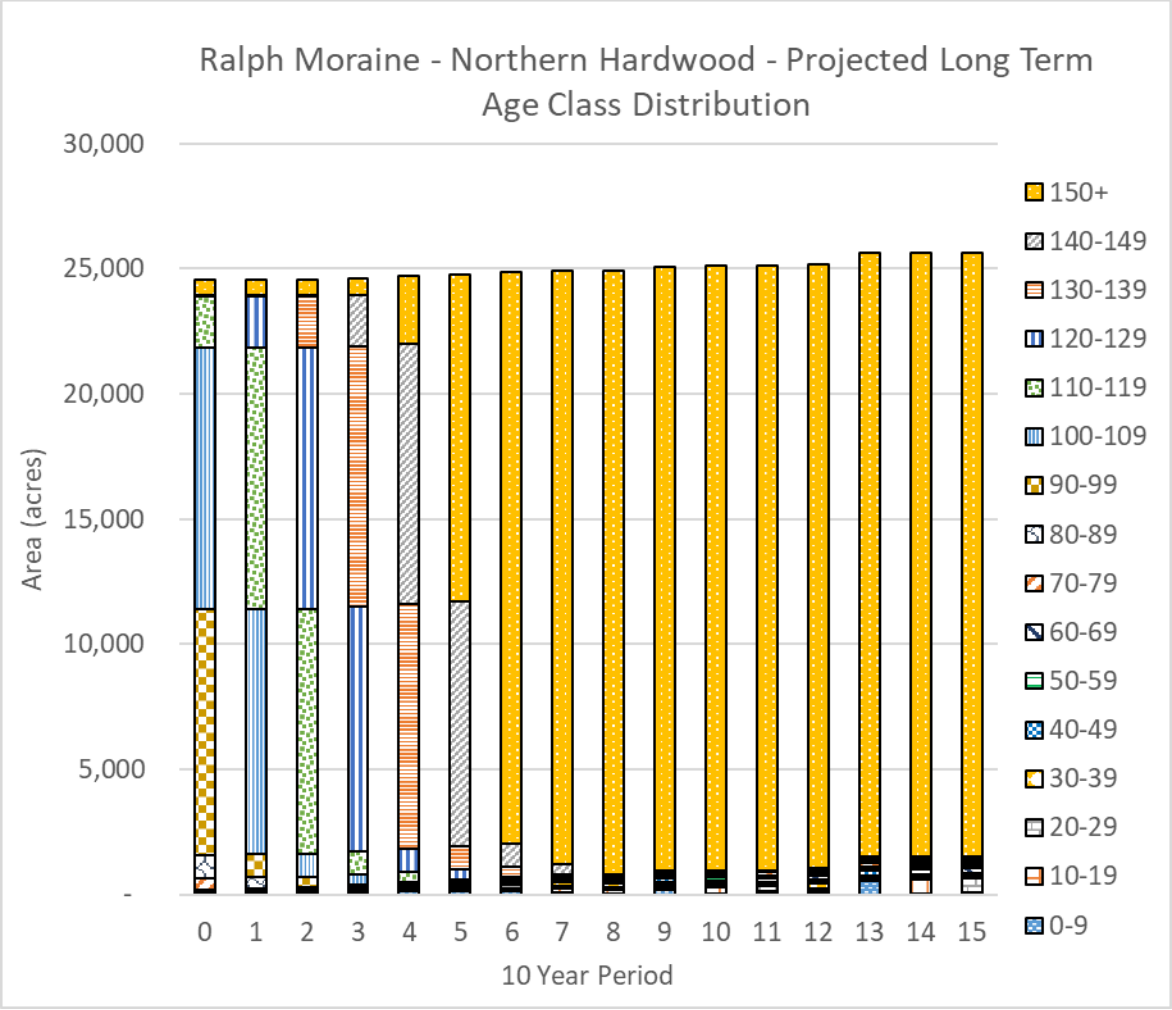


Figure 10. Projected age class distribution over 15. 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 11,017 acres. About 51 acres will be managed under an even-aged system, with some of those acres harvested through a clearcut or shelterwood method to improve stand quality (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed-canopy landscape condition.

Cedar

Current condition

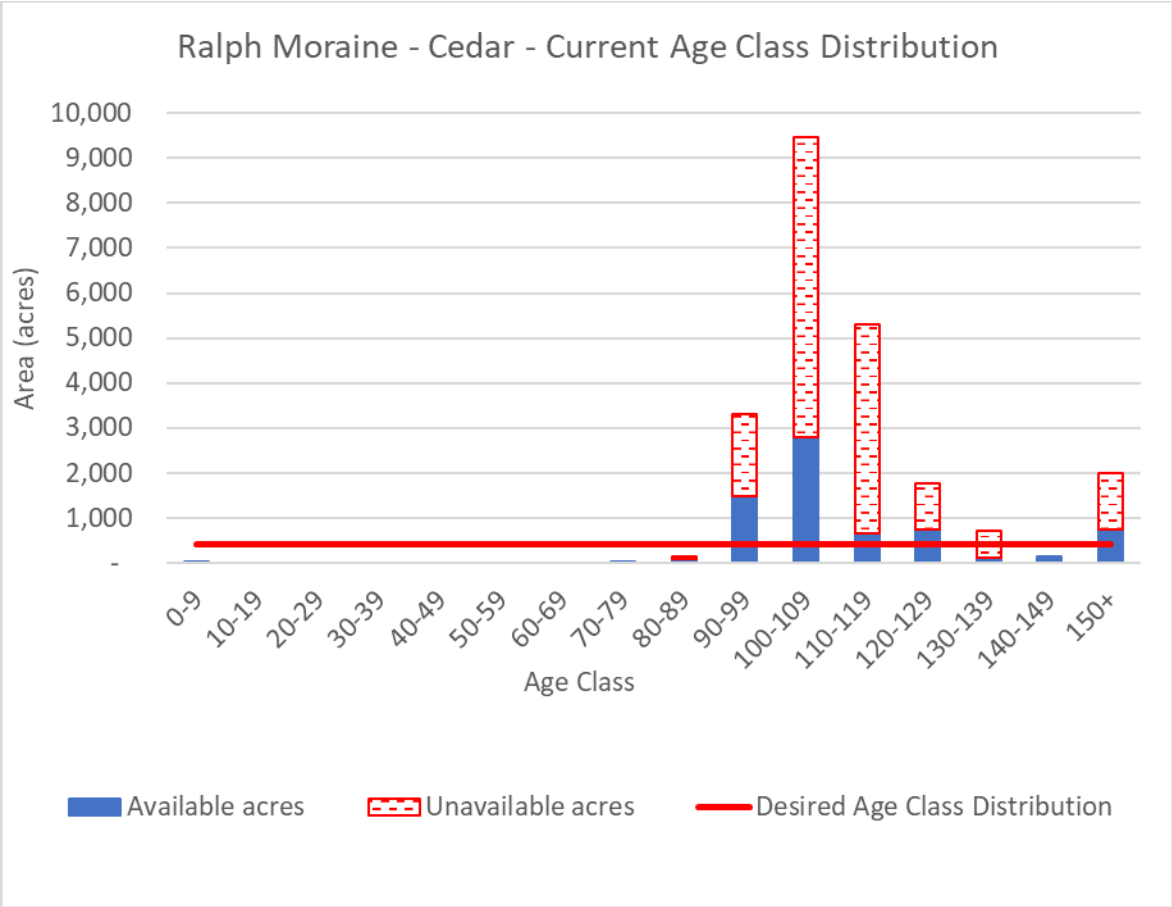


Figure 11. Current age class distribution, the desired age class distribution, and the projected harvests in the cedar cover type over the 10-year planning period.

The current age class distribution shows a classic bell curve of an unmanaged even-aged stand with a surplus of acres in the 100-109-year-old age classes. The younger age classes have few to no acres. The reasons for this are not well understood, but many factors contribute to the lack of regeneration of the cover type. These include but are not limited to cervid herbivory, suppression of fire, and the relatively young age of the stands. A portion of this cover type meets the habitat requirements of snowshoe hare, marten and white-tailed deer (Table 11).

Table 11. Featured species with cedar as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat - Cedar	Cedar Habitat Acres - Available	Cedar Habitat Acres - Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	20	0
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	6,494	15,652
White-tailed deer	All ages and size classes	--	22,872

Desired future condition

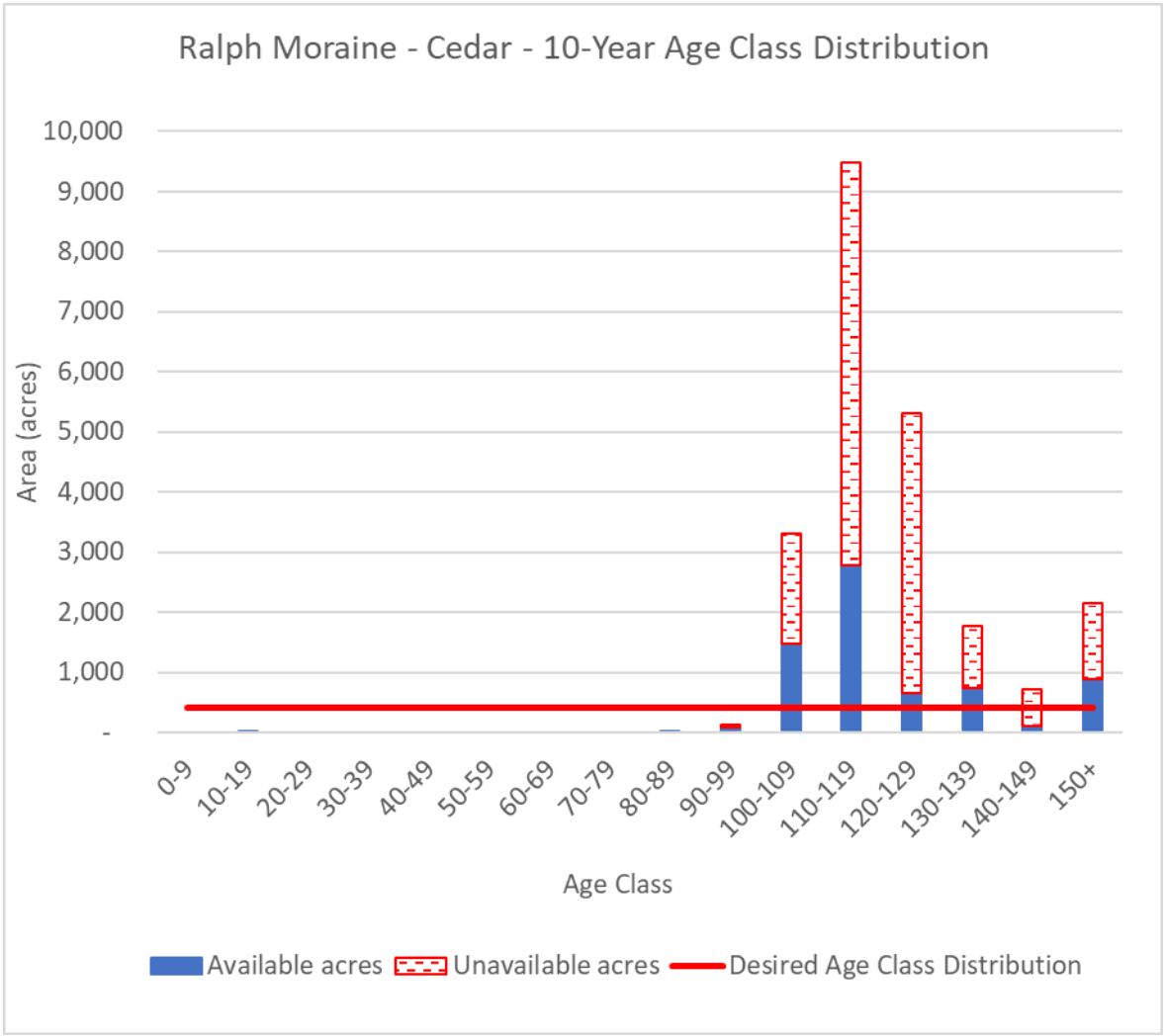


Figure 12. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of no acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of cedar will take many decades in this management area.



Figure 13. Projected mid-term age class distribution at the end of the fifth planning period compared to long-term desired age class distribution.

The mid-term age class distribution shows the population of cedar acres aging with only a few acres regenerating (Figure 13).



Figure 14. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 14) will concentrate the manageable acres of cedar in productive growing conditions while providing some forest products and a variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are no acres of projected harvests in the cedar cover type. It is expected some cedar will be cut in ongoing research and field trials to learn how to best regenerate this species.

Deer wintering complexes (DWC) greater than 15,000 acres are modeled as Special Analysis Units and information on them can be found in Section 5 of the plan. In DWCs less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.



Figure 15. Projected age class distribution over fifteen 10-year planning periods.

Conservation area network

High conservation value areas

There are no high conservation value areas in this management area.

Ecological reference areas

Ecological reference areas (ERAs) are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 35. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 36. Ecological reference areas within the management area.

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Dry-mesic northern forest	B	G4	S3	1
Existing ERA	Poor conifer swamp	AB	G4	S4	1
Grand Total					**2**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 14) may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 15) generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 14. Reviewable special conservation areas within the Ralph Moraine management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**72**
6 Mile Lake Boating Access Site	1

Reviewable Special Conservation Area Type and Name	Acres
Chandler Brook lowlands	50
Gene's Pond Campground	21
Habitat Area or Habitat Corridor	**472**
Chandler Brook island	8
Compartment 61 deer yarding area	29
Compartment 61 deer yarding area	203
Hemlock/white pine island	6
Landon fir	13
Landon Lake fir	5
Landon Upland	10
W Branch travel corridor.	32
W. Bob's Lake	166
Possible Type 1 or Type 2 Old Growth	**1,187**
--	1,187
Spring, Wetlands, or Riparian Areas	**126**
Landon Lake	14
Landon/Chandler lowland	112
Grand Total	**1,857**

Table 15. Static special conservation areas within the Ralph Moraine management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Deer Winter Range - Obligate and Conditional		**4,662**
Conditional		4,662
Designated Trout and Cold Water Stream Buffer		**2,979**
		1,033
Big Brook		103
Bryan Creek		99
Cady Creek		56
Camp Eleven Creek		4
East Branch Sturgeon River		152
Flat Rock Creek		62
Ford River		91
Hayes Creek		39
Little Brook		80
McGregor Creek		179
North Branch Ford River		291
North Branch Sturgeon River		116
Poplar Creek		25
Schwartz Creek		128
Sixmile Creek		92

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Skunk Creek		105
Turner Creek		79
Twomile Creek		95
Weber Creek		31
West Branch Sturgeon River		110
Wild West Creek		9
Designated Trout and Coldwater Streams	**111.1**	
	37.6	
Big Brook	3.0	
Bryan Creek	3.8	
Cady Creek	2.1	
Camp Eleven Creek	0.2	
East Branch Sturgeon River	5.6	
Flat Rock Creek	2.3	
Ford River	3.3	
Hayes Creek	1.5	
Little Brook	3.8	
McGregor Creek	6.6	
North Branch Ford River	11.0	
North Branch Sturgeon River	4.4	
Poplar Creek	1.0	
Schwartz Creek	4.7	
Sixmile Creek	3.4	
Skunk Creek	4.0	
Turner Creek	2.9	
Twomile Creek	4.1	
Weber Creek	1.2	
West Branch Sturgeon River	4.2	
Wild West Creek	0.3	
Mussel Stream Group 2 - State threatened or endangered	**4.0**	
Peronto Lake-East Branch Sturgeon River	3.3	
Skunk Creek-East Branch Sturgeon River	0.7	
Natural Beauty Roads	**2.4**	
C C Rd	1.3	
Camp Three Rd	1.1	
Wood Turtle Stream 100ft Buffer		**89**
Ford River		7
North Branch Ford River		29
West Branch Escanaba River		53
Wood Turtle Stream 660ft Buffer		**561**
Ford River		58

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
North Branch Ford River		184
West Branch Escanaba River		319
Grand Total	**117.4**	**8,290**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 17 and 18) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 37. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 17. Rare animal species occurrence within the Ralph Moraine management area

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alces alces*	Moose	SC	--	--
Animal	Bombus borealis	Northern amber bumble bee	SC	--	3
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	2
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Gavia immer	Common loon	T	--	2
Animal	Glyptemys insculpta	Wood turtle	T	--	2
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	4
Animal	Lasmigona compressa	Creek heelsplitter	SC	--	1
Animal	Melanoplus walshii	Walsh's short-winged grasshopper	SC	--	1
Animal	Necturus maculosus	Mudpuppy	SC	--	1
Animal	Pandion haliaetus	Osprey	SC	--	3

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Picoides arcticus	Black-backed woodpecker	SC	--	1
Total	--	--	--	--	**20**

**Occurrence information provided by field staff.*

Table 18. Other rare occurrence within the Ralph Moraine management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	3
Total	--	--	--	--	**3**

Non-ERA natural communities

Natural communities identified with an element occurrence in the MNFI Biotics database, but do not have an additional ecological reference area (ERA) designation, are recognized and managed accordingly. There are no non-ERA natural communities in the management area.

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 19) and diseases (Table 20) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 19. Defoliating insects of concern in the Ralph Moraine management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 20. Maladies of concern in the Ralph Moraine management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak Wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

A total of 161 miles of streams and rivers are found in the management area (Table 21). Streams/rivers classified as cold types comprise approximately 57 percent of the riverine mileage.

Table 21. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	25
Cold small river	0
Cold transitional stream	66
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	29
Warm transitional small river	37
Warm transitional large river	0
Warm stream	4
Warm small river	0
Warm large river	0

Lacustrine habitat

A total of 17 lakes and ponds of at least 1 surface acre are found in the management area (Table 22).

Table 22. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	15
100-499	0
500+	2

Wetlands

A total of 58,691 acres of wetlands lie in the management area (Table 23). Forested wetlands comprise approximately 97 percent of wetland types found in the management area.

Table 23. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,545
Forested	57,037
Riverine	109

Vernal pools and seeps

A total of 1,137 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub, cedar and aspen are the predominant cove types in a 100-meter riparian zone located next to streams/rivers in the management area (Table 24).

Table 24. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	5,826
Cedar	4,032
Aspen	3,043
Lowland conifers	1,521
Lowland spruce/fir	855
Lowland aspen/balsam poplar	485
Northern hardwood	463
Lowland mixed forest	398
Lowland deciduous	334
Upland spruce/fir	286

Watershed vegetation cover

The management area includes portions of important watersheds of the Ford River and Sturgeon River (Tables 25and 26). Aspen, cedar, and northern hardwood are major cover types.

Table 25. Largest vegetative cover types (i.e., top five) and area of the Ford River watershed located within the management area.

Cover Type	Acres
Aspen	24,538
Cedar	9,016
Northern hardwood	8,076
Lowland shrub	3,541
Lowland conifer	3,321

Table 26. Largest vegetative cover types (i.e., top 5) and area of the Sturgeon River watershed located within the management area.

Cover Type	Acres
Aspen	16,067
Northern hardwood	8,482

Cover Type	Acres
Cedar	6,099
Lowland shrub	2,384
Lowland conifer	1,312

Recreation

The Ralph Moraine management area has good access for recreation and management. One off-road vehicle route and two major snowmobile routes pass through this area: UP-32 runs east-west in the north of the area and UP-5 runs north-south in the west. There are no designated non-motorized trails except for hunter walking trails within the two Grouse Enhanced Management Sites.

One state forest campground (rustic) is located within the management area on Gene's Pond flooding, with water access available.

Table 27. Designated recreation trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	ORV (all types)	5.9
Motorized recreation trails	Snowmobile	47.1
Non-motorized recreation trails	Hiking	0
Non-motorized recreation trails	Equestrian	0
Non-motorized recreation trails	Biking	0
Non-motorized recreation trails	Hunter walking trails	23.4
Total	--	**76.3**

Note: Trail use types may overlap.

Table 28. State forest campgrounds.

Name	Number of Sites
Gene's Pond campground	14

The management area contains several floodings formerly designated as wildlife management areas. In 2020 these were removed as uniquely named focus areas for the DNR's Wildlife Division and are managed as part of state forest co-management activities.

The Bill Rollo Memorial and Ralph Grouse Enhanced Management Sites are easily accessible from county roads, providing hunter walking trails through aspen stands and beautiful scenery for premiere grouse and woodcock hunting opportunities.

There are six boating access sites in this management area, providing access to the Escanaba River, Gene's Pond and several small inland lakes.

Table 29. Areas Managed for Hunting.

Type	Name	Number of Acres

State Wildlife Management Areas	Gene's Pond Flooding SWMA	3,350.4
GEMS	Bill Rollo Memorial GEMS Ralph GEMS	6,833.1 5,272.9
Total	--	**18,048.6**

Table 30. Boating Access Sites.

Name	Waterbody
Gene's Pond campground	Gene's Pond
Lower Dam campground	West Branch Escanaba River
Pickerel Lake	Pickerel Lake
Six Mile Lake	Six Mile Lake
Solberg Lake	Solberg Lake
West Branch campground	West Branch Escanaba River

Suomi Till and Outwash Plain

State Forest Area: 142,739 acres	Location: Portions of North Dickinson and South Western Marquette Counties	Population Centers: Gwinn, Palmer, Witch Lake
Sub-Section: Suomi Till and Outwash Plain	Landforms: Ice-stagnation features, end moraines, ground moraine, and outwash	Landcover: Forested: 124,579 acres Non-forested: 18,160 acres

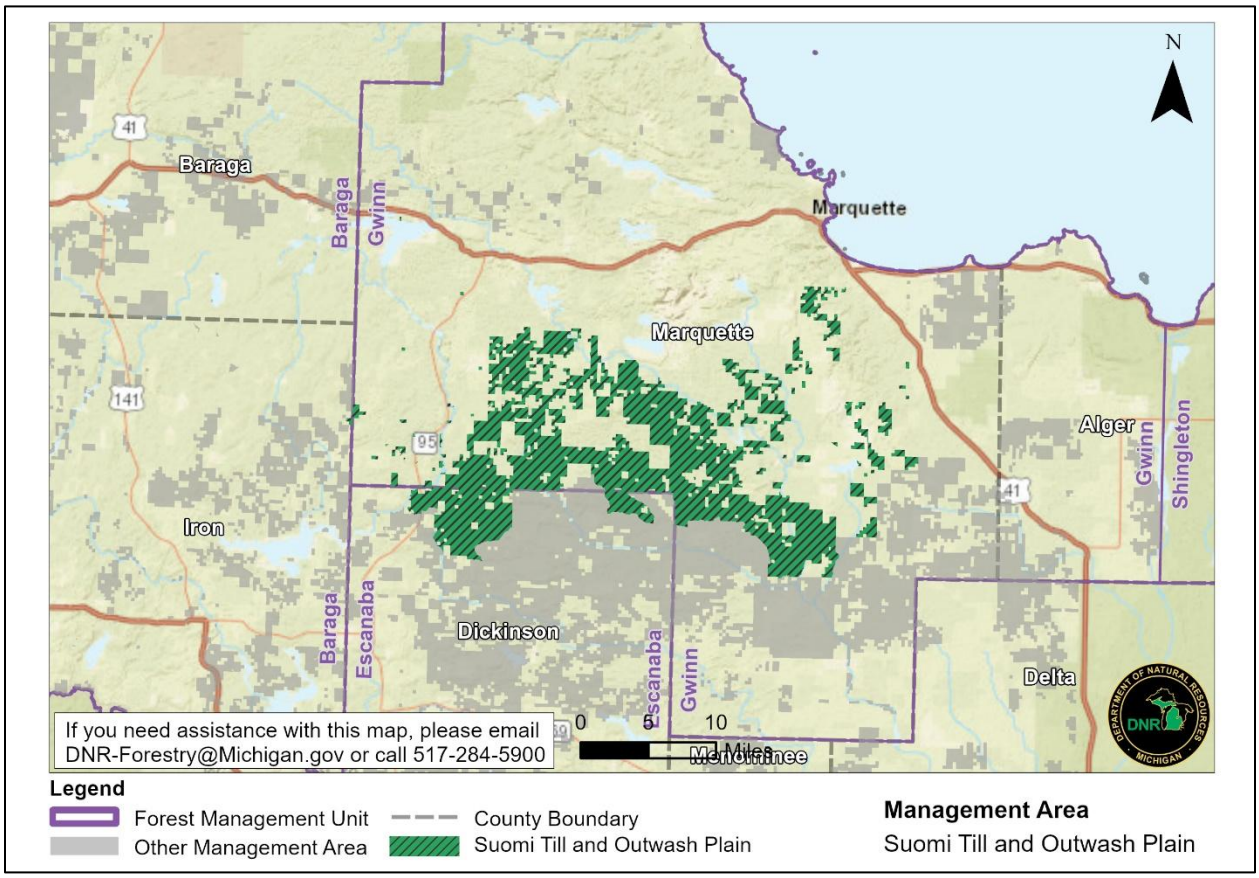


Figure 1. Map of the Suomi Till and Outwash Plain management area.

