4.4 MA 4 – Emmet Moraines Management Area

Summary of Use and Management

Management in the Emmet Moraines management area (MA) will emphasize the selective management of the northern hardwood resource, balancing the age classes of aspen, continued thinning of red pine to increase value and maintaining species distribution as it currently occurs. Management will strive to sustainably produce various forest products, enhance game and non-game wildlife habitat, protect areas of unique character, provide for forest-based recreational uses and respect the Native American use of non-commercial forest products. Management activities may be moderately constrained by poor access on the steep slopes and areas of seeps and springs, especially in the northern hardwoods. Expected trends within this 10-year planning period are increased recreational pressure and introduced pests and diseases, especially beech bark disease and emerald ash borer (beech and ash are significant species in northern hardwood stands). The extensive area of multi-generational northern hardwood forest in this management area provides habitat to red-shouldered hawk, northern goshawk, pine marten and neotropical migrant birds.

Introduction

This management area is located near the northwest end of the northern Lower Peninsula in Emmet County and contains 35,957 acres of state forest (Figure 4.4.1). The primary attributes which identify the Emmet Moraines management area include:

- The management area falls mostly within Albert's Stutsmanville sub-region (Albert, 1995).
- The historic and current cover types are dominated by northern hardwoods species including beech, sugar maple, hemlock, basswood, ironwood and yellow birch. Red pine was a minor component circa-1800. Aspen occurs on 15% of the management area.
- The dominant landforms include steep glacial moraines or sand ridges (some nearly 500 feet high) with poorly drained outwash plain and high dunes near Lake Michigan.
- Due to the proximity of this management area to the population centers of Mackinaw City, Pellston and Harbor Springs, the forest resources contribute social and economic values to the area.
- Department of Natural Resources recreation facilities in this management area include Wilderness State Park. Snowmobile and hiking trails cross the area, including a portion of the North Country Trail and the North Western State Trail.
- The University of Michigan Biological Station is located near this management area.
- Certain areas of this management area are sources of non-commercial forest products sought by Native Americans.
- Surveys have located the several threatened, endangered or special concern species including red-shouldered hawk, osprey and ram's head lady slipper. Communities of special concern include mesic northern forest and open dunes.
- Much of the topography of this management area is dominated by large, broad ridges of moderate to steep sloped ground moraines of well-drained sands and sandy loams.

