INTRODUCTION TO SECTION - 4 - MANAGEMENT AREA DIRECTION

4 .1 Introduction

This section builds upon the discussions in the previous sections on forest history and current conditions and trends and provides specific management direction for each of the 35 state forest management areas in the western Upper Peninsula ecoregion (Figure 4.1). Management areas are groupings of forest compartments that range in size from approximately 5,000 to 190,000 acres. The boundaries of management areas are based upon common attributes.

Each management area section contains:

- An introduction, which includes a projection of harvest acres in the next 10-year planning period.
- Management direction for each of the major and some of the minor forest cover types in the management area, including a description of the current condition, desired future condition, 10-year vegetation management objectives and long-term management issues.
- Featured wildlife species and habitat specifications.
- Discussions of fish, wildlife, plant management; forest health management; aquatic resources; fire management; recreation; access; and other region-specific issues, such as mining and oil and gas development.

The sustainability of Michigan state forest timber management is largely predicated upon a sophisticated and continually updated forest inventory that enables the use of a modified area control method and the associated balancing of age-classes rather than volume control. Area regulation is an indirect method of controlling the amount of timber to be annually harvested on the basis of an equal (balanced) number of acres in each of several age classes (up to a set rotation age) of stocked trees, in order to meet management objectives and as a means of ensuring sustained yields over time. Most public forestry agencies employ an area regulation approach to achieve sustainable, even flows of timber (Leak, 2011). For the Michigan state forest system, area control is used for management of even-aged stands in the aspen, jack pine and some oak forest types. Management of uneven-aged stands such as northern hardwoods is based upon a basal area/stocking approach and a combination of basal area and age class is used in management of red and white pine stands. Most lowland cover types are also managed as even-aged stands using the area control method. It is important to understand that balancing age classes for a forest type is a long-term management objective that can only be achieved over the course of time (typically 50-80 years). During this period, harvest levels in any given year of entry can be higher or lower than the desired long-term area-regulated harvest level as unbalanced age classes (resulting from past over- or under-harvesting) are rectified through additional harvest prescriptions. Application of the modified area control method to the effective base of timberland in the state forest ensures that harvest levels are sustainable and comply with forest certification standard requirements.

The calculation of projected harvest levels is a key component of each management area section in the regional state forest management plan and are framed in terms of projected harvests (in acres) for the major and minor cover types for the following decade. These projections are based upon several factors:

- The desired future condition for the forest type, which include area regulated (balanced) age-class distributions and the perpetuation or transition of dominant forest types based upon Kotar habitat classification (Burger and Kotar, 2003);
- The present acreage and age class and/or stocking condition of forest types, based upon inventory data;
- Areas that are reserved from harvest due to treatment limiting factors or other management goals (including special conservation areas, high conservation value areas and ecological reference areas; and
- The type of silvicultural practices that are typically employed for different cover types, age classes and means of forest regeneration.

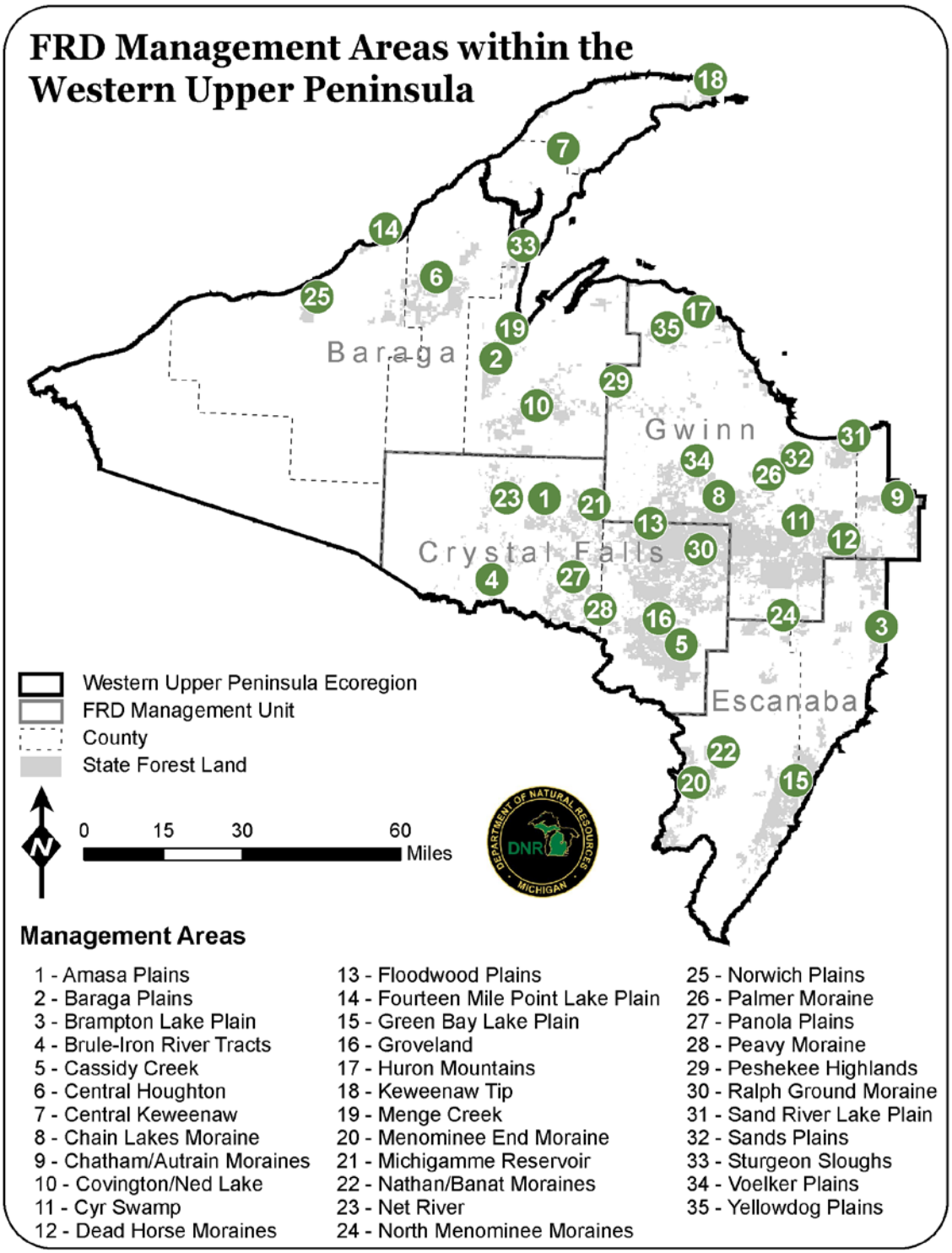

Figure 4.1. Western Upper Peninsula ecoregion map showing the management areas.

Other variable factors such as disease, insect, wind or fire mortality may also impact harvest levels. Where disease, insect or fire mortality problems are known in advance to apply to a management area (e.g., beech mortality due to beech bark disease) they are taken into consideration when establishing harvest levels for that management area. These factors cannot always be predicted with sufficient accuracy or certainty to allow them to be integrated into operational landscape-level planning. Therefore, when they do occur, harvest schedules are often adjusted in the compartment review process to address them. Where there are occurrences of disease or insect outbreaks or large wind throws or wildfires, they are usually quite localized and may lead to unanticipated temporary increases in salvage harvests to avoid major losses in timber value. These unanticipated harvests are taken into account in subsequent annual planning analyses and processes.

All the above factors are integrated into DNR planning processes at the strategic-level (2008 Michigan State Forest Management Plan), operational landscape-level (regional state forest management plans), and the tactical-level (compartment review process). In particular, they are considered in formulating the management direction for each management area in the regional state forest management plan, which provide specific estimates of harvest levels for the next 10-year compartment review cycle.

The management direction contained within each management area section of the plan is used with appropriate standards and guidelines and professional judgment in the compartment review process to plan tactical prescriptions for timber harvest. Whereas standards originate from higher authority, they retain higher precedence than the contents of this plan. Standards and guidelines that are used for the operational management of the state forest include:

Standards:

1. Natural Resource Commission Policy 2204, Reforestation, issued January 1, 1977.
2. Natural Resource Commission Policy 2207, Management of State Forests, issued May 11, 1979.
3. DNR Policy and Procedure 32.22-06, Forest Type Mapping Instructions and Type Symbols, issued July 11, 2005.
4. DNR Policy and Procedure 32.22-07, Forest Management, issued July 11, 2005.
5. DNR Policy and Procedure 39.21-20, Beaver Management, issued July 11, 2005.
6. DNR Forest Management, Fire and Mineral Development Policy and Procedure 241, Reforestation, issued October 26, 1999.
7. DNR Forest Management, Fire and Mineral Development Policy and Procedure 251, Sale and Removals of Timber, issued March 1, 2000.
8. DNR Forest Management, Fire and Mineral Development Policy and Procedure 251a, Sale and Removals of Timber, Visual Management, issued February 28, 2002.
9. DNR Forest Management, Fire and Mineral Development Policy and Procedure 441, Operations Inventory and Compartment Review Procedures, issued January 19, 2000.
10. DNR Forest Certification Work Instruction 1.4 – Biodiversity Management on State Forest Lands.
11. DNR Forest Certification Work Instruction 1.5 – Social Impact Considerations and Public Involvement Processes.
12. DNR Forest Certification Work Instruction 1.6 – Forest Management Unit Analysis.
13. DNR Forest Certification Work Instruction 2.1 – Reforestation.
14. DNR Forest Certification Work Instruction 2.3 – Integrated Pest Management and Forest Health.
15. DNR Forest Certification Work Instruction 7.1 – Timber Sale Preparation and Administration Procedures.

Guidelines:

1. DNR Silvicultural Guidelines.
2. Within-Stand Retention Guidance (Michigan Department of Natural Resources, 2011).
3. Michigan Woody Biomass Harvesting Guidance (Michigan Department of Natural Resources, 2010).
4. Sustainable Soil and Water Quality Practices on Forest Land (Michigan Department of Natural Resources and Michigan Department of Environmental Quality, 2009).
5. Evaluating Riparian Management Zones on State Lands (Michigan Department of Natural Resources, 2004).
6. Forest Certification Green-Up Guidelines (Michigan Department of Natural Resources, 2006).
7. Guidelines for Red Pine Management (Michigan Department of Natural Resources, 2006).
8. American Beech Management: Beech Bark Disease (Michigan Department of Natural Resources, 2012).
9. Ash Management: Emerald Ash Borer (Michigan Department of Natural Resources, 2012).
10. Rare Species Protection Approach and Assessment Guidelines (Michigan Department of Natural Resources, 2008).
11. Interim Management Guidance for Red-Shouldered Hawks and Northern Goshawk on State Forest Lands (Michigan Department of Natural Resources, 2012).
12. Strategy for Kirtland's Warbler Habitat Management (Michigan Department of Natural Resources et al., 2001).
13. The average size of clearcut harvests over the state forest system should not exceed 120 acres, except where necessary to meet regulatory requirements or to respond to forest health emergencies or other natural catastrophes (The Sustainable Forestry Initiative, Inc., 2010).
14. Deer Winter Range Guidelines (Michigan Department of Natural Resources et al., 2013).

This forest plan is based upon 2012 DNR state forest inventory data. A model was used to analyze the inventory data and to generate the tables and figures presented in this plan section. Metadata describing the design elements and functions of this model are provided in Appendix D.

Harvest of lowland cover types (mixed lowland conifers, lowland hardwoods, black spruce and tamarack) is expected to increase over this planning period. This is due to a number of factors, including an abundance of mature and over-mature acres in these lowland forest types; emerging forest health issues associated with some mature forest types; and a current DNR project to digitize, review and update old hard copy maps of deer wintering complexes (comprised predominantly lowland conifer cover types) into a unified GIS shape file.

The modeled DNR inventory data projects a prescribed harvest level of 151,131 acres over the 10-year planning period for the state forest in the western Upper Peninsula ecoregion, which is the summation of the projected 10-year final harvest area and the projected 10-year partial harvest area levels for both major and minor cover types in each management area (Table 4.1). These projections should be considered to be prescribed inventory acres. Proposed timber sale acres are consistently 10% less than prescribed inventory acres, due to site-specific conditions (such as access issues or survey needs). Considering this, the acreage of proposed timber sales the state forest in the western Upper Peninsula ecoregion is projected to be about 136,000 acres over this 10-year planning period (an average of about 13,600 acres per year). This does not mean that 13,600 acres of timber will be harvested during every year in the planning period. Harvest levels in any given year may actually be lower or higher than 13,600 acres due to several reasons, including variability in the proportion of different forest types and their age/size classes in any given year-of-entry, variability in the timing of actual harvests during the 3-4 year timber sale preparation and contract process and variability in the number of unanticipated salvage harvests (due to forest health or fire occurrences). Likewise and for the same reasons, there is variability in the annual harvest levels in any given forest management unit. Harvest levels in each cover type will also be variable due to reclassification of cover types as the transition from the Operations Inventory to the Integrated Forest Monitoring Assessment and Prescription forest inventory system progresses during the planning period. Harvest levels in lowland cover types may be higher or lower, as available acres are quantified by collection of site condition (limited factor) data for all forest stands during the planning period. However, over the full 10-year planning period it is anticipated that about 136,000 acres of timber will be harvested from the western Upper Peninsula ecoregion.

Table 4.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the western Upper Peninsula ecoregion.

Species	Percentage	Current Acreage	Hard Factor Limited Acres	Manageable Acres	Project 10 year Final harvest	Project 10 Year Partial Harvest	Projected Acreage at end of planning horizon
Aspen	28%	246,797	15,304	231,493	44,780	0	246,797
Northern Hardwood	18%	162,935	12,967	149,968	0	63,652	162,935
Cedar	10%	83,865	4,540	79,325	0	0	83,865
Lowland Conifers	9%	81,308	44,053	37,255	4,538	0	81,308
Lowland Open/Semi-Open Lands	8%	68,318	0	68,318	0	0	68,318
Lowland Spruce/Fir	3%	29,131	12,019	17,112	2,888	0	29,131
Jack Pine	3%	26,910	773	26,137	1,345	0	26,910
Lowland Deciduous	3%	23,876	9,975	13,901	1,972	0	23,876
Upland Open/Semi-Open Lands	3%	23,674	0	23,674	0	0	23,674
Red Pine	2%	21,549	4,326	17,223	3,641	5,647	21,549
Upland Spruce/Fir	2%	21,344	7,086	14,258	1,407	0	21,344
Misc Other (Water, Local, Urban)	1%	12,315	1	12,314	0	0	12,315
Mixed Upland Deciduous	1%	11,050	1,462	9,588	2,242	2,269	11,050
White Pine	1%	10,582	1,303	9,279	1,015	2,584	10,582
Tamarack	1%	9,285	4,458	4,827	868	0	9,285
Hemlock	1%	9,163	1,583	7,580	0	1,449	9,163
Oak	1%	8,154	2,077	6,077	991	1,470	8,154
Upland Mixed Forest	1%	8,043	1,605	6,438	650	1,288	8,043
Lowland Aspen/Balsam Poplar	1%	6,882	1,679	5,203	786	0	6,882
Paper Birch	1%	5,482	3,486	1,996	495	0	5,482
Upland Conifers	1%	4,999	460	4,539	1,371	1,398	4,999
Natural Mixed Pines	0%	3,554	110	3,444	400	889	3,554
Lowland Mixed Forest	0%	3,202	382	2,820	1,070	0	3,202
Planted Mixed Pines	0%	367	0	367	20	2	367
Totals		882,785	129,652	753,133	70,482	80,649	882,785

Climate Change Considerations

As the climate continues to change, the effects of these changes may present forest managers with challenges to achieving the desired future conditions outlined in this plan and exploration of additional strategies for adapting to these changes may be warranted. Within the scope of this plan, forest managers may consider management actions that help to put forests in a better position to respond to a range of future conditions. Millar et al. (2007) described an adaptation framework with actions that fit into three broad categories:

- Resistance Actions – These help a forest ecosystem build its defenses, both against the direct impacts of a changing climate and the indirect impacts of other threats that are aggravated by climatic changes. These are for situations where there is a goal of keeping the ecosystem in a relatively unchanged condition. Examples of actions include creating a complete fire-break around a unique, vulnerable area or intensive removal of all invasive species from an area. For many areas, these actions may only make sense in the short-term, as ultimately the climatic changes may simply go beyond the physical limits of the species or system and will likely get more expensive with greater climate changes.
- Resilience Actions – These help a forest ecosystem rebound and return to a prior condition following a disturbance and are for situations where a small-degree of change is acceptable. Resilience actions are similar to resistance actions, but are applied more broadly and focus on helping a system cope with disturbance. An example would be actions that help to increase the diversity of species in an ecosystem. Again, these actions may not be long-term solutions, if the climate becomes completely unsuitable for that ecosystem.
- Response Actions – These help a forest ecosystem change and move to a different condition that is suitable for a changing and new climate. These actions include assisted migration (intentionally moving a species to a location outside of its current range) and promoting connected landscapes.

Decisions about what types of adaptation actions are most appropriate for an area will need to consider the implications of climate changes to that area and recognize that they will be influenced by differences in ecosystem, ownership and management objectives. Section 3 includes an overview of some regional differences that may affect which kinds of actions are most appropriate.

Many of the special resource areas described by management area in this section have characteristics that may make them more vulnerable to climate change, as well as characteristics that may make them good candidates as refugia for species threatened by climate changes. Refugia are “locations and habitats that support populations of organisms that are limited to small fragments of their previous range” (Handler et al., In Press). In addition to their potential for providing some protection for vulnerable species and ecosystems, refugia may also be valuable for their potential to protect water supplies and functions as they fluctuate across the landscape (Handler et al., In Press).

Some special resource areas are examples of natural communities that are already rare – either have very specific hydrologic/climatic/disturbance requirements or are already threatened in other ways; regardless, this will make them more vulnerable to additional threats/stresses. However, those special resource areas that are already in good condition and include diverse species and few invasives will have a higher adaptive capacity than other lower quality places, making them good potential refugia. High-quality natural communities are more likely to support rare species – this is an additional characteristic that will make some special resource areas valuable as refugia. Additionally, management objectives already in place in many special resource areas focus on promoting high-quality natural communities, thus are already in line with the best adaptation strategies.

Special Resource Area Management Direction

The Department of Natural Resources has used many mechanisms to identify areas that may have particular or special biological/ecological, social or economic conservation objectives or values. For example, some state natural areas have been dedicated by Natural Resource Commission resolutions and the Simmons Woods Area was established using a land use order under the authority of the director. Some areas are managed through memorandums of understanding and statute, and there are also areas that have been noted for their biodiversity potential through less formal mechanisms.

Over time it has become challenging to sift through naming conventions and designations to understand the broad range of conservation values within the state forest system. The special resource area management direction section of this plan begins the process of collating and organizing these areas and their associated designations.

This section provides a description of areas of the state forest that have been identified as having specific or special resource attributes that are considered in management planning and activities. The majority of these areas are noted for renewable resource conservation values; however, some social and non-renewable categories (e.g., concentrated recreation areas and mineral resource areas) have also been included in order to document and track their purposes.

Areas with specific conservation values have been sorted into three primary categories: special conservation areas, high conservation value areas and ecological reference areas. Each category has a conservation value trait and a ‘level of recognition’ trait. Combined, the two traits determine whether an area is identified as a special conservation area, a high conservation value area or an ecological reference area. It is anticipated that over time, areas will be moved between, added and/or removed from these categories based on conservation values and level of recognition.

Special Conservation Areas: Special conservation areas are areas of state forest land that have one or more identified special conservation objectives, interests or natural community (Kost et al., 2007) element occurrences. They are a broad assemblage of areas that possess some inherent ecological, social or economic value. Conservation objectives listed in the special conservation area category have been identified through a variety of methods and mechanisms. The type and strength of recognition (and possible management options) will vary depending on the process used to identify the conservation value. For example, some objectives are detailed in the land use orders of the director (force of law) while other may be identified through cooperative agreements (administrative recognition). Areas formerly identified through administrative recognition that have not had that recognition superseded by another formal designation will have administrative recognition re-affirmed by this plan. There are also objectives developed through department process or agreement (e.g., deer wintering areas, Grouse Enhanced Management System areas, potential old growth or riparian buffers). The special conservation area category may also be used to document areas identified by an external group or organization, such as National Audubon Society's Important Bird Areas Program.

High Conservation Value Areas: High conservation value areas are areas of state forest lands that have been recognized for their contribution to specific conservation objectives or ecological attributes through a public process. Examples of these formal processes include: legislation, administrative rule or director's or Natural Resource Commission orders. High conservation value areas include dedicated natural, wilderness and wild areas; natural rivers; species recovery plan areas such as piping plover habitat areas; and critical dune areas.

Designated high conservation value areas are located only upon state forest land, but within a landscape context, conservation efforts of equivalent high conservation value area resources should be coordinated with other private and agency landowners. The high conservation value area category is intended to address the Forest Stewardship Council, U.S. Forest Management Standard (v1.0) Principle 9, which requires the maintenance of high conservation value forests.

Ecological Reference Areas: Ecological reference areas are areas that serve as models of ecological reference within the state. They are high-quality examples of ecosystems that are primarily influenced by natural ecological processes and they can be located upon any land ownership. High-quality natural communities recognized by NatureServe (an internet based international network of biological inventories) and the Michigan Natural Features Inventory as global (G) or state (S) endangered (1), threatened (2) or rare (3) and with an element of occurrence rank of A or B in the Michigan Natural Features Inventory database serve as an initial set of ecological reference areas. This ecological classification system was selected as a baseline because it is nationally and internationally acknowledged and is based on a sound scientific system. The ecological reference area category is intended to address the Forest Stewardship Council, U.S. Forest Management Standard (v1.0) Criterion 6.4, which requires the establishment of a system of protected representative ecosystems across the landscape of all ownerships.

Identified ecological reference areas, high conservation value areas and special conservation areas will be managed to conserve, protect and/or enhance the defined conservation objective or value. The methods used will vary depending upon the objective and type of designation. Methods can include active management or just the provision of access. Either method must be compatible with the defined conservation objective or value. Land managers, field staff and stand examiners use technical materials, program staff and/or other references when assessing management options that are suitable for the specific conservation objective. All areas will be managed to protect the immediate natural resource values with consideration of human health and safety.

Areas that are designated as ecological reference areas, high conservation value areas or special conservation areas may overlap one another and are not mutually exclusive. The Department of Natural Resources has developed maps that show the spatial extent of these areas across the landscape of the western Upper Peninsula ecoregion.

The starting point for reviewing special conservation areas is the operations inventory and compartment review process. The starting point for reviewing high conservation value areas and ecological reference areas is the biodiversity conservation planning process. Both processes include public participation and consider nominations for inclusion, removal or other changes to designations. Additional information regarding these areas can be found in the Conservation Area Management Guidelines and the standards and guidelines applicable to the management directions for each type of special resource area can be found in Section 5 of the Michigan State Forest Management Plan, 2008.

Cultural and Customary Use Areas

Cultural and customary use areas include areas that possess and provide significant values and purposes for Native American tribes and other various ethnic or religious groups, or sites that have been traditionally used by tribes and the public for specific purposes. Cultural use areas include those that possess spiritual and cultural values and traditional

gathering of non-timber forest products by Native American tribes and other people. Customary use areas are those that are used seasonally and may include such uses as maple syrup, wild fruit and other plant gathering areas and placement of traditional hunting camps.

The western Upper Peninsula offers an abundance of areas that produce gathering opportunities for specific ceremonial, medicinal, craft and edible items under appropriate permits where applicable. There are at least 138 products documented in over 54 botanical families and 87 genera, including more than 100 species in the western Upper Peninsula.

The maintenance and preservation of cultural and customary use areas for future generations is important to our society. Use of these areas to conduct natural resource gathering and harvesting activities are important for economic reasons, recreation and social ties; and for the values of self-sufficiency, independence, work ethic and relationship with nature.

Land use permits for non-tribal customary and cultural uses are coordinated by each forest management unit. Permits for cultural and customary uses of state forest resources by tribal members who are exercising their gathering rights in areas that are under the 2007 Inland Consent Decree for the 1836 Treaty of Washington (Figure 4.2) are issued by their respective tribal government.

Archaeological Sites

Archaeological sites have intrinsic social value and require protection in the western Upper Peninsula ecoregion. There are two types of archaeological sites. First, there are the pre-historic sites that existed before the arrival of Europeans. Examples of pre-historic sites are camp sites, village sites, quarries, mortuary mounds and other areas used by early natives. The second type of archeological site is the historic site. These are sites that may be part of the written record, including cemeteries, town sites, logging camps and homesteads. In the ecoregion, most historic sites are from the early 1800s to the mid-20th century.

Sites may be identified by natural heritage data from the State Historical Preservation Office and Office of the State Archaeologist. Sites or possible sites may be discovered in the course of normal field work. These sites should be reported to the Office of the State Archaeologist if they are not already in the database. To protect archaeological sites it is necessary to safeguard location information. This information is sensitive and will be protected from public disclosure and as such, is exempted from the Freedom of Information Act.

Tribal governments should be contacted when working in areas where Native American use may have occurred. Tribal governments should receive notification of open house meetings to enable review of treatment proposals for any possible disruption to archeological sites.

