

## 4.11 MA 11 – Thunder Bay Outwash Management Area

### Summary of Use and Management

Management in the Thunder Bay Outwash management area (MA) (Figure 4.11.1) will emphasize balancing the age classes of aspen, jack pine and red pine and regenerating the aging oak resource to sustainably produce various timber products, enhance game and non-game wildlife habitat and provide for forest-based recreational uses. Areas of unique character will be identified and managed accordingly. With about 12% of the management area being lowland conifers or cedar in addition to other small amounts of lowland types, management activities may be minimally constrained. Expected trends within this 10-year planning period are increased recreational pressure, introduced pests and diseases and managing oil and gas development.

The current predominant cover types, acreages and projected harvest acres in the management area are shown in Table 4.11.1.

### Introduction

This management area is located in northeastern Lower Peninsula in Montmorency and Presque Isle counties and contains 56,111 acres of state forest (Figure 4.11.1). The primary attributes which identify the Thunder Bay Outwash management area include:

- The management area falls mostly within Albert's Onaway sub-region (Albert, 1995).
- Historically fires were fairly frequent resulting in red and jack pines mixed with oak being prominent and there was little aspen. The current vegetation composition is mostly aspen, red pine, oak and jack pine with only 6% in relatively inaccessible lowland types.
- The dominant landform consists of rolling to moderately sloping ground moraine topography. Drumlins are common and are typically separated by areas of poorly drained outwash.
- The Thunder Bay Outwash management area is a popular destination for game hunting, hiking, mushroom hunting, etc. for the nearby communities of Atlanta, Hillman and Onaway. There are also snowmobile and off-road vehicle trails that are popular with recreationists.
- Due to the proximity of this management area to the populated areas, the forest resources contribute social and economic values to the area.
- The Rainy River and Sportsman's Flooding Wildlife Management Area are located in the management area.
- Department of Natural Resources recreation facilities in this management area include nearby Clear Lake State Park, Ess Lake and Jackson Lake state forest campgrounds and the High Country pathway, along with snowmobile and off-road vehicle trails in the area.
- Much of the topography in this management area was sculpted by re-advancing glaciers that left drumlin fields interspersed with poorly drained outwash. During the early Algonquin period when Lake Huron was receding, the drumlins and moraines were islands. Small areas of exposed limestone bedrock are common and karst topography is present.

# Thunder Bay Outwash

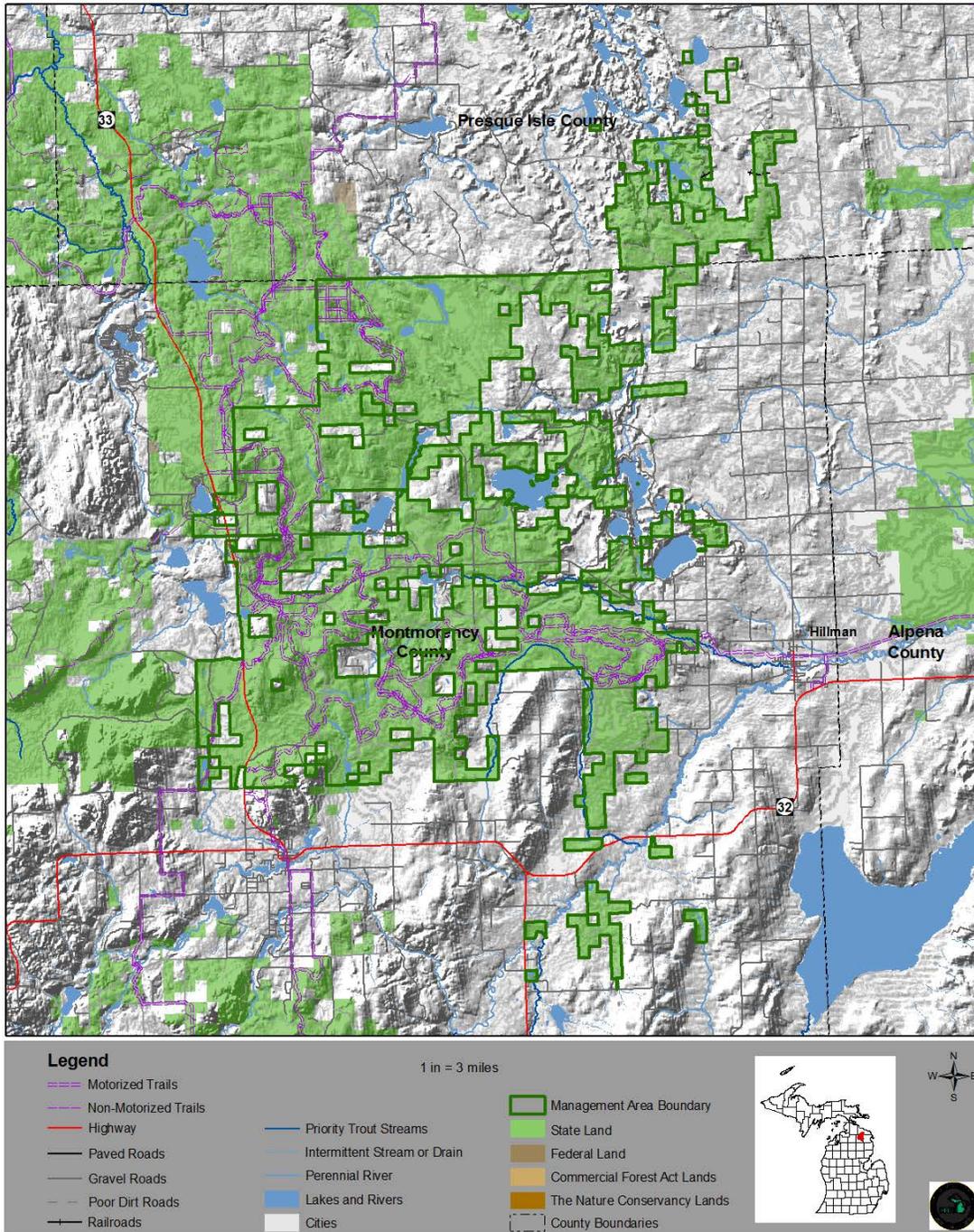


Figure 4.11.1. A map of the Thunder Bay Outwash management area (dark green boundary) in relation to surrounding state forest and other lands in northeast Montmorency and southern Presque Isle counties, Michigan.