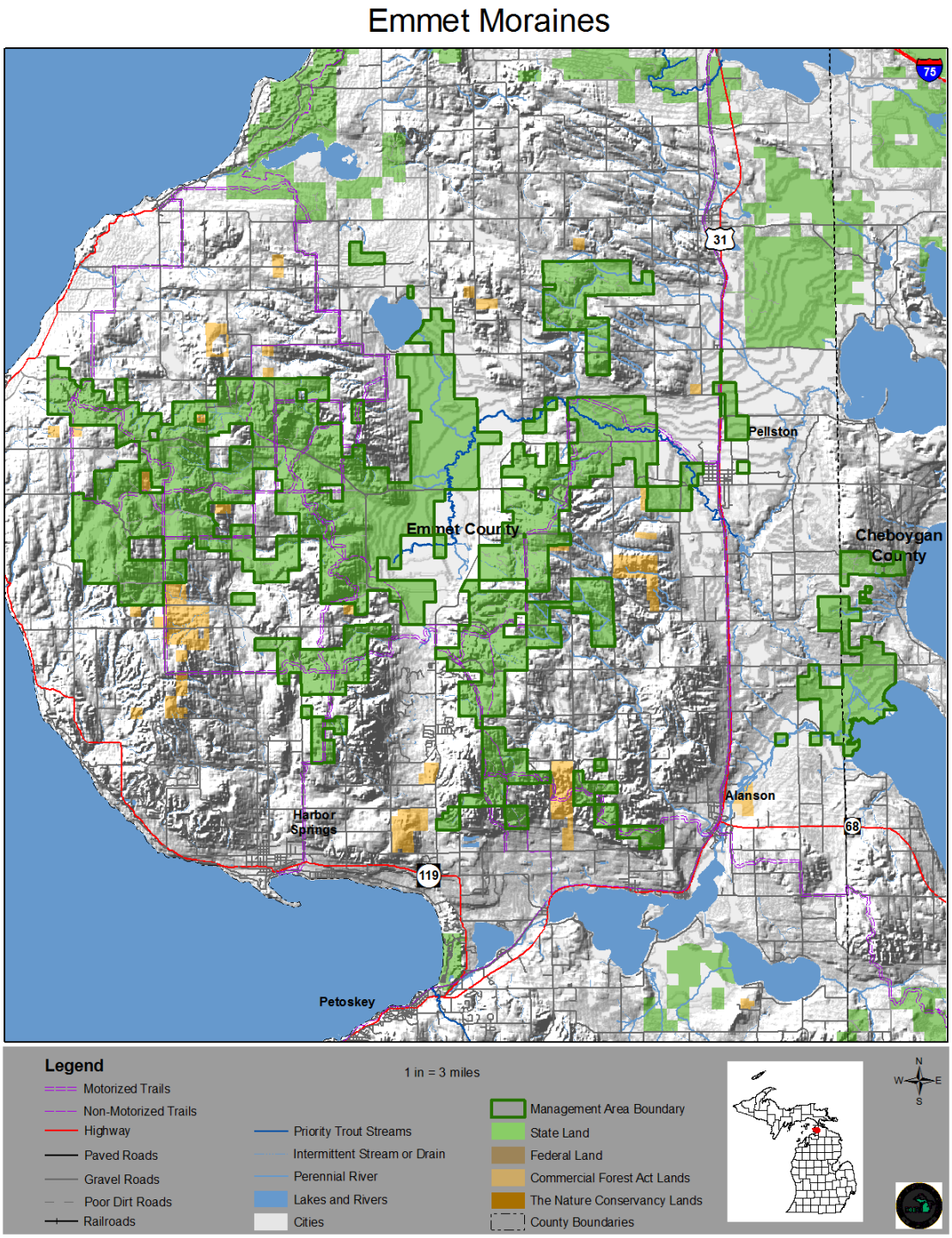

Figure 4.4.1. A map of the Emmet Moraines management area (dark green boundary) in relation to surrounding state forest and other lands in Emmet and Cheboygan counties, Michigan.

Table 4.4.1. Current cover types, acreages, projected harvests and projected acreages at the end of the ten-year planning period for the Emmet Moraines 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	54%	19,294	1,274	18,020		1,162	19,294		8,586
Aspen	15%	5,560	266	5294	758		5,560	756	
Red Pine	8%	2,748		2748	1,023	838	2,748	305	1,723
Lowland Deciduous	4%	1,481	1,037	444	49		1,481	49	
Lowland Conifers	3%	1,151	921	230	26		1,151	26	
Cedar	2%	840	840				840		
Upland Open/Semi-Open Lands	3%	1,236		1236			1,236		
Lowland Open/Semi-Open Lands	6%	2,307		2307			2,307		
Misc Other (Water, Local, Urban)	0%	130	0	130			130		
Others	3%	1,210	428	782	147	172	1,210	98	172
Total		35,957	4,765	31,192	2,003	2,172	35,957	1,234	10,481

4.4.1 Forest Cover Type Management Direction

The following sections contain information on the management direction in the form of **Current Forest Condition, 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 tree species and other vegetation, stands or communities are classified by the species which has the dominant canopy coverage.

4.4.1.1 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwoods acres (Figure 4.4.2) total 19,294 or 54% of the management area (Table 4.4.1). Northern hardwoods are distributed throughout the management area, including coarse textured end moraines, ground moraines, drumlins and outwash plains, till plains and undifferentiated end moraine-ground moraine complexes (habitat classes: AFOCa and AFO (see Appendix E)).

Forest communities dominated by northern hardwoods in this management area are valued ecologically as sources of habitat for numerous species of wildlife including bear, white-tailed deer, marten and various song birds; commercially for pulp and saw logs; and for a wide range of forest recreation. Many of the stands have portions that are located on steep slopes or have seeps that may limit treatment options. There are 1,274 acres of northern hardwoods have met harvest criteria, but have site conditions that limit harvest (hard factor limited acres). Extensive salvage harvests are currently being conducted in stands with a high basal area of ash and American beech species due to the presence of the emerald ash borer and beech bark disease in the management area. There are 3,417 acres with a partial harvest pending and these acres are included in their current basal area range.

Desired Future Condition

- Northern hardwoods-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 recreational opportunity.

