4.14 MA 14 – Grayling Ice Contact Management Area

Summary of Use and Management

Management in the Grayling Ice Contact management area (MA) will emphasize continuing to balance the age class of aspen on suitable sites and thinning the northern hardwoods, balancing age classes of red pine and jack pine and regenerating the aging oak resource. Management will strive to sustainably produce various forest products; enhance game and non-game wildlife habitat; protect areas of unique character, such as the historic Deward Tract; and provide for forest-based recreational uses. With about 3% of the management area being lowland, management activities will be minimally constrained. Expected trends within this 10-year planning period are increased recreational pressure, managing oil and gas development, introduced pests and diseases and the difficulty in regenerating oak.

Introduction

This management area is located in the central northern Lower Peninsula in Kalkaska, Crawford and Otsego counties and contains 55,348 acres of state forest (Figure 4.14.1). The primary attributes which identify the Graying Ice Contact management area include:

- The management area falls mostly within Albert's Grayling Outwash Plain sub-region (Albert, 1995).
- Historically vegetation varied on these ice-contact ridges – some ridges were dominated by northern hardwoods and others by red oak, hemlock and white pine. Fires which spread from the adjacent outwash areas were important in determining species composition. Current vegetation is primarily northern hardwoods, aspen, red pine and oak with only 3% of the area in relatively inaccessible lowland cover types.
- This management area, which lies in the central part of the Large Grayling Outwash Plain sub-region, is made up of ice-contact formed end-moraine ridges, separated by outwash areas. The headwaters of the Au Sable and Manistee rivers are in this management area.
- The Grayling Ice Contact management area is a popular destination for game hunting, hiking, mushroom hunting and other activities for the nearby communities of Grayling, Kalkaska and Gaylord. Due to the proximity of this management area to the populated areas, the forest resources contribute social and economic values to the area.
- Department of Natural Resources recreation facilities in this management area include nearby Otsego Lake and Hartwick Pines state parks, Lake Margrethe and Upper Manistee, Manistee River Bridge and Goose Creek state forest campgrounds and Goose Creek Trail Camp.
- Manistee River state forest campground, Upper Manistee River and Lake Marjory rustic campgrounds and Goose Creek Trail Camp. Snowmobile trails and an equestrian trail cross the management area.
- Much of the topography in this management area was sculpted by melting glaciers that dissected some of the ice-contact ridges into steep ridges with flat sandy outwash plains between.

