## 4.22 Nathan/Banat Moraines Management Area

Summary of Use and Management

Vegetative management in the Nathan/Banat Moraines management area (MA) (Figure 4.22.1) will provide a variety of forest products; maintain or enhance wildlife habitat; protect areas with unique characteristics; and provide for forest based recreational uses. Timber management objectives for the 10-year planning period include improving the age-class distribution of aspen; maintaining the conifer component in northern hardwood stands; maintaining the presence of minor cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives include addressing the habitat requirements identified for the following featured species: northern goshawk, ruffed grouse and wild turkey. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and will be an issue for this 10-year planning period.

Introduction

The Nathan/Banat Moraines management area is on a drumlinized ground moraine in western Menominee County. The state forest covers about 10,300 acres and is mostly contiguous. The major ownership in this vicinity is non-industrial private. The management area is dominated by the cedar, aspen and northern hardwood cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by the natural communities: poor conifer swamp, mesic northern forest, and dry mesic northern forest;
- Mid-range in site quality;
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitats.

The management priority in this area is to continue to provide these multiple benefits while minimizing user conflicts.

The predominant cover types, composition and projected harvest areas for the Nathan/Benet management area are shown in Table 4.22.1.

Table 4.22.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

| Cover Type | Cover % | Current Acreage | Hard Factor Limited Acres | Manageable Acres | 10 Year Projected Harvest (Acres) | | Projected Acreage in 10 Years | Desired Future Harvest (Acres) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Final Harvest | Partial Harvest | | Final Harvest | Partial Harvest |
| Aspen | 29% | 2,999 | 126 | 2,873 | 0 | 0 | 2,999 | 479 | 0 |
| Cedar | 26% | 2,689 | 0 | 2689 | 0 | 0 | 2,689 | 168 | 0 |
| Northern Hardwood | 16% | 1,666 | 58 | 1608 | 0 | 636 | 1,666 | 0 | 780 |
| Lowland Deciduous | 7% | 732 | 338 | 394 | 44 | 0 | 732 | 44 | 0 |
| Upland Open/Semi-Open Lands | 1% | 82 | 0 | 82 | 0 | 0 | 82 | 0 | 0 |
| Lowland Open/Semi-Open Lands | 4% | 406 | 0 | 406 | 0 | 0 | 406 | 0 | 0 |
| Misc Other (Water, Local, Urban) | 0% | 47 | 0 | 47 | 0 | 0 | 47 | 0 | 0 |
| Others | 16% | 1,622 | 297 | 1325 | 177 | 7 | 1,622 | 179 | 20 |
| Total | | 10,243 | 818 | 9,425 | 221 | 643 | 10,243 | 870 | 800 |

