4.10 MA 10 – Rattlesnake Hills Management Area

Summary of Use and Management

Management in the Rattlesnake Hills management area (MA) (Figure 4.10.1) will emphasize balancing age-classes of aspen, red pine and jack pine, regenerating the aging oak resource and the continuation of selective management of the northern hardwood resource. Management will strive to sustainably produce various timber products, enhance game and non-game wildlife habitat, protect areas of unique character, such as Green Swamp and provide for forest-based recreational uses. Management activities may be constrained by poor access on the steep slopes. Expected trends within the next decade are increased recreational pressure, illegal off-road vehicle use, introduced pests and diseases, especially beech bark disease and emerald ash borer (beech and ash are significant species in northern hardwood stands), managing oil and gas development, an increased need to regenerate oak, and elk browsing that influences forest regeneration.

The current predominant cover types, acreages and projected harvest acres in the management area are shown in Table 4.10.1.

Introduction

This management area is located in the northeast Lower Peninsula in the northwest part of Montmorency County and contains 31,217 acres of state forest (Figure 4.10.1). The primary attributes which identify the Rattlesnake Hills management area include:

- The management area falls mostly within Albert's (1995) Vanderbilt Moraines sub-region.
- Historically, northern hardwoods, red and jack pines mixed with oak, wetlands and to a lesser degree, aspen were present. Fires were fairly frequent in the drier northern part of the management area.
- Currently, the majority of the vegetation is northern hardwoods, aspen and red pine, with about 10% in relatively inaccessible lowland types which includes cedar. Elk concentrations have resulted in some cover type changes, the most significant being conversions to upland brush.
- The dominant landform consists of sandy, well drained moraine ridges surrounded by poorly drained outwash channels and plains. Green Swamp, a very large, extremely diverse high-quality rich conifer swamp is located in this management area.
- The Rattlesnake Hills management area is a popular area for the nearby communities of Atlanta and Onaway for game hunting, hiking, mushroom hunting and other activities. Along with the Pigeon River Country management area to the west, this area represents the core of Michigan's elk range.
- This area has intensive Antrim and Niagaran gas development.
- DNR recreation facilities in this management area include Clear Lake State Park. A portion of the High Country Pathway crosses the area.
- Surveys have located the several threatened, endangered or special concern species including red-shouldered hawk, secretive locust, Hungerford's crawling water beetle, Blanding's turtle, eastern massasauga rattlesnake, rough fescue, calypso orchid, Hill's thistle and ram's head lady slipper.
- Much of the topography of this management area is dominated by steep moraine ridges surrounded by outwash channels and plains.

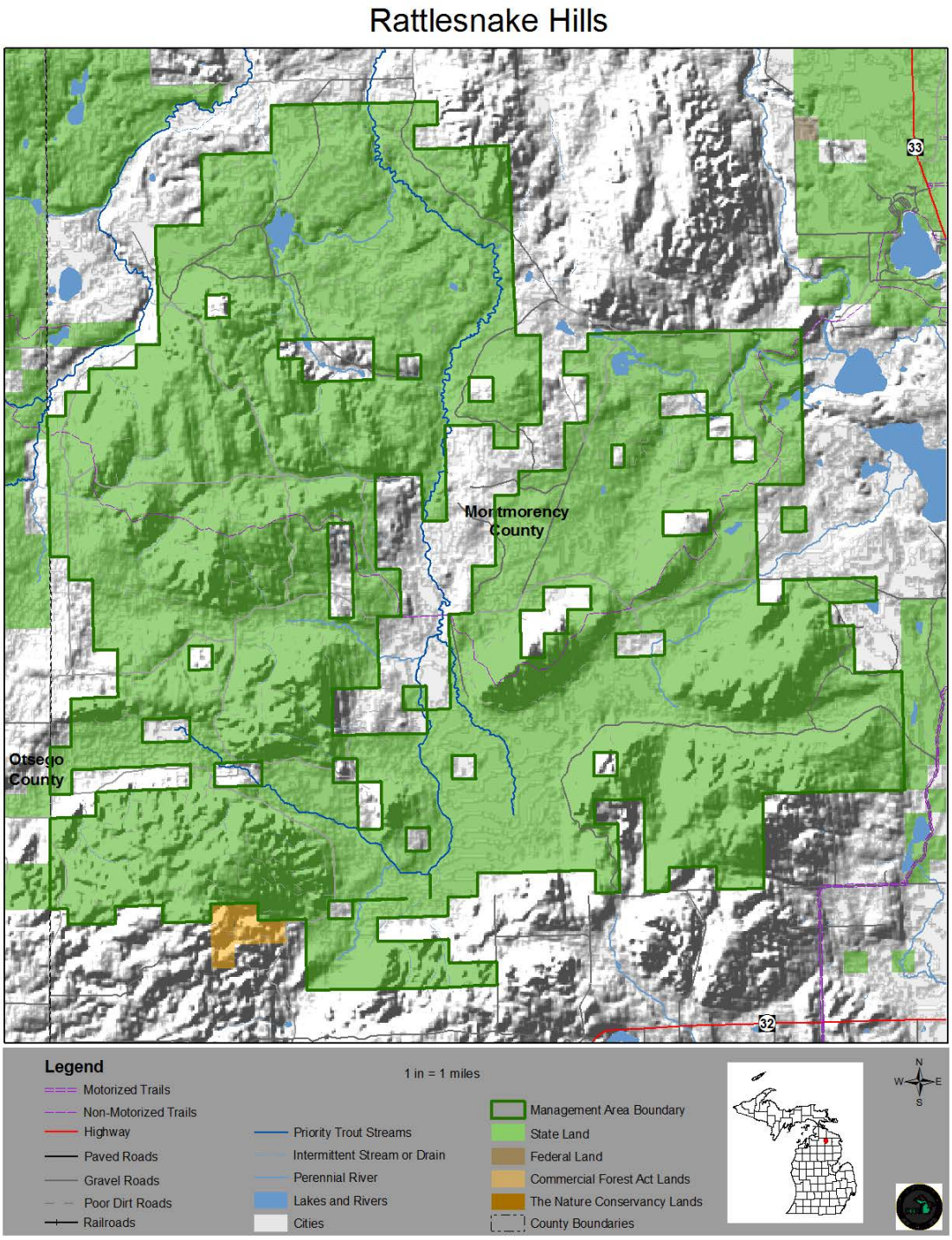

Figure 4.10.1. A map of the Rattlesnake Hills management area (dark green boundary) in relation to surrounding state forest and other land in western Montmorency County, Michigan.