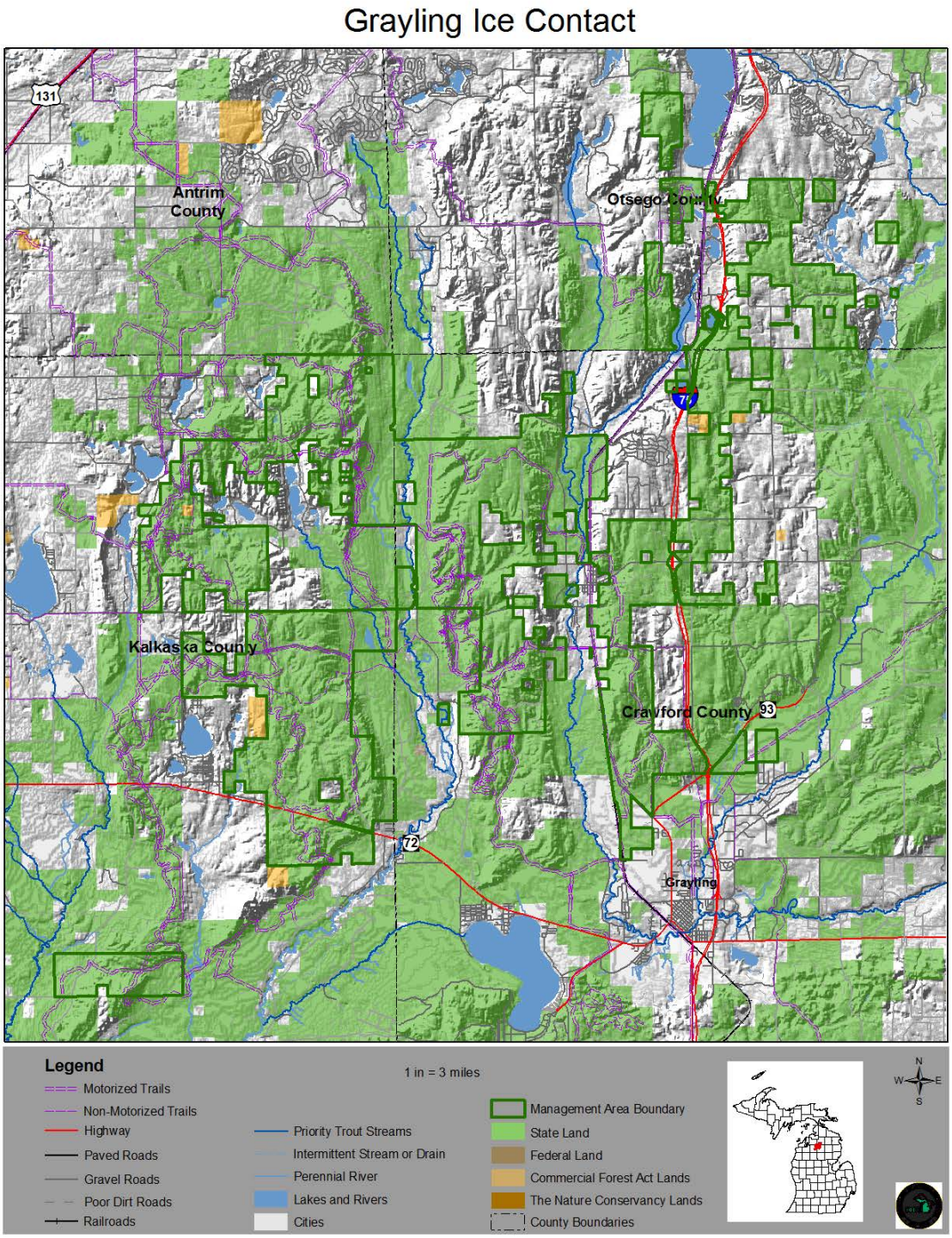

Figure 4.14.1. A map of the Grayling Ice Contact management area (dark green boundary) in relation to surrounding state forest and other lands in Kalkaska, Crawford and Otsego counties, Michigan.

Table 4.14.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Grayling Ice Contact management area, northern Lower Peninsula ecoregion (2012 Department of Natural Resources inventory data).

Cover Type	Cover %	Current Acreage	Hard Factor Limited Acres	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Acreage in 10 Years	Desired Future Harvest (Acres)	
					Final Harvest	Partial Harvest		Final Harvest	Partial Harvest
Northern Hardwood	29%	16,174	952	15,222	400	6,683	16,174		6,886
Aspen	29%	15,881	566	15315	3,780		15,881	2,553	
Red Pine	12%	6,375	223	6152	1,264	2,398	6,375	618	2,992
Oak	10%	5,517	2,406	3111	222	782	5,517	346	795
Jack Pine	2%	1,277	125	1152	134		1,277	169	
Upland Open/Semi-Open Lands	9%	4,779		4779			4,779		
Lowland Open/Semi-Open Lands	2%	874		874			874		
Misc Other (Water, Local, Urban)	1%	339		339			339		
Others	5%	2,940	1,080	1860	525	304	2,940	218	583
Total		55,348	5,397	49,951	6,588	10,573	55,348	4,008	11,699

4.14.1 Forest Cover Type Management Direction

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

4.14.1.1 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwood acres total 16,174 or 29% of the management area (Table 4.14.1). Forest communities dominated by northern hardwoods in this management area are valued ecologically as sources of habitat for numerous species of wildlife including bear, white-tailed deer and various song birds, commercially for pulp and saw logs and for a wide range of forest recreation. Many of the stands have portions that are located on steep slopes that limit treatment options. There are 952 acres of northern hardwood have met harvest criteria (Figure 4.14.2), but have site conditions that limit harvest (hard factor limit acres). There are 255 acres that have regeneration harvest pending and these acres are included in the current basal area range.

There are 1,634 acres with a partial harvest pending and these acres are included in their current basal area range.

