

4.22 MA 22 – Manistee Plains Management Area

Summary of Use and Management

Vegetation management in the Manistee Plains management area (MA) (Figure 4.22.1) will provide forest products; maintain or enhance wildlife habitat; protect areas of unique character including the Betsie River (a designated natural river), Bear Creek and the Grass Lake Flooding State Wildlife Management Area; threatened, endangered and special concern species; and provide for forest-based recreational uses. The primary attributes and associated uses that influence and drive management in the Manistee Plains management area are wood fiber production, wildlife habitat for existing species and recreational uses. Management activities will emphasize the age, size and species distribution within cover types. Expected trends within this 10-year planning period are increased recreation pressure and continued management to balance cover type age-class distributions for timber and wildlife habitat.

This management area is located in the northeast portion of Manistee County and the southeast portion of Benzie County northeast of Manistee, Michigan and contains 31,847 acres of state forest (Figure 4.22.1).

Introduction

This management area is located in the northeast portion of Manistee County and southeast corner of Benzie County and contains 31,847 acres of state forest (Figure 4.22.1). The primary attributes which identify the Manistee Plains management area include:

- The lake plain landform (49%) and outwash plain (24%).
- Cover types which are dominated by lowland deciduous, aspen, northern hardwoods and red pine. This management area is almost entirely within the Newaygo Outwash Plain sub-region of the northern Lower Peninsula.
- Dispersed recreation in the form of hunting as well as concentrated recreation on snowmobile trails and at the Healy Lake Campground and Grass Lake Campground are popular in this management area.
- There has been extensive development of oil/gas resources.
- The Betsie River which is a natural river (high conservation value area) and the Little Betsie River run through the management area.
- Bear Creek by agreement is managed as if it were an officially designated natural river.
- A snowmobile trail crosses the management area. Surveys have located the threatened, endangered or special concern species red-shouldered hawk, bald eagle, wood turtle, woodland vole and a several great blue heron colonies.
- The Selma Swamp, a northern hardwood swamp is also located in the management area.

The current predominant cover types, acreages and projected harvest acres in the management area are shown in Table 4.22.1.