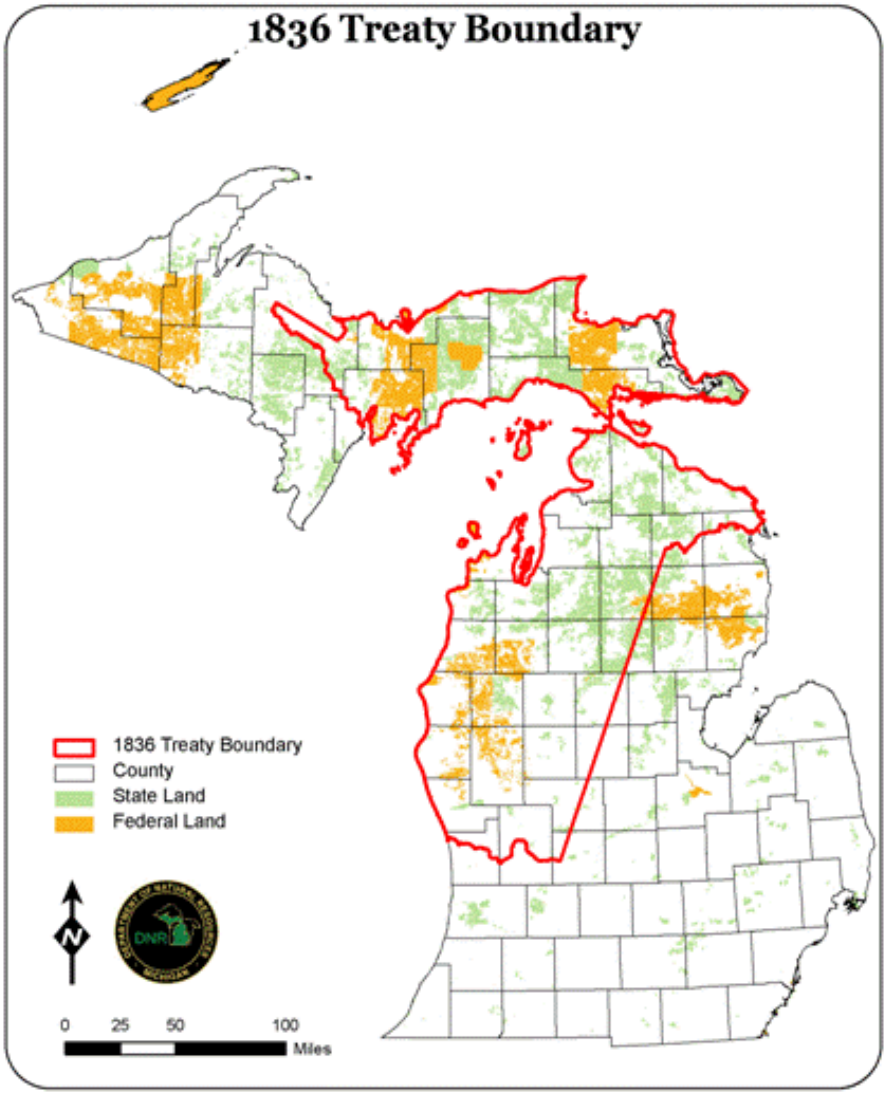

Figure 4.2. Boundary for the 1836 Treaty of Washington (Department of Natural Resources, 2007).

4.1 Amasa Plains Management Area

Summary of Use and Management

Vegetative management in the Amasa Plains management area (MA) (Figure 4.1.1) 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 and upland spruce; 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 providing winter deer habitat; maintaining or enhancing the oak component in hardwood stands; maintaining early successional habitat; and the retention of large living trees and snags for cavity nesters. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (emerald ash borer) and disease (beech bark disease) infestations will be issues for this 10-year planning period.

Introduction

The Amasa Plains management area is located in Iron County just north of Crystal Falls and is situated on an outwash plain. The management area covers about 8,600 acres, is mostly contiguous and is surrounded mostly by private industrial forest land. The management area is dominated by the aspen, northern hardwoods and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Domination by two natural communities: Mesic northern forest and poor conifer swamp;
- 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 Amasa Plains management area are shown in Table 4.1.1.

Table 4.1.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest areas for the Amasa Plains 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	49%	4,178	128	4,050	1,376	0	4,178	675	0
Northern Hardwood	11%	952	5	947	0	469	952	0	469
Lowland Conifers	10%	834	263	571	63	0	834	63	0
Upland Spruce/Fir	6%	486	262	224	106	0	486	32	0
Lowland Spruce/Fir	4%	362	117	245	83	0	362	27	0
Upland Open/Semi-Open Lands	2%	133	0	133	0	0	133	0	0
Lowland Open/Semi-Open Lands	12%	1,068	0	1068	0	0	1,068	0	0
Misc Other (Water, Local, Urban)	2%	151	0	151	0	0	151	0	0
Others	5%	395	176	219	62	48	395	21	48
Total		8,559	950	7,609	1,689	517	8,559	818	517

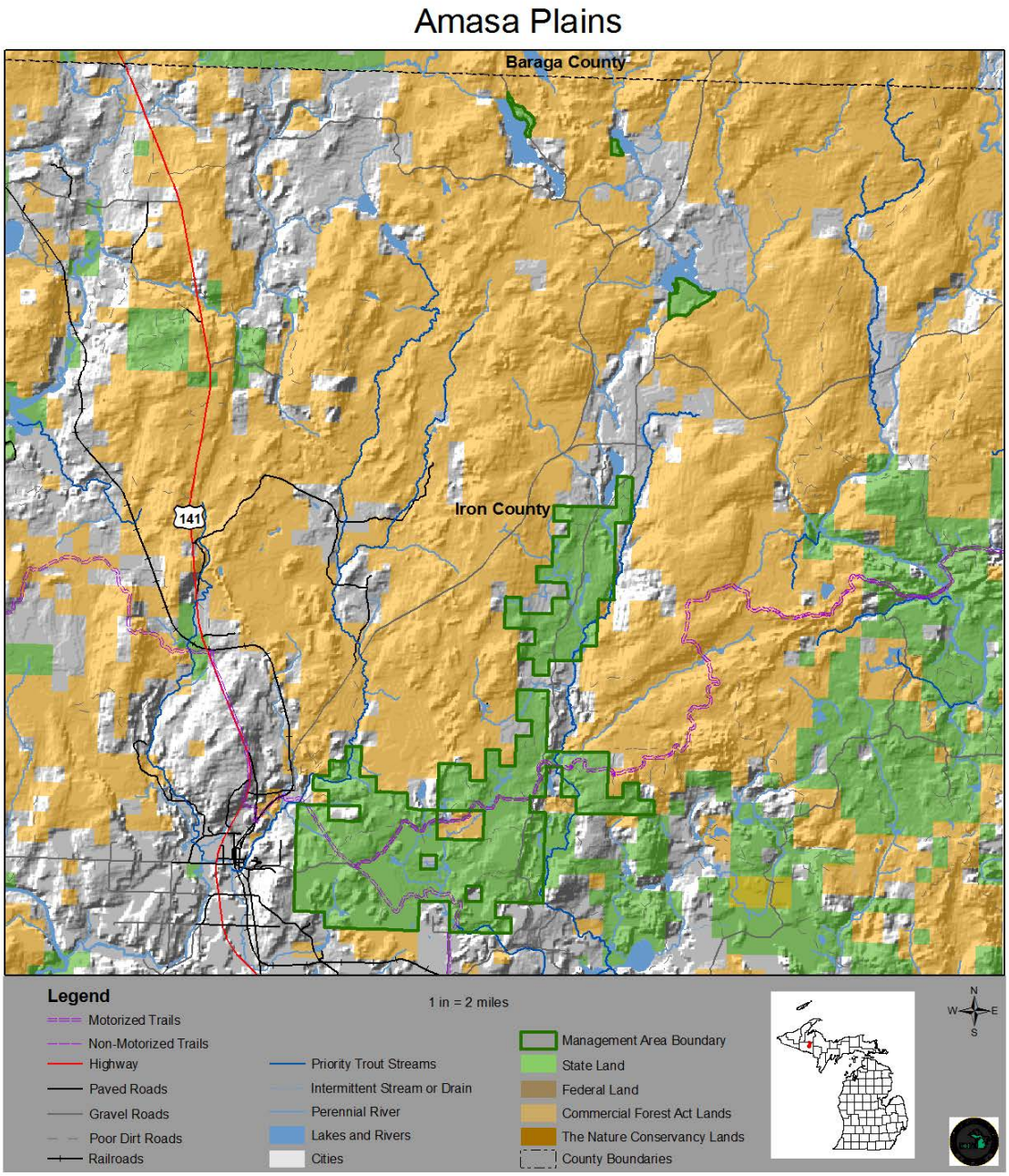

Figure 4.1.1. A map of the Amasa Plains management area (dark green boundary) in relation to surrounding state forest lands in Iron County, Michigan.

4.1.1 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 Amasa Plains 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 (e.g., 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 that dominant the canopy.

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 4,178 acres (49%) of the management area (Table 4.1.1) and is poorly distributed across age classes (Figure 4.1.2). Aspen in this management area is growing on sandy loam sites, about half with shallow water tables and the balance typically on well-drained soils. The age-class structure contains a spike in the 30-39 year old age class (Figure 4.1.2) and there are few acres available for harvest beyond 60 years old. There are relatively few factor limited acres and they are in the older age classes.

Harvesting over the past decade has not been able to convert older stands to regenerating young stands because mature aspen is in very limited supply. This condition will persist at least into the next decade.

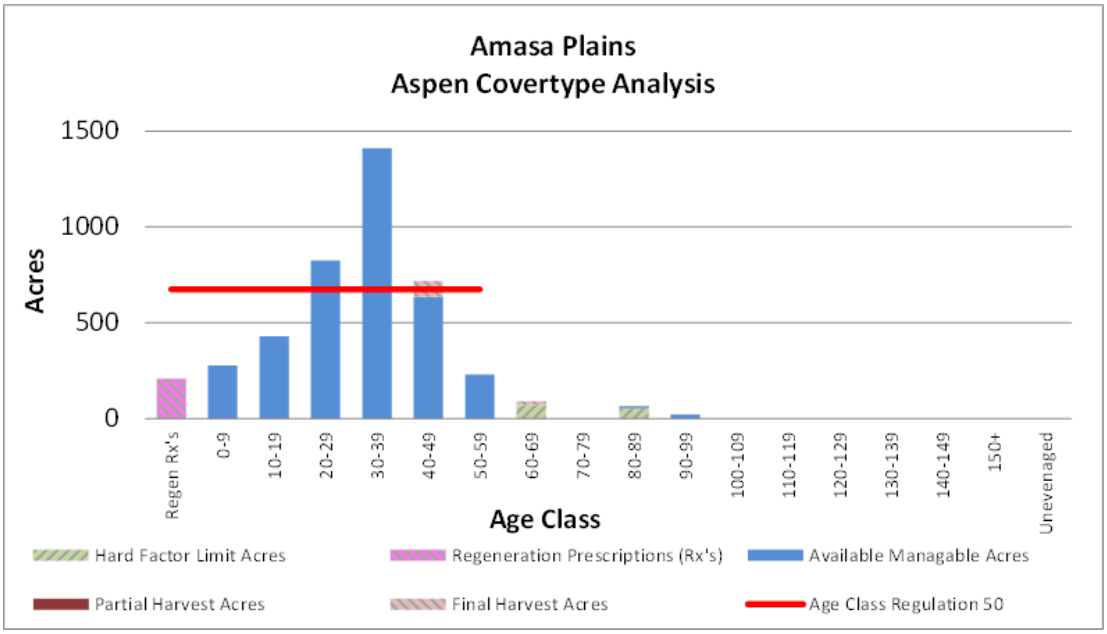

Figure 4.1.2. Graph of the age-class structure for the aspen cover type on the Amasa Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation; and
- Provide an even supply of forest products and a balanced mix of habitat conditions for a variety of wildlife as well as a variety of hunting-type opportunities.

Long-Term Management Objective

- Balance the age-class distribution by harvesting and regenerate approximately 675 acres each decade (red line on Figure 4.1.2).

10-Year Management Objectives

- Harvest and regenerate 1,376 acres over the next decade (higher than the long-term management model indicates because of unbalanced age classes);
- With a lack of older age classes, identify some younger aspen stands on higher quality sites that could be available for early harvest; and
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest.

Northern Hardwood Cover Type

Current Condition

The northern hardwood stands within this cover type make up 834 acres (11%) of the management area and occur on medium-to high-quality sugar maple sites. Most stands have been managed on an uneven-aged basis using the selection harvest system. Uneven-aged management features basal area, rather than a rotation age to guide harvesting decisions. Most stands within the management area are in good condition.

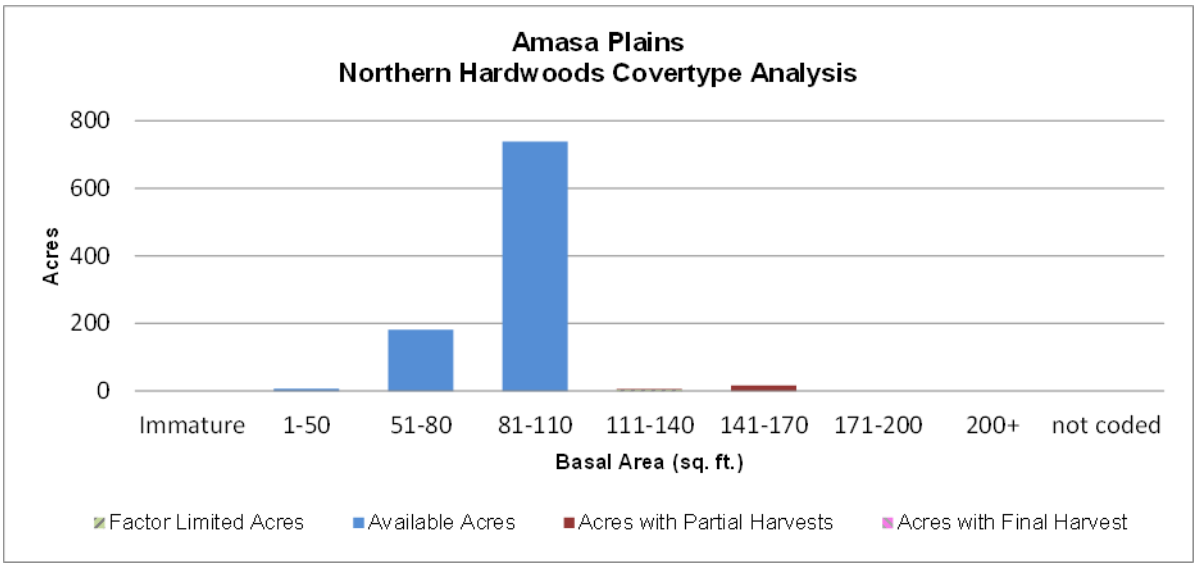

Figure 4.1.3. Graph of the basal area structure for northern hardwoods cover type on the Amasa Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand-structure promoting high-value sugar maple sawlogs and veneer on good sites.

Long-Term Management Objective

- Selectively harvest northern hardwood stands on a 20-year cycle. Optimize the harvest cycle to maintain high growth rates and minimize stagnant growth periods.

10-Year Management Objectives

- Approximately 469 acres should be harvested in the next decade, using the selection harvest system; and
- Maintain hemlock, white pine and upland cedar in stands that are harvested.

Lowland Conifers Cover Type

Current Condition

There are 834 acres (10%) of the management area in this cover type. Lowland conifer sites tend to be poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Due to the wet site conditions, they are more susceptible to damage from rutting by logging equipment and present difficult operating conditions for harvesting. Lowland conifers are poorly distributed across age classes, with almost all stands over 60 years of age. Most of the acreage more than 80 years old is factor limited. Very little harvesting has been done in this type over the past 30 years; however, some young age classes may be classified as uneven-aged as shown in Figure 4.1.4. Lowland conifer stands provide important winter habitat for deer. It is desirable to maintain the closed canopy structure in many stands for that purpose. These stands will become susceptible to attacks by insects and diseases as they age.

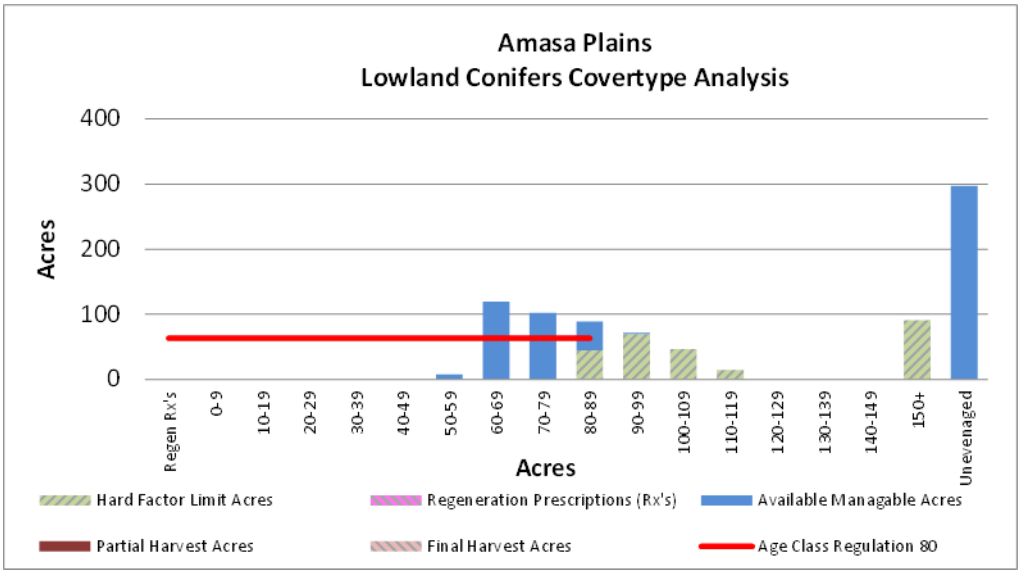

Figure 4.1.4. Graph of the age-class distribution for the lowland conifer cover type on the Amasa Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation, and;
- Regenerate stands to species mixes similar to the pre-harvest conditions with preference for cedar, black spruce and balsam fir.

10-Year Management Objectives

- Harvest about 63 acres (red line on Figure 4.1.4) over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Upland Spruce/Fir Cover Type

Current Condition

There are 486 acres (6%) of upland spruce/fir on state forest land in the Amasa Plains management area. Most of the acres are 60 years old. Upland spruce-fir stands are generally short-lived reaching maturity in 60-70 years (Figure 4.1.5). They tend to convert to shade tolerant hardwoods like red maple if left undisturbed. The upland spruce/fir cover type in the Amasa Plains management area does not have a well-balanced age-class distribution (Figure 4.1.5). It typically occurs as the transition between upland types like aspen and northern hardwood and the lowlands. These transitions have important wildlife values. Most of the older age classes have hard factor limits.

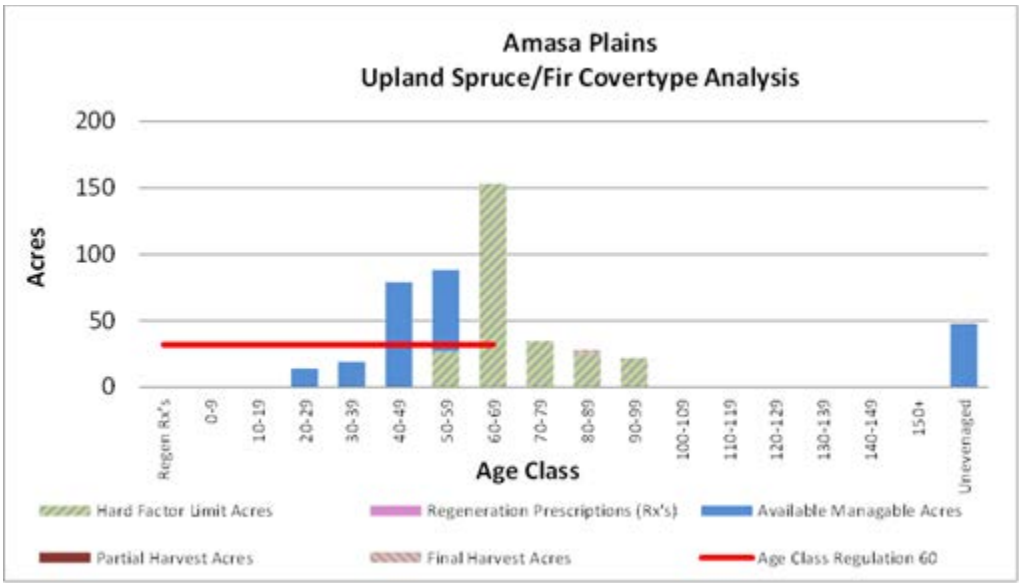

Figure 4.1.5. Graph of the age-class distribution for the upland spruce/fir cover type on the Amasa Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain approximately the current level of upland spruce/fir acreage; and
- Balance age classes on a 60 year rotation.

Long-Term Management Objective

- Once age classes are balanced, harvest and regenerate about 32 acres per decade.

10-Year Management Objectives

- Harvest and regenerate 106 acres of upland spruce/fir in the next decade (this is above the long-term management, but is necessary due to the imbalanced age-class structure); and
- Try to mitigate the factor limitations in the older age classes to improve age-class structure.

Lowland Spruce/fir Cover Type

Current Condition

Currently there are 362 acres (4%) of the lowland spruce/fir type in the Amasa Plains management area. Lowland spruce/fir is often found in association with lowland conifer, cedar and tamarack cover types. Lowland spruce/fir on the Amasa Plains management area does not have a well-balanced age-class distribution, with most stands over 80 years old having a factor limitation (Figure 4.1.6). There are also a large number of acres classified as uneven-aged. These stands become increasingly susceptible to insect and disease problems as they age.

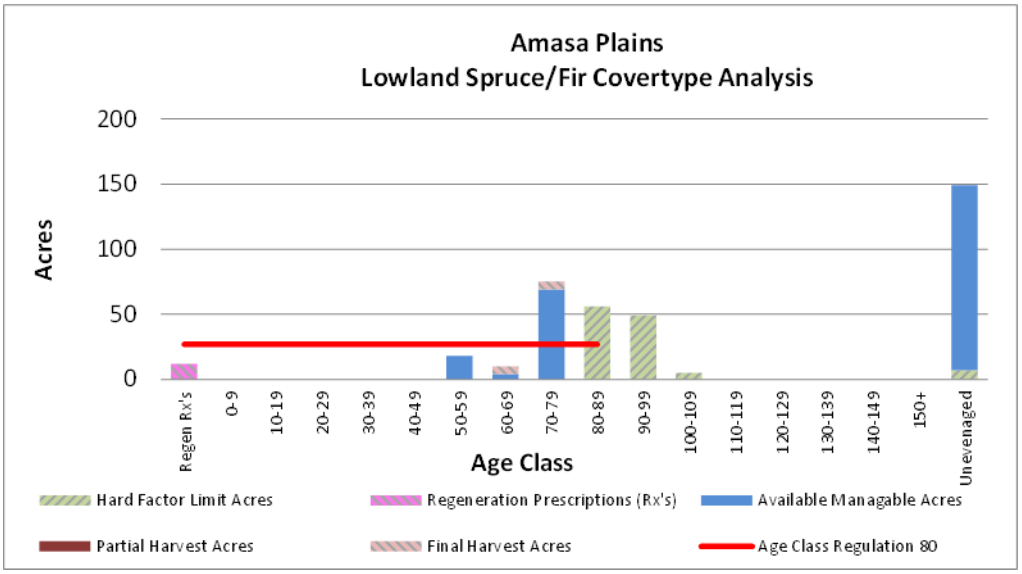

Figure 4.1.6. Graph of the age-class distribution for the lowland spruce/fir cover type on the Amasa Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain approximately the current level of lowland spruce/fir cover type with stands representing a variety of age classes.

Long-Term Management Objectives

- Manage mature lowland spruce/fir cover types on an 80-year rotation, leading to harvesting 27 acres per decade once age classes are balanced; and
- Lowland conifer stands in areas inaccessible for harvest will be subject to natural processes, resulting in a range of successional stages.

10-Year Management Objectives

- Because of the large number of uneven-aged acres (Figure 4.1.6) and poor age-class distribution, 83 acres are expected to be harvested and regenerated in the next decade;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested cover types are made up of tamarack (153 acres), white pine (61 acres), cedar (59 acres), hemlock (41 acres), lowland deciduous (40 acres), red pine (26 acres), upland mixed (8 acres), and paper birch (7 acres). These types make up about 5% of the management area in small, scattered stands.

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;
- Use appropriate silvicultural techniques to assure adequate regeneration of desired species;
- Monitor harvested sites; and
- Featured species habitat requirements will be taken into consideration.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 62 acres over the next decade.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on the Amasa Plains: Upland open/semi-open lands (133 acres – 2%); lowland open /semi-open lands (1,068 acres – 12%); and other (water, local, urban) (151 acres – 2%).

Desired Future Condition

- Maintain current acreage in grasses and other non-forested cover types.

Long-Term Management Objective

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses and forbs to dominate.

10-Year Management Objective

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

4.1.2 Featured Wildlife Species Management

The Amasa Plains management area contains a mix of uplands and lowlands with lowland conifer cover types providing important wintering deer habitat. This resource is of highest priority for most featured species in the management area and should be conserved. A small amount of oak exists in the hardwood stands and should be maintained and enhanced. The following species are featured for this management area during this cycle of state forest planning: American woodcock, black bear, pileated woodpecker, ruffed grouse and white-tailed deer. Some of the most significant wildlife management issues in the area are early successional habitat (both upland and associated with alder, riparian zones or forested wetlands); mast (hard and soft); conservation of deer wintering complexes; and retention or development of large living and dead standing trees (for cavities). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., deer wintering complexes) for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to increase abundance. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover to cubs (e.g., white pine and hemlock).

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain large (>15 inches in diameter at breast height (DBH)) snags and cavity trees, coarse woody debris and reserve green trees to ensure a sustainable supply of future cavity and foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: leave scattered retention patches around some 18 inches DBH or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches DBH. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age class (within the compartment, management area or WUP ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

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.
- 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and

hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.1.3 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, 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 one listed species and no natural communities of note occurring in the management area as listed in Table 4.1.2. 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.

Table 4.1.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Amasa Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Bird								
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

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

Approximately 21.8 acres of potential old growth have been identified within the Amasa Plains 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.

There have been no high conservation value areas or ecological reference areas identified in the management unit as illustrated in Figure 4.1.7

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.

4.1.4 Forest Health Management

Although forest health issues span the entire landscape, some specific threats are more important in this MA 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
- 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. Following is a list of species of concern that been documented in or near this management area:

- Bell’s honeysuckle
- Birdsfoot trefoil
- Common buckthorn
- Dane’s rocket
- European swamp thistle
- Japanese knotweed
- Tatarian honeysuckle.