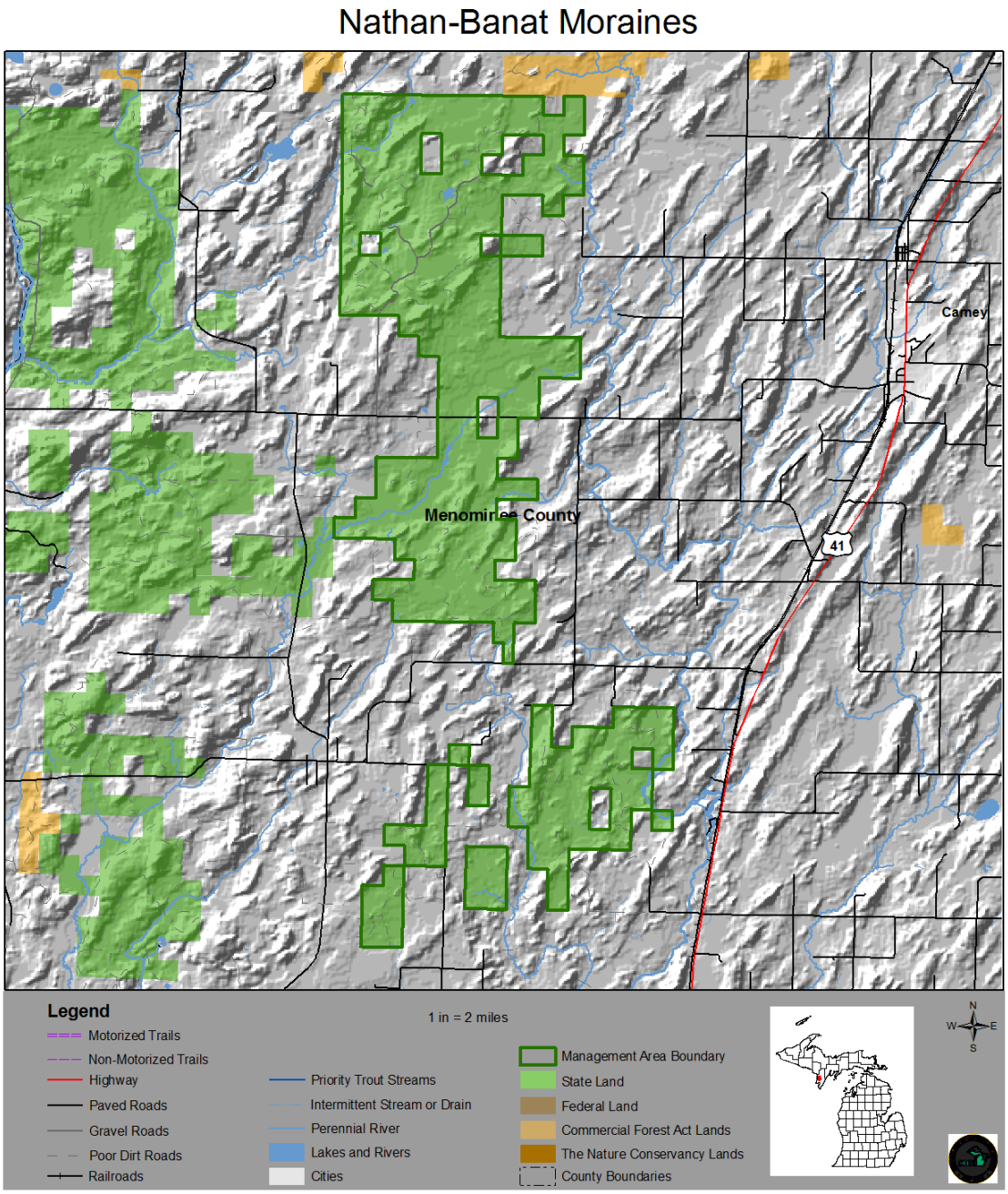


Figure 4.22.1. A map of the Nathan/Banat Moraines management area (dark green boundary) in relation to surrounding state forest and other land in Menominee County, Michigan.

### 4.22.1 Forest Cover Type Management Direction

The following sections contain information on vegetation management for each of the major cover types, a grouping of minor cover types and important non-forested vegetation types for the Nathan-Banat Moraines management area in the form of Desired Future Condition, 10-Year Management Objectives and Long-Term Management Objectives. This information applies to those portions of the forest where active management (i.e., timber harvest, prescribed fire, planting or mowing) will be conducted. In other portions of the state forest, the natural processes of succession and disturbance

will provide ecological benefits. While most stands have a variety of tree species and other vegetation, they are classified by the species with dominant canopy coverage.

The following cover types are valued commercially for their timber products; ecologically as sources of habitat for numerous wildlife species; and for the variety of recreational opportunities they provide. Harvesting and regenerating these cover types will provide for a continuous flow of forest products and will help to ensure (or provide) wildlife habitat.

**Aspen Cover Type**

Current Condition

The aspen cover type covers 2,999 acres (29%) of this management area (Table 4.22.1). Aspen is poorly distributed across age classes spiking in the 0-9 and 10-19 year age classes and running deficits in the 30-39 and 40-49 year old age classes (Figure 4.22.2). A few acres of aspen have limiting factors on them. The majority of these acres will succeed to upland spruce/fir.