Table 4.11.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Thunder Bay Outwash 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	33%	18,357	515	17,842	5,805		18,357	2,974	
Red Pine	9%	4,789	379	4410	960	1,152	4,789	490	1,550
Oak	8%	4,715	1,335	3380	296	875	4,715	307	924
Jack Pine	7%	4,207	160	4047	189		4,207	578	
Cedar	7%	4,106	4,106				4,106		
Lowland Conifers	5%	2,872	2,308	564	66		2,872	66	
Lowland Aspen/Balsam Poplar	3%	1,787	897	891	152		1,787	152	
Northern Hardwood	3%	1,608	3	1605		512	1,608		607
Mixed Upland Deciduous	3%	1,589		1589	16	307	1,589	227	337
Upland Open/Semi-Open Lands	4%	2,204		2204			2,204		
Lowland Open/Semi-Open Lands	5%	2,950		2950			2,950		
Misc Other (Water, Local, Urban)	1%	839		839			839		
Others	11%	6,088	2,496	3592	661	711	6,088	395	896
<b>Total</b>		<b>56,111</b>	<b>12,199</b>	<b>43,912</b>	<b>8,144</b>	<b>3,557</b>	<b>56,111</b>	<b>5,189</b>	<b>4,314</b>

#### 4.11.1 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 or communities are classified by the species which has the dominant canopy coverage.

##### 4.11.1.1 Forest Cover Type Management – Aspen

###### Current Condition

Aspen acres total 18,357 acres or 33% of the management area (Table 4.11.1). Aspen is found throughout the management area on PARVVb/AFO, PARVVb, PARVHa and PVCd habitat 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. Most of the aspen in this management area is younger than the 60-year rotation (Figure 4.11.2). There are 515 acres of aspen that have met harvest criteria, but have site conditions that limit harvest (hard factor limited acres).

There are 2,034 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.

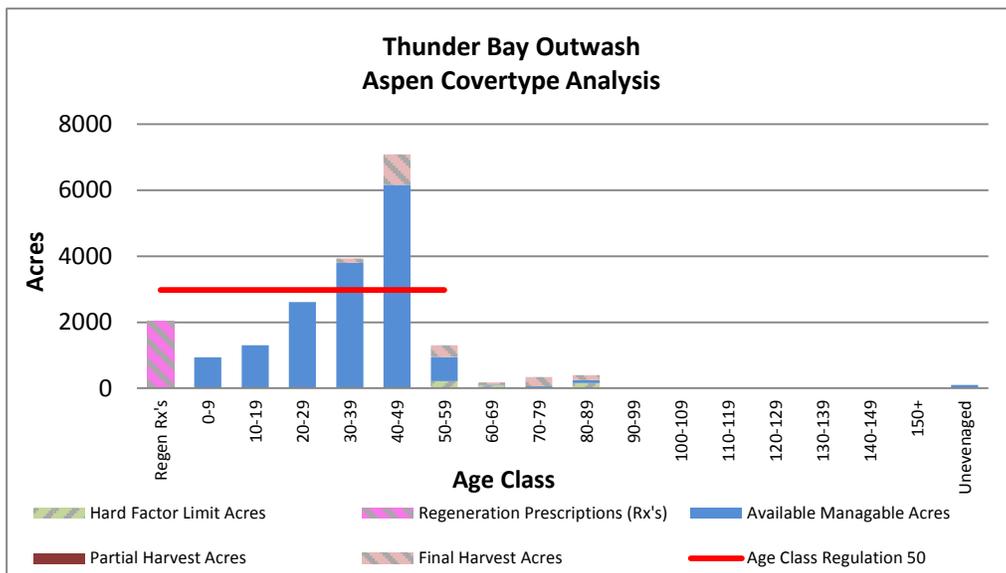


Figure 4.11.2. Age-class distribution for aspen in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct regeneration harvests a projected 5,805 acres in the next 10 years; 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 to work towards balancing the age-class distribution of aspen; and
- Desired future harvest levels are projected at 2,974 acres of final harvest per 10-year period.

**4.11.1.2 Forest Cover Type Management – Red Pine**

Current Condition

Red pine acres total 4,789 acres or 9% of the management area (Table 4.11.1), with most being 70-89 years old. Nearly all of the pine is of planted origin on PARVVb, PARVHa/PArVVb, PArVHa and PVCd habitat sites. The acreage of red pine on very dry sites (PVCd) may decrease because of conversion to jack pine. Red pine in this management area is commercially valued for pulp, saw logs and utility poles. Various regeneration techniques have been prescribed in this landscape. There are 379 acres of red pine have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 413 acres with a regeneration harvest pending and these acres are included in the regeneration prescription class. Figure 4.11.3 includes the projected number of acres converted to red pine as a result of treatments that remove an overstory species resulting in planting to red pine. These acres are included in the regeneration prescription class.