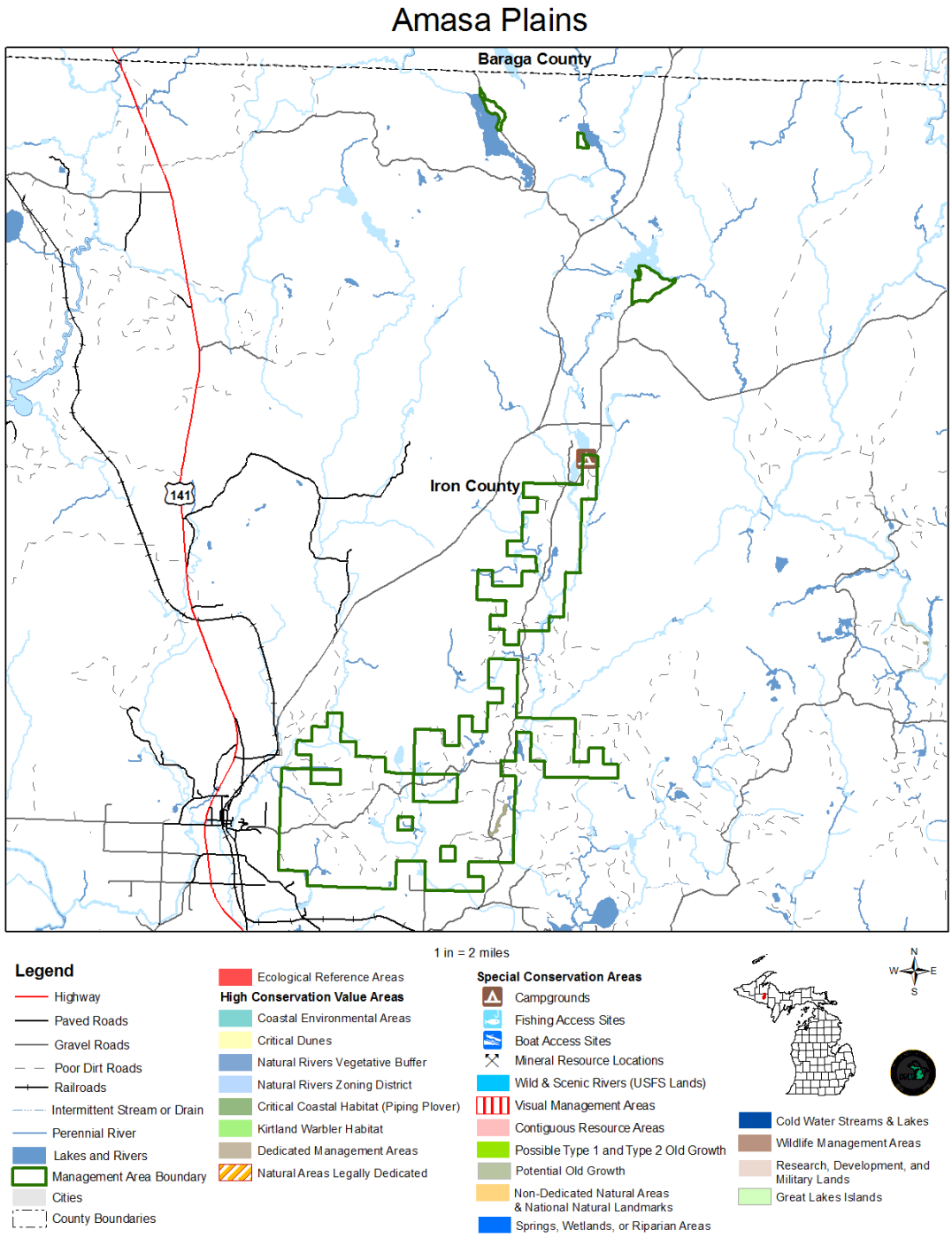

Figure 4.1.7. A map of the Amasa Plains management area showing the special resource areas.

4.1.5 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 are shown in Figure 4.1.1.

4.1.6 Fire Management

A mix of mesic hardwoods, conifer swamps covers most of the west and central portion of this area. Natural fire regime was probably very long there. Along the east side of the management area, some upland conifers probably had shorter fire return interval, although infrequent stand replacement fires promoted pine as a stand component.

- All wildfires are subject to appropriate initial attack suppression response; and
- The Deer Lake Campground provides an opportunity for fire prevention messages that address forest recreation.

4.1.7 Public Access and Recreation

This area has fair public and management access. Roads are gravel or poor dirt roads with minimal maintenance. There are access issues with undivided interest and crossing privately owned land. A snowmobile trail crosses the southern portion of this area. There is a state forest campground and boating access site at Deer Lake (Figure 4.1.7).

There is a motorized trail through the management area (Figure 4.1.1) and there is a desire to expand public access as opportunities arise.

4.1.8 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium, an end morine of coarse-textured till, coarse-textured till and minor peat and muck. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the general area and there is good potential on the uplands.

The Precambriam Hemlock Formation and Intrusives subcrop below the glacial drift. There is no current economic use for these rocks.

Old iron mines are located just to the west of this management area and additional metallic mineral production could occur in or adjacent to this management area. Portions of the management area were previously leased for metallic mineral exploration, but none are active at this time.

4.2 Baraga Plains Management Area

Summary of Use and Management

Vegetative management in the Baraga Plains management area (MA) (Figure 4.2.1) 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 jack pine and maintaining the presence of minor cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives include managing for unique habitat types such as pine barrens, Kirtland's warbler habitat and Canada goose. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this10-year planning period.

Introduction

The Baraga Plains management area is on an outwash plain located in west central Baraga County. The state forest covers about 12,200 acres and is mostly contiguous. The major ownerships in this vicinity are public state forests or forest service. Major forest cover types include jack pine, aspen and grass openings. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: barrens and dry northern forests;
- Low-range in site quality;
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitat;

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 Baraga Plains management area are shown in Table 4.2.1.

Table 4.2.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Baraga Plains 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
Jack Pine	55%	6,793	19	6,774	388	0	6,793	968	0
Aspen	15%	1,784	462	1322	301	0	1,784	223	0
Upland Open/Semi-Open Lands	9%	1,123	0	1123	0	0	1,123	0	0
Lowland Open/Semi-Open Lands	3%	319	0	319	0	0	319	0	0
Misc Other (Water, Local, Urban)	1%	79	0	79	0	0	79	0	0
Others	18%	2,155	22	2133	215	235	2,155	225	400
Total		12,253	503	11,750	904	235	12,253	1,416	400

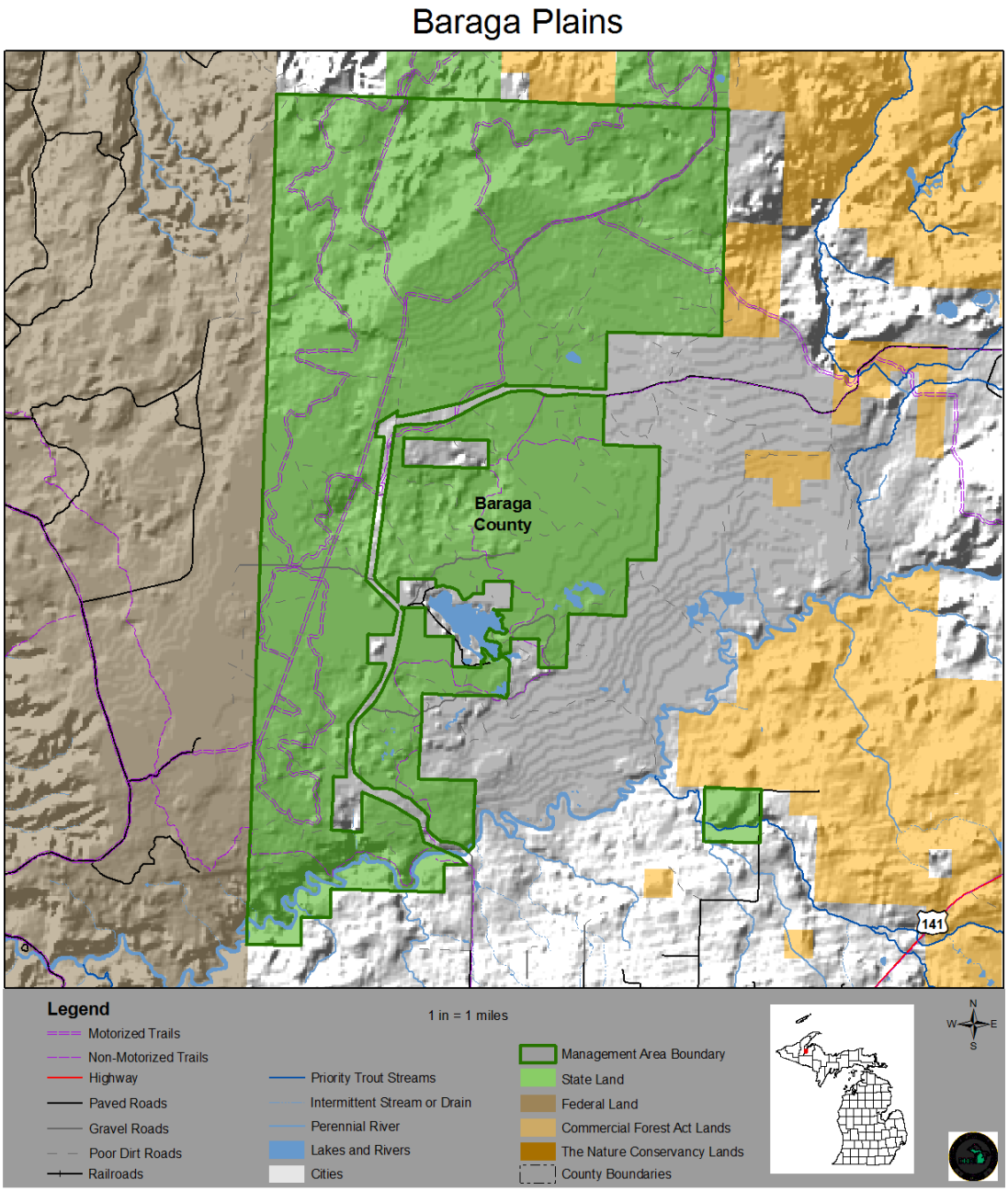

Figure 4.2.1. A map of the Baraga Plains management area (dark green boundary) in relation to surrounding state forest lands and other ownerships in Baraga County, Michigan.

4.2.1 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 Baraga Plains 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.

Jack Pine Cover Type

Current Condition

Jack pine is the dominant cover type comprising over 55% of the area, and covers 6,793 acres (Table 4.2.1). Most of the jack pine is not equally distributed across age classes and is less than 40 years old (Figure 4.2.2). In the past, much of the jack pine on the plains was a single age class. Forest management over the past 20 years has focused on increasing the age-class distribution by harvesting poorly stocked stands, delaying harvesting in well-stocked stands and regenerating harvested acres promptly. Most of the mature jack pine has been harvested except in areas that are reserved for aesthetics around campgrounds and popular recreation sites. There are 19 acres of jack pine that have site conditions limiting their harvest this entry period. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

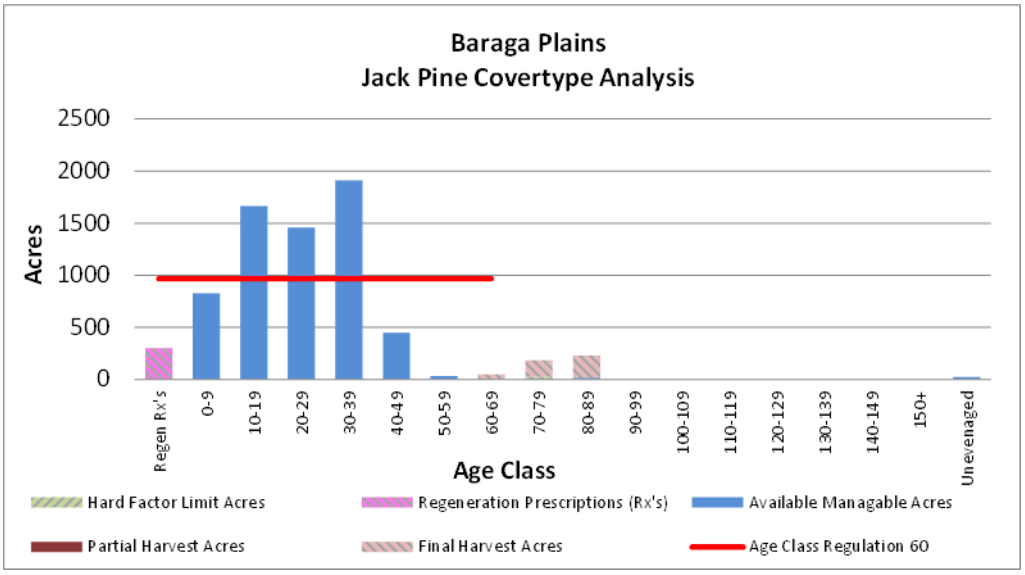

Figure 4.2.2. Graph of the age-class distribution of the jack pine cover type on the Baraga Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 60 years (indicated by the red line in Figure 4.2.2); and
- Provide an even supply of forest products and a balanced mix of habitat conditions for a variety of wildlife as well as a variety of hunting-type opportunities.

Long-Term Management Objectives

- Manage jack pine on a 60-year rotation, regenerating approximately 968 acres each decade;
- Favor larger clearcuts harvests;
- Manage portions of the jack pine in this area in older age-classes in small retention patches; and
- Jack pine stands that are reserved from harvest will undergo natural succession.

10-Year Management Objective

- In order to harvest 388 acres over the next decade, early entry into younger age classes may be necessary.

Aspen Cover Type

Current Condition

Aspen occurs on 1,784 acres (15%) of the management area (Table 4.2.1). Aspen on the Baraga Plains is predominantly on Rubicon and Grayling soils, too dry for healthy aspen growth. Much of the aspen is growing in association with oak and almost half the aspen is currently listed as uneven-aged. There are 462 acres of aspen that have site conditions limiting their harvest this entry period (Figure 4.2.3).

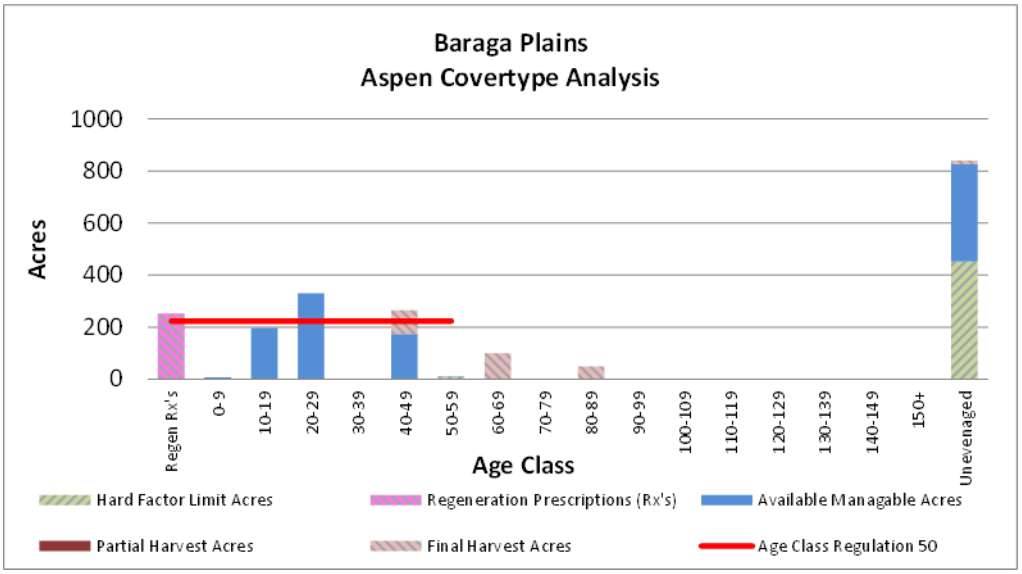

Figure 4.2.3. Graph of the age-class distribution of the aspen cover type on the Baraga Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Provide an even supply of forest products; and
- Provide a balanced mix of habitat conditions for a variety of wildlife as well as a variety of hunting-type opportunities.

Long-Term Management Objectives

- Aspen will be maintained in the proportions desired by managing on approximately a 50-year rotation through harvesting, regenerating 223 acres per decade; and
- Identify stands that can be converted from poor quality off-site aspen to natural red pine, white pine and oak stands.

10-Year Management Objectives

- Harvest and regenerate 301 acres over the 10-year planning period (this is slightly lower than the regulated amount due to the current age-class structure with a large number of acres in the 0-9 year class);
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types, mitigating any loss during this planning period through identification of replacement acreage prior to conversion; and
- Partial harvesting may be done in these stands to accelerate the conversion process.

Other Forested Cover Types

Current Condition

Other forested types make up 2,155 acres and are made up of upland mixed forest (469 acres), upland mixed deciduous (409 acres), natural mixed pine (383 acres), oak (224 acres), upland conifer (135 acres), lowland conifers (120 acres), planted mixed pines (108 acres), white pine 104 acres), northern hardwoods (77 acres), hemlock (59 acres), red pine (44 acres) and lowland spruce/fir (23 acres). Together these types make up about 18% of the management area (Table 4.2.1). There are 22 acres of other types that have site conditions limiting their harvest this entry period. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Desired Future Condition

- Maintain similar proportions of minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods;
- Harvest as opportunities arise in conjunction with other management activities; and
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

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 215 acres of final harvest and 235 acres of partial harvest over the next decade.

Other Non-forested Cover Types

Current Condition

The follow non-forested cover types are found on this management area: upland open/semi- open lands (1,123 acres – 9%), lowland open /semi-open lands (319 acres – 3%), and other (water, local, urban) (79 acres – 1%) (Table 4.2.1).

Desired Future Condition

- The desired future condition of the grass (open/semi-open lands) type is an open sedge/grass community populated with native grass and other herbaceous species.

Long-Term Management Objectives

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses, small grains and forbs to establish; and
- Maintain current acreage in grasses or other open conditions.

10-Year Management Objectives

- A periodic burn schedule will be established to maintain permanent openings; and
- Opportunities to expand the fields into adjacent pine, aspen or oak types will be determined on a case-by-case basis.

4.2.2 – Featured Wildlife Species Management

The Baraga Plains management area is unique because of the size and spatial arrangement of compartments within the management area and proximity to U.S. Forest Service ownership within a single outwash plain system. This area provides the best opportunity for managing for Kirtland's warbler, open land species, and barrens within the ecoregion. It is desired to use management strategies that mimic natural fire disturbance regimes, and coordinate with the U.S. Forest Service and other owners in the planning and management of this outwash plain system. Wildlife management priorities in the Baraga Plains include a waterfowl management area. A master plan is being written for that area and should guide management activities at a finer scale. The following have been identified, as featured species for the Baraga Plains: black bear, Canada goose, eastern bluebird and Kirtland's warbler. Some of the most significant wildlife management issues in the management area are: mast (hard and soft); habitat fragmentation; large open land complexes (with snags in open lands); and large contiguous blocks of young jack pine. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., patches of sufficient size and density for Kirtland's warbler) for featured species will be performed.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;

- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover for cubs (e.g., white pine and hemlock).

Canada Goose

The western Upper Peninsula Canada goose goal is to provide recreational opportunity by attracting migrating geese to state forest lands. The focus of such management is to provide favorable water features and foraging fields.

Wildlife habitat specifications:

- Attract geese to huntable areas during the fall season;
    - Plant green browse such as winter wheat or rye;
    - Manage water features as necessary; and
    - Manage small grain fields, leaving the maximum possible amount of waste grain.

Eastern Bluebird

The western Upper Peninsula goal for bluebirds is to maintain or improve habitat. Management efforts during this planning period will focus on maintaining or expanding open land conditions, protection of snags or dying standing trees associated with openings and managing opening complexes/savanna with prescribed fire.

Wildlife habitat specifications:

- Maintain herbaceous open-land complexes within the management area using prescribed burns or mowing and consider the spatial arrangement;
- Protect snags, or dying standing trees within the open-lands. If nest cavities are not present, consider leaving standing live trees (e.g., aspen) trees in final harvest timber sales; and/or planting scattered oak; and
- Leave a ½-chain buffer around openings to limit aspen encroachment following aspen timber harvests.

Kirtland's Warbler

The western Upper Peninsula goal for Kirtland's warbler during this planning period is to provide suitable breeding and foraging habitat within this management area. Management will focus on providing large patches (300-550 acres, where possible) of early successional jack pine forest with appropriate structural and compositional diversity on droughty outwash plains systems. When possible, large blocks should be created by managing several smaller harvest blocks adjacent to each other simultaneously.

Wildlife habitat specifications:

- Develop landscape level plans for Kirtland's warbler habitat within and across management areas to ensure suitable habitat is provided at any point in time across management areas within the ecoregion. Jack pine should be harvested in a manner that attempts to mimic both the size and structure of the stands that would result from fire.
- Develop harvest plans in the context of landscape-level plans. Strive to increase patch size to meet Kirtland's warbler habitat needs Consider current and desired future patch size, age-class distribution and distance to other jack pine stands. When developing harvest plans, identify opportunities for increasing patch size:
    - Review state forest inventory in management area and identify adjacent stands with similar age classes that could reasonably be combined into one stand;
    - Collaborate in planning of the spatial arrangement and timing of harvest with willing major landowners within this outwash plain (e.g., U.S. Forest Service, Michigan Technological University); and
    - Large blocks of regenerating jack pine adjacent to herbaceous openings are desirable as they function as open-lands until the trees are 3-4 feet in height and benefit open-land species as well.
- Post-disturbance legacies include simulated skips or fingers of jack pine; snags; and larger diameter, fire-tolerant trees such as red pine. These features should be left in stands of harvested jack pine as retention to benefit Kirtland's warbler.
- Scarify stands quickly after stands are harvested or use prescribed fire where feasible to maintain jack pine and to ensure maximum stem density.

Spruce Grouse

The western Upper Peninsula goal for spruce grouse is to maintain or improve habitat. Management will focus on early successional forest (jack pine, mixed swamp conifer, tag alder, and aspen), coarse woody debris and encouraging conifer (e.g., jack pine, mixed swamp conifer) understory component.

Wildlife habitat specifications:

- In jack pine harvests, leave mixed conifer and/or jack pine retention strips of mature trees along riparian corridors and lowland margins as well as along upland edges.
- Maintain spruce seed trees through retention, especially at lowland margins.
- Maintain or increase diversity of conifer stands by implementing seed tree/shelterwood prescriptions and limiting the use of herbicides, especially along lowland edges.
- Large clearcuts may isolate populations of spruce grouse so landscape level planning must take into account this species' need for low-density mixed-conifer travel corridors to connect suitable stands. This is especially important in management areas where Kirtland's warbler also is a featured species.
- Ensure black spruce recruitment and regeneration is reliable if harvesting in this cover type. Regeneration monitoring should be required to assess whether or not we are getting desired results from management.

4.2.3 –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, 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 six listed species and no natural communities of note occurring in the management area as listed in Table 4.2.2. 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.

Table 4.2.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Baraga Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Bird								
Kirtland's warbler	*Dendroica kirtlandii*	LE/E/G1/S1	Confirmed	PS	Very High	Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Early
Butterflies								
Freija fritillary	*Boloria freija*	*SC/G5/S3S4*	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
Frigga fritillary	*Boloria frigga*	SC/G5/S3S4	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plants								
American shore-grass	*Littorella uniflora*	SC/G5/S2S3	Confirmed			Submergent marsh	Lowland open/semi-open	N/A
Canada rice grass	*Oryzopsis canadensis*	T/G5/S2	Confirmed			Pine barrens	Jack Pine	Early

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

The Baraga Plains Goose management area is a special conservation area within this management area as shown in Figure 4.2.4.

There have been no high conservation value areas or ecological reference areas identified in the management area as illustrated in Figure 4.2.4.

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.

4.2.4 – 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:

- Jack pine budworm
- Diplodia shoot blight of pine
- *Sirococcus* shoot blight
- White trunk rot of aspen
- *Hypoxylon* canker
- Oak wilt
- Two-lined chestnut borer.

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. Following is a list of species of concern that been documented in or near this management area:

- Bell's honeysuckle
- Common buckthorn
- European swamp thistle
- Glossy buckthorn
- Japanese barberry
- Morrow's honeysuckle
- Multiflora rose
- Reed canary grass
- Spotted knap weed
- Tatarian honeysuckle.