Desired Future Condition

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

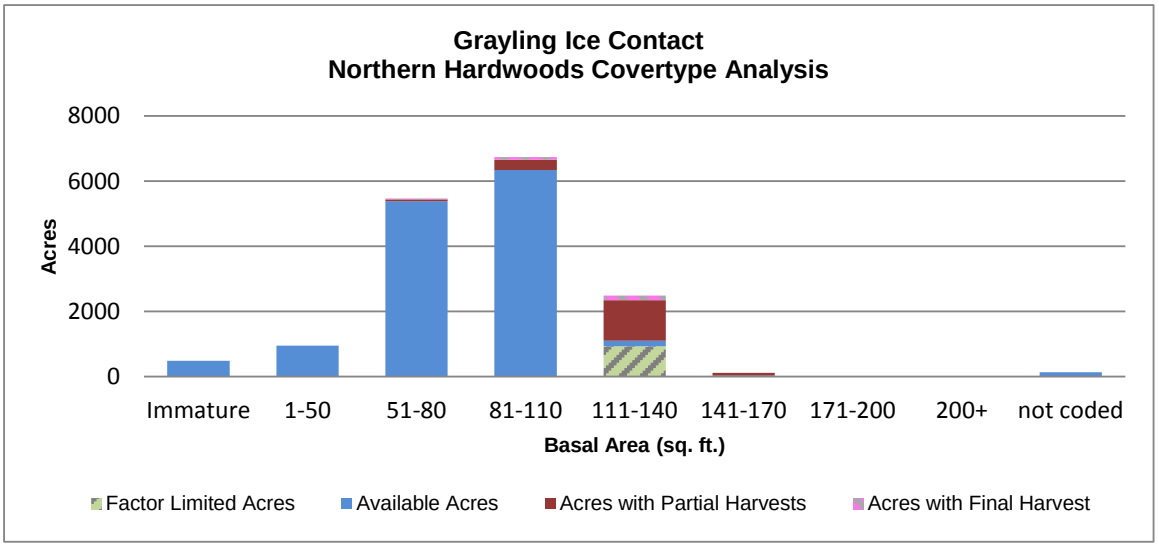

Figure 4.14.2. Basal area distribution for northern hardwood in the Grayling Ice Contact management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- On better quality hardwood sites a projected 6,683 acres will be harvested through selection harvests to produce uneven aged stands;
- On poorer quality hardwood sites (Habitat Class: PArVVb and PArVHa) a projected 400 acres will be harvested through final harvests; and
- Where necessary and feasible, consider harvesting stands from the lower basal area ranges to expedite the balancing of basal area distributions.

Long-Term Management Objectives

- Beech bark disease will change the stand composition of the northern hardwoods in this management area. As beech decreases in northern hardwood stands, consider introducing oak for mast in stands without oak;
- 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 distribution on better-quality hardwood sites; and
- Consider the need to continue to manage poorer quality sites through final harvests.

4.14.1.2 Forest Cover Type Management – Aspen

Current Condition

Aspen acres total 15,881 or 29% of the management area (Table 4.14.1). Aspen is found on the AFO/AFOCa, PARVVb/AFO, PArVHa/PArVVb, PArVHa and PVCd/PArVHa habitat class sites (see Appendix E). Forest communities dominated primarily by aspen in this management area are valued ecologically as sources of habitat for numerous species of wildlife including ruffed grouse, hare, woodcock, bear, white-tailed deer and various song birds; commercially for pulp and saw logs; and for a wide range of forest recreation. Aspen occurs throughout the area and many stands have a mixture of red maple and oak. Most of the aspen in this management area is younger than the 60 year rotation (Figure 4.14.3).

