

4.24 MA 24 – Houghton Lake Wetlands Management Area

Summary of Use and Management

Vegetation management in the Houghton Lake Wetlands management area (MA) will provide forest products; maintain or enhance wildlife habitat; protect areas of unique threatened, endangered and special concern species; and provide for forest-based recreational uses. Timber management for this 10-year planning period will focus on balancing the aspen age-class distribution. Wildlife habitat management objectives include perpetuating early-successional communities for species adapted to young forests for hunting and other wildlife-related recreation opportunity. Expected trends within the next decade are the need to continue to balance aspen age-class distributions, an expected increase in recreation pressure and invasive species encroachment.

Introduction

There are 69,470 acres of state forest land in the Houghton Lake Wetlands management area located in Roscommon and Missaukee counties near the towns of Houghton Lake, Grayling, Lake City, Roscommon and West Branch. The primary attributes which identify the Houghton Lake Wetlands management area include:

- The dominant landform consists of poorly drained outwash channels and plains which accounts for over 94% of the management area.
- The management area falls within Grayling Outwash Plain sub-region as classified by Albert (1995).
- This area is popular for hunting, off-road vehicle riding on the West Higgins Off-Road Vehicle trail, snowmobiling on a snow trail and other activities for the nearby communities of Grayling Houghton Lake, Roscommon, Lake City and West Branch.
- The Houghton Lake State Forest Campground located on the north side of Houghton Lake is included in the management area.
- These recreational uses, combined with the quantity and availability of wood fiber contributes significant social and economic values to the area.
- Oil and gas development is not significant.
- A significant portion of the management area includes the Dead Stream Swamp which is a National Natural Landmark and special conservation area. The Houghton Lake State Wildlife Research Area, the Reedsburg Dam and Bear Creek Flooding State Wildlife Management Areas are special conservation areas and are also included within the management area.
- The management area contains the Wraco Flooding and the Houghton Lake Flats (north and south units).
- The management area contains the headwaters of the Muskegon River.
- Threatened, endangered or species of special concern located by Michigan Natural Features Inventory surveys include spotted turtle, great blue heron colony, yellow rail, osprey, boreal *brachionyncha* moth, bald eagle, rainbow mussel, slippershell mussel, Blanding's turtle, black tern, least bittern, red-shouldered hawk, common moorhen and river redhorse and bigmouth shiner.

Most of the management area was covered by wetlands including lowland deciduous, lowland conifers, and lowland open/semi-open lands interspersed with jack pine, cedar and aspen (Table 4.24.1).