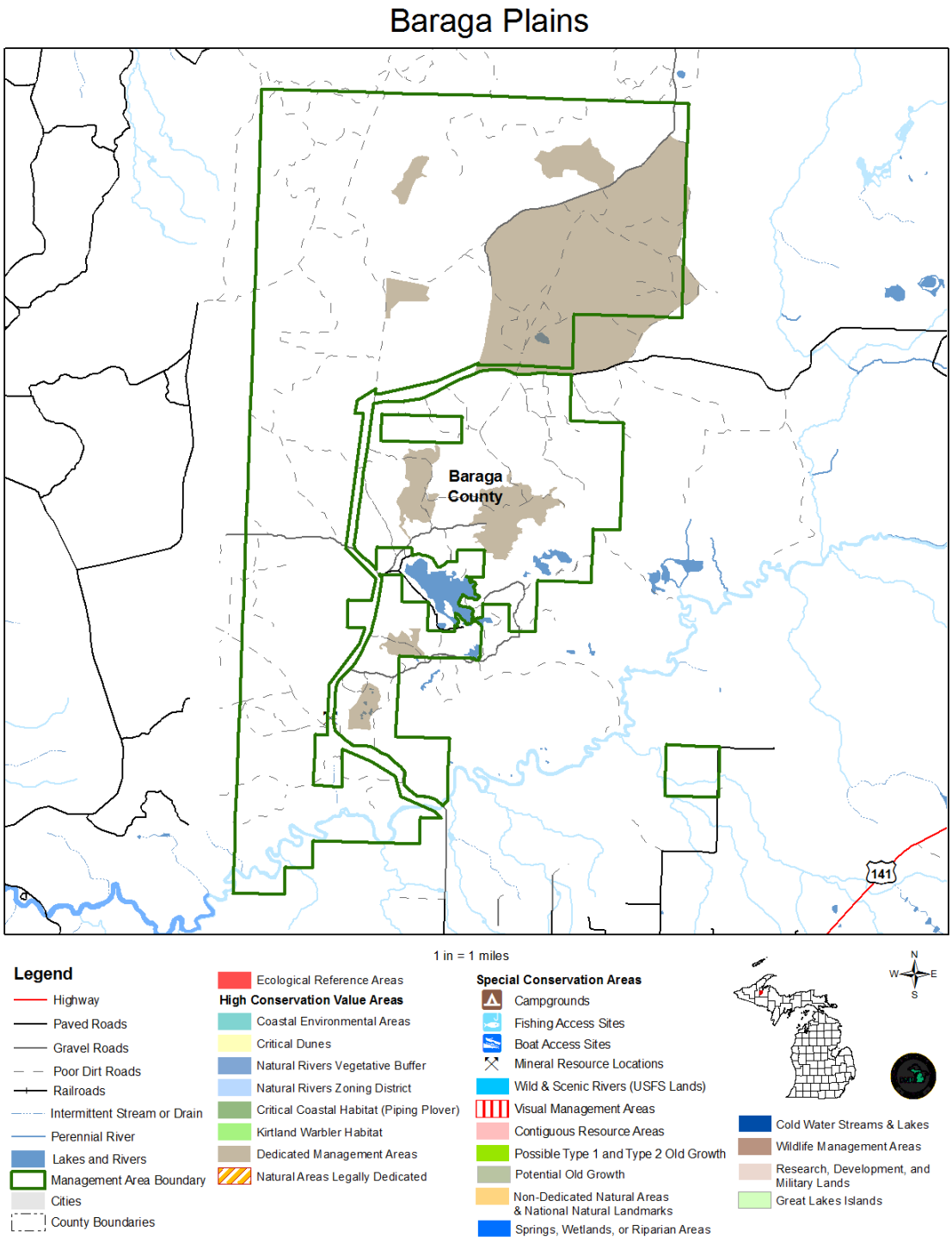

Figure 4.2.4. A map of the Baraga Plains management area showing the special resource areas.

4.2.5 - 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 are shown in Figure 4.2.1.

4.2.6 – Fire Management

With the exception of wetland northeast of Big Lake, the state forest here is largely comprised of lands that were, under natural conditions, subject to frequent stand replacement fires. This fire regime produced a barrens and dry northern forest community. Recreational development around Big Lake indicates the need for wildland urban interface fuel hazard reduction. All of the state forest land within this area falls within the Baraga Protection Area and the Baraga Plains Zone Dispatch.

- All wildfires within the management area should be subject to appropriate initial attack response. Pre-planned response, based on fire danger level, calls for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger days.
- Work with Baraga County on their Community Wildfire Protection Planning process that targets this area.
- Prevention activities should target users of the Big Lake Campground, the Baraga Plains Off-Road Vehicle trail and residential/recreational property owners adjacent to state forest lands.
- Prescribed fire proposals should be prioritized, planned and conducted, especially when they enhance protection of the Big Lake area from wildfire.
- Use prescribed fire to maintain large openings in the Baraga Plains Waterfowl Management Area

4.2.7 – Public Access and Recreation

This area has good public and management access. Motorized vehicle trails include multiple snowmobile trails and the Baraga Plains ORV trail that loops through the area (Figure 4.2.1). There is a state forest campground at Big Lake. The North Country hiking trail crosses the South end of this area along the Sturgeon River (Figure 4.2.1). This trail extends east of the Baraga Plains road and northerly around the east side of Big Lake. A portion of the plains has been designated as a waterfowl refuge and waterfowl hunting area. The area is fairly well used by waterfowl hunters in the fall.

- The DNR will continue to maintain the public access to this area.

4.2.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium, with minor amounts of an end moraine of coarse-textured till and lacustrine (lake) sand and gravel. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is potential on the uplands.

The Precambriam Michigamme Formation subcrops below the glacial drift. There is no current economic use for the Michigamme.

Metallic mineral exploration appears not to have occurred in this management area. However, there still is potential for metallic mineral exploration in the future.

4.3 Brampton Lake Plain Management Area

Summary of Use and Management

Vegetative management in the Brampton Lake Plain management area (MA) (Figure 4.3.1) 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 and red pine; maintaining the presence of minor cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives include balancing the aspen age-class distribution and enhancing the conifer component of mixed stands. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age-classes will be an issue for this 10-year planning period.

Introduction

The Brampton Lake Plain management area is on a lake plain in west-central Delta County. The state forest covers about 6,000 acres and is mostly contiguous. The management area is dominated by the aspen, red pine and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry-mesic northern forests and poor conifer swamps;
- Mid-range in site quality;
- The proximity to the communities of Gladstone and Escanaba, this area is heavily used for hunting, motorized and non-motorized forest recreation (biking, skiing and hiking);
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitat;

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 Brampton Plains management area are shown in Table 4.3.1.

Table 4.3.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Brampton Plains 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	30%	1,806	107	1,699	366	0	1,806	283	0
Red Pine	26%	1,539	188	1351	435	574	1,539	150	778
Cedar	10%	589	0	589	0	0	589	37	0
Northern Hardwood	8%	487	3	484	0	75	487	0	123
Lowland Conifers	8%	482	386	96	30	0	482	11	0
Upland Open/Semi-Open Lands	3%	171	0	171	0	0	171	0	0
Lowland Open/Semi-Open Lands	3%	156	0	156	0	0	156	0	0
Misc Other (Water, Local, Urban)	0%	26	0	26	0	0	26	0	0
Others	13%	778	134	644	187	20	778	78	49
Total		6,034	818	5,216	1,018	669	6,034	559	950

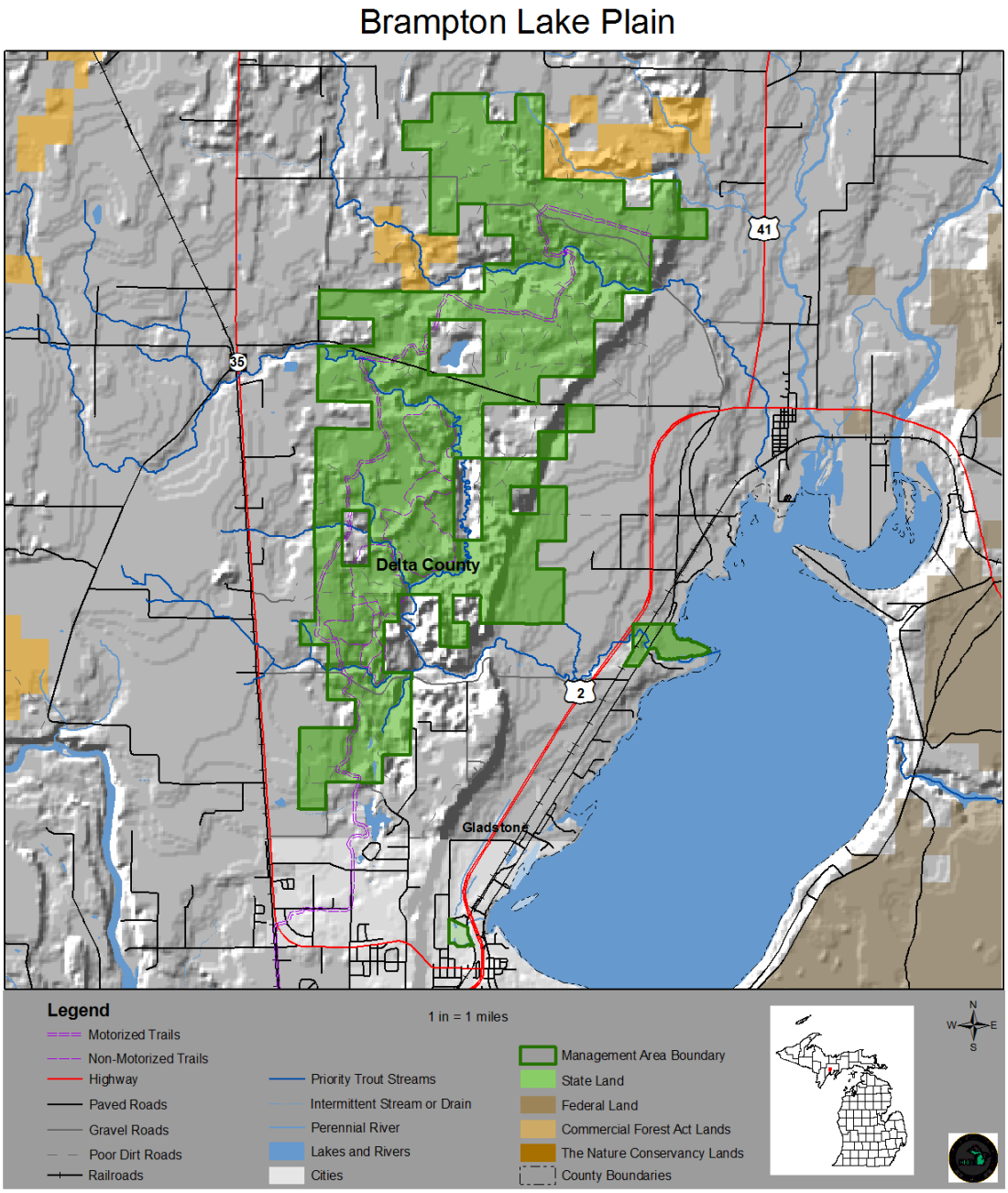

Figure 4.3.1. A map of the Brampton Plain management area (dark green boundary) in relation to surrounding state forest and other lands in Delta County, Michigan.

4.3.1 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 Brampton Plains 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 1,806 acres (30%) of the state forest land in this management area (Table 4.3.1) and is poorly distributed across age classes (Figure 4.3.2). Aspen is growing on dry-mesic sandy soils, which are productive sites for the species. Aspen will be managed on a 50 year rotation to a balanced age-class structure indicated by the red line in Figure 4.3.2. Most of the age classes over the rotation age of 50 years (50-59 years on the graph) are in the hard factor limited category, partial harvest category or are part of a regeneration harvest. With an absence of aspen in the 40-49 year and 50-59 year-old age classes, early entry into those age classes above the age-class regulation line is possible, but unlikely during the next 10-year period because aspen in these age classes is not of merchantable size.

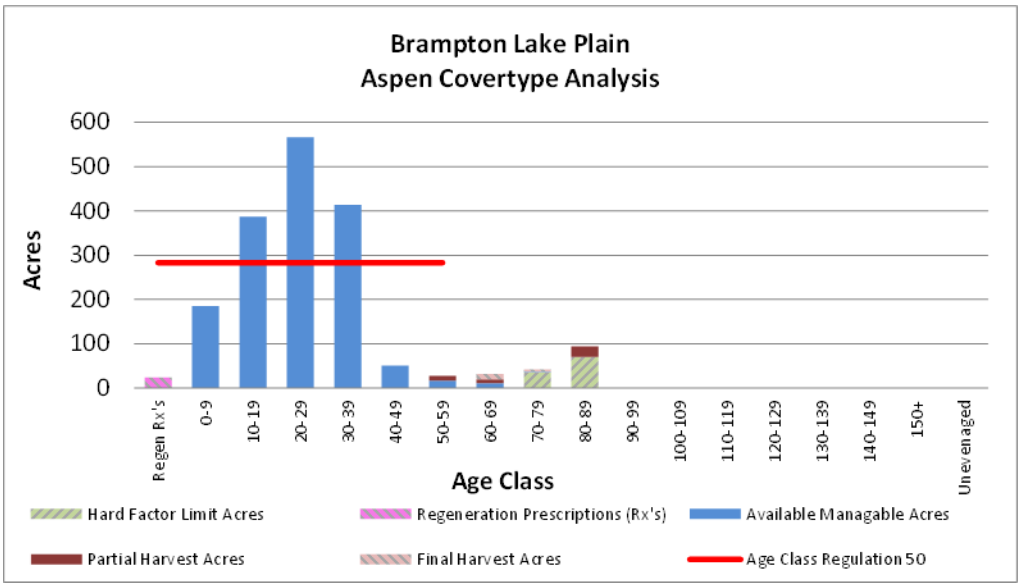

Figure 4.3.2. Graph of the age-class distribution for the aspen cover type on the Brampton Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation as indicated by the red line in Figure 4.3.2;
- Provide an even supply of forest products; and
- Provide a balanced mix of habitat conditions for a variety of wildlife as well as a variety of hunting-type opportunities.

Long-Term Management Objectives

- Once age classes are more balanced, regenerate approximately 283 acres each decade;
- Over the next 20 years, few acres will be available for harvest because of the absence of aspen in the 40-49 and 50-59 year old age class;
- Opportunities to harvest in the spikes (above the red line) presently in the 20-29 and 30-39 year old age classes will be explored as these classes grow older and reach merchantable size; and
- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early.

10-Year Management Objectives

- Because of age-class imbalance and age-class spikes in the younger classes, harvest and regenerate 366 acres over the 10-year planning period (with much of this acreage will come from the 40-49 year and older age classes); and
- As biomass markets improve, opportunities to harvest from the 30-39 year old age class will be explored.

Red Pine Cover Type

Current Condition

The red pine cover type covers 1,539 acres (25%) of the management area (Table 4.3.1) and is poorly distributed across age classes (Figure 4.3.3). This cover type will be managed on an 80-year rotation with a balanced age-class structure of 150 acres in each age class (indicated by the red line in Figure 4.3.3). Red pine stands occur on dry-mesic sandy soils, similar to the aspen stands in this management area. Red pine is ideally suited for these soil types. Nearly 60% of the red pine in this management area is of plantation origin. The spike in the 60-69 year-old age class on Figure 4.3.3 is indicative of the planting efforts of the 1950s that established many of these stands.

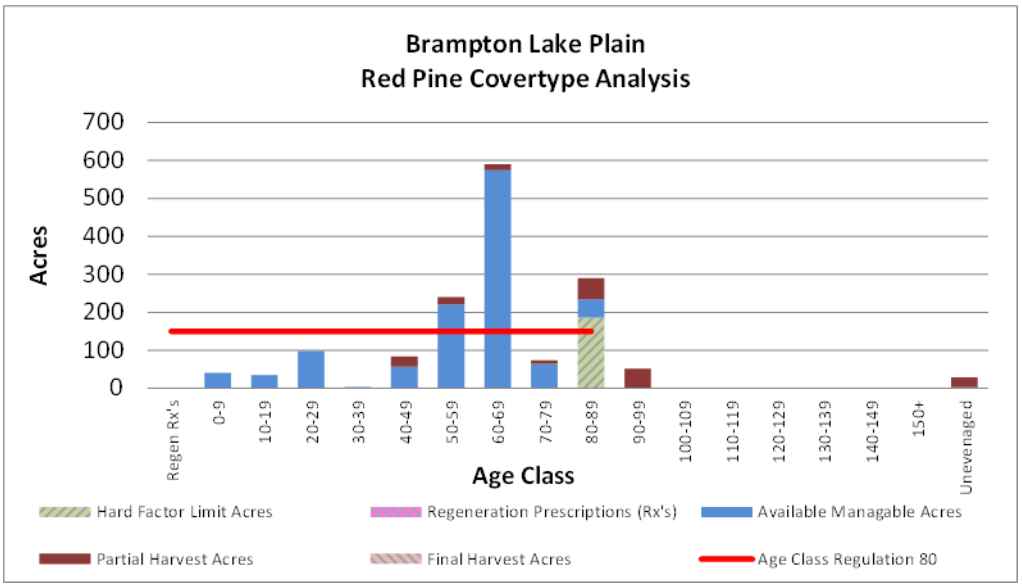

Figure 4.3.3. Graph of the age-class distribution for the red pine cover type on the Brampton Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the same number of acres of red pine in the management area and at approximately the same ratio of plantation pine to natural origin pine;
- Balance age-classes of the plantation origin red pine to lessen the spike in the 60-69 year-old age class; and
- Where possible along recreation trails, convert plantation red pine to natural origin red pine.

Long-Term Management Objectives

- Once age classes are more balanced, harvest and regenerate 150 acres and thin 778 acres each decade;
- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) as basal area guidelines are met;
- Maintain stands of natural origin on about 40% of the red pine acreage on an average 150-year rotation using natural regeneration techniques and scarification as needed; and
- Both natural origin and plantation stands will be thinned as necessary.

10-Year Management Objectives

- Thin 574 acres of red pine in the next decade;
- Regenerate 435 acres of red pine in the next decade (this number is higher than the regulated amount due to the current age class structure);
- None of the natural origin stands will reach rotation age within the next decade; and
- Thinning should add natural regeneration gaps to promote stand species diversity.

Cedar Cover Type

Current Condition

The cedar cover type covers 589 acres (10%) of the management area (Table 4.3.1). Cedar historically does not regenerate reliably especially in high deer population areas such as the Brampton Lake Plain and this is well illustrated in Figure 4.3.4. The absence of any age classes below 80-89 years indicates little harvesting has occurred in this type; largely due to regeneration challenges.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Maintain the cedar cover type at the current acreage level.

Long-Term Management Objective

- Explore techniques for regenerating the cedar cover type under high browsing pressures, ideally leading to harvesting 37 acres per decade.

10-Year Management Objective

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

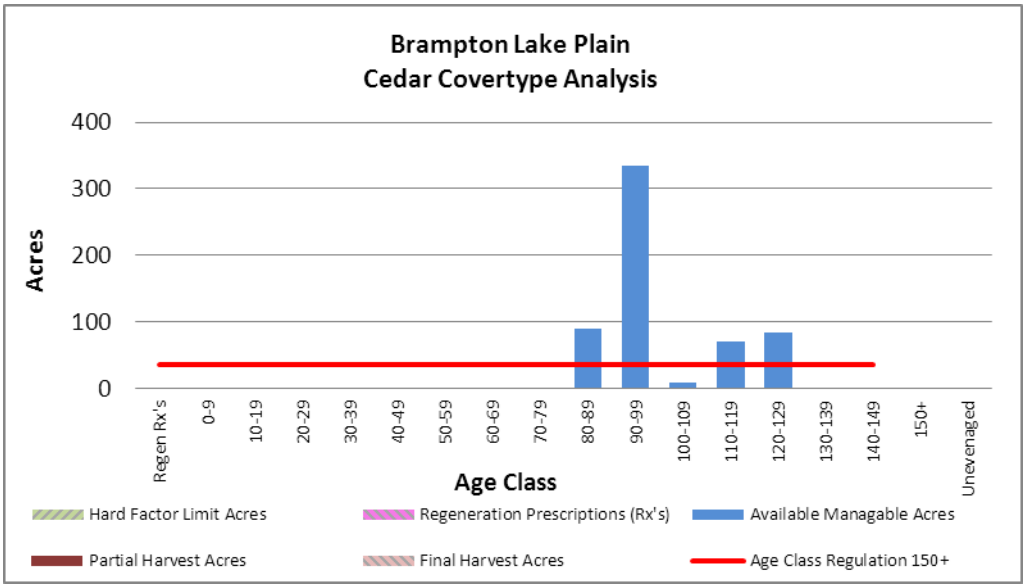

Figure 4.3.4. Graph of the age-class distribution for cedar on the Brampton Lake Plain management area (2012 Department of Natural Resources inventory data).

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 487 acres (8%) of this management area. Stands occur mostly on dry-mesic sites and yield low- to medium-quality hardwood. Most stands have been managed on a selection harvest basis and are in good condition. Recruitment of seedlings and saplings into larger size classes is generally not successful due to browse pressure. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

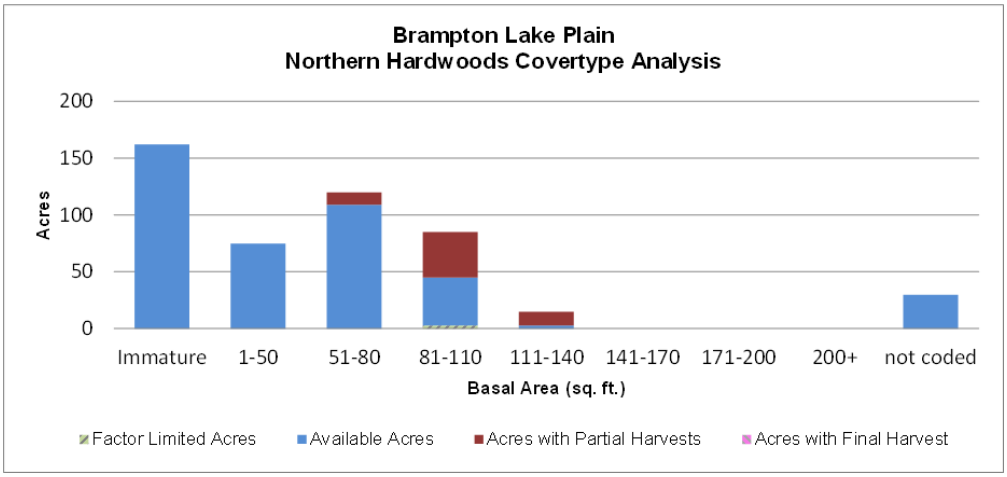

Figure 4.3.5. Graph of the basal area distribution for northern hardwoods on the Brampton Lake Plain management area (2012 Department of Natural Resources inventory data).

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, selectively harvest high quality northern hardwood stands on a 20-year cycle. The harvest cycle will be optimized to maintain high growth rates and minimize stagnant growth periods. To accomplish this harvest cycles may vary slightly from the nominal 20-year cycle. This will result in an estimated 123 acres harvested each decade.
- Low quality hardwood stands may be managed on an even-aged system with an 80-year rotation

10-Year Management Objective

- Approximately 75 acres should be harvested in the in the next decade (this number is lower than the estimated long-term amount due to the current low basal areas); and
- Maintain hemlock, white pine and upland cedar where possible in stands that are harvested.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 482 acres (8%) of the management area and occurs on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Mixed lowland conifers have a poor age-class distribution, with most of the stands ranging between 80 and 110 years old. Most of these stands have a hard factor limit associated with them which makes them unavailable for harvesting this planning period. Some harvesting has been done in this type over the past 10 years. As these stands age, they become increasingly susceptible to insect and disease problems.

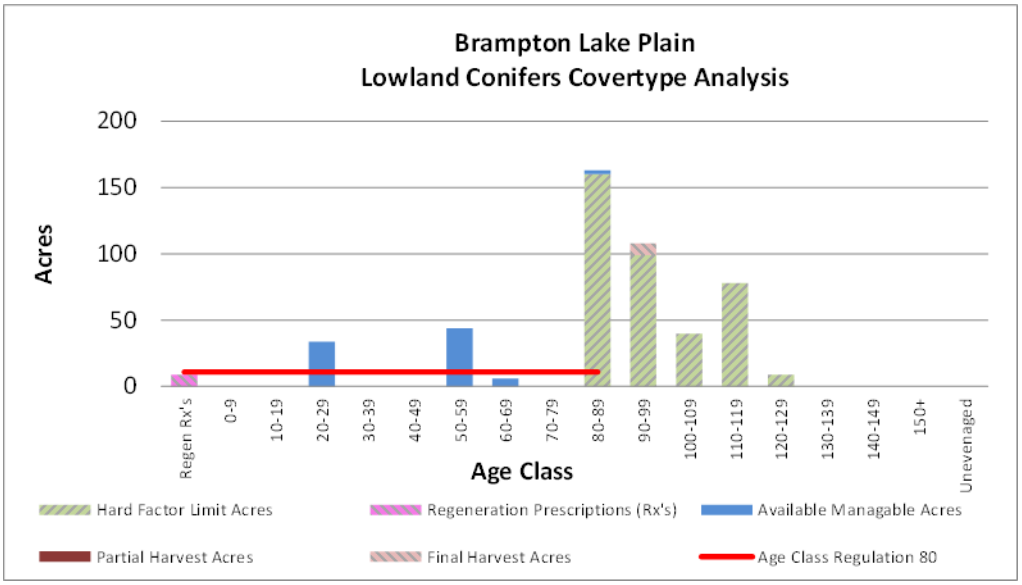

Figure 4.3.6. Graph of the age-class distribution for the lowland conifer cover type on the Brampton Lake Plain management area (2012 Department of Natural Resources inventory data)**.**

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage this cover type on an 80-year rotation, leading to harvesting 11 acres per decade in those stands without hard factor limits;
- Regenerate stands to species mixes similar to the pre-harvest conditions with preference for cedar, black spruce and balsam fir;
- Harvesting will be done using patch cuts with clumped retention or strips; and
- Lowland conifer stands in areas inaccessible for harvest will be subject to natural processes, resulting in a range of successional stages.

10-Year Management Objectives

- Harvest about 30 acres over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques (this number is greater than the regulated amount due to the current age-class structure, with very few acres in young age classes);
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested types make up 778 acres and includes upland spruce/fir (139 acres), lowland deciduous (116 acres), mixed upland deciduous (111 acres), lowland spruce/fir (84 acres), hemlock (69 acres), paper birch (67 acres), white pine (60 acres), jack pine (47 acres), lowland poplar (41 acres) upland conifer (20 acres), natural mixed pine (17 acres), and upland mixed forest (7 acres). Together these types make up about 13% of the area in small, scattered stands.

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 current representation using appropriate silvicultural methods;
- Harvest as opportunities arise in conjunction with other management activities; Black spruce, jack pine, paper birch, balsam poplar and tamarack are typically managed with even-age systems. These stands will continue to be managed with appropriate rotation ages.
- Harvest older stands that do not have factor limits first to prevent mortality;
- Use appropriate silvicultural techniques to assure adequate regeneration;
- Monitor harvested sites; and
- Featured species habitat requirements will be taken into consideration.

