4.21 MA 23 – Manistee River Valley Management Area

Summary of Use and Management

Vegetation management in the Manistee River Valley management area (MA) (Figure 4.23.1) will provide timber products; maintain or enhance wildlife habitat; protect areas of unique character including the Manistee River and its tributaries, a designated natural river; threatened, endangered and special concern species; and provide for forest-based recreational uses. Timber management for this 10-year planning period includes continuing aspen management to maintain early successional habitat for hunting and other wildlife-related recreational opportunities; increasing regeneration of oak; focusing on balancing the red pine age class structure through final harvests and re-planting; and on improving red pine quality through partial harvests. Expected trends within this 10-year planning period are increased recreational pressure, especially on the established trails and along the Manistee River and its tributaries; an increased wildland/urban interface and a need to restore barrens communities through prescribed fire; and invasive plant control.

Introduction

This management area is located between Traverse City and Cadillac in Grand Traverse, Wexford, Kalkaska and Missaukee counties and contains 114,592 acres of state forest (Figure 4.23.1). The primary attributes which identify the Manistee River Valley management area include:

- The glacial outwash plain landform (75% of the management area).
- A history of intensive management which has resulted in the cover types of aspen, red pine, oak, upland hardwoods and white pine.
- Due to the proximity of this management area to Traverse City and Cadillac and other population areas, the forest resources contribute significant social and economic values to the area.
- This management area is evenly split between two forest management units (Traverse City and Cadillac forest management units), which will require cooperative management.
- The management area falls within the Grayling Outwash Plain sub-region of the northern Lower Peninsula.
- The Manistee River and its tributaries, a designated natural river, cross the management area and are heavily used for canoeing, kayaking and fishing. A portion of the Manistee River in Wexford County is being managed as a natural river although it is not designated as such.
- Portions of the North Country Trail, Grand Traverse to Supply Road Missaukee and Michigan Cycle Conservation Club Trail (MCCCT), North Missaukee Off-Road Vehicle (ORV) Route, North Missaukee ORV Trail, US – 131 to North Missaukee Trail, MCCCT to US 131 Motorcycle Trail, Missaukee – Kalkaska Snowmobile Trail and the 20 Road to Grand Traverse MCCCT cross portions of the management area.
- The Baxter Bridge and Spring Lake Campgrounds are located in the management area.
- Surveys have located the threatened, endangered or special concern species Hill's thistle, bald eagle, wood turtle, northern goshawk, great blue heron heronry, ginseng, eastern Massasauga, red-shouldered hawk and the common loon. In addition, listed communities include Upper Midwest type wet meadows and Upper Midwest type pine barrens are located in the management area.

The current predominant cover types, acreages and projected harvest acres in the management area are shown in Table 4.23.1.

