4.12 Dead Horse Moraines Management Area

Summary of Use and Management

Vegetative management in the Dead Horse Moraines management area (MA) (Figure 4.12.1) will provide a variety of forest products, maintain or enhance wildlife habitat, protect areas with unique characteristics and provide for forest based recreational uses. Timber management objectives for the 10-year planning period include improving the age-class distribution of aspen, maintaining the conifer component in northern hardwood stands, maintaining the presence of minor cover types on the landscape and maintaining non-forest vegetation types. Wildlife management objectives include addressing the habitat requirements identified for the following featured species: black bear, pileated woodpecker, ruffed grouse and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (emerald ash borer) and diseases (beech bark disease) will be issues for this 10-year planning period.

Introduction

The Dead Horse Moraines management area is mostly on ground moraines in southeastern Marquette, southwestern Alger and northwestern Delta Counties. The state forest covers 87,799 acres and is mostly contiguous. The major ownership in this vicinity is non-industrial private. The management area is dominated by the northern hardwoods, aspen and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by three natural communities: poor conifer swamp, mesic northern forest, and dry northern forest;
- Mid-range in site quality;
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitats.
- This management area contains one of the western Upper Peninsula Grouse Enhanced Management Systems areas. This area plan will emphasize balanced age classes of aspen for timber production which will have habitat benefits for a number of the featured species including ruffed grouse and deer. The boundaries of Grouse Enhanced Management Systems areas will be delineated and an operational plan will be developed during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager and integrated into the plan through the revision process.

The management priority in this area is to continue to provide these multiple benefits while minimizing user conflicts.

The predominant cover types, composition and projected harvest areas for the Dead Horse Moraines management area are shown in Table 4.12.1.

Table 4.12.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Cover Type	Cover %	Current Acreage	Hard Factor Limited Acres	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Acreage in 10 Years	Desired Future Harvest (Acres)	
					Final Harvest	Partial Harvest		Final Harvest	Partial Harvest
Northern Hardwood	22%	19,560	1,394	18,166	0	7,137	19,560	0	8,748
Aspen	18%	15,465	704	14761	1,524	0	15,465	2,109	0
Cedar	17%	15,106	140	14966	0	0	15,106	935	0
Lowland Conifers	15%	13,194	8,061	5133	570	0	13,194	570	0
Lowland Deciduous	9%	8,335	3,845	4490	499	0	8,335	499	0
Upland Open/Semi-Open Lands	1%	1,103	0	1103	0	0	1,103	0	0
Lowland Open/Semi-Open Lands	7%	6,024	0	6024	0	0	6,024	0	0
Misc Other (Water, Local, Urban)	1%	695	0	695	0	0	695	0	0
Others	9%	8,317	2,601	5716	721	211	8,317	736	295
Total		87,799	16,746	71,053	3,314	7,348	87,799	4,849	9,043