Desired Future Condition

- Red pine on dry-mesic sites will be maintained and managed with a thinning regime until stand replacement harvest at economic maturity with acres balanced between 0 and 89 years of age to provide for continual harvest, wildlife habitat and recreational opportunity.

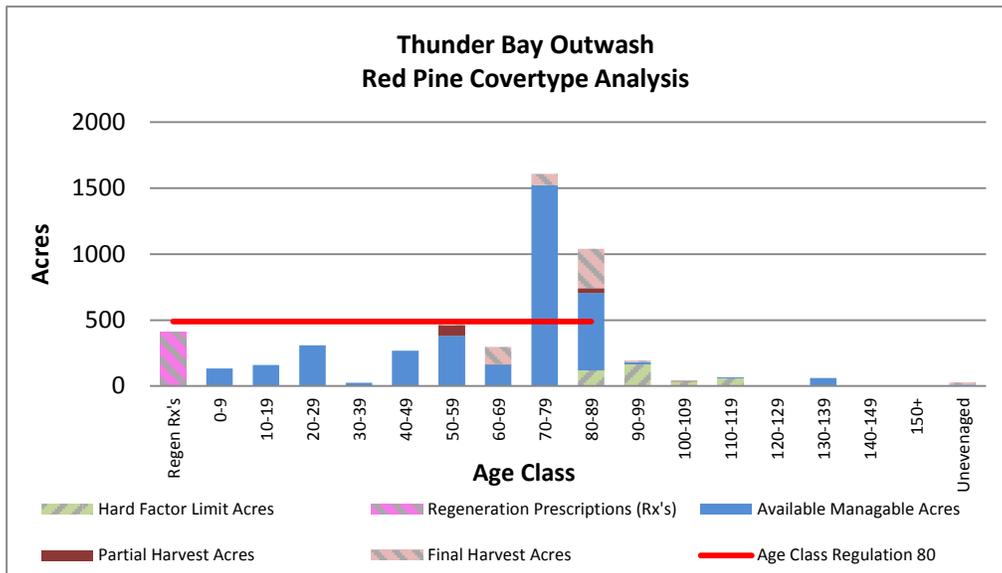


Figure 4.11.3. Age-class distribution for red pine in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

#### 10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and balancing age-class distribution;
- Conduct thinning harvests on a projected 1,152 acres, concentrating on stands of better quality red pine that has the potential for a higher product value in larger size classes; and
- Conduct stand replacement harvests, on a projected 960 acres, 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 work towards balancing the age-class distribution between the ages of 0 and 89 years through final harvests and replanting;
- Seek opportunities to move red pine to suitable sites which may include managing red pine in mixed stands with oak or other species;
- Red pine found in riparian buffers or other sensitive sites may remain until biological maturity; and
- Desired future harvest levels are projected at 490 acres for final harvest and 1,550 acres for partial harvest per 10-year period.

### **Section 4.11.1.3 Forest Cover Type Management – Oak**

#### Current Condition

Oak acres total 4,715 or 9% of the management area (Table 4.11.1) on PArVHa/PVCd habitat classes. The oak quality varies from better-quality red oak to poorer-quality pin oak. Forest communities dominated primarily by oak in this management area are valued ecologically as sources of habitat and mast for numerous species of wildlife including bear, deer, squirrels and various birds and commercially for firewood and industrial lumber. On northern pin oak sites (PVCd), clearcuts have a history of producing regeneration better than 5-spot patch cuts, especially on low site-index sites.

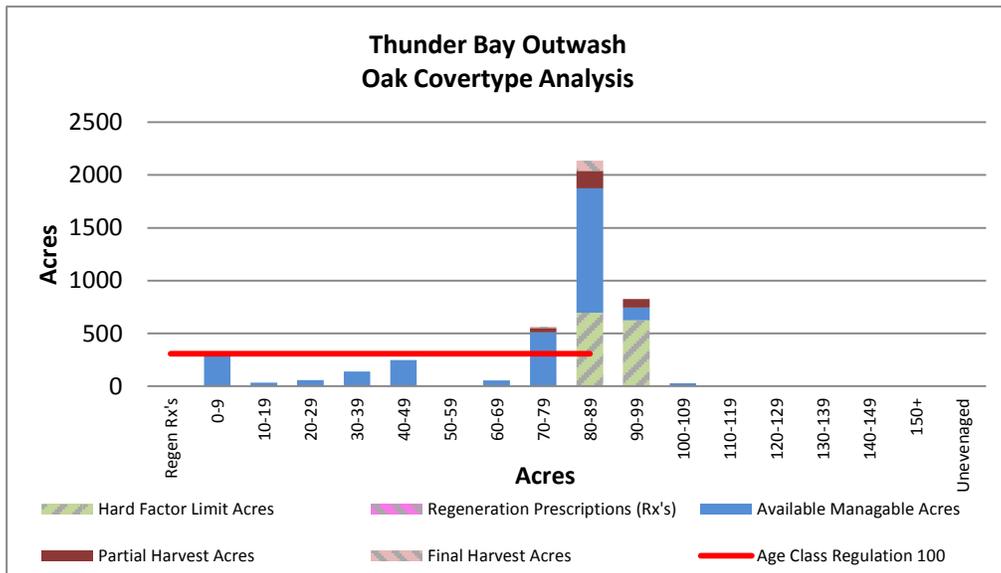


Figure 4.11.4. Age-class distribution for oak in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

Some poor-performing oak stands are suitable for reintroducing red pine. Many stands have good natural white pine regeneration in the understory. There are 1,335 acres of oak that have met harvest criteria (Figure 4.11.4), but have site conditions that limit harvest (hard factor limit acres). There are two acres that have harvest regeneration harvest pending and these acres are included in the regeneration prescription class. There are 289 acres that have partial harvests pending and these acres are included in the current age classes. 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 a release of oak. These acres are included in the regeneration prescription class.