10-Year Management Objectives

- Approximately 207 acres will be available for harvest from these stands in the next decade. Generally no harvesting will be done in the hemlock type.

Non-forested Cover Types

Current Condition

The follow non-forested cover types are found on this management area: upland open/semi open lands (156 acres – 3%), lowland open/semi open lands (171 acres – 3%) and other (water, local, urban) (26 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.

4.3.2 – Featured Wildlife Species Management

The Brampton Lake Plain management area contains a large proportion of upland aspen and pine cover types. Future management will strive to balance aspen age-class distribution and enhance the conifer component of mixed stands. This will be done by encouraging the naturally occurring understory of red pine, white pine and balsam fir. Many red pine plantations will be managed for natural reproduction. The following have been identified as featured species for this management area: American woodcock, blackburnian warbler, ruffed grouse and wild turkey. Some of the most significant wildlife management issues in the management area are: mesic conifer (hemlock, white pine, cedar, spruce); mature forest; habitat fragmentation; 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.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on balancing the age-class distribution and provision of display, feeding, nesting and brood-rearing habitat via upland brush, opening and poorly stocked stand management.

Wildlife habitat specifications:

- Maintain aspen cover types within the management area, especially where associated with alder, riparian zones, or forested wetlands;
- Balance aspen age-class distribution within the management area;

- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retaining a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under plant hemlock, white pine and white spruce in hardwood dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer dominated, particularly hemlock, stands in the management area by extending the rotation length for white spruce and balsam fir cover types to 80 years and not harvesting hemlock in this management area

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,
- 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.

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 forest openings (forest openings, savannas, barrens, hayfields, etc.) used for broad rearing sites; and
- Promote or enhance small dense mature confer stands for winter thermal cover and roosting.

4.3.3 – 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, 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 one listed species and no natural communities of note occurring in the management area as listed in Table 4.3.2. 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.

Table 4.3.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Brampton Lake Plain 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
Bird								
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late

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

Approximately 353.4 acres of potential old growth have been identified within the Brampton Lake Plain 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.

There is only one high conservation value area in the management area and that is the 20 acre Brampton Lake Plain coastal environmental area (Figure 4.3.7). There are no ecological reference areas identified in the 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.

4.3.4 – 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
- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight

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. Following is a list of species of concern that been documented in or near this management area:

- Garlic mustard
- Glossy buckthorn
- Japanese knotweed
- *Phragmites* (common reed)

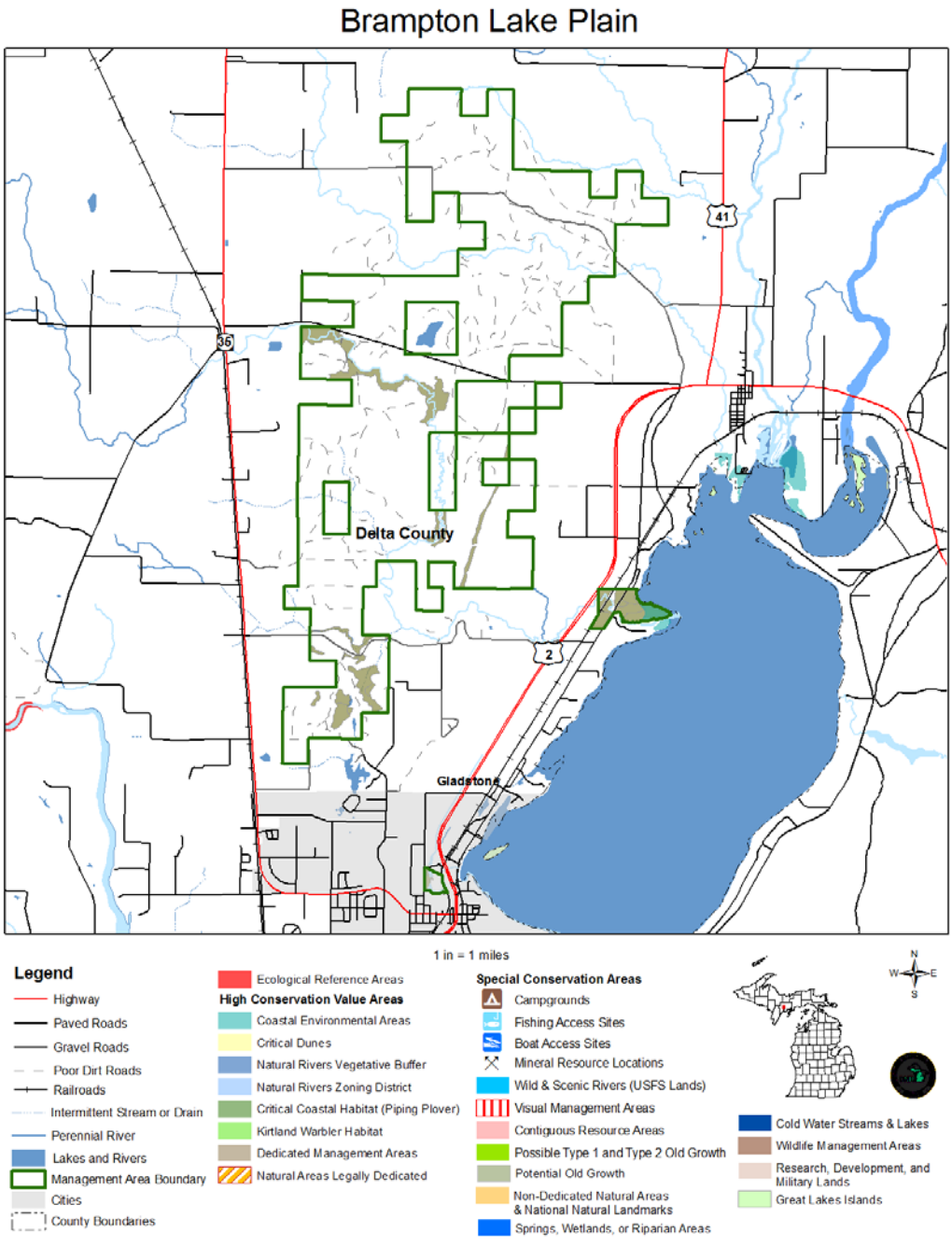

Figure 4.3.7. A map of the Brampton Lake Plain management area showing the special resource areas.

4.3.5 – 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 are shown in Figure 4.3.1.

4.3.6 – Fire Management

The management area consist primarily of dry and dry-mesic northern forests sites with some lowland conifers. With the slope enhanced onshore winds, these dry sites probably experienced periodic stand replacement fires, with fire return intervals of approximately 80-150 years.

- All wildfires within the management area will be subject to appropriate initial attack response.
- Residential development at the southern end of the management area on these dry soils is a significant wildland urban interface issue. Localized access to firewise information should be considered.
- Prescribed fire has been used to encourage red pine reproduction and should be considered as a part of future natural regeneration efforts.

4.3.7 – Public Access and Recreation

This area has good public and management access and receives a significant amount of recreational use due to the close proximity to the cities of Escanaba and Gladstone. The Days River Pathway and Gladstone to Rapid River snowmobile trail are located in this area (Figure 4.3.1). No state forest campgrounds are located in this management area.

- Maintain current management access. Work to expand public access as opportunities arise.
- Buffer recreational pathways as needed to protect recreational and esthetic character of the trails.

4.3.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium, with minor amounts of peat and muck, medium-textured till and lacustrine (lake) sand and gravel. The glacial drift thickness varies between ten and 50 feet. Sand and gravel pits are located in the management area and there is potential on the uplands.

The Ordovician Trenton Group subcrops below the glacial drift. The Trenton is quarried for dolostone just to the northeast of the management area.

Metallic mineral exploration has not occurred in this management area and the depth to Precambrian rocks may limit the potential.

4.4 Brule/Iron River Tracts Management Area

Summary of Use and Management

Vegetative management in the Brule/Iron River Tracts management area (MA) (Figure 4.4.1) will provide a variety of forest products; maintain or enhance wildlife habitat; protect areas with unique characteristics; and provide for forest based recreational uses. Forest management objectives for the 10-year planning period include priorities for this area are to maintain a forested buffer on the Brule River and connecting cold-water streams; improving access for recreational users; maintaining the presence of minor cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives include maintaining large tracts of mature forest, particularly along this riparian corridor. Management activities may be constrained by site conditions and the small tract size. Recreational access and undivided ownership will be issues for this 10-year planning period.

Introduction

The Brule/Iron River Tracts management area is on a drumlinized ground moraine in southern Iron County. The state forest covers about 3,300 acres and is in small-scattered parcels. The management area is dominated by the aspen, northern hardwoods, and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by mesic northern forest natural communities;
- Mid-range in site quality;
- The major ownerships in this vicinity are mostly non-industrial private, forest industry, and U.S. Forest Service; and
- Many parcels share undivided interests with other owners.

The management priorities for this area are to maintain a forested buffer on the Brule River and connecting cold-water streams. Improving access for recreational users to this area is also a priority.

The predominant cover types, composition and projected harvest areas for the Brule/Iron River Tracts management area are shown in Table 4.4.1.

Table 4.4.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Brule-Iron River Tracts 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	50%	1,726	292	1,434	271	0	1,726	239	0
Northern Hardwood	19%	644	0	644	0	316	644	0	316
Lowland Conifers	6%	198	62	136	53	0	198	15	0
Upland Open/Semi-Open Lands	8%	266	0	266	0	0	266	0	0
Lowland Open/Semi-Open Lands	6%	216	0	216	0	0	216	0	0
Misc Other (Water, Local, Urban)	4%	150	0	150	0	0	150	0	0
Others	8%	266	118	148	55	0	266	18	0
Total		3,466	472	2,994	378	316	3,466	272	316

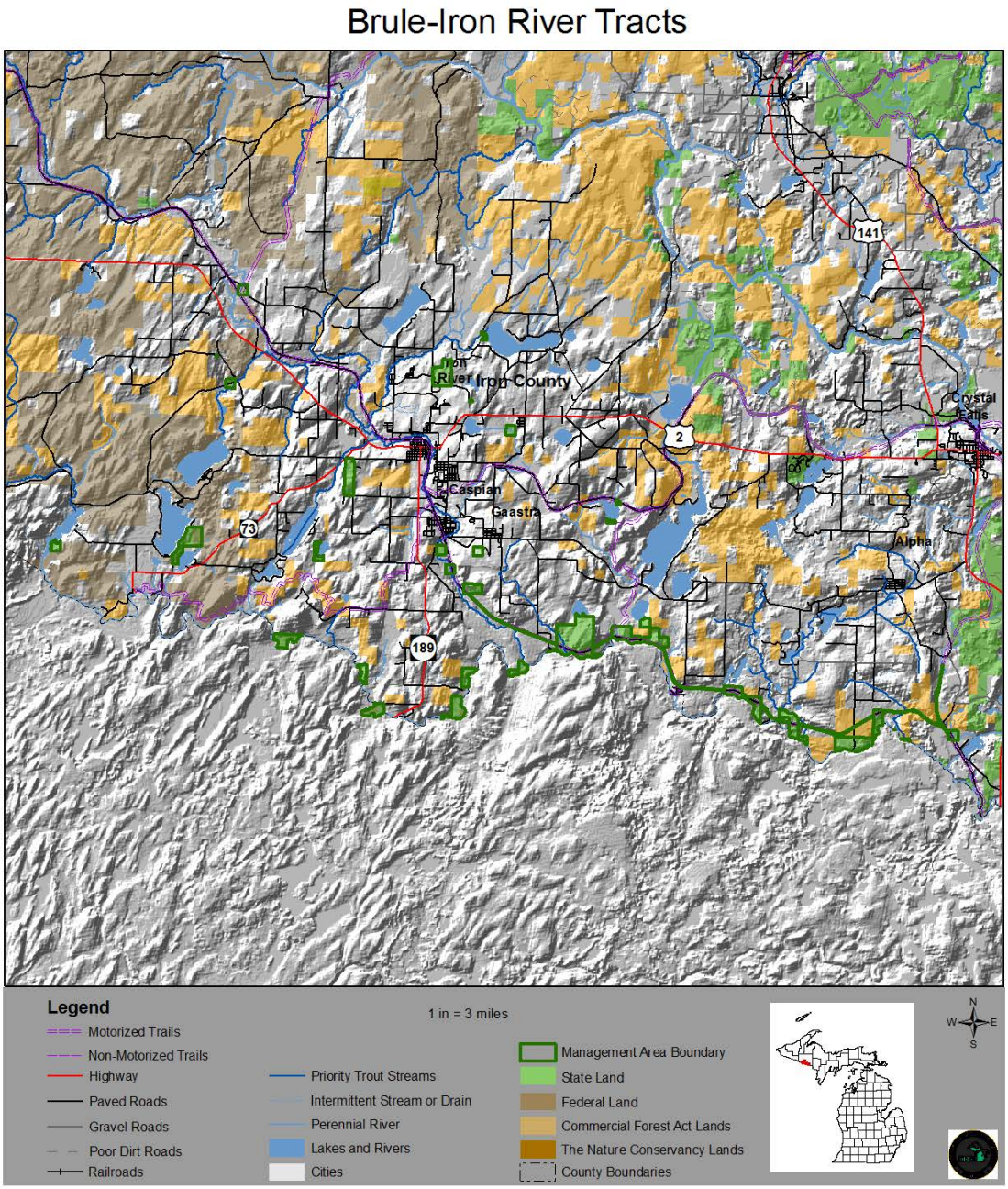

Figure 4.4.1. A map of the Brule/Iron River Tracts management area (dark green boundary) in relation to surrounding state forest and other lands in Iron County, Michigan.

4.4.1 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 Brule-Iron River Tracts 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

Aspen occurs on 1,726 acres (50%) of the management area (Table 4.4.1). Most of the upland cover types in this management area are found on very productive sites. Age classes are distributed irregularly (Figure 4.4.2). There are 292 acres of aspen that have harvest limitations primarily due to proximity to the Brule River. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. These stands are within the riparian influence zone, often on steep terrain next to the river.

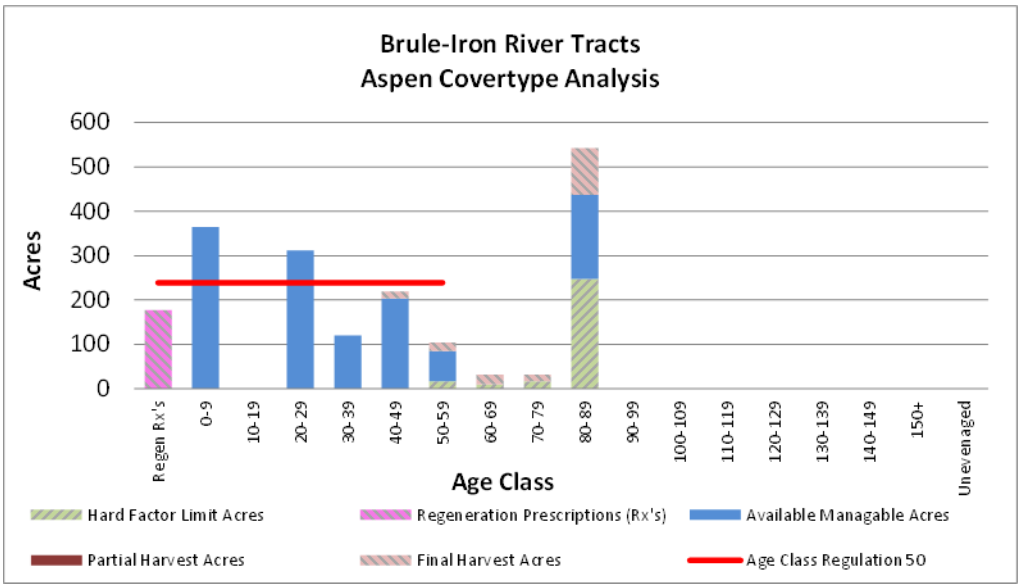

Figure 4.4.2. Graph of the age-class distribution for the aspen cover type on the Brule/Iron River Tracts management area (2012 Department of Natural Resources inventory data)**.**

Desired Future Condition

- Balancing age classes on the widely scattered parcels of state forest land in this management area is a low priority for ecological or economic reasons. The parcels are small and scattered so they do not have a significant influence on the landscape. There is some value in having small niche representatives of various age classes but the value is much lower than it would be where state forest land is a more prominent part of the landscape.

Long-Term Management Objectives

- Harvest and regenerate aspen stands on a 50-year rotation (indicated by the red line in Figure 4.4.2);
- Balanced age classes would provide approximately 239 acres of aspen for harvest every decade; and
- Stands that have limiting factors will most likely succeed to upland spruce/fir types.

10-Year Management Objective

- Over this 10-year planning period, it estimated that 271 acres of aspen would be harvested.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 644 acres (19%) of state forest land in this management area (Table 4.4.1). They occur on high-quality sugar maple sites. Most stands have been managed on a selection harvest basis, but have limited regeneration success. Some stands have a well-established sedge understory with little tree regeneration, shrub or herbaceous plant communities. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age (Figure 4.4.3).

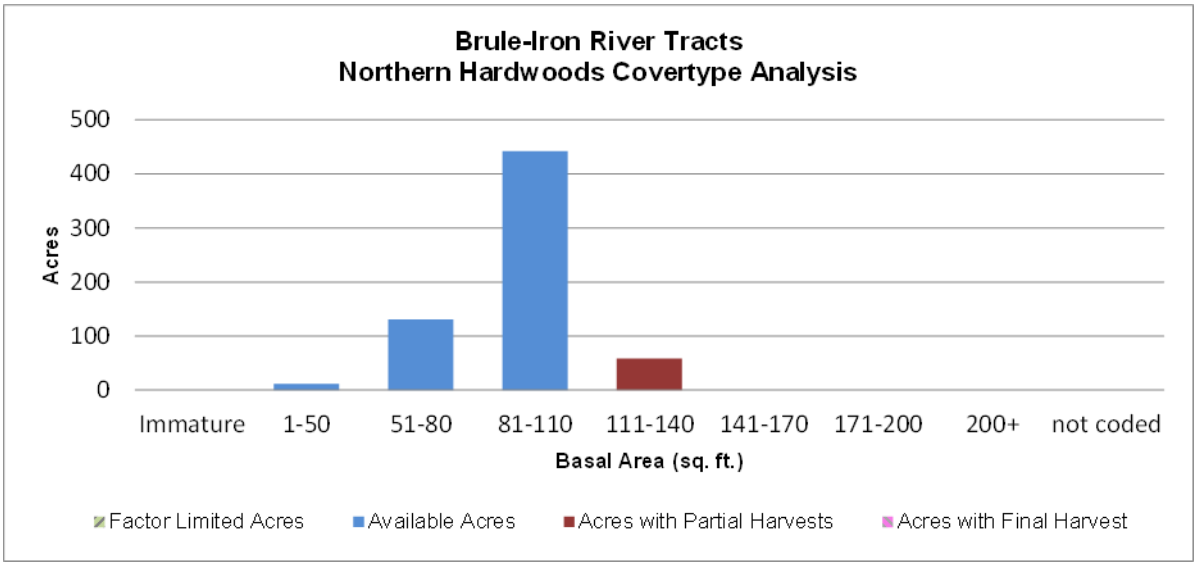

Figure 4.4.3. Graph of the basal area distribution for the northern hardwood cover type on the Brule/Iron River Tracts management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high value sugar maple sawlogs and veneer with a full complement of tree seedlings recruiting into the overstory, well developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selective harvest northern hardwood stands on a 20-year cycle producing an estimated 316 acres for harvest each decade; and
- Work to increase hardwood regeneration and reduce the sedge component.

10-Year Management Objectives

- Approximately 316 acres will be select cut in the next decade;
- Maintain hemlock, white pine, oak and upland cedar where they occur in stands that are cut; and
- Experiment with mechanical and chemical treatments of the sedge understory to establish northern hardwood tree regeneration and improve understory diversity.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 198 acres (6%) of the management area (Table 4.4.1). These stands are found on poorly drained sites that support mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. In this management area, these are widely scattered, small stands. The largest stand is less than 40 acres; all stands averaging only 11 acres. There are 62 acres of lowland conifers that have harvest limitations due to wet conditions or riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Wet site conditions are susceptible to rutting damage from logging equipment. This presents difficult harvesting conditions. Mixed lowland conifers are poorly distributed across the age spectrum. Nearly 90% of the stands are between 80 and 110 years old (Figure 4.4.4).

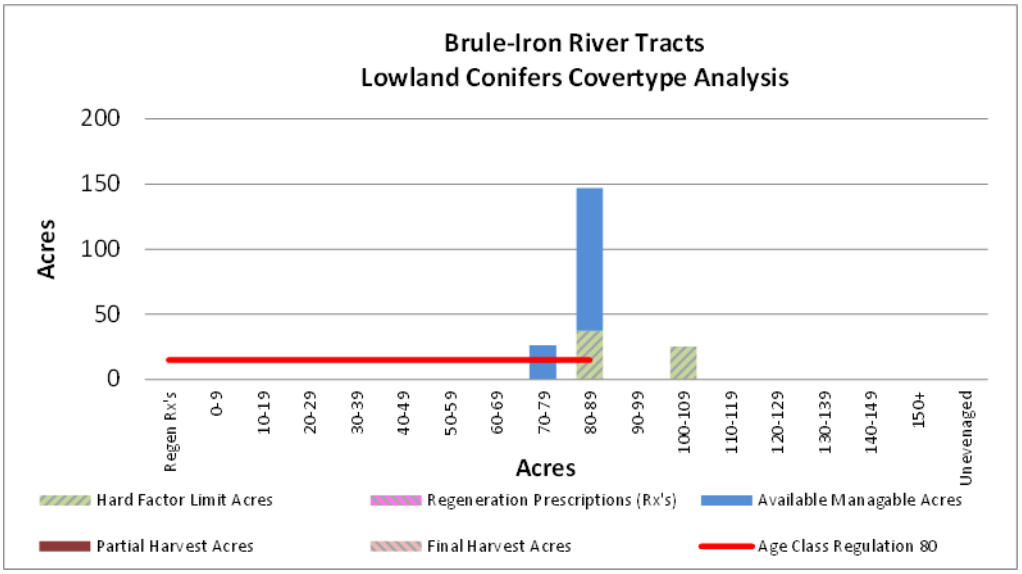

Figure 4.4.4. Graph of the age-class structure for the lowland conifer cover type on the Brule/Iron River Tracts management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation providing 15 acres of final harvest each decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions with preference for cedar, black spruce and balsam fir;
- Harvesting will be done using small clearcuts or strips with clumped retention; and
- Lowland conifer stands in areas inaccessible for harvest will be subject to natural processes, resulting in a range of successional stages.

10-Year Management Objectives

- Over the next 10 years, it estimated that 53 acres of lowland conifer will be harvested (this is more than the regulated amount due to the current age-class structure where all stands are over 70 years old);
- Stands will be monitored for increased mortality due to the general over mature condition;
- When mortality occurs decisions will be made as to the priority of salvaging and regenerating young, vigorous stands or leaving them to natural, small patch replacement processes;
- Use appropriate silvicultural techniques to assure adequate regeneration of desirable species; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested types make up 266 acres and are made up of tamarack (77 acres), lowland poplar (64 acres), lowland spruce/fir (50 acres), cedar (27 acres), upland spruce/fir (27 acres), and lowland deciduous (21 acres). Together these types make up 8% percent of the management area (Table 4.4.1).

Approximately 118 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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;
- Monitor to assure adequate regeneration of desired species;
- Featured species habitat requirements will be taken in to consideration; and
- Where stands have site conditions limiting harvest, early successional cover types will be lost through natural succession.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be total approximately 55 acres over the next decade.

Other Non-forested Cover Types

Current Condition

Non-forested cover types found on this management area include: upland open/semi - open lands (266 acres – 8%), lowland open/semi-open lands (216 acres – 6%) and other (water, local, urban) (150 acres – 4%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objectives

- Grass (herbaceous open land) will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.4.2 – Featured Wildlife Species Management

Several state forest compartments in this management area lie along the Brule River and are adjacent to the Whisker Lake Wilderness on the Chequamegon-Nicolet National Forest and collaborative management opportunities with the U.S. Forest Service should be explored. It is a priority to maintain large tracts of mature forest, particularly along this riparian corridor. The primary focus of wildlife habitat management in the Brule-Iron River Tracts management area will be to address the habitat requirements identified for the following featured species: American marten, black bear, northern goshawk and wood duck. Some of the most significant wildlife management issues in the management area are habitat fragmentation; coarse woody debris; mesic conifer; mature forest; and mast (hard and soft). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blow down.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.
- Retain down coarse woody debris present before cutting, and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, and coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover for cubs (e.g., white pine and hemlock).

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 and on addressing fragmentation. Landscape scale management should provide mature and old aspen stands in the 60-70 year-old age category.

Wildlife habitat specifications:

- Maintain a minimum of 15% of the state forest aspen resource above the 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 the 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure

32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

Wood Duck

The western Upper Peninsula goal for wood duck is to maintain or increase suitable habitat. Management should focus on the protection of forest wetland, riparian corridors, providing large cavity trees, mast and the management of priority wildlife management areas with suitable habitat.

Wildlife habitat specifications:

- In landscapes that contain streams, beaver ponds and other potential habitat for wood ducks, provide potential nesting sites by providing mature forest (possibly special conservation area designations) and/or big-tree silviculture near water.
- Retain all large diameter over-mature cavity trees within 300 feet of water bodies for cavities in lowland and upland hardwoods. Where adjacent forest is young or cavities limited, nest trees should be promoted.
- Where appropriate, manage for mast in riparian areas.
- Increase potential riparian buffers to 300+ feet, where desired, instead of the standard 100 foot best management practice.

4.4.3 –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, 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 six listed species and no natural communities of note occurring in the management area as listed in Table 4.4.2. 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 in this management area as illustrated in Figure 4.4.5.

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.