Manistee Plains

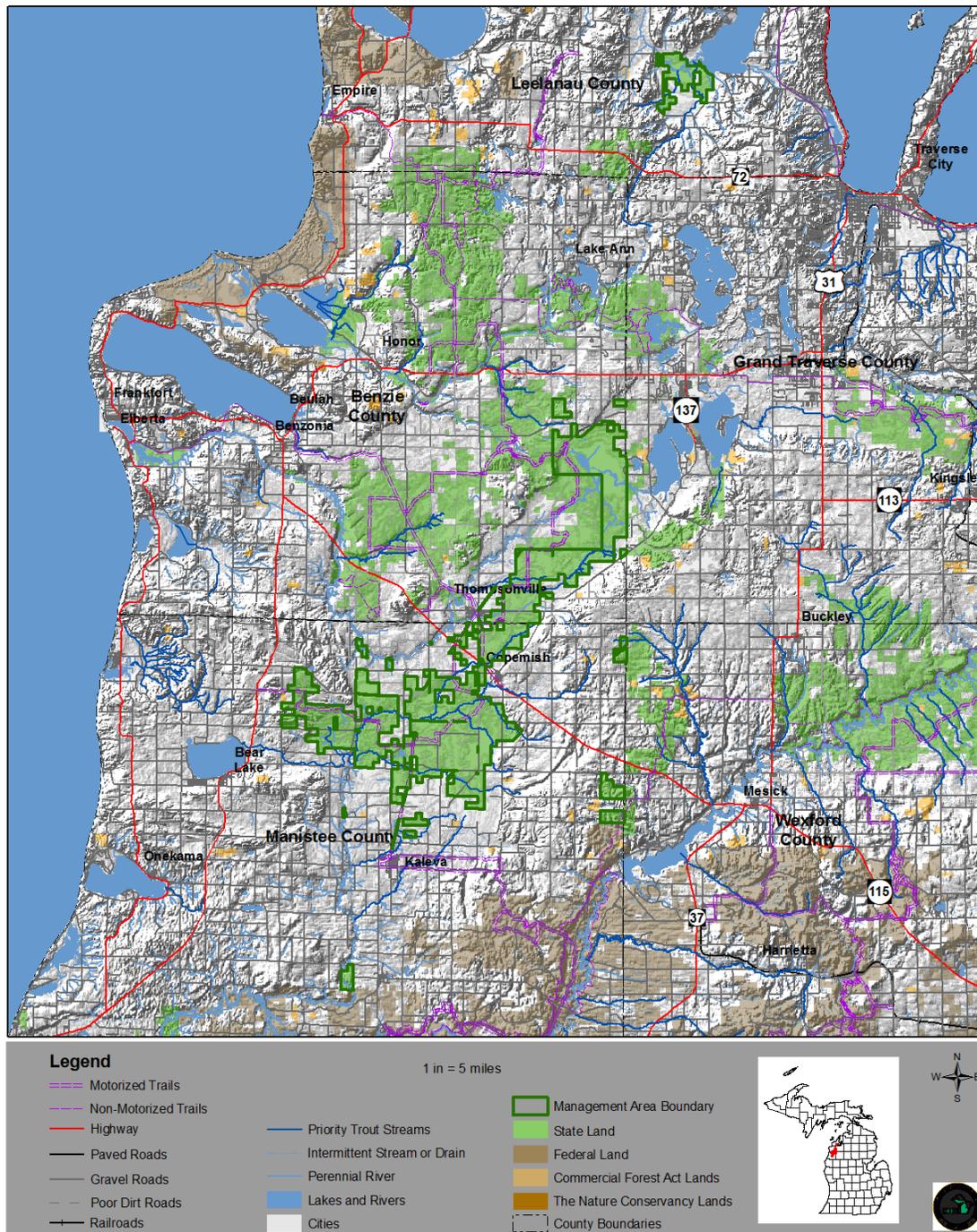


Figure 4.22.1. A map of the Manistee Plains management area (dark green boundary) in relation to surrounding state forest and other lands in Manistee and Benzie Counties, Michigan.

Table 4.22.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Manistee Plains 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
Lowland Deciduous	25%	8,059	4,350	3,709	412		8,059	412	
Aspen	20%	6,469	294	6175	1,277		6,469	1,029	
Northern Hardwood	9%	2,753	155	2598	150	1,134	2,753		1,134
Red Pine	8%	2,698	71	2627	544	1,372	2,698	292	1,399
Cedar	6%	1,761	53	1708	107		1,761	107	
Lowland Aspen/Balsam Poplar	5%	1,530	289	1241	640		1,530	207	
White Pine	3%	907	52	855	265	399	907	78	399
Lowland Conifers	3%	851	373	478	53		851	53	
Upland Open/Semi-Open Lands	6%	1,803		1803			1,803		
Lowland Open/Semi-Open Lands	7%	2,365		2365			2,365		
Misc Other (Water, Local, Urban)	2%	648	0	648			648		
Others	6%	2,003	39	1964	490	333	2,003	235	399
Total		31,847	5,676	26,171	3,937	3,238	31,847	2,413	3,331

4.22.1 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.

4.22.1.1 Forest Cover Type Management – Lowland Deciduous

Current Condition

Lowland deciduous acres total 8,059 or 25% of the management area (Table 4.22.1) and are located on wetland sites. As shown in Figure 4.22.2, most of the acres are in the age-classes above the age of 60. 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.

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. 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 over 4,350 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; and
- These lowland types will provide a sustainable level of forest products along with wildlife habitat and recreational opportunity.

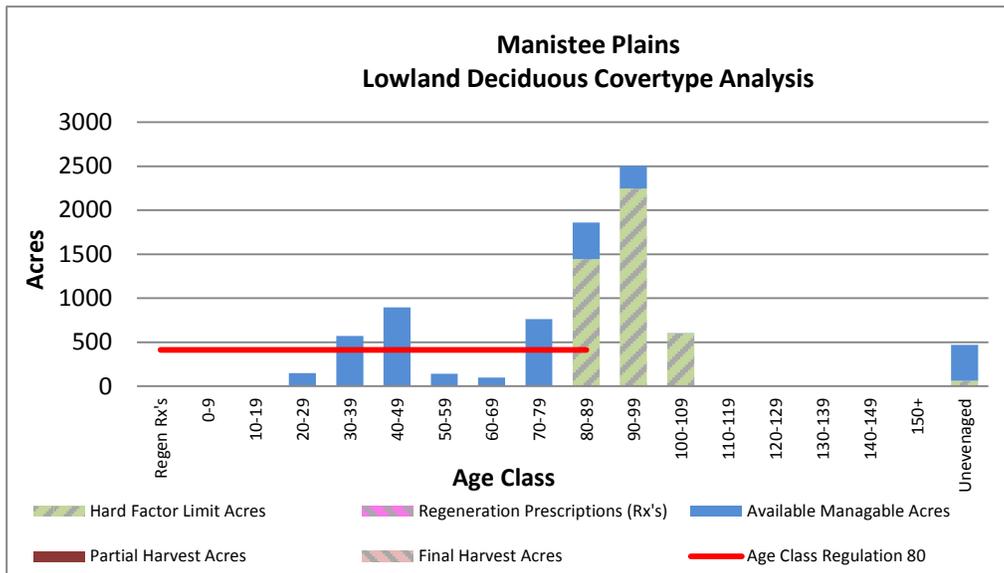


Figure 4.22.2. Age-class distribution for lowland deciduous in the Manistee Plains management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct final harvests on a projected 412 acres.

Long-Term Management Objectives

- Continue to manage lowland deciduous stands for timber products, wildlife habitat and recreational opportunities;
- Lowland deciduous stands will continue to be managed with individual tree selection, group selection or final harvest to produce a sustainable level of forest products and wildlife habitat;
- Consider the impact of emerald ash borer on ash in lowland deciduous stands in management decisions; and
- A desired future harvest level is projected at 412 acres for final harvest per 10-year period.