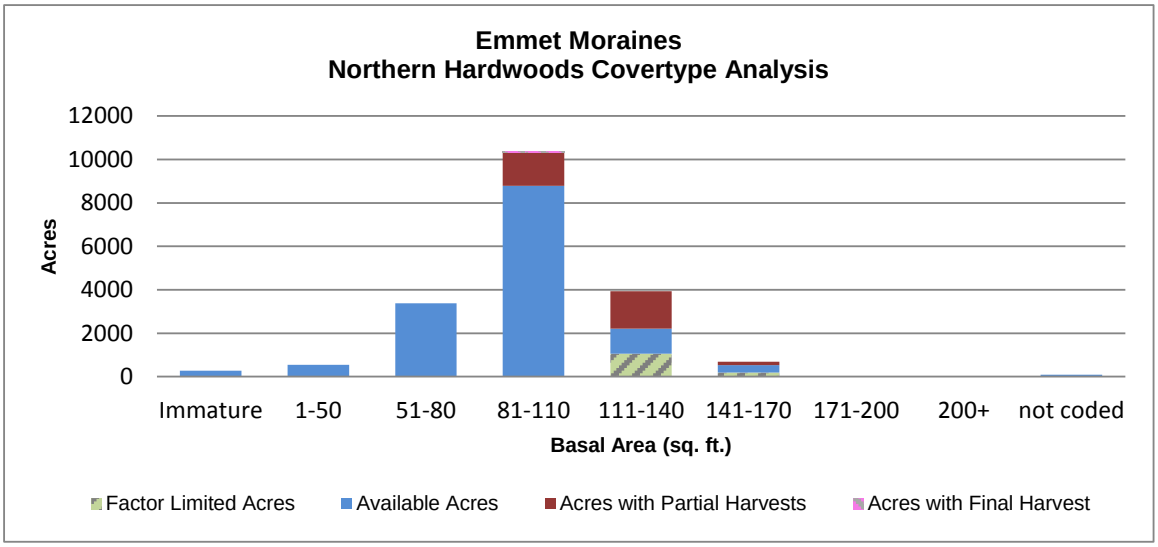

Figure 4.4.2. Basal area distribution for northern hardwoods in the Emmet Moraines management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct partial harvests on a projected 1,162 acres of northern hardwood from the higher basal area ranges; and
- Consider harvesting stands in lower basal area ranges to expedite the balancing of basal area distributions.

Long-Term Management Objectives

- Seek opportunities to collect more detailed quantitative data to assess impacts of loss of ash and beech due to insect and disease;
- Management may need to take into consideration the impacts of emerald ash borer and beech bark disease on northern hardwood stand compositions in this management area;
- Consider delaying treatments where ash and beech have been salvaged resulting in reduced basal area; and
- As these species lessen in the northern hardwood stands, consider managing for other mast producing species where available.

4.4.1.2 Forest Cover Type Management – Aspen

Current Condition

Aspen acres total 5,560 or 15% of the management area (Table 4.4.1). Aspen is distributed throughout the management area including coarse textured moraines, ground moraines, outwash plains, till plains and undifferentiated end moraine-ground moraine complexes (habitat class: AFO).

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, bear, white-tailed deer (a featured species in this management area) and various song birds; commercially for pulp and saw logs; and for a wide range of forest recreation. Most of the aspen in this management area is younger than the 60-year rotation age (Figure 4.4.3). Accessible aspen has been consistently harvested over the last 40 years. Data show that 266 acres of aspen have met harvest criteria, but have site conditions that limit harvest. There are 172 acres of stands that have a final harvest pending and these acres are included in the regeneration prescription class.

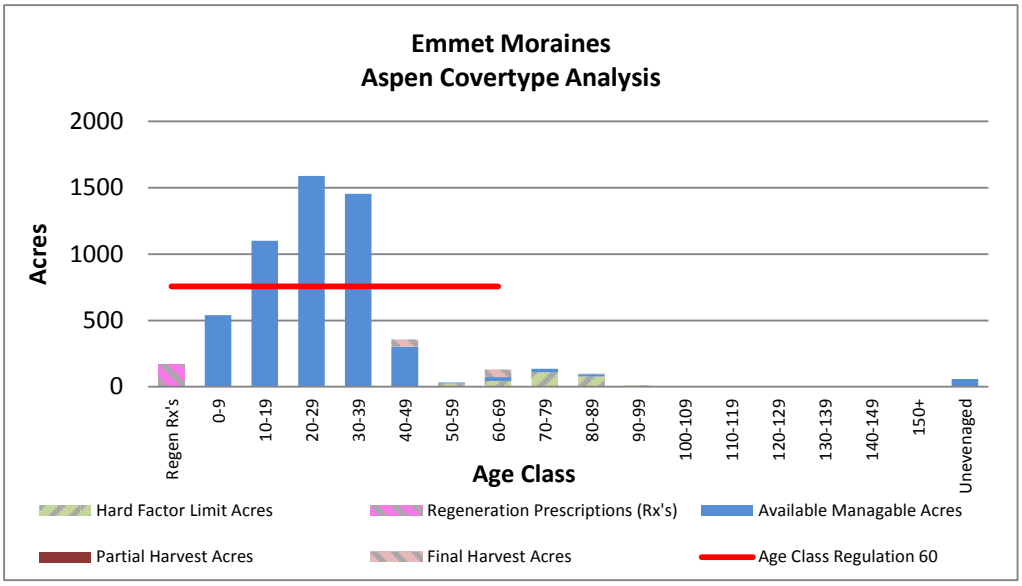

Figure 4.4.3. Age-class distribution for aspen in the Emmet Moraines management area (2012 Department of Natural Resources inventory data).