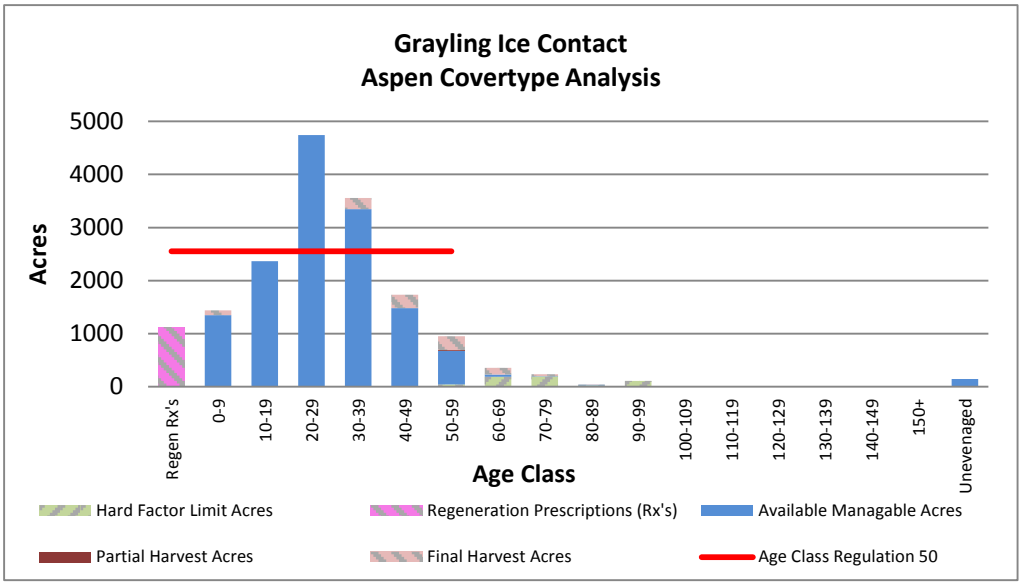

Figure 4.14.3. Age-class distribution for aspen in the Grayling Ice Contact management area (2012 Department of Natural Resources inventory data).

Accessible aspen has been consistently harvested over the last 50 years. There are 566 acres of aspen that have met harvest criteria but have site conditions that limit harvest (hard factor limit acres). There are 1,121 acres of stands that have regeneration harvest pending and these acres are included in the regeneration prescription class.

Desired Future Condition

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

10-Year Management Objectives

- Conduct final harvests on a projected 3,780 acres from the oldest age-classes, where aspen is accessible; 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 management of aspen through regeneration harvests to balance the age-class distribution; and
- Desired future harvests are projected at 2,553 acres of final harvest per 10-year period.

4.14.1.3 Forest Cover Type Management – Red Pine

Red pine acres total 6,375 or 12% of the management area (Table 4.14.1), with most being 40-59 years old. Nearly all the pine is of planted origin on the AFO/AFOCa. PArVVb/AFO, PArVVb, PArVHa/PVVb, PVCd/PArVHa and PArVHa habitat class sites. Red pine in this management area is commercially valued for pulp, saw logs and utility poles.

Some red pine is located on poor sites (PArVHa) and some on hardwood sites (AFO/AFOCa).

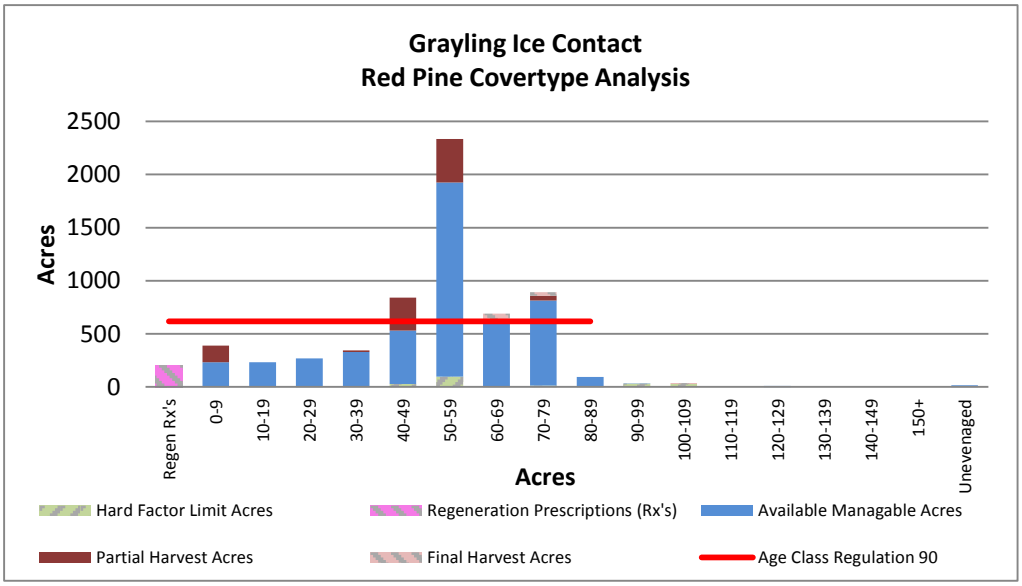

Figure 4.14.4. Age-class distribution for red pine in the Grayling Ice Contact management area (2012 Department of Natural Resources inventory data).

There are 223 acres of red pine have met harvest criteria (Figure 4.14.4), but have site conditions that limit harvest (hard factor limit acres).