Table 4.10.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Rattlesnake Hills management area, northern Lower Peninsula ecoregion (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	21%	6,555	993	5,562		2,521	6,555		2,521
Aspen	19%	6,001	262	5739	2,243		6,001	957	
Cedar	11%	3,302	3,302				3,302		
Red Pine	9%	2,809	80	2729	778	761	2,809	303	1,182
Jack Pine	8%	2,547	169	2378	410		2,547	340	
Oak	7%	2,084	1,120	964	260	407	2,084	88	407
Lowland Conifers	5%	1,708	1,366	342	38		1,708	38	
Mixed Upland Deciduous	4%	1,294		1294	470	387	1,294	185	480
Upland Open/Semi-Open Lands	7%	2,173		2173			2,173		
Lowland Open/Semi-Open Lands	2%	678		678			678		
Misc Other (Water, Local, Urban)	1%	247		247			247		
Others	6%	1,819	559	1260	256	262	1,819	135	290
Total		31,217	7,851	23,366	4,455	4,338	31,217	2,046	4,880

4.10.1 Forest Cover Type Management Direction

The following sections contain information on vegetation management direction in the form of **Desired Future Conditions**, **10-Year Management Objectives** and **Long-Term Management Objectives** for each of the major cover types or forest communities within the management area. This information applies to those portions of the forest where active management (e.g., timber harvest, prescribed fire, planting or mowing) will be conducted. In other portions of the state forest, natural succession will achieve ecological objectives. While most stands have a variety of trees species and other vegetation, stands or communities are classified by the species which has the dominant canopy coverage.

4.10.1.1 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwoods (Figure 4.10.2) acres total 6,555 acres or 21% of the management area (Table 4.10.1). Northern hardwoods are found throughout the management area on AFO, PArVVb/AFO, PArVHa/PArVVb habitat sites. Forest communities dominated by northern hardwoods in this management area are valued ecologically as sources of habitat for numerous species of wildlife including elk, bear, white-tailed deer and various song birds, commercially for pulp and saw logs and for a wide range of forest recreation. Hemlock may be found in stands throughout the management area. Portions of many stands may be on steep slopes that limit treatment options. In some locations, elk browsing can affect stand density and regeneration.

Data show that 993 acres of northern hardwoods have met harvest criteria, but have site conditions that limit harvest (hard factor limited acres). There are 1,277 acres with a partial harvest pending and these acres are included in their current basal area class. There are 53 acres with a final harvest pending and these acres are included in their current basal area class.

Desired Future Condition

- Northern hardwood-dominated forest communities will be maintained on operable sites through selective harvesting to achieve an uneven-aged stand structure to provide for a continuous supply of timber products, wildlife habitat and recreation opportunity.

10-Year Management Objectives

- Selectively harvest a projected 2,521 acres of northern hardwood characterized as having a management area of 111 square feet per acre or greater;
- Where necessary and feasible, consider harvesting stands from lower basal area ranges to expedite the balancing of basal area distributions; and
- If present, retain hemlock and other under-represented species in harvest areas for within stand diversity.

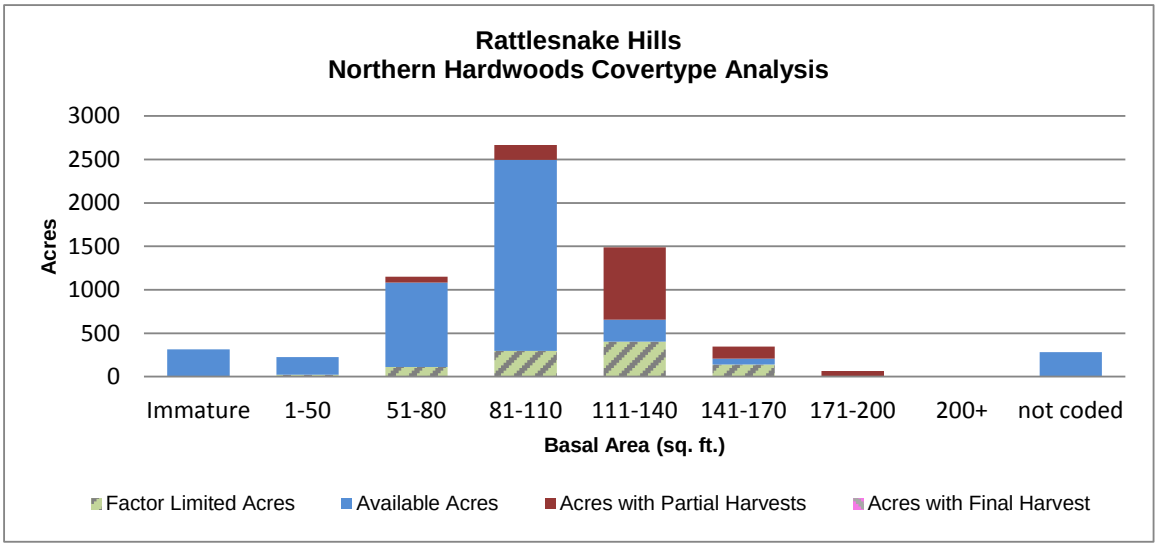

Figure 4.10.2. Basal area distribution for northern hardwoods in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

Long-Term Management Objectives

- Emerald ash borer and beech bard disease will change the stand composition of the northern hardwoods in this management area. As these species lessen in the northern hardwood stands, consider introducing oak for mast in stands without oak; and
- Consider the need to delay further selection harvesting due to resultant lower than normal residual basal area in post-salvage harvest stands.

4.10.1.2 Forest Cover Type Management – Aspen

Current Condition

Aspen acres total 6,001 or 21% of the management area (Table 4.10.1). Aspen is found throughout the management area on AFOCa, AFO, PARVVb/AFO, PArVVb and PARVHa/PArVVB habitat sites (see Appendix E). Forest communities dominated primarily by aspen in this management area are valued ecologically as sources of habitat for numerous species of wildlife including ruffed grouse, hare, woodcock, elk, bear, white-tailed deer and various song birds, commercially for pulp and saw logs and for a wide range of forest recreation. Accessible aspen has been consistently harvested over the last 50 years resulting in most of the aspen being less than 50 years old (Figure 4.10.3).

There are 262 acres of aspen have met harvest criteria, but have site conditions that limit harvest (hard factor limited acres). There are 324 acres that have regeneration harvest pending and these acres are included in the regeneration prescription class.

Desired Future Condition

- Aspen-dominated forest communities will be maintained on operable sites through even-aged management with acres balanced between 0 and 59 years of age to provide for a regulated harvest, wildlife habitat and recreation opportunity.

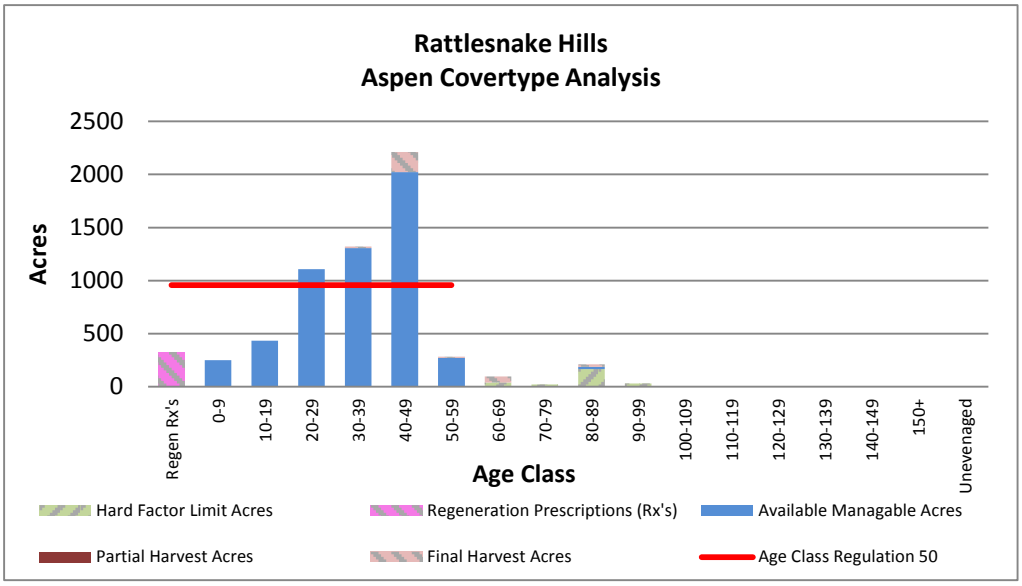

Figure 4.10.3. Age-class distribution for aspen in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct regeneration harvests on a projected 2,243 acres;
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite the balancing of age class distributions; and
- Consider the need for larger harvest areas to minimize possible elk browsing impacts.