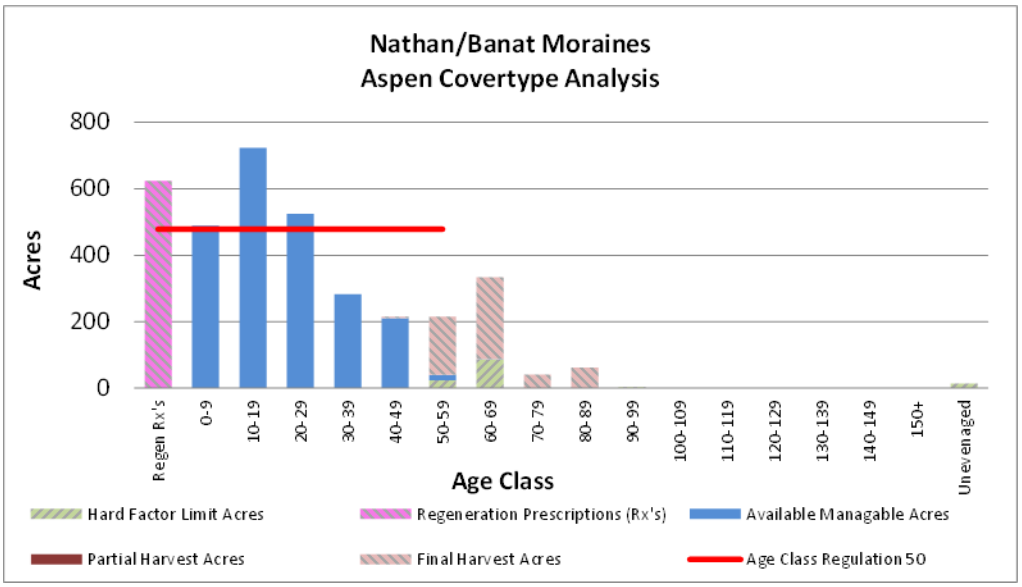

Figure 4.22.2. Graph of the age-class distribution for the aspen cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years; and
- Provide an even supply of forest products using Intensive aspen management.

Long-Term Management Objectives

- Regenerate 479 acres each decade using a 50-year rotation length; and
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types and mitigate any aspen acreage loss during this planning period through identification of replacement acreage prior to conversion.

10-Year Management Objectives

- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;
- Identify some of the 40-49 year-old aspen on better sites that could be available for early harvest; and
- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early.

**Cedar Cover Type**

Current Condition

The cedar cover type covers 2,689 acres (26%) in this management area (Table 4.22.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir characterize the cedar type. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. The cedar type is poorly distributed across age classes with most stands over 100 years of age (Figure 4.22.3). Little harvesting has been done in this type over the past 60 years.

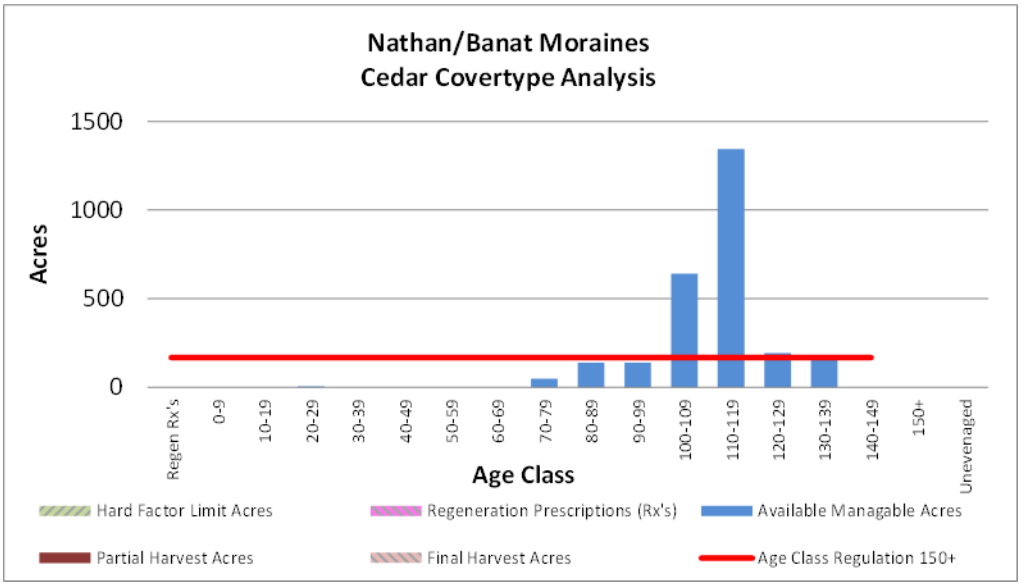

Figure 4.22.3. Graph of the age-class distribution for the cedar cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes; and
- Sustainable regeneration and recruitment of seedlings and saplings.

Long-Term Management Objectives

- Explore techniques for regenerating the cedar cover type under high browsing pressures, ideally leading to harvesting 168 acres per decade; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objective

- While no active management activities are planned in this type during this 10-year planning period, limited harvesting may occur to test methods of cedar regeneration.

**Northern Hardwood Cover Type**

Current Condition

Northern hardwood stands make up 1,666 acres (16%) of this management area. They occur on medium-quality sites. Most stands have been managed on a selection harvest basis but regeneration success has been limited. Many stands have well-established sedge understory with little tree regeneration, shrub or herbaceous plant communities.