There are 99 acres that have a final harvest pending and these acres are included in the regeneration prescription class. There are 945 acres with a partial harvest pending and these acres are included in their current age class. Figure 4.14.4 includes 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.

Desired Future Condition

- Red pine on dry-mesic sites (PArVVb/AFO and PArVVb) will be maintained and managed with a thinning regime until stand replacement harvest at economic maturity with acres balanced between 0-99 years of age to provide for continual harvest, wildlife habitat and recreational opportunity;
- Plantation red pine on mesic sites (AFO/AFOCa) will be managed to economic maturity, while allowing natural hardwood conversion on sites more suitable for hardwoods;
- Red pine will be regenerated on sites lacking high-quality natural hardwood regeneration; and
- On sites being converted to hardwoods or aspen, a scattering of a few pine trees per acre will be left for legacy retention providing a super-canopy of red pine and providing vertical structure for various wildlife species.

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and balancing the age-class distribution;
- Conduct partial harvests on a projected 2,398 acres concentrating on stands of better-quality red pine that have the potential for a higher product value in larger size classes; and
- Conduct final harvests on a projected 1,264 acres of red pine beginning with the oldest age-classes and with a concentration on stands with less potential for a higher product value.

Long-Term Management Objectives

- Continue management of younger red pine stands with partial harvests with final harvests occurring near economic maturity (90 years); and
- Desired future harvest levels are projected at 618 acres of final harvest and 2,992 acres of partial harvest per 10-year period.

4.14.1.4 Forest Cover Type Management – Oak

Current Condition

Oak acres total 5,517 acres or 10%of the management area (Table 4.14.1). Oak is located on the PArVHa/PArVVb, PArVHa and PVCd/PArVHa habitat class sites. Forest communities dominated primarily by oak, some of it high-quality red oak and white oak, in this management area are valued ecologically as sources of habitat and mast for numerous species of wildlife including bear, white-tailed deer, squirrels and various birds and commercially for firewood and industrial lumber. There are 2,406 acres of oak have met harvest criteria (Figure 4.14.5), but have site conditions that limit harvest (hard factor limit acres). There are 469 acres that have a final harvest pending and these acres are shown in the regeneration prescriptions class.

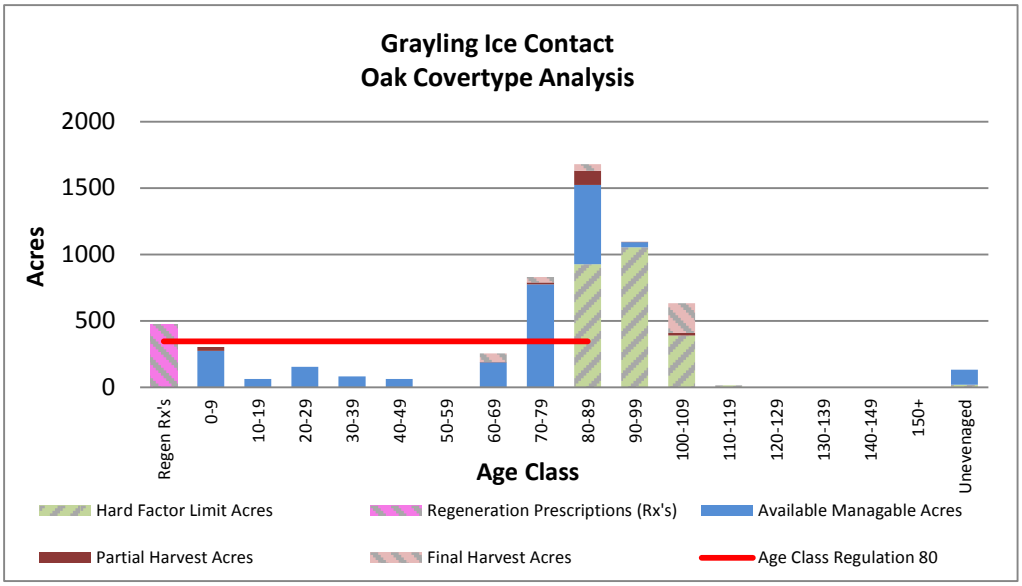

Figure 4.14.5. Age-class distribution for oak in the Grayling Ice Contact management area (2012 Department of Natural Resources inventory data).