Long-Term Management Objectives

- Continue regeneration harvests to balance the age-class distribution; and
- Desired future harvest levels are projected at 957 acres for final harvest per 10-year period.

4.10.1.3 Forest Cover Type Management – Red Pine

Current Condition

Red pine communities, mostly planted during the Civilian Conservation Corps-era, acres total 2,809 acres or 9% of the management area (Table 4.10.1), with most being 70-79 years old (Figure 4.10.4). Red pine is found on PARVHa, PArVHa/PArVVb and PVCd habitat sites. Red pine plantations in this management area are commercially valued for pulp, saw logs and utility poles. Some of the dry red pine sites are converting to jack pine.

There are 80 acres of red pine have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 118 acres of stands that have regeneration harvest pending and these acres are included in the regeneration prescription class and there are 23 acres with a partial harvest pending and these acres are included in their current age classes.

Desired Future Condition

- Red pine on dry-mesic sites will be maintained and managed with a thinning regime until stand replacement harvest at economic maturity with acres balanced between 0 and 89 years of age to provide for continual harvest, wildlife habitat, and recreational opportunity.

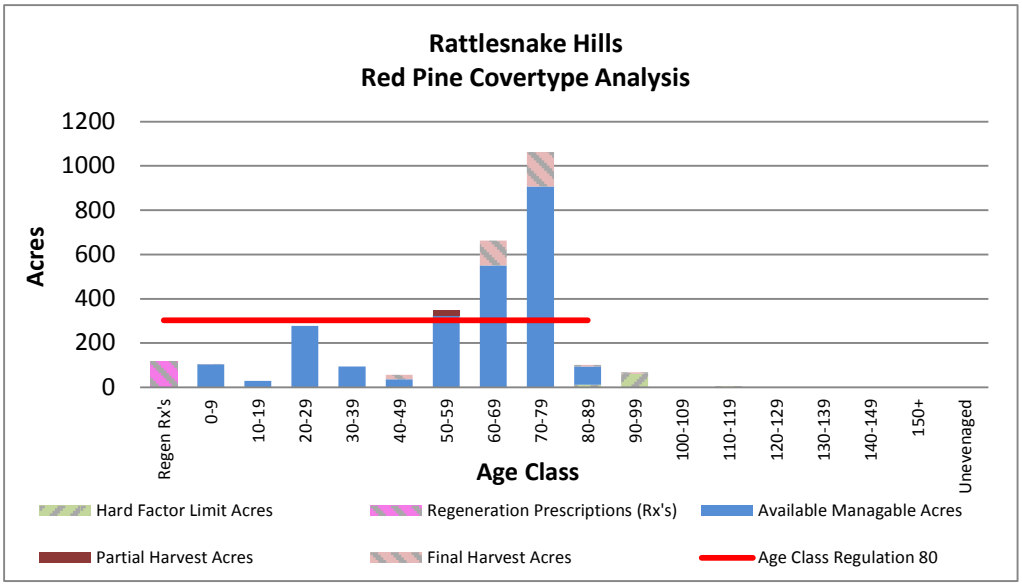

Figure 4.10.4. Age-class distribution for red pine in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and balancing age class distribution;
- Conduct partial harvests on a projected 761 acres, concentrating on stands of better quality red pine that has the potential for a higher product value in larger size classes; and
- Conduct regeneration harvests on a projected 778 acres, beginning with the oldest age classes.

Long-Term Management Objectives

- In identified special conservation areas, especially those with natural red pine on dry-mesic sites, consider management of red pine to a biological rotation of 200+ years;
- Over the next several decades, continue thinning red pine that are currently in the 40-69 year age classes. For most stands at age 80, conduct stand-replacement harvests for either natural or planted regeneration; and
- Desired future harvest levels are projected at 303 acres of final harvest and 1,182 acres of partial harvest per 10-year period.

4.10.1.4 Forest Cover Type Management – Jack Pine

Current Condition

Jack pine acres total 2,547 or 8% of the management area (Table 4.10.1). Jack pine is found throughout the management area on habitat class PArVVb, PARVHa and PVCd sites. Forest communities dominated primarily by jack pine in this management area are valued ecologically as sources of habitat for numerous species of wildlife including bear, white-tailed deer and various song birds, commercially for pulp and saw logs and for a wide range of forest recreation. Accessible jack pine has been consistently harvested over the last 50 years.

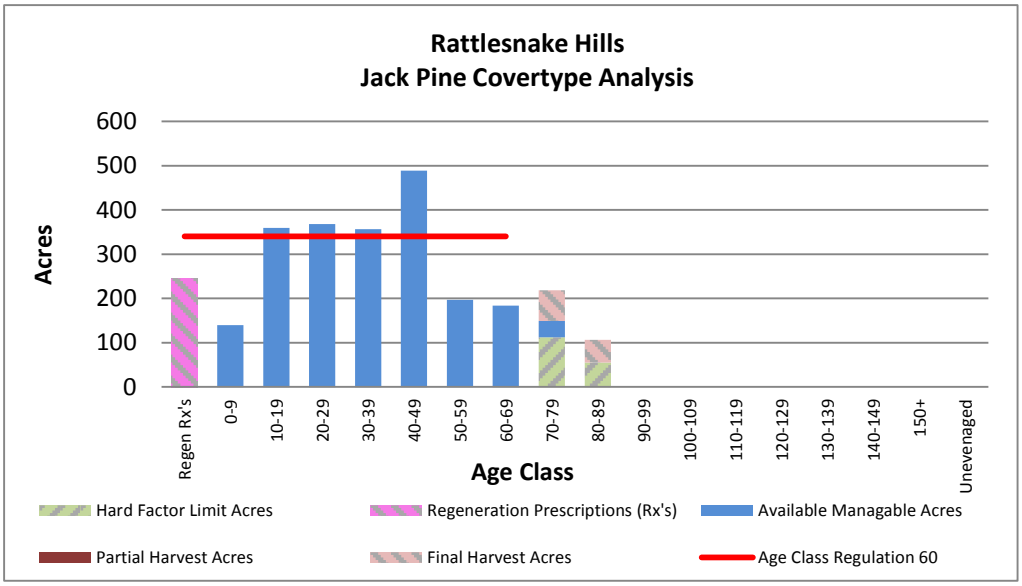

Figure 4.10.5. Age-class distribution for jack pine in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

There are 169 acres of jack pine have met harvest criteria (Figure 4.10.5), but have site conditions that limit harvest (hard factor limit acres). There are 246 acres of stands that have regeneration harvest pending and these acres are included in the regeneration prescription class. Conversions of other cover types to jack pine as a result of treatments that harvest another species and planting to jack pine are included in the regeneration prescription class.