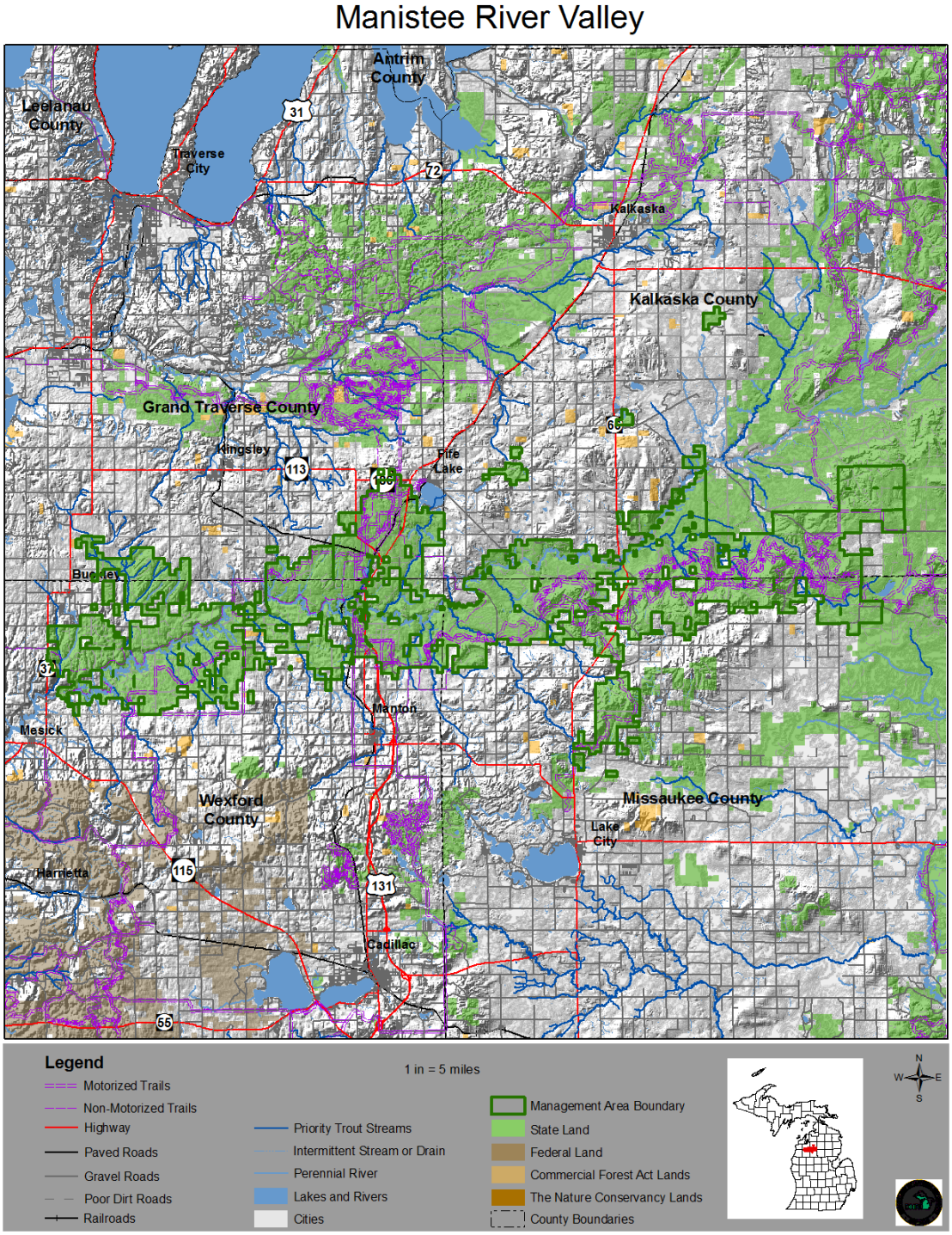

Figure 4.23.1. A map of the Manistee River Valley management area (dark green boundary) in relation to surrounding state forest and other lands in Grand Traverse, Wexford, Kalkaska and Missaukee counties, MI.

Table 4.23.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Manistee River Valley 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	29%	33,036	911	32,125	6,570		33,036	5,354	
Red Pine	15%	17,411	903	16508	3,487	6,692	17,411	1,651	8,425
Oak	11%	12,636	3,050	9586	2,027	803	12,636	1,065	2,650
Northern Hardwood	9%	10,147	416	9731	200	3,800	10,147		4,259
Jack Pine	5%	6,247	42	6205	264		6,247	886	
Lowland Conifers	5%	5,186	1,797	3389	376		5,186	376	
White Pine	3%	3,658	86	3572	1,007	1,427	3,658	325	1,492
Natural Mixed Pines	3%	3,625	268	3357	599	1,020	3,625	305	1,138
Mixed Upland Deciduous	3%	3,292	273	3019	775	497	3,292	435	831
Upland Open/Semi-Open Lands	5%	6,300		6300			6,300		
Lowland Open/Semi-Open Lands	2%	1,782		1782			1,782		
Misc Other (Water, Local, Urban)	0%	123	0	123			123		
Others	10%	11,149	1,673	9476	1,653	726	11,149	984	834
Total		114,592	9,419	105,173	16,958	14,965	114,592	11,381	19,629

4.23.1 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.

4.23.1.1 Forest Cover Type Management - Aspen

Current Condition

Aspen acres total 33,036 or 29% of the management area (Table 4.23.1). Aspen is distributed throughout the management area on till areas on very dry to dry/poor nutrient sites (habitat classes: PArVHa and PArVVb). The age-classes of aspen are fairly well balanced. There are 911 acres of aspen are coded with a harvest criterion (Figure 4.23.2) but have site conditions that limit harvest (hard factor limit acres). There are 3,334 acres that have a final harvest pending and these acres are included in the regeneration prescription class.

Desired Future Condition

- Aspen acres will be maintained on currently operable sites to provide early successional habitat for species viability, with acres balanced within the 0-59 year age-class rotation to provide a sustainable level of wood fiber.

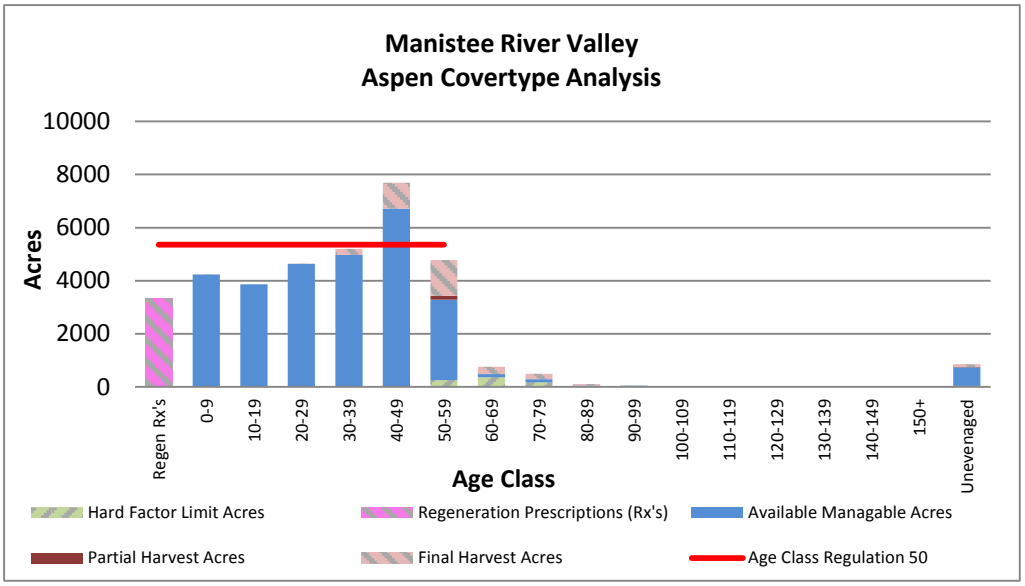

Figure 4.23.2. Age-class distribution for aspen in the Manistee River Valley management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct final (regeneration) harvests on a projected 6,570 acres; and
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite the balancing of age-class distributions.