Table 4.4.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Brule-Iron River Tracts 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								
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
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Dragonfly								
Extra-striped snaketail	*Ophiogomphus anomalus*	SC/G4/S1	Confirmed	PS	Very High	Headwater & Mainstem Streams	Aquatic	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late

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

4.4.4 – 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
- 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. Following is a list of species of concern that been documented in or near this management area:

- Bell's honeysuckle
- Canada thistle
- Common buckthorn
- Common St. John's-wort
- Crack willow
- European swamp thistle
- Garlic mustard
- Japanese barberry
- Japanese knotweed
- Narrow-leaved cat-tail
- *Phragmites*
- Purple loosestrife
- Reed canary grass
- Scots pine
- Spotted knapweed
- Tatarian honeysuckle.

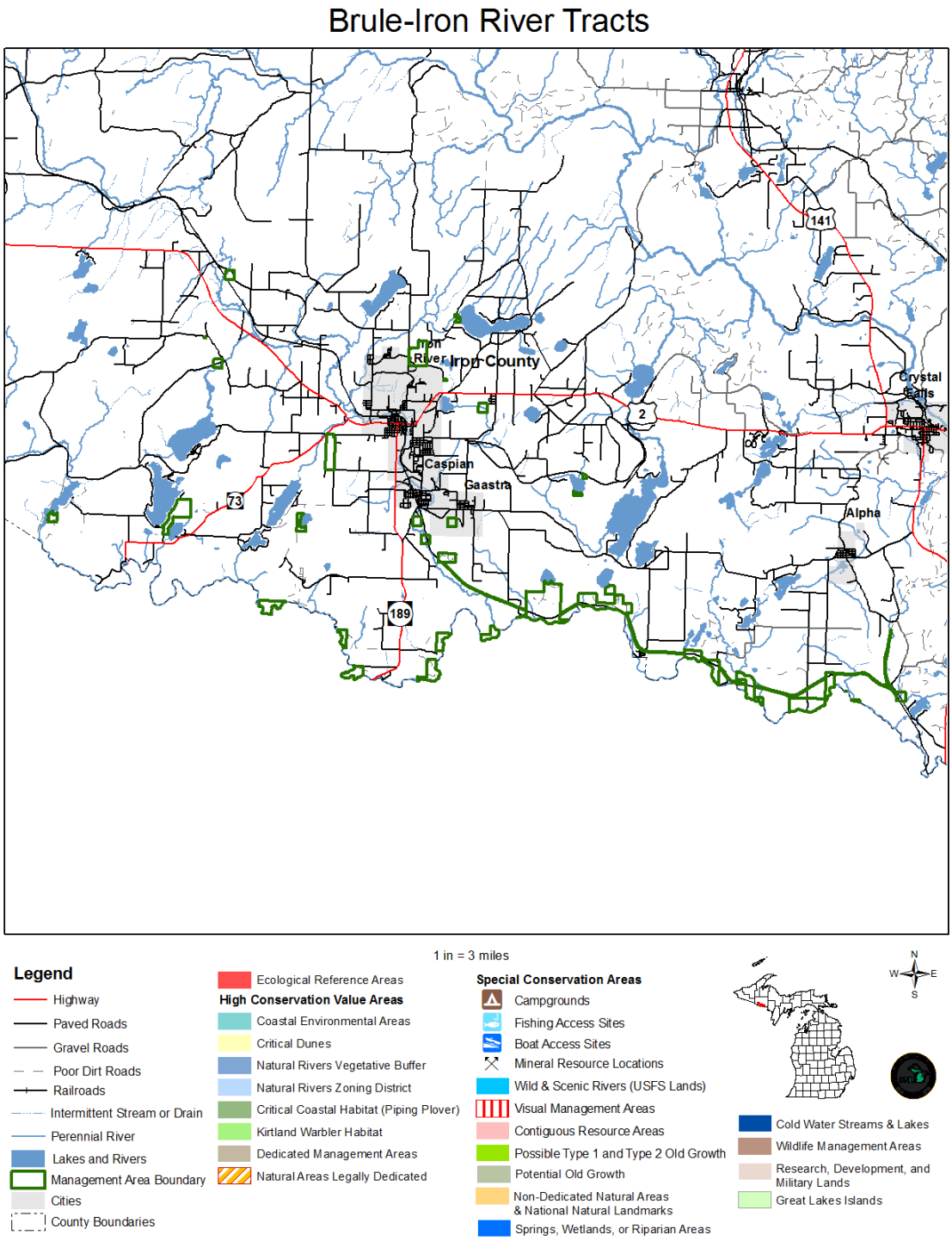

Figure 4.4.5. A map of the Brule-Iron River management area showing the special resource areas.

4.4.5 – 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 are shown in Figure 4.4.1.

4.4.6 – Fire Management

Fire probably did not play a significant role in this largely mesic northern forest community.

- All wildfires are subject to appropriate initial attack suppression response.

4.4.7 – Public Access and Recreation

This area follows the Brule River on the south, a popular fishing and canoeing/kayaking river that border Wisconsin. The state forest is in isolated parcels, surrounded by private land and has some undivided interest limiting public access opportunities. A snowmobile trail crosses this area (Figure 4.4.1). There are no state forest campgrounds. Boating access sites are located on the Brule River. Maintain current management access.

- Work to expand public access as opportunities arise.

4.4.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium and coarse-textured till. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is potential on the uplands.

The Precambrian Michigamme and Quinnesec Formations, Badwater Greenstone and Paint River Group subcrop below the glacial drift. There is no current economic use for these rocks.

Old iron mines are located in this area. Metallic mineral exploration has occurred in this general area and there could be potential. The parcels located along the Menominee River would be less likely to be leased.

4.5 Cassidy Creek Management Area

Summary of Use and Management

Vegetative management in the Cassidy Creek management area (MA) (Figure 4.5.1) 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 and lowland conifer; maintaining the presence of minor cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives include encouraging and enhancing conifer in this area, hardwood stand structure and diversity to benefit multiple species. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes in aspen and lowland conifer will be issues for this 10-year planning period.

Introduction

The Cassidy Creek management area is on a Bedrock Controlled Ground Moraine in southern Dickinson County. The state forest covers about 29,942 acres and is mostly contiguous. The management area is dominated by the aspen, northern hardwoods and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by the mesic northern forest, dry-mesic northern forest and poor conifer swamp natural communities;
- Mid-range in site quality; and
- State forest lands are the major ownership in this vicinity.

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 Cassidy Creek management area are shown in Table 4.5.1.

Table 4.5.1 Summary of cover types, composition, limited factor area, manageable are and projected harvest area for the Cassidy Creek 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	49%	14,674	875	13,799	3,572	0	14,674	2,300	0
Northern Hardwood	14%	4,190	10	4180	0	1,957	4,190	0	2,054
Lowland Conifers	10%	2,962	2013	949	105	0	2,962	105	0
Upland Open/Semi-Open Lands	2%	498	0	498	0	0	498	0	0
Lowland Open/Semi-Open Lands	6%	1,813	0	1813	0	0	1,813	0	0
Misc Other (Water, Local, Urban)	1%	432	0	432	0	0	432	0	0
Others	18%	5,373	1,752	3621	708	208	5,373	367	460
Total		29,942	4,650	25,292	4,385	2,165	29,942	2,772	2,514

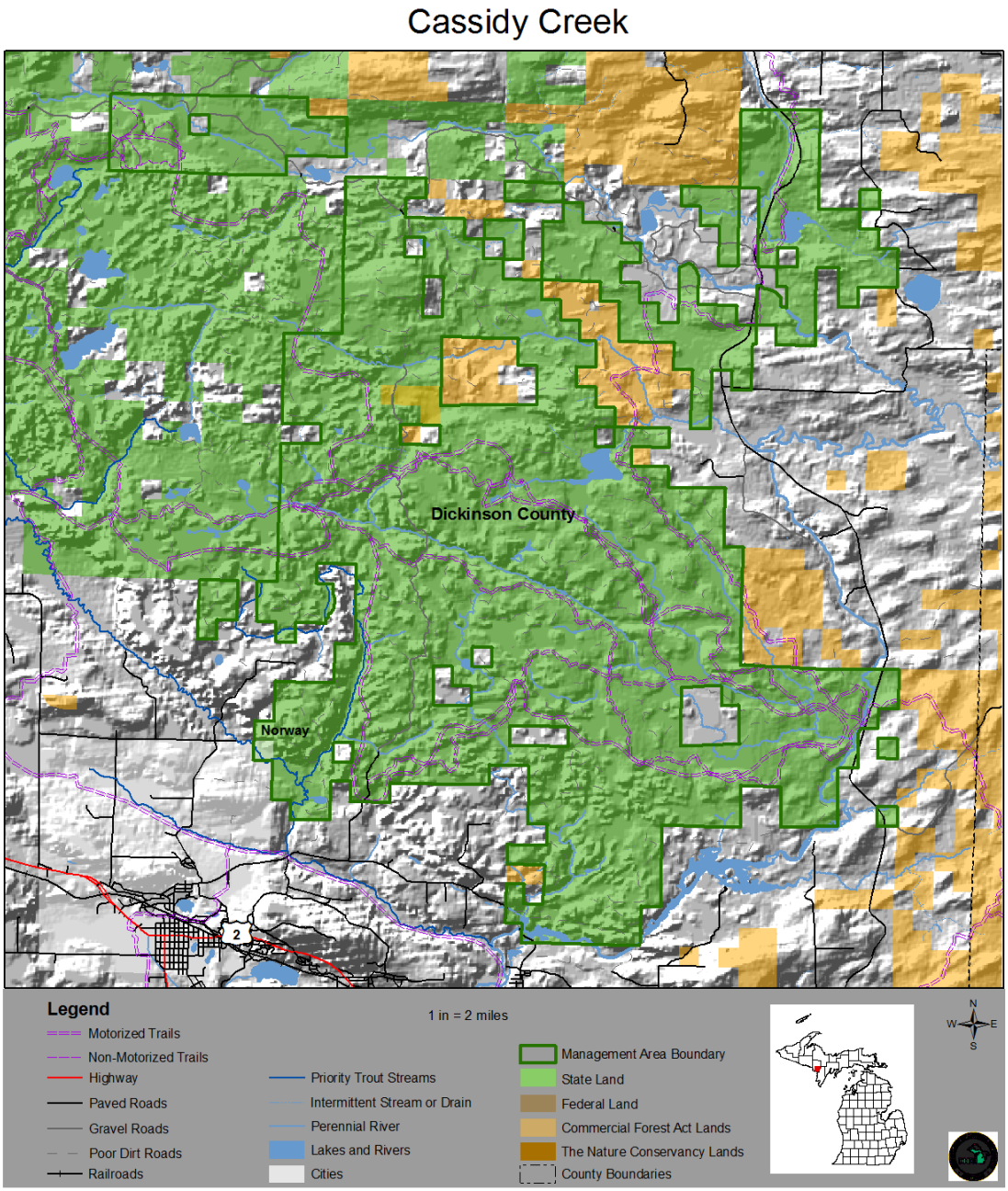

Figure 4.5.1. A map of the Cassidy Creek management area (dark green boundary) in relation to surrounding state forest and other lands in Dickinson County, Michigan.

4.5.1 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 Cassidy Creek 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

About 14,674 acres (49%) of state forest land in this management area are in the aspen cover type (Table 4.5.1). Most of the upland cover types in this management area are found on medium-productive sites. Aspen is poorly distributed across age classes spiking in the 20-29 year age class (Figure 4.5.2). There are 875 acres of aspen that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

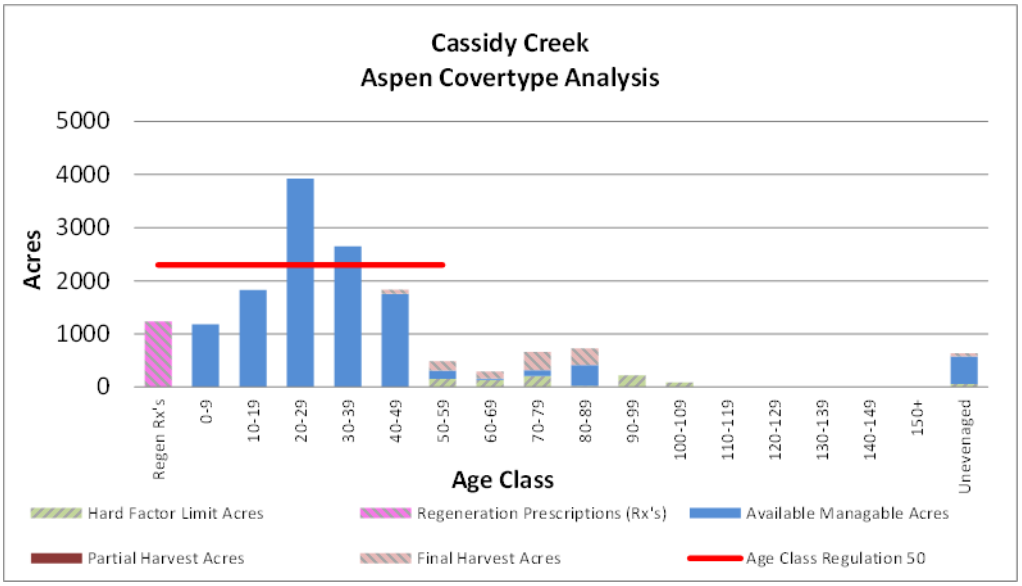

Figure 4.5.2. Graph of the age-class distribution for the aspen cover type on the Cassidy Creek management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate approximately 2,300 acres each decade, based on a 50 year rotation; and
- Stands of aspen with harvest limitations will succeed to more shade tolerant species.

10-Year Management Objectives

- Over the next 10 years, 3,572 acres should be harvested to balance age classes; and
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 4,190 acres (14%) of state forest land in this management area (Table 4.5.1). They occur on high-quality sugar maple sites. Most stands have been managed on a selection harvest basis, but have had limited regeneration success. Many stands have a well-established sedge understory with little tree regeneration, shrub or herbaceous plant communities. Northern hardwood is typically managed using an uneven-aged harvest system based on

basal area rather than age. Figure 4.5.3 shows the current basal area distribution for the management area and also indicates that a small number of acres were recently harvested under an even-aged system, shown as immature.

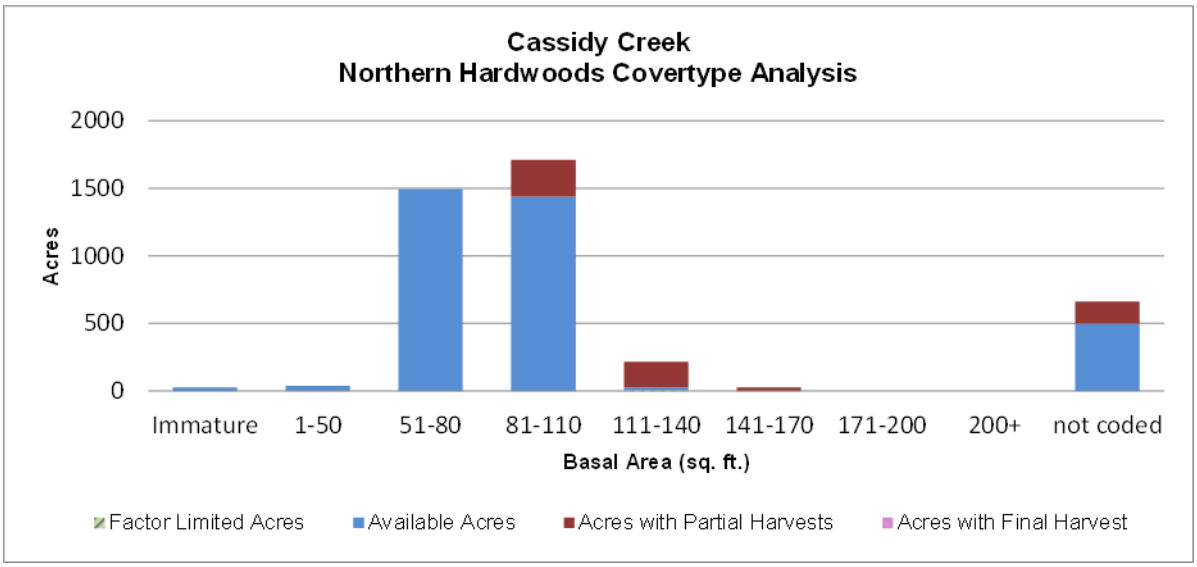

Figure 4.5.3. Graph of the basal area distribution for the northern hardwood cover type on the Cassidy Creek management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs with a full complement of tree seedlings recruiting into the overstory, well developed shrub and herbaceous layers

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest northern hardwood stands on a 20-year cycle (this will result in an estimated 2,054 acres harvested each decade); and
- Work to increase hardwood regeneration and reduce the sedge component.

10-Year Management Objectives

- Approximately 1,957 acres will be selectively cut in the next decade (this is slightly lower than the expected regulated amount due to the current basal area structure);
- Maintain white pine, hemlock, oak and upland cedar where they occur in stands that are cut; and
- Experiment with mechanical and chemical treatments of the sedge understory to establish northern hardwood tree regeneration and improve understory diversity.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 2,962 acres (10%) of the management area (Table 4.5.1). Lowland conifers are found on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Currently, there are 2,013 acres of lowland conifer stands that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Lowland conifers are poorly distributed across the age classes. Most of the stands are between 70 and 120 years old (Figure 4.5.4).

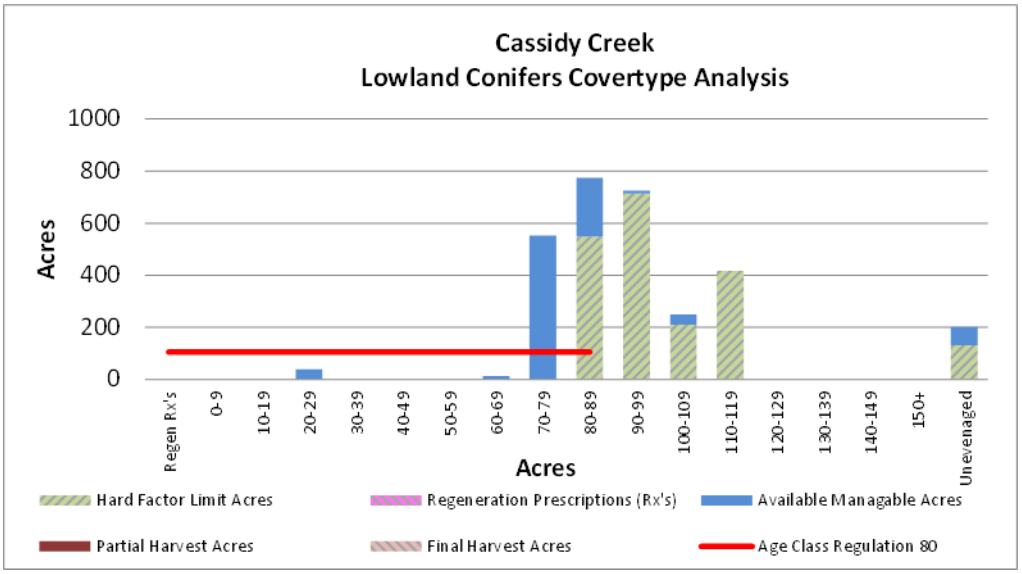

Figure 4.5.4. Graph of the age-class distribution for the lowland conifer cover type on the Cassidy Creek management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for approximately 105 acres to be harvested per decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir;
- Harvesting will be done using small clearcuts or strips with clumped retention; and
- Lowland conifer stands with harvest limitations will be subject to natural processes, resulting in a range of successional stages.

10-Year Management Objectives

- Harvest about 105 acres over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested types make up 5,373 acres and are made up of cedar (1,174 acres), lowland deciduous (914 acres), upland spruce/fir (710 acres), red pine (640 acres), paper birch (256 acres), lowland mixed forest (247 acres), lowland spruce/fir (236 acres), lowland poplar (190 acres), mixed upland deciduous (173 acres), tamarack (172 acres), mixed upland deciduous (164 acres), natural mixed pine (163 acres), white pine (152 acres), upland conifers (134 acres), upland mixed forest (114 acres), oak (74 acres), jack pine (18 acres) and hemlock (15 acres). Together these types make up about 18% of the management area (Table 4.5.1).

Approximately 1,752 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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;
- Use appropriate silvicultural techniques to assure adequate regeneration;
- Monitor harvested sites;
- Featured species habitat requirements will be taken in to consideration;
- Maintain hemlock as it occurs; and
- Where stands have site conditions limiting harvest, early successional cover types will be lost through natural succession.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Projected harvests in these cover types include 708 acres of final harvest and 208 acres of partial harvest over the next decade.

Other Non-forested Cover Types

Current Condition

Non-forested cover types found on this management area include: upland open/semi-open lands (498 acres – 2%), lowland open/semi-open lands (1,813 acres – 6%) and other (water, local, urban) (432 acres – 1%) (Table 4.5.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.5.2 – Featured Wildlife Species Management

The Cassidy Creek management area contains numerous rocky outcrops and areas with thinner soils that should be moved into later successional and conifer species, where appropriate. Conifer should be encouraged and enhanced in this area. Hardwood stands should be managed for structure and diversity to benefit multiple species. The primary focus of wildlife habitat management in the Cassidy Creek management area will be to address the habitat requirements identified for the following featured species: American woodcock, blackburnian warbler, northern goshawk, white-tailed deer and wood duck. Some of the most significant wildlife management issues in the management area are early successional forest conditions (associated with alder, riparian zones, or forested wetlands); mesic conifers; mature forest (upland and adjacent to water); habitat fragmentation; coarse woody debris; white-tailed deer wintering habitat; and hard mast. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g. lowland and riparian habitat with potential for early successional woodcock habitat management) for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on balancing the age-class distribution and provision of display, feeding, nesting and brood-rearing habitat via upland brush, opening and poorly stocked stand management.

Wildlife habitat specifications:

- Maintain aspen cover types within the management area, especially where associated with alder, riparian zones, or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retaining a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years in upland areas.

Northern Goshawk

The goal for northern goshawk is to maintain suitable habitat. Management at the stand scale should focus on the protection of nest trees, provision of coarse woody debris and on 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 resource 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

Wood Duck

The western Upper Peninsula goal for wood duck is to maintain or increase suitable habitat. Management should focus on the protection of forest wetland, riparian corridors, providing large cavity trees, mast and the management of priority wildlife management areas with suitable habitat.

Wildlife habitat specifications:

In landscapes that contain streams, beaver ponds and other potential habitat for wood ducks, provide potential nesting sites by providing mature forest (possibly special conservation area designations) and/or big-tree silviculture near water.

- Retain all large diameter over-mature cavity trees within 300 feet of water bodies for cavities in lowland and upland hardwoods. Where adjacent forest is young or cavities limited, nest trees should be promoted.
- Where appropriate, manage for mast in riparian areas.
- Increase potential riparian buffers to 300+ feet, where desired, instead of the standard 100 foot best management practice.

4.5.3 – 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, 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 nine listed species and no natural communities of note occurring in the management area as listed in Table 4.5.2. Elk has also been noted in the management area but is not a listed species by Michigan Natural Features Inventory standards. 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 Bloomgren's Marsh and Hancock Creek Flooding state wildlife management areas are special conservation areas within this management area as shown in Figure 4.5.5.

Approximately 24.5 acres of potential old growth have been identified within the Cassidy Creek 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.

There have been no high conservation value areas or ecological reference areas identified in the 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 4.5.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Cassidy Creek 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								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Mullusks								
Slippershell mussel	*Alasmidonta viridis*	T/G4G5/S2S3	Confirmed	EV	Very High	Headwater Stream	Aquatic	N/A
						Mainstem streams	Aquatic	N/A
						Inland lake	Aquatic	N/A
Black sandshell	*Ligumia recta*	E/G5/SNR	Confirmed	?	?	Unknown		
Round pigtoe	*Pleurobema sintoxia*	SC/G4G5/S2S3	Confirmed	HV	Low	Mainstem streams	Aquatic	N/A
						Rivers	Aquatic	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plants								
Goblin moonwort	*Botrychium mormo*	T/G3/S2	Confirmed			Mesic northern forest	Northern Hardwood	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
Blunt-lobbed woodsia	*Woodsia obtusa*	T/G5/S1S2	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Limestone cliff	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite cliff	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.