10-Year Management Objectives

- Conduct stand-replacement harvests on a projected 410 acres concentrating on the oldest age classes first.

Long-Term Management Objectives

- Consider the potential for jack pine budworm outbreaks in management decisions;
- Continue management to balance the age-class distributions; and
- Desired future harvest levels are projected at 340 acres of final harvest per 10-year period.

4.10.1.5 Forest Cover Type Management – Oak

Current Condition

Oak acres total 2,084 or 8% of the management area (Table 4.10.1) on PArVHa/PVCd habitat classes. Forest communities dominated primarily by oak in this management area are valued ecologically as sources of habitat and mast for numerous species of wildlife including bear, deer, squirrels and various birds and commercially for firewood and industrial lumber. There are 1,120 acres of oak have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres).

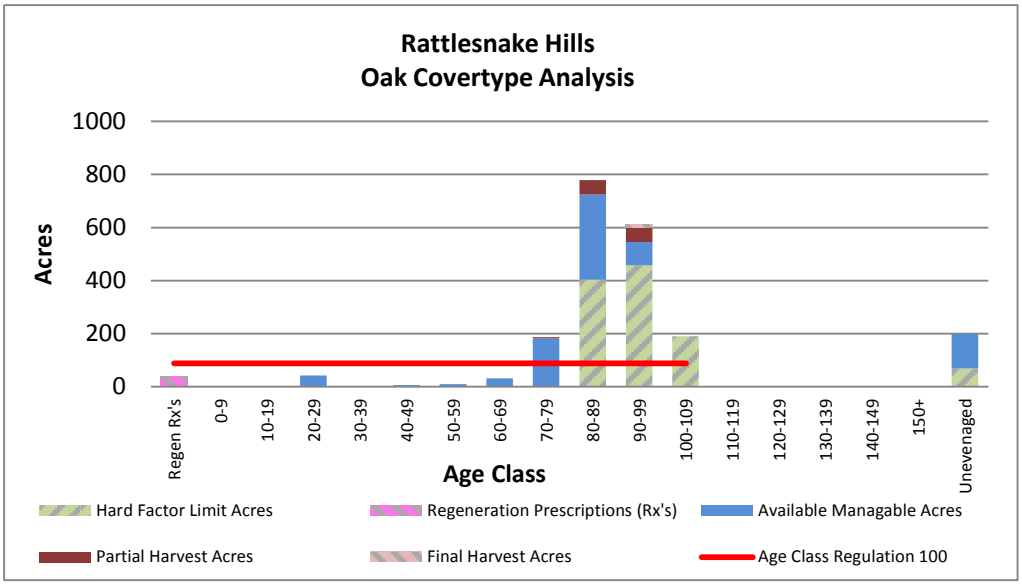

Figure 4.10.6. Age-class distribution for oak in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

There are 13 acres of stands that have regeneration harvest pending and these acres are included in the 0-9 year-old age class (regenerating acres) (Figure 4.10.6) and there are 113 acres with a partial harvest pending and these acres are included in their current age class.

Desired Future Condition

- Northern pin oak will be maintained on operable sites through even-aged management with acres balanced between 0 and 89 years of age;
- Northern red oak will be maintained on operable sites through selection management until age 100; and
- Oak management will provide a sustained yield of forest products along with wildlife mast and habitat and recreation opportunity.

10-Year Management Objectives

- Manage northern pin oak on an 80-year rotation and northern red oak on a 100-year rotation;
- Conduct regeneration harvests on a projected 260 acres;
- Conduct partial harvests on a projected 407 acres concentrating on stands that have not had any harvests or those stands that have a sufficient basal area for a partial harvest; and
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite the balancing of age-class distributions.

Long-Term Management Objectives

- Over the next several decades, continue stand replacement harvests to balance age-class structure;
- Consider whether to introduce pine as a seed source or stand component to provide cover for oak regeneration and for stand diversity; and
- Desired future harvest levels are projected at 88 acres of final harvest and 407 acres of partial harvest per 10-year period.

4.10.1.6 Forest Cover Type Management – Cedar and Lowland Conifers

Current Condition

Cedar acres total 3,302 or 11% of the management area and lowland conifer acres total 1,708 or 5% of the management area (Table 4.10.1). Cedar and lowland conifer are primarily located on unclassified lowlands (lowlands have not been assessed for habitat classification) throughout the management area. The age-classes for both cover types are heavily skewed toward the older age classes above 70 years of age (Figure 4.10.7 and 4.10.8) and there has been virtually no regeneration.

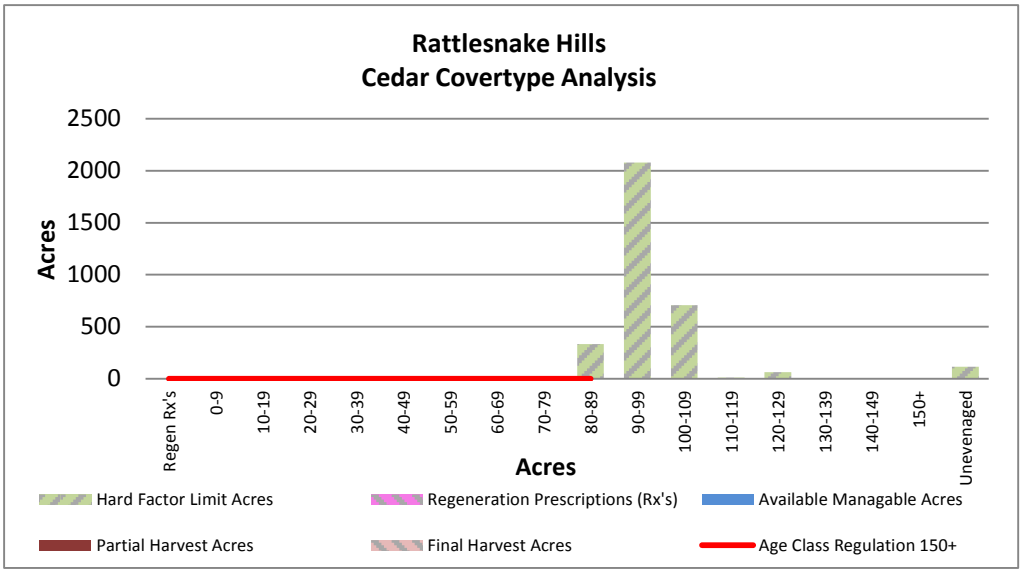

Figure 4.10.7. Age-class distribution for cedar in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

Forest cover types dominated primarily by cedar and lowland conifers in this management area are valued ecologically as sources of habitat for numerous species of wildlife including bear, white-tailed deer, hare and various song birds, and commercially for pulp.

There are 871 acres of lowland conifers and all 3,302 acres of cedar that have met harvest criteria, but have a site conditions that may limit the ability to commercially harvest (hard factor limit acres).

Desired Future Condition

- Lowland conifer dominated forest cover types will be maintained on operable sites through even-aged management with acres balanced between 0 and 89 to provide for a sustainable harvest;
- These types will also contribute to the preservation of regional biodiversity by providing habitat for a unique suite of plants and wide variety of animal species; and
- By storing high levels of sequestered carbon and serving as carbon sinks, cedar and lowland conifer swamps will play an important role in global geochemical cycles.