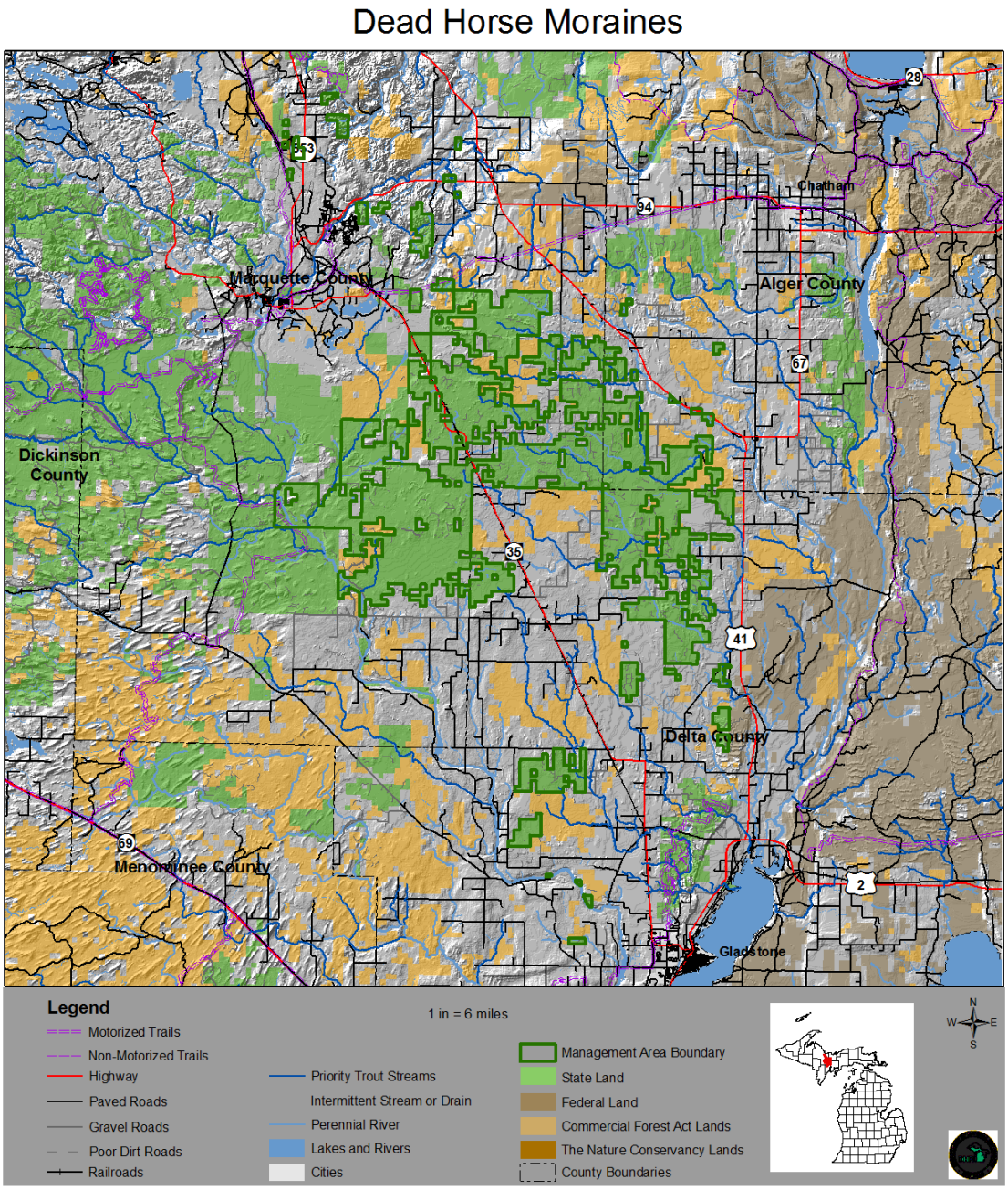

Figure 4.12.1 A map of the Dead Horse Moraines management area (dark green boundary) in relation to surrounding state forest and other lands) in Marquette, Alger and Delta Counties, Michigan.

4.12.1 Forest Cover Type Management Direction

The following sections contain information on vegetation management for each of the major cover types, a grouping of minor cover types and important non-forested vegetation types for the Dead Horse Moraines management area in the form of Desired Future Condition, 10-Year Management Objectives and Long-Term Management Objectives. This information applies to those portions of the forest where active management (i.e., timber harvest, prescribed fire, planting or mowing) will be conducted. In other portions of the state forest, the natural processes of succession and disturbance will provide ecological benefits. While most stands have a variety of tree species and other vegetation, they are classified by the species with dominant canopy coverage.

The following cover types are valued commercially for their timber products; ecologically as sources of habitat for numerous wildlife species; and for the variety of recreational opportunities they provide. Harvesting and regenerating these cover types will provide for a continuous flow of forest products and will help to ensure (or provide) wildlife habitat.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 19,560 acres (22%) of state forest land in this management area (Table 4.12.1). They occur on good-quality sugar maple sites mixed with wetland sites. Most stands have been managed using the selection harvest system. There are some problems with regeneration, especially in the southern portions of the management area. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age (Figure 4.12.2). There are 1,343 acres of northern hardwood that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