Aspen is generally managed on a 60-year rotation in this management area to produce pulpwood and sawlogs. The exceptions to this management are priority areas for ruffed grouse habitat (a featured species for this management area) where the emphasis may be placed on shorter rotations which provides more acres in the younger age classes. In some areas, aspen may be of merchantable size at less than 60 years and this may provide an opportunity to harvest stands "early" to restart additional acres which may help to balance the age-class distributions.

Desired Future Condition

- Aspen-dominated forest communities will be maintained on operable sites through even-aged management with acres balanced between 0 and 69 years of age to provide for regulated harvest, wildlife habitat and recreation opportunity.

10-Year Management Objectives

- Conduct stand regeneration harvests on a projected 758 acres; and
- Consider harvesting stands below the rotation age (60 years) to expedite balancing the age-class distribution.

Long-Term Management Objectives

- Continue management to balance age-class distributions; and
- A desired future harvest level is projected at 756 acres per 10-year period. This is an increase over the projected harvests for the current 10-year planning period and reflects continued management to balance age-class distributions.

Section 4.4.1.3 Forest Cover Type Management – Red Pine

Current Condition

Red pine acres total 2,748 acres or 8% of the management area (Table 4.4.1), with most being 50-59 years old.

Red pine is distributed throughout the management area including coarse textured moraines, ground moraines, outwash plains, till plains and undifferentiated end moraine-ground moraine complexes on mesic/medium- to rich-nutrient sites (habitat class: AFO).

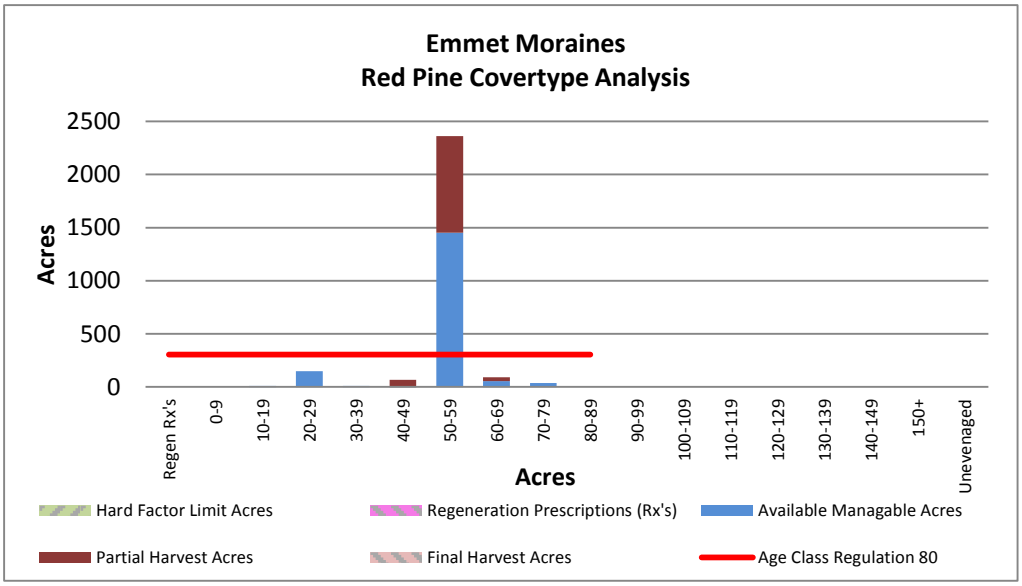

Figure 4.4.4. Age-class distribution for red pine in the Emmet Moraines management area (2012 Department of Natural Resources inventory data).

Red pine in this management area is commercially valued for pulp, saw logs and utility poles, which drives continued management of the red pine resource. Nearly all of the pine is of planted origin occurring on mesic (hardwood) sites with hardwood saplings in the under-story.

There are 1,010 acres with a partial harvest pending and these acres are included in their current age class (Figure 4.4.4).

Almost all of the red pine acres in the Emmet Moraines management area are in the 50-59 year age class which reflects the era of planting in the 1950s. These acres will continue to be managed through partial harvests to increase the value. There is very little red pine near the rotation age of 80 years and few acres will be final harvested in the next 10-year period.

Desired Future Condition

- Red pine, virtually all of which is on mesic sites (hardwood soils) will be primarily managed with a thinning regime until 80 years of age;
- Planted red pine on mesic sites will be managed to economic maturity, while allowing natural hardwood conversion on sites more suitable for hardwoods;
- Red pine will be regenerated on sites lacking high-quality natural hardwood regeneration; and
- On sites being converted to hardwoods, a scattering of a few pine trees per acre will retained providing a super-canopy of red pine and providing vertical structure for various wildlife species.