Forested landscape

Current and projected future condition

The Suomi Till and Outwash Plain management area is dominated by shade-intolerant cover types in the young and mid-aged categories. Tolerant cover types dominate the older age categories, while the unavailable lowland acres are more prevalent in the old age category.

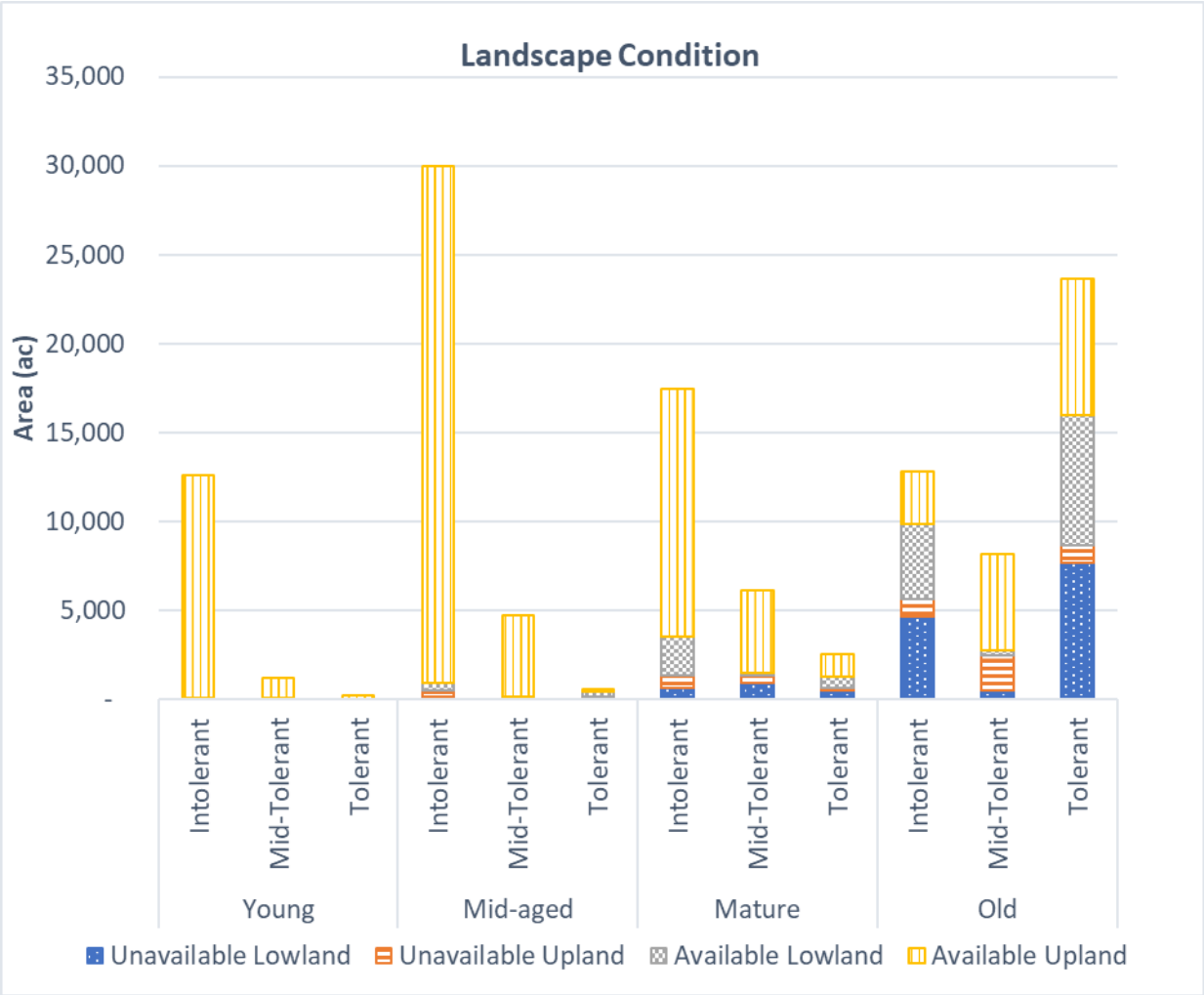


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the management area landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in Aspen and Jack Pine	14,008
Mature forest	Acres of 80+ year stands across cover types	44,618
Mature forest	Acres of 120+ year stands across cover types	18,816
Mesic conifer cover types	Acres of mesic conifer cover types	8,836
Mesic conifers in other cover types	Average canopy occupancy	41%
Mast – oak cover types	Acres of Oak cover types	2,313
Mast tree species in other cover types	Acres of Total Canopy Occupancy of Mast Tree Acres (Trace-100%)	32,993
Big trees	Acres of Total Canopy Stand Occupancy of Species in Sawlog or Greater Size Class	58,127
Non-forested openings	Acres of Total herbaceous open land, upland shrub and cropland	4,092
Landscape forest matrix	Percent Deciduous Forest	48%
Landscape forest matrix	Percent Coniferous Forest	47%

The Suomi Till and Outwash Plain management area has the following Special Analysis Units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the MA, ensuring they are met. Please see Section 5 for a detailed description of the management direction and harvest goals for each of these SAUs.

- Deer Wintering Complex (DWC): Iron-Floodwood
- Grouse Enhanced Management (GEM): Bill Rollo Memorial GEMS

The Suomi Till and Outwash Plain management area is dominated by forested cover types with 87 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 65 percent of the management area and comprised mostly of aspen. The upland coniferous portion is 21 percent of the management area and is comprised mostly of planted and natural jack pine. Cedar is the most common lowland conifer representing 7 percent of the landscape. Lowland shrub is the most common non-forested cover type, representing 4 percent of the landscape.

Table 2. Landscape conditions and distribution of cover types in the Suomi Till and Outwash Plain management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	45,022	58,575	93,205	124,579
			Northern hardwood	8,222			
			Black-red hybrid oak	169			
			Northern red oak	1,588			
			Oak mix	661			
			Mixed upland deciduous	2,914			
		Mixed	Upland mixed forest	5,136	5,136		
		Coniferous	Planted red pine	5,823	29,494		
			Planted jack pine	8,173			
			Planted white pine	9			
			Planted mixed pine	460			
			Natural red pine	1,001			
			Natural jack pine	5,195			
			Natural white pine	1,887			
			Natural mixed pines	2,418			
			Upland spruce/fir	1,519			
			Upland conifers	2,953			
			Hemlock	56			
	Lowland	Deciduous	Lowland aspen/balsam poplar	288	768	31,374	
			Lowland deciduous	480			
		Mixed	Lowland mixed forest	1,756	1,756		
		Coniferous	Cedar	10,102	28,851		
			Lowland conifers	7,183			
			Lowland spruce/fir	9,123			
			Tamarack	2,443			
Nonforested	Upland	N/A	Herbaceous openland	1,593	N/A	5,117	18,160
			Upland shrub	2,402			
			Low density trees	665			
			Bare/sparsely vegetated	38			
			Cropland	97			
			Urban	323			
	Lowland	N/A	Lowland shrub	6,093	N/A	13,042	
			Marsh	544			
			Bog	2,481			
			Treed bog	2,900			
			Water	1,024			
						Grand Total:	**142,739**

There are 103,630 acres (72.7 percent of the total management area and 83.3 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Suomi Till and Outwash Plain management area (Table 3). Of that, more than 35 percent is in the aspen cover type, 7 percent is in planted jack pine, 6 percent in northern hardwood, and 5 percent in planted red pine. The remaining 19 cover types represent about 19 percent of the forested and available land in the management area.

Table 3. Landscape conditions and cover type composition of the Suomi Till and Outwash Plain management area.

Forested Cover Type	Available Acres	Available Percent	Unavailable Acres	Unavailable Percent	Total Acres	Total Percent
Aspen	43,895	35.2%	1,127	0.9%	**45,022**	**36.1%**
Cedar	5,101	4.1%	5,001	4.0%	**10,102**	**8.1%**
Lowland spruce fir	4,955	4.0%	4,168	3.3%	**9,123**	**7.3%**
Northern hardwood	7,348	5.9%	874	0.7%	**8,222**	**6.6%**
Planted jack pine	8,148	6.5%	25	0.0%	**8,173**	**6.6%**
Lowland conifers	3,934	3.2%	3,249	2.6%	**7,183**	**5.8%**
Planted red pine	5,785	4.6%	38	0.0%	**5,823**	**4.7%**
Natural jack pine	4,859	3.9%	336	0.3%	**5,195**	**4.2%**
Upland mixed forest	4,632	3.7%	504	0.4%	**5,136**	**4.1%**
Upland conifers	2,394	1.9%	559	0.4%	**2,953**	**2.4%**
Mixed upland deciduous	2,144	1.7%	770	0.6%	**2,914**	**2.3%**
Tamarack	1,311	1.1%	1,132	0.9%	**2,443**	**2.0%**
Natural mixed pines	1,904	1.5%	515	0.4%	**2,418**	**1.9%**
Natural white pine	1,724	1.4%	163	0.1%	**1,887**	**1.5%**
Lowland mixed forest	451	0.4%	1,305	1.0%	**1,756**	**1.4%**
Northern red oak	1,531	1.2%	57	0.0%	**1,588**	**1.3%**
Upland spruce fir	1,092	0.9%	427	0.3%	**1,519**	**1.2%**
Natural red pine	799	0.6%	203	0.2%	**1,001**	**0.8%**
Oak mix	661	0.5%	0	0.0%	**661**	**0.5%**
Lowland deciduous	290	0.2%	190	0.2%	**480**	**0.4%**
Planted mixed pine	460	0.4%	0	0.0%	**460**	**0.4%**
Lowland aspen balsam poplar	244	0.2%	44	0.0%	**288**	**0.2%**
Black-red hybrid oak	127	0.1%	42	0.0%	**169**	**0.1%**
Hemlock	46	0.0%	10	0.0%	**56**	**0.0%**
Planted white pine	9	0.0%	0	0.0%	**9**	**0.0%**
Total	**103,841**	**83.4%**	**20,739**	**16.6%**	**124,579**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvesting) acres for the Suomi Till and Outwash Plain management area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
BMPs	8,814	42.0%
Unproductive	2,778	13.2%
Deer wintering area	2,562	12.2%
Conservation values	1,943	9.3%
Blocked by obstacle	1,834	8.7%
Too wet	1,382	6.6%
Too steep	824	3.9%
Cannot regenerate	241	1.1%
Long-term retention	237	1.1%
Wildlife concerns	177	0.8%
Other dept./div. Processes	57	0.3%
Denied access	46	0.2%
Recreational/scenic	37	0.2%
Neighbor / interest group	25	0.1%
Other influence zones	15	0.1%
Non-military lease/easement	1	0.0%
Total Unavailable	**20,971**	**100.0%**

Management actions

Each cover type in the Suomi Till and Outwash Plain management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvests levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	**Clearcut**	**Selection**	**Thinning**	**Group Selection**	**Shelterwood**	**Salvage Clearcut**	**Salvage Thinning**	**Grand Total**
Aspen	8,169	-	-	-	-	-	-	8,169
Northern hardwood	45	2,244	-	109	3	-	-	2,400
Lowland spruce/fir	911	-	-	-	-	-	-	911
Upland conifers	593	-	8	-	70	-	-	670
Natural jack pine	516	-	-	-	-	-	-	516
Planted jack pine	498	-	-	-	-	-	-	498
Planted red pine	51	-	370	-	-	-	-	421
Lowland conifers	342	-	-	-	-	-	-	342
Natural white pine	-	-	97	-	68	-	-	165
Mixed upland deciduous	121	14	-	-	21	-	-	155
Tamarack	133	-	-	-	-	-	-	133
Natural mixed pines	-	-	55	-	50	-	-	106
Oak mix	92	-	-	-	-	-	-	92
Upland spruce/fir	79	-	-	-	-	-	-	79
Natural red dine	-	-	29	-	27	-	-	56
Lowland deciduous	26	-	-	-	-	-	-	26
Lowland aspen/balsam poplar	24	-	-	-	-	-	-	24
Upland mixed forest	24	-	-	-	-	-	-	24
Black-red hybrid oak	1	-	-	-	-	-	-	1
Totals	**11,624**	**2,257**	**559**	**109**	**238**	**-**	**-**	**14,788**

These harvests will help establish a desirable amount of regeneration for even-aged cover types over the 10-year period or help to achieve desired basal area distribution among uneven-aged cover types like northern hardwoods. The following sections will provide additional details for each of the significant cover types in the Suomi Till and Outwash Plain management area.

Table 6. Ten-year estimated Harvest Volume by product and species for the Suomi Till and Outwash Plain management area.

10-Year Estimated Harvest Volume Projection **Suomi Till and Outwash Plain Management Area**			
Product	**Species**	**Volume Planned***	**Volume Prepared** ***
Pulpwood (cords)	Mixed aspen	68,551	64,438
	Mixed hardwood	33,596	31,581
	Mixed spruce	21,407	20,122
	Mixed softwood	15,425	14,499
	Jack pine	14,215	13,362
	Red pine	3,779	3,552
	White pine	3,770	3,544
	Mixed oak	1,851	1,740
	Pulpwood Total	**162,594**	**152,838**
Sawtimber (MBF)	Mixed aspen	11,234	10,560
	Sugar maple	7,786	7,318
	Red pine	6,644	6,245
	White pine	6,265	5,889
	Red maple	3,883	3,650
	Red oak	1,345	1,265
	Basswood	727	683
	Mixed oak	447	420
	White oak	389	365
	Sawtimber Total	**38,719**	**36,396**
	Total Sawtimber Harvest Volume in Cords	**82,215**	**77,282**
	Grand Total Harvest Volume in Cords	**244,809**	**230,121**

* Volume estimates based on 100% of the projected harvests for the 10 year planning period.

** Volume estimates based on 94% of the projected harvests for the 10 year planning period accounting for reduction in acres and associated volume once sales are prepared for bid.

There are few cover type transitions projected in the Suomi Till and Outwash Plain management area. The managed area of each cover type is projected to remain relatively stable. The largest decrease forecasted is in the aspen cover type where 1,427 acres are forecasted to convert to other cover types through forest management activities. The largest increase is in planted red pine where 922 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	45,022	43,601	-1,420
Cedar	10,102	10,102	0
Lowland spruce/fir	9,123	8,844	-279
Northern hardwood	8,222	8,230	8
Planted jack pine	8,173	8,325	152
Lowland conifers	7,183	7,273	90
Planted red pine	5,823	6,741	918
Natural jack pine	5,195	5,263	69
Upland mixed forest	5,136	5,757	621
Upland conifers	2,953	2,619	-334
Mixed upland deciduous	2,914	2,895	-19
Tamarack	2,443	2,393	-50
Natural mixed pines	2,418	2,418	0
Natural white pine	1,887	1,940	53
Lowland mixed forest	1,756	2,007	251
Northern red oak	1,588	1,589	1
Upland spruce/fir	1,519	1,463	-56
Natural red pine	1,001	1,001	0
Oak mix	661	661	0
Lowland deciduous	480	471	-9
Planted mixed pine	460	463	4
Lowland aspen/balsam poplar	288	285	-2
Black-red hybrid oak	169	169	0
Hemlock	56	56	0
Planted white pine	9	13	4
Lowland shrub	6,093	6,093	0
Treed bog	2,900	2,900	0
Bog	2,481	2,481	0
Upland shrub	2,402	2,402	0
Herbaceous openland	1,593	1,593	0

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Water	1,024	1,024	0
Low density trees	665	665	0
Marsh	544	544	0
Urban	323	323	0
Cropland	97	97	0
Bare/sparsely vegetated	38	38	0
Total:	**142,739**	**142,739**	**0**

Featured species current and projected habitat acres

A dozen featured species in this management area that span various cover types, age classes, and stand level conditions.

As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years. This is due to the basal area dropping below 81, but because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Two of these species were not included in the SFMP model but are included here to inform management decisions over the decade.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black bear	Mast	11,834	--	--	--
Black-backed woodpecker	Natural D\disturbance	--	--	--	--

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Blackburnian warbler	Northern hardwoods, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, hemlock	10,288	12,992	9,879	14,886
Golden-winged warbler young	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	12,936	13,483	12,608	12,722
Kirtland's warbler	Natural jack pine, planted jack pine (Floodwood Plains, Sand Plains, Voelker Plains)	1,684	--	--	--
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	24,586	27,753	24,524	29,972
Moose	To be determined	--	--	--	--
Red crossbill	Natural red pine, natural white pine, natural mixed pine, planted red pine	1,538	1,256	1,648	2,299
Ruffed grouse	Aspen	12,376	12,726	12,219	12,297
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	20,446	21,825	19,230	19,058

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
White-tailed deer (food)	Northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	66,234	65,653	63,077	63,369
White-tailed deer (shelter)*	Hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	42,534	42,946	45,167	45,104
Wood turtle	Non-forested openings	--	--	--	--

Deer wintering complexes that are greater than 15,000 acres are modeled as special analysis units and information on them can be found in Section 5 of the plan. In complexes less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated wildlife species

Aspen

Current condition

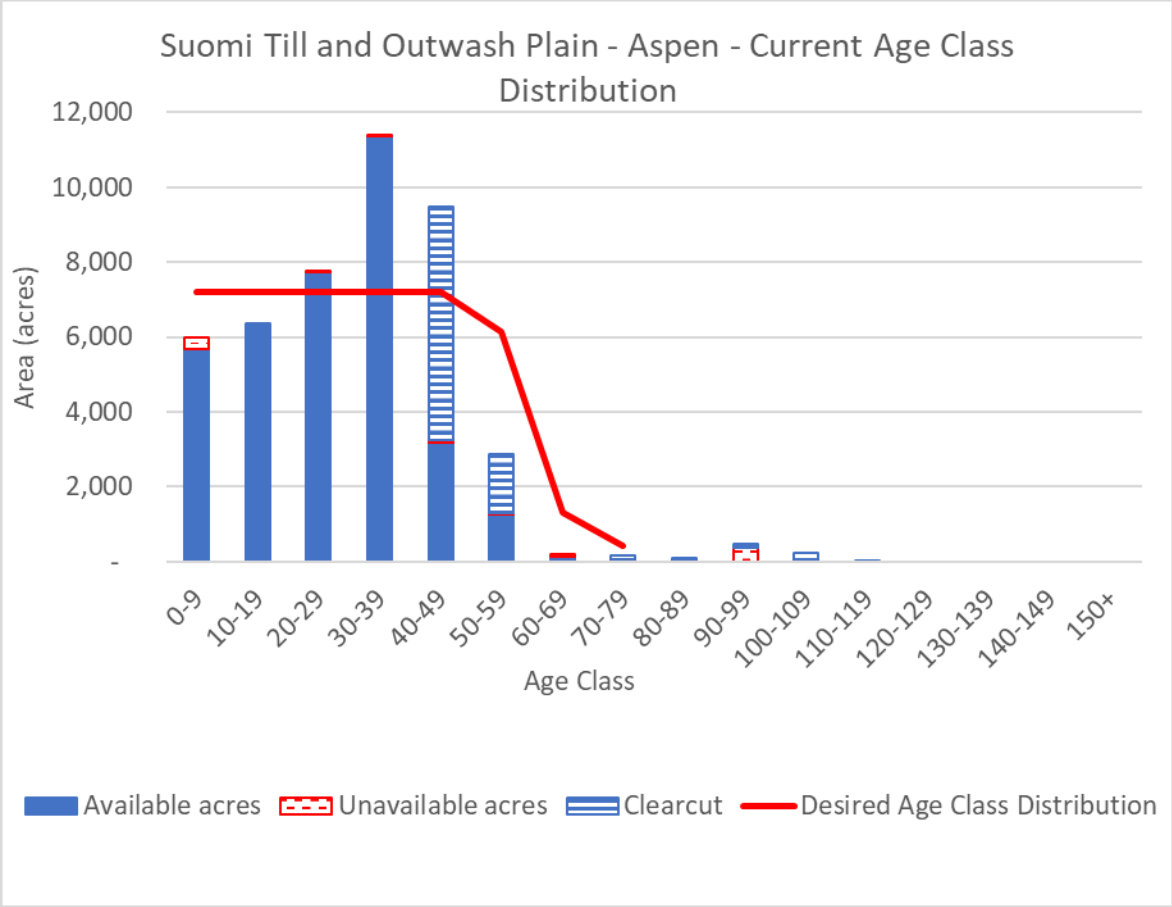


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is unbalanced, with a deficit of acres in the 0-19- and the 50-79-year-old age classes and a surplus of acres in the 20-49-year old age classes. A portion of this cover type meets the habitat requirements for golden-winged warbler, snowshoe hare, ruffed grouse and white-tailed deer.

Table 9. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: sapling	12,036	340

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Ruffed grouse	Age category: 0-19 Size class: sapling	12,036	340
Snowshoe hare	Age category: 0-19 Size class: sapling	12,036	340
White-tailed deer	All ages and size classes	45,022	--

Desired future condition

The desired age class distribution is to have a rotation age of 40 years for approximately 82 percent of the acres, then 14 percent of the acres in an age class tail out to the 50-year age class, 3 percent of the acres in an age class tail out to the 60-year age class, and 1 percent of the acres in an age class tail out to the 70 year age class.