10-Year Management Objectives

- If harvests can be done in a manner that will not impact wetland soils, conduct regeneration harvests on a projected 38 acres of lowland conifer;
- Additional opportunities to increase harvest prescriptions in lowland forest types will be assessed, both in and outside (due to forest health issue) of normal years-of-entry; and
- Consider methods to ensure adequate regeneration lowland types.

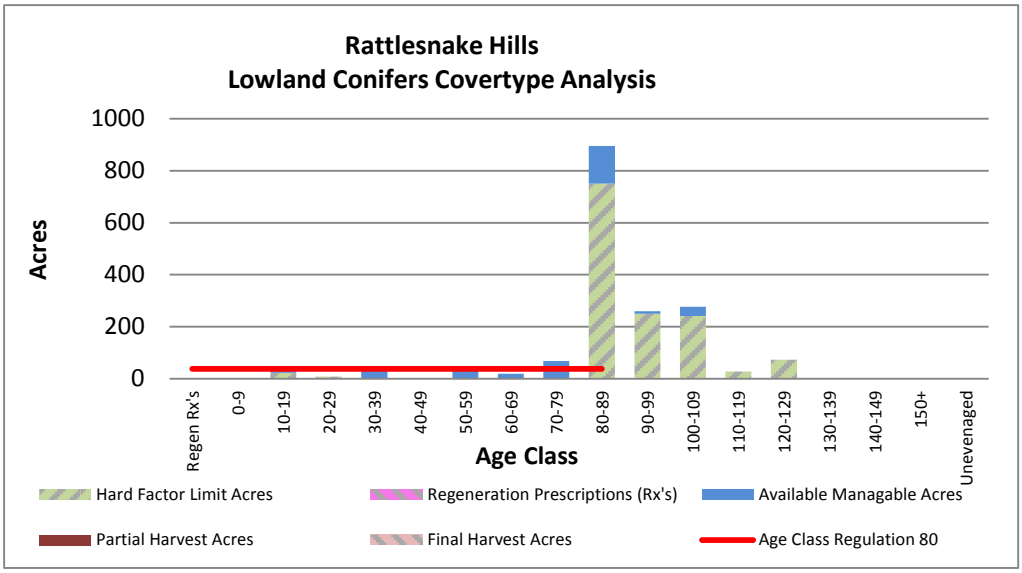

Figure 4.10.8. Age-class distribution for lowland conifer in the Rattlesnake Hills management area (2012 Department of Natural Resources inventory data).

Long-Term Management Objectives

- It is acceptable that over the next several decades, the older cedar and lowland conifer, much of it inaccessible for harvest, will continue to experience natural processes (fire, windthrow, insect defoliation and beaver flooding) resulting in the formation of a range of successional stages; and
- Desired future harvest levels are projected at 38 acres of lowland conifer final harvest per 10-year period.

4.10.1.7 Forest Cover Type Management – Lowland Open/Semi-Open Lands

Current Condition

Lowland open/semi-open lands (lowland shrub, marsh, treed bog and bog) communities in this management area are valued ecologically as sources of habitat for numerous species of wildlife. Lowland open/semi-open acres total 678 acres or 2% of the management area (Table 4.10.1).

Desired Future Condition

- Lowland open/semi-open lands sites will be maintained at or above current levels to provide wildlife habitat.

10-Year Management Objectives

- Management in lowland open/semi-open lands will be minimal. What little maintenance that will be done will be to maintain the hydrology and open characteristics.

Long-Term Management Objectives

- Continue management to maintain upland open/semi-open lands at or above current levels;
- Continue to protect stands from illegal off-road vehicle use; and
- Where feasible and necessary, use control methods on invasive non-native species.

4.10.1.6 Forest Cover Type Management – Upland Open/Semi-Open Lands

Current Condition

Upland open/semi-open lands total 2,173 acres or 7% of the management area. This category is a combination of the following non-forested land cover types: herbaceous open land, upland shrub, bare/sparsely vegetated and low-density

trees. These non-forested areas are a result of natural processes of fire, frost or other disturbances which create openings in the forest canopy along with the past management practices to maintain these areas. These communities are valued ecologically as sources of open land habitat for numerous species of wildlife.

Desired Future Condition

- The amount of upland open/semi-open lands will be at or above the current level to provide habitat for species which use openings.

10-Year Management Objectives

- Consider management to maintain upland open/semi-open lands.

Long-Term Management Objectives

- Continue management to maintain upland open/semi-open lands at or above current levels;
- Continue to protect stands from illegal off-road vehicle use; and
- Where feasible and necessary, use control methods on invasive non-native species.

4.10.1.7 Forest Cover Type Management – Other Types

Individual cover types which may cover less than 5% of the management area include: mixed upland deciduous 1,294 acres or 4% of the management area. Other species including non-forested types which are scattered in small stands cover 1,819 acres or 6% of the management area. All of the timbered and non-timbered communities have important ecological values and are important habitat for numerous wildlife species.

Desired Future Condition

- These communities will be managed on operable sites, contributing to the compositional diversity of the landscape while providing for sustainable harvest and to contribute to the preservation of regional biodiversity by providing habitat for a unique suite of plants and wide variety of animal species.

10-Year Management Objectives

- Seek opportunities to harvest, where appropriate, the scattered acreages of upland and lowland minor types where access and operability will not adversely impact sensitive areas;
- The following species are projected for regeneration harvests: mixed upland deciduous 470 acres, lowland aspen/balsam poplar 115 acres, white pine, 51 acres, natural mixed pines 59 acres and upland mixed forest, 96 acres and:
- The following species are projected for partial harvests: 387 acres of mixed upland deciduous, 27 acres of white pine, 107 acres of natural mixed pines, 99 acres of upland mixed forest and 21 acres of upland conifers.

Long-Term Management Objectives

- Continue efforts to regenerate lowland types where feasible.

4.10.2 Featured Wildlife Species

The following have been identified as featured species for this management area during this cycle of state forest planning:

- Black bear
- Eastern massasauga rattlesnake
- Elk
- Golden-winged warbler
- Pileated woodpecker
- Red-shouldered hawk
- Ruffed grouse
- Wild turkey
- White-tailed deer

The primary focus of wildlife habitat management in the Rattlesnake Hills management area will be to address the habitat requirements identified for the listed featured species. Based on the selected featured species, some of the most significant wildlife management issues in the management area are the maintenance of young forest; extensive mature forest; large open grassland complexes; the retention of large, over-mature trees and snags; and the maintenance and expansion of hard mast and mesic conifer components.

A more detailed overview of featured species is included in Section 3.

Black Bear

The goal for black bear in the management area is to maintain or improve habitat. Black bears have large home ranges and require large contiguous tracts of diverse forests with a mixture of cover types. They tend to use forested riparian corridors in their movements (which can be extensive). Hard mast is critical in the fall for bears to achieve adequate weight gains before denning. State forest management for the species should focus on improving existing habitat by minimizing forest fragmentation and maintaining oak to offset potential population declines due to changes in land-use.

Wildlife Habitat Specifications:

- Identify, maintain, develop or restore forested corridors that connect larger forested tracts, paying particular attention to riparian zones.
    - Implementation of riparian guidance (best management practices) will be sufficient to meet the black bear habitat specifications related to preventing fragmentation and maintaining corridors.
- Conduct silvicultural practices that maintain or increase oak-dominated stands and the oak component of mixed stands.
    - Implementation of the 10-year management direction for oak will be sufficient to meet black bear habitat specifications.