Long-Term Management Objectives

- Continue regeneration harvests to balance age-class distributions which should be completed within the next 50-year rotation; and
- A desired future harvest level is projected at 5,354 acres for final harvest per 10-year period.

4.23.1.2 Forest Cover Type Management – Red Pine

Current Condition

Natural and planted red pine acres total 17,411 or 15% of the management area (Table 4.23.1) on habitat class PArVVb and PArVHa sites. Approximately 2,000 acres of red pine along the Manistee River is under a timber lease with the Consumers Power Corporation. There is a pronounced spike of red pine in age classes from 40-59 (Figue 4.23.3) which coincides with an era of active planting during the 1950s and 1960s. Also, there has been very little re-planting or regeneration of red pine in the last 40 years. Many of the planted red pine areas are in the pole to small sawlog size (8-12 inches in diameter at breast height) in relatively dense stands (above 110 square feet per acre of basal area).

These are frequently thinned to concentrate growth on the remaining stems to increase value through growth into larger sizes and more valuable product classes. Some of the older pine stands are natural red pine that may be mixed with oak or white pine. There are 903 acres of red pine have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 1,301 acres of stands that have regeneration harvest pending and these acres are included in the regeneration prescription class. There are 3,141 acres with a partial harvest pending and these acres are included in their current age class. The graph displays the projected number of acres converted to the cover type as a result of treatments and planting to red pine. These acres are included in the regeneration prescription class.

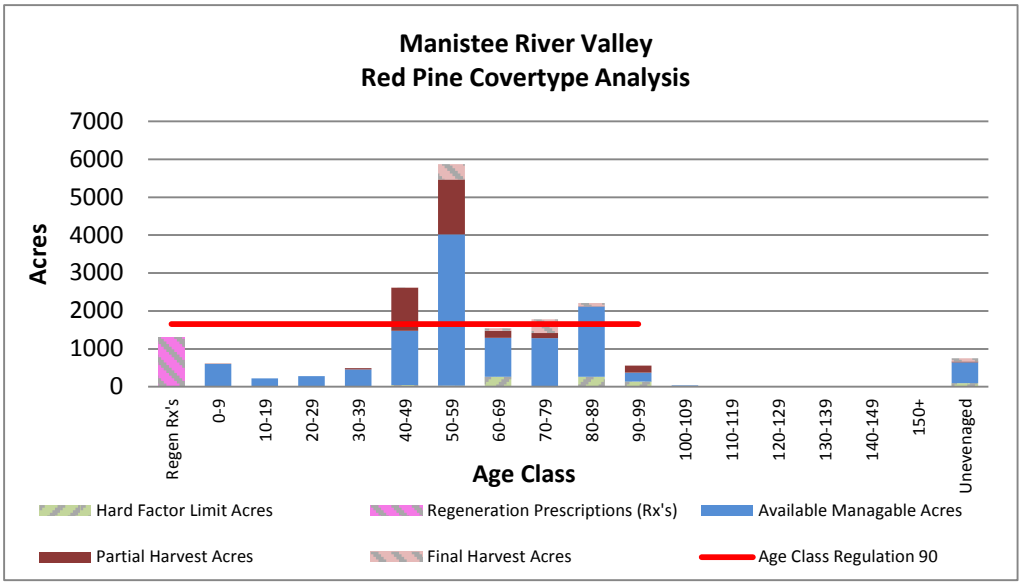

Figure 4.23.3. Age-class distribution for red pine in the Manistee River Valley management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Red pine of either natural origin or in planted stands will be located on suitable sites with acres balanced between 0-99 years of age.

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and balancing the age-class distribution;
- Conduct partial harvests on a projected 6,692 acres on the younger age-classes to improve quality and size class; and
- Conduct final (regeneration) harvests on a projected 3,487 acres in the older age-classes to help balance the age-class distribution.

Long-Term Management Objectives

- Continue work towards balancing the age-class distribution between the ages of 0-99 years through regeneration harvests;
- Seek opportunities to move red pine to suitable sites which may include managing red pine in mixed stands with oak or other species;
- On quality northern hardwood sites or sites where advanced northern hardwood species are present, consider whether to allow these sites to convert to northern hardwood while retaining a component of red pine for within stand diversity;
- On poorer quality red pine sites (PVCd habitat class) consider whether to restore to oak/pine barrens;
- In identified special conservation areas, especially those with natural red pine on dry-mesic sites, consider management of red pine to a biological rotation of 200+ years; and
- A desired future harvest level is projected at 1,651 acres for final harvest and 8,425 acres for partial harvest per 10-year period.