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 838 acres, concentrating on stands of better quality red pine that has the potential for a higher product value in larger size classes; and
- Conduct final harvests on a projected 1,023 acres, concentrating on poorer quality red pine sites lacking a hardwood understory.

Long-Term Management Objectives

- A desired future harvest level is projected at 1,723 acres for partial harvest per 10-year period. This is an increase over the projected partial harvest in the current 10-year planning period and reflects management to improve the value of the older age classes in preparation for future final harvests; and
- Desired future harvest levels for final harvest are projected at 305 acres per 10-year period. This reflects continued management to balance the age-class distribution.

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

Current Condition

Upland open/semi-open lands occur on approximately 1,236 acres (3%) of the management area. This category is a combination of herbaceous open land, upland shrub low-density trees and bare/sparsely vegetated. 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;
- Conduct management activities that favor mast-producing shrubs (such as blueberry, juneberry, cherry, and hawthorn) for black bear, turkey and ruffed grouse; and
- Manage for warm season bunch grasses, row crops and drill planted forages were possible for wild turkey brood rearing habitat.

Long-Term Management Objectives

- If feasible, continue management to keep the amount of 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.

4.4.1.5 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 lands acres total 2,307 acres (6%) of the management area (Table 4.4.1).

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.

4.4.1.6 Forest Cover Type Management – Other Types

Current Condition

Individual cover types which may cover less than 5% of the management area include: lowland deciduous, 1,481 acres (4% of the management area), lowland conifers, 1,151 acres (3%) and cedar, 840 acres (2%) (see Table 4.4.1). Also included but not shown in Table 4.4.1 are even smaller acreages of other cover types including white pine, 392 acres (1%) and lowland aspen/balsam poplar, 346 acres (1%). Other scattered acres include tamarack, mixed upland deciduous, jack

pine, hemlock, upland spruce/fir, paper birch, oak, lowland spruce/fir, natural mixed pines, lowland mixed forest, planted mixed pines, upland conifers and upland mixed forest. All of these timbered and non-timbered cover types have important ecological values and are important habitat for numerous species. Some of these types are managed through partial or restarting harvests to provide forest products.

Desired Future Condition

- These cover types will be maintained on suitable sites and contribute to the compositional species diversity of the landscape while providing forest products and habitat for wildlife.

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;
- Conduct restarting harvests on a projected 26 acres of lowland conifer and 49 acres of lowland deciduous stands;
- Additional opportunities to increase harvest prescriptions in lowland forest types will be assessed, both in and outside (due to forest health issues) of normal years-of-entry;
- Consider methods to ensure adequate regeneration of lowland types;
- Conduct final harvests on a projected 83 acres of white pine, 33 acres of lowland aspen/balsam poplar and 31 acres of jack pine; and
- Conduct partial harvests on a projected 150 acres of white pine.

Long-Term Management Objectives

- Continue management to regenerate lowland types;
- Continue management of upland types to provide a sustainable yield of forest products and wildlife habitat; and
- Desired future harvest levels are projected to remain steady for lowland conifer (26 acres) and lowland deciduous at (49 acres) per 10-year period.

4.4.2 Featured Wildlife Species

Each of the featured species outlined below includes recommended practices with regard to forest and/or wetland management.

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

- American woodcock
- Beaver
- Black bear
- Black-throated blue warbler
- Golden-winged warbler
- Pileated woodpecker
- Red-headed woodpecker
- Red-shouldered hawk
- Ruffed grouse
- Snowshoe hare
- Wild turkey
- White-tailed deer
- Wood thrush.

The primary focus of wildlife habitat management in the Emmet Moraines 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 and marsh/grassland complexes, the retention of large, over-mature trees and snags and the maintenance and expansion of hard mast, understory shrub and mesic conifer components.

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

American Woodcock

The goal for American woodcock in the northern Lower Peninsula is to maintain or increase available habitat. American woodcock use young aspen stands having stem densities ranging from 6,000-20,000 stems/acre for feeding, nesting and brood-rearing. State forest management should address the maintenance of adequate early successional habitat to provide feeding, nesting and brood-rearing habitat and opportunity for hunting.

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 American woodcock 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 and lowland deciduous will be sufficient to meet this American woodcock habitat specification.
- Identify commercial and non-commercial treatment opportunities in aspen and alder stands associated with non-high priority trout stream (see Appendix F) riparian zones or forested wetlands.

Beaver

The goal for beaver in the northern Lower Peninsula is to maintain available habitat. Consideration will be given to best management practices, trout stream management and trends in beaver nuisance permits issued. State forest management for the species should focus on providing favorable food within 100 feet of streams that are not designated high priority trout streams (see Appendix F).