#### 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
- Northern pin oak will be maintained on operable sites through even-aged management with acres balanced between 0 and 89 years of age. Northern red oak will be maintained on operable sites through selection management between 0 and 109 years of age.

#### 10-Year Management Objectives

- Manage northern pin oak on an 80-year rotation and red oak on a 100-year rotation;
- Conduct final harvests on a projected 296 acres;
- Conduct partial harvests on a projected 875 acres; and
- Maintain or expand oak as a component in stands throughout the management area through retention and management for natural regeneration in other cover types.

#### 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 overstory, 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; and
- Desired future harvest levels are projected at 307 acres for final harvest and 924 acres for partial harvest per 10-year period.

#### 4.11.1.4 Forest Cover Type Management – Jack Pine

##### Current Condition

Jack pine acres total 4,207 acres or 8% of the management area on PArVHa/PArVVb and PVCd habitat classes. Forest communities dominated primarily by jack pine 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.

Some jack pine plantings were historically used by Kirtland’s warbler. Accessible jack pine has been consistently harvested over the last 40 years. The acreage of jack pine is expected to increase as red pine on dry sites (PVCd) is converted to jack pine. There are 160 acres of jack pine have met harvest criteria (Figure 4.11.5), but have site conditions that limit harvest (hard factor limit acres). There are 96 acres of stands that have regeneration harvest pending and these acres are included in the regeneration prescription. The graph includes the projected number of acres converted to the cover type as a result of treatments that remove an overstory species and planting to jack pine. These acres are included in the regeneration prescription class.

##### Desired Future Condition

- Jack pine-dominated forest communities will be maintained on operable sites through even-aged management with acres balanced between 0 and 69 years of age to provide for a sustainable harvest of wood products along with wildlife habitat and recreation opportunity.

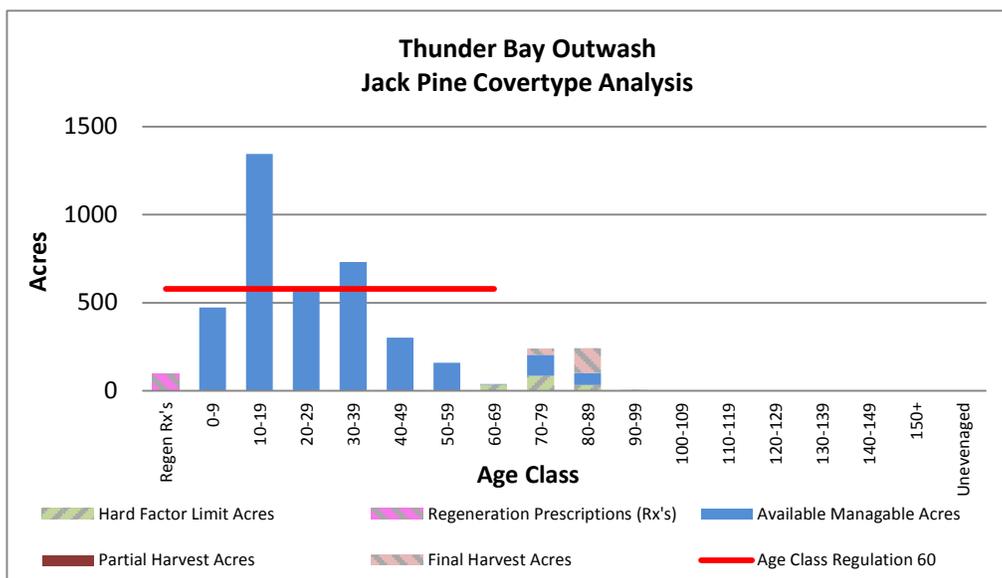


Figure 4.11.5. Age-class distribution for jack pine in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

##### 10-Year Management Objectives

- Conduct final harvests on a projected 189 acres with a concentration on the oldest age classes.

##### Long-Term Management Objectives

- Consider management strategies to minimize the impact of jack pine budworm outbreaks; and
- Desired future harvest levels are projected at 578 acres for final harvest per 10-year period.

#### 4.11.1.5 Forest Cover Type Management – Cedar and Lowland Conifers

##### Current Condition

Cedar acres total 4,106 or 7% of the management area and lowland conifer acres total 2,872 or 5% of the management area (Table 4.11.1). Cedar (Figure 4.11.6) and lowland conifer (Figure 4.11.7) are primarily located on unclassified lowlands (lowlands have not been assessed for habitat classification) throughout the management area. The age classes

for both cover types are heavily skewed toward the older age classes above 70 years of age and there has been virtually no regeneration.