4.22.1.2 Forest Cover Type Management – Aspen

Current Condition

Aspen acres total 6,469 or 20% of the management area (Table 4.22.1). Aspen (most commonly quaking aspen) is distributed throughout the management area. The age-classes of aspen are somewhat imbalanced, with spikes in the 0-9 and 30-39 year-old age classes (Figure 4.22.3). There are 294 acres of aspen that have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 766 acres that have a final harvest pending and these acres are included in the regeneration prescription class.

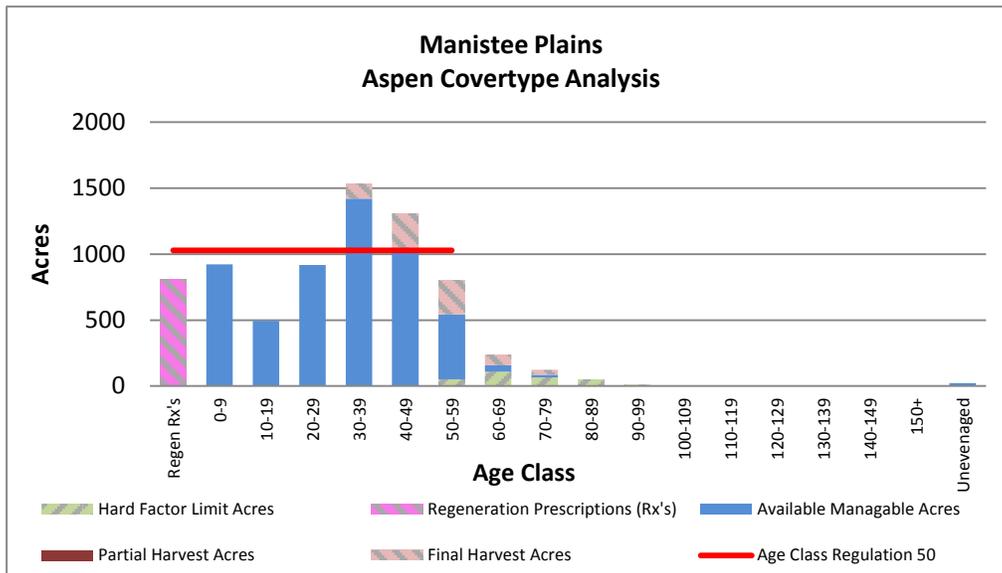


Figure 4.22.3. Age-class distribution for aspen in the Manistee Plains management area (2012 Department of Natural Resources inventory data).

The graph includes the projected number of acres converted to the cover type as a result of treatments that remove an overstory species resulting in release of aspen. These acres are included in the 0-9 year-old age-class.

Aspen is generally managed on a 50-year rotation in this management area to produce pole quality timber and occasional sawlogs. The exceptions to this management are priority areas for ruffed grouse and American woodcock 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 some areas, aspen may be of merchantable size at less than 50 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 located on suitable sites with acres balanced between 0-59 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 regeneration harvests on a projected 1,277 acres.

Long-Term Management Objectives

- Continue management through regeneration harvests at the desired future harvest level of 1,029 acres for final harvest per 10-year period to continue work toward balancing the age-class distribution; and
- 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.

4.22.1.3 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwood acres total 2,753 acres or 9% of the management area (Table 4.22.1). Since hardwood stands have trees of varying ages, stand density, described as basal area, is a more appropriate measure of stand condition for northern hardwood stands. Nearly half of the northern hardwood acres are in stands with a basal area between 81-110 square feet per acre. There are 155 acres of northern hardwoods have met harvest criteria (Figure 4.22.4) but have site conditions that limit harvest (hard factor limit acres). There are 104 acres with a partial harvest pending and these acres are included in their current basal area range.

Northern hardwoods in the management area may vary from higher quality sites capable of producing quality hardwood sawlogs to poor-quality sites that contain a mix of less valuable timber species.

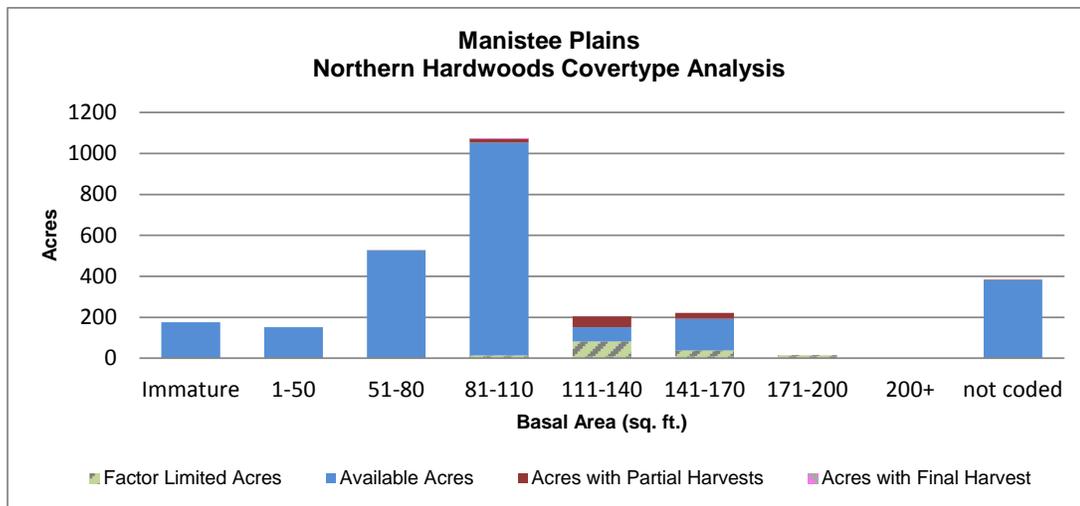


Figure 4.22.4. Basal area distribution for northern hardwoods in the Manistee Plains management area (2012 Department of Natural Resources inventory data).