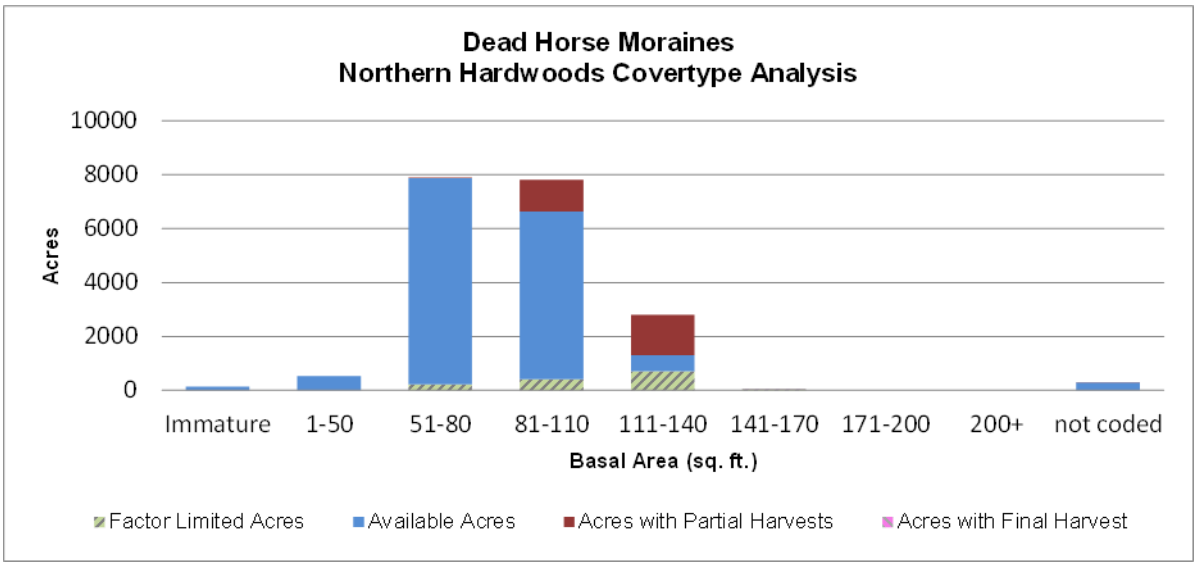

Figure 4.12.2. Graph of the basal area distribution for the northern hardwood cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selective harvest high-quality northern hardwood stands on a 20-year cycle;
- Low quality northern hardwood stands may be managed on an even-aged system with an appropriate rotation age; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Harvest 7,137 acres of northern hardwoods in this 10-year planning period;
- Maintain and promote white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock and white pine components in stands lacking that species where appropriate.

Aspen Cover Type

Current Condition

The aspen cover type covers 15,465 acres (18%) of state forest land in this management area (Table 4.12.1). Aspen has been successfully harvested and regenerated, resulting in the majority of the acres in the 0-39 year age classes (Figure 4.12.3). There are 704 acres of aspen with hard limiting factors on them. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

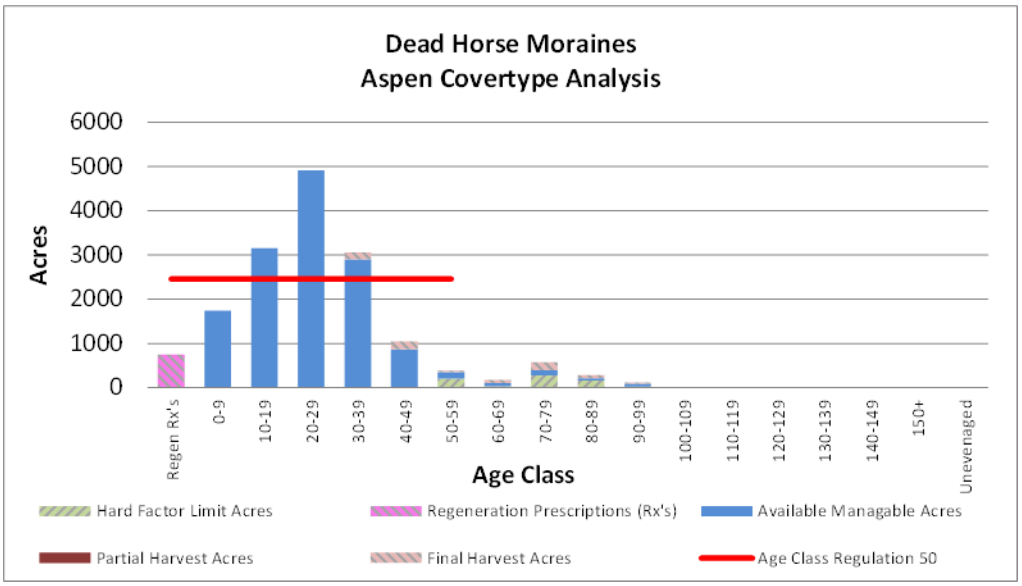

Figure 4.12.3. Graph of the age-class structure for the aspen cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length; and
- Regenerate approximately 2,460 acres each decade.

10-Year Management Objectives

- The projected harvest for this 10-year planning period is 2,717 acres of aspen;
- Identify some of the younger aspen on better sites that could be available for early harvest;
- Aspen within the identified Grouse Enhanced Management Systems area may be managed differently than the rest of the aspen within the management area, with a shorter rotation age, small patch cuts and carefully considered stand adjacency and
- Maintain mature large-tooth aspen if present as retention.