Houghton Lake Wetlands

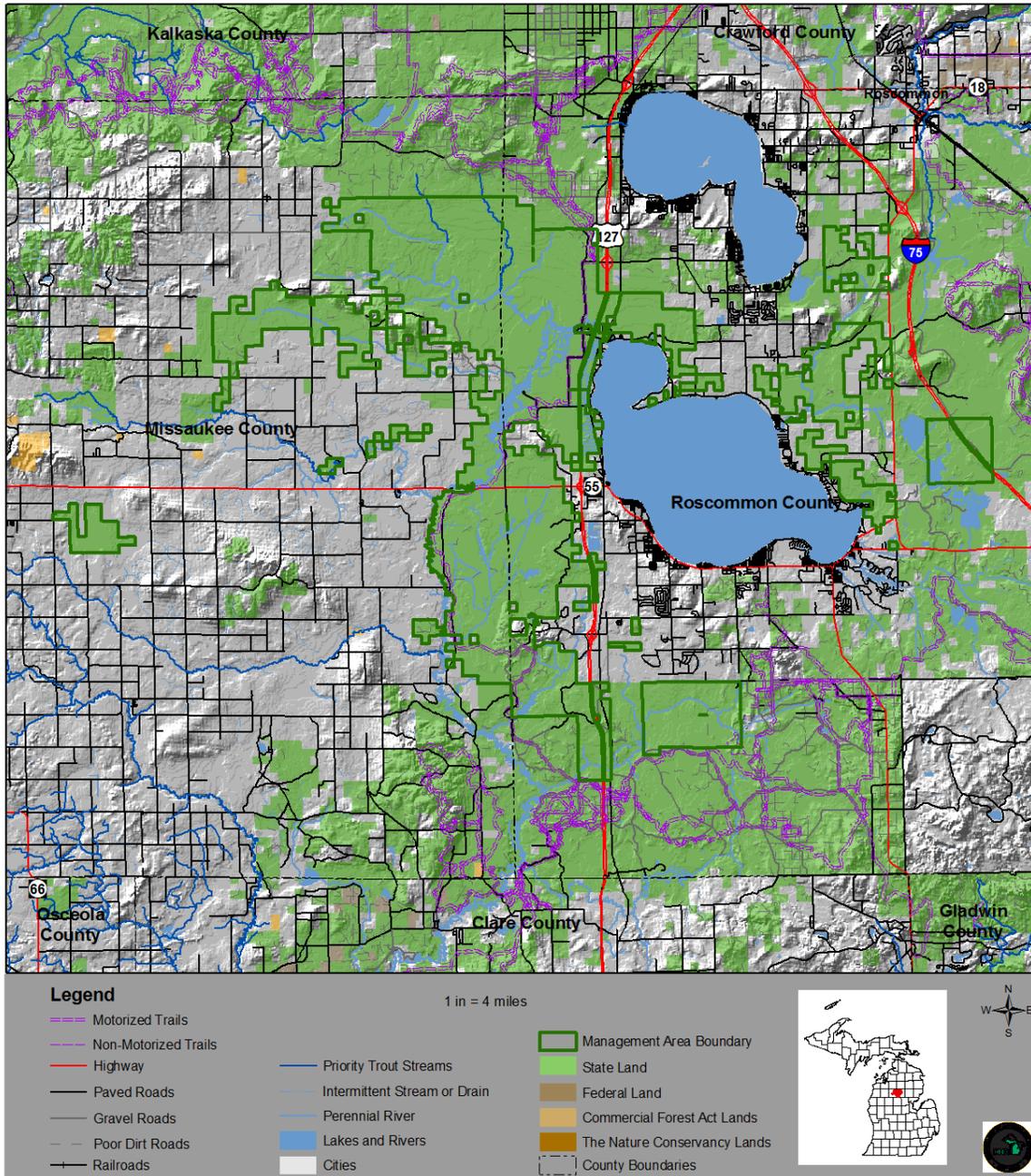


Figure 4.24.1. A map of the Houghton Lake Wetlands management area (dark green boundary) in relation to surrounding state forest and other lands in Roscommon and Missaukee counties, Michigan.

Table 4.24.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Houghton Lake Wetlands 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
Aspen	18%	12,726	777	11,949	993		12,726	1,707	
Lowland Conifers	11%	7,432	5,946	1486	165		7,432	165	
Cedar	10%	6,722	6,722				6,722		
Lowland Deciduous	8%	5,417	3,821	1596	177		5,417	177	
Jack Pine	6%	3,900	271	3629	67		3,900	518	
Oak	3%	1,753	1,050	703	89	96	1,753	78	153
Red Pine	2%	1,236	201	1035	403	366	1,236	115	502
White Pine	2%	1,124	223	901	276	320	1,124	82	360
Upland Open/Semi-Open Lands	2%	1,310		1310			1,310		
Lowland Open/Semi-Open Lands	30%	20,854		20854			20,854		
Misc Other (Water, Local, Urban)	3%	2,279		2279			2,279		
Others	7%	4,717	1,762	2955	311	659	4,717	299	666
Total		69,470	20,772	48,698	2,481	1,441	69,470	3,141	1,681

4.24.1 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 (i.e., 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.

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

Current Condition

Lowland open/semi-open acres total 20,854 or 30% of the management area (Table 4.24.1). 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, including wood duck, mallard and eastern massasauga rattlesnake which are featured species in this management area.

Desired Future Condition

- Lowland open/semi-open lands sites will be maintained at current levels to ensure an adequate level of 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. This will benefit numerous wildlife species, including the featured species for this management area.

Long-Term Management Objectives

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

4.24.1.2 Forest Cover Type Management - Aspen

Current Condition

Aspen acres total 12,726 acres or 18% of the management area (Table 4.24.1). Aspen is distributed throughout the management area including outwash sands with a high water table and pitted outwash with high-quality big-tooth aspen (habitat classes: primarily PARVHa with some PARVVb).

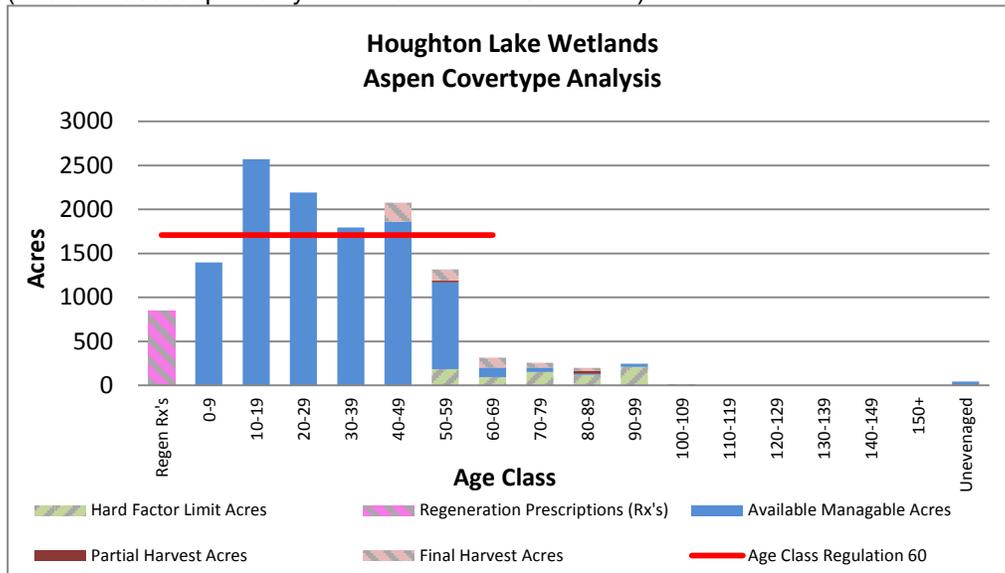


Figure 4.24.2. Age-class distribution for aspen in the Houghton Lake Wetlands management area (2012 Department of Natural Resources inventory data).