On the poor-quality sites, the form and quality of the trees may result in lower value products due to multiple stems or poorer quality stems that are not capable of producing quality sawlogs. This will dictate whether stands are treated through selective or partial harvests to produce quality sawlogs or through restarting harvests to improve the future stem quality. Restarting harvests may occasionally release aspen which may out-compete the hardwoods resulting in a conversion to aspen.

Desired Future Condition

- Northern hardwood stands will be maintained and managed through selection harvests on better quality hardwood sites and through regeneration harvests on poorer quality hardwood sites to provide a sustainable timber supply, wildlife habitat and recreational opportunity; and
- Where feasible, stands will be in relatively large contiguous patches of uneven-aged, compositionally diverse forest which contain coarse woody debris, scattered large trees and scattered snags. This will be of benefit to a wide range of wildlife species, including pileated woodpecker, a featured species in this management area.

10-Year Management Objectives

- On better quality hardwood sites a projected 1,134 acres will be harvested through selection harvests to produce uneven-aged stands;
- Where necessary and feasible, consider harvesting stands from the lower basal area range to expedite the balancing of basal area distributions; and
- Where present, favor red oak for mast and hemlock and white pine for within-stand diversity.

Long-Term Management Objectives

- Where present, continue to conduct salvage harvests of beech affected by beech bark disease and ash where present and affected by emerald ash borer, in northern hardwood stands, using Beech Bark Disease Guidelines and Emerald Ash Borer Guidelines;
- Consider the need to delay further selection harvesting due to resultant lower than normal residual basal area in post-salvage harvest stands;
- Continue to manage for stands with an uneven-age class on better quality hardwood sites at a projected desired future harvest level of 1,134 acres for partial harvest per 10-year period; and
- Consider continued management of poorer quality sites through regeneration harvests.

4.22.1.4 Forest Cover Type Management – Red Pine

Current Condition

Red pine is mostly planted, of generally high-quality and consists of a total of 2,698 acres (8%) on high quality moraines (Table 4.22.1). Red pine timber is a high-value forest commodity which drives continued management of the red pine resource. There is a pronounced spike in the 50-59 year-old age classes (Figure 4.22.5) which represents an era of active planting. There are 88 acres that have a final harvest pending and these acres are included in the regeneration prescription class.

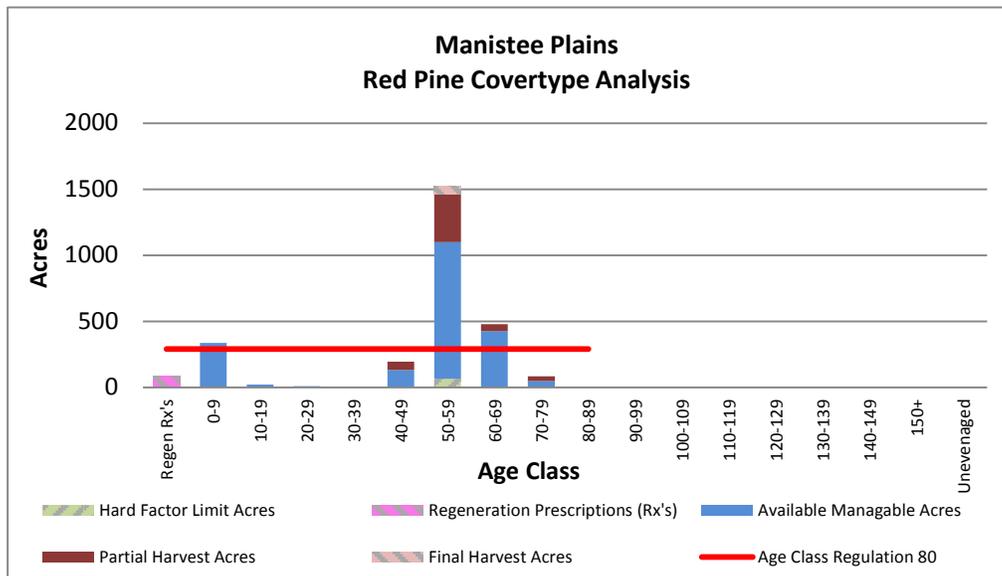


Figure 4.22.5. Age-class distribution for red pine in the Manistee Plains management area (2012 Department of Natural Resources inventory data).

There are approximately 507 acres with a partial harvest pending and these acres are included in their current age class. The graph includes the projected number of acres converted to the cover type as a result of final harvests and planting of red pine. These acres are included in the 0-9 year-old age class.