Cedar Cover Type

Current Condition

Cedar occurs on 15,106 acres (17%) of the management area (Table 4.12.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir characterize the cedar type. There are 140 acres of cedar that have factor limits due to wet conditions or for riparian corridors. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Cedar types are poorly distributed across the age-class distribution (Figure 4.12.4). Most of the stands are over 80 years of age.

Regeneration of cedar stand has been problematic in this area. Within this area, cedar regeneration experiments have been conducted in the North Perkins and Lampi Deer wintering complexes. These treatments are being actively monitored for regeneration. Future long-term management may be influenced by the results of these monitoring efforts. Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of cedar seedlings and saplings; and
- Maintain the closed canopy (>70%) structure in many cedar stands for winter deer habitat.

Long-Term Management Objectives

- Maintain cedar cover type on the landscape; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objective

- While no cedar harvests are planned for this area in the next decade, limited harvesting may occur to test methods of cedar regeneration.

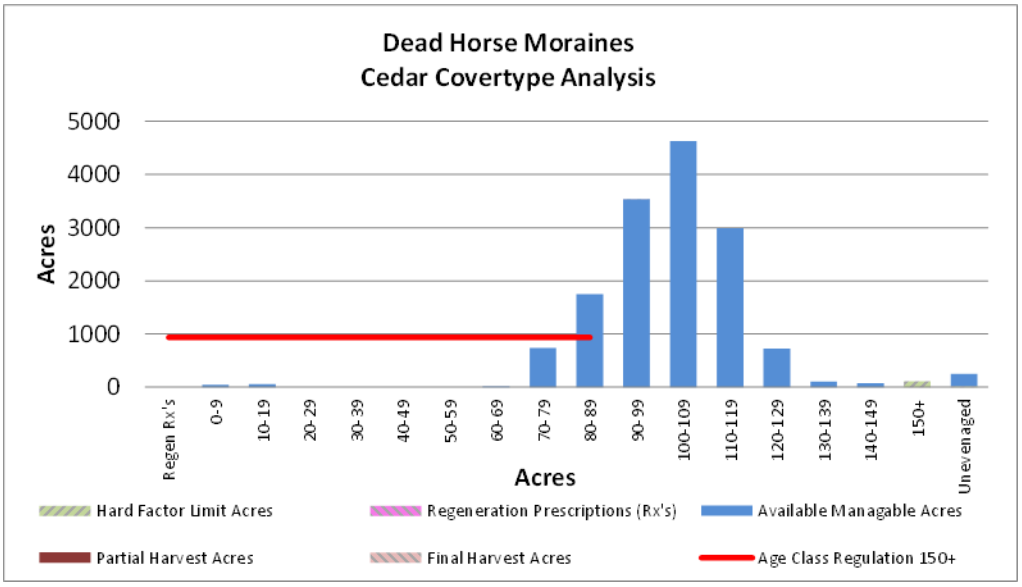

Figure 4.12.4. Graph of the age-class structure for the cedar cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 13,194 acres (15%) of the management area (Table 4.12.1). This cover type is found on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 7,648 acres of lowland conifers that have factor limits due to wet conditions or are reserved for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Mixed lowland conifers are poorly distributed across the age-class distribution, with the majority of the stands over rotation age (Figure 4.12.5). Some harvesting has been done in this type over the past 60 years, somewhat diversifying the age classes.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for approximately 570 acres to be harvested per decade; and
- Regenerate stands to a species-mix similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir.