4.23.1.3 Forest Cover Type Management – Oak

Current Condition

Oak which is predominantly northern red, white and black oak acres total 12,636 acres or 11% of the management area (Table 4.23.1) on the till areas of very dry to dry/poor nutrient (habitat classes: PArVHa, PArVVb) sites. The origin of the oak resource was the aftermath of the logging era in the late 1800s and early 1900s when most of the red and white pine was removed. This cutting combined with frequent wildfires resulted in a period of oak regeneration during the late 1800s

and early 1900s. Some oak, due to the lack of fire, is found on poor quality PVCd sites that were historically oak/pine barrens. There are 3,050 acres of oak have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 718 acres of stands that have a final harvest pending and these acres are shown in the regeneration prescription class (Figure 4.23.4). There are 1,940 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 treatments that remove an overstory species resulting in the release of oak. These acres are included in the current age-class.

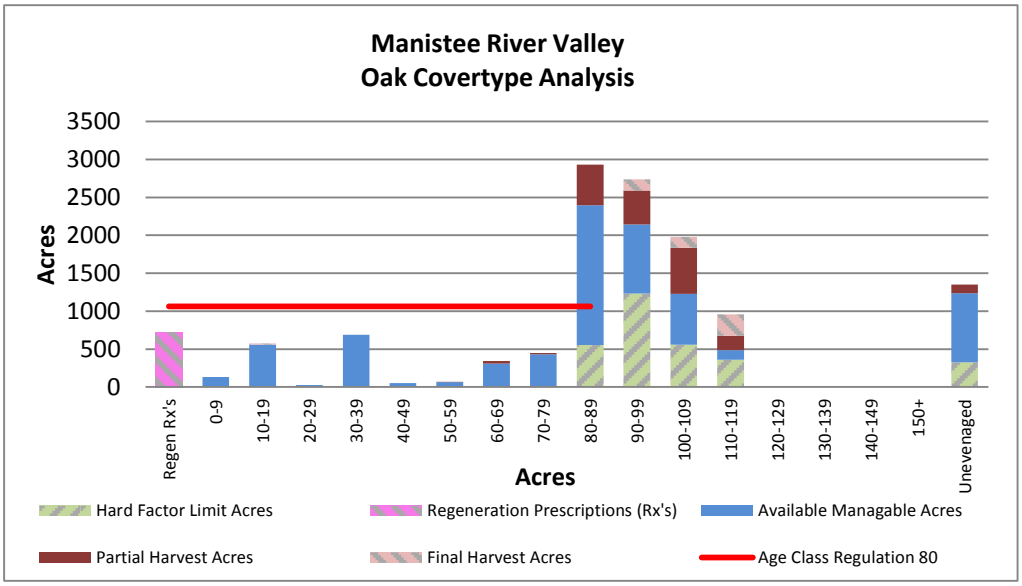

Figure 4.23.4. Age-class distribution for oak in the Manistee River Valley management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Oak in stands and as a component in stands throughout the management area will be maintained through management to provide for timber products, wildlife habitat and recreational opportunities; and
- Oak will become more valuable as a mast source as a result of beech bark disease which will cause a decline in the amount of beech.

10-Year Management Objectives

- Conduct partial harvests on a projected 803 acres to prepare stands for eventual regeneration harvests;
- Conduct final harvests on a projected 2,027 acres;
- Maintain or expand oak as a component in stands throughout the management area through retention and management for natural regeneration on other cover types; and
- Seek opportunities to manage existing oak for wildlife values and a sustainable yield of wood products in pine and low quality hardwoods.

Long-Term Management Objectives

- Continue work towards maintaining oak as the predominant species in selected stands through restarting harvests;
- It is acceptable that some oak stands may become mixed stands through partial removal of an oak over story, planting pine in oak stands or through natural regeneration of other species;
- Continue to seek opportunities to maintain or expand oak as a component of stands throughout the management area;
- On poorer quality oak sites (PVCd habitat class) consider whether to restore to pine/oak barrens; and
- A desired future harvest level is 1,065 acres for final harvest and 2,650 acres for partial harvest per 10-year period.

4.23.1.4 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwood acres total 10,147 acres or 9% of the management area (Table 4.23.1) on habitat class PArVVb, AFOCa and AFO sites. High-quality red oak is a valuable component of northern hardwood stands in this management area. Northern hardwood forest communities in this management area are valued ecologically as sources of habitat for numerous plants (i.e., spring ephemeral herbs, ferns and shrubs) and wildlife species including black bear, red shouldered hawk, wood thrush and red-backed salamander; commercially for firewood, high value sawlogs and veneer; and recreationally for hiking, biking, hunting and mushrooming. There are 416 acres of northern hardwood have met harvest criteria (Figure 4.23.5), but have site conditions that limit harvest (hard factor limit acres). There are 1,770 acres with a partial harvest pending and these acres are included in their current basal area range.

Desired Future Condition

- Northern hardwood stands will be maintained and managed through selection harvests on better quality hardwood sites and through regeneration harvests on poor-quality hardwood sites to provide a sustainable timber supply, wildlife habitat and recreational opportunity.

10-Year Management Objectives

- Conduct partial harvests on a projected 3,806 acres to produce uneven-aged stands;
- On poor-quality hardwood sites a projected 200 acres will be harvested through restarting harvests;
- Where present, retain oak for mast and hemlock and white pine for within-stand diversity; and
- Where necessary and feasible, consider harvesting stands from lower basal area ranges to expedite the balancing of basal area distributions.