The acres in the 50-59 year-old age class are being thinned to increase growth on the remaining trees to achieve a more valuable product. There is a slight surplus of acres in the 0-9 year-old age class and harvests may need to be adjusted down in the 10-year planning period to offset this surplus.

Desired Future Condition

- Red pine will be located on suitable sites with acres balanced between the ages of 0-89; and
- Red pine will be managed for a sustainable yield of forest products and recreational opportunities.

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and balancing age-class distribution;
- If a well-established understory of desirable northern hardwood seedlings and saplings exists below older red pine, consider using seed tree or shelterwood harvests to release the hardwoods while keeping red pine as a component to improve stand diversity;
- Conduct final (regeneration) harvests on a projected 544 acres, beginning with the oldest age-classes and with a concentration on stands with less potential for a higher product value; and
- Conduct partial harvests on a projected 1,372 acres, concentrating on stands of better quality red pine that have the potential for a higher product value in larger size classes.

Long-Term Management Objectives

- Continue to thin younger stands until the stands are replaced by seed tree harvests or final harvests at economic maturity (80 years);
- Future planning may need to consider adjustments to harvest levels to continue work toward balancing age-class distributions. Due to the extremely unbalanced age-class distribution of red pine, balancing the age-class distribution will take many decades; and
- A desired future harvest level is projected at 292 acres for final harvest and 1,399 acres for partial harvest per 10-year period.

4.22.1.5 Forest Cover Type Management – Cedar

Current Condition

Cedar acres total 1,761 acres or 6% of the management area (Table 4.22.1). Cedar is primarily located on lowlands throughout the management area.

Forest cover types dominated primarily by cedar in this management area is valued ecologically as sources of habitat for numerous species of wildlife including bear and white-tailed deer (featured species in this management area), hare and various song birds; and commercially for pulp. The age-class distribution for cedar is heavily skewed toward the older age classes (70 and above) (Figure 4.22.6) and there has been virtually no regeneration in the last 80 years.

Desired Future Condition

- Cedar forest cover types will be maintained on operable sites through even-aged management with acres balanced between 0-159 for cedar to provide for regulated harvest;
- To contribute to the preservation of regional biodiversity by providing habitat for a unique suite of plants and wide variety of animal species; and
- By storing high levels of sequestered carbon and serving as carbon sinks, cedar swamps will play an important role in global geochemical cycles.

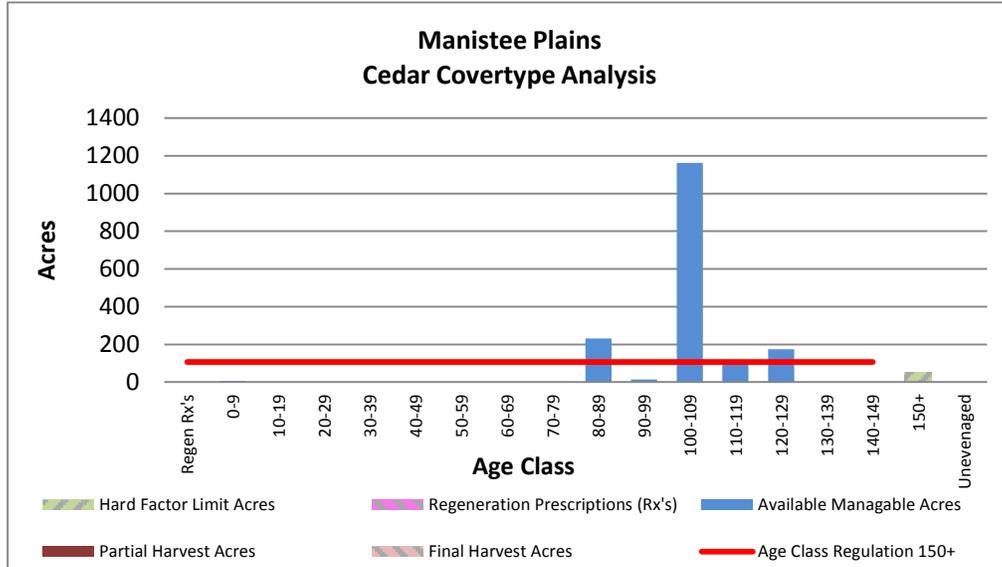


Figure 4.22.6. Age-class distribution for cedar in the Manistee Plains management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct regeneration harvests on a projected 107 acres of cedar;
- Consider methods to ensure adequate regeneration of cedar; and
- 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.

Long-Term Management Objectives

- It is acceptable that over the next several decades, the older cedar stands, much of it inaccessible for harvest, will continue to experience natural processes (fire, wind throw, insect defoliation and beaver flooding) resulting in the formation of a range of successional stages;
- Continue to manage cedar where accessible for a sustainable yield of forest products, habitat and recreational opportunities; and
- A desired future harvest level is projected at 107 acres for final harvest per 10-year period.