Elk

The goal for elk in the management area is to maintain the population at 500-900 animals as measured in the biennial aerial survey. Elk prefer open areas and regenerating deciduous forest. Mast crops, especially acorns, are important sources of food in fall and winter. State forest management should focus on maintaining/increasing early successional, opening and hard mast habitat components at/to desired levels in priority landscapes.

Wildlife Habitat Specifications:

The goals of habitat management in the elk range are described in the 2007 Pigeon River Country Concept of Management:

- Maintain 7-8% of the forest cover types managed by even aged management in the 0-9 year-old age class;
- Maintain the existing aspen component;
- Increase the amount of opening and upland brush to 6-7 percent of the range; and
- Maintain the existing component of mast producing trees (red oak, white oak, northern pin oak and beech).

Eastern Massasauga Rattlesnake

The goal for eastern massasauga rattlesnake in the management area is to maintain available habitat and provide for the long-term persistence of the rattlesnake population. Eastern massasauga rattlesnakes inhabit open wetlands for over-wintering as well as adjacent upland open cover types that support gestation and parturition. Populations in northern Michigan will often use lowland coniferous forests, such as cedar swamps, as well as open wetlands. Upland sites may range from forest openings to old fields, agricultural lands and prairies. State forest management for the species should focus on maintaining suitable habitat on dedicated managed lands in accordance with the approved Candidate Conservation Agreement with Assurances. As of August 2013, the Candidate Conservation Agreement is in the initial stages of approval and as a result is subject to change. Refer to approved Candidate Conservation Agreement for final managed land boundaries and habitat management guidelines. Approximately 6,300 acres of state forest land in the Rattlesnake Hills management area are proposed for designated as eastern massasauga rattlesnake managed lands per the raft Candidate Conservation Agreement.

Wildlife Habitat Specifications:

- At occupied sites maintain ≤50% canopy from trees and shrubs in wetland and upland vegetation types, maintain patches of suitable habitat at greater than 250 acres, restrict mowing and burning to November to March when eastern massasauga rattlesnake are in hibernation, and refrain from manipulating water levels between November and March at sites where eastern massasauga rattlesnake are known to occur.
    - Implementation of eastern massasauga rattlesnake Candidate Conservation Agreement in appropriate management areas will be sufficient to meet eastern massasauga rattlesnake wildlife habitat specifications in this management area.

Golden-winged Warbler

The goal for golden-winged warbler in the management area is to maintain or increase available habitat. Golden-winged warbler nest in a variety of shrubby and early-successional forest sites including moist woodlands, willow and alder thickets and young forests of sapling aspen and fire cherry. Habitat tracts of 25-125 acres can support several pairs and are preferred over both smaller and larger areas. State forest management should focus on the maintenance of young aspen (0-10 years old) in association with lowland shrub and grasslands in priority landscapes.

Wildlife Habitat Specifications:

- Identify commercial and non-commercial treatment opportunities in aspen and alder adjacent to or within lowland shrub and grassland. Treatment areas 25-125 acres are preferred.
    - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this golden-winged warbler habitat specification.
- Within management area, maintain 20% of aspen associated with lowland shrub and grasslands in the 0-10 year age class.

Pileated Woodpecker

The goal for pileated woodpecker in the management area is to maintain available habitat. Pileated woodpeckers prefer stands greater than 40 years old for foraging and greater than 70 years old for nesting and roosting and abundance is positively related to the density of trees >12 inches in diameter at breast-height. State forest management should focus on the maintenance of a component of large diameter trees (>12 inches in diameter at breast height) at the landscape scale.

Wildlife Habitat Specifications:

- Maintain a component of large diameter trees greater than 12 inches in diameter at breast height.
    - Implementation of Within-Stand Retention Guidance, factor-limited acres, uneven-aged management in the northern hardwoods type, special conservation areas with objectives for big tree management, and continued mortality from insect and disease will be sufficient to meet the pileated woodpecker habitat specifications for large trees in this management area.

Red-shouldered Hawk

The goal for red-shouldered hawk in the management area is to maintain available habitat. Red-shouldered hawks nest in contiguous, mature, closed canopy, hardwood forests. Nesting habitat consists primarily of well-stocked pole or sawtimber stands (stocking densities 6 and 9) with a closed canopy (80-100%) and basal area of at least 98 square feet per acre. Nests are usually found in deciduous trees with a mean diameter of 23 inches at breast height. State forest management activities should focus on the maintenance of large blocks (>385 acres) of mesic northern forest with the appropriate level of large diameter trees in priority landscapes.

Wildlife Habitat Specifications:

- All suspected red-shouldered hawk nests are to be reported to local wildlife staff and confirmed nests documented in accordance with the DNR *Approach to the Protection of Rare Species on State Forest Lands* (CI 4172) and included in Integrated Forest Monitoring, Assessment and Prescriptions Geographic Decision Support Environment when there is an expected operational impact. For red-shouldered hawk, the wildlife habitat specifications contained within Michigan DNR's *Interim Management Guidelines for Red-Shouldered Hawks and Northern Goshawk on State Forest Lands* (August 2012) will be followed.

Ruffed Grouse

The goal for grouse in the management area is maintain available habitat. Ruffed grouse prefer young (6-15 year-old), even-aged deciduous stands that typically support 8,000-10,000 woody stems/acre. Although ruffed grouse use many different forest types (aspen, birch, oak-hickory), aspen can support higher densities than those attained in other forest types. The juxtaposition of different age classes allows for different life history requirements to be met within a small area and promotes higher grouse densities. Ideal aspen stands will be of 40-160 acres under a 40-year rotation with staggered harvests of 25% every 10 years in 10-40 acre harvest units. Larger harvest units should have irregular boundaries and include one or two, 1-3-acre unharvested inclusions. State forest management should focus on maintaining and balancing the age-class distribution for aspen and oak cover types in priority landscapes.

Wildlife Habitat Specifications:

- Maintain the aspen cover type and the aspen component in mixed stands within the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this ruffed grouse habitat specification.
- Move to balance the age-class distribution of aspen and continue management to regenerate oak to maintain young forests across the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen, lowland deciduous and oak will be sufficient to meet this ruffed grouse habitat specification.
- Maintain the upland shrub cover type specifically juneberry, hawthorn, cherry and other mast producing shrub components.
  - Implementation of 10-year management direction for upland brush will be sufficient to meet this grouse habitat specification.

Wild Turkey

The goal for turkey in the management area is maintain available habitat. In northern Lower Peninsula, snow depth is the primary limiting factor that restricts turkey population expansion as deep snow limits access to winter food. The availability of acorns can help mediate the impacts of deep snow. A secondary limiting factor throughout their range is good brood cover. Openings with grasses and forbs and little or no overstory trees are preferred. State forest management should focus on providing natural winter food, maintaining and regenerating oak, and maintaining brood-rearing openings to improve brood-production and winter survival.