Long-Term Management Objectives

- Continue to conduct salvage harvests of beech affected by beech bard 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 whether to delay further selection harvesting due to resultant lower than normal residual basal area in post-salvage harvest stands;
- Continue to manage northern hardwoods for stand quality, age and species diversity, wildlife values and a sustainable yield of wood products;
- Continue to manage for stands with an uneven age-class on better quality hardwood sites; and
- A desired future harvest level is projected at 4,259 acres for partial harvest per 10-year period.

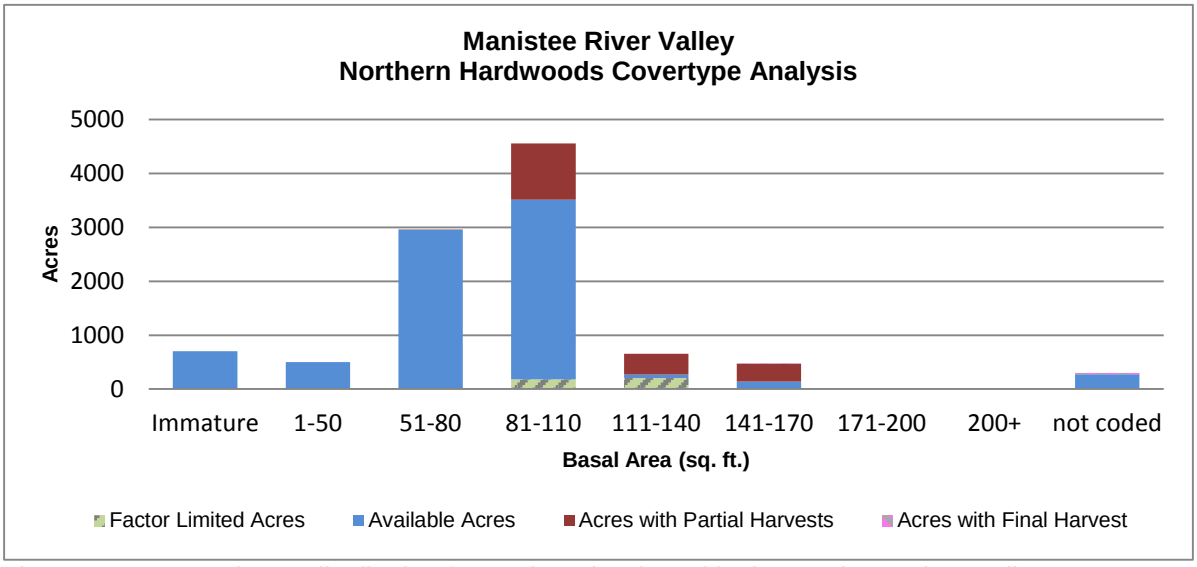

Figure 4.23.5. Basal area distribution for northern hardwood in the Manistee River Valley management area (2012 Department of Natural Resources inventory data).

4.23.1.5 Forest Cover Type Management – Jack Pine

Current Condition

Jack pine acres total 6,247 or 5% of the management area (Table 4.23.1) on habitat class PArVHa sites. Age classes are uniformly below the age-class regulation level with the exception of the regeneration prescription class. Data show that 1,797 acres of jack pine have met harvest criteria, but have site conditions that preclude harvest (hard factor limited acres). There are 3,849 acres of stands that have regeneration harvest pending and these acres are included in the regeneration prescription class. Jack pine budworm outbreaks may result in increased mortality in older age classes and work continues to reduce the number of acres in the older age classes. Harvests will come from the older age-classes including the 60-69 and 80-89 year age-classes.

Desired Future Condition

- Jack pine will have balanced age classes between 0 and 69 years of age to provide a sustainable timber production and wildlife habitat which will provide recreational opportunities.

10-Year Management Objectives

- Conduct final harvests on a projected 264 acres concentrating on stands older than 60 years to reduce the risk of jack pine budworm and other forest health issues in older age-classes.

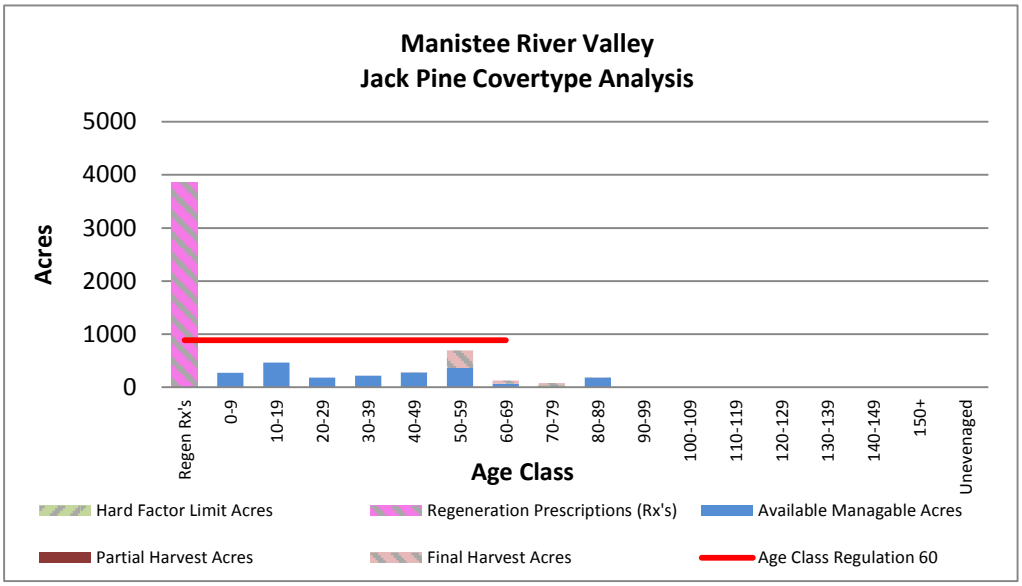

Figure 4.23.6. Age-class distribution for jack pine in the Manistee River Valley management area (2012 DNR inventory data).