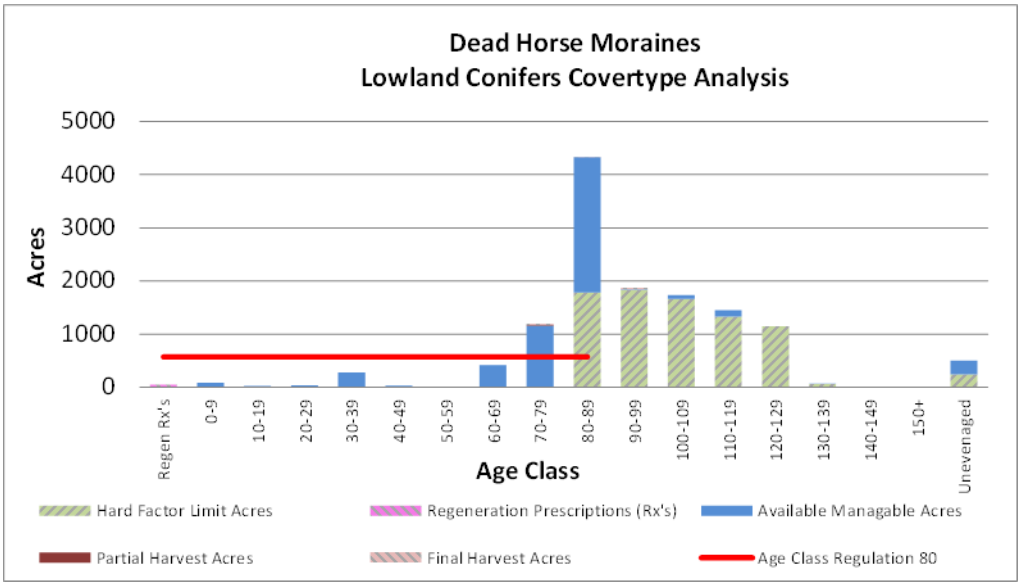

Figure 4.12.5. Graph of the age-class structure for the lowland conifer cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Harvest about 570 acres over the next decade.

Lowland Deciduous Cover Type

Current Condition

Currently there are 8,335 acres (9%) of the lowland deciduous cover type in the management area (Table 4.12.1). This cover type is often found in association with mixed lowland conifer, cedar and tamarack types. There are 3,845 acres that have factor limits due to wet conditions or for riparian corridors. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Although there has been some recent harvest and regeneration work, the lowland deciduous cover type on this management area does not have a well-balanced age-class distribution (Figure 4.12.6). Most of the stands in this area are over 80 years in age.

Desired Future Condition

- Maintain approximately the current level of the lowland deciduous cover type with stands representing a variety of age classes.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for approximately 499 acres to be harvested per decade; and
- Regenerate stands to species mixes similar to the pre-harvest conditions favoring cedar and hemlock retention.

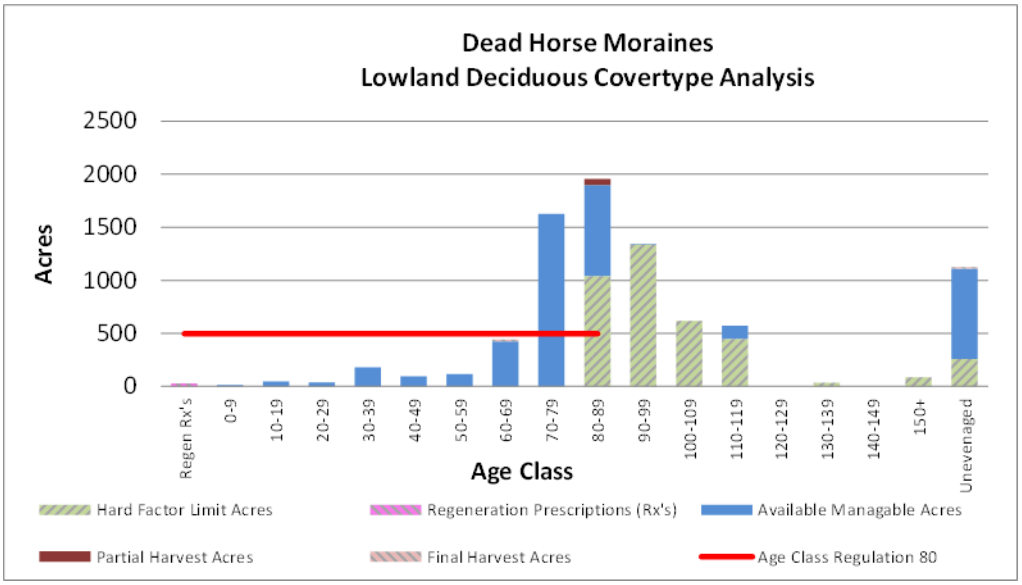

Figure 4.12.6. Graph of the age-class structure for the lowland deciduous cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Harvest about 499 acres over this 10-year planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Other Forested Cover Types

Current Condition

Other forested types make up 8,317 acres and are made up of lowland spruce/fir (2,050 acres), upland spruce/fir (1,560 acres), tamarack (1,257 acres), lowland poplar (1,056 acres), mixed upland deciduous (431 acres), jack pine (428 acres), lowland mixed forest (392 acres), hemlock (275 acres), upland mixed forest (227 acres), red pine (192 acres), paper birch (162 acres), upland conifers (90 acres), oak (83 acres), natural mixed pines (79 acres) and white pine (35 acres). Together these types make up about nine percent of the management area (Table 4.12.1).