4.22.1.6 Forest Cover Type Management – Lowland Aspen/Balsam Poplar

Current Condition

Lowland aspen/balsam poplar (primarily balsam poplar, swamp aspen and swamp white birch) acres total 1,530 or 5% of the management area (Table 4.22.1). Forest communities dominated primarily by lowland poplar in this management area are valued ecologically as sources of habitat for numerous species of wildlife including bear and white-tailed deer (featured species in this management area); various song birds; and commercially for pulp. Lowland aspen/balsam poplar is primarily concentrated in wet areas or areas without easement limiting treatment options. There are 289 acres in this management area is considered inaccessible (Figure 4.22.7) or otherwise unavailable for harvest unless it can be done in a manner that will not adversely impact wetland soils (hard factor limit acres).

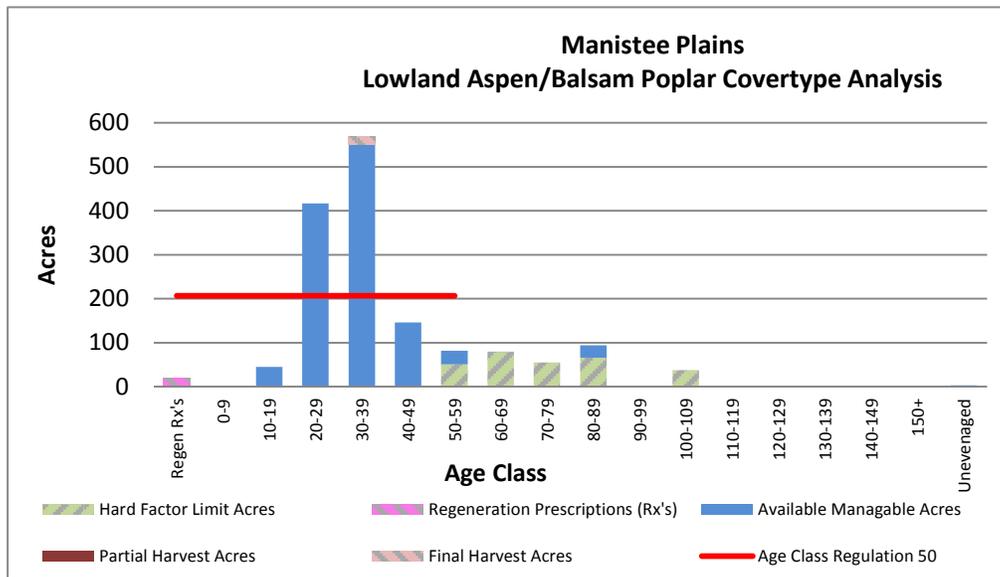


Figure 4.22.7. Age-class distribution for lowland aspen/balsam poplar in the Manistee Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Lowland aspen/balsam poplar-dominated forest communities will be maintained on operable sites through even-aged management with acres balanced between 0-59 years of age to provide for a sustainable harvest, wildlife habitat and to contribute to the preservation of regional biodiversity.

10-Year Management Objectives

- Conduct regeneration harvests on a projected 640 acres in accessible stands that will attain age 50 during the next decade; and
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite the balancing of age-class distributions.

Long-Term Management Objectives

- It is acceptable that the older lowland poplar, much of it inaccessible to human management, will continue to experience natural processes (wind throw, flooding and senescence) resulting in changes in species composition;

- Future planning decisions may need to take into consideration the impact of emerald ash borer on ash in lowland sites; and
- A desired future harvest level is projected at 207 acres for final harvest per 10-year period.

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

Current Condition

Upland shrub and herbaceous open land acres total 1,803 acres or 6% of the management area (Table 4.22.1). 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.

Desired Future Condition

- Upland open/semi-open lands will be maintained at or above the current level in order to provide habitat for species which use openings.

10-Year Management Objectives

- Where necessary and feasible, consider methods to maintain upland open/semi-open lands during this management cycle. This will be of benefit to wildlife species that use non-forested openings, including wild turkey, a featured species in this management area.

Long-Term Management Objectives

- Continue to maintain herbaceous open land and upland shrub openings at or above current levels in order to promote wildlife values and recreational opportunity; and
- Where feasible and necessary, use control methods on invasive non-native species.

4.22.1.8 Forest Cover Type Management – Other Types

Current Condition

Individual cover types which may cover less than 5% of the management area include: white pine 844 acres or 3%, mixed upland deciduous 841 (3%), lowland conifers 721 acres (3%), oak 563 acres (2%), tamarack 538 (2%) and upland mixed forest 421 acres (2%). Other forest and non-forested acres total 2,003 acres or 6% 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;
- The following species are projected for restarting or regeneration harvests: 265 acres of white pine, 53 acres of lowland conifers, 175 acres of lowland mixed forest, 82 acres of upland mixed forest, 105 acres of mixed upland deciduous, 59 acres of natural mixed pines and 68 acres of oak; and
- Partial harvests are projected for 399 acres of white pine, 127 acres of upland mixed forest, 52 acres of mixed upland deciduous, 77 acres of natural mixed pines and 77 acres of oak.

Long-Term Management Objectives

- A desired future harvest level is projected at 53 acres of lowland conifers for final harvest per 10-year period.