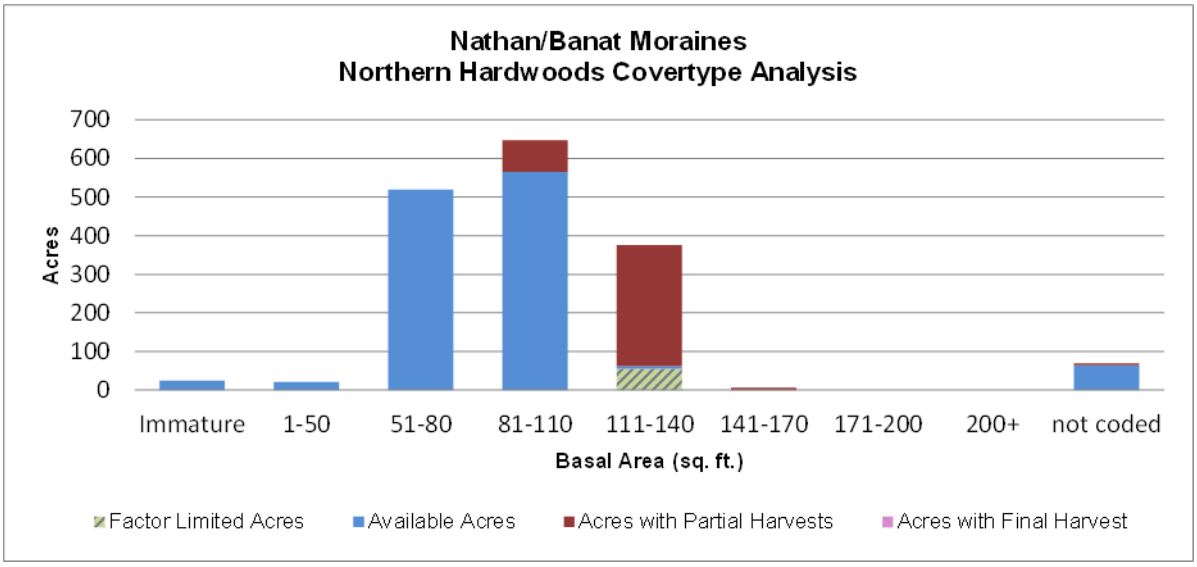

Figure 4.22.4. Graph of the basal area distribution for the northern hardwood cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Sustainable regeneration and recruitment of northern hardwood species leading to an all-age structure.

Long-Term Management Objectives

- Using an uneven-aged system, selective harvest high-quality northern hardwood stands on a 20-year cycle, promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory;
- Provide for well-developed shrub and herbaceous layers;
- Provide 780 acres for harvested each decade; and
- Work to reduce deer herbivory and sedge.

10-Year Management Objectives

- Selectively harvest 636 acres during this 10-year planning period (this number is lower than the estimated long-term amount due to the current low basal areas);
- Maintain white pine, hemlock, oak and upland cedar where they occur in stands that are cut;
- Experiment with mechanical and chemical treatments of the sedge understory to establish northern hardwood tree regeneration and improve understory diversity; and
- Monitor hardwood regeneration.

**Lowland Deciduous Cover Type**

Current Condition

Currently there are 732 acres (7%) of the lowland deciduous type in the management area (Table 4.22.1). This type is often found in association with lowland conifer, cedar and tamarack types. There are 338 acres with factor limits due to wet conditions or for riparian corridors. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. The lowland deciduous types on this management area do not have a well-balanced age-class distribution. Most of the stands in this area are over 80 years in age.