Long-Term Management Objectives

- Continue to manage jack pine for a balanced age-class distribution at a projected regulation level of 886 acres over 10 years to produce a sustainable timber supply and wildlife habitat which will provide recreational opportunities;
- Where necessary and feasible, future planning may need to consider harvesting additional acres above the rotation regulation level from younger age classes to expedite the balancing of age class distributions;
- Some jack pine dominated stands have a component of red pine that is much better quality and form than the jack pine. These stands may be converted to a mixed stand with a red pine component (through planting) and natural oak/red maple/aspen. Some deteriorating jack pine stands have a considerable oak understory which may be promoted as managerially desirable; and
- A desired future harvest level is projected at 886 acres for final harvest per 10-year period.

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

Current Condition

Upland open/semi-open acres total 6,300 acres or 5% of the management area (Table 4.23.1). 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

- If necessary and feasible, consider maintaining upland open/semi-open lands through possible use of prescribed fire, woody brush removal, herbicide and planting.

Long-Term Management Objectives

- Continue 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.

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

Current Condition

Lowland open/semi-open lands (lowland shrub, marsh, treed bog and bog) communities in this management area are valued ecologically as sources of habitat for numerous species of wildlife. Lowland open/semi-open acres total 1,782 acres or 2% of the management area (Table 4.23.1).

Desired Future Condition

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

10-Year Management Objectives

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

Long-Term Management Objectives

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

4.23.1.8 Forest Cover Type Management – Other Types

Current Condition

Individual cover types which may cover less than 5% of the management area include: jack pine 6,247 or 5% of the management area, lowland conifers 5,186 acres (5%), white pine 3,658 acres (3%), natural mixed pines 3,625 acres (3%), mixed upland deciduous 3,292 acres (3%), lowland deciduous 2,662 acres (2%), cedar 2,418 acres (2%) and upland mixed forest 2,027 acres (2%). Other forested and non-forested communities total 11,149 acres or 10% 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 150 acres of cedar, 376 acres of lowland conifers, 1,007 acres of white pine, 599 acres of natural mixed pines, 775 acres of mixed upland deciduous, 239 acres of lowland deciduous, 204 acres of upland mixed forest, 41 acres of lowland aspen/balsam poplar, 286 acres of lowland mixed forest, 171 acres of planted mixed pines, 120 acres of upland spruce/fir, 126 acres of lowland spruce/fir, 287 acres of upland conifers and 28 acres of tamarack;
- Consider methods to ensure regeneration of cedar and lowland conifers;
- 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;
- The following species are projected for regeneration harvests: lowland conifers; and
- Partial harvests are projected for 1,427 acres of white pine, 1,020 acres of natural mixed pines, 497 acres of mixed upland deciduous, 471 acres of upland mixed forest and 255 acres of planted mixed pines.

Long-Term Management Objectives

- Continue to manage other types to provide forest products, wildlife habitat and recreational opportunities; and
- Desired future harvest levels for final harvest are projected at 376 acres for lowland conifers, 239 acres for lowland deciduous and 150 acres per 10-year period.

4.23.2 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 cycle of state forest planning:

- American bittern (Cannon Creek Floodings State Wildlife Management Area)
- American woodcock (Headquarters Lake Flooding State Wildlife Management Area)
- Beaver (Cannon Creek Floodings State Wildlife Management Area)
- Black bear
- Eastern massasauga rattlesnake (Cannon Creek Floodings State Wildlife Management Area)
- Golden-winged warbler
- Mallard (Cannon Creek Floodings and Headquarters Lake Flooding state wildlife management areas)
- Pileated woodpecker
- Ruffed grouse
- Snowshoe hare
- White-tailed deer
- Wood duck (Cannon Creek Floodings and Headquarters Lake Flooding state wildlife management areas)

The primary focus of wildlife habitat management in the Manistee River Valley 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 Bittern

The goal for American bittern in the northern Lower Peninsula is maintain or increase available habitat. American bittern prefer large (>10 acres), shallow (average depth four inches) wetlands with open water in the center, a band of emergent vegetation around periphery and idle grassland in the adjacent uplands (4:1 grassland to wetland ratio). State forest management should focus on priority wildlife management areas with suitable shallow water marsh (hemi-marsh).

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. Ideal wetland/upland complexes are > 50 acres.
    - Implementation of the wildlife management area master plan for Cannon Creek Flooding State Wildlife Management Area and application of the beaver wildlife habitat specifications will be sufficient to meet this mallard habitat specification.
- Maintain water levels from the April through August breeding season.

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 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 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 that 15% and other inland bodies of water.
    - Implementation of the Cannon Creek Floodings State Wildlife Management Area Master Plan and the 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this habitat specification.