4.5.4 – 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
- 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. Following is a list of species of concern that been documented in or near this management area:

- Common buckthorn
- Garlic mustard
- Glossy buckthorn
- Japanese knotweed
- *Phragmites*

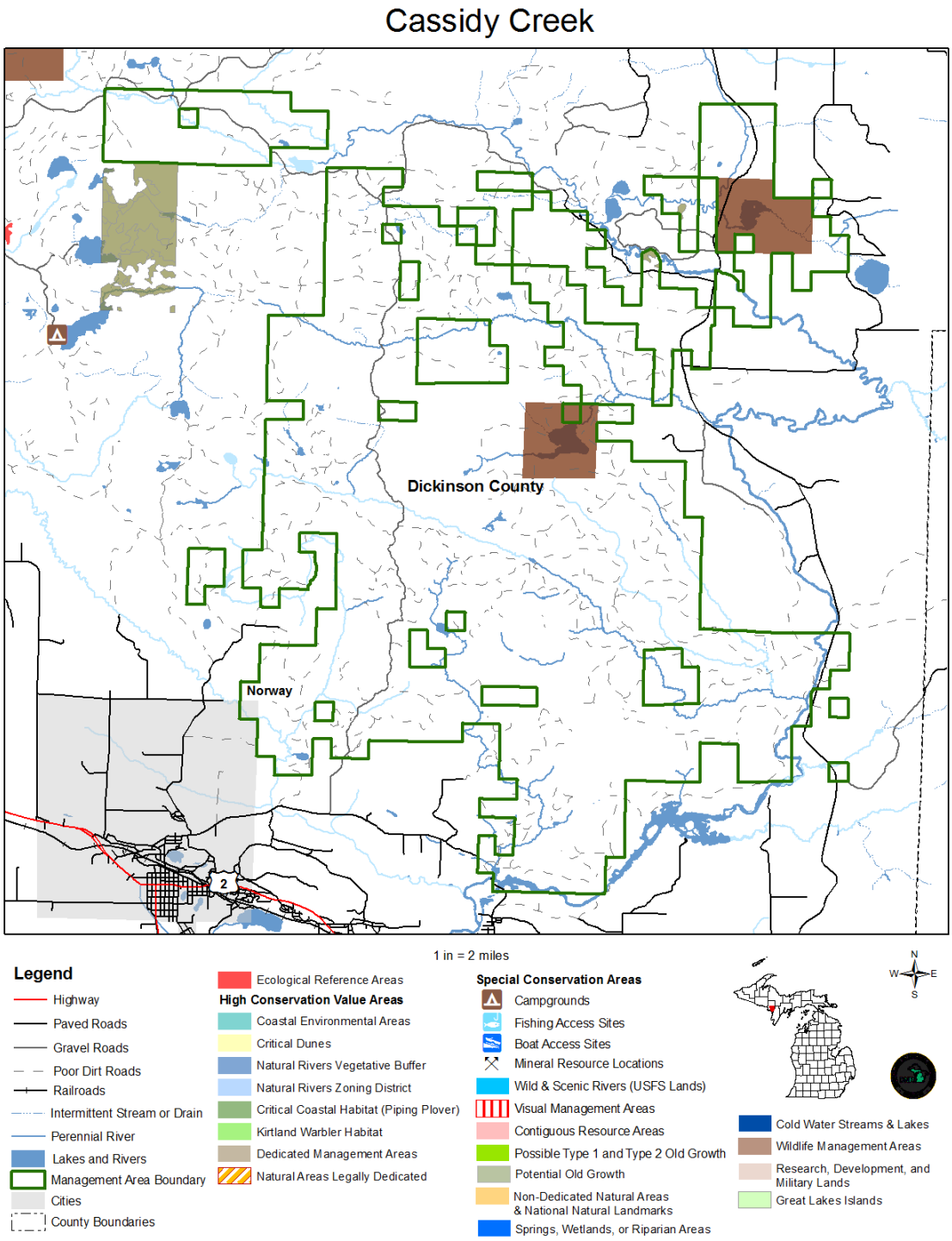

Figure 4.5.5. A map of the Cassidy Creek management area showing the special resource areas.

4.5.5 – 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 Prescriptions Geographic Decision Support Environment. Remove or discourage beaver populations on designated high priority trout streams.

High priority trout streams in this management area are shown in Figure 4.5.1.

4.5.6 – Fire Management

Much of the area is covered by mesic and lowland forest communities. Fire return interval was generally very long. However, significant portions of the management area probably supported dry-mesic pine forests with shorter fire intervals.

- All wildfires are subject to appropriate initial attack suppression response;
- The Norway Off-Road Vehicle (ORV) trailhead off Holmes Road on the east end presents an opportunity for fire prevention messages about spark arrestors; and
- Work to develop modified suppression strategies for portions of this area.

4.5.7 – Public Access and Recreation

This area has good public and management access. Roads are primarily gravel or poor dirt roads. The Norway Off-Road Vehicle (ORV) Trail, snowmobile trail and portions of the Merriman Ski Trail are located in this area. Both the off-road vehicle and the ski trails are heavily used by the public. There are no state forest campgrounds in this management area. The department will continue to maintain the public access to this area.

- Work to improve the quality of the road system as opportunities arise.

4.5.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of mostly thin to discontinuous glacial till over bedrock with some glacial outwash sand and gravel and postglacial alluvium and medium-textured till. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the vicinity of the management area and there may be some potential.

The Precambrian Archean Granite/Gneiss, Michigamme and Chocolay Formations, and the Cambrian Munising Group subcrop below the glacial drift. Some of the Granite/Gneiss could be used as dimension stone.

Old iron mines are located to the southwest of the management area. Metallic mineral exploration has occurred in this area in the past and there could be potential.

4.6 Central Houghton Management Area

Summary of Use and Management

Vegetative management in the Central Houghton management area (MA) (Figure 4.6.1) 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 area is the production of high quality timber products, particularly hardwood sawlogs and veneer. Wildlife management objectives include addressing the habitat requirements identified for the following featured species: blackburnian warbler, pileated woodpecker, ruffed grouse and northern goshawk. Management activities may be constrained by site conditions and the skewed age-class distributions. Maintaining high quality hardwoods and retaining stand diversity will be issues for this 10-year planning period.

Introduction

The Central Houghton management area is on dissected moraines in Central Houghton County. The state forest covers 46,908 acres and is in scattered blocks. The management area is dominated by the northern hardwoods, aspen and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by the mesic northern forest natural community;
- High-range in site quality;
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitats.
- This management area contains one of the western Upper Peninsula Grouse Enhanced Management Systems areas. This area plan will emphasize balanced age classes of aspen for timber production which will have habitat benefits for ruffed grouse. The boundaries of Grouse Enhanced Management Systems areas will be delineated and an operational plan will be developed during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager and integrated into the plan through the revision process.

The management priority for this area is the production of high-quality timber products, particularly hardwood sawlogs and veneer while maintaining habitat qualities for wildlife species dependent on the northern hardwood communities in this area

The predominant cover types, composition, and projected harvest areas for the Central Houghton management area are shown in Table 4.6.1.

Table 4.6.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Central Houghton 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
Northern Hardwood	69%	32,456	4,401	28,055	0	13,794	32,456	0	13,794
Aspen	7%	3,479	253	3226	582	0	3,479	538	0
Lowland Conifers	5%	2,559	1,084	1475	164	0	2,559	164	0
Upland Open/Semi-Open Lands	1%	586	0	586	0	0	586	0	0
Lowland Open/Semi-Open Lands	2%	954	0	954	0	0	954	0	0
Misc Other (Water, Local, Urban)	1%	512	0	512	0	0	512	0	0
Others	14%	6,362	1,898	4464	805	1,130	6,362	378	1,188
Total		46,908	7,636	39,272	1,551	14,924	46,908	1,080	14,982

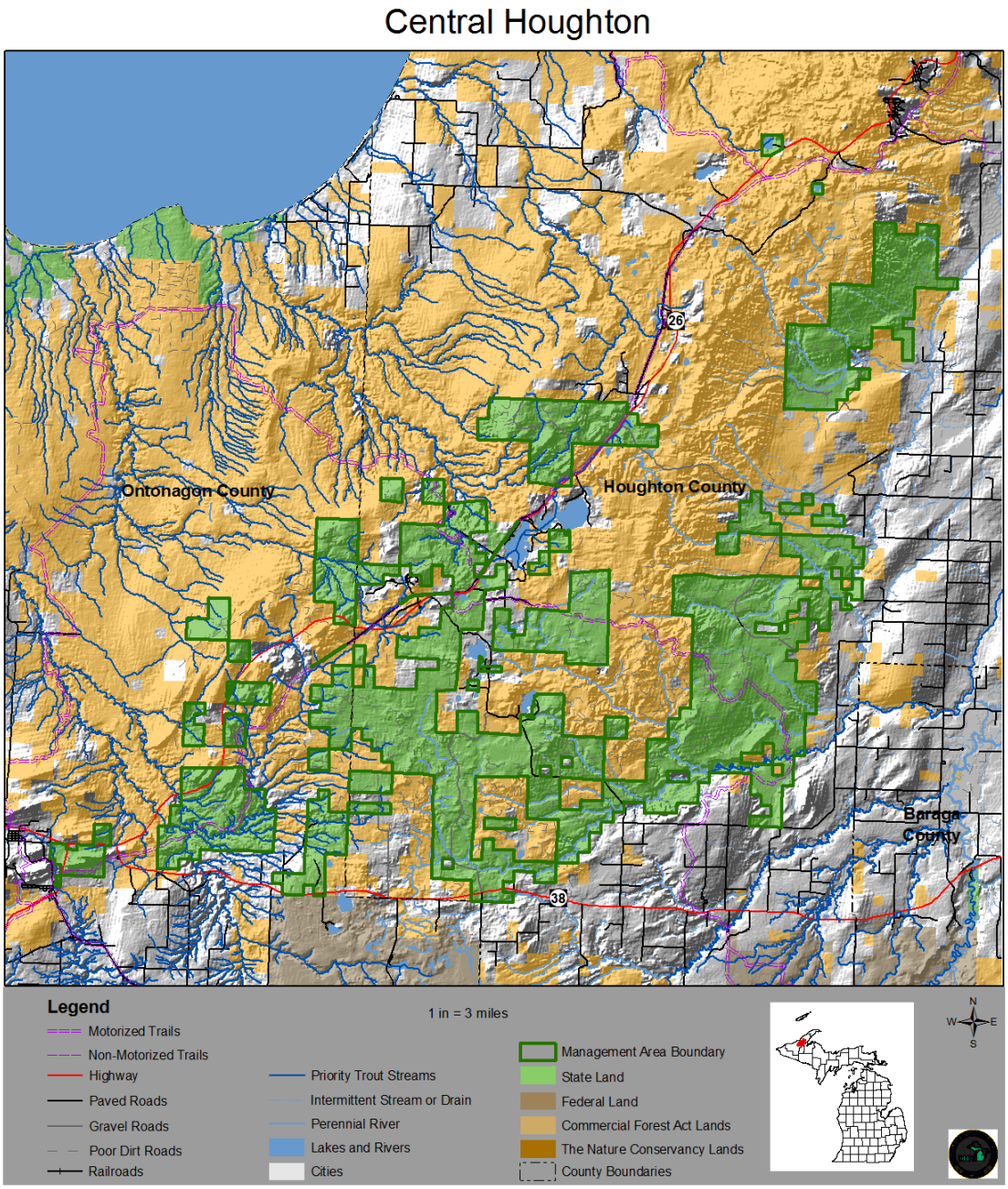

Figure 4.6.1. A map of the Central Houghton management area (dark green boundary) in relation to surrounding state and other forest lands in Houghton County, Michigan.

4.6.1 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 Central Houghton 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands occur on 32,456 acres (69%) of state forest land in this management area (Table 4.6.1). They occur on high-quality sugar maple sites. Most stands have been managed on a selection harvest basis. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age. Figure 4.6.2 shows the current basal area distribution for the management area. There are 4,401 acres of northern hardwood that have site conditions limiting their harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

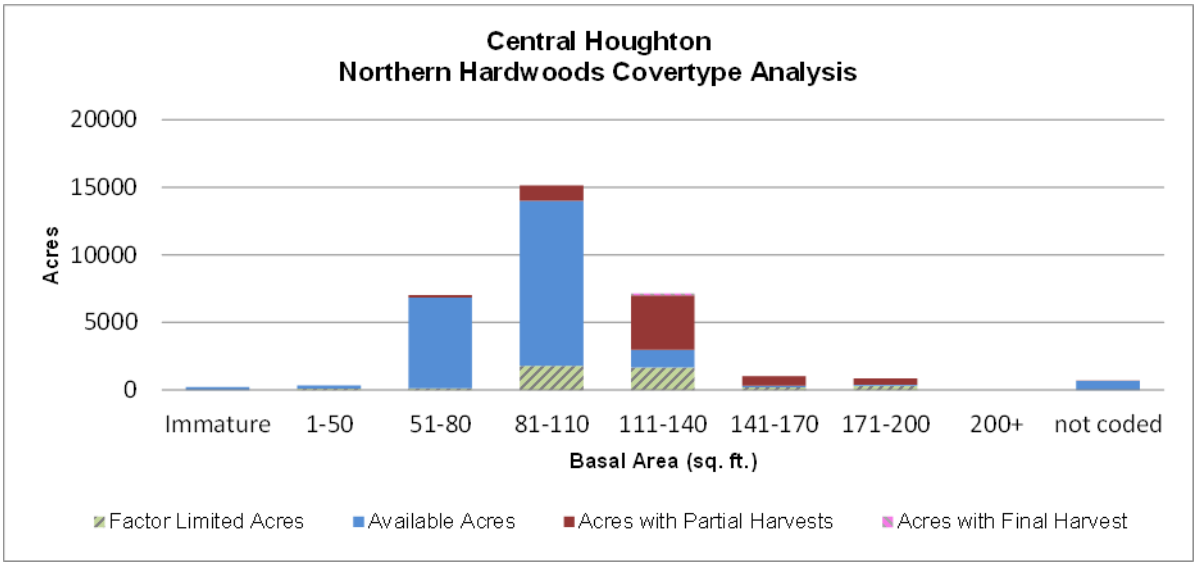

Figure 4.6.2. Graph of the basal area distribution for the northern hardwood cover type on the Central Houghton management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs and veneer with a full complement of tree seedlings recruiting into the overstory and well developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selective harvest northern hardwood stands on a 20-year cycle (this will result in an estimated 13,794 acres for harvest each decade); and
- Maintain and encourage minor species to increase within-stand diversity.

10-Year Management Objectives

- Approximately 13,794 acres will be selectively cut in the next decade;
- Maintain and promote regeneration of white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock components in stands lacking that species.

Aspen Cover Type

Current Condition

About 3,479 acres (7%) of state forest land in this management area are in the aspen cover type (Table 4.6.1). The aspen is grouped on the east side of the management area. Most of the aspen cover type in this management area is found on medium-productive hardwood sites. Aspen is poorly distributed across age classes with a spike occurring in the 10-19 year age class (Figure 4.6.3). Many of the stands coded as uneven-aged, are actually two-aged stands. In the future they will be managed as even-aged. There are 253 acres of aspen that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

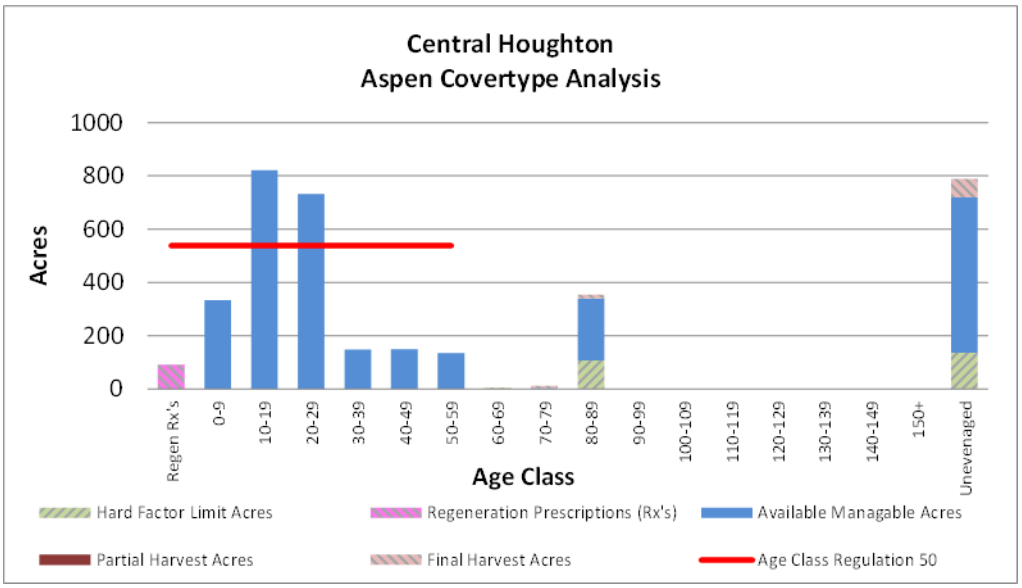

Figure 4.6.3. Graph of the age-class distribution for the aspen cover type on the Central Houghton management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate 538 acres each decade; and
- Stands of aspen with harvest limitations will succeed to more shade tolerant species.

10-Year Management Objectives

- The projected ten-year final harvest of aspen is 582 acres with most of this acreage expected to come from uneven-aged stands;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;
- Aspen within the identified Grouse Enhanced Management Systems area may be managed differently than the rest of the aspen within the management area, with a shorter rotation age**,** small patch cuts and carefully considered stand adjacency; and

- Maintain mature large-tooth aspen as retention.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 2,559 acres (5%) of the MA (Table 4.6.1). This cover type is found on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 1,084 acres that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Mixed lowland conifers are poorly distributed across the age-class distribution. Most of the stands are between 80 and 110 years old (Figure 4.6.4). Little harvesting has been done in this type over the past 40 years.

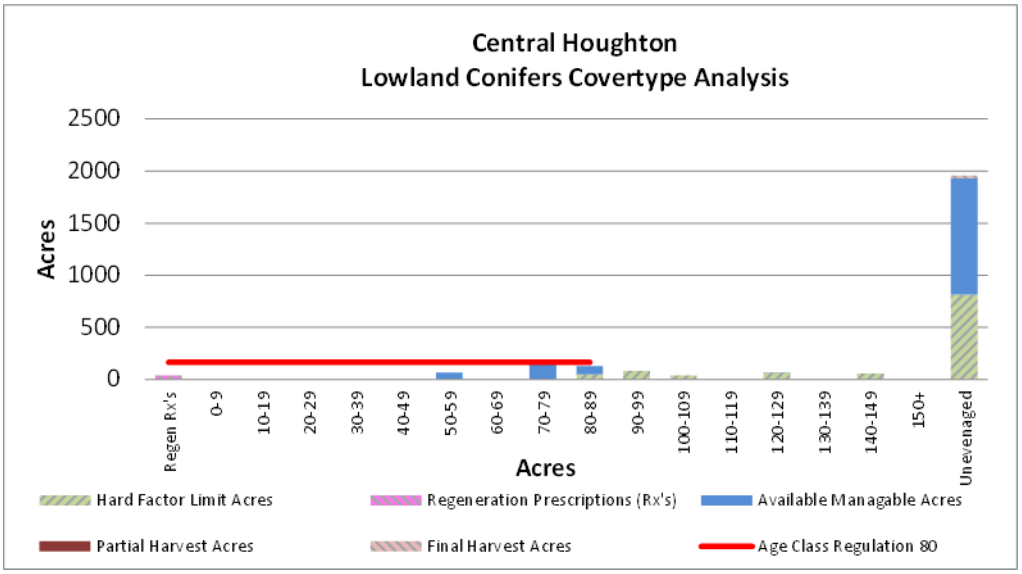

Figure 4.6.4. Graph of the age-class distribution for the lowland conifer cover type on the Central Houghton management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for approximately 105 acres to be harvested per decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 164 acres over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques;
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested types make up 6,362 acres (14%) and are made up of hemlock (1,371 acres), upland mixed forest (1,023 acres), mixed upland deciduous (1,009 acres), lowland deciduous (732 acres), upland conifer (635 acres), cedar (380 acres), upland spruce/fir (355 acres), oak (317 acres), lowland mixed forest (272 acres), tamarack (134 acres), lowland spruce-fir (130 acres) and jack pine (4 acres). Together these types make up about four percent of the management area (Table 4.6.1).

Approximately 1,898 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Desired Future Condition

- Maintain similar proportions of minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods;
- Harvest as opportunities arise in conjunction with other management activities;
- Most of the minor cover types in this management area are typically managed with even-age systems; however, if opportunities arise these stands will be harvested and managed at an appropriate rotation;
- Monitor to assure adequate regeneration; and
- Where stands have site conditions limiting harvest, early successional cover types will be lost through natural succession.

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
- Projected harvests in these cover types include 805 acres of final harvest, and 1,130 acres of partial harvest over the next decade.

Other Non-forested Cover Types

Current Condition

Non-forested cover types found on this management area include: upland open/semi-open lands (586 acres – 1%), lowland open/semi-open lands (954 acres – 2%) and miscellaneous other (water, local, urban) (512 acres – 1%) (Table 4.6.1).

Desired Future Condition

- Maintain current acreage in grasses and other non-forested cover types.

Long-Term Management Objectives

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses and forbs to dominate.

10-Year Management Objectives

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

4.6.2 – Featured Wildlife Species Management

This management area represents almost 15% of the western Upper Peninsula state forest hemlock resource and is one of the few management areas where the species reliably regenerates and recruits. The primary focus of wildlife habitat management in the Central Houghton management area will be to address the habitat requirements identified for the following featured species: blackburnian warbler, pileated woodpecker, ruffed grouse and northern goshawk. Some of the most significant wildlife management issues in the management area are mesic conifers; mature forest; habitat fragmentation; coarse woody debris; and retention or development of large living and dead standing trees (for cavities). Increasing the structural and compositional diversity of the northern hardwoods with a particular emphasis on increasing the hemlock component is of utmost importance. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., identifying large contiguous blocks of potential habitat for northern goshawk) for featured species will be performed.

This management area will include one of the western Upper Peninsula Grouse Enhanced Management System areas. The boundaries will be delineated during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager. Aspen stands that fall within the boundary may be managed to enhance habitat and hunting opportunities for ruffed grouse. Habitat treatments may include managing aspen on a shortened rotation with multiple age classes and smaller stand sizes.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover to cubs (e.g., white pine and hemlock).

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain mesic conifer during harvests; b) Use silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated stands, particularly hemlock, in the management area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years in upland areas.

Northern Goshawk

The goal for northern goshawk is to maintain suitable habitat. Management at the stand scale should focus on the protection of nest trees, provision of coarse woody debris and on 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. 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.

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches diameter at breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: leave scattered retention patches around some 18 inches in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age class (within the compartment, management area or WUP ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

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.
- Manage the aspen cover type for smaller patch size, a shorter rotation and a more deliberate habitat configuration within the designated Grouse Enhanced Management Systems areas where appropriate.
- 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.

4.6.3 – 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, 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 ten listed species and no natural communities of note occurring in the management area as listed in Table 4.6.2. 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 Pine Lake Dam Flooding State Wildlife Management Area is a special conservation area within this management area as shown in Figure 4.6.5.

Approximately 1337.5 acres of potential old growth have been identified within the Central Houghton 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.

Table 4.6.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Central Houghton 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								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Fish								
Bigmouth shiner	*Notropis dorsalis*	SC/G5/S4	Confirmed	MV	Moderate	Rivers	Aquatic	N/A
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plants								
Walking fern	*Asplenium rhizophyllum*	T/G5/S2S3	Confirmed			Mesic northern forest	Northern Hardwood	Late
						Limestone cliff	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Limestone lakeshore cliff	Upland open/semi-open	N/A
						Mesic southern forest		
						Sinkhole	Upland open/semi-open	N/A
Laurentian fragile fern	*Cystopteris laurentiana*	SC/G3/S1S2	Confirmed			Mesic northern forest	Northern Hardwood	Late
						Granite cliff	Upland open/semi-open	N/A
						Limestone cliff	Upland open/semi-open	N/A
American shore-grass	*Littorella uniflora*	SC/G5/S2S3	Confirmed			Submergent marsh	Lowland open/semi-open	N/A
Farwell's water milfoil	*Myriophyllum farwelii*	T/G5/S2	Confirmed			Emergent marsh	Lowland open/semi-open	N/A
Fairy bells	*Prosartes hookeri*	E/S2/G5	Confirmed			Mesic northern forest	Northern Hardwood	Late

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

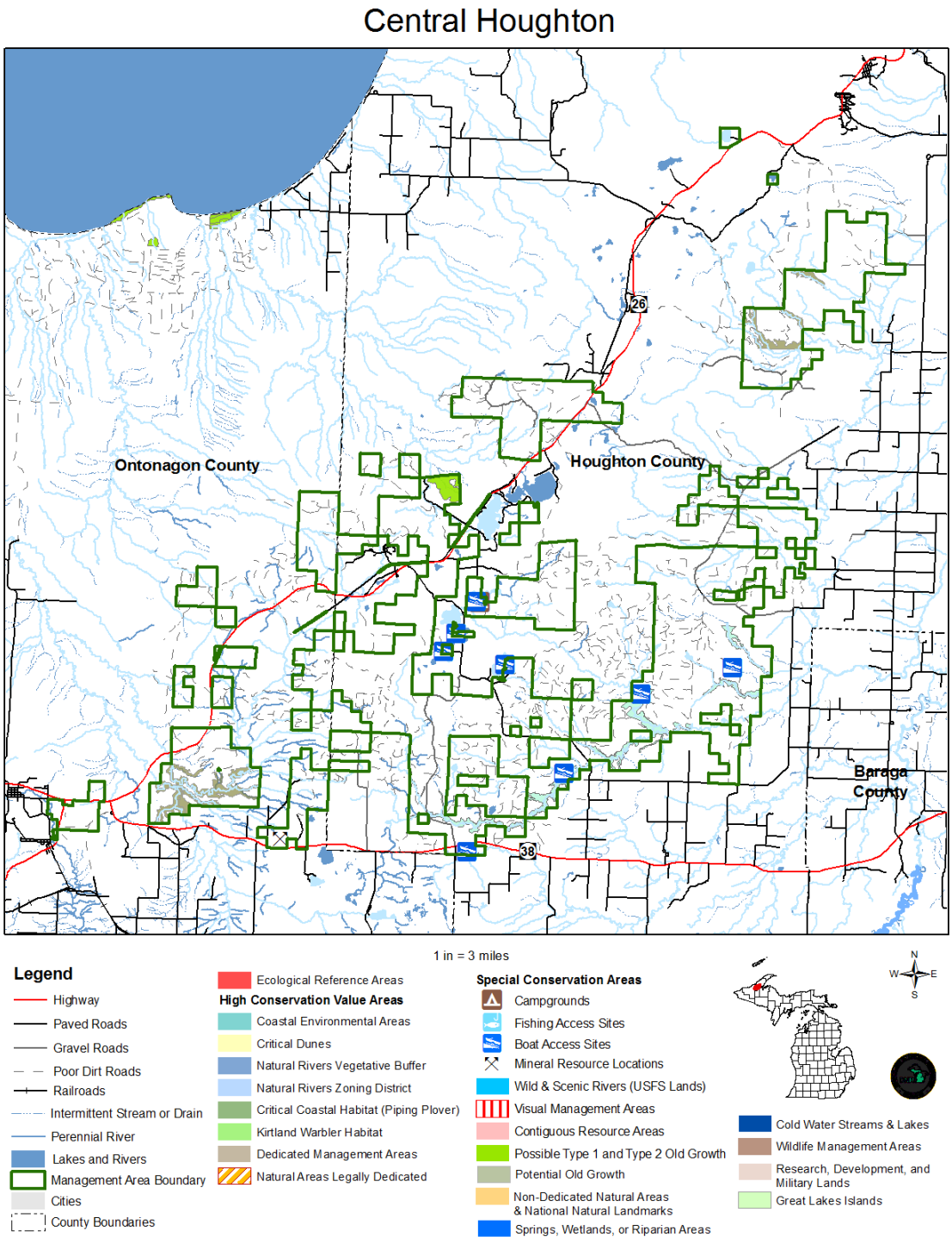

Figure 4.6.5. A map of the Central Houghton management area showing the special resource areas.