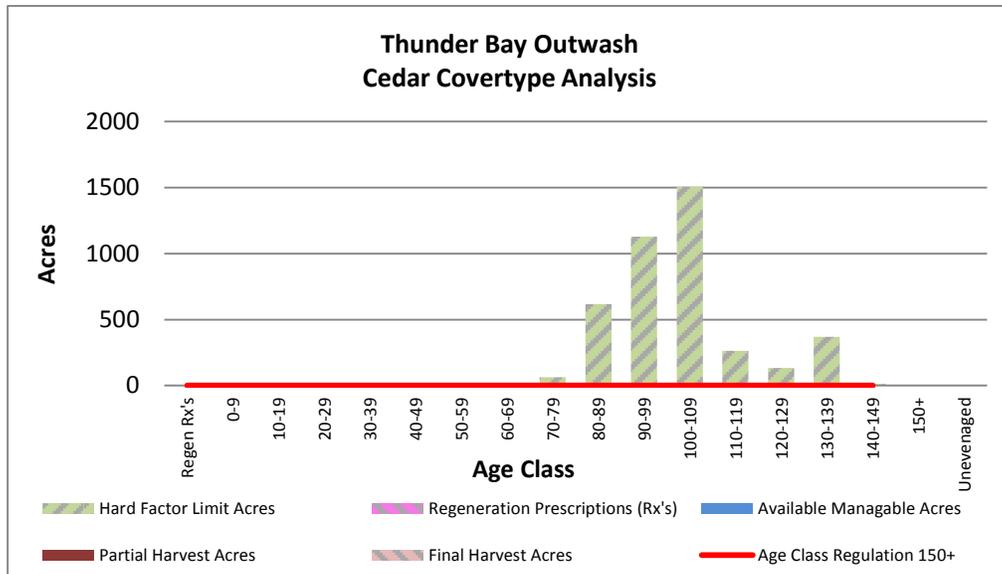


Figure 4.11.6. Age-class distribution for cedar in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

Forest cover types dominated primarily by cedar and lowland conifers in this management area are valued ecologically as sources of habitat for numerous species of wildlife including bear, white-tailed deer, hare and various song birds and commercially for pulp.

There are 871 acres of lowland conifers and all 4,106 acres of cedar that have met harvest criteria, but have a site conditions that may limit the ability to commercially harvest (hard factor limit acres).

#### Desired Future Condition

- Lowland conifer-dominated forest cover types will be maintained on operable sites through even-aged management with acres balanced between 0 and 89 to provide for a sustainable harvest;
- These types will also contribute to the preservation of regional biodiversity by providing habitat for a unique suite of plants and wide variety of animal species; and
- By storing high levels of sequestered carbon and serving as carbon sinks, cedar and lowland conifer swamps will play an important role in global geochemical cycles.

#### 10-Year Management Objectives

- If harvests can be done in a manner that will not impact wetland soils, conduct regeneration harvests on a projected 66 acres of lowland conifer;
- Additional opportunities to increase harvest prescriptions in lowland forest types will be assessed, both in and outside (due to forest health issue) of normal years-of-entry; and
- Consider methods to ensure adequate regeneration of lowland types.

#### Long-Term Management Objectives

- It is acceptable that over the next several planning periods, the older cedar and lowland conifer, much of it inaccessible for harvest, will continue to experience natural processes (fire, windthrow, insect defoliation and beaver flooding) resulting in the formation of a range of successional stages; and
- Desired future harvest levels are projected at 66 acres of lowland conifer for final harvest per 10-year period.

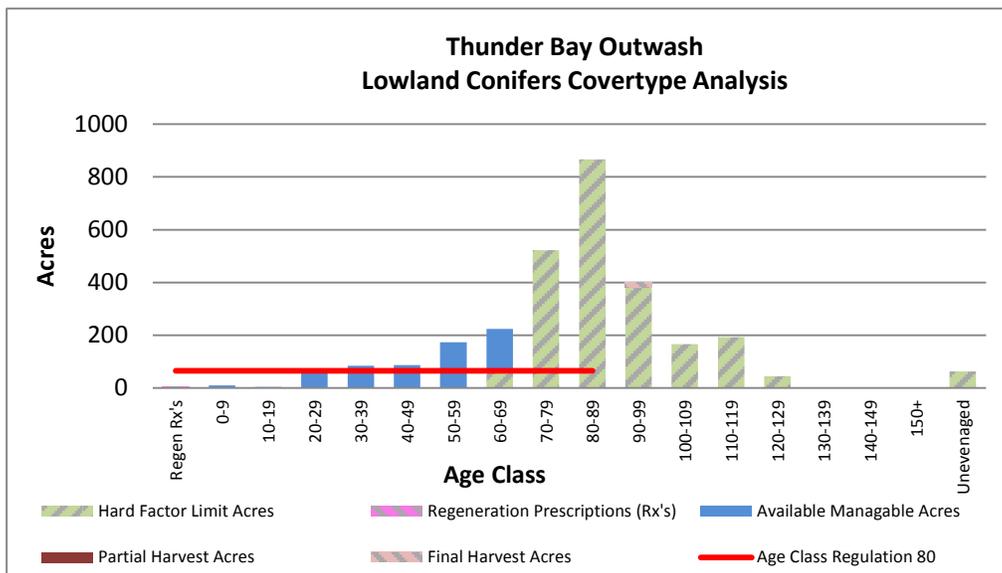


Figure 4.11.7. Age-class distribution for lowland conifer in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

#### 4.11.1.6 Forest Cover Type Management – Lowland Aspen/Balsam Poplar

##### Current Condition

Lowland aspen/balsam poplar (Figure 4.11.8) (primarily balsam poplar, swamp aspen and swamp white birch) acres total 1,787 or 3% of the management area.