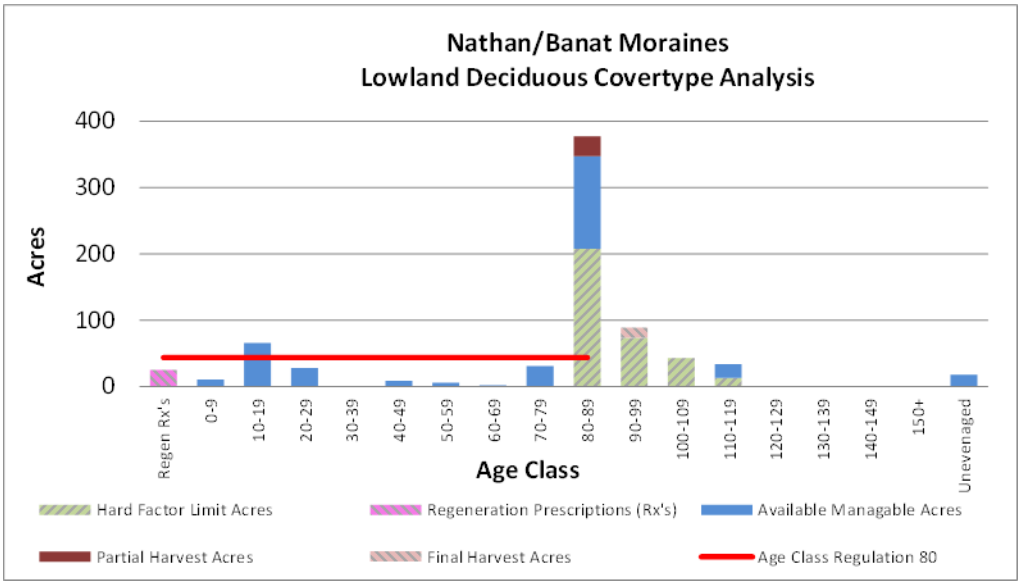

Figure 4.22.5. Graph of the age-class distribution for the lowland deciduous cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain approximately the current level of the lowland deciduous type with stands representing a variety of age classes.

Long-Term Management Objectives

- Harvest stands without limiting factors using an 80-year rotation leading to 44 acres being harvested each decade;
- Regenerate stands to a species mix similar to the pre-harvest conditions; and
- Harvesting will be done using small clearcuts with clumped retention.

10-Year Management Objectives

- Harvest 44 acres during this planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.

**Other Forested Cover Types**

Current Condition

Other forested types make up 1,622 acres and are made up of upland spruce/fir (458 acres), lowland conifers (454 acres), tamarack (299 acres), lowland spruce/fir (159 acres), lowland poplar (103 acres), mixed upland deciduous (68 acres), red pine (54 acres), upland conifer (11 acres), paper birch (nine acres) and lowland mixed conifer (7acres). Together these types make up about 16% of the management area.

Desired Future Condition

- Maintain the presence of the minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods; and
- Featured species habitat requirements will be taken in to consideration.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 184 acres over the next decade.

**Other Non-forested Cover Types**

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (82 acres – 1%), lowland open/semi-open lands (406 acres – 4%) and miscellaneous other (water, local, urban) (47 acres - >1%).

Desired Future Condition

- The desired future condition of the grass types is an open sedge/grass community populated with native grass, soft mast shrubs and other herbaceous species.

Long-Term Management Objective

- Permanent grass openings may be maintained as needed.

10-Year Management Objective

- Grass-types may be treated for opening maintenance this decade as needed.

**4.22.2 – Featured Wildlife Species Management**

The Nathan/Banat Moraines management area is located in a forest-agricultural interface that contains cedar, aspen and northern hardwood cover types. Popular game species such as deer and wild turkey do well here and the Carney Fen Natural Area is located in this management area. Management will strive to improve the aspen age-class distribution and enhance vegetative diversity in northern hardwood stands, many of which show poor regeneration success. The primary focus of wildlife habitat management in the Nathan/Banat Moraines management area will be to address the habitat requirements identified for the following featured species: northern goshawk, ruffed grouse and wild turkey. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: mature forest (upland deciduous, especially aspen and mixed forest with little understory); habitat fragmentation; coarse woody debris; early successional forest; mast (soft and hard); and forest openings. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

**Northern Goshawk**

The goal for northern goshawk is to maintain suitable habitat. Management at the stand scale should focus on protection of nest trees, the provision of coarse woody debris, addressing fragmentation. Landscape scale management should provide mature and old aspen stands in the 60-69 year-old age class.

Wildlife habitat specifications:

- Maintain a minimum of 15% of the state forest aspen resource above age of 60 in this management area (this can be accomplished using factor limited stands, special conservation areas, etc…). All known woodland raptor nests should be reported to local wildlife staff and documented in the Integrated Forest Monitoring Assessment and Prescription comments. If the species is known the common name should be included in those comments. For northern goshawk nests, the wildlife habitat specifications contained within Michigan DNR's *Interim Management Guidance for Red-Shouldered Hawks and Northern Goshawk on State Forest lands* (August 2012) will be followed until the workgroup has completed the guidance that will permanently replace the interim guidelines.

**Ruffed Grouse**

The western Upper Peninsula goal for ruffed grouse is to maintain or improve habitat. Management during this planning period will focus on early successional forest in priority landscapes, balancing age-class distribution and provision of soft browse.