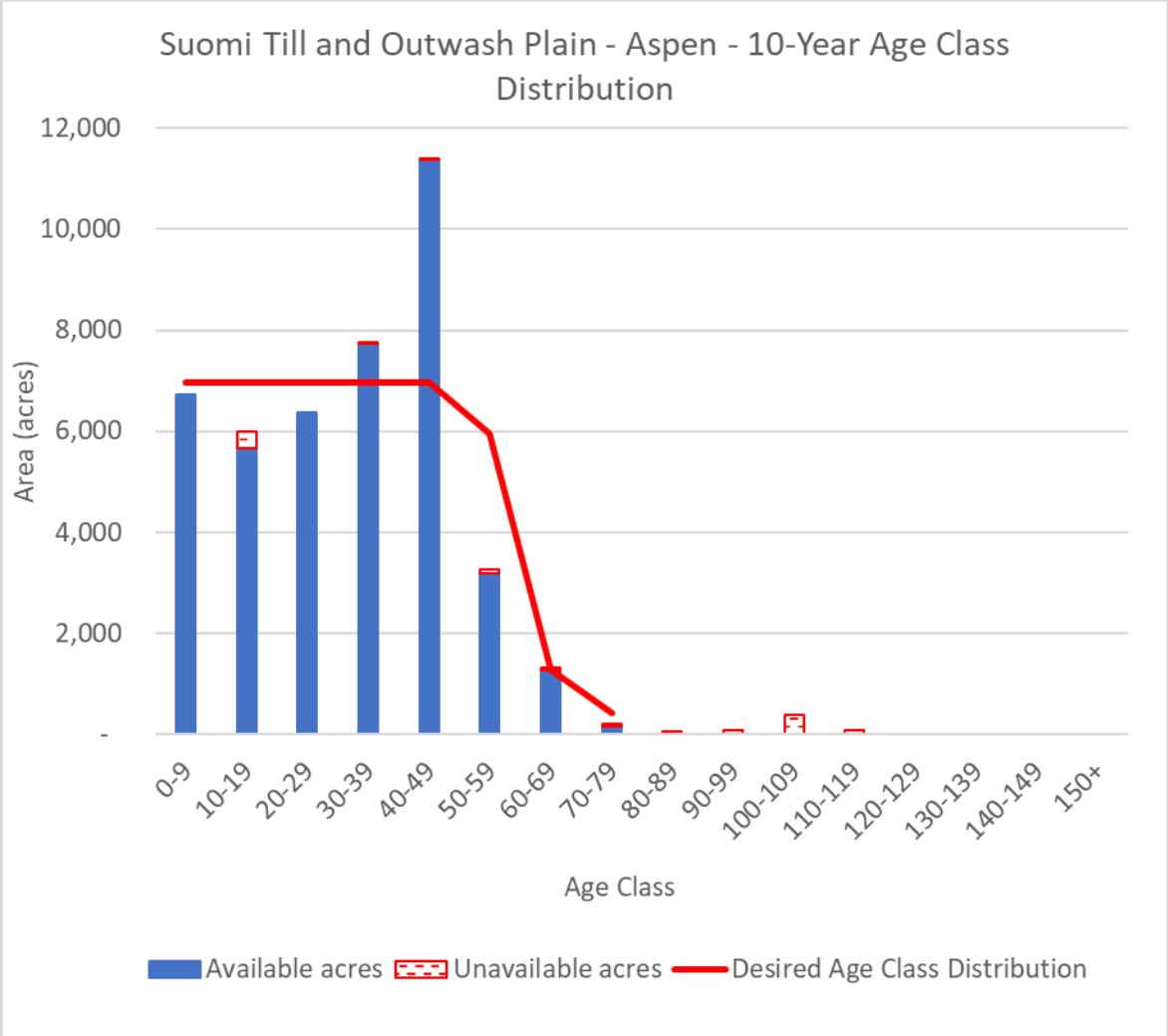


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in establishing 6,721 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take a few decades in this management area.

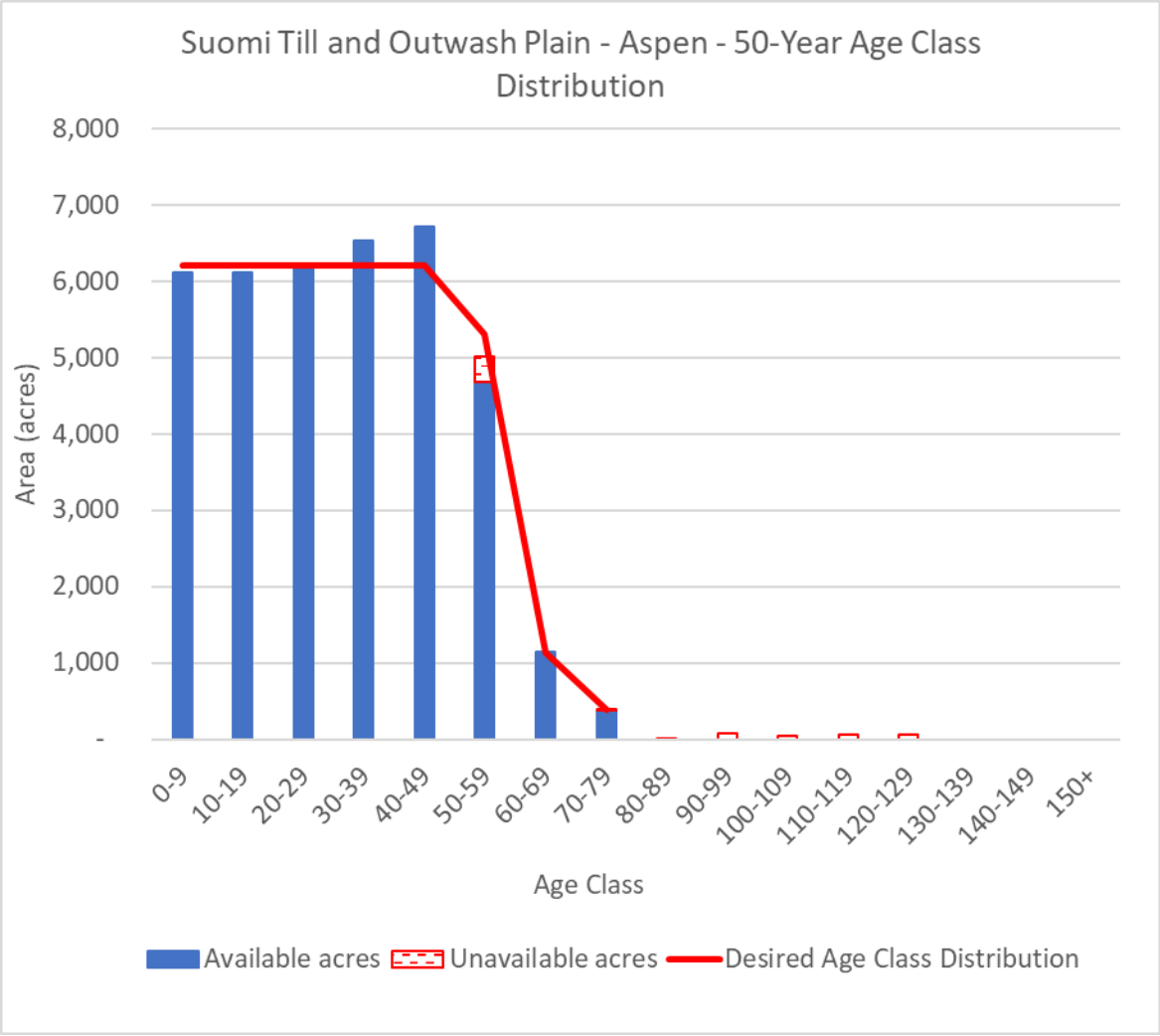


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows aspen acres nearly reaching the desired future condition with few age classes deviating from the target proportions (Figure 5).

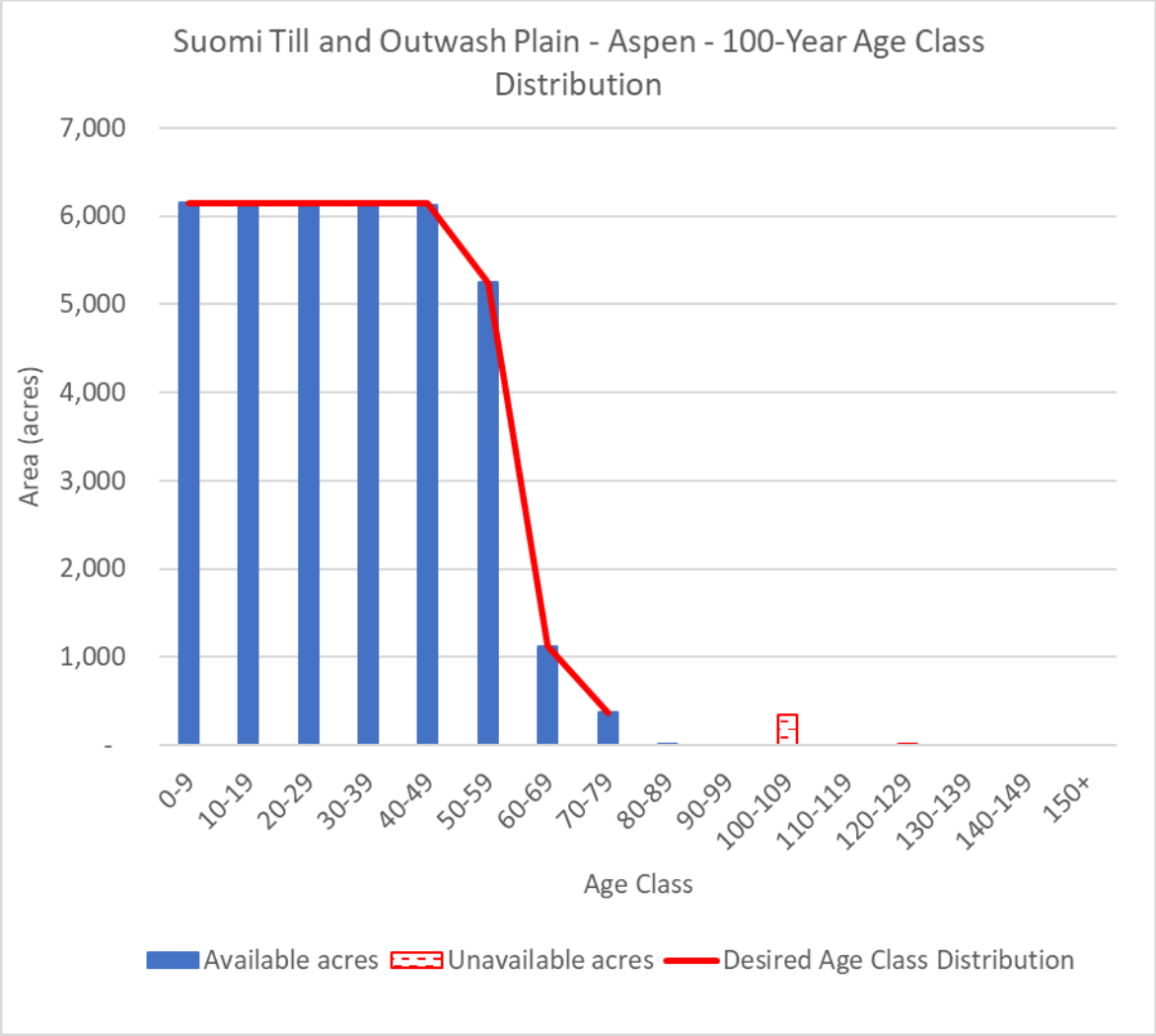


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 8,169 acres of projected clearcut harvest in the aspen cover type. It is expected that about 1,420 acres of aspen will be converted to other cover types. These total to an expected 6,749 acres of regeneration in the aspen cover type over the next 10 years.

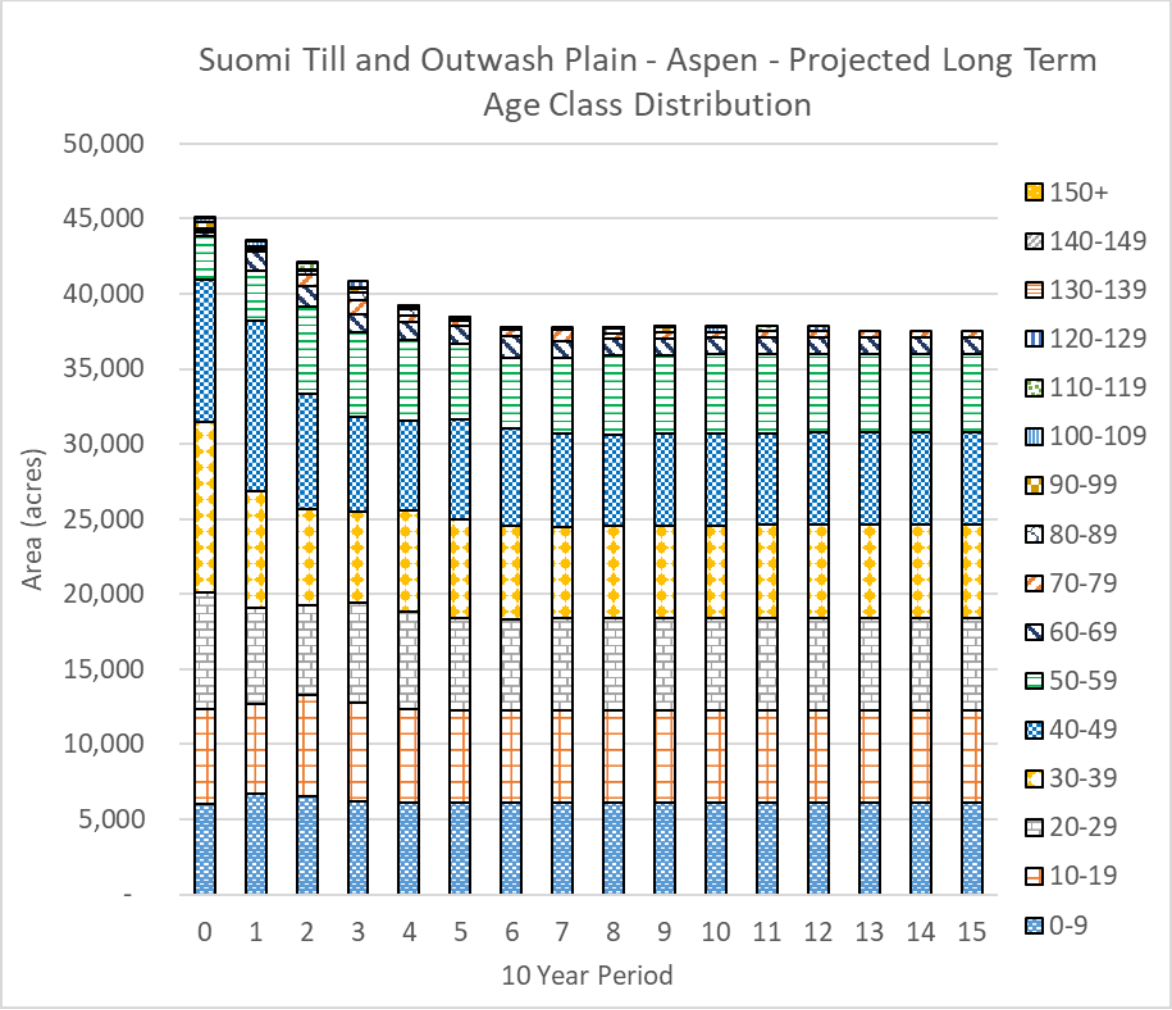


Figure 7. Projected age class distribution over fifteen 10-year planning periods.

Planted jack pine

Current condition

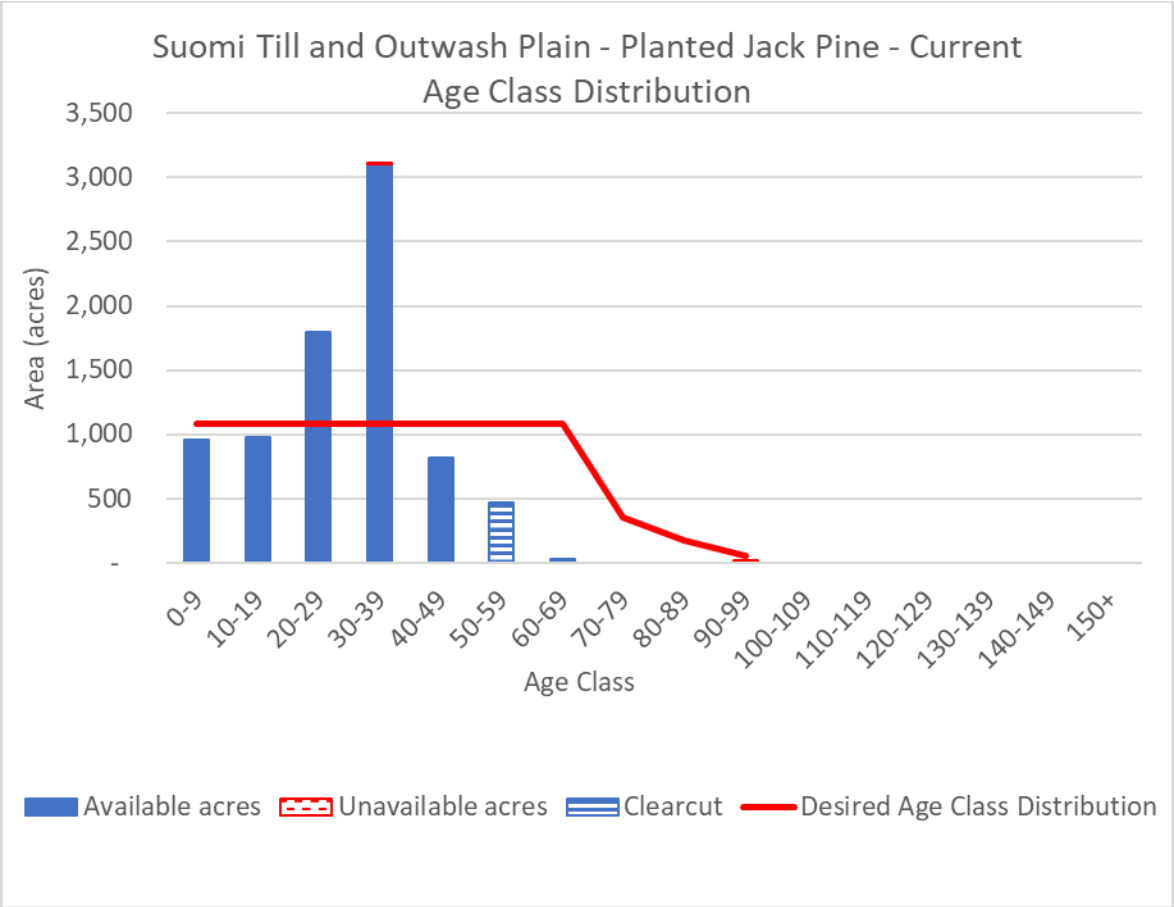


Figure 8. Current age class distribution, the desired age class distribution, and the projected harvests in the planted jack pine cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in the 0-19- and the 40-89year-old age classes, and a surplus of acres in the 20-39-year-old age classes. A portion of this cover type meets the habitat requirements for snowshoe hare and Kirtland's warbler. Kirtland's warbler habitat acres are from Floodwood Plains, Sand Plains, Voelker Plains only and should be harvested in a minimum of 200-acre patches.

Table 7. Featured species with planted jack pine as a selected habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Planted Jackpine	Planted Jack Pine Habitat Acres-Available	Planted Jack Pine Habitat Acres-Unavailable
Kirtland's warbler	Age category: 0-19 Size category: sapling	1,684 (includes natural jack pine)	0

Featured Species	Featured Species Habitat – Planted Jackpine	Planted Jack Pine Habitat Acres-Available	Planted Jack Pine Habitat Acres-Unavailable
Snowshoe hare	Age category: 0-19 Size category: sapling	1,940	0

Desired future condition

The desired age class distribution is to have a rotation age of 60 years with approximately 4 percent of the acres in an age class tail out to the 70-year age class, 2 percent of the acres in an age class tail out to the 80 year age class, and 1 percent of the acres in an age class tail out to the 90-year age class.

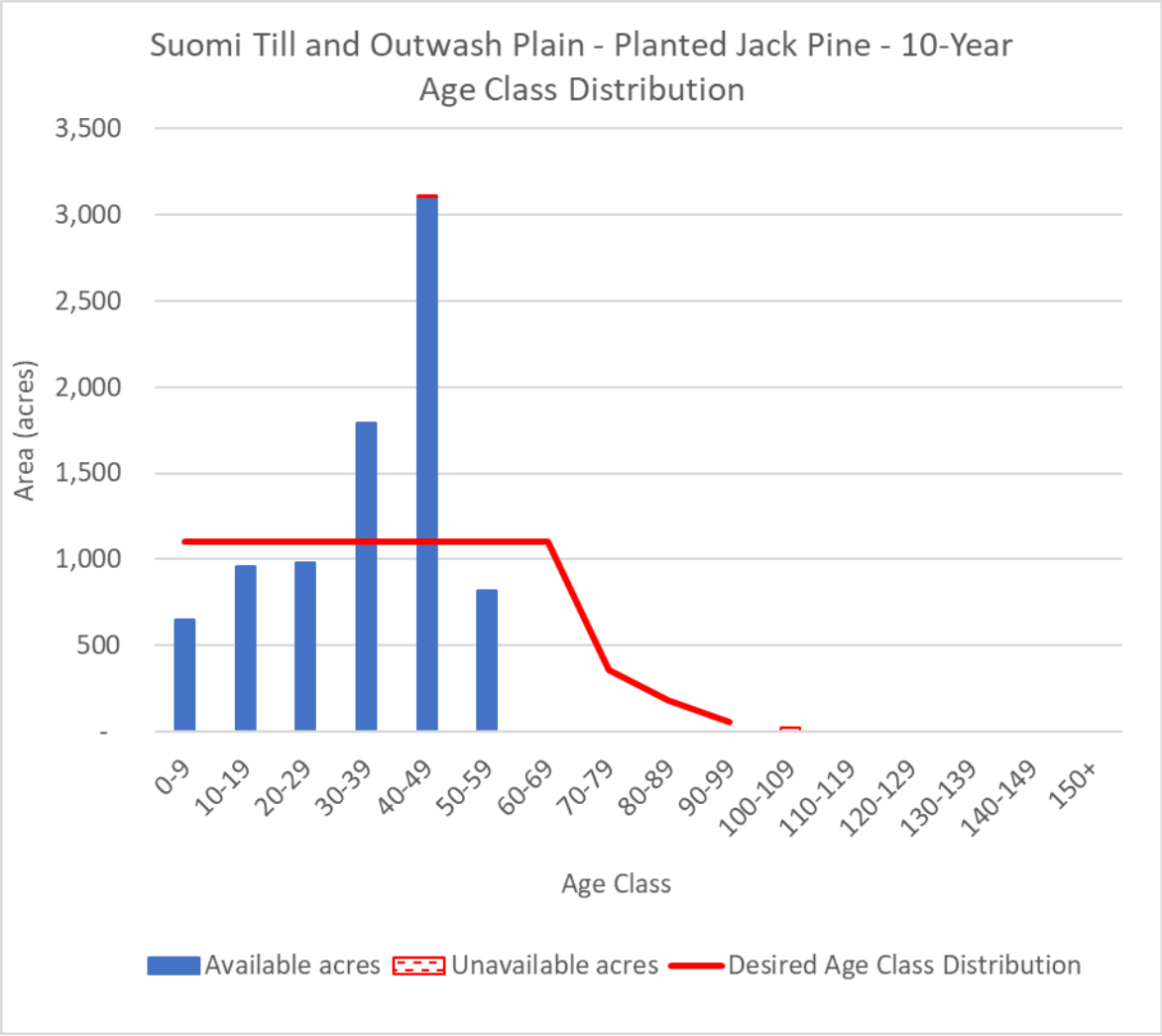


Figure 9. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 650 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of planted jack pine will take many decades in this management area.