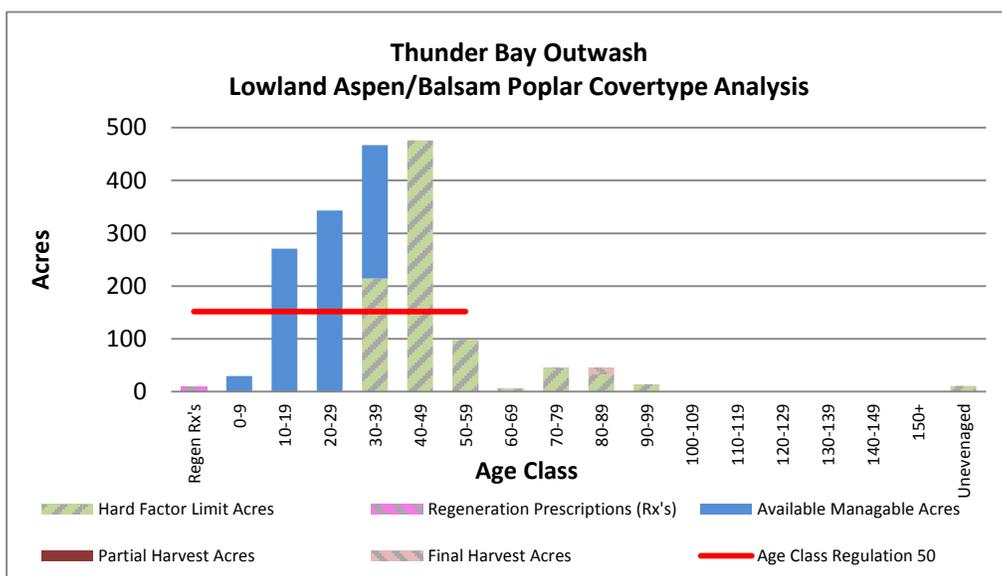


Figure 4.11.8. Age-class distribution for lowland aspen/balsam poplar in the Thunder Bay Outwash management area (2012 Department of Natural Resources Inventory Data).

Forest communities dominated primarily by lowland poplar in this management area are valued ecologically as sources of habitat for numerous species of wildlife including woodcock, ruffed grouse, bear, white-tailed deer (a featured species in this management area) and various song birds and commercially for pulp. Data show that 96 acres of lowland poplar have met harvest criteria, but have site conditions that limit harvest. There are 9 acres with a final harvest prescribed and these acres are included in the regeneration prescriptions (Rx's) class.

There are spikes of acres above the regulation level in the 20 through the 49 year age classes. There are few acres available above the 50-year age class regulation target and consideration should be given to harvesting from younger age classes to expedite balancing the age-class distribution.

##### Desired Future Condition

- Lowland poplar-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 a regulated and sustainable harvest, available wildlife habitat and to contribute to the preservation of regional biodiversity.

10-Year Management Objectives

- Conduct final harvests on a projected 152 acres of lowland aspen/balsam poplar, if it can be done in a manner that will not adversely impact wetland soils; and
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite balancing of age-class distributions.

Long-Term Management Objectives

- It is acceptable that the older lowland poplar, much of it inaccessible for commercial harvest, will continue to experience natural processes (windthrow, flooding and senescence);
- Consider alternatives to managing ash in lowland areas due to impacts from the emerald ash borer; and
- Final harvests are projected to be 152 acres in the next 10-year planning period.

**Section 4.11.1.7 Forest Cover Type Management – Northern Hardwoods**

Current Condition

Northern hardwood acres total 1,608 acres or 3% of the management area (Table 4.11.1). 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.

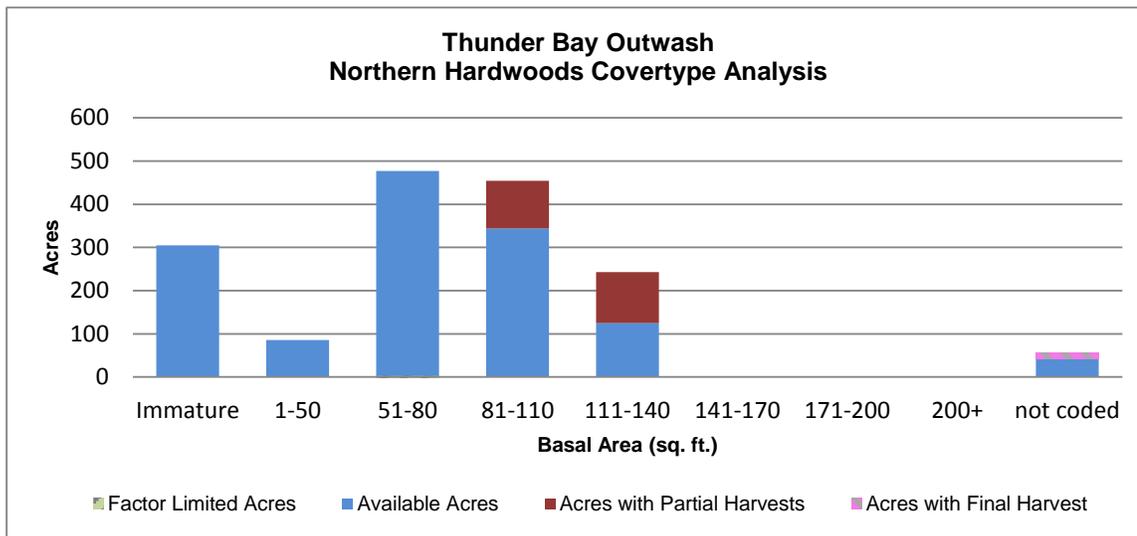


Figure 4.11.9. Basal area distribution for northern hardwood in the Thunder Bay Outwash management area (2012 Department of Natural Resources inventory data).

There are 59 acres of stands that have regeneration harvest pending and these acres are included in the current age class. There are 228 acres with a partial harvest pending and these acres are included in their current age class.

Desired Future Condition

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

10-Year Management Objectives

- On better quality hardwood sites a projected 512 acres will be harvested through selection harvests to produce uneven-aged stands;
- 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 bark disease and ash where present and affected by emerald ash borer, in northern hardwood stands, using Beech Bark Disease Management 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; and
- Continue to manage for stands with an uneven-age class on better-quality hardwood sites.