Wildlife Habitat Specifications:

- Maintain and increase the number of brood-rearing openings (forest openings, savannas, barrens, hayfields, etc.).
  - Implementation of 10-year management direction for upland open land will be sufficient to meet this turkey habitat specification.
- Through opening maintenance, planting and pruning, provide sources of winter food that are accessible above the snow (food plots, annual grains, fruit-bearing trees or shrubs).
  - Implementation of 10-year management direction for upland open land will be sufficient to meet this turkey habitat specification.
- Conduct silvicultural practices that conserve the oak component in forest stands and promote oak regeneration.
  - Implementation of 10-year management direction for oak will be sufficient to meet this turkey habitat specification.

White-tailed Deer

The goals for white-tailed deer habitat in the management area are to: 1) Maintain spring and summer forage and improve recreational access through openings management; 2) Maintain the overall proportion of potential woody browse such as aspen; 3) Maintain or increase the oak component in forest stands and promote oak regeneration; and 4) Maintain and promote functional shelter in wintering complexes.

Wildlife Habitat Specifications:

- Annual manage at least 3,000 acres of forest openings across the ecoregion to provide spring and summer forage and recreational opportunities.
  - Implementation of 10-year management direction for upland open land and upland shrub will be sufficient to meet this deer habitat specification.

- Maintain the aspen cover type and the aspen component in mixed stands within the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this deer habitat specification.
- Move to balance the age-class distribution of aspen and continue management to regenerate oak to maintain young forests across the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen, lowland deciduous and oak will be sufficient to meet this deer habitat specification.
- Conduct silvicultural practices that conserve the oak component in forest stands and promote oak regeneration.
  - Implementation of 10-year management direction for oak will be sufficient to meet this deer habitat specification.
- Manage cedar and hemlock with the main objectives of regeneration and providing future functional cover
  - Implementation of 10-year management direction for cedar and lowland conifer will be sufficient to meet this deer habitat specification.
- Promote hemlock on appropriate sites using silviculture to increase within-stand hemlock components.

4.10.3 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 or past surveys have indicated a possibility of their presence.

Past surveys have noted and confirmed nine listed species and no natural communities of note occurring in the management area as listed in Table 4.10.2. 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.

There are no high conservation value areas or ecological reference areas identified for the Rattlesnake Hills management area as illustrated in Figure 4.10.9.

Management goals during this planning period:

- Document occurrences of rare, threatened, endangered and special concern species and natural communities for the management area through the inventory process or with occasional focused surveys.
- Evaluate all potential Type 1, potential Type 2 and potential old growth areas to determine their status as a special resource area.
- Develop and maintain management and monitoring plans for ecological reference areas on state forest land.

Table 4.10.3. Occurrence information for special concern, rare, threatened and endangered communities and species for the Rattlesnake Hills 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								
Rich conifer swamp		S3/G4	Confirmed				Tamarack	Late
Birds								
Red-shouldered hawk	*Buteo lineatus*	T/G5/S3-4	Confirmed	PS	Very High	Floodplain forest	Lowland mixed	Mid
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Insect								
Hungerford's crawling water beetle	*Byrchius hungerfordi*	LE/E/G1/S1	Confirmed	HV	Very High	Northern shrub thicket	Upland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
Secretive locust	*Appalachia arcane*	SC/S2S3/G2G3	Confirmed	MV	Very High	Bog	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
Reptile								
Blanding's turtle	*Emydoidea blandingii*	SC/G4/S3	Confirmed	HV	Very High	Mesic prairie	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern fen	Lowland open/semi-open	N/A
						Submergent marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Great Lakes marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Inundated shrub swamp	Lowland open/semi-open	N/A
Eastern Massassauga rattlesnake	*Sistrurus catenatus catenatus*	C/SC/G3G4T3T4Q/S3S4	Confirmed	HV	High	Coastal fen	Lowland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Poor conifer swamp	Tamarack	Late
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Dry northern forest	Jack Pine, Red Pine	Early
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
Plants								
Hill's thistle	*Cirsium hillii*	SC/G3/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Boreal forest	Upland open/semi-open	N/A
						Dry northern forest	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
Ram's head lady's-slipper	*Cypripedium arietinum*	SC/G3/S3	Confirmed			Rich conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Poor fen	Lowland open/semi-open	N/A
						Wooded dune & swale complex	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
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
Rough fescue	*Festuca scabrella*	T/G5/S2S3	Confirmed			Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
Limestone oak fern	*Gymnocarpium robertianum*	T/G5/S2	Confirmed			Rich conifer swamp	Tamarack	Late
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland 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.

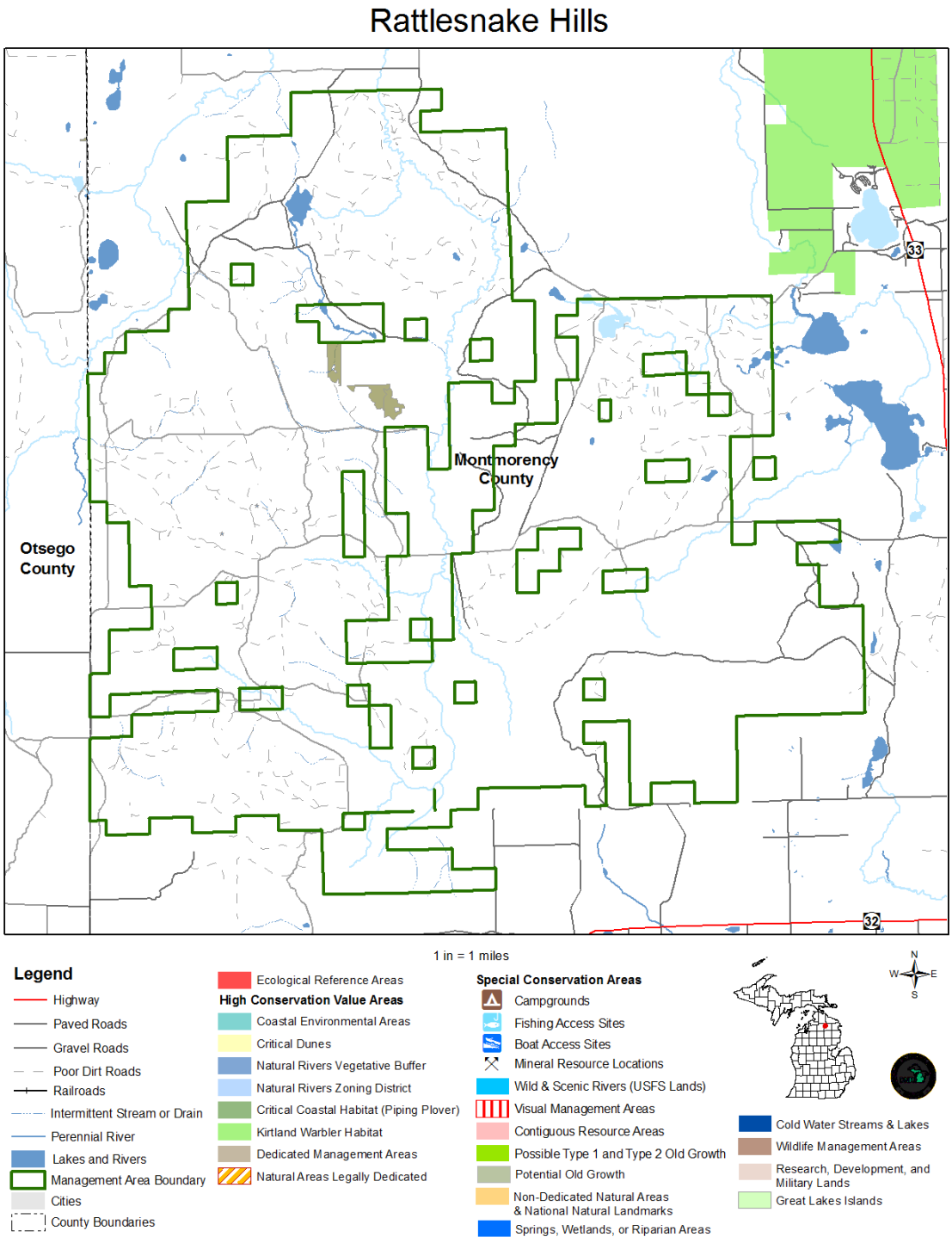

Figure 4.10.9. A map of the Rattlesnake Hills management area showing the special resource areas.