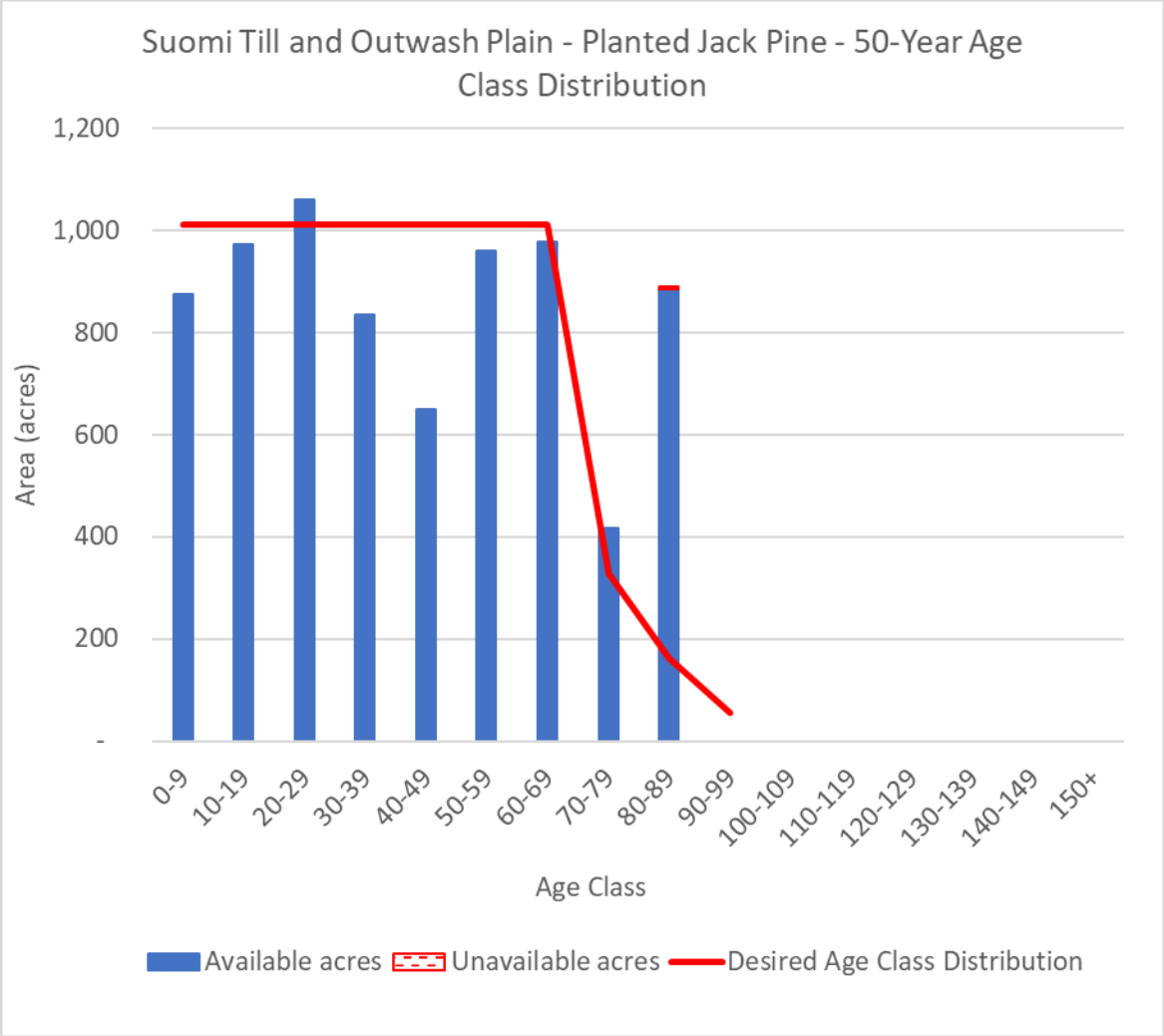


Figure 10. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of planted jack pine acres working toward the desired future condition as the older age classes are treated (Figure 10).

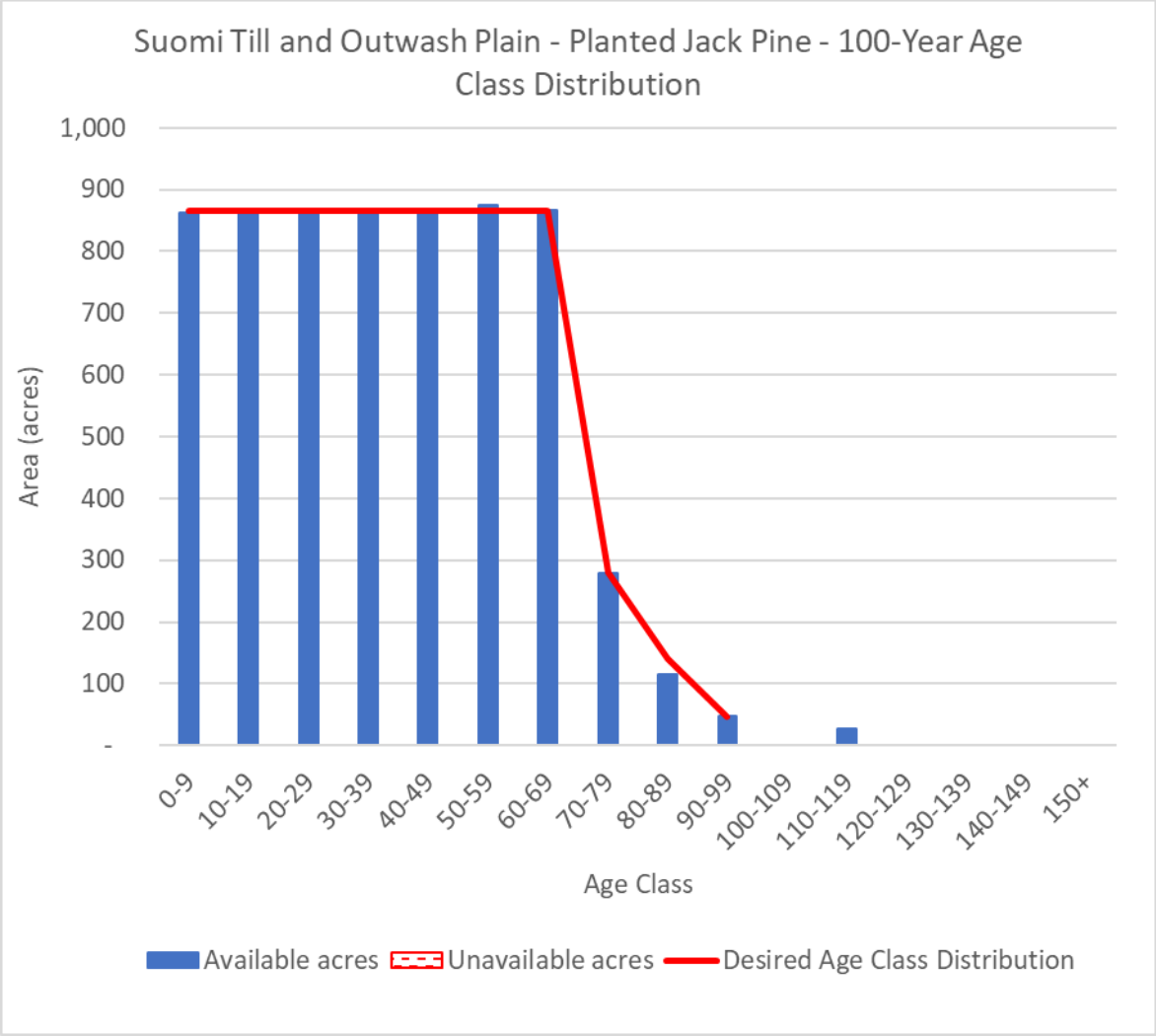


Figure 11. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 11) will concentrate the manageable acres of planted jack pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 498 acres of projected harvest in the planted jack pine cover type. It is expected that about 152 acres of planted jack pine will be converted from other cover types. These total to an expected 650 acres of regeneration in the planted jack pine cover type over the next 10 years.

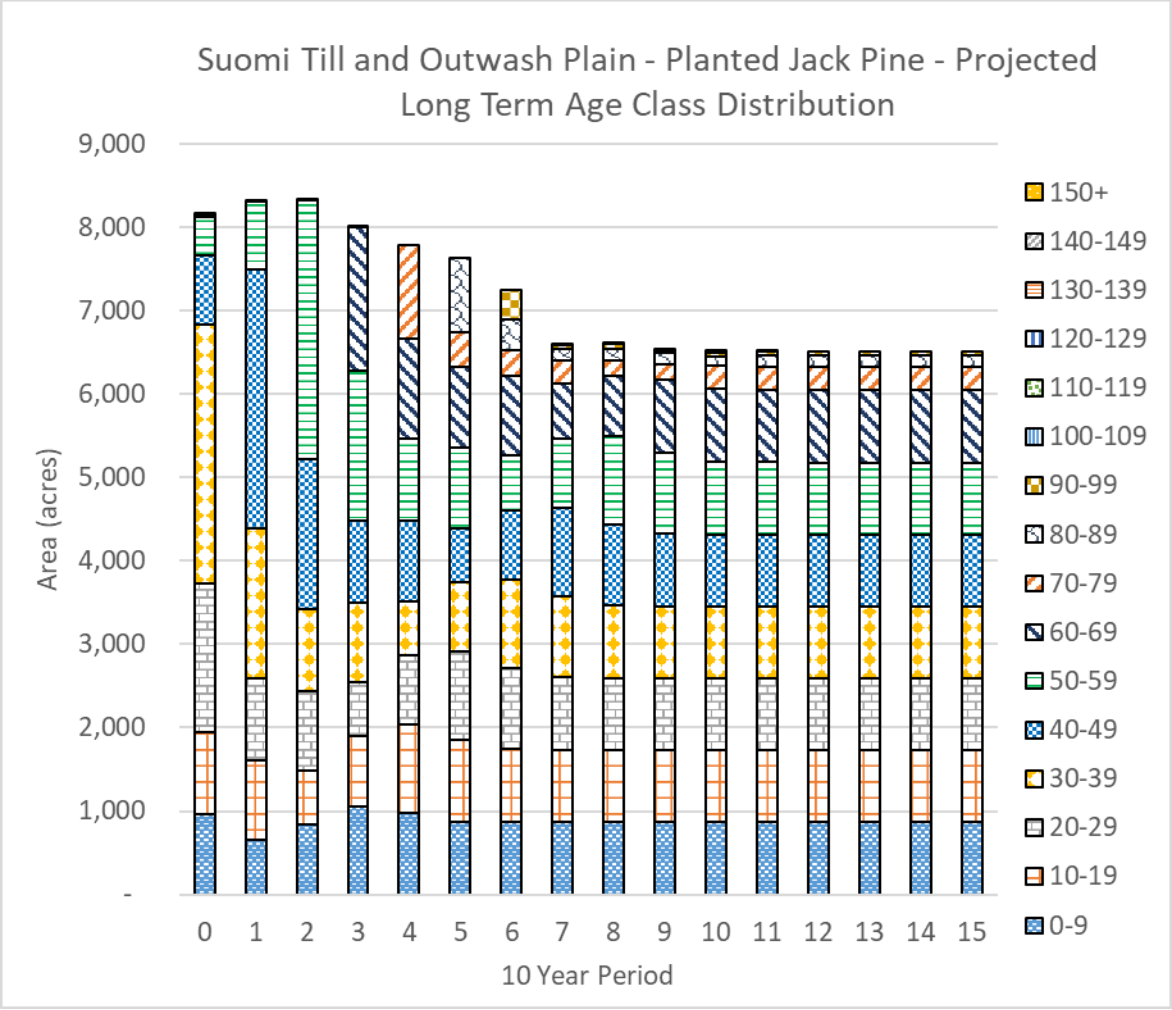


Figure 12. Projected age class distribution over 15. 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 90 and 99 years old in the Suomi Till and Outwash Plain management area (Figure 13). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase overtime. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 15).

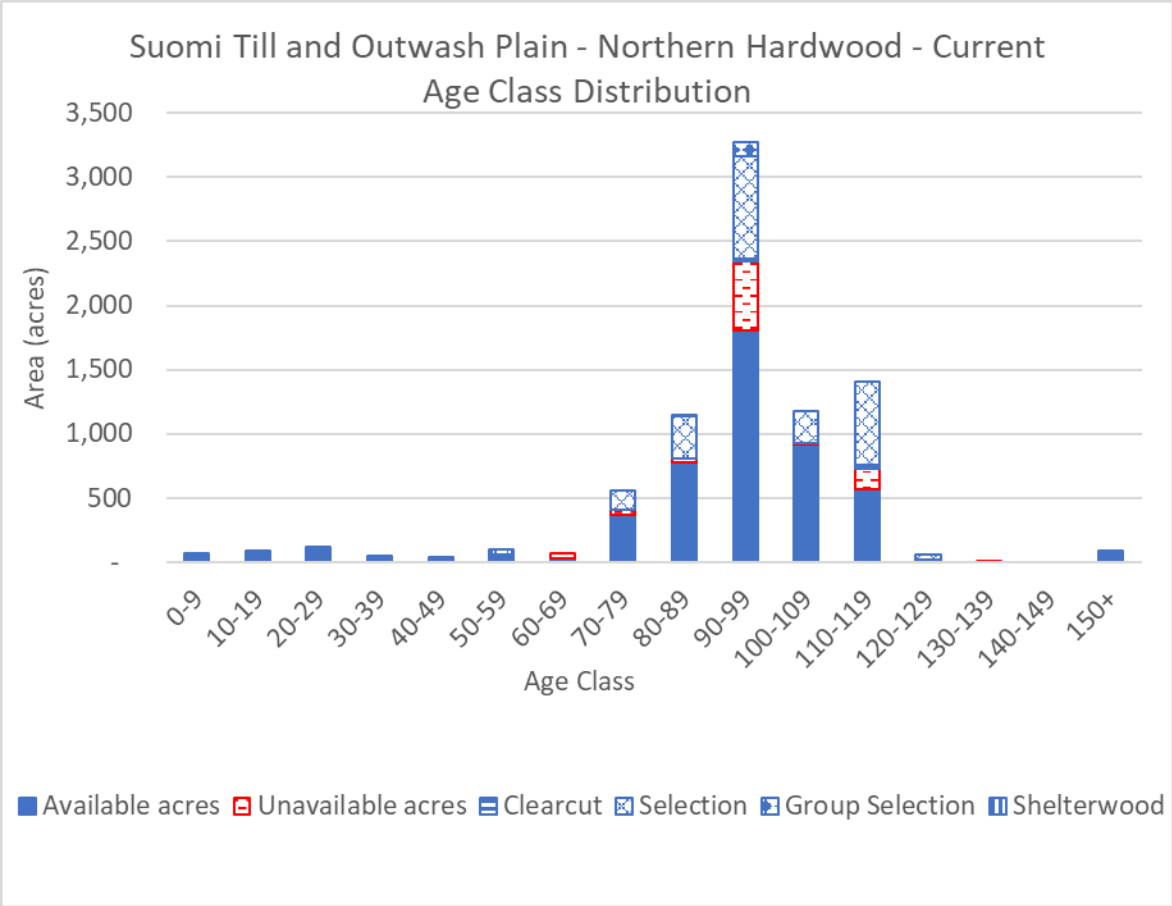


Figure 13. Current age class distribution and projected harvests in the northern hardwood cover type in the Suomi Till and Outwash Plain management area.

The area of northern hardwood is fairly well distributed in the ideal basal area classes for optimal growing conditions in the Suomi Till and Outwash Plain management area (Figure 14). A portion of this cover type meets the habitat requirements for marten, blackburnian warbler and white-tailed deer (Table 8).

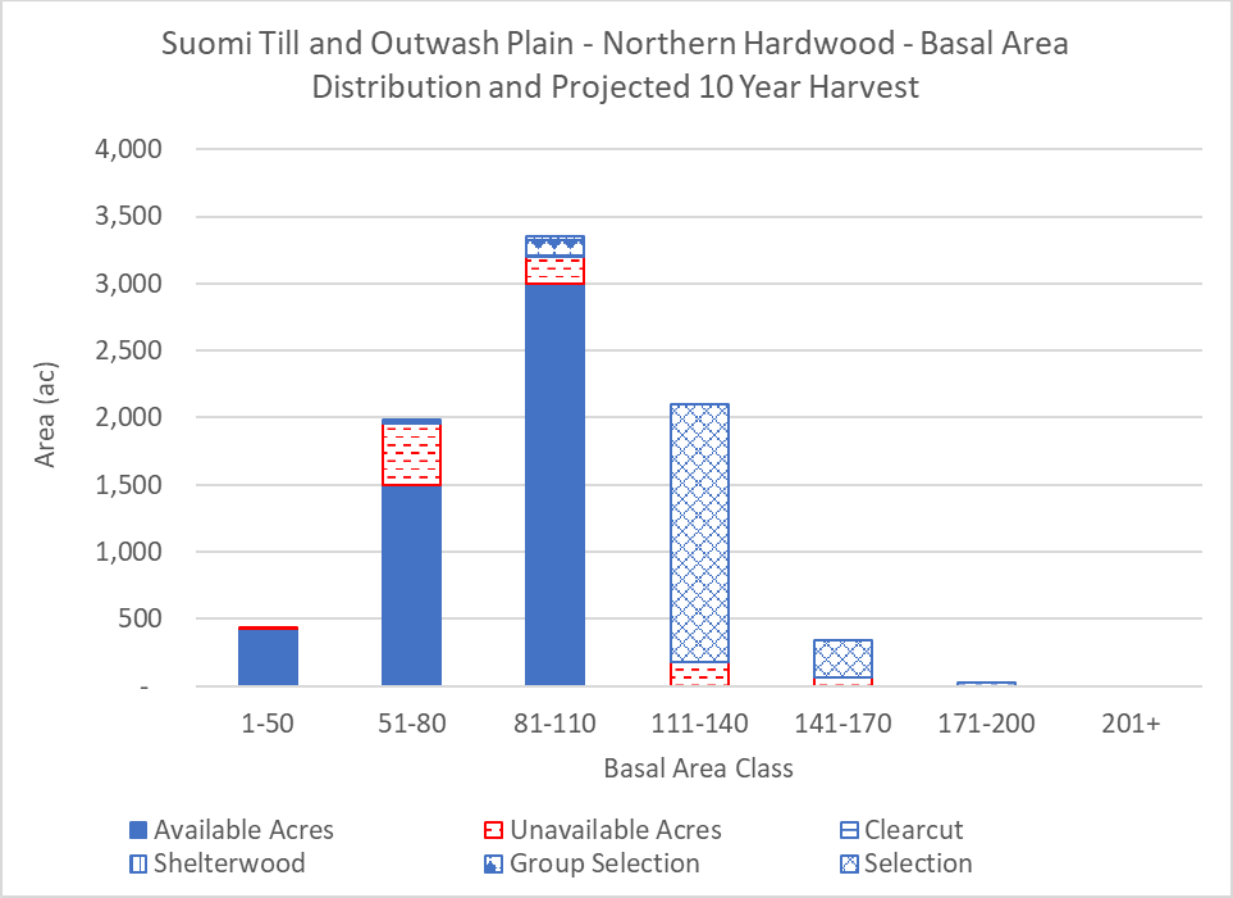


Figure 14. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 8. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Blackburnian warbler	Age category: 80+ Size category: sawlog Basal area: 81+	4,918	354
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	4,918	354
White-tailed deer	All sizes and age classes	8,222	--

Desired future condition

The projected long-term cover type trend for northern hardwood is somewhat stable in the Suomi Till and Outwash Plain management area. There are 8 acres transitioning to this cover type in the next ten years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class with recently harvested stands occupying the 51-80 class and stands that are ready for harvest occupy the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime depends on the successful establishment of northern hardwood as well as the recruitment of those seedlings and saplings into the pole and sawlog classes. Northern hardwood in the Suomi Till and Outwash Plain management area have challenges in regeneration and recruitment due to cervid herbivory and poor site conditions in some stands.

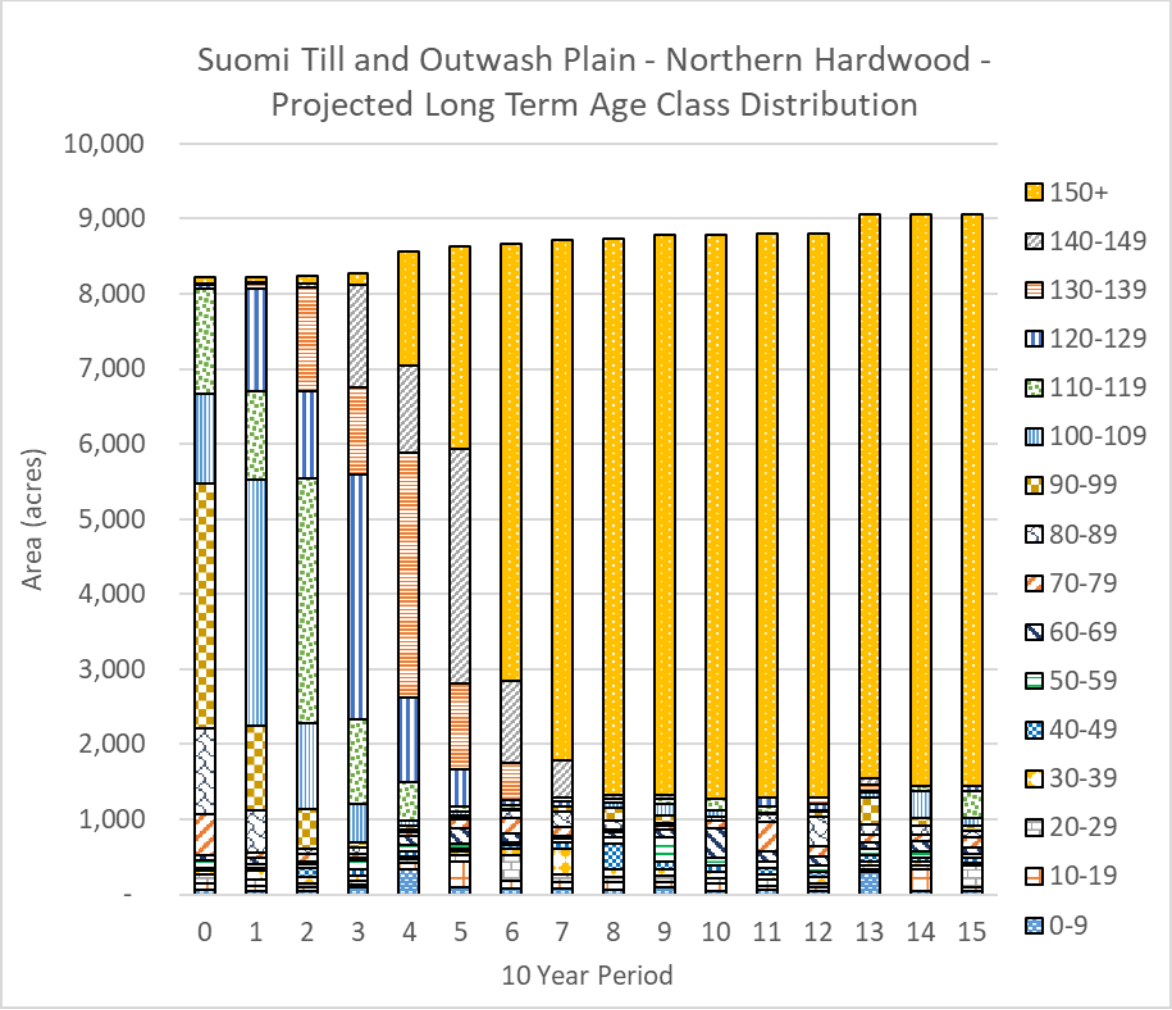


Figure 15. Projected age class distribution over 15, 10-year planning periods.