4.22.2 Featured Wildlife Species

Each of the featured species outlined below includes recommended practices with regard to forest and/or wetland management. These recommended practices will not be employed across the management area as a whole, but rather in priority compartments, stands or wetlands as defined by local Wildlife Division and Forest Resources Division field staff.

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

- American woodcock
- Beaver
- Black bear
- Mallard (Grass Lake Flooding State Wildlife Management Area)
- Pileated woodpecker
- Red-headed woodpecker
- Ruffed grouse
- Wild turkey
- White-tailed deer
- Wood duck (Grass Lake Flooding State Wildlife Management Area)

The primary focus of wildlife habitat management in the Manistee Plains 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.

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 to 30 acres in size. Optimal hemi-marsh sites are > 2.5 acres with open water portions having extensive portions < 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 plan for Grass Lake Flooding State Wildlife Management Area 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, hawthorn, cherry, and other mast producing shrub components.
 - Implementation of 10-year management direction for upland brush will be sufficient to meet this grouse habitat specification.

Wild Turkey

The goal for turkey in the 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 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 or larger in diameter at breast height. 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 plan for Grass Lake Flooding State Wildlife Management Area and application of the beaver wildlife habitat specifications will be sufficient to meet this wood duck habitat specification.
- Maintain stable water levels at managed floodings from April through August.

4.22.3 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 five listed species and no natural community of note occurring in the management area as listed in Table 4.22.2. 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.

The Betsie River and its tributaries have been identified as a natural river and along with its corridor are also designated as a high conservation value area as shown in Figure 4.22.8.

There is no ecological reference areas identified for the Manistee Plains management area.

Management goals during this planning period:

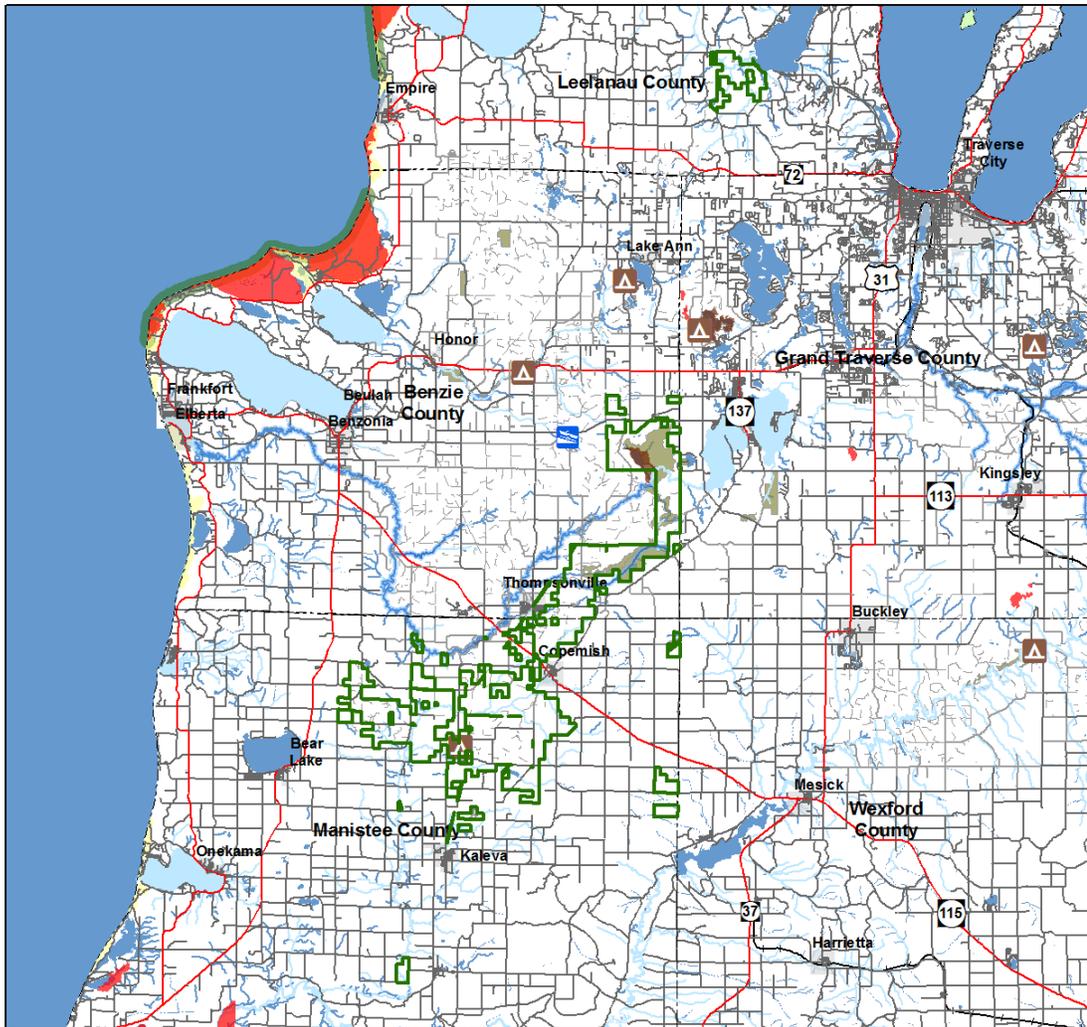
- Document occurrences of rare, threatened, endangered and special concern species and natural communities for the management area through the inventory process or with occasional focused surveys.
- Evaluate all potential Type 1, potential Type 2 and potential old growth areas to determine their status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