There are 174 acres that have a partial harvest pending and these acres are included in their current age classes. Figure 4.14.5 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 regeneration prescription class.

Desired Future Condition

- Oak will be maintained on operable sites through even-aged management with acres balanced between 0 and 89 years of age to provide for continual harvest, wildlife habitat and recreational opportunity.

10-Year Management Objectives

- Conduct regeneration harvests on a projected 222 acres in the 80+ age classes concentrating on the stands that have previously had partial harvests;
- Conduct partial harvests on a projected 782 acres concentrating on stands that have not had any harvests or those stands that have a sufficient basal area for a partial harvest; and
- Maintain or expand oak as a component in stands throughout the management area through retention and management for natural regeneration on other cover types.

Long-Term Management Objectives

- Over the next several decades, continue to aggressively regenerate oak through harvests to balance the age-class structure;
- Management decisions need to consider that the oak community will become more mixed over time to include more red maple and white pine;
- Continue to seek opportunities to maintain or expand oak as a component of stands throughout the management area; and

- Desired future harvest levels are projected at 346 acres of final harvest and 795 acres of partial harvest per 10-year period.

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

Current Condition

Upland open/semi-open acres total 4,779 acres or 9% of the management area (Table 4.14.1). 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

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

10-Year Management Objectives

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

Long-Term Management Objectives

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

4.14.1.6 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 874 acres or 2% of the management area (Table 4.14.1).

Desired Future Condition

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

4.14.1.7 Forest Cover Type Management – Other Types

Individual cover types which may cover less than 5% of the management area include: jack pine, 1,277 acres (2% of the management area) and white pine, 1,192 acres (2%). Other forest communities total approximately 2,940 acres (5%) 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.

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 final harvests over the next 10 years: jack pine 134 acres, white pine 263 acres, natural mixed pines 173 acres, mixed upland deciduous 169 acres, upland mixed forest 128 acres and upland spruce/fir 54 acres;
- Partial harvests are projected for 406 acres of white pine, 186 acres of natural mixed pines and 108 acres of upland mixed forest; and
- Consider methods to ensure regeneration of lowland types.

Long-Term Management Objectives

- It is acceptable that the age-class structure of most of the other types will remain unbalanced for several decades.

4.14.2 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 are during this 10-year planning period:

- American woodcock
- Beaver
- Eastern massasauga rattlesnake
- Pileated woodpecker
- Red-headed woodpecker
- Ruffed grouse
- Wild turkey
- White-tailed deer

The primary focus of wildlife habitat management in the Grayling Ice Contact 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 and large open grassland complexes, the retention of large, over-mature trees and snags and the maintenance and expansion of hard mast and mesic conifer components.

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

American Woodcock

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

Wildlife Habitat Specifications:

- Maintain the aspen cover type and the aspen component in mixed stands within the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this American woodcock habitat specification.
- Move to balance the age-class distribution of aspen and continue management to regenerate oak to maintain young forests across the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this American woodcock habitat specification.
- Identify commercial and non-commercial treatment opportunities in aspen and alder stands associated with non-high priority trout stream 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 Dingman Marsh and French Farm Flooding master plans and the 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this habitat specification.

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.

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

five acres in size with a savannah-like dispersion of large trees (<50% canopy cover) with open understory and include tall trees or snags of large than12 inches in diameter at breast height. State forest management for the species should focus on the maintenance of snags in timber sales and salvage in priority landscapes.

Wildlife Habitat Specifications:

- Retain patches of dead wood left by beaver floodings, fire, disease and insect outbreaks by minimizing salvage cuts within the management area with preference for snags 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 10 years in 10-40 acre harvest units. Larger harvest units should have irregular boundaries and include one or two, 1-3-acre unharvested inclusions. State forest management should focus on maintaining and balancing the age-class distribution for aspen and oak cover types in priority landscapes.

Wildlife Habitat Specifications:

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

Wild Turkey

The goal for turkey in the 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.

4.14.3 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 seven listed species and no natural communities of note occurring in the management area as listed in Table 4.14.2. 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 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 4.14.6.

There are no ecological reference areas identified for the Grayling Ice Contact management area.