Approximately 2,601 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Desired Future Condition

- Maintain the presence of the minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- The projected 10-year final harvest in these types is 721 acres and the projected 10-year partial harvest is 211 acres.

Other Non-forested Cover Types

Current Condition

The follow non-forested cover types are found on this management area: upland open/semi- open lands (1,103 acres-1%), lowland open/semi-open lands (6,024 acres – 7%) and other (water, local, urban) (695 acres – 1%) (Table 4.12.1).

Desired Future Condition

- These areas may be maintained in the current condition.

Long-Term Management Objective

- Grass may be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.12.2 – Featured Wildlife Species Management

The Dead Horse Moraines management area contains a large proportion of hardwood forest with excellent regeneration due to the heavier snow cover and lower deer numbers than the southern portion of this management area where regeneration can be an issue. Managers will focus efforts on attaining reliable hardwood regeneration and improving within-stand vegetative diversity. Efforts will also be made to balance the age-class distribution of aspen. The primary focus of wildlife habitat management in the Dead Horse Moraines management area will be to address the habitat requirements identified for the following featured species: black bear, pileated woodpecker, ruffed grouse and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are mast (hard and soft); mature forest (upland deciduous, especially aspen and mixed forest with little understory); coarse woody debris, early successional forest and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

This management area will include one of the western Upper Peninsula Grouse Enhanced Management System areas. The boundaries will be delineated during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager. Aspen stands that fall within the boundary may be managed to enhance habitat and hunting opportunities for ruffed grouse and deer. Habitat treatments may include managing aspen on a shortened rotation with multiple age classes and smaller stand sizes.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpecker is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inched in diameter at breast height) snags and cavity trees, coarse woody debris, and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: Leave scattered retention patches around some 18 inches in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect, disease, or fire within the same cover type and age class (within the compartment, management area or ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

Ruffed Grouse

The western Upper Peninsula goal for ruffed grouse is to maintain or improve habitat. Management during this planning period will focus on early successional forest in priority landscapes, balancing age-class distribution and provision of soft browse.

Wildlife habitat specifications:

- Maintain aspen acres in the management area and balance the age-class distribution of aspen cover types.
- Stand size for grouse: Ideal aspen stands will be irregularly shaped 10-40 acres to maximize juxtaposition or edge avoiding extensive single age final harvests. Larger harvest units should have irregular boundaries, provide one 1-3 acre unharvested clumped inclusion for every 40 acres harvested.
- Manage the aspen cover type for smaller patch size, a shorter rotation and a more deliberate habitat configuration within the designated Grouse Enhanced Management Systems areas where appropriate.
- Hold or increase the conifer component in aspen stands. Leave conifers under four-inch diameter at breast height in mixed stands and aspen types as immediate residual escape cover and to promote corridors.
- Maintain cherry production for soft mast and oak component in stands with oak and emphasize areas with a hazel understory.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.12.3 – Rare Species and Special Resource Area Management

All forest operations must be reviewed for potential conflicts between rare species and proposed forest operations, following the guidance in "*DNR's Approach to the Protection of Rare Species on State Forest Lands*" (IC4172). This is especially important when listed species are present, when past surveys have indicated a possibility of their presence, or when appropriate habitat is available and the species is known to occur in the general region.

Past surveys have noted and confirmed fourteen listed species as well as one natural community of note occurring in the management area as listed in Table 4.12.2. Any established management guidelines will be followed. Further surveys for special species and natural communities will be carried out as a matter of course during the inventory process and opportunistically for special more focused surveys.

Approximately 6,565.8 acres of potential old growth have been identified within the Dead Horse Moraines management area as shown in Figure 4.12.7. These stands were identified for a broad range of reasons and were coded in the Operations Inventory database as Stand Condition 8. These stands area also special conservation areas until they are evaluated.

Although there are no high conservation value areas, there is one ecological reference area in the management area representing the alvar natural community (9.4 acres).

Management goals during this planning period:

Goal 1: To develop and maintain a list of rare, threatened, endangered and special concern species and natural communities for the management area through a continuous inventory and through opportunistic focused inventory surveys.

Objective 1-1: Field staff should be trained and aware of the identification characteristics and natural history of rare, threatened, endangered and special concern species.

Objective 1-2: Occurrences of rare, threatened, endangered and special concern species noted during the inventory process by inventory staff should be verified and added to the body of knowledge for the management area.