The age classes of aspen are fairly well balanced, with small spikes in the 10-19, 20-29 and 40-49 year-old age classes (Figure 4.24.2). There are 777 acres of aspen have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 843 acres of stands that have a final harvest pending and these acres are included in the regeneration prescription class.

Aspen is generally managed on a 60-year rotation in this management area to produce pole quality timber and occasional sawlogs. The exceptions to this management are priority areas for American woodcock, white-tailed deer and ruffed grouse habitat (featured species for this management area) where the emphasis may be placed on shorter rotations which provide more acres in the younger age-classes. In other priority areas, maintaining young aspen as well as alder, birch, maple or willow along streams will provide habitat for beaver, a featured species in this management area.

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 will be managed on suitable sites with acres balanced between 0-69 years of age; and
- Aspen acres will be maintained on currently operable sites to provide early successional habitat for species viability, while also providing a sustainable level of wood fiber.

10-Year Management Objectives

- Conduct final harvests on a projected 993 acres.

Long-Term Management Objectives

- As aspen stands reach the rotation age, harvest stands as needed to facilitate balancing the age-class distribution;
- Where necessary and feasible, future planning may need to consider harvesting additional acres above the rotation regulation level by harvesting from younger age classes to expedite the balancing of age-class distributions; and
- A desired future harvest level is projected at 1,707 acres for final harvest per 10-year period.

4.24.1.3 Forest Cover Type Management – Lowland Deciduous

Lowland deciduous acres total 5,417 acres or 8% of the management area (Table 4.24.1) and are located on wetland sites. Most of the acres are in the age classes above the age of 60 years (Figure 4.24.3). Lowland deciduous stands may be managed as even-aged stands on drier sites. On wetter sites, uneven-aged management is preferred. The residual trees keep the sites from becoming even wetter, resulting in a conversion to marsh.

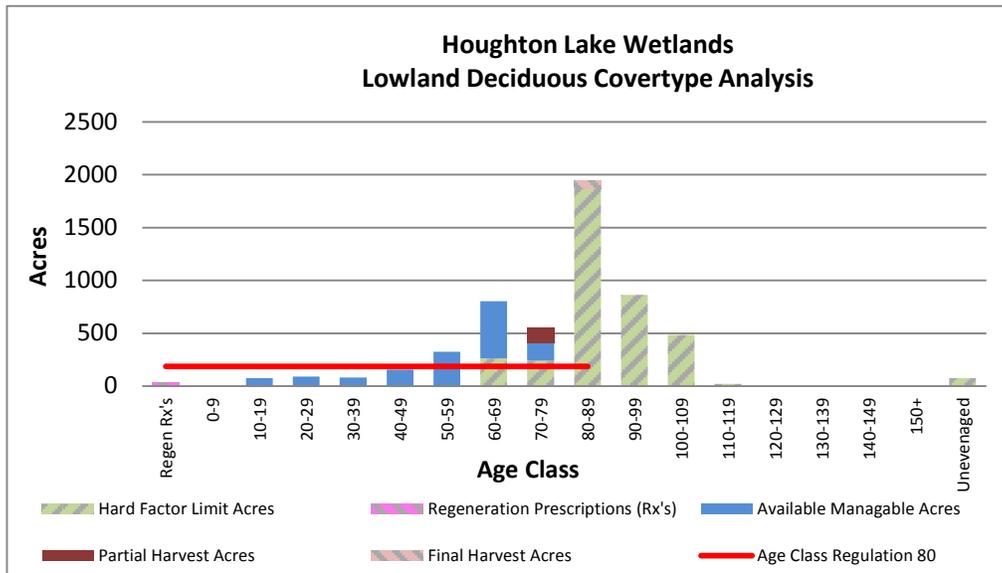


Figure 4.24.3. Age-class distribution for lowland deciduous in the Houghton Lake Wetlands management area (2012 Department of Natural Resources inventory data).

Tip overs and windthrow may also be an issue in stands that have been reduced below a residual basal area of 80 square feet per acre. Green ash, black ash, red maple and aspen are frequent components of swamp hardwoods (lowland hardwoods) and treatments on more mesic sites may convert lowland deciduous stands to aspen or red maple. It is expected that much of the ash will be affected by emerald ash borer. There are currently 3,821 acres factor limited that are not available for harvest (hard factor limit acres), often because the sites are too wet or due to other site factors.

Desired Future Condition

- Lowland deciduous stands will be located on suitable sites in a compositionally diverse forest which contains coarse woody debris, scattered large trees and scattered snags. This condition will benefit numerous wildlife species including red-headed and pileated woodpecker, featured species in this management area; and
- These lowland types will provide a sustainable level of forest products along with wildlife habitat and recreational opportunity.

10-Year Management Objectives

- Conduct final harvests on a projected 177 acres.

Long-Term Management Objectives

- Management decisions should consider impact of the emerald ash borer on the ash with the expectation that ash will not be available;
- Continue efforts to regenerate lowland types where feasible; and
- A desired future harvest level is projected at 177 acres for final harvest per 10-year period.

4.24.1.4 Forest Cover Type Management – Jack Pine

Current Condition

Jack pine on outwash sands with a high water table acres total 3,900 acres or 6% of the management area (Table 4.24.1). Jack pine is found on habitat class PVCd, PArVHa and PArVCo sites. There are 271 acres that have met harvest

criteria (Figure 4.24.4), but have site conditions that limit harvest (hard factor limit acres). There are 285 acres that have a final harvest pending and these acres are included in the regeneration prescription class.