Management actions

The desired future conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 2,353 acres. About 48 acres will be managed under an even-aged system with some of those acres harvested through a clearcut or shelterwood method to improve stand quality (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed-canopy landscape condition.

Planted red pine

Current condition

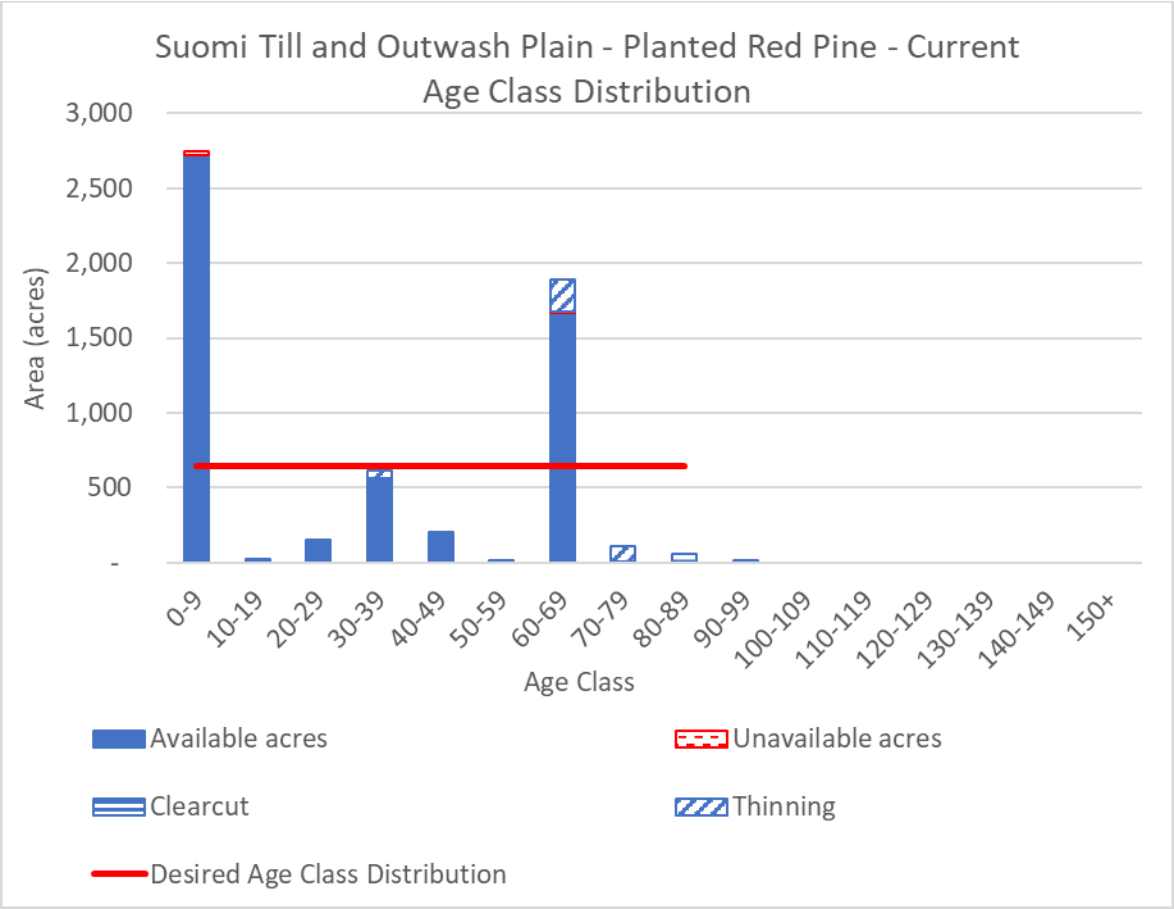


Figure 16. Current age class distribution, the desired age class distribution, and the projected harvests in the planted red pine cover type over the 10-year planning period.

The current age class distribution is unbalanced with a deficit of acres in the 10-59- and 70-89-year-old age classes and a surplus of acres in the 0-9- and 60-69-year-old age classes.

Desired future condition

The desired age class distribution is to have a rotation age of 80 years.



Figure 17. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 969 acres in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of planted red pine will take many decades.

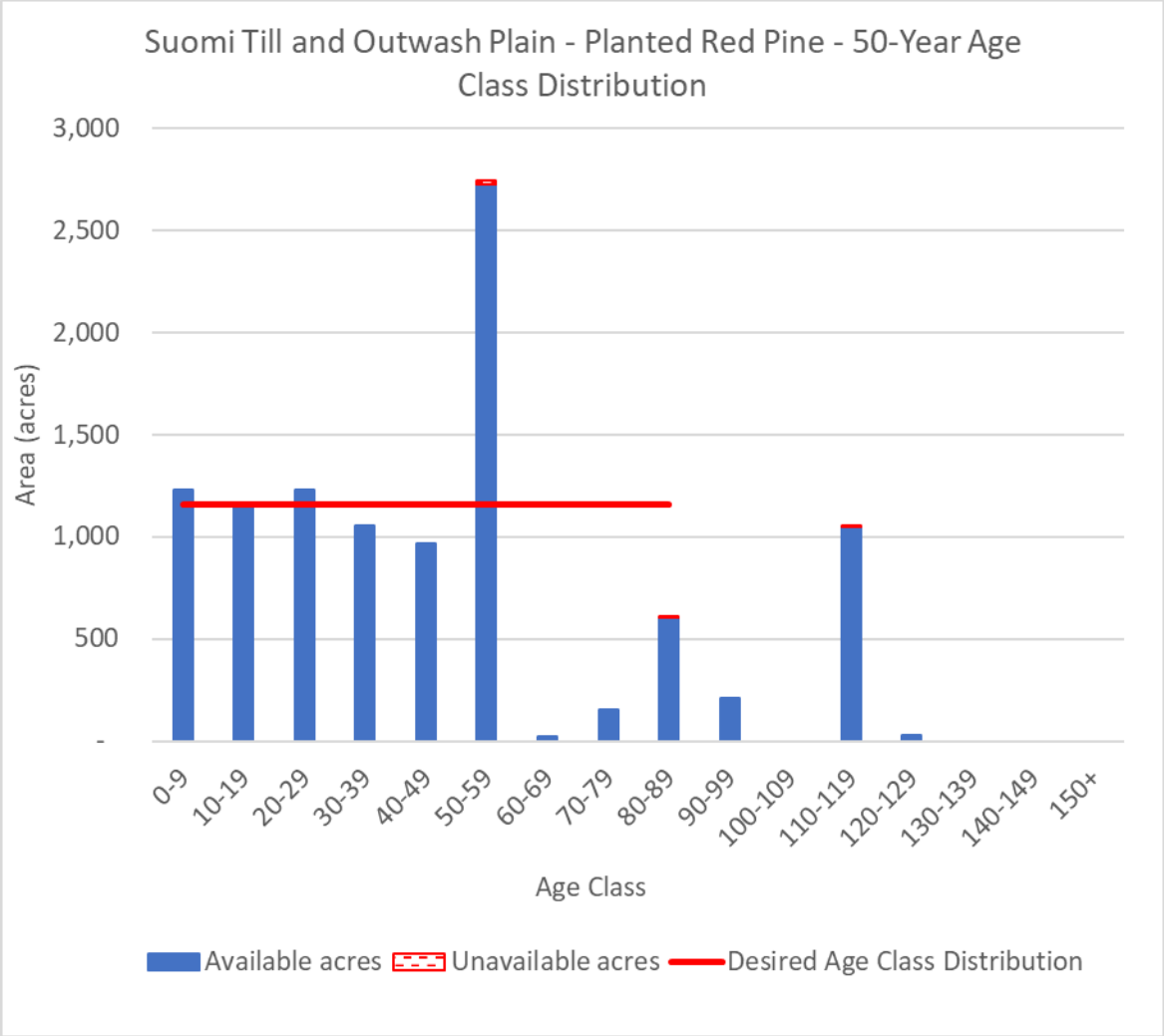


Figure 18. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of planted red pine acres working toward the desired future condition as older age classes are treated (Figure 18).

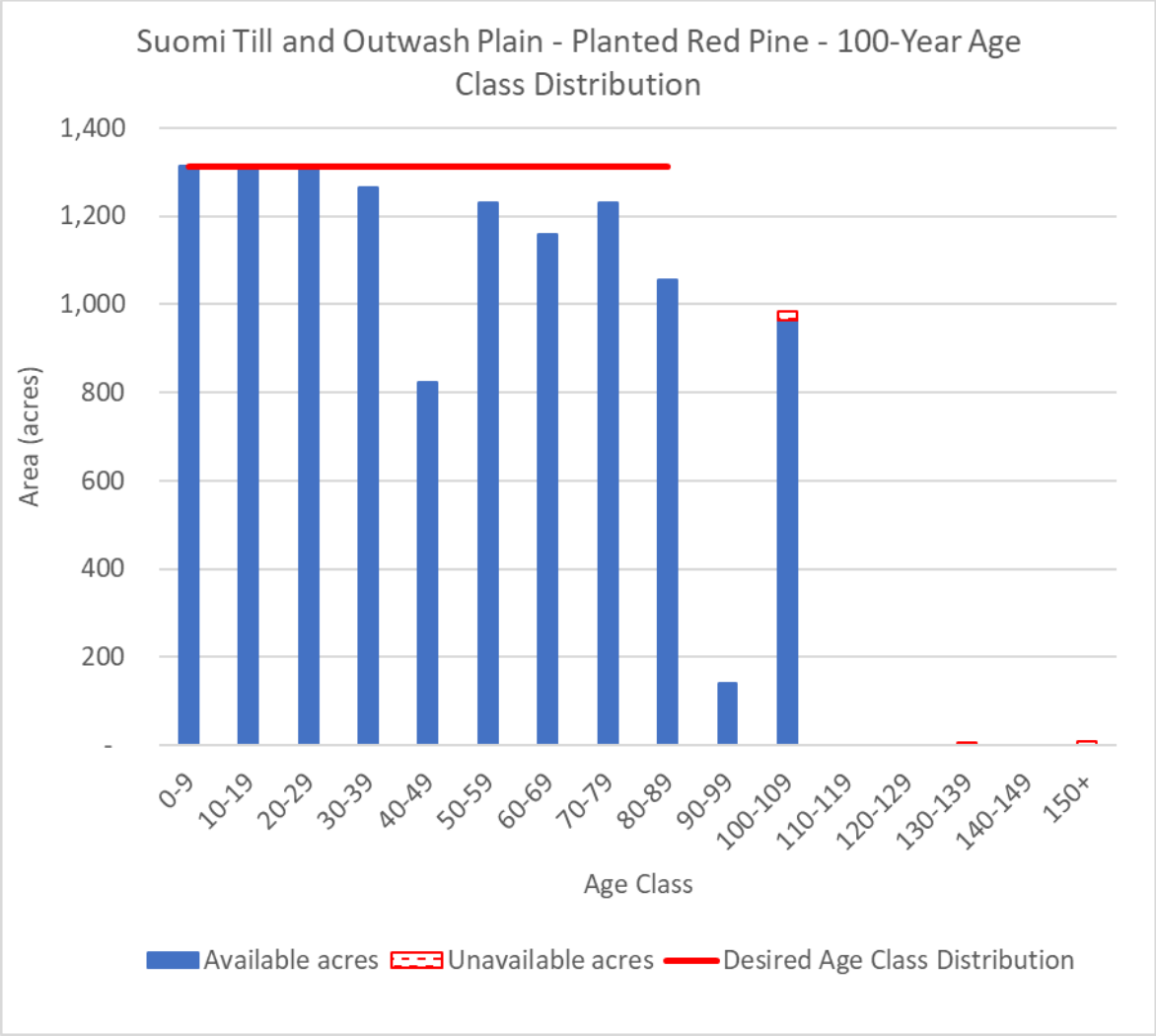


Figure 19. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 19) will concentrate the manageable acres of planted red pine in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 51 acres of projected harvest in the planted red pine cover type. It is expected that about 918 acres of planted red pine will be converted from other cover types. These add up to an expected 969 acres of regeneration in the planted red pine cover type over the next 10 years. An additional 370 acres of planted red pine are projected to be thinned to improve stand health and productivity.

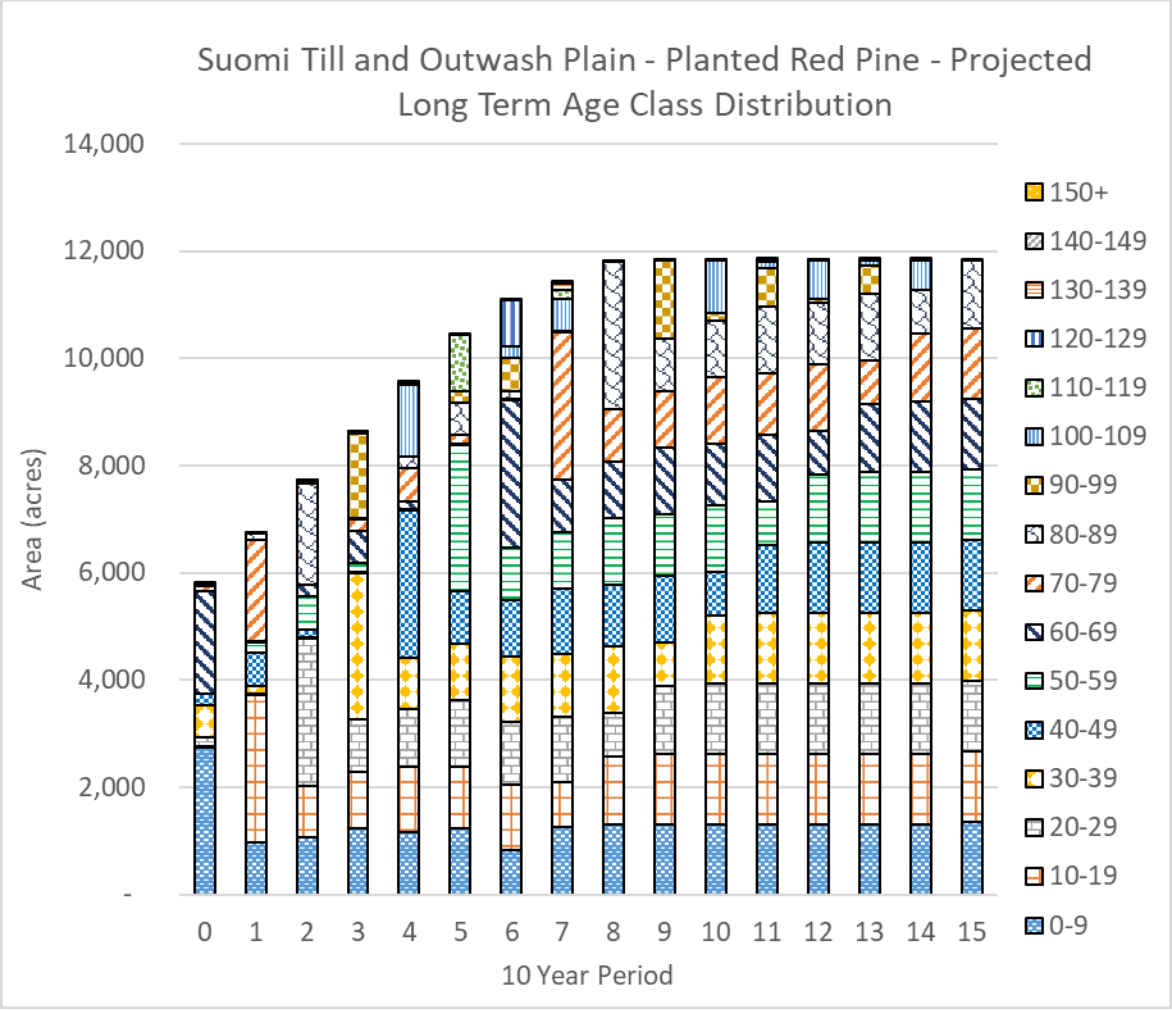


Figure 20. Projected age class distribution over 15, 10-year planning periods.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 13; see Biodiversity in Section 3 for more information). There are currently no HCVAs in this management area.

Ecological reference areas

Ecological reference areas (ERAs) are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 38. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 39. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Dry-mesic northern forest	BC			1
Existing ERA	Mesic northern forest	C			1
Existing ERA	Patterned fen	B			1
Existing ERA	Poor conifer swamp	AB	G4	S4	1
Existing ERA	Poor conifer swamp	BC	G4	S4	1
Existing ERA	Rich conifer swamp	BC			1
Existing ERA	Rich conifer swamp	C		S3	1
Proposed ERA	Poor fen	AB	G3	S3	1
Grand Total					**8**

Special conservation areas

Reviewable special conservation areas (SCAs; Table 11) refers to those SCA types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 12) refers to those

SCA types that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 11. Reviewable special conservation areas within the Suomi Till and Outwash Plain management area.

Reviewable Special Conservation Area Type and Name	Acres
Concentrated Recreational Area	**504**
32262	140
Anderson Lake	16
Bass Lake (Marquette) Campground	6
Little Lake Campground	16
Little Lake	16
Pike Lake (Marquette) Campground	7
Squaw Lake Campground	15
Unspecified	288
Habitat Area or Habitat Corridor	**274**
Bear Creek island	6
Bear Creek tributary buffer	3
Bob's Creek hardwood island	9
Bob's Lake pine	3
cedar	8
--	17
--	20
--	11
--	199
Possible Type 1 or Type 2 Old Growth	**45**
--	45
Spring, Wetlands, or Riparian Areas	**2,375**
1	3
2	96
3	9
4	15
5	12
6	21
7	19
8	23
9	25
11	183
12	114
13	41
14	49
15	45
16	35

Reviewable Special Conservation Area Type and Name	Acres
32001	465
32043	20
32063	51
32242	237
330222	82
32032102	60
32242047	50
32252015	56
32252036	15
Bryan Creek SCA North	131
Bryan Creek SCA South	124
Escanaba 1	25
Escanaba 2	23
Escanaba 3	55
Escanaba 4	51
Escanaba 5	35
Escanaba 6	68
Escanaba 7	21
Michigamme 1	1
Miller Creek and Chandler Brook	37
--	51
Trout 1	22
Trout 2	3
Trout Falls	3
Visual Management Areas	**415**
32039	10
32045	18
Anderson Lake	7
Anderson Lake XC ski, Flacks Lk	330
Escanaba River	50
Grand Total	**3,617**

Table 12. Static special conservation areas within the Suomi Till and Outwash Plain management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer		**3,807**
		1,876
Bass Creek		53
Bear Creek		101

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Big Brook		137
Bobs Creek		12
Bryan Creek		148
Camp Eleven Creek		128
Cedar Creek		13
Cherry Creek		58
Chocolay River		9
East Branch Chocolay River		21
Flat Rock Creek		180
Flopper Creek		109
Halfway Creek		22
Little Brook		50
McGregor Creek		49
Mitchigan River		87
Norby Creek		14
North Branch Ford River		47
Peterson Creek		16
Poplar Creek		134
Rocky Creek		13
Schwartz Creek		73
Sheen Creek		20
Trout Falls Creek		8
Twomile Creek		147
West Branch Chocolay River		8
West Branch Middle Branch Escanaba River		123
Wild West Creek		108
Wilson Creek		43
Designated Trout and Coldwater Streams	**141.1**	
	69.0	
Bass Creek	2.0	
Bear Creek	3.9	
Big Brook	6.2	
Bobs Creek	0.4	
Bryan Creek	5.6	
Camp Eleven Creek	4.8	
Cedar Creek	0.3	
Cherry Creek	2.1	
Chocolay River	0.3	
East Branch Chocolay River	0.8	
Flat Rock Creek	6.7	

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Flopper Creek	4.0	
Halfway Creek	0.8	
Little Brook	1.0	
McGregor Creek	1.8	
Mitchigan River	3.4	
Norby Creek	0.5	
North Branch Ford River	1.9	
Peterson Creek	0.6	
Poplar Creek	4.9	
Rocky Creek	0.5	
Schwartz Creek	2.7	
Sheen Creek	0.9	
Trout Falls Creek	0.3	
Twomile Creek	5.0	
West Branch Chocolay River	0.3	
West Branch Middle Branch Escanaba River	4.7	
Wild West Creek	3.9	
Wilson Creek	1.7	
Wood Turtle Stream 100-foot buffer		**158**
Escanaba River		36
Michigamme River		70
Middle Branch Escanaba River		51
Wood Turtle Stream 660-footbBuffer		**1,109**
Escanaba River		273
Michigamme River		487
Middle Branch Escanaba River		350
Grand Total	**141.1**	**5,074**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 14, 15 and 16) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 40. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 14. Rare animal species occurrence within the Suomi Till and Outwash Plain management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Accipiter gentilis	Northern goshawk	T	--	1
Animal	Alces alces*	Moose	SC	--	--
Animal	Boloria freija	Freija fritillary	SC	--	1
Animal	Boloria frigga	Frigga fritillary	SC	--	3
Animal	Bombus terricola	Yellow banded bumble bee	SC	--	1
Animal	Canis lupus*	Gray wolf	SC	LE	--
Animal	Erebia discoidalis	Red-disked alpine	SC	--	1
Animal	Gavia immer	Common loon	T	--	6
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	1
Animal	Lithobates palustris	Pickerel frog	SC	--	2
Animal	Lynx canadensis	Lynx	E	LT	1
Animal	Myotis septentrionalis	Northern long-eared bat	T	LE	1
Animal	Necturus maculosus	Mudpuppy	SC	--	2
Animal	Opheodrys vernalis	Smooth green snake	SC	--	2
Animal	Pandion haliaetus	Osprey	SC	--	3
Animal	Picoides arcticus	Black-backed woodpecker	SC	--	1
Animal	Setophaga kirtlandii	Kirtland's warbler	E	--	2
Total	--	--	--	--	**28**

**Occurrence information provided by field staff.*

Table 15. Rare plant species occurrence within the Suomi Till and Outwash Plain management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Gentiana linearis	Narrow-leaved gentian	T	--	1
Plant	Piptatherum canadense	Canada rice grass	T	--	1

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Plant	Rubus acaulis	Dwarf raspberry	T	--	1
Total	--	--	--	--	**3**

Table 16. Other rare occurrences within the Suomi Till and Outwash Plain management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	2
Total	--	--	--	--	**2**

Non-ERA natural communities

Natural communities that are identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area designation are recognized and managed accordingly. There are currently no non-ERA natural communities in the management area.

Forest health

Forest health concerns, both native and non-native, can affect stand conditions and management decisions. The following insects (Table 17) and diseases (Table 18) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 17. Defoliating insects of concern in the Suomi Till and Outwash Plain management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes
Jack pine budworm	Choristoneura pinus	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 18. Maladies of concern in the Suomi Till and Outwash Plain management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes
Oak wilt	Bretziella fagacearum	Non-native	No

Aquatic resources

Riparian habitat

A total of 150 miles of streams and rivers are found in the management area (Table 19). Streams/rivers classified as cold types comprise approximately 66 percent of the riverine mileage.

Table 19. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	73
Cold small river	0
Cold transitional stream	26
Cold transitional small river	0
Cold transitional large river	0
Warm transitional stream	22
Warm transitional small river	9
Warm transitional large river	7
Warm stream	13
Warm small river	0
Warm large river	0

Lacustrine Habitat

A total of 49 lakes and ponds of at least 1 surface acre are found in the management area (Table 20).

Table 20. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	41
100-499	7
500+	1

Wetlands

A total of 45,359 acres of wetlands can be found in the management area (Table 21). Forested wetlands comprise approximately 96 percent of wetland types found in the management area.