Table 4.14.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Grayling Ice Contact 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	*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
Fish								
Cisco (lake herring)	*Coregonus artedi*	T/G5/S3	Confirmed	MV	Low	Great Lakes	Aquatic	N/A
						Inland lake	Aquatic	N/A
						Rivers	Aquatic	N/A
Butterfly								
Dusted skipper	*Atrytonopsis hianna*	Sc/G4G5/S2S3	Confirmed	MV	Low	Dry sand prairie	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
Reptile								
Eastern Massassauga rattlesnake	*Sistrurus catenatus catenatus*	C/SC/G3G4T3T4Q/S3S4	Confirmed	HV	High	Coastal fen	Lowland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Poor conifer swamp	Tamarack	Late
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Dry northern forest	Jack Pine, Red Pine	Early
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
Plant								
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
Hill's pondweed	*Potamogeton hillii*	T/G3/S2				Emergent marsh	Lowland open/semi-open	N/A

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

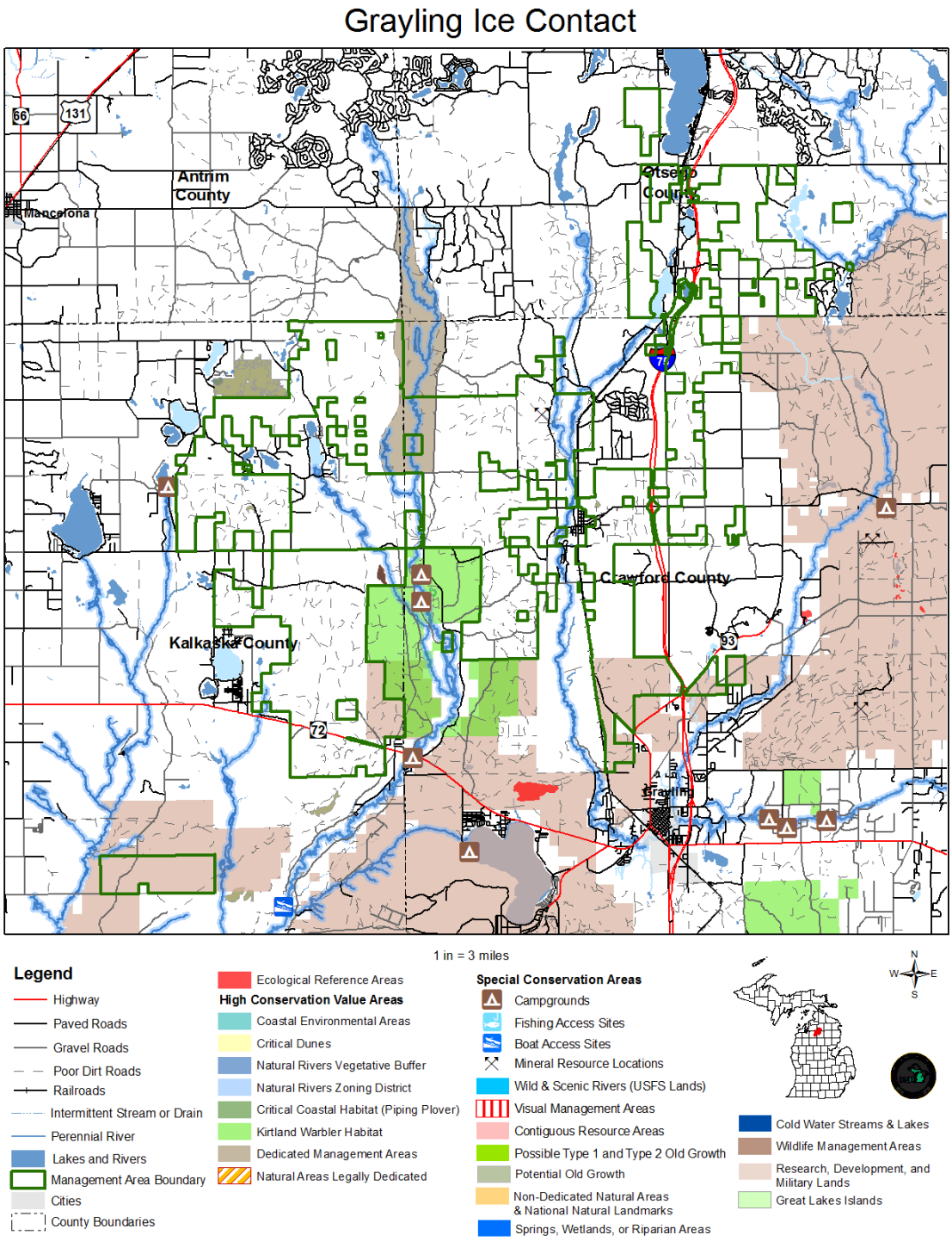

Figure 4.14.6. A map of the Grayling Ice Contact management area showing the special resource areas.