Jack pine is managed on a 60-year rotation to provide pulpwood products and occasional sawlogs with the objective of balancing the age-class distribution and managing jack pine on suitable sites. Jack pine also provides habitat for many wildlife species, including snowshoe hare, a featured species in this management area, which prefers young dense conifer stands. There is a lack of acres in the 20-29 and 30-39 year-old age-classes which will affect future management decisions.

Desired Future Condition

- Jack pine of either natural origin or in planted stands will be managed on suitable sites with acres balanced in the 0-69 year old age-classes to provide a continuous flow of forest products and wildlife habitat for recreational activities.

10-Year Management Objectives

- Conduct final harvests on a projected 67 acres primarily from the 70-79 and 80-89 year age classes.

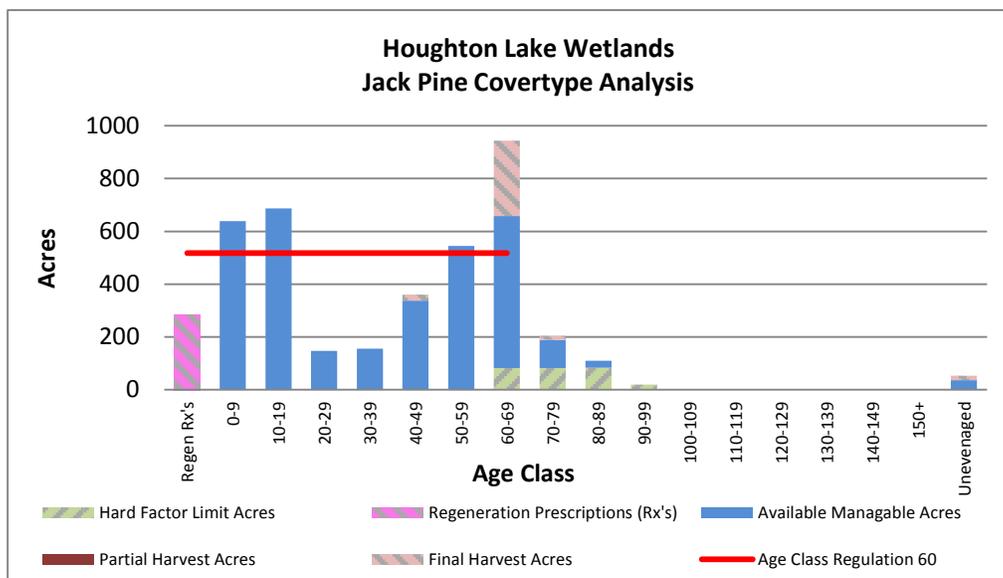


Figure 4.24.4. Age-class distribution for jack pine in the Houghton Lake Wetlands management area (2012 Department of Natural Resources inventory data).

Long-Term Management Objectives

- Consider converting jack pine to red pine on sites where red pine is better suited;
- Consider maintaining jack pine for habitat and forest products;
- Future planning may need to consider delaying harvest of jack pine until future periods to help offset the lack of jack pine acres in the 20-29 and 30-39 year-old age classes; and
- A desired future harvest level is projected at 518 acres for final harvest per 10-year period.

4.24.1.5 Forest Cover Type Management – Red Pine

Current Condition

Red pine acres total 1,236 acres or 2% of the management area (Table 4.24.1). There are 201 acres that have met harvest criteria (Figure 4.24.4) but have site conditions that limit harvest (hard factor limit acres). There are 22 acres that have a partial harvest pending and these acres are included in their current age-classes (60-69 and 70-79).

There is a pronounced spike of red pine in the 40-89 year age-classes and these acres are being thinned to increase growth on the remaining trees to achieve a more valuable product. There are very few acres in the 0-39 year age classes and this will result in a significant reduction in future red pine harvests.

Desired Future Condition

- Red pine will be located on suitable sites with acres balanced between 0 and 89 years of age to provide a sustainable harvest of forest products.

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and managing toward a balanced age-class distribution;
- Consider site suitability when deciding where to plant red pine;
- Conduct partial harvests (thinning) on a projected 366 acres, concentrating on stands of better quality red pine that have the potential for a higher product value in larger size classes; and
- Conduct final harvests on a projected 403 acres of red pine beginning with the oldest age-classes and with a concentration on stands with less potential for a higher product value.