Goal 2: To evaluate the potential old growth areas by the end of this 10-year planning period.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.
Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.12.4 – Forest Health Management

Although forest health issues span the entire landscape, some specific threats are more important in this management area due to the species composition, site quality or other factors. Some of the more important forest health pests in this area include:

- White trunk rot of aspen
- *Hypoxylon* canker
- Spruce budworm
- Emerald ash borer

Table 4.12.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Dead Horse Moraines management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Alvar		S1/G2?	Confirmed				Upland open/semi-open	N/A
Birds								
Northern goshawk	*Accipiter gentilis*	SC/G5/S3	Confirmed	PS	Very High	Mesic northern Forest	Northern Hardwood	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Late
			Confirmed			Dry-mesic northern forest	White Pine	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
Red-shouldered hawk	*Buteo lineatus*	T/G5/S3-4	Confirmed	PS	Very High	Floodplain forest	Lowland mixed	Mid
						Mesic southern forest		
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Mammal								
Tri-colored bat (Eastern pipistrelle	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Wild chives	*Allium schoenoprasum*	T/G5/S2				Alvar	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
Cooper's milk vetch	*Astragalus neglectus*	SC/G4/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak barrens		
						Boreal forest	Upland & Lowland Sp/F	Mid
						Hillside prairie	Upland open/semi-open	N/A
						Lakeplain oak openings		
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
Calypso or fairy-slipper	*Calypso bulbosa*	T/G5/S2	Confirmed			Rich conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Wooded dune & swale comple	Upland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry-mesic northern forest	White Pine	Late
						Great Lakes barrens	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
Purple clematis	*Clematis occidentalis*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Volcanic cliff	Upland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Boreal forest	Upland & Lowland Sp/F	Mid
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Alpine sainfoin	*Hedysarum alpinum*	E/G5/S1	Confirmed			Alvar	Upland open/semi-open	N/A
Mat muhly grass	*Muhlenbergia richardsonis*	T/G5/S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
Western dock	*Rumex occidentalis*	E/G5/S1	Confirmed			Emergent marsh	Lowland open/semi-open	N/A
Prairie dropseed	*Sporobolus heterolepis*	SC/G5/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A

Climate Change Vulnerability Index: EV – Extremely Vulnerable; HV – Highly Vulnerable; MV – Moderately Vulnerable; PS – Presumed Stable; and IL – Increase Likely.