Table 21. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,533
Forested	43,689
Riverine	137

Vernal pools and seeps

A total of 1,326 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Lowland shrub, aspen, and lowland spruce/fir are the predominant cover types present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 22).

Table 22. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Lowland shrub	3,732
Aspen	2,643
Lowland spruce/fir	2,255
Lowland conifers	1,716
Cedar	1,505
Upland mixed forest	716
Northern hardwood	705
Upland conifers	684
Mixed upland deciduous	636
Natural jack pine	462

Watershed vegetation cover

The management area includes portions of important watersheds of the Escanaba River and Michigamme River (Tables 23 and 24). Aspen is a major state forest cover type in each watershed.

Table 23. Top 5 vegetative cover types and area of the Escanaba River watershed located within the management area.

Cover Type	Acres
Aspen	33,785
Lowland spruce/fir	8,416
Planted jack pine	7,721
Cedar	6,935
Lowland conifer	5,980

Table 24. Largest vegetative cover types and area of the Michigamme River watershed located within the management area.

Cover Type	Acres
Aspen	5,095
Northern hardwood	518
Cedar	430

Cover Type	Acres
Herbaceous openland	391
Upland shrub	379

Recreation

The Suomi Till and Outwash Plain management area generally has good public recreation and management access. However, some areas are fragmented and remote with few public access roads. Motorized trails in the management area include snowmobile trails, the Bass Lake Motorcycle Trail (24-mile loop), the Porterfield Lake Motorcycle Trail (30.5 miles) and off-road vehicle G Route. The Little Lake-Chatham Snowmobile Trail (rail-trail) is on the east side of the management area. Non-motorized pathways include the Blueberry Ridge, Anderson Lake and Flacks Lake Pathways (hiking trails) and the Thunder Valley Equestrian Trail.

Four state forest campgrounds (rustic) are located within the area, each providing water access.

Table 25. Designated recreation trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	ORV (all types)	57.2
Motorized recreation trails	Snowmobile	31.3
Non-motorized recreation trails	Hiking	19.1
Non-motorized recreation trails	Equestrian	11.6
Non-motorized recreation trails	Biking	0
Non-motorized recreation trails	Hunter Walking Trails	0
Total	--	119.2

Note: Trail use types may overlap.

Table 26. State forest campgrounds.

Name	Number of Sites	ORV Access
Bass Lake	22	X
Ski-kwe zaag'igan	15	X
Anderson Lake West	13	
Little Lake	16	

There are no areas managed specifically for hunting in this management area. Boating access sites are numerous, providing access to the Escanaba River and inland lakes.

Table 27. Boating access sites (BAS).

Name	Waterbody

Anderson Lake West campground	Anderson Lake
Big Trout Lake	Big Trout Lake
East Branch Escanaba River	East Branch Escanaba River
East Branch Escanaba River	East Branch Escanaba River
Horseshoe Lake campground	Horseshoe Lake
Lake Michigamme	Lake Michigamme
Little Lake campground	Little Lake
Main Branch Escanaba River	Main Branch Escanaba River
Pike Lake campground	Pike Lake
Sporley Lake	Sporley Lake
Ski-kwe zaag'igan campground (new name 2023)	Ski-kwe zaag'igan Lake
Twin Lake	Twin Lake
West Bass Lake campground	West Bass Lake

Way Dam Complex

State Forest Area: 59,070 acres	Location: North Eastern Iron County	Population Centers: Crystal Falls, Amasa
Sub-Section: Suomi Till and Outwash Plain	Landforms: Ice-stagnation features, end moraines, ground moraine, and outwash	Landcover: Forested: 50,353 acres Non-forested: 8,717 acres

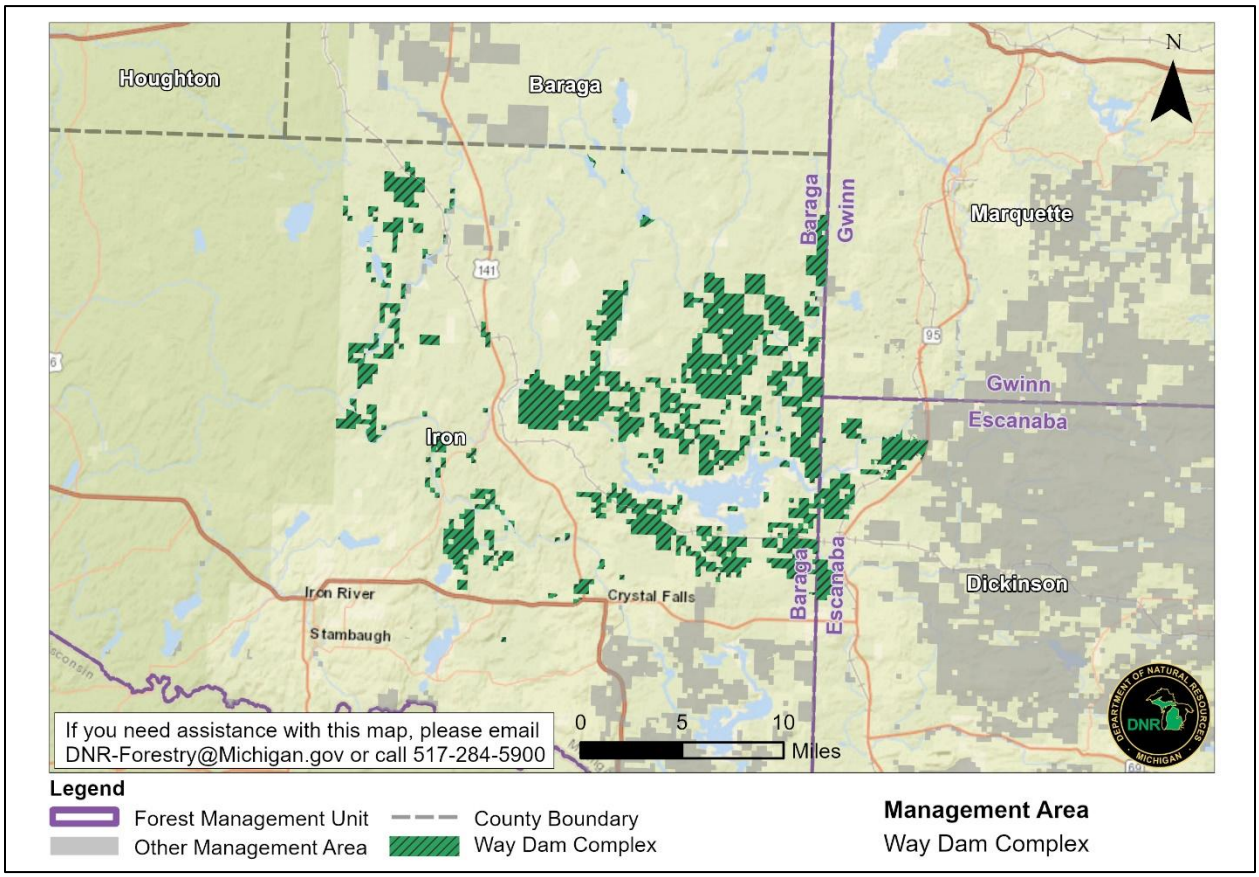


Figure 1. Map of the Way Dam Complex management area.

Forested landscape

Current and projected future condition

The Way Dam Complex management area is dominated by shade intolerant cover types in the young and mid-aged categories. Tolerant cover types dominateolder age categories, while unavailable lowland acres are more prevalent in the older age category.

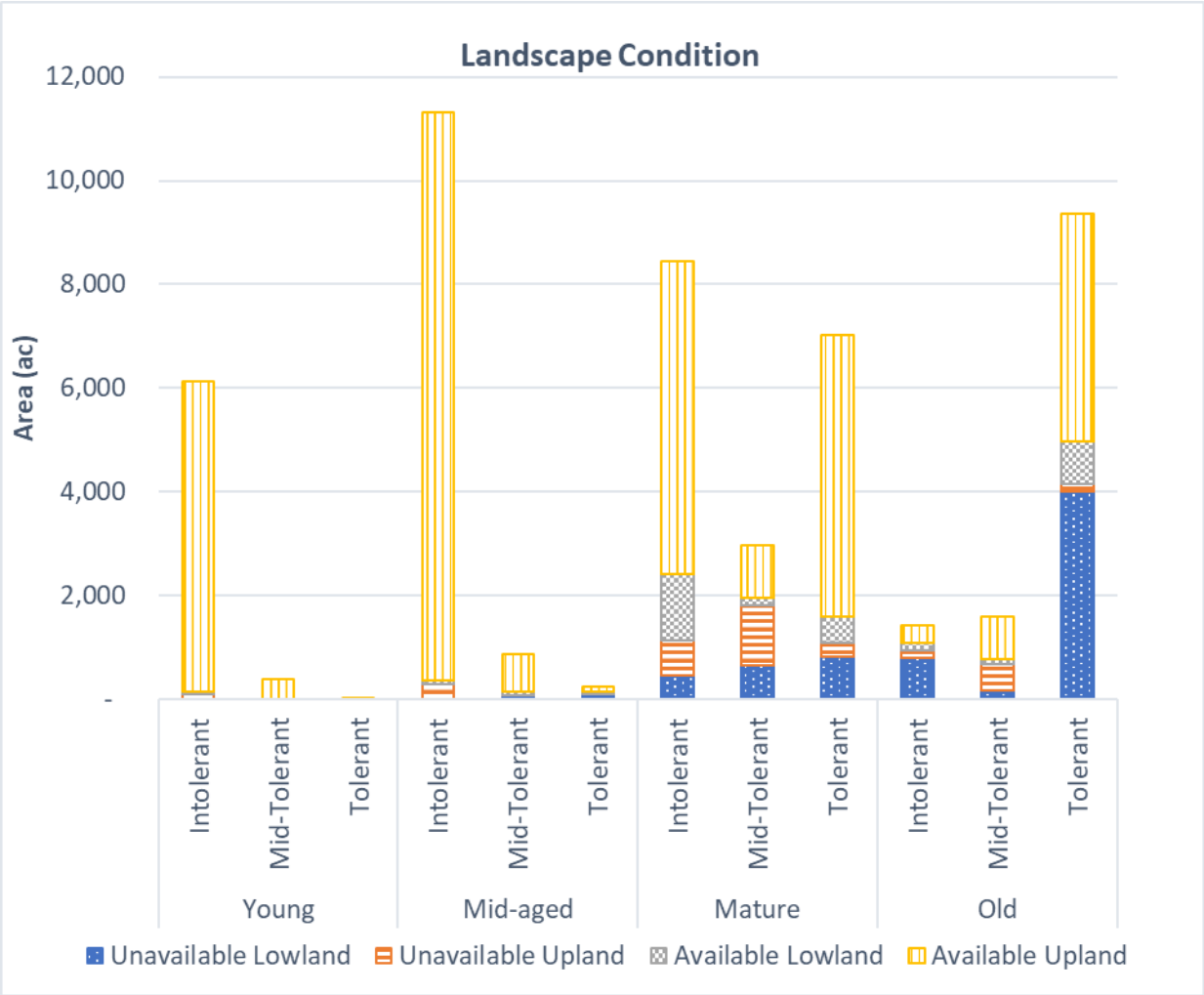


Figure 2. Forest diversity matrix showing the current distribution of forested acres across management availability, age category, landscape position and shade tolerance.

Landscape habitat conditions refine the landscape into featured species habitat context. Current and projected acres for the metrics identified in the Management Priorities (Section 3 Statewide/Regional) establish a baseline and future condition based on management over the planning period (Table 1).

Table 1. Current and projected acres for landscape habitat conditions.

Landscape Habitat Condition	Monitoring Metric	Current Acres
Young forest	Acres of 0-19 stands in Aspen and Jack Pine	6,531
Mature forest	Acres of 80+ year stands across cover types	12,384
Mature forest	Acres of 120+ year stands across cover types	2,900
Mesic conifer cover types	Acres of mesic conifer cover types	2,421
Mesic conifers in other cover types	Average canopy occupancy	27%
Mast – oak cover types	Acres of Oak cover types	18
Mast tree species in other cover types	Acres of Total Canopy Occupancy of Mast Tree Acres (Trace-100%)	12,842
Big trees	Acres of Total Canopy Stand Occupancy of Species in Sawlog or Greater Size Class	26,811
Non-forested openings	Acres of Total herbaceous open land, upland shrub and cropland	627
Landscape forest matrix	Percent Deciduous Forest	70%
Landscape forest matrix	Percent Coniferous Forest	24%

The Way Dam Complex management area has the following Special Analysis Units (SAUs). These SAUs have specific cover type goals, typically associated with wildlife habitat management. For any SAUs that overlap with this MA, SAU cover type goals take priority as the SFMP model strives to meet the cover type goals across the management area. Please see Section 5 for a detailed description of management direction and harvest goals for each of these SAUs.

- Deer Wintering Complex: Deerfoot Lodge
- Deer Wintering Complex: Iron-Floodwood

The Way Dam Complex management area is dominated by forested cover types with 85 percent of the area covered in forested stands (Table 2). The upland deciduous portion of that is 68 percent of the management area and comprised mostly of aspen. The upland coniferous portion is 5 percent of the management area and is comprised mostly of upland conifer cover type. Cedar is the most common lowland conifer in this management area, representing 6 percent of the landscape. Lowland shrub is the most common non-forested cover type in this management area, representing 6% of the landscape.

Table 2. Landscape conditions and distribution of cover types in the Way Dam Complex management area.

Land Type	Landscape Position	Forest Type	Cover Type	Area (ac)	Land Type	Landscape Position	Forest Type
Forested	Upland	Deciduous	Aspen	22,897	34,259	40,007	50,353
			Northern hardwood	9,899			
			Black-red hybrid oak	0			
			Northern red oak	18			
			Oak mix	0			
			Mixed upland deciduous	1,446			
		Mixed	Upland mixed forest	2,579	2,579		
		Coniferous	Planted red pine	316	3,169		
			Planted jack pine	37			
			Planted white pine	0			
			Planted mixed pine	98			
			Natural red pine	218			
			Natural jack pine	79			
			Natural white pine	233			
			Natural mixed pines	131			
			Upland spruce/fir	733			
			Upland conifers	1,217			
			Hemlock	106			
	Lowland	Deciduous	Lowland aspen/balsam Poplar	72	744	10,346	
			Lowland deciduous	672			
		Mixed	Lowland mixed forest	619	619		
		Coniferous	Cedar	3,483	8,983		
			Lowland conifers	2,804			
			Lowland spruce/fir	1,981			
			Tamarack	714			
Nonforested	Upland	N/A	Herbaceous openland	129	N/A	990	8,717
			Upland shrub	498			
			Low density trees	87			
			Bare/sparsely vegetated	82			
			Cropland	0			
			Urban	195			
			Lowland shrub	3,570			
			Marsh	422			

	Lowland	N/A	Bog	960	N/A	7,727	
			Treed bog	1,793			
			Water	984			
						Grand Total:	**59,070**

There are 39,952 acres (70.5 percent of the total management area and 79.3 percent of the forested area) that can be managed toward desired future conditions via commercial timber harvest in the Way Dam Complex management area (Table 3). Of that, more than 44 percent is in the aspen cover type and 19.2% in northern hardwood. The remaining cover types represent about 19 percent of the forested and available land in the management area.

Table 3. Summary table describing the landscape conditions and cover type composition of the Way Dam Complex management area.

Waydam Complex						
Forested Cover Type	**Available Acres**	**Available %**	**Unavailable Acres**	**Unavailable %**	**Total Acres**	**Total %**
Aspen	22,257	44.2%	643	1.3%	22,900	45.5%
Cedar	722	1.4%	2,762	5.5%	3,484	6.9%
Hemlock	12	0.0%	93	0.2%	106	0.2%
Lowland aspen/balsam poplar	31	0.1%	42	0.1%	72	0.1%
Lowland conifers	652	1.3%	2,152	4.3%	2,804	5.6%
Lowland deciduous	116	0.2%	557	1.1%	673	1.3%
Lowland mixed Forest	250	0.5%	369	0.7%	619	1.2%
Lowland spruce/fir	1,238	2.5%	744	1.5%	1,982	3.9%
Mixed upland deciduous	658	1.3%	789	1.6%	1,447	2.9%
Natural jack pine	8	0.0%	71	0.1%	79	0.2%
Natural mixed pines	66	0.1%	65	0.1%	131	0.3%
Natural red pine	147	0.3%	73	0.1%	219	0.4%
Natural white pine	199	0.4%	35	0.1%	233	0.5%
Northern hardwood	9,648	19.2%	251	0.5%	9,899	19.7%
Northern red oak	9	0.0%	9	0.0%	18	0.0%
Planted jack pine	37	0.1%	0	0.0%	37	0.1%
Planted mixed pine	98	0.2%	0	0.0%	98	0.2%
Planted red pine	229	0.5%	88	0.2%	316	0.6%
Tamarack	278	0.6%	437	0.9%	714	1.4%
Upland conifers	976	1.9%	242	0.5%	1,217	2.4%

Upland mixed forest	2,064	4.1%	515	1.0%	2,579	5.1%
Upland spruce/fir	259	0.5%	475	0.9%	734	1.5%
Grand Total	**39,952**	**79.3%**	**10,409**	**20.7%**	**50,361**	**100.0%**

Table 4. Site condition (reason area is unavailable for commercial harvest) acres for the Way Dam Complex management area.

Site Condition (Reason area is unavailable for commercial harvest)	Area (ac)	% of Unavailable Area
Deer wintering area	4,970	47.7%
BMPs	1,615	15.5%
Too wet	1,249	12.0%
Blocked by obstacle	693	6.7%
Unproductive	603	5.8%
Wildlife concerns	564	5.4%
Non-military lease/easement	381	3.7%
Long-term retention	81	0.8%
Denied access	58	0.6%
Conservation values	48	0.5%
Species of special concern or T&E	42	0.4%
Neighbor / interest group	41	0.4%
Too steep	26	0.3%
Other dept./div. processes	17	0.2%
Other influence zones	10	0.1%
Recreational/scenic	6	0.1%
Blocked by railroad	4	0.0%
Total unavailable	**10,409**	**100.0%**

Management actions

Each cover type in the Way Dam Complex management area has a unique age class and basal area class goals that describe the long-term desired future conditions. The harvest levels that are needed in the first planning period to begin achieving those long-term goals are summarized below (Table 5).

Table 5. Ten-year planning period harvest goals (acres) by cover type and silvicultural regime.

Silvicultural Regimes								
Cover Type	Clearcut	Selection	Thinning	Group Selection	Shelterwood	Salvage Clearcut	Salvage Thinning	Grand Total
Northern hardwood	13	3,772	-	-	6	-	-	3,790
Aspen	3,304	-	-	-	-	-	-	3,304
Lowland Shspruce/fir	181	-	-	-	-	-	-	181
Mixed upland deciduous	96	-	-	-	27	-	-	123
Upland spruce/fir	118	-	-	-	-	-	-	118
Upland conifers	113	-	-	-	-	-	-	113
Lowland conifers	113	-	-	-	-	-	-	113
Tamarack	85	-	-	-	-	-	-	85
Lowland mixed forest	76	-	-	-	-	-	-	76
Upland mixed forest	22	-	-	-	-	-	-	22
Natural white pine	-	-	12	-	5	-	-	17
Lowland deciduous	15	2	-	-	-	-	-	17
Natural red pine	-	-	-	-	8	-	-	8
Lowland aspen/balsam poplar	7	-	-	-	-	-	-	7
Totals	**4,143**	**3,774**	**12**	**-**	**46**	**-**	**-**	**7,975**

Table 6. Ten-year estimated Harvest Volume for the Way Dam Complex management area.

There are few cover type transitions projected in the Way Dam Complex management area. The managed area of each cover type is projected to remain relatively stable. The largest decrease forecasted is in the aspen cover type, where 655 acres are forecasted to convert to other cover types through forest management activities. The largest increase is in upland mixed forests, where 668 acres are expected to convert into that cover type.

Table 7. Projected 10-year cover type acres resulting from cover type transitions.

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Aspen	22,897	22,242	-655
Northern hardwood	9,899	9,906	7
Cedar	3,483	3,483	0
Lowland conifers	2,804	2,820	16
Upland mixed forest	2,579	3,248	668
Lowland spruce/fir	1,981	1,944	-37
Mixed upland deciduous	1,446	1,372	-74

Cover Type	Current acreage	Projected acreage at end of 10-year planning period	Projected 10-year change in acreage
Upland conifers	1,217	1,153	-64
Upland spruce/fir	733	657	-76
Tamarack	714	693	-21
Lowland deciduous	672	665	-7
Lowland mixed forest	619	668	49
Planted red pine	316	407	91
Natural white pine	233	244	11
Natural red pine	218	218	0
Natural mixed pines	131	131	0
Hemlock	106	106	0
Planted mixed pine	98	179	81
Natural jack pine	79	79	0
Lowland aspen/balsam poplar	72	72	0
Planted jack pine	37	37	0
Northern red oak	18	18	0
Planted white pine	0	11	11
Lowland shrub	3,570	3,570	0
Treed bog	1,793	1,793	0
Water	984	984	0
Bog	960	960	0
Upland shrub	498	498	0
Marsh	422	422	0
Urban	195	195	0
Herbaceous openland	129	129	0
Low density trees	87	87	0
Bare/sparsely vegetated	82	82	0
Total:	**59,070**	**59,070**	**0**

Featured species current and projected habitat acres

There are 11 featured species in this management area that span various cover types, age classes, and stand level conditions.

As noted in the Featured Species Management Priority (Section 3), it is recommended that these featured species habitat acres be viewed as acres of potential habitat, representing a condition on the landscape where the more nuanced aspects of each species' habitat requirements are likely to be found or managed for. As described in the introduction, the modeling effort was limited by several factors including the simplification of habitat attributes into MiFI variables. Therefore, when referring to habitat acres what is being referred to is potential habitat acres.

Current and projected total habitat acres by species across the decade provide a baseline and show the result of long-term management actions (Table 8). Some species show a loss in habitat over the next century. As mentioned in the Featured Species Management Priority (Section 3), the current condition for many cover types is a surplus of acres in the 0-9 age class from the compensatory management approach applied in the previous decade. The model eventually evens out the age classes at a lower, sustainable level over time, usually by 50 years. For any species with northern hardwoods as a priority cover type, there is a perceived drop in acres between 40-60 years; this is due to the basal area dropping below 81. Because it only drops into the upper 70s, it is not expected to translate to any real habitat loss on the ground. Two of these species were not included in the SFMP model but are included here to inform management decisions over the decade. White-tailed deer habitat acres are not limited to deer wintering complexes.

Table 8. Featured species current and projected total habitat acres (i.e., potential habitat).