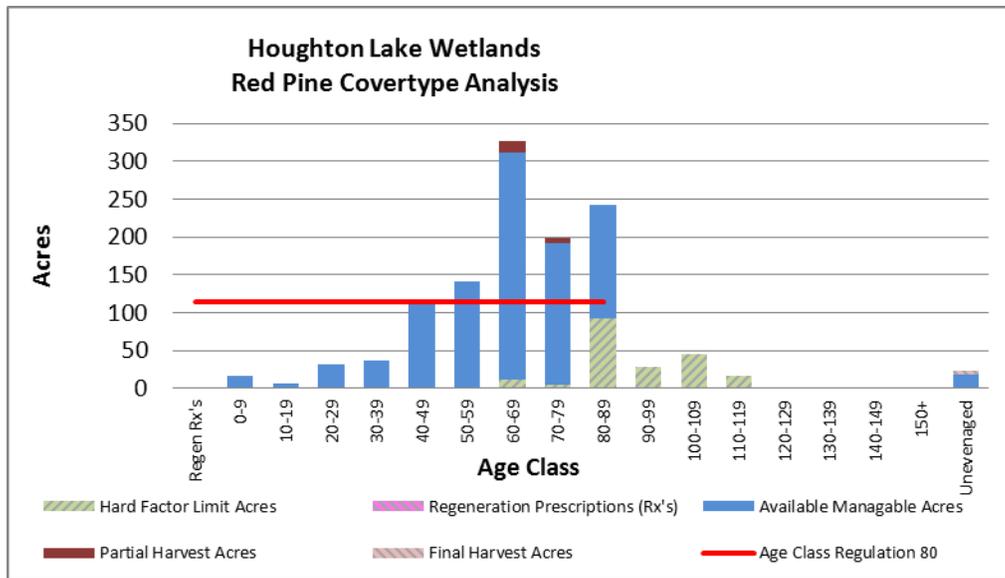


Figure 4.24.5. Age-class distribution for red pine in the Houghton Lake Wetlands management area (2012 Department of Natural Resources inventory data).

Long-Term Management Objectives

- Continue management of red pine through partial harvests of the younger age classes and regeneration harvests as stands reach the silvicultural rotation age (80 years).
- Consider opportunities to re-establish red pine through planting;
- Where necessary and feasible, future planning may need to consider the implications of the lack of red pine in the 0-39 year age-classes;
- Balancing the age-class distribution of red pine will require one complete rotation (80 years or more); and
- A desired future harvest level is projected at 115 acres for final harvest and 502 acres for partial harvest per 10-year period.

4.24.1.6 Forest Cover Type Management – White Pine

Current Condition

White pine acres total 1,124 acres or 2% of the management area (Table 4.24.1). There are 223 acres that have met harvest criteria (Figure 4.24.4), but have site conditions that limit harvest (hard factor limit acres). There are 127 acres that have a partial harvest pending and these acres are included in their current age classes (40-49, 50-59 and 60-69).

All acres of white pine are over the age of 30 with a spike in the 50-59 year age class. Although white pine can be managed on a rotation to 109 years, the lack of acres in the younger age classes 0-29 will result in a reduction of white pine available for harvest in the future.

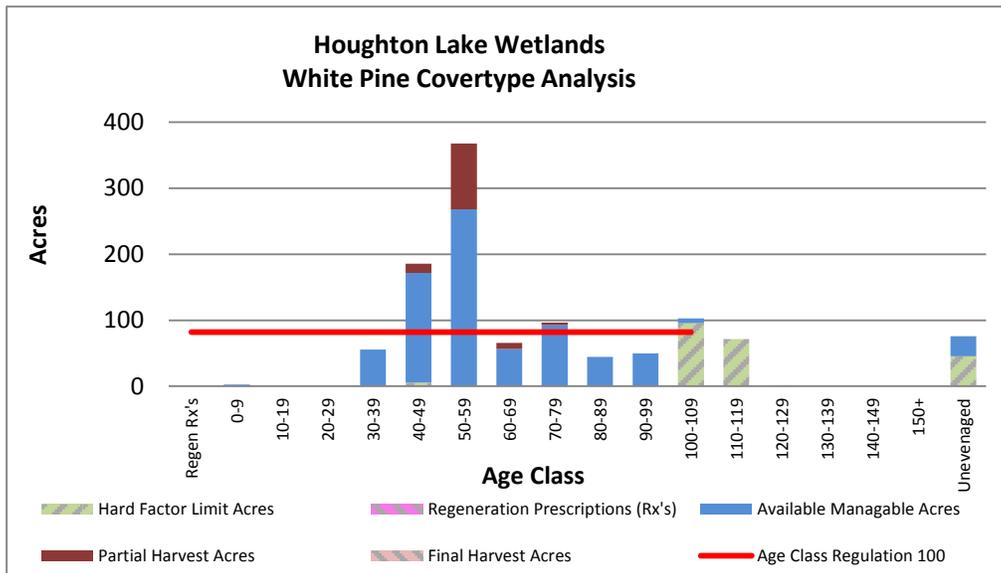


Figure 4.24.6. Age-class distribution for white pine in the Houghton Lake Wetlands management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- White pine will be balanced between the 0-109 year age classes to provide sustainable harvests of wood products and wildlife habitat for recreational activities.

10-Year Management Objectives

- Conduct partial harvests (thinning) on a projected 276 acres; and
- Conduct final harvests on a projected 320 acres of white pine.

Long-Term Management Objectives

- Continue management to balance the age class distribution;
- Future planning will need to consider the impact of the current lack of white pine in the youngest age classes; and
- A desired future harvest level is projected at 82 acres for final harvest and 360 acres of partial harvest per 10-year period.

Section 4.24.1.6 Forest Cover Type Management – Other Types

Current Condition

Individual cover types which may cover less than 5% of the management area include: oak 1,753 acres or 3%. Other forest communities total 3,693 acres or 5% of the management area and are spread across 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 cover types will be maintained on suitable sites and contribute to the compositional species diversity of the landscape.