Black Bear

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

Wildlife Habitat Specifications:

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

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 three 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 Cannon Creek Floodings and Headquarters Lake Flooding 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.

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.

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 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 area 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 Cannon Creek Floodings and Headquarters Lake Flooding state wildlife management areas 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.

4.23.3 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 eight listed species and one natural communities of note occurring in the management area as listed in Table 4.23.2. A colony of great blue herons has also been identified. 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.

Future development and recreational pressure associated with expected population growth in the vicinity of this management area will be the primary challenge to successful management for rare fish, wildlife, plants and listed communities.

Table 4.23.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Manistee River Valley management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Northern wet meadow		S4/G4	Confirmed				Lowland open/semi-open	N/A
Birds								
Northern goshawk	*Accipiter gentilis*	SC/G5/S3	Confirmed	PS	Very High	Mesic northern Forest	Northern Hardwood	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry-mesic northern forest	White Pine	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
Red-shouldered hawk	*Buteo lineatus*	T/G5/S3-4	Confirmed	PS	Very High	Floodplain forest	Lowland mixed	Mid
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Common tern	*Stema hirundo*	T/G5/S2	Confirmed	MV	Moderate	Sand & gravel beach	Upland open/semi-open	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	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
Plants								
Hill's thistle	*Cirsium hillii*	SC/G3/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Boreal forest	Upland open/semi-open	N/A
						Dry northern forest	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
Ginseng	*Panax quinquefolius*	T/G3G4/S2S3	Confirmed			Floodplain forest	Lowland mixed	Mid
						Mesic northern forest	Northern Hardwood	Late

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

The Upper Manistee 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 4.23.7.

There are no ecological reference areas identified for the Manistee River Valley management area as illustrated in Figure 4.23.7.

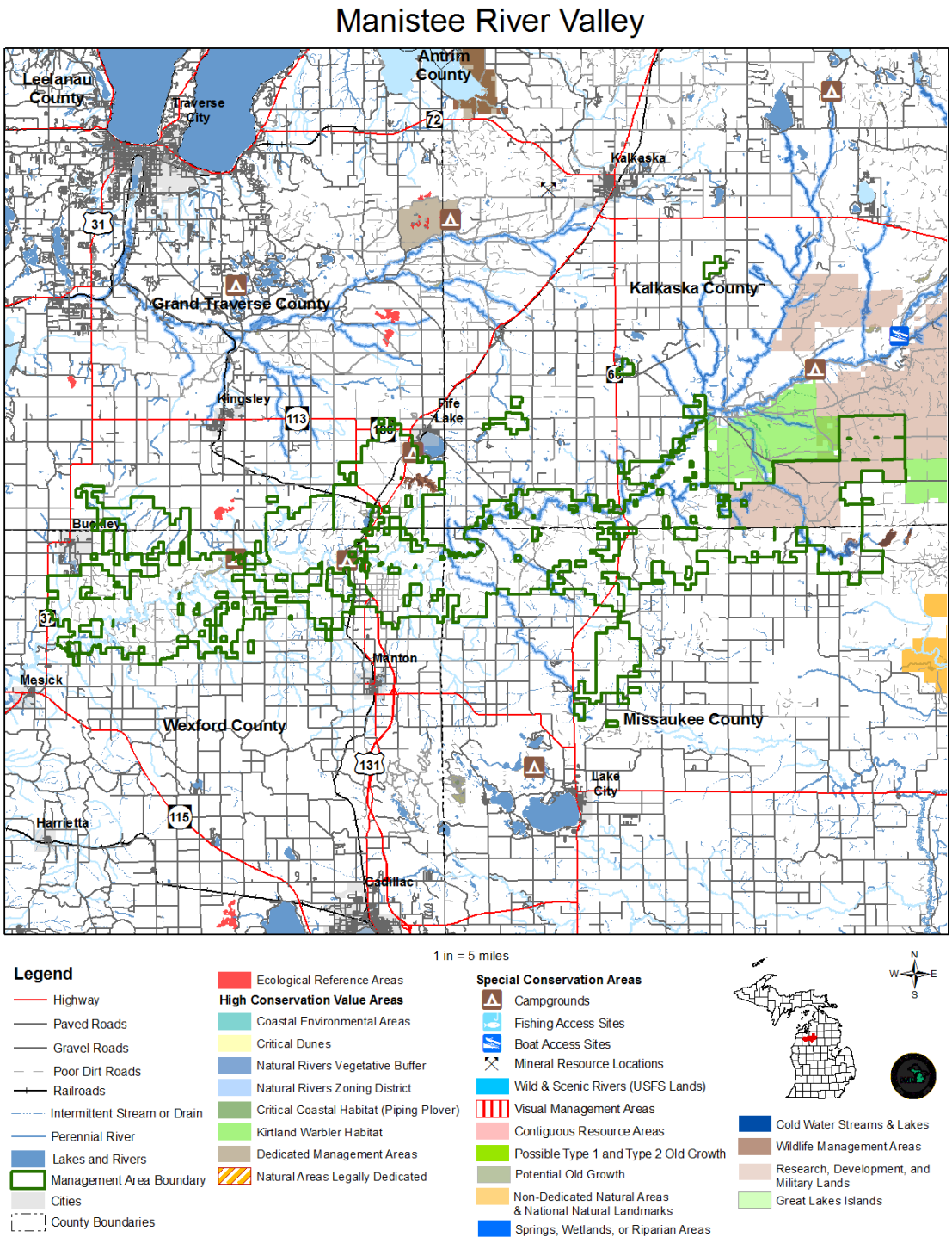

Figure 4.23.7. A map of the Manistee River Valley management area showing the special resource areas.