Wildlife habitat specifications:

- Maintain aspen acres in the management area and balance the age-class distribution of aspen cover types.
- Stand size for grouse: Ideal aspen stands will be irregularly shaped 10-40 acres to maximize juxtaposition or edge avoiding extensive single age final harvests. Larger harvest units should have irregular boundaries, provide one 1-3 acre unharvested clumped inclusion for every 40 acres harvested and include at least four age classes in close proximity to one another.
- Hold or increase the conifer component in aspen stands. Leave conifers under four-inch diameter at breast height in mixed stands and aspen types as immediate residual escape cover and to promote corridors.
- Maintain cherry production for soft mast and oak component in stands with oak and emphasize areas with a hazel understory.

**Wild Turkey**

The western Upper Peninsula goal for turkey is to provide sufficient habitat in order to continue to provide recreational opportunity to see and harvest turkey. Management should focus on providing natural winter food, maintaining and regenerating the oak component and maintaining brood-rearing openings to improve brood-production and winter survival to offset anticipated habitat losses.

Wildlife habitat specifications:

- Provide sources of winter food that are accessible above the snow (food plots, annual grains, fruit-bearing trees or shrubs);
- Conserve the oak component in forest stands, promote oak regeneration and where absent, plant oak on appropriate sites;
- Maintain and increase the number of brood-rearing forest openings (forest openings, savannas, barrens, hayfields, etc.); and
- Promote/enhance small dense mature confer stands for winter thermal cover/roosting sites.

**4.22.3 –Special Conservation Areas**

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, when past surveys have indicated a possibility of their presence, or when appropriate habitat is available and the species is known to occur in the general region.

Past surveys have noted and confirmed three listed species and no natural communities of note occurring in the management area as listed in Table 4.22.2. Any established management guidelines will be followed. Further surveys for special species and natural communities will be carried out as a matter of course during the inventory process and opportunistically for special more focused surveys.

Approximately 400.2 acres of potential old growth have been identified within the Nathan-Banat Moraines management area. These stands were identified for a broad range of reasons and were coded in the Operations Inventory database as Stand Condition 8. These stands area also special conservation areas until they are evaluated.

The 2,330 acre Carney Fen Natural Area is a high conservation value area in the Nathan-Banat management area as shown in Figure 4.22.6.

There are no ecological reference areas identified in this management area.

Management goals during this planning period:

Goal 1: To develop and maintain a list of rare, threatened, endangered and special concern species and natural communities for the management area through a continuous inventory and through opportunistic focused inventory surveys.

Objective 1-1: Field staff should be trained and aware of the identification characteristics and natural history of rare, threatened, endangered and special concern species.

Objective 1-2: Occurrences of rare, threatened, endangered and special concern species noted during the inventory process by inventory staff should be verified and added to the body of knowledge for the management area.

Goal 2: To evaluate the potential old growth areas by the end of this 10-year planning period.

Table 4.22.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Nathan-Banat Moraine management area.