4.10.4 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 management area include oak decline, emerald ash borer, beech bard disease and management should be adapted as follows:

- Oak decline is most prevalent on frost-prone, nutrient poor outwash plains. Old age and drought predispose areas to two-lined chestnut borer and *Armillaria* root rot. Shorter rotations will reduce risk of decline.

- Full site use (e.g., stocking, desired species and low species diversity) on high-quality northern hardwood sites heavily impacted by beech bark disease and/or emerald ash borer is important.
- Consider planting red or white oaks, white or red pines, black cherry, white spruce, etc. as site conditions and quality allow.
- Herbicides may be needed to control competing vegetation and/or to reduce density of ash and beech regeneration.

Invasive Species

Invasive species pose a major threat to forest resources. They impact timber production, wildlife habitat and recreational access. Locations of invasive species mapped in and within a five-mile buffer of the management area are summarized in Table 4.10.3 below. This information was compiled from the Midwest Invasive Species Information Network database, but it should not be considered complete. This information and other sources that show the extent and location of invasives, will be used to inform the potential for additional sightings that should be documented. Invasives that merit eradication efforts are those species that threaten sensitive sites due to their location or growth characteristics and have population levels that may be successfully controlled.

Table 4.10.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Rattlesnake Hills- FMD MAs	Cases within FMD Areas	Cases within 5-Mile Buffer	Total number of cases	Total number of different Invasive Species
	0	2	2	1

Invasive Species within FMD Areas	Occurrences	Invasive Species within 5-Mile Buffer	Occurrences
-	-	Japanese Knotweed *Fallopia japonica*	2

4.10.5 Aquatic Resources

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 IC4011. Designated high priority trout streams for this management area are shown in Figure 4.10.1 and listed in Appendix F.

4.10.6 Fire Management

Disturbance through fire has played an important role in the initial propagation and maintenance of oak and natural oak/pine types and small inclusions of aspen or grass/upland brush types.

The Michigan DNR has a prescribed fire program and maintains a well-trained staff to conduct prescribed burns for silviculture, habitat maintenance or habitat restoration. Each year, all burns prescribed on state forests, parks and wildlife game lands are evaluated and ranked, with funding allocated to the highest priority burns. The ability to fund prescribed burns is based on available funding, the total acres prescribed for burning and the prioritized ranking of individual burns. The demand for prescribed burning money frequently exceeds the amount of funding and some recommended burns may not be funded for that fiscal year. Once funded, the ability to implement a burn is dependant on suitable prescribed burning weather, a suitable fuel (vegetation) condition, local staffing and other resources. The following fire management concepts should be applied in the management area:

- Reintroduce fire in the oak/pine areas to encourage pine and oak regeneration and to discourage competition; and
- Incorporate fire as a tool to restore or maintain managed openings.

4.10.7 Public Access and Recreation

Where access is limited on state forest land, the DNR will continue to seek access across adjacent private property. In accordance with the DNR's *Sustainable Soil and Water Quality Practices on Forest Land*, upon completion of harvesting, temporary spur and seasonal roads will be closed and stabilized.

Although managing recreational opportunities is the primary responsibility of Parks and Recreation Division, timber management activities may impact the quality of recreational opportunities and management modifications will be considered to minimize these impacts. The High Country Pathway is located in this management area as shown in Figure 4.10.1.

Management modifications that may minimize possible recreational trail and other infrastructure impacts are agreed upon by recreation staff in Parks and Recreation Division and Forest Resources Division staff through the compartment review process. Public input received through meetings, including the compartment review process and other forums, will also be considered. Trail protection specifications can be applied through the vegetative management system in the design and administration of timber management activities. Guidance for within-stand retention may also be used along trails to minimize impacts which may include modifications to management to protect trails. Where modifications to management may not be compatible with timber management objectives, opportunities to educate the public on the department's timber management policies may be considered. Specifications and guidance for management around trails may include, but is not limited to: vegetative management system Sections 5.2.39, 5.2.40, 5.2.41 and 5.2.42 and the Department of Natural Resources Within Stand Retention Guidance.

4.10.8 Oil, Gas and Mineral Development

Surface sediments consist of coarse-textured till, glacial outwash sand and gravel and postglacial alluvium and an end moraine of medium-textured till. The glacial drift thickness varies between 200 and 600 feet. Sand and gravel pits are located in this management area, and there is good potential.

The Mississippian Coldwater and Sunbury Shales and Devonian Berea Sandstone and Bedford and Antrim Shales subcrop below the glacial drift. The Antrim is quarried for cement products elsewhere in the state.

Oil and gas production from the Antrim Shale throughtout the management area and a few Guelph (former Niagaran) reefs are located in the southwest corner. The Collingwood Formation may also have oil and gas potential in this area and nearly all of the management area is leased for the Antrim. If drilling is sucessful for the Collingwood Formation, additional drilling in the management area could occur.

Metallic mineral production is not supported by the geology given the depth to known metallic bearing formations.

Administration of oil and gas development on state forest land is provided by both the DNR and Department of Environmental Quality to ensure that minerals shall be developed in an orderly manner to optimize revenue consistent with other public interest and natural resource values.

Lease classification of state lands is guided by DNR Oil and Gas Lease Classification Procedure No. 27.23-15. Contained within each DNR Oil and Gas Lease Agreement are environmental terms which detail requirements for permits to drill issued by the Department of Environmental Quality, supervisor of wells pursuant to Part 615 of 1994 PA 451, as amended. No operations are to take place in a wetland (as defined in Part 303 of 1994 PA 451, as amended), habitat critical to the survival of an endangered species and designated under provisions of Part 365 of 1994 PA 451, as amended, or a site designated by the secretary of state to be of historical or archeological significance, unless a plan to eliminate negative impacts to archeological or historical resources is agreed upon. Areas identified as having special wildlife, environmental, recreational significance and/or state surface require a development plan which will minimize negative impacts and will minimize surface waste while remaining consistent with the spacing requirements established by the supervisor of wells. All pipelines from the well site are required to follow existing well roads or utility corridors and all pipelines are to be buried below plow depth. Forest operations (including harvest and planting trees, prescribed fire and wildfire response) in the management area may require modification to accommodate the presence of pre-existing oil and gas pipelines located at or near the ground surface. Abandoned well sites should be incorporated back into state forest stands as either forest openings or re-forested areas, as determined by the vegetation plan contained in the lease agreement or as subsequently decided in compartment review.