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.

4.14.4 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, oak wilt, emerald ash borer, beech bark disease and branch mortality of seedling and sapling white pine and management should be adapted as follows:

- Oak decline is most prevalent on frost-prone, nutrient poor outwash plains. Old age and drought predispose areas to two-lined chestnut borer and *Armillaria* root rot. Shorter rotations will reduce risk of decline.
- Full site use (e.g., stocking, desired species and low species diversity) on high-quality northern hardwood sites heavily impacted by beech bark disease and/or emerald ash borer is important. Consider planting red or white oaks, white or red pines, black cherry, white spruce, etc. as site conditions and quality allow. Herbicides may be needed to control competing vegetation and/or to reduce density of ash and beech regeneration.
- Monitor for branch mortality of seedling and sapling white pine along and adjacent to river corridors. Causal agent(s) responsible for this problem may include pine spittlebug feeding and various fungal pathogens. Until management guidelines can be developed, continue reporting incidence of this problem to the forest health specialist.
- Oak wilt is prevalent in this area. Epicenters need to be identified and treated. Timber sale restrictions which prevent wounding of oaks from April 15 to July 15 need to be enforced. Other management activities that can lead to damage of residual red oak trees (oil and gas development, recreational trail improvement, etc.) should be not be conducted during this high-risk period.

Invasive Species

Invasive species pose a major threat to forest resources. They impact timber production, wildlife habitat and recreational access. Currently there are no invasive species within the management area or within a five-mile radius of the management area. This information was compiled from the Midwest Invasive Species Information Network database, but it should not be considered complete. This information, and other sources that show the extent and location of invasives, will be used to inform the potential for additional sightings that should be documented. Invasives that merit eradication efforts are those species that threaten sensitive sites due to their location or growth characteristics and have population levels that may be successfully controlled.

4.14.5 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 4.14.1 and listed in Appendix F.

4.14.6 Fire Management

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

The Michigan DNR has a prescribed fire program and maintains a well-trained staff to conduct prescribed burns for silviculture, habitat maintenance or habitat restoration. Each year, all burns prescribed on state forests, parks and wildlife game lands are evaluated and ranked, with funding allocated to the highest priority burns. The ability to fund prescribed burns is based on available funding, the total acres prescribed for burning and the prioritized ranking of individual burns. The demand for prescribed burning money frequently exceeds the amount of funding and some recommended burns may not be funded for that fiscal year. Once funded, the ability to implement a burn is 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 reintroduce 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.

4.14.7 Public Access and Recreation

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

Campgrounds (Figure 4.14.6)

- Lake Marjory, Lake Margrethe, Upper Manistee, Manistee River Bridge and Goose Creek state forest campgrounds and Goose Creek Trail Camp.

Boating Access Sites (BASs) (Figure 4.14.6)

- Lake Marjory BAS
- Bradford Lake BAS
- Horseshoe Lake BAS
- Bluegill Lake BAS

Off-Road Vehicle Trails (Figure 4.14.1)

- Kalkaska Trail and Route
- Frederic Trail and Route

Snowmobile Trails (Figure 4.14.1)

- Various

Non-Motorized Trails (Figure 4.14.1)

- 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.

4.14.8 Oil, Gas and Mineral Development

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium and ice-contact outwash sand and gravel. The glacial drift thickness varies between 200 and 1,000 feet. Sand and gravel pits are located in this management area and there is good potential for additional pits.

The Mississippian Marshall Sandstone and Coldwater Shale subcrop below the glacial drift. The Marshall was previously used as a building stone elsewhere in the state.

Much of this management area has been developed for gas production from the Antrim Shale and some oil and gas production from Guelph (former Niagaran) reefs. Well spacing is currently 80 acres and most of the area of Antrim potential has already been drilled. The Collingwood Formation may also have oil and gas potential in this area and probably will have a well spacing of 320 to 640 acres per well (or possibly larger). The southern parts of Crawford and Kalkaska Counties, that have not been drilled yet, are leased for the Collingwood Formation and drilling, if sucessful, could expand into the rest of the management area.

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

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

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