| Common Name | Scientific Name | Status | Status in Management Area | Climate Change Vulnerability Index (CCVI) | Confidence | Natural Community Association | Probable Cover Types | Successional Stage |
|---|---|---|---|---|---|---|---|---|
| **Natural Community** | | | | | | | | |
| Northern fen | | S3/G3 | Confirmed | | | | Lowland open/semi-open | N/A |
| **Birds** | | | | | | | | |
| Northern goshawk | *Accipiter gentilis* | SC/G5/S3 | Confirmed | PS | Very High | Mesic northern Forest | Northern Hardwood | Late |
| | | | | | | Hardwood-conifer swamp | Lowland Mixed | Mid |
| | | | | | | Northern hardwood swamp | Black Ash | Late |
| | | | | | | Floodplain forest | Lowland mixed | Mid |
| | | | | | | Dry northern forest | Jack Pine, Red Pine | Late |
| | | | | | | Dry-mesic northern forest | White Pine | Late |
| | | | | | | Boreal forest | Upland & Lowland Sp/F | Mid |
| Red-shouldered hawk | *Buteo lineatus* | T/G5/S3-4 | Confirmed | PS | Very High | Floodplain forest | Lowland mixed | Mid |
| | | | | | | Dry-mesic northern forest | White Pine | Late |
| | | | | IL | Moderate | Mesic northern Forest | Northern Hardwood | Late |
| Bald eagle | *Haliaeetus leucocephalus* | SC/G5/S4 | Confirmed | | | Bog | Lowland open/semi-open | N/A |
| | | | | | | Hardwood-conifer swamp | Lowland Mixed | Mid |
| | | | | | | Northern hardwood swamp | Black Ash | Late |
| | | | | | | Poor conifer swamp | Tamarack | Late |
| | | | | | | Floodplain forest | Lowland mixed | Mid |
| | | | | | | Dry northern forest | Jack Pine, Red Pine | Early |
| | | | | | | Dry-mesic northern forest | White Pine | Late |
| | | | | | | Mesic northern Forest | Northern Hardwood | Late |
| **Dragonfly** | | | | | | | | |
| Ebony boghaunter | *Williamsonia fletcheri* | SC/G4/S1S2 | Confirmed | MV | Low | Inland lake | Lowland open/semi-open | N/A |
| | | | | | | Bog | Lowland open/semi-open | N/A |
| | | | | | | Northern fen | Lowland open/semi-open | N/A |
| | | | | | | Patterned fen | Lowland open/semi-open | N/A |
| | | | | | | Poor fen | Lowland open/semi-open | N/A |
| | | | | | | Prairie fen | Lowland open/semi-open | N/A |
| | | | | | | Muskeg | Lowland open/semi-open | N/A |
| | | | | | | Hardwood-conifer swamp | Lowland Mixed | Mid |
| | | | | | | Inundated shrub swamp | Lowland open/semi-open | N/A |
| | | | | | | Coastal fen | Lowland open/semi-open | N/A |
| | | | | | | Southern shrub-carr | | |
| **Plants** | | | | | | | | |
| Small round-leaved orchis | *Amerorchis rotundifolia* | E/G5/S1 | Confirmed | | | Patterned fen | Lowland open/semi-open | N/A |
| | | | | | | Rich conifer swamp | Tamarack | Late |
| | | | | | | Northern fen | Lowland open/semi-open | N/A |
| Calypso or fairy-slipper | *Calypso bulbosa* | T/G5/S2 | Confirmed | | | Rich conifer swamp | Tamarack | Late |
| | | | | | | Boreal forest | Upland & Lowland Sp/F | Mid |
| | | | | | | Limestone bedrock glade | Upland open/semi-open | N/A |
| | | | | | | Volcanic bedrock lakeshore | Upland 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 |
| | | | | | | Volcanic bedrock glade | Upland open/semi-open | N/A |
| Assiniboia sedge | *Carex assiniboinensis* | T/G4G5/S2 | Confirmed | | | Floodplain forest | Lowland mixed | Mid |
| | | | | | | Mesic northern forest | Northern Hardwood | Late |
| Ram's head lady's-slipper | *Cypripedium arietinum* | 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 |
| Dwarf lake iris | *Iris lacustris* | LT/T/G3/S3 | Confirmed | | | Open dunes | Upland open/semi-open | N/A |
| | | | | | | Alvar | Upland open/semi-open | N/A |
| | | | | | | Wooded dune & swale complex | Upland open/semi-open | N/A |
| | | | | | | Boreal forest | Upland & Lowland Sp/F | Mid |
| | | | | | | Limestone bedrock glade | Upland open/semi-open | N/A |
| | | | | | | Limestone cobble shore | Upland open/semi-open | N/A |
| | | | | | | Limestone bedrock lakeshore | Upland open/semi-open | N/A |
| Marsh grass-of-Parnassus | *Parnassus palustris* | T/G5/S2 | Confirmed | | | Rich conifer swamp | Tamarack | Late |