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
Black bear	Generalist/mast	12,842	--	--	--
Cerulean warbler	Northern hardwoods, mixed upland deciduous, lowland deciduous	6,239	9,900	10,785	10,824
Golden-winged warbler	Aspen, black-red hybrid oak, northern red oak, oak mix, tamarack	6,166	5,765	4,859	5,428
Marten	Northern hardwoods, mixed upland deciduous, upland mixed forest, natural white pine, natural mixed pines, upland conifers, upland spruce/fir, lowland mixed forest, lowland conifers, hemlock, cedar	10,574	15,137	12,396	17,327
Moose	To be determined	--	--	--	--
Ruffed grouse	Aspen	6,056	5,645	4,856	5,269
Snowshoe hare	Aspen, cedar, hemlock, lowland aspen, lowland conifers, lowland mixed forest, lowland spruce/fir, mixed upland deciduous, natural jack pine, natural mixed pines, planted jack pine, upland spruce/fir	6,638	7,109	5,771	6,237
White-tailed deer (food)	Food: northern hardwood, oak mix, aspen, mixed upland deciduous, lowland deciduous, lowland aspen/balsam poplar, lowland mixed forest	38,202	38,176	37,546	36,985

Featured Species	Priority Cover Types	Total Habitat Acres Current	10-year Projected Habitat Acres	50-year Projected Habitat Acres	100-year Projected Habitat Acres
White-tailed deer (shelter)*	Shelter: hemlock, cedar, planted red pine, planted white pine, planted mixed pine, natural red pine, natural white pine, natural mixed pines, upland conifers, upland spruce fir, lowland conifers	11,321	11,352	11,993	12,635
Wild turkey	Non-forested openings	215	--	--	--
Wood thrush	Northern hardwoods, northern red oak, mixed upland deciduous, lowland deciduous	9,976	11,159	6,833	11,260
Wood turtle	Non-forested openings	--	--	--	--

Deer Wintering Complexes that are greater than 15,000 acres are modeled as a special analysis units and information on them can be found in section 5 of the plan. In complexes less than 15,000 acres, harvest of cedar and hemlock are not allowed within obligate range stands, and secondary shelter is often protected as well. These areas are guided by the DNR Deer Winter Range Guidelines.

Cover type composition and associated wildlife species

Aspen

Current Condition

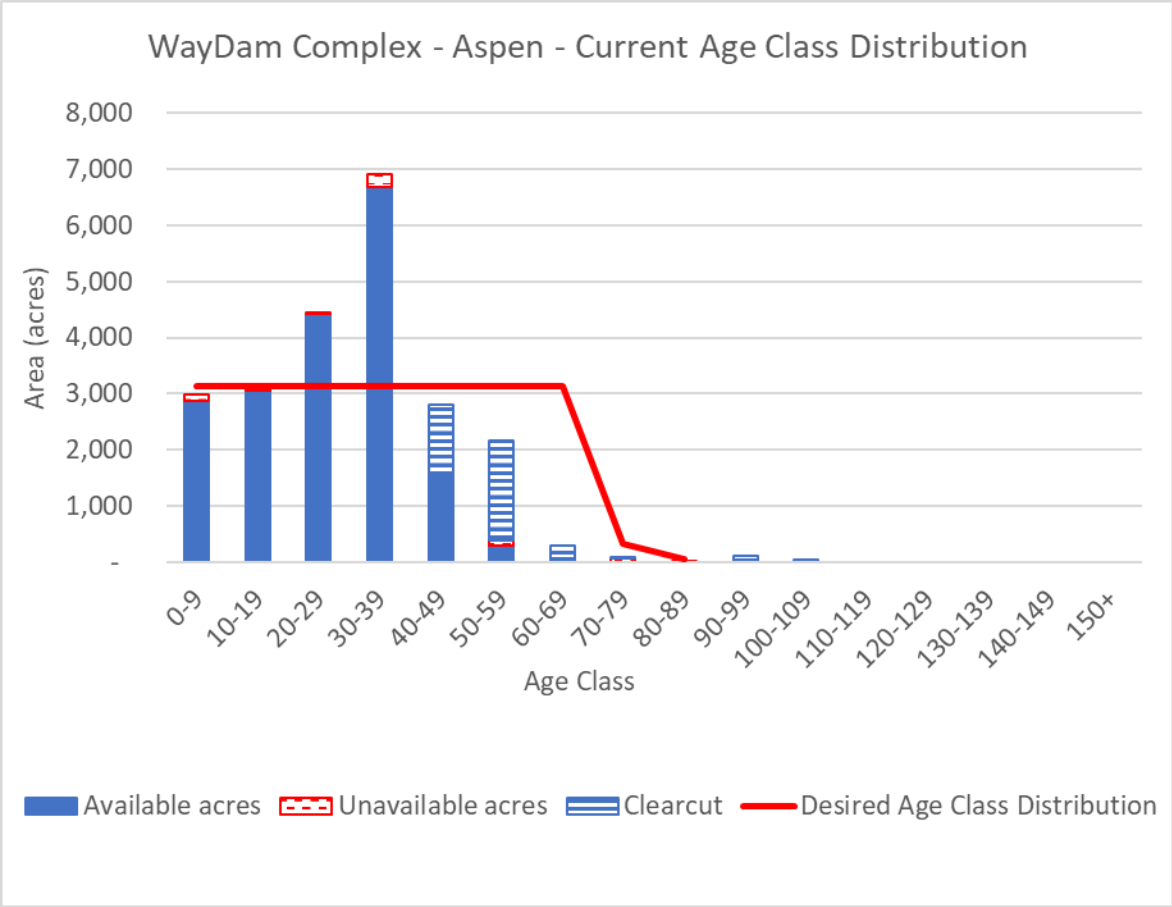


Figure 3. Current age class distribution, the desired age class distribution, and the projected harvests in the aspen cover type over the 10-year planning period.

The current age class distribution is unbalanced, with a deficit of acres in the 40-89-year-old age classes and a surplus of acres in the 20-39-year-old age classes. A portion of this cover type meets the habitat requirements for golden-winged warbler, ruffed grouse, snowshoe hare and white-tailed deer (Table 8).

Table 8. Featured species with aspen as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Aspen	Aspen Habitat Acres - Available	Aspen Habitat Acres - Unavailable
Golden-winged warbler	Age category: 0-19 Size class: sapling	5,909	147
Ruffed grouse	Age category: 0-19 Size class: sapling	5,909	147
Snowshoe hare	Age category: 0-19 Size class: sapling	5,909	147
White-tailed deer	All ages and size classes	22,897	--

Desired future condition

The desired age class distribution is to have a rotation age of 60 years for approximately 98 percent of the acres, then 1.6% of the acres in an age class tail out to the 70-year age class, and 0.4 percent of the acres in an age class tail out to the 80-year age class.

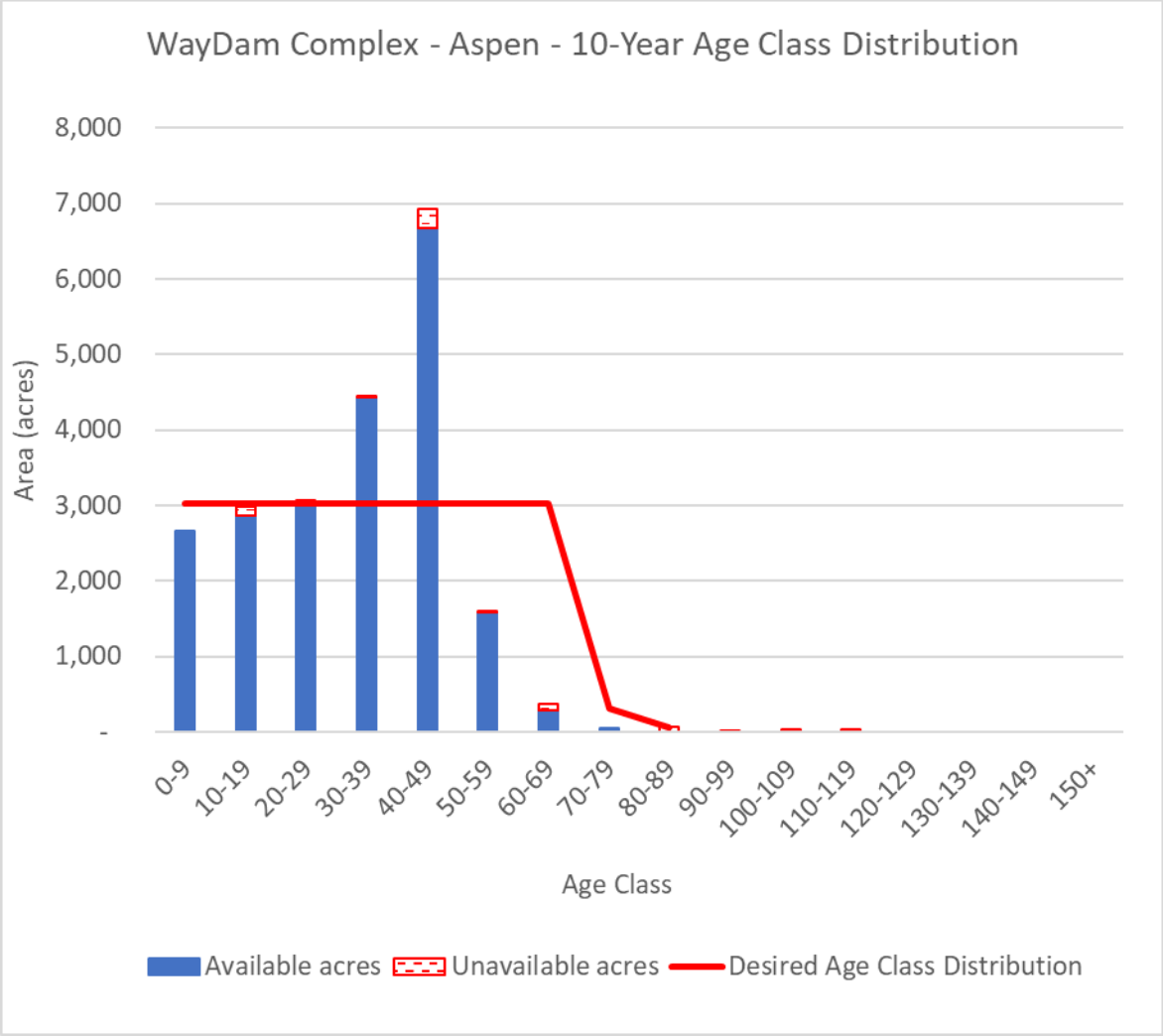


Figure 4. Short-term future age class distribution at the end of the 10-year planning period compared to the long-term desired age class distribution.

The end of the planning period will result in the establishment of 2,656 acres of aspen in the upcoming 0-9 age class. Progress toward the long-term desired age class distribution of aspen will take a few decades in this management area.

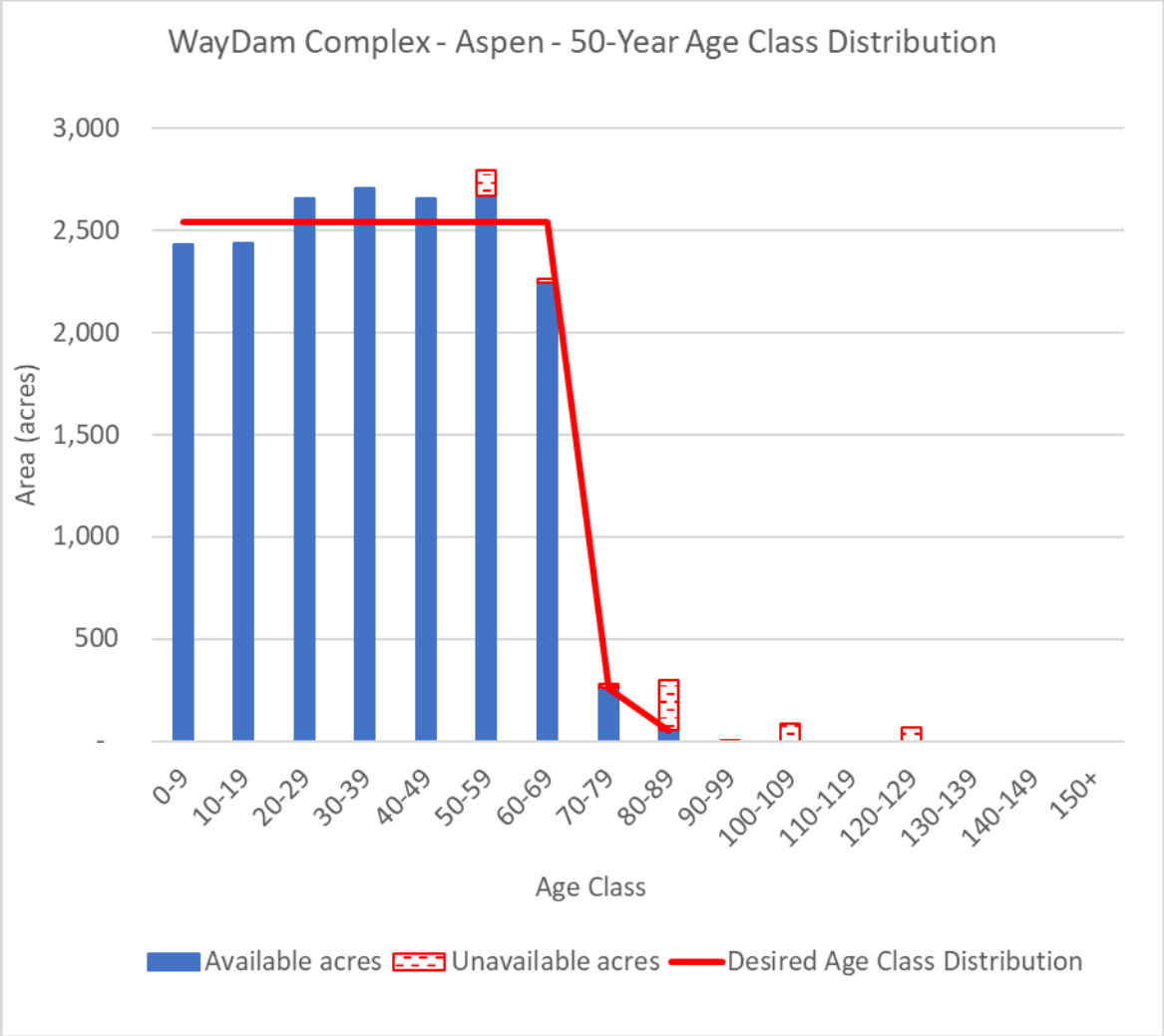


Figure 5. Projected mid-term age class distribution at the end of the fifth planning period compared to the long-term desired age class distribution.

The mid-term age class distribution shows the population of aspen acres nearly reaching the desired future condition with few age classes deviating from the target proportions (Figure 5).

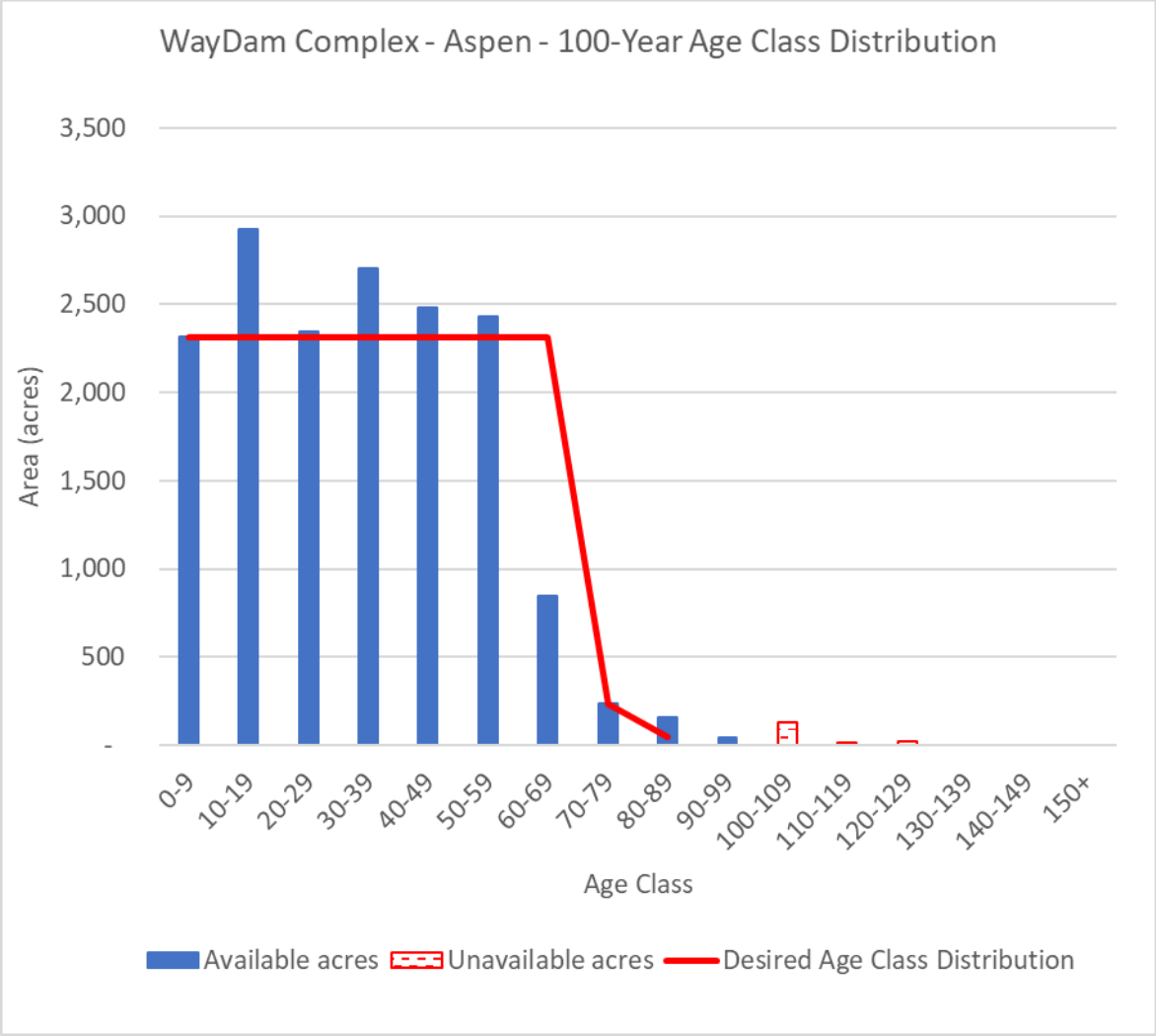


Figure 6. Projected long-term age class distribution at the end of the 10th planning period compared to the long-term desired age class distribution.

The long-term achievement of the desired age class distribution (Figure 6) will concentrate the manageable acres of aspen in productive growing conditions while providing an even flow of forest products and a wide variety of wildlife habitat conditions across the landscape in young, mid-aged, and mature forest.

Management actions

There are 3,304 acres of projected clearcut harvest in the aspen cover type. It is expected that about 655 acres of aspen will convert to other cover types. These total to an expected 2,649 acres of regeneration in the aspen cover type over the next 10 years.

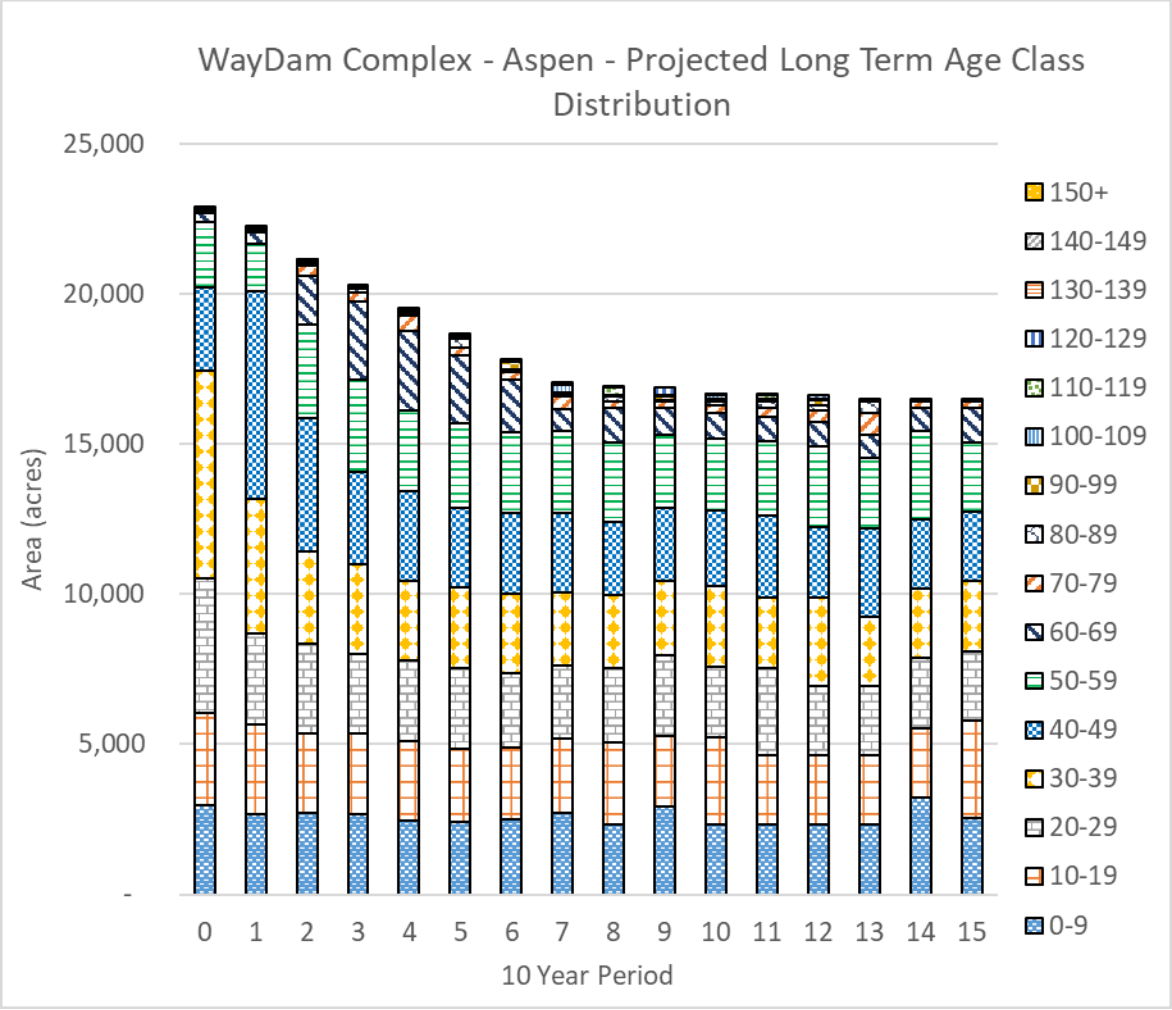


Figure 7. Projected age class distribution over 15, 10-year planning periods.

Northern hardwoods

Current condition

Most of the northern hardwood cover type is currently between a stand age of 70-79-years-old in the Way Dam Complex management area (Figure 8). The past management regime has been primarily single-tree selection, which allows for stand age to continue to increase overtime. Some stands are beginning to achieve an uneven-aged condition where a featured stand age becomes less evident, but the dominant age of these stands will likely increase past 150 years old prior to a younger age cohort becoming the prominent component of these stands (Figure 10). A portion of this cover type meets the habitat requirements of wood thrush, marten, cerulean warbler and white-tailed deer (Table 9).