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 final harvests on a projected 165 acres of lowland conifer, 89 acres of oak, 84 acres of lowland aspen/balsam poplar, 67 acre of mixed upland deciduous, 85 upland spruce/fir, 9 acres of lowland mixed forest, 30 acres of upland mixed forest and 44 acres of upland conifer;
- Consider methods to ensure adequate regeneration of lowland types;

- 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
- Conduct partial harvests on a projected 96 acres of oak, 170 acres of mixed upland deciduous, 172 acres of northern hardwood, 131 acres of upland mixed forest, 82 acres of natural mixed pines, 37 acres of hemlock and 60 acres of upland conifers.

Long-Term Management Objectives

- Continue management of these other types to produce forest products, wildlife habitat and recreational opportunities; and
- Desired future harvest levels for final harvests are projected at 165 acres for lowland conifers.

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

Current Condition

Upland open/semi-open lands acres total 1,310 or 2% of the management area (Table 4.24.1). This category is a combination of the following non-forested land cover types: 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

- Maintain upland open/semi-open lands 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.

4.24.2 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 area during this 10-year planning period:

- American woodcock
- Beaver
- Black bear
- Eastern massasauga rattlesnake
- Golden-winged warbler
- Mallard (Backus Creek State Game Area and Bear Creek Flooding and Houghton Lake Flats state wildlife management areas)
- Pileated woodpecker
- Red-headed woodpecker
- Ruffed grouse
- Snowshoe hare
- White-tailed deer
- Wood duck (Backus Creek State Game Area and Bear Creek Flooding and Houghton Lake Flats state wildlife management areas)

The primary focus of wildlife habitat management in the Houghton Lake Wetlands 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, 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 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 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 woodcock habitat specification.
- Identify commercial and non-commercial treatment opportunities in aspen and alder stands associated with non-high priority trout stream 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.

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 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.

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 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.

Mallard

Mallards prefer complexes of grassland and shallow seasonal or semi-permanent marshes in association with permanent hemi-marshes for pair bonding, nesting and brood rearing. Mallard pair-bonding wetlands are typically 0.25 to 20 acres in size and brood rearing wetlands are typically 1.2-30 acres in size. Optimal hemi-marsh sites are greater than 2.5 acres with open water portions having extensive portions less than 3 feet deep and 4:1 area of adjacent grasslands to hemi-marsh. Mallards nest on upland sites, normally within ~ 200 yards from water.

Wildlife Habitat Specifications:

- Maintain priority wetlands in hemi-marsh condition, with 50/50 open water to emergent marsh, for both breeding and non-breeding habitat.
 - Implementation of the wildlife management area master plans for Backus Creek State Game Area and the Bear Creek Flooding and Houghton Lake Flats state wildlife management areas; and application of the beaver wildlife habitat specifications will be sufficient to meet this mallard habitat specification.
- Maintain stable water levels at managed floodings from April through August.

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 greater than 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 5 acres in size with a savannah-like dispersion of large trees (< 50% canopy cover) with open under story and include tall trees or snags of large (> 12 inches) 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 greater 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.

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 ten 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 and oak will be sufficient to meet this 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 and oak will be sufficient to meet this grouse habitat specification.
- Maintain the upland shrub cover type specifically juneberry, hawthorne, 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.

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 Duck

The goal for wood duck in the northern Lower Peninsula is to maintain or increase available habitat. Wood ducks are most limited by available nesting and brood rearing habitat. Wood duck nest in tree cavities near rivers, streams, swamps, beaver ponds and marshes. Nests require mature hardwood trees with 10 inches in diameter at breast height or larger. Brood rearing habitat is composed of wetland areas such as forested wetlands, shrub-scrub wetlands and emergent marshes that maintain adequate water through the brood rearing period. Hemi-marshes with nearby shrub-scrub or forest are important, where marshes are typically within 100 yards of woody cover. Optimal breeding habitat includes 1.25 acres or larger hemi-marsh and/or swamp (forested and shrub-scrub wetlands) located within 1,100 yards of mature hardwood forest. State forest management should focus on the protection of forest wetlands and adjacent snags and the management of priority wildlife management areas with suitable habitat.

Wildlife Habitat Specifications:

- Maintain priority wetlands in hemi-marsh condition, with 50/50 open water to emergent marsh, for both breeding and non-breeding habitat;
- Implementation of the wildlife management area master plans for Backus Creek State Game Area and the Bear Creek Flooding and Houghton Lake Flats state wildlife management areas; and application of the beaver wildlife habitat specifications will be sufficient to meet this wood duck habitat specification; and
- Maintain stable water levels at managed floodings from April through August.

4.24.3 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 six listed species and no natural communities of note occurring in the management area as listed in Table 4.24.2. 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.

As shown in Figure 4.24.7, the Houghton Lake Wildlife Research Area (shared with the AuSable Outwash management area) is a special conservation area (12,000 acres) as is the Dead Stream Swamp (11,663 acres) (also a national natural landmark) which is shared with the Upper Muskegon management area. There are no high conservation value areas or ecological reference areas identified for the Houghton Lake Wetlands management area as illustrated in Figure 4.24.7.