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

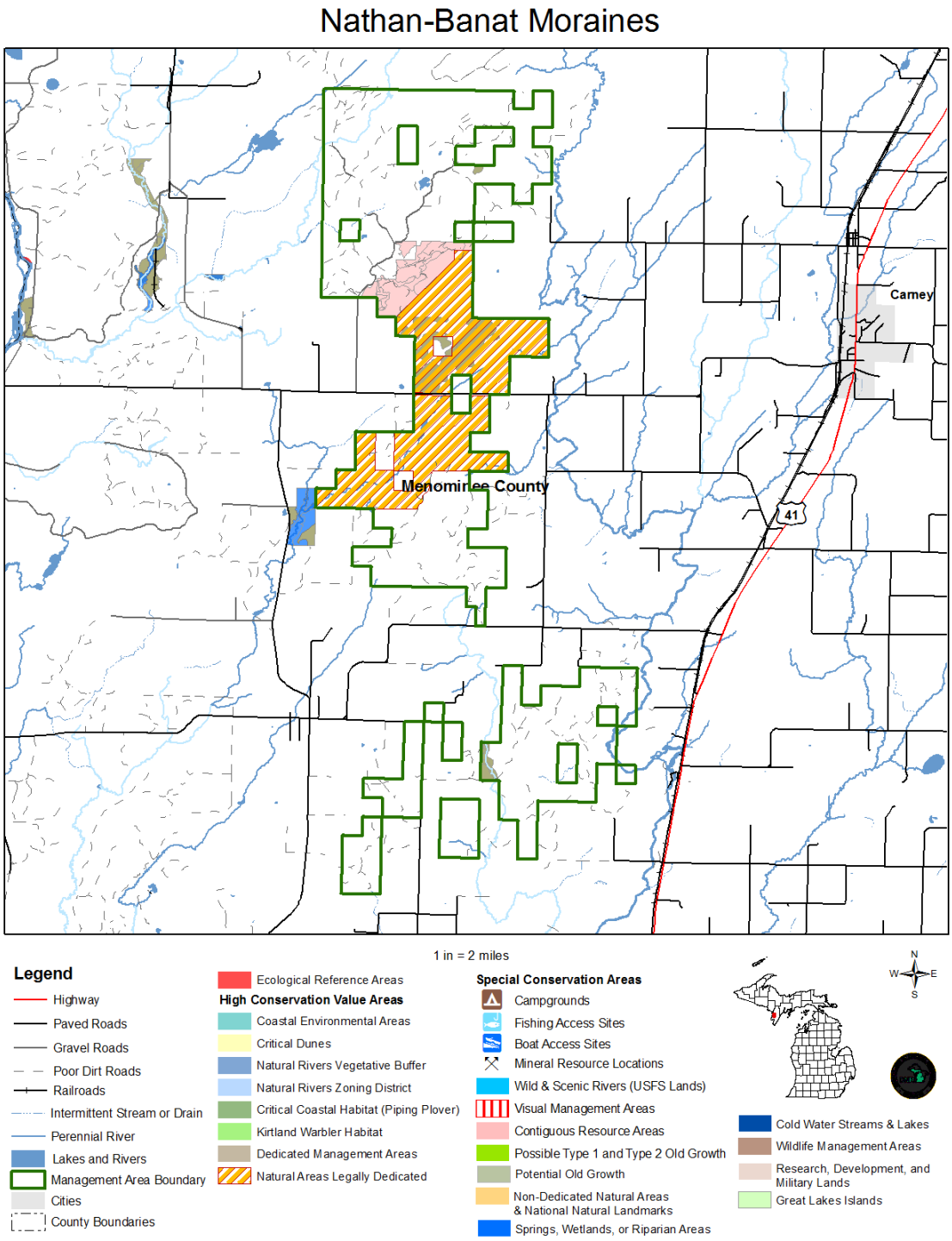


Figure 4.22.6. A map of the Nathan-Banat Moraines management area showing the special resource areas.

### 4.22.4 – Forest Health Management

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

- White trunk rot of aspen
- *Hypoxylon* canker
- Emerald ash borer
- Beech bark disease
- Spruce budworm.

When forest pests are detected, they are to be reported to the forest health specialist for treatment recommendations. The treatment of large outbreaks of forest pests will be coordinated on a state and regional level.

Several invasive exotic species of plants are thought to be located in the vicinity. When invasive species are detected, they will be reported to the forest health specialist and treatment options will be reviewed. Priority for treatment should be given to those species that threaten sensitive sites due to their location or growth characteristics and have population levels that may be successfully controlled. There are no known occurrences of species of concern in or near this management area.

### 4.22.5 – Aquatic Resource Management

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 are identified in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. Remove or discourage beaver populations on designated high priority trout streams.

High priority trout streams in this management area as shown in Figure 4.22.1.

### 4.22.6 – Fire Management

This area is dominated by mesic northern forests interspersed with conifer lowlands. Relatively slow fire spread overall kept fire from burning significant areas for the most part resulting in very long fire return intervals.

- All wildfires within the management area should be subject to appropriate initial attack response.

### 4.22.7 – Public Access and Recreation

This area has good public and management access. There are no recreational facilities in this area.

- Work to expand public access and recreation facilities as opportunities arise.

### 4.22.8 – Oil, Gas and Mineral Resources

Exploration and development for oil and gas has been limited to a few wells drilled in the eastern Upper Peninsula. No economic oil and gas production has been found in the Upper Peninsula.

Surface sediments consist of medium-textured till and glacial outwash sand and gravel and postglacial alluvium. The glacial drift thickness varies between 10 and 50 feet. Sand and gravel pits are located in the management area and there is good potential on the uplands for additional pits.

The Ordovician Prairie du Chien Group and Cambrian Trempealeau Formation subcrop below the glacial drift. There is not a current economic use for these rocks.

The “Back Forty” area is located a few miles to the southwest. Metallic mineral exploration has occurred in the management area in the past and there may be additional potential.