Wildlife Habitat Specifications:

- Maintain or promote alder, aspen, birch, maple or willow cover types within 100 feet of non-high priority trout streams with gradients of less than 15% and other inland bodies of water.
  - Implementation of the Dingman Marsh and French Farm Flooding master plans and the 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this habitat specification.

Black Bear

The goal for black bear in the northern Lower Peninsula 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.

Black-throated Blue Warbler

The goal for black-throated blue warbler in the northern Lower Peninsula is to maintain available habitat. Black-throated blue warbler is an area-sensitive species (e.g., densities increase exponentially with increasing patch size) mainly occurring in mesic deciduous forest tracts >50 years in age and >250 acres in size, with a dense understory layer for nesting and foraging. State forest management for the species should focus on maintaining mature, large (>50 years old and >250 acres) mesic deciduous forest tracts with a dense understory layer for nesting and foraging.

Wildlife Habitat Specifications:

- Identify, maintain, develop or restore mesic-deciduous tracts >50 years old and >250 acres in size.
- Maximize forest interior (of northern hardwood stands) within the management area by increasing the portion of forest over 250 acres, minimizing edges (concentrating openings, oil and gas development, roads and pipelines along the forest or stand edge) and providing canopy gaps through single tree and group selection harvest practices.
- Conduct silvicultural practices to maintain or promote a well-developed shrub understory.

Golden-winged Warbler

The goal for golden-winged warbler in the northern Lower Peninsula 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 northern Lower Peninsula 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-headed Woodpecker

The goal for red-headed woodpecker in the northern Lower Peninsula is to maintain or increase available habitat. Red-headed woodpecker are limited by the availability of snags for nesting, roosting and feeding and prefer areas with groupings of snags caused by beaver girdling, flooding, fire, disease or insect outbreaks. Preferred sites are greater than five acres in size with a savannah-like dispersion of large trees (<50% canopy cover) with open understory and include tall trees or snags larger than12 inches in diameter at breast height. State forest management for the species should focus on the maintenance of snags in timber sales and salvage in priority landscapes.

Wildlife Habitat Specifications:

- Retain patches of dead wood left by beaver floodings, fire, disease and insect outbreaks by minimizing salvage cuts within the management area with preference for snags larger than 12 inches in diameter at breast height.
  - Implementation of beaver wildlife habitat specifications, Within-Stand Retention Guidance, factor-limited acres and continued mortality from insect and disease will be sufficient to meet the red-headed woodpecker habitat specifications for snags in this management area.

Red-shouldered Hawk

The goal for red-shouldered hawk in the northern Lower Peninsula 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 23 inches in diameter 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 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 northern Lower Peninsula 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.

Snowshoe Hare

The goal for snowshoe hare in the northern Lower Peninsula is to maintain or increase available habitat. Hare populations use areas of dense, young (sapling/pole) forest and shrub communities and prefer alder and coniferous swamps. Dense understory cover is the primary limiting factor as escape/thermal cover is more important than food availability. In mature forests, hare are associated with beaver ponds and aspen harvests, feeding upon available cuttings and finding cover in the resulting re-vegetation. State forest management should focus on maintaining young aspen adjacent to lowlands, maintaining jack pine, retaining slash, increasing mesic conifer components and increasing beaver.

Wildlife Habitat Specifications:

- Maintain young aspen and lowland shrub (alder or willow) communities that have a conifer understory or young aspen stands that are adjacent to lowland/swamp conifer and mesic conifers. Conduct silvicultural practices that maintain or increase mesic conifer components in aspen stands.
  - Implementation of beaver wildlife habitat specifications and the 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this hare habitat specification.

- When conducting site-prep herbicide treatments, encourage more diverse stands by using application-skips in pockets or along stand edges.
- In snowshoe hare habitat, limit biomass harvesting and whole-tree chipping operations, retain slash and create brush piles.

Wild Turkey

The goal for turkey in the northern Lower Peninsula 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 northern Lower Peninsula 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.

Wood Thrush

The goal for wood thrush in the northern Lower Peninsula is to maintain available habitat. Wood thrush occur primarily in upland, mesic deciduous and mixed forests with large trees, diverse tree communities, moderate undergrowth and a well-developed litter layer.

Wood thrush is highly susceptible to nest predation and brood parasitism, which increases with forest fragmentation. State forest management for the species should focus on maintaining large (>250 acres) forest tracts, minimizing edge and promoting a dense understory layer for nesting and foraging.