Management goals during this planning period:

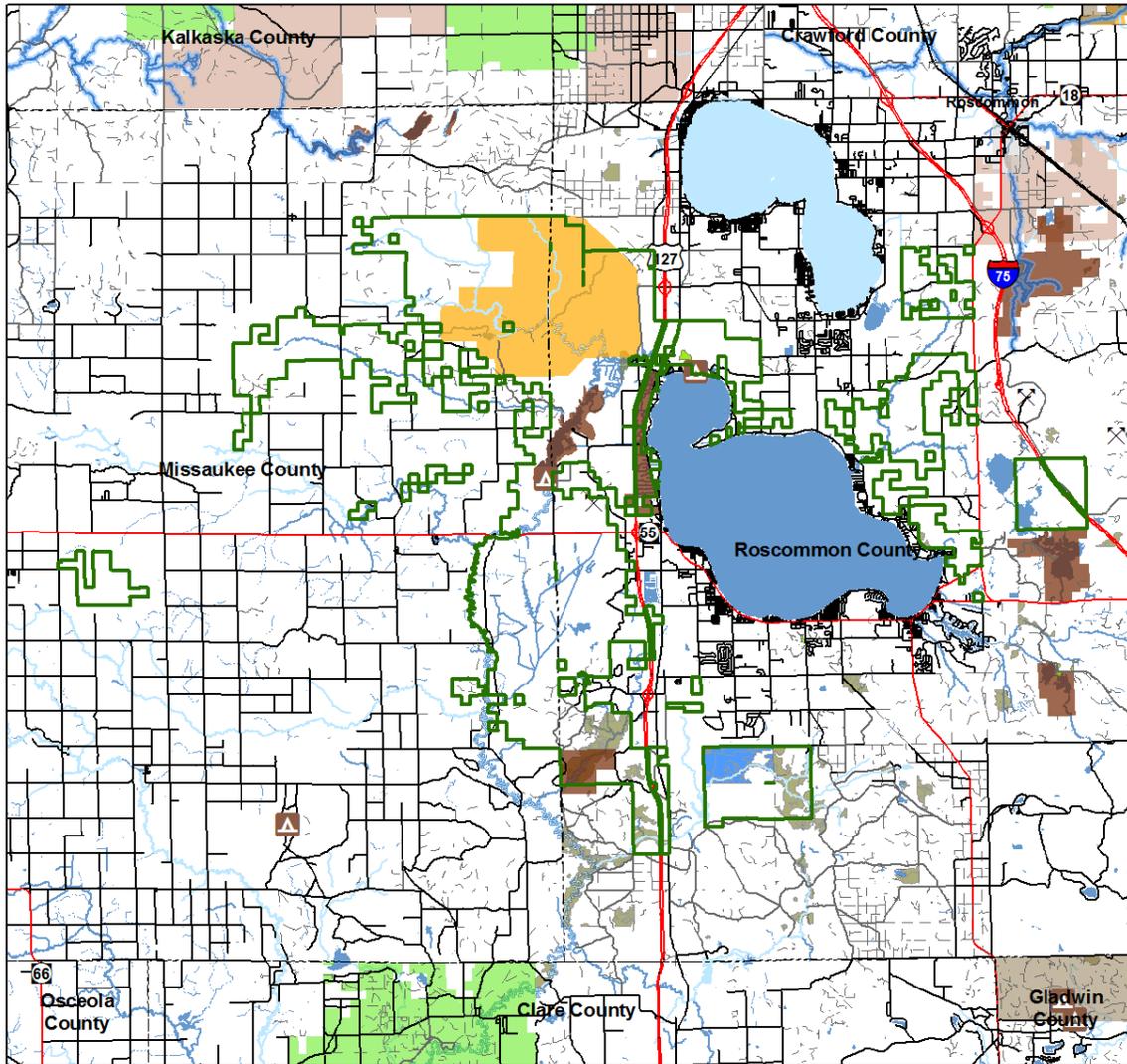
- Document occurrences of rare, threatened, endangered and special concern species and natural communities for the management area through the inventory process or with occasional focused surveys.
- Evaluate all potential Type 1, potential Type 2 and potential old growth areas to determine their status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

Table 4.24.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Houghton Lake Wetlands 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
Bird								
Bald eagle	<i>Haliaeetus leucocephalus</i>	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
Insect								
Red-legged spittlebug	<i>Prosapia ignipectus</i>	SC/G4/S2S3	Confirmed	EV	Moderate	Alvar	Upland open/semi-open	N/A
						Prairie fen	Upland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Mesic sand prairie	Upland open/semi-open	N/A
Secretive locust	<i>Appalachia arcane</i>	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
Plants								
Pale Agoseris	<i>Agoseris glauca</i>	T/G5/S2	Confirmed			Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry sand prairie	Upland open/semi-open	N/A
Hill's thistle	<i>Cirsium hillii</i>	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
Rough fescue	<i>Festuca scabrella</i>	T/G5/S2S3	Confirmed			Oak-pine barrens	Oak	Mid