Management goals during this planning period:

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

4.23.4 Forest Health Management

Although forest health issues span the entire landscape, some specific threats are more important in this management area due to the species composition, site quality or other factors. Some of the more important forest health pests in this management area include oak decline, beech bark disease and emerald ash borer and management should be adapted as follows:

- Oak decline is most prevalent on frost-prone, nutrient poor outwash plains. Old age and drought predispose areas to two-lined chestnut borer and *Armillaria* root rot. Shorter rotations will reduce risk of decline;
- Full site use (e.g., stocking, desired species and low species diversity) on high-quality northern hardwood sites heavily impacted by beech bark disease and/or emerald ash borer is important;
- Consider planting red or white oaks, white or red pines, black cherry, white spruce, etc. as site conditions and quality allow; 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 4.23.3. This information was compiled from the Midwest Invasive Species Information Network database, but it should not be considered complete. Local staff has identified garlic mustard in this 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 4.23.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Manistee River Valley - FMD Management Areas	Cases within FMD Areas	Cases within 5 Mile Buffer	Total number of cases	Total number of different Invasive Species
	0	1	1	1

Invasive Species within FMD Areas	Occurrences	Invasive Species within 5 Mile Buffer	Occurrences
-	-	Japanese Knotweed *Fallopia japonica*	1

4.23.5 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 4.23.1 and listed in Appendix F.

4.23.6 Fire Management

This management area which is largely a glacial outwash area has had a history of wildfire which 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. Current 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:

- Consider opportunities to re-introduce fire in the oak/pine areas to encourage pine and oak regeneration and to discourage competition;
- Consider opportunities to incorporate fire as a tool to restore or maintain managed openings and natural pine/oak barrens; and
- Recognize that increased urbanization in close proximity to the management area will present more wildland/urban interface challenges to wildfire suppression.

4.23.7 Public Access and Recreation

Access for management and/or recreation is generally very good throughout this management area as there is very little lowland and a well-developed road/trail system which includes the Missaukee off-road vehicle route and the North Missaukee Off-Road Vehicle Trail. In accordance with the DNR's *Sustainable Soil and Water Quality Practices on Forest Land*, upon completion of harvesting, temporary spur and seasonal roads will be closed and stabilized.

Dominated by the Manistee River, this management area provides unique recreational experiences influenced by one of Michigan's most pristine rivers. Both Baxter Bridge and Old US-131 state forest campgrounds (Figure 4.23.7) are located on the banks of the Manistee River, providing weary river users a place to camp. Along with riverside camping opportunities, there are numerous independent boating access sites offering access to the Manistee River. Hopkins Creek and Spring Lake campgrounds provide rustic camping experience and the Hopkins Creek Equestrian campground is strategically located along the Shore-to-Shore horse trail (Figure 4.23.1). Off-road vehicle trails, and snowmobile trails (Figure 4.23.1) are prevalent on upland sites and the nationally recognized North Country (hiking) Trail is another recreation amenity within this management area. Current and future recreation expansion, especially by those using the Manistee River will continue to be an important feature in this management area. The recreation features provided in this management area are listed below.

Campgrounds
- Hopkins Creek State Forest Campground
- Hopkins Creek Equestrian Campground
- Old US-131 State Forest Campground
- Baxter Bridge State Forest Campground
- Spring Lake State Forest Campground

Boating Access Sites (BASs)
- Old US-131 BAS
- Baxter Bridge BAS
- Spring Lake BAS
- Lucas Road BAS
- Harvey Bridge BAS
- Rainbow Jim's BAS
- Smithville Landing BAS
- Sand Banks BAS

Off-Road Vehicle Trails
- Grand Traverse to Supply Road Missaukee and Michigan Cycle Conservation Club Trail
- North Missaukee Trail and Route
- Grand Traverse Trail and Route
- Kalkaska Route

Snowmobile Trails

- Various

Non-Motorized Trails

- North Country Trail
- Shore-To-Shore Trail

Although managing recreational opportunities is the primary responsibility of Parks and Recreation Division, timber management activities may impact the quality of recreational opportunities and management modifications will be considered to minimize these impacts.

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

4.23.8 Oil, Gas and Mineral Development

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium, an end moraine of coarse-textured till, coarse-textured till and ice-contact outwash sand and gravel. 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.

The Pennsylvanian Saginaw Formation and Mississippian Michigan Formation, Marshall Sandstone and Coldwater Shale sub-crop below the glacial drift. The Mississippian Michigan Formation is quarried for gypsum elsewhere in the state.

Only a small part of these lands has been developed for oil and gas from the Devonian Richfield, the Guelph (former Niagaran) reefs and Ordovician Prairie du Chien. Well spacing for the Devonian is 40 acres and the Guelph is 80 acres and the Prairie du Chien 320-640 acres. Additional development for these formations is likely. The Collingwood Formation's first well was drilled for gas in this management area and additional wells have been permitted. Spacing will most likely be 640 acres or larger. 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.