Wildlife Habitat Specifications:

- Identify, maintain, develop or restore mesic-deciduous tracts >50 years old and >250 acres in size.
- Maximize forest interior (of northern hardwood stands) within the management area by increasing the portion of forest over 250 acres, minimizing edges (concentrating openings, oil and gas development, roads and pipelines along the forest or stand edge) and providing canopy gaps through single tree and group selection harvest practices.
- Conduct silvicultural practices to maintain or promote a well-developed shrub understory.

4.3.3 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, 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 eight listed species as well as two natural communities of note occurring in the management area as listed in Table 4.4.2. 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 Emmet Moraines management area as illustrated in Figure 4.4.5.

Table 4.4.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Emmet 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								
Mesic northern forest		S3/G4	Confirmed				Northern Hardwood	Late
Open dunes		S3/G3	Confirmed				Upland open/semi-open	N/A
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
Black tern	*Chlidonias niger*	SC/G4/S3	Confirmed	MV	Very High	Great Lakes marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Emergent Marsh	Lowland open/semi-open	N/A
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								
Woodland vole	*Microtus pinetorum*	SC/G5/S3S4	Confirmed	PS	Very High	Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
						Floodplain forest	Lowland mixed	Mid
						Oak-pine barrens	Oak	Mid
						Bur oak plains	Upland open/semi-open	N/A
Plants								
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
Michigan monkey flower	*Mimulus glabratus michiganensis*	LE/E/G5T1/S1	Confirmed			Rich conifer swamp	Tamarack	Late

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

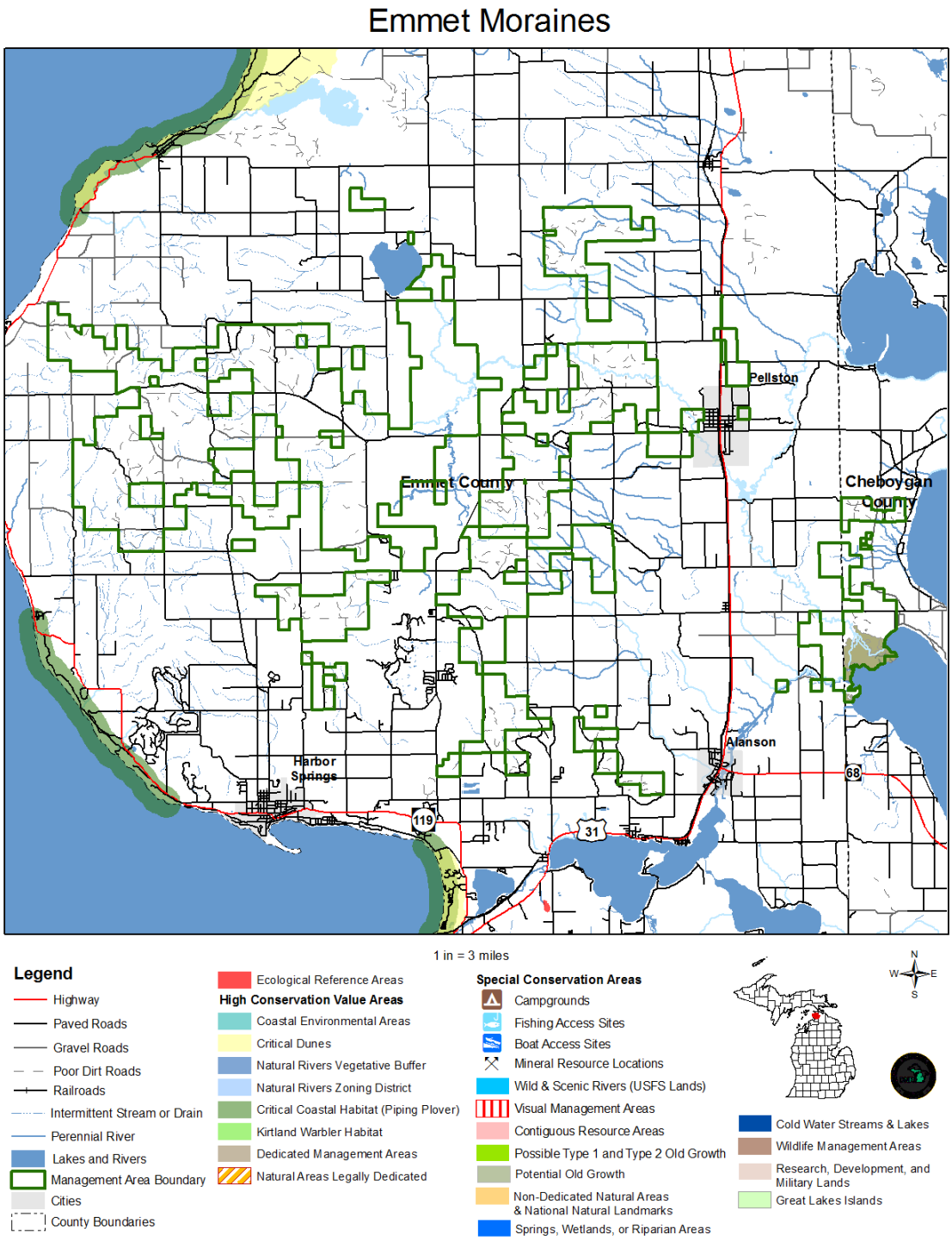

Figure 4.4.5. A map of the Emmet Moraines management area showing the special resource areas.