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

Houghton Lake Wetlands



1 in = 4 miles

Legend

<ul style="list-style-type: none"> — Highway — Paved Roads — Gravel Roads - - - Poor Dirt Roads — Railroads — Intermittent Stream or Drain — Perennial River — Lakes and Rivers — Management Area Boundary — Cities — County Boundaries 	<ul style="list-style-type: none"> — Ecological Reference Areas High Conservation Value Areas — Coastal Environmental Areas — Critical Dunes — Natural Rivers Vegetative Buffer — Natural Rivers Zoning District — Critical Coastal Habitat (Piping Plover) — Kirtland Warbler Habitat — Dedicated Management Areas — Natural Areas Legally Dedicated 	<ul style="list-style-type: none"> Special Conservation Areas — Campgrounds — Fishing Access Sites — Boat Access Sites — Mineral Resource Locations — Wild & Scenic Rivers (USFS Lands) — Visual Management Areas — Contiguous Resource Areas — Possible Type 1 and Type 2 Old Growth — Potential Old Growth — Non-Dedicated Natural Areas & National Natural Landmarks — Springs, Wetlands, or Riparian Areas 	<ul style="list-style-type: none"> — Cold Water Streams & Lakes — Wildlife Management Areas — Research, Development, and Military Lands — Great Lakes Islands
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Figure 4.24.7. A map of the Houghton Lake Wetland management area showing the special resource areas.

4.24.4 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. One of the more important forest health issues in this management area includes oak decline and management should be adapted as follows:

- Oak decline which 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.

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 4.24.3. 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 should be used to inform of 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 4.24.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Houghton lake Wetlands - FRD Management Areas	Cases within FRD Areas	Cases within 5 Mile Buffer	Total number of cases	Total number of different Invasive Species
	1	2	3	3
Invasive Species within FRD Areas	Occurrences	Invasive Species within 5 Mile Buffer	Occurrences	
Japanese Knotweed <i>Fallopia japonica</i>	1	Garlic Mustard <i>Alliaria petiolata</i>	1	
-	-	Reed Canary Grass <i>Phalaris arundinacea</i>	1	

4.24.5 Fire Management

Historically, disturbance through fire has played an important role in the initial propagation and maintenance of oak and natural oak/pine types, small inclusions of aspen or grass/upland brush types. Wildfire risk and fuel loading is increased in young dense conifer plantations and mature jack pine affected by jack pine budworm.

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:

- Re-introduce fire in the oak/pine areas to encourage pine and oak regeneration and to discourage competition particularly from red maple;
- Incorporate fire as a tool to restore or maintain managed openings;
- Reduce fuel loading and therefore the risk of wildfire in jack pine stands by harvesting at maturity; and
- Recognize that increased urbanization in close proximity to the management area will present more wildland/urban interface challenges to wildfire suppression.

4.24.6 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 4.24.1 and listed in Appendix F.

4.24.7 Public Access and Recreation

Access for management and/or recreation is generally very poor throughout this management area due to the extent of the lowland areas. In accordance with the department's *Sustainable Soil and Water Quality Practices on Forest Land*, upon completion of harvesting, temporary spur and seasonal roads will be closed and stabilized.

With a high water table and fragile ecosystems, this management area offers limited recreational opportunities; however, the facilities provided have unique qualities. Situated on the north shore of Houghton Lake, the Houghton Lake State Forest Campground (Figure 4.24.7) routinely ranks as one of the top five busiest state forest campgrounds in the state. Houghton Lake State Forest Campground has a "modern" toilet facility, natural flowing drinking water wells and portable docks for boat enthusiasts, which all sustain its heavy use. Reedsburg Dam state forest campground (Figure 4.24.7) offers typical camp sites, along with smaller "hike-in" sites for those looking for a tenting camping experience. Off-road vehicle enthusiasts can ride the 50-inch West Higgins Trail and snowmobiling is an important economic boost to the area in the winter months (Figure 4.24.1). Current recreation opportunities are heavily used, but future additional recreation amenities are limited by the fragile terrain associated with wetland ecosystems. The recreation features provided in this management area are listed below.

Campgrounds

- Reedsburg Dam State Forest Campground
- Houghton Lake State Forest Campground

Boating Access Sites (BASs)

- Reedsburg Dam BAS
- Deadstream Flooding BAS

Off-Road Vehicle Trails

- West Higgins Trail

Snowmobile Trails

- Various

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 retaining trees along single track off-road vehicles trails to maintain the integrity of narrow trails. Additionally, considerations may be made for harvest timing around snowmobile 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.

4.24.8 Oil, Gas and Mineral Development

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium, fine-textured till, coarse-textured till, ice-contact outwash sand and gravel and peat and muck. The glacial drift thickness varies between 200 and 800 feet. Sand and gravel pits are located in this management area and there is good potential for additional pits.

The Jurassic Red Beds, Pennsylvanian Saginaw Formation and Mississippian Bayport Limestone and Michigan Formation subcrop below the glacial drift. The Bayport is quarried for limestone elsewhere in the state.

Very little of these lands have been developed for oil and gas from the Devonian Richfield and Ordovician Prairie du Chien. Well spacing for the Devonian is 40 acres and the Prairie du Chien 320 to 640 acres. There is potential for additional development for these formations in this management area. The Collingwood Formation's first well was drilled for gas in Missaukee county and additional wells have been permitted. Spacing will most likely be 640 acres or larger.

Most of the management area is currently leased, most likely for Collingwood Formation development and if drilling is successful, additional leasing and drilling will continue in this 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, 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. In 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 that all pipelines are to be buried below plow depth. 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.