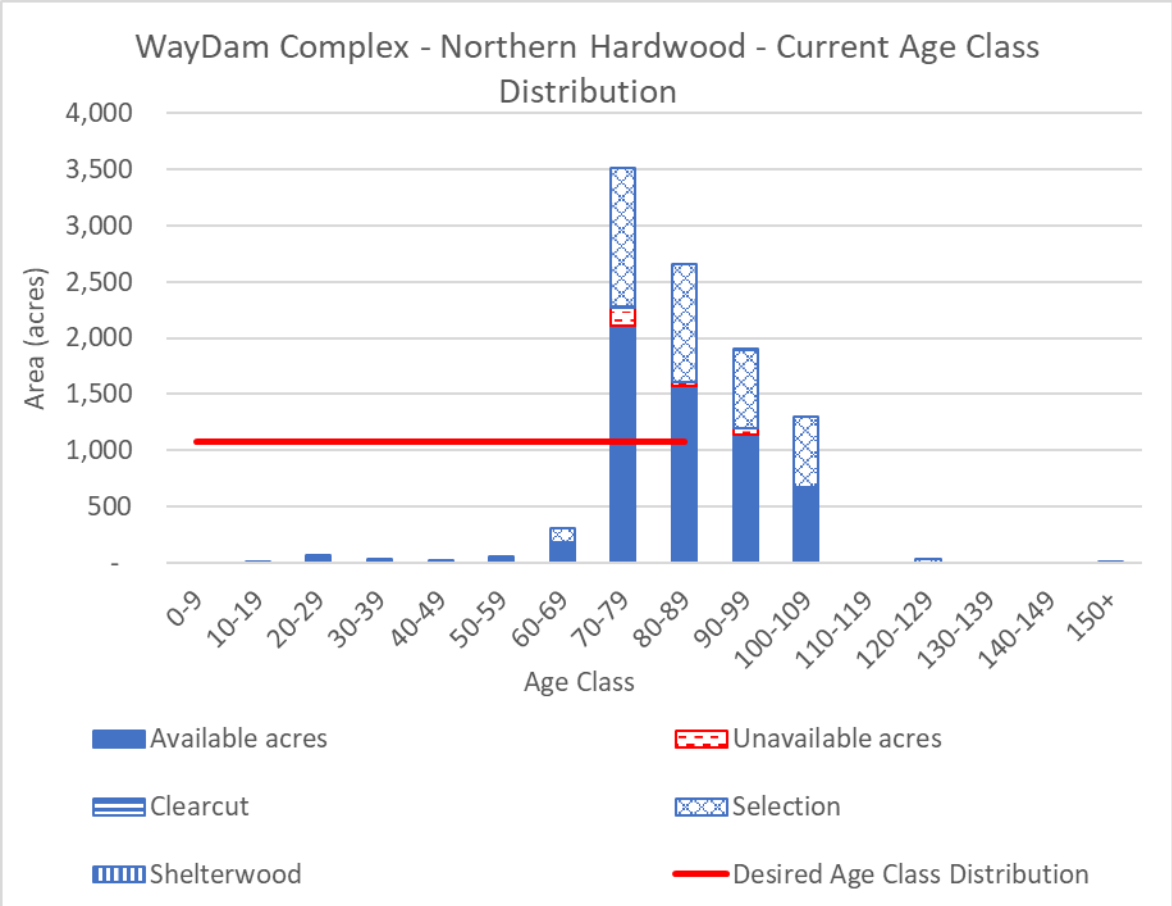


Figure 8. Current age class distribution and projected harvests in the northern hardwood cover type in the Way Dam Complex management area.

The area of northern hardwood is fairly well distributed in the ideal basal area classes for optimal growing conditions in the Way Dam Complex management area (Figure 9).

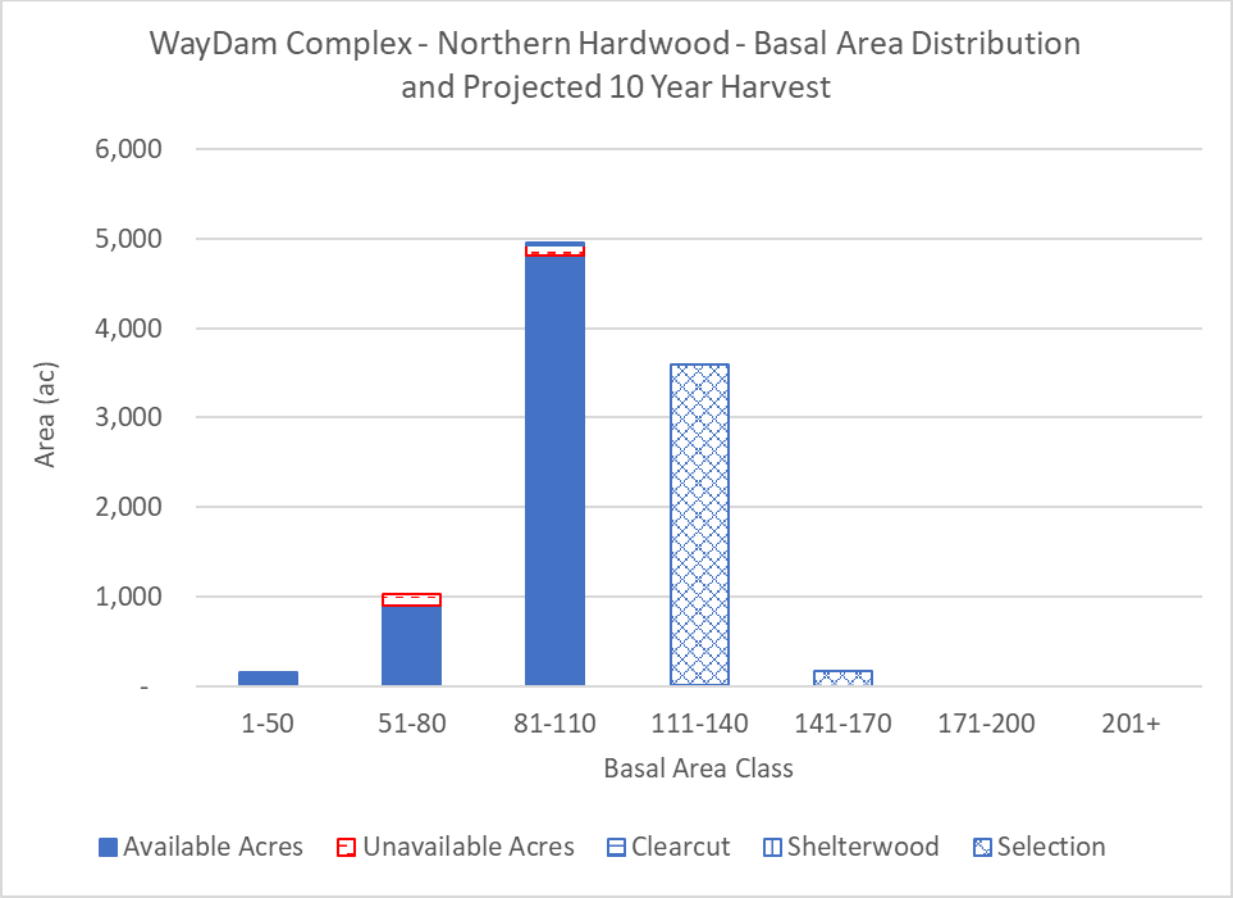


Figure 9. Current basal area distribution of the northern hardwood cover type as well as the projected harvests from each basal area class.

Table 9. Featured species with northern hardwoods as a priority habitat cover type, habitat variables, and current acres (i.e., potential habitat).

Featured Species	Featured Species Habitat – Northern Hardwood	Northern Hardwood Habitat Acres- Available	Northern Hardwood Habitat Acres- Unavailable
Cerulean warbler	Age category: 50+ Size category: pole, sawlog Basal area: 81+	5,805	89
Wood thrush	Age category: 40+ Size category: sawlog Basal area: 81+	8,604	116
Marten	Age category: 40+ Size category: pole, sawlog Basal area: 81+	5,252	76
White-tailed deer	All sizes and age classes	9,899	--

Desired future condition

The projected long-term cover type trend for northern hardwood is somewhat stable in the Way Dam Complex management area. There are 7 acres transitioning into this cover type in the next 10 years.

The desired basal area distribution is a bell-shaped curve where a significant majority of the area is kept in the 81-110 basal area class, with recently harvested stands occupying the 51-80 age class and stands that are ready for harvest occupying the 111-140 basal area class. Diameter distributions of the northern hardwood stands should follow the appropriate Q-curve relative to stand age and condition.

An uneven-aged condition is the long-term goal for all northern hardwood stands in this management area. An uneven-aged condition is achieved when there is no single discernable age cohort that is more prevalent than others across the stand area as canopy gaps fill in with regenerating seedlings, saplings, poles, and eventually remaining stems become sawlog sized over time.

Regeneration and recruitment continue to be a focus in the northern hardwood cover type across this management area. The long-term sustainability of this cover type in an uneven-aged silvicultural regime depends on the successful establishment of northern hardwood species as well as recruitment of those seedlings and saplings into the pole and sawlog classes. Northern hardwood in the Way Dam Complex management area face challenges in regeneration and recruitment due to cervid herbivory and poor site conditions in some of the stands.

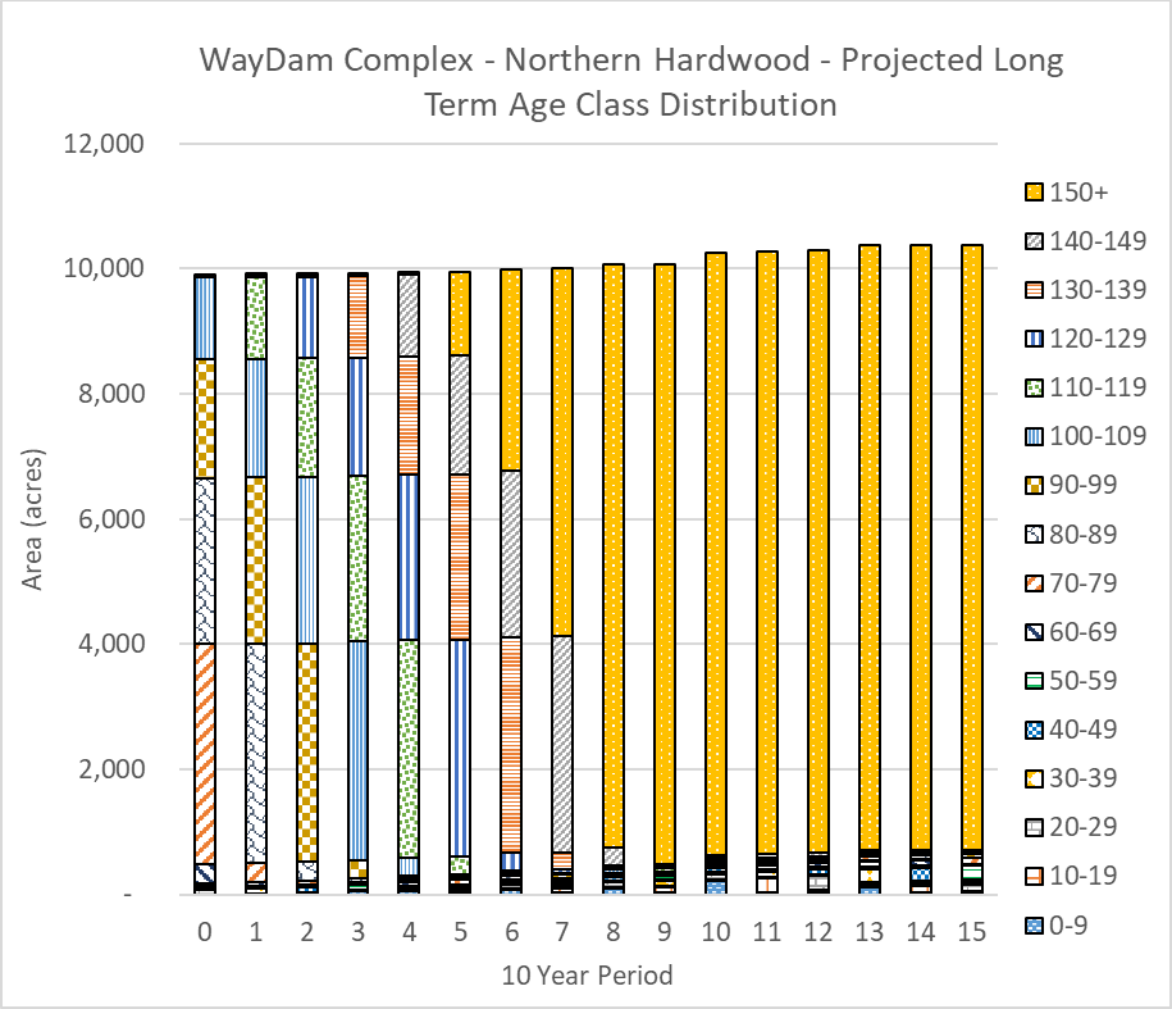


Figure 10. Projected age class distribution over 15, 10-year planning periods.

Management actions

The desired forest conditions and associated featured species habitat will be maintained and achieved through continued application of the projected selection harvest regime on 3,772 acres. About 19 acres will be managed under an even-aged system, with some of those acres harvested through a clearcut or shelterwood method to improve stand quality (Table 5). Larger canopy gaps should be used to encourage diverse regeneration of northern hardwood species while maintaining an overall long-term mature forest closed canopy landscape condition.

Conservation area network

High conservation value areas

There are up to nine different HCVA types that can be found in each management area (Table 10; see Biodiversity in Section 3 for more information)

Table 10. High conservation value areas within the Keweenaw management area.

High Conservation Value Area Type and Name	Acres
Deer wintering complex	**38,757**
	38,757
Grand Total	**38,757**

Ecological reference areas

Ecological Reference Areas (ERAs) are higher quality examples of functioning ecosystems that are primarily influenced by natural ecological processes.

Table 41. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 42. Ecological reference areas within the management area

Ecological Reference Area Type	Community Type	EO Rank	Global Rank	State Rank	Number of Occurrences
Existing ERA	Dry-mesic northern forest	C	G4	S3	1
Existing ERA	Muskeg	B	G4G5	S3	1
Existing ERA	Northern shrub thicket	B	G4	S5	1
Existing ERA	Northern wet meadow	B	G4G5	S4	1
Existing ERA	Rich conifer swamp	BC	G4	S3	1
Grand Total					**5**

Special conservation areas

Reviewable special conservation areas (SCAs, Table 13) refers to types that may be reviewed or updated through the compartment review process as needed. Static SCAs (Table 14) refers to those that generally do not change or require updating (see Biodiversity in Section 3 for more information).

Table 13. Reviewable special conservation areas within the Way Dam Complex management area.

Reviewable Special Conservation Area Type and Name	Acres
Habitat Area or Habitat Corridor	**1,962**
deer winter range	1,962
Grand Total	**1,962**

Table 14. Static special conservation areas within the Way Dam Complex management area.

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Designated Trout and Cold Water Stream Buffer		**3,807**
		1,876
Bass Creek		53
Bear Creek		101
Big Brook		137
Bobs Creek		12
Bryan Creek		148
Camp Eleven Creek		128
Cedar Creek		13
Cherry Creek		58
Chocolay River		9
East Branch Chocolay River		21
Flat Rock Creek		180
Flopper Creek		109
Halfway Creek		22
Little Brook		50
McGregor Creek		49
Mitchigan River		87
Norby Creek		14
North Branch Ford River		47
Peterson Creek		16
Poplar Creek		134
Rocky Creek		13
Schwartz Creek		73
Sheen Creek		20
Trout Falls Creek		8

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Twomile Creek		147
West Branch Chocolay River		8
West Branch Middle Branch Escanaba River		123
Wild West Creek		108
Wilson Creek		43
Designated Trout and Coldwater Streams	**141.1**	
	69.0	
Bass Creek	2.0	
Bear Creek	3.9	
Big Brook	6.2	
Bobs Creek	0.4	
Bryan Creek	5.6	
Camp Eleven Creek	4.8	
Cedar Creek	0.3	
Cherry Creek	2.1	
Chocolay River	0.3	
East Branch Chocolay River	0.8	
Flat Rock Creek	6.7	
Flopper Creek	4.0	
Halfway Creek	0.8	
Little Brook	1.0	
McGregor Creek	1.8	
Mitchigan River	3.4	
Norby Creek	0.5	
North Branch Ford River	1.9	
Peterson Creek	0.6	
Poplar Creek	4.9	
Rocky Creek	0.5	
Schwartz Creek	2.7	
Sheen Creek	0.9	
Trout Falls Creek	0.3	
Twomile Creek	5.0	
West Branch Chocolay River	0.3	
West Branch Middle Branch Escanaba River	4.7	
Wild West Creek	3.9	
Wilson Creek	1.7	
Wood Turtle Stream 100ft Buffer		**158**
Escanaba River		36
Michigamme River		70
Middle Branch Escanaba River		51

Static Special Conservation Area Type and Name	Sum of Length (Miles)	Sum of Acres
Wood Turtle Stream 660ft Buffer		**1,109**
Escanaba River		273
Michigamme River		487
Middle Branch Escanaba River		350
Grand Total	**141.1**	**5,074**

Rare species

Rare species occurrences are compiled from the Michigan Natural Features Inventory Biotics database (Tables 16 and 17) and do not necessarily include all rare species found in this management area due to biases in survey effort and verifiable observation reporting over time.

Table 43. Rare animal and plant species conservation status key.

Status	Status
E = endangered	LE = listed endangered
T = threatened	LT = listed threatened
SC = special concern	PDL = proposed for delisting

Table 16. Rare animal species occurrence within the Way Dam Complex management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Animal	Alces alces	Moose	SC	--	--
Animal	Boloria freija	Freija fritillary	SC	--	2
Animal	Bombus borealis	Northern amber bumble bee	SC	--	1
Animal	Buteo lineatus	Red-shouldered hawk	SC	--	1
Animal	Canis lupus	Gray wolf	SC	LE	--
Animal	Gavia immer	Common loon	T	--	9
Animal	Haliaeetus leucocephalus	Bald eagle	SC	--	10
Animal	Lasmigona compressa	Creek heelsplitter	SC	--	1
Animal	Lithobates palustris	Pickerel frog	SC	--	2
Animal	Pandion haliaetus	Osprey	SC	--	2

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Total	--	--	--	--	**28**

Table 17. Other rare occurrences within the Way Dam Complex management area.

Element Category	Scientific Name	Common Name	State Status	Federal Status	Number of Occurrences
Other	Great Blue Heron Rookery	Great Blue Heron Rookery	--	--	1
Total	--	--	--	--	**1**

Non-ERA natural communities

Natural communities identified with an element occurrence in the MNFI Biotics database, but that have not been given an additional ecological reference area (ERA) designation, are recognized and managed accordingly (Table 19).

Table 18. Ecological reference area natural community ranking based on NatureServe.

Element Occurrence Rank	State Rank	Global Rank
A: excellent	S1: critically imperiled	G1: critically imperiled
B: good	S2: imperiled	G2: imperiled
C: fair	S3: rare	G3: very rare
D: poor	S4: apparently secure	G4: apparently secure
E: extant	S5: demonstrably secure	G5: demonstrably secure
H: historical	SX: extirpated	GH: historical occurrence
F: not found		GU: status uncertain
X: extirpated		GX: extinct
		?: inexact

Table 19. Non-ERA Natural Communities within the Way Dam management area.

Community Type	Element Occurrence Rank	State Rank	Global Rank	Number of Occurrences
Northern Wet Meadow	B	S4	G4G5	1
Grand Total				**1**

Forest health

Forest health concerns, both native and non-native, can have impacts on stand conditions and management decisions. The following insects (Table 20) and diseases (Table 21) could have an impact on management during the planning period and may need to be monitored and/or addressed.

Table 20. Defoliating insects of concern in the Way Dam Complex management area.

Common Name	Scientific Name	Native/Non-native	Knows Presence
Spongy moth	Lymantria dispar	Non-native	Yes
Forest tent caterpillar	Malacosoma disstria	Native	Yes
Large aspen tortrix	Choristoneura conflictana	Native	Yes
Spruce budworm	Choristoneura fumiferana	Native	Yes

Watch for lingering ash with potential resistance to emerald ash borer.

Table 21. Maladies of concern in the Way Dam Complex management area.

Common Name	Scientific Name	Native/Non-native	Known Presence
Canker	Various	Various	Yes
Armillaria root rot	Armillaria spp.	Native	Yes

Aquatic resources

Riparian habitat

A total of 77 miles of streams and rivers are found in the management area (Table 22). Streams/rivers classified as cold types comprise approximately 62 percent of the riverine mileage.

Table 22. Classification type and length of streams/rivers found within the management area.

Type	Length (miles)
Cold stream	21
Cold small river	0
Cold transitional stream	25
Cold transitional small river	2
Cold transitional large river	0
Warm transitional stream	13
Warm transitional small river	12
Warm transitional large river	4
Warm stream	0
Warm small river	0
Warm large river	<1

Lacustrine habitat

A total of 46 lakes and ponds of at least 1 surface acre are found in the management area (Table 23).

Table 23. Size and number of lakes and ponds located within the management area.

Lake Size Class (acres)	Number
1-99	21
100-499	0
500+	25

Wetlands

A total of 19,449 acres of wetlands can be found in the management area (Table 24). Forested wetlands comprise approximately 92% of wetland types found in the management area.

Table 24. Area of emergent, forested, and riverine wetland types found within the management area.

Wetland Type	Acres
Emergent	1,090
Forested	17,988
Riverine	371

Vernal pools and seeps

A total of 437 acres of vernal pools and seeps have been inventoried in the management area while no areas of seeps have been identified.

Riparian vegetation cover

Aspen and lowland shrub are the predominant cover type present in a 100-meter riparian zone located next to streams/rivers in the management area (Table 25).

Table 25. Largest vegetative cover types (i.e., top 10) and area located in a 100-meter buffer of streams/rivers within the management area.

Cover Type	Acres
Aspen	2,158
Lowland shrub	1,994
Lowland conifers	879
Treed bog	694
Cedar	581
Upland spruce/fir	530
Northern hardwood	495
Lowland spruce/fir	412
Mixed upland deciduous	390
Marsh	346

Watershed vegetation cover

The management area includes portions of important watersheds of the Michigamme and Paint rivers (Tables 26 and 27). Aspen and northern hardwoods are major cover types of the state forest in each watershed.

Table 26. Largest vegetative cover types (top 5) and area of the Michigamme River watershed located within the management area.

Cover Type	Acres
Aspen	18,180
Northern hardwood	6,666
Lowland shrub	2,397
Lowland conifer	2,012
Cedar	1,609

Table 27. Largest vegetative cover types (i.e., top 5) and area of the Paint River watershed located within the management area.

Cover Type	Acres
Aspen	5,244
Northern hardwood	3,179
Cedar	1,209
Lowland shrub	1,045
Lowland conifer	764

Recreation

The Way Dam Complex management area is fragmented, with fair to poor public recreation and management access. Roads are gravel or poor dirt roads and there are access issues with undivided

interest and crossing privately owned land. Three snowmobile trails pass through the management area and a small portion of the Iron River-Crystal Falls ORV Route (rail-trail). There are no designated non-motorized trails. Deer Lake state forest campground provides rustic camping opportunities and access to Deer Lake.

Table 28. Designated Recreation Trails by type.

Recreation Category	Recreation Type	Number of Miles
Motorized recreation trails	ORV (all types)	2.5
Motorized recreation trails	Snowmobile	21.8
Non-motorized Recreation Trails	Hiking	0
Non-motorized Recreation Trails	Equestrian	0
Non-motorized Recreation Trails	Biking	0
Non-motorized Recreation Trails	Hunter Walking Trails	0
Total	--	**24.3**

Note: Trail use types may overlap.

Table 29. State Forest Campgrounds (SFCG).

Name	Number of Sites
Deer Lake campground	12

There are no areas managed specifically for hunting in this management area.

Boating access sites are located on several area lakes and four access sites along the Paint and Net River systems.

Table 30. Boating Access Sites.

Name	Waterbody
Cable Lake	Cable Lake
Erickson's Landing	Paint River
Fire Lake	Fire Lake
Holmes Lake	Holmes Lake
Lake Ellen SFCG	Lake Ellen
Net River Flooding	Net River Flooding
Silver Lake	Silver Lake
Snake Rapids	Net River
The Wide Waters	Net River