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.

4.4.4 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 emerald ash borer and beech bark disease and management should be adapted as follows:

- 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; and
- Herbicides may be needed to control competing vegetation and/or to reduce density of ash and beech regeneration (see Beech Bark Disease and Emerald Ash Borer guidelines for more information).

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 the Table 4.4.3. 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 4.4.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Emmet Moraines - FMD Management Areas	Cases within FMD Areas	Cases within 5-Mile Buffer	Total number of cases	Total number of different Invasive Species
	19	28	47	9

Invasive Species within FMD Areas	Occurrences	Invasive Species within 5-Mile Buffer	Occurrences
Common Buckthorn *Rhamnus cathartica*	1	Common Buckthorn *Rhamnus cathartica*	1
Garlic Mustard *Alliaria petiolata*	2	Garlic Mustard *Alliaria petiolata*	3
Glossy Buckthorn *Rhamnus frangula*	6	Glossy Buckthorn *Rhamnus frangula*	5
Japanese Knotweed *Fallopia japonica*	2	Japanese Knotweed *Fallopia japonica*	1
Spotted Knapweed *Centaurea stoebe*	3	Phragmites (Common Reed) *Phragmites australis*	2
Tatarian Honeysuckle *Lonicera tatarica*	3	Purple Loosestrife *Lythrum salicaria*	1
Wild Parsnip *Pastinaca sativa*	2	Spotted Knapweed *Centaurea stoebe*	2
-	-	Tatarian Honeysuckle *Lonicera tatarica*	11
-	-	Wild Parsnip *Pastinaca sativa*	2

4.4.5 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 IC 4011. Designated high priority trout streams for this management area are shown in Figure 4.4.1 and listed in Appendix F.

4.4.6 Fire Management

Northern hardwoods which have historically been a major component of this management area are rarely impacted by natural fire regimes. However, disturbance through fire has played an important role in the initial propagation and maintenance small inclusions of aspen or grass/upland brush types. Wildfire risk and fuel loading is increased in young dense conifer plantations.

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 dependent 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:

- When feasible, seek opportunities to use fire in the oak/pine areas to encourage pine and oak regeneration and to discourage competition;
- When feasible, seek opportunities to incorporate fire as a tool to restore or maintain managed openings; and
- Recognize that increased urbanization in close proximity and within the management area will present more wildland/urban interface challenges to wildfire suppression.

4.4.7 Public Access and Recreation

Access for management and/or recreation is generally good throughout this management area, as there is very little lowland and a well-developed road/trail system which including a portion of the North Country Trail (Figure 4.4.1). In accordance with the DNR's *Sustainable Soil and Water Quality Practices of Forest Land*, upon completion of harvesting, temporary spur and seasonal roads will be closed and stabilized.

Taking advantage of the undulating terrain and abundant snow in the lee of Lake Michigan, many miles of snowmobile cross the management area as shown in Figure 4.4.1. In addition, the North Country Trail bisects the entire management area from north to south and there are miles of off-road vehicle trails (Figure 4.4.1).

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.

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 such as maintaining conifers to shade winter snow trails or retaining trees along single-track off-road vehicle trails to maintain the integrity of narrow 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.

4.4.8 Oil, Gas and Mineral Development

Surface sediments consist of coarse textured glacial till (the uplands), lacustrine (lake) sand and gravel, glacial outwash sand and gravel, postglacial alluvium and peat and muck. The glacial drift thickness varies between 400 and 1,000 feet. Gravel pits are located in this management area and there is potential for additional gravel pits on the upland areas.

The Devonian Traverse Group, Bell Shale, Dundee Limestone and Detroit River Group subcrop below the glacial drift. Most of the bedrock formations have limestone/dolomite potential, especially in areas of thin glacial till.

The nearest oil and gas production, the Antrim Shale gas play, is located 15 miles to the south. The Collingwood Formation may have oil and gas potential in this area and approximately 90% of the state mineral rights in this management area are leased for oil and gas development. Drilling for the Collingwood Formation has occurred or is proposed along the eastern edge of the management area in Cheboygan County. If production is established, drilling could expand in the management area.

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.