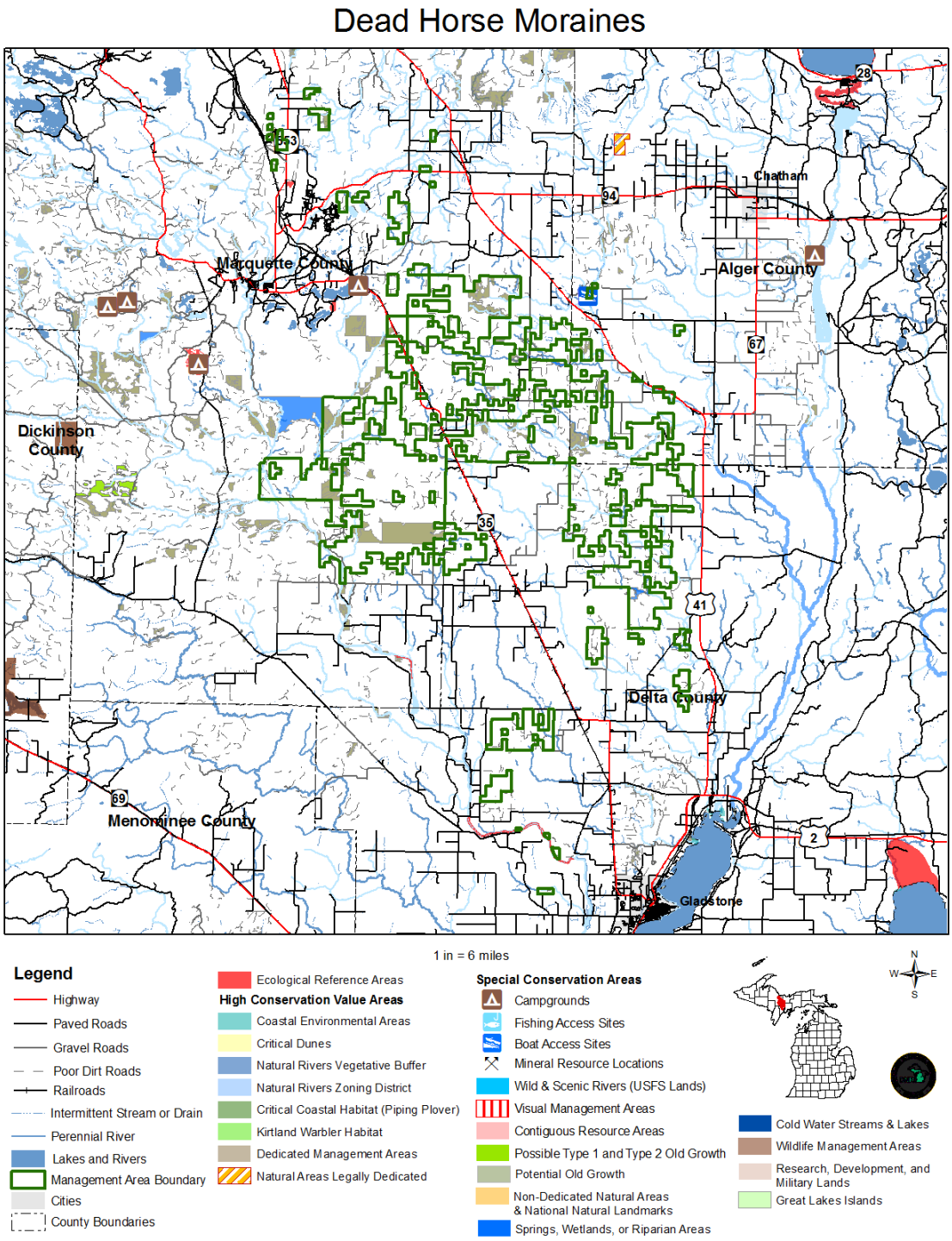

Figure 4.12.7. A map of the Dead Horse Moraines management area showing the special resource areas.

When forest pests are detected, they are to be reported to the forest health specialist for treatment recommendations. The treatment of large outbreaks of forest pests will be coordinated on a state and regional level.

Several invasive exotic species of plants are thought to be located in the vicinity. When invasive species are detected, they will be reported to the forest health specialist and treatment options will be reviewed. Priority for treatment should be given to those species that threaten sensitive sites due to their location or growth characteristics and have population levels that may be successfully controlled. Glossy buckthorn, Japanese knotweed and *Phragmites* are species of concern that have been documented in or near this management area.

4.12.5 – Aquatic Resource Management

Fisheries Division management unit biologists will review proposed forest management activities using the compartment review process and will consider the potential impact of proposed prescriptions upon riparian and aquatic values. Management prescriptions will be modified to account for riparian and aquatic values by applying the standards and guidance documents listed in the introduction to this plan section to the unique conditions specific to any given forest stand.

Prescription of riparian management zone widths greater than the minimum widths provided in IC4011 (*Sustainable Soil and Water Quality Practices on Forest Land*) must be justified and documented during the compartment review process.

Forested stands adjacent to designated high priority trout streams will specifically be managed to discourage beaver use in accordance with both DNR Policy and Procedure 39.21-20 Beaver Management and IC 4011. Designated high priority trout streams are identified in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. Remove or discourage beaver populations on designated high priority trout streams.

High priority trout streams in this management area are shown in Figure 4.12.1.

4.12.6 – Fire Management

This area is dominated by mesic northern forest and lowland conifer forest. Fire impacts were rare, resulting in very long fire return intervals.

- All wildfires are subject to appropriate initial attack suppression response.

4.12.7 – Public Access and Recreation

This area has fair public and management access. Access is better in the northern half of the area where state ownership is more contiguous. To the south, scattered parcels have limited access through private lands. The only recreational facility in this area on state forest land is a boating access site on Sporley Lake.

Specific hunting recreation improvements such as parking lots, gates, trail planting and trail establishment, as well as the preparation and dissemination of specific promotional material, may be made as a result of Grouse Enhanced Management Systems areas planning in this management area.

- Maintain current management access; and
- Work to expand public access as opportunities arise.

4.12.8 – Oil, Gas and Mineral Resources

Exploration and development for oil and gas has been limited to a few wells drilled in the eastern Upper Peninsula and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist primarily of medium-textured till, peat and muck, end moraines of coarse and medium-textured tills, glacial outwash sand and gravel and postglacial alluvium. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is potential on the uplands for additional pits.

The Ordovician Trenton and Black River Formations and Prairie du Chien Group, the Cambrian Trempealeau Formation and Munising Group and Precambrian Jacobsville and Archean Granite/Gneiss subcrop below the glacial drift. The Trenton and Black River are quarried for dolostone/stone in the Upper Peninsula.

Old iron mines are located just to the northwest of the management area. Metallic mineral exploration is not known to have occurred in the management area in the past, but there could be metallic mineral potential in the future.