#### **4.11.1.8 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 2,950 acres or 5% of the management area (Table 4.11.1).

##### 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.

#### **4.11.1.9 Forest Cover Type Management – Upland Open/Semi-Open Lands**

##### Current Condition

Upland open/semi-open acres total 2,204 or 4% of the management area (Table 4.11.1). This category is a combination of the following non-forested land cover types: herbaceous open land, upland shrub, low-density trees and bare/sparsely vegetated. These non-forested areas are a result of natural processes of fire, frost or other disturbances which create openings in the forest canopy along with the past management practices to maintain these areas. These communities are valued ecologically as sources of open land habitat for numerous species of wildlife.

##### Desired Future Condition

- Maintain upland open/semi-open lands at or above the current level to provide habitat for species which use openings.

### 10-Year Management Objectives

- Consider management opportunities to maintain openings.

### 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.

#### **4.11.1.10 Forest Cover Type Management – Other Types**

##### Current Condition

Other species including non-forested types which are scattered in small stands cover 6,088 acres (11%). 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 contribute to the compositional diversity of the landscape in addition to providing wood products, wildlife habitat and recreational opportunities.

### 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 regeneration harvests on a projected 41 acres of lowland deciduous; 17 acres of planted mixed pines; 168 acres of upland mixed forest; 22 acres of lowland spruce/fir; 255 acres of white pine; 18 acres of tamarack; 85 acres of upland spruce/fir; and 54 acres of upland conifers;
- Conduct partial harvests on a projected 307 acres of mixed upland deciduous; 299 acres of upland mixed forest; 217 acres of white pine; 130 acres of natural mixed pines; and 65 acres of upland conifers; and
- Consider methods to ensure regeneration of lowland types.

### Long-Term Management Objectives

- Continue efforts to regenerate lowland types where feasible.

#### **4.11.2 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:

- Black bear
- Eastern massasauga rattlesnake
- Golden-winged warbler
- Pileated woodpecker
- Ruffed grouse
- White-tailed deer

The primary focus of wildlife habitat management in the Thunder Bay Outwash 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, the retention of large, over-mature trees and snags and the maintenance and expansion of hard mast and mesic conifer components. An overview of featured species is included in Section 3.

## **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  $\leq 50\%$  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.

## **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 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 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 junberry, 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.

#### **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.

#### **4.11.3 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 no natural communities of note occurring in the management area as listed in Table 4.11.2. Any established management guidelines will be followed. Further surveys for special species and natural communities will be carried out as a matter of course during the inventory process and opportunistically for special more focused surveys.

There are no high conservation value areas or ecological reference areas identified for the Thunder Bay Outwash management area as illustrated in Figure 4.11.10.

Management goals during this planning period:

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

Table 4.11.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Thunder Bay Outwash 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
<b>Birds</b>								
Red-shouldered hawk	<i>Buteo lineatus</i>	T/G5/S3-4	Confirmed	PS	Very High	Floodplain forest	Lowland mixed	Mid
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Common loon	<i>Gavia immer</i>	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
<b>Fish</b>								
Cisco (lake herring)	<i>Coregonus artedii</i>	T/G5/S3	Confirmed	MV	Low	Great Lakes	Aquatic	N/A
						Inland lake	Aquatic	N/A
						Rivers	Aquatic	N/A
<b>Insect</b>								
Secretive locust	<i>Appalachia arcana</i>	SC/S2S3/G2G3	Confirmed	MV	Very High	Bog	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
<b>Reptile</b>								
Blanding's turtle	<i>Emydoidea blandingii</i>	SC/G4/S3	Confirmed	HV	Very High	Mesic prairie	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern fen	Lowland open/semi-open	N/A
						Submergent marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Great Lakes marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Inundated shrub swamp	Lowland open/semi-open	N/A
Eastern Massasauga rattlesnake	<i>Sistrurus catenatus catenatus</i>	C/SC/G3G4T3T4Q/S3S4	Confirmed	HV	High	Coastal fen	Lowland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Poor conifer swamp	Tamarack	Late
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						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
<b>Plants</b>								
Hill's thistle	<i>Cirsium hillii</i>	SC/G3/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Boreal forest	Upland open/semi-open	N/A
						Dry northern forest	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
Ram's head lady's-slipper	<i>Cypripedium arietinum</i>	SC/G3/S3	Confirmed			Rich conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Poor fen	Lowland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
						Dry-mesic northern forest	White Pine	Late
						Great Lakes barrens	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A