Table 4.22.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Manistee Plains 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
Birds								
Red-shouldered hawk	<i>Buteo lineatus</i>	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
Mammal								
Woodland vole	<i>Microtus pinetorum</i>	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
Reptile								
Blanding's turtle	<i>Emydoidea blandingii</i>	SC/G4/S3	Confirmed	HV	Very High	Mesic southern forest		
						Mesic prairie	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern fen	Lowland open/semi-open	N/A
						Submergent marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Great Lakes marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Inundated shrub swamp	Lowland open/semi-open	N/A
Wood turtle	<i>Glyptemys insculpta</i>	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Eastern Massasauga rattlesnake	<i>Sistrurus catenatus catenatus</i>	C/SC/G3G4T3T4Q/S3S4	Confirmed	HV	High	Coastal fen	Lowland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Poor conifer swamp	Tamarack	Late
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Dry northern forest	Jack Pine, Red Pine	Early
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid

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

Manistee Plains



Legend

- Highway
- Paved Roads
- Gravel Roads
- Poor Dirt Roads
- Railroads
- Intermittent Stream or Drain
- Perennial River
- Lakes and Rivers
- Management Area Boundary
- Cities
- County Boundaries

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

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



- Cold Water Streams & Lakes
- Wildlife Management Areas
- Research, Development, and Military Lands
- Great Lakes Islands

Figure 4.21.8. A map of the Manistee Plains management area showing the special resource areas.

4.22.4 Forest Health Management

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

management area include oak wilt, beech bark disease and emerald ash borer impacts on black ash in lowland types and management should be adapted as follows:

- Where high quality ash and/or beech are present, 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.

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 4.22.3. This information was compiled from the Midwest Invasive Species Information Network Ddatabase, but it should not be considered complete. Local staff has noted the presence of garlic mustard and *Phragmites* in the management area. 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 4.22.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Manistee Plains - FRD Management Areas	Cases within FRD Areas	Cases within 5 Mile Buffer	Total number of cases	Total number of different Invasive Species
	4	12	16	4
Invasive Species within FRD Areas	Occurrences	Invasive Species within 5 Mile Buffer	Occurrences	
Glossy Buckthorn <i>Rhamnus frangula</i>	4	Glossy Buckthorn <i>Rhamnus frangula</i>	9	
-	-	Japanese Knotweed <i>Fallopia japonica</i>	1	
-	-	Purple Loosestrife <i>Lythrum salicaria</i>	1	
-	-	Tatarian Honeysuckle <i>Lonicera tatarica</i>	1	

4.22.5 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 4.22.1 and listed in Appendix F.

4.22.6 Fire Management

Northern hardwoods which have historically been a major component of this management area are rarely impacted by natural fire regimes.

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:

- Consider opportunities to incorporate fire as a tool to restore or maintain managed openings;
- Consider opportunities to use fire as a tool for site preparation and to reduce slash or competing vegetation; and
- Recognize that increased urbanization in close proximity to the management area will present more wildland/urban interface challenges to wildfire suppression.

4.22.7 Public Access and Recreation

Access for management and/or recreation is generally good throughout this management area as there is a well-developed road/trail system. The department will continue to seek access across adjacent private property. 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.

Recreation opportunities within this management area include the Healy Lake State Forest Campground (Figure 4.22.8) and boating access site, which are both managed by Springdale Township. The Betsie Valley Trail, which is a converted railroad line, offers non-motorized users with a gentle, smooth trail tread in non-winter months and then during the winter, provides snowmobilers with a critical snowmobile trail link to local communities (Figure 4.22.1). Other recreational opportunities such as dispersed camping, mushroom and berry picking are prevalent in this management area. Future growth of recreational amenities is likely in this management area based upon population shifts, and compatible soil types. Recreation facilities within this management area are shown below:

Campgrounds

- Healy Lake State Forest Campground

Boating Access Sites

- Healy Lake Boating Access Site

Snowmobile Trails

- Various

Non-Motorized Trails

- Betsie Valley Trail

The opportunity to participate in these recreational activities on the nearby state forest land is one of the reasons that the population in areas near the management area is expected to continue to increase. This will result in an increased demand for outdoor recreation opportunities. 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. 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.

4.22.8 Oil, Gas and Mineral Development

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium and lacustrine (lake) sand and gravel. The glacial drift thickness varies between 400 and 800 feet. Sand and gravel pits are located in this management area and there is potential.

The Mississippian Coldwater and Sunbury Shales and Devonian Ellsworth and Antrim Shales sub-crop below the glacial drift. The Antrim is quarried for cement products elsewhere in the state.

Most of these lands have been developed for gas production from the Antrim Shale and oil and gas production from the Guelph (former Niagaran) reefs. Well spacing for both formations is currently 80 acres and most of the producing area is still under lease. Additional development for both formations is likely. The Collingwood Formation does not appear to have potential 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.