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

# Thunder Bay Outwash

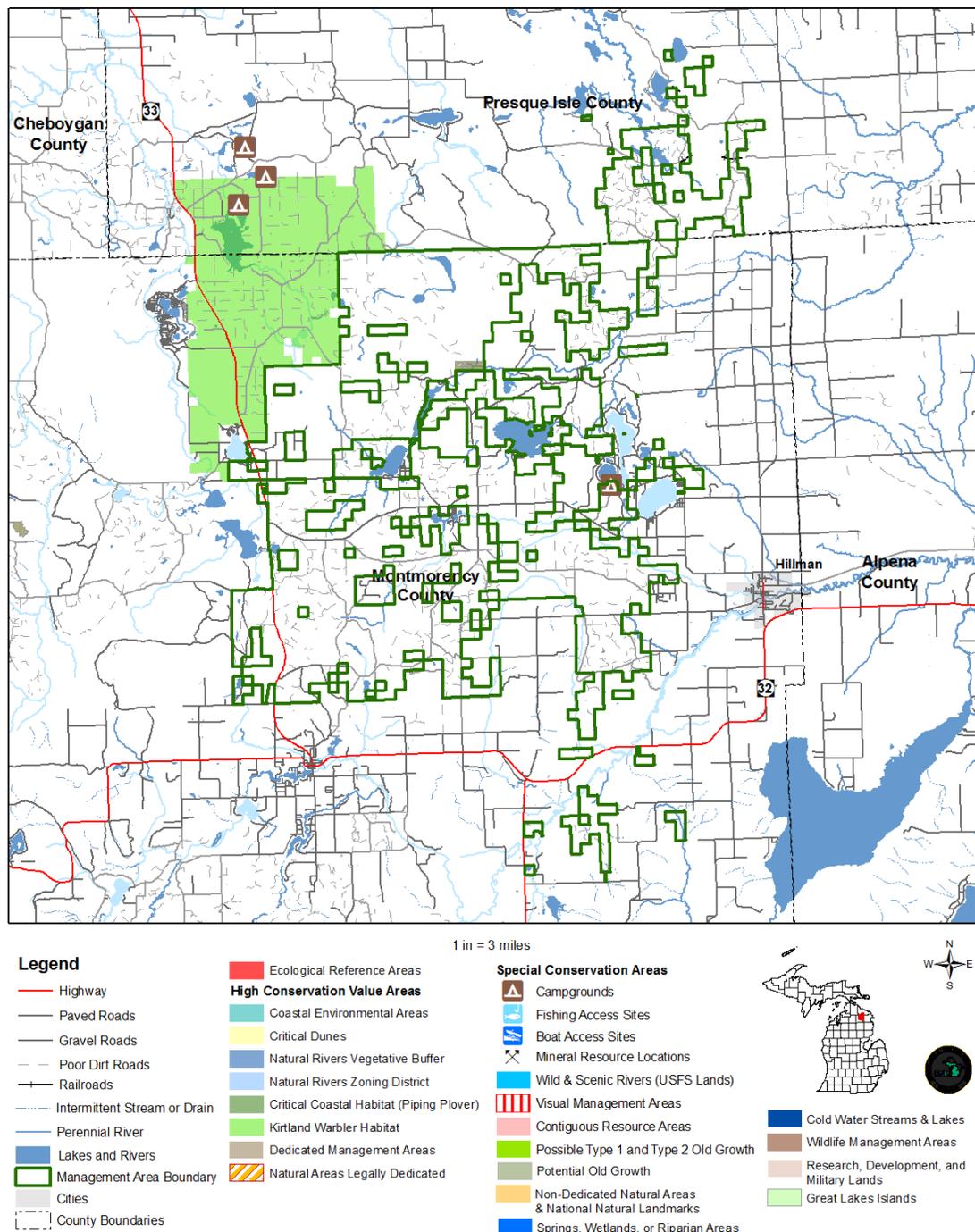


Figure 4.11.10. A map of the Thunder Bay Outwash management area showing the special resource areas.

## 4.11.5 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 includes oak decline and management will 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; and
- Shorter rotations will reduce risk of decline.

## Invasive Species

Invasive species pose a major threat to forest resources. They impact timber production, wildlife habitat and recreational access. Locations of invasive species are mapped in and within a five-mile buffer of the management area. Currently, there are no invasive species recorded within this management area or within a five-mile radius. 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.

#### **4.11.6 Aquatic Resources**

Fisheries Division management unit biologists will review proposed forest management activities using the compartment review process and will consider the potential impact of proposed prescriptions upon riparian and aquatic values. Management prescriptions will be modified to account for riparian and aquatic values by applying the standards and guidance documents listed in the introduction to this plan section to the unique conditions specific to any given forest stand.

Prescription of riparian management zone widths greater than the minimum widths provided in IC4011 (*Sustainable Soil and Water Quality Practices on Forest Land*) must be justified and documented during the compartment review process.

Forested stands adjacent to designated high priority trout streams will specifically be managed to discourage beaver use in accordance with both DNR Policy and Procedure 39.21-20 Beaver Management and IC 4011. Designated high priority trout streams for this management area are shown in Figure 4.11.1 and listed in Appendix F.

#### **4.11.6 Fire Management**

Historically, 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 herbaceous openland/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 dependant on suitable prescribed burning weather, a suitable fuel (vegetation) condition, local staffing and other resources.

The following fire management concepts should be considered in the management area:

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

#### **4.11.7 Public Access and Recreation**

Access may be minimally constrained by lowland areas that cover more than 12% of the management area. 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.

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. There is one state forest campground located within this management area as shown in Figure 4.11.10. The Atlanta Off-Road Vehicle Trail and route is located throughout the management area as shown in Figure 4.11.1.

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.

#### **4.11.8 Oil, Gas and Mineral Development**

Surface sediments consist of coarse-textured till, glacial outwash sand and gravel and postglacial alluvium. The glacial drift thickness varies between 50 and 600 feet. Sand and gravel pits are located in this management area and there is good potential for additional pits.

The Mississippian Coldwater and Sunbury Shales and Devonian Berea Sandstone, Bedford and Antrim Shales and the Traverse Formation subcrop below the glacial drift. The Traverse Limestone has limestone/dolomite potential, especially in areas of thin glacial till.

The southern portion of the management area has been developed for gas production from the Antrim Shale. Well spacing is currently 80 acres and most of the 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 320-640 acres per well (or possibly larger). Most of the southern area of the management area is leased for the Antrim and drilling, if successful for the Collingwood, would use existing sites. Drilling and leasing for the Collingwood could expand into the northern portion 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.