There have been no high conservation value areas or ecological reference areas identified in the management area as illustrated in Figure 4.6.5.

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.

4.6.4 – 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
- 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. Following is a list of species of concern that been documented in or near this management area:

- Bell's honeysuckle
- Canada thistle
- Crack willow
- European swamp thistle
- Japanese barberry
- Japanese honeysuckle
- Japanese knotweed
- Leafy spurge
- Phragmites
- Purple loosestrife
- Reed canary grass
- Scots pine
- Spotted knapweed
- Tatarian honeysuckle
- Wild parsnip

4.6.5 – 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 are shown in Figure 4.6.1.

4.6.6 – Fire Management

This area is dominated by mesic northern forest. Fire impacts were rare, resulting in very long fire return intervals and now all wildfires are subject to appropriate initial attack.

4.6.7 – Public Access and Recreation

This area contains a complex network of forest roads supplying public access for hunting and fishing, as well as timber harvest. The roads cross state lands, large industrial ownerships and some small private ownerships. The state forest land is fragmented by large industrial ownerships which is a concern as frequently the new owners limit access across their property. There are motorized vehicle trails as shown in Figure 4.6.1 and there is one state forest campground at Emily Lake as well as several boating access sites scattered around area lakes (Figure 4.6.5). The direction is to maintain current management and public access.

Specific hunting recreation improvements such as parking lots, gates, trail planting and trail establishment, as well as the preparation and dissemination of specific promotional material, may be made as a result of Grouse Enhanced Management Systems areas planning in this management area.

4.6.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of coarse and fine-textured till, an end moraine of fine-textured till, lacustrine sand and gravel and clay and silt, with minor amounts of glacial outwash sand and gravel and postglacial alluvium. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is good potential. There is also a Devonian Bois Blanc outlier located in the area, that is quarried for limestone in Baraga County.

The Precambrian Jacobsville Sandstone, Portage lake Volcanics and Copper Harbor Conglomerate subcrop below the glacial drift. The Jacobsville was used as a building stone in the past.

Old copper mines are located along the northwest edge of the management area. Metallic mineral exploration has occurred in the management area, in the past, and a new nomination is currently in the leasing process in the area of the older mines.

4.7 Central Keweenaw Management Area

Summary of Use and Management

Vegetative management in the Central Keweenaw management area (MA) (Figure 4.7.1) 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 the management priority for this area is the production of timber products, while maintaining habitat qualities for wildlife species dependent on the northern hardwood communities in this area; maintaining the presence of minor cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives include providing thermal cover in the 5 Mile Point and Jacobsville deer wintering complexes. Management activities may be constrained by site conditions and the small scattered parcels in the area. Management access will be an issue for the next 10-year planning period.

Introduction

The Central Keweenaw management area is mostly on beach ridge and dunes in northern Houghton and southern Keweenaw Counties. The state forest covers 3,679 acres and is in small-scattered parcels. The management area is dominated by the upland spruce/fir, cedar and aspen. Other attributes that played a role in the definition of this management area include:

- Dominated by the mesic northern forest natural community;
- Mid-range in site quality; and
- Major ownerships in this vicinity are non-industrial private and forest industry.

The management priority for this area is the production of timber products, while maintaining habitat qualities for wildlife species dependent on the northern hardwood communities in this area.

The predominant cover types, composition and projected harvest areas for the Central Keweenaw management area are shown in Table 4.7.1.

Table 4.7.1 Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Central Keweenaw 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
Upland Spruce/Fir	19%	696	431	265	0	0	696	29	0
Cedar	8%	295	69	226	0	0	295	14	0
Aspen	7%	246	19	227	0	0	246	32	0
Northern Hardwood	6%	216	0	216	0	102	216	0	108
Lowland Spruce/Fir	6%	205	122	83	32	0	205	9	0
Lowland Conifers	5%	186	67	119	46	0	186	13	0
Upland Open/Semi-Open Lands	1%	54	0	54	0	0	54	0	0
Lowland Open/Semi-Open Lands	25%	922	0	922	0	0	922	0	0
Misc Other (Water, Local, Urban)	6%	215	0	215	0	0	215	0	0
Others	18%	644	122	522	179	129	644	68	139
Total		3,679	830	2,849	256	231	3,679	165	247

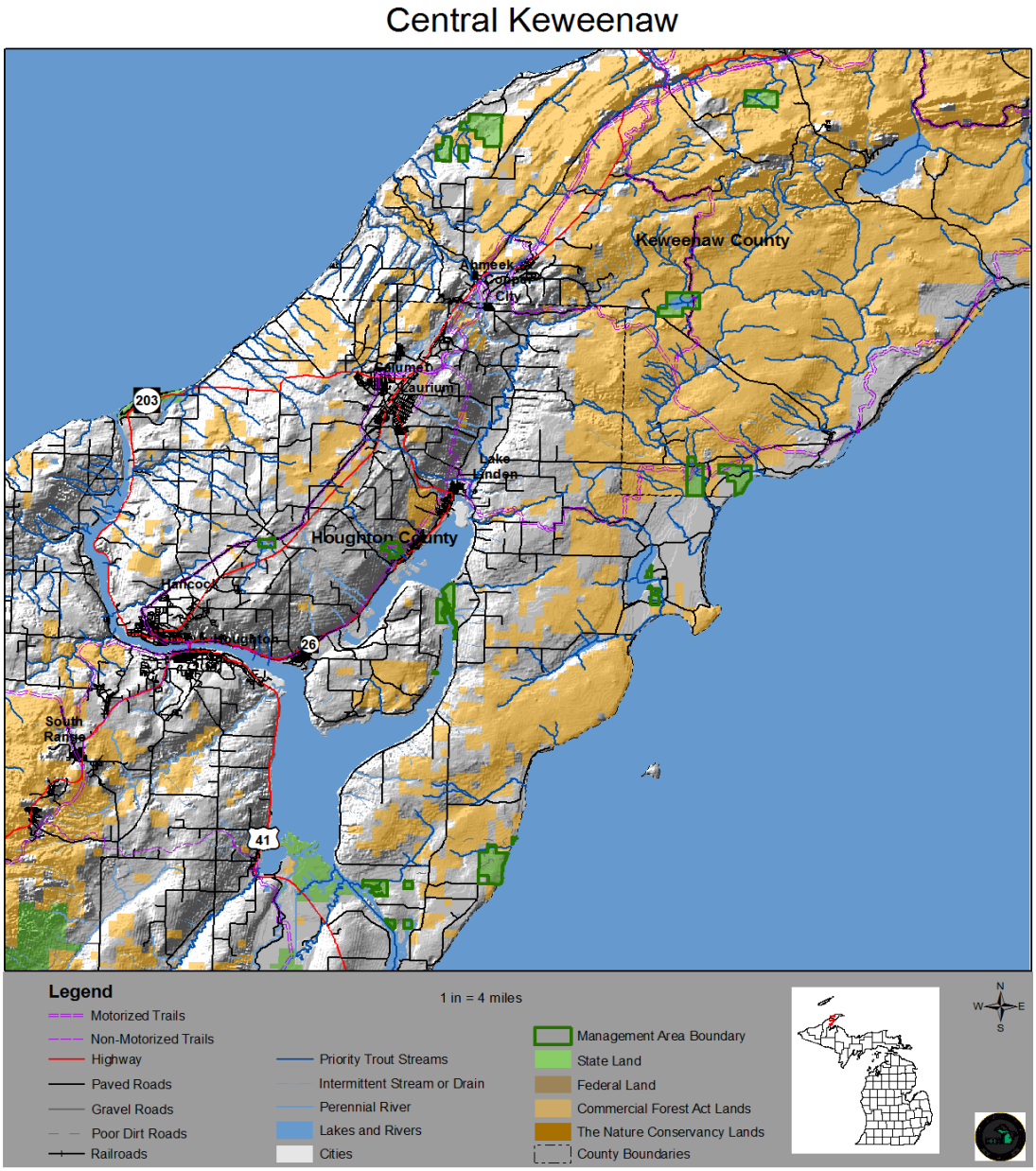

Figure 4.7.1. A map of the Central Keweenaw management area (dark green boundary) in relation to the surrounding state forest and other lands in Houghton and Keweenaw Counties, Michigan.

4.7.1 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 Central Keweenaw 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.

Upland Spruce/Fir Cover Type

Current Condition

There are 696 acres (19%) of upland spruce-fir in this management area (Table 4.7.1). Upland spruce/fir typically occurs as small stands occupying the transition zone between larger upland types (aspen and northern hardwood) and lowlands. Upland spruce/fir stands are generally short-lived reaching maturity in 60-70 years. Left unmanaged they may experience insect (spruce budworm) and/or windthrow mortality will be followed by natural regeneration of spruce/fir and/or aspen. Alternatively, they may succeed to shade tolerant hardwoods like red maple. Upland spruce/fir stands in this management area are poorly distributed by age class (Figure 4.7.2). While there has been recent harvesting in this cover type, most of the stands in this area are over 80 years of age. There are 431 acres of upland spruce/fir that have site conditions limiting their harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

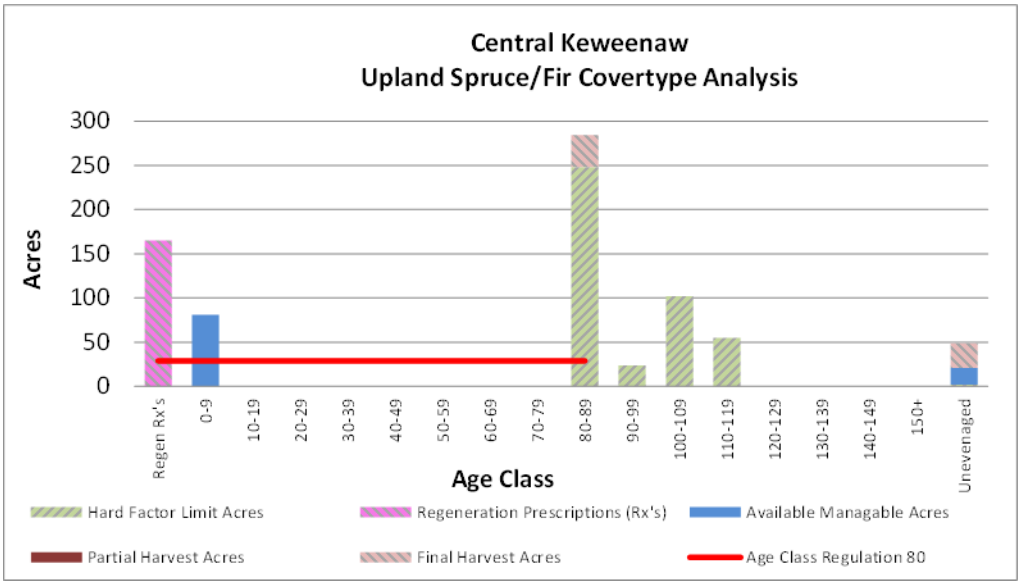

Figure 4.7.2. Graph of the age-class structure for the upland spruce-fir cover type on the Central Keweenaw management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain existing cover type although an increase in spruce-fir acreage is expected as factor limited paper birch stands succeed to spruce-fir stands.

Long-Term Management Objectives

- Harvest and regenerate upland spruce-fir stands using a 60-year rotation length (this would allow approximately 29 acres to be harvested per decade).

10-Year Management Objectives

- No harvest is planned for this cover type in this planning period; and
- Evaluate the oldest stands with factor limits to determine which stands should be permanently withdrawn from timber production and which stands are only temporarily limited.

Cedar Cover Type

Current Condition

Cedar occurs on 295 acres (8%) of the management area (Table 4.7.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir characterize the cedar cover type. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Cedar cover types are poorly distributed across the age-class distribution (Figure 4.7.3). Most of the stands are over 120 years of age. Little harvesting has been done in this cover type over the past 80 years. There are 69 acres of cedar with site conditions limiting their harvest.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

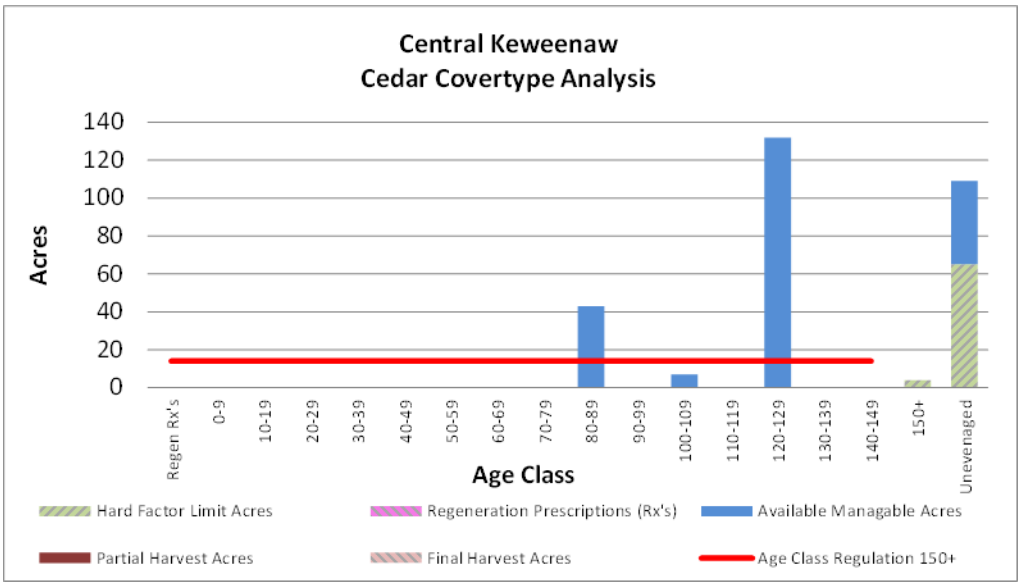

Figure 4.7.3. Graph of the age-class distribution of the cedar cover type on the Central Keweenaw management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of cedar seedlings and saplings;
- Maintain the closed cedar canopy structure in many stands for winter deer habitat.

Long-Term Management Objectives

- Maintain cedar cover type on the landscape; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objective

- While no cedar harvests are planned for this area in the next decade, limited harvesting may occur to test methods of cedar regeneration.

Aspen Cover Type

Current Condition

About 246 acres (7%) of state forest land in this management area are in the aspen cover type (Table 4.7.1). Aspen is poorly distributed across age-classes with a spike occurring in the 10-19 year age class (Figure 4.7.4). There are 19 acres

of aspen that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

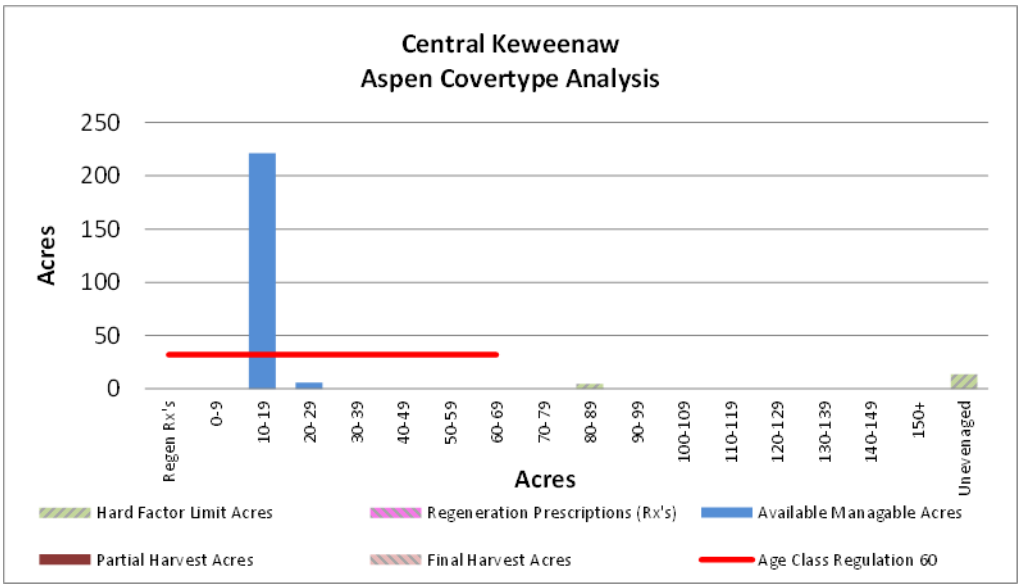

Figure 4.7.4. Graph of the age-class distribution of the aspen cover type for the Central Keweenaw management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Provide a supply of forest products and a mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objective

- Harvest and regenerate aspen stands using a 60-year rotation length allowing approximately 32 acres of aspen to be harvested per decade.

10-Year Management Objectives

- No harvest of aspen over this 10-year planning period.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands occur on 216 acres (6%) of state forest land in this management area (Table 4.7.1). Most stands have been managed using the selection harvest system. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age. Figure 4.7.5 shows the current basal area distribution for the management area.

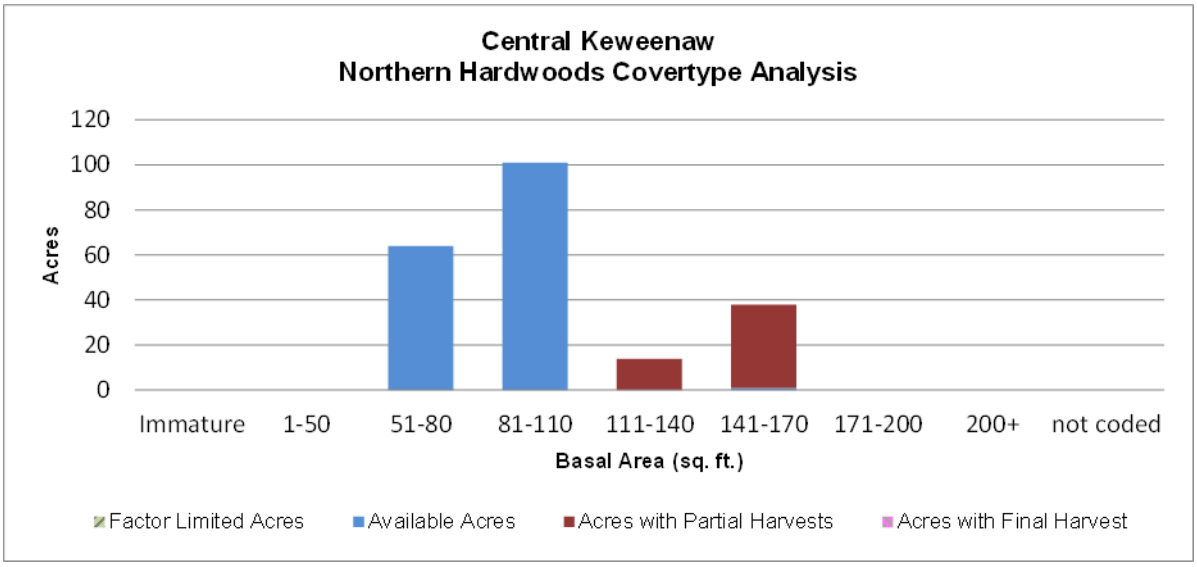

Figure 4.7.5. Graph of the basal area distribution for the northern hardwood cover type of the Central Keweenaw management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Manage for uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide a full complement of tree seedlings recruiting into the overstory; and
- Provide well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest northern hardwood stands on a 20-year cycle; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Approximately 102 acres will be selectively cut in the next decade;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested;
- Favor oak as a retention species; and
- Work to regenerate hemlock components in stands lacking that species.

Lowland Spruce/fir Cover Type

Current Condition

Currently there are 205 acres (6%) of the lowland spruce/fir cover type in the management area (Table 4.7.1). Lowland spruce/fir is often found in association with lowland conifer, cedar and tamarack cover types. Lowland spruce/fir in this management area does not have a well-balanced age-class distribution spiking in the 100-109 age class (Figure 4.7.6). A large portion of the lowland spruce/fir stands have been coded as uneven-aged, having trees of all sizes and ages. There are 122 acres of lowland spruce/fir that have site conditions limiting their harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

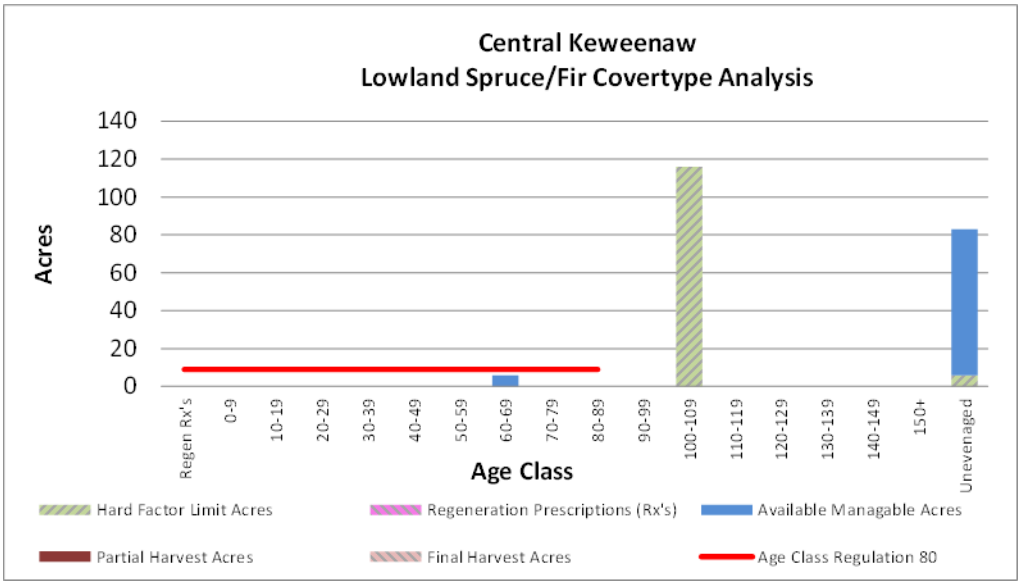

Figure 4.7.6. Graph of the age-class distribution for the lowland spruce/fir cover type on the Central Keweenaw management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain approximately the current acreage of lowland spruce-fir cover type with stands representing a variety of age classes.

Long-Term Management Objective

- Regenerate mature lowland spruce/fir cover types on an 80-year rotation allowing for nine acres to be harvested per decade.

10-Year Management Objectives

- Harvest 32 acres in the next decade (this number is higher than the regulated amount due to the current age-class structure where there are no stands in young age classes;
- Monitor harvested sites to assure regeneration; and
- More aggressive harvesting in this type maybe needed in the next 10-year planning period to reduce mortality losses in the older stands.

Other Forested Cover Types

Current Condition

Other forested types make up 830 acres and are made up of lowland conifer (186 acres), mixed upland deciduous (146 acres), upland conifer (114 acres), paper birch (136 acres), upland conifers (114 acres), tamarack (69 acres), red pine (47 acres), upland mixed forest (44 acres), lowland deciduous (39 acres), lowland mixed forest (25 acres), white pine (16 acres) and oak (eight acres). Together these types make up about 23% of the management area (Table 4.7.1).

Approximately 122 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Desired Future Condition

- Maintain similar proportions of minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods;

- Harvest as opportunities arise in conjunction with other management activities; and
- Monitor to assure adequate regeneration.

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
- The projected 10-year harvest is 225 acres of final harvest and 129 acres of partial harvest distributed across these cover types.

Other Non-forested Cover Types

Current Condition

Non-forested cover types found on this management area include: upland open/semi-open lands (54 acres – 1%), lowland open/semi-open lands (922 acres – 25%) and other (water, local, urban) (215 acres – 6%) (Table 4.7.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.7.2 – Featured Wildlife Species Management

The primary focus of wildlife habitat management in the Central Keweenaw management area will be to protect thermal cover in the 5 Mile Point and Jacobsville deer wintering complexes and address the habitat requirements identified for the following featured species: black bear, northern goshawk and white-tailed deer. Some of the most significant wildlife management issues in the management area are hard and soft mast; habitat fragmentation; mature forest (upland deciduous, especially aspen and mixed forest with little understory); coarse woody debris; and deer wintering complexes. Additional analyses to better define the spatial extent of priority areas (e.g., identify white-tailed deer wintering complexes) for featured species will be performed during this 10-year planning period.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover for cubs (e.g., white pine and hemlock).

Northern Goshawk

The goal for northern goshawk is to maintain suitable habitat. Management at the stand scale should focus on the protection of nest trees, provision of coarse woody debris and on 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 Integrated Forest Monitoring Assessment and Prescription comments. If the species is known the common name should be included in those comments. 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.7.3 – 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, 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 thirteen listed species as well as three natural communities of note occurring in the management area as listed in Table 4.7.2. 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.

Table 4.7.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Central Keweenaw management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Great Lakes marsh		S3/G2	Confirmed				Lowland open/semi-open	N/A
Sandstone lakeshore cliff		S2/G3	Confirmed				Upland open/semi-open	N/A
Wooded dune and swale complex		S3/G3	Confirmed				Upland open/semi-open	N/A
Birds								
Merlin	*Falco columbarius*	T/G5/S1S2	Confirmed	PS	Very High	Boreal forest	Upland & Lowland Sp/F	Mid
						Great Lakes barrens	Upland open/semi-open	N/A
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
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
Bigmouth shiner	*Notropis dorsalis*	SC/G5/S4	Confirmed	MV	Moderate	Rivers	Aquatic	N/A
Sauger	*Sander canadensis*	T/G5/S1	Confirmed	HV	Low	Rivers	Aquatic	N/A
						Great Lakes	Aquatic	N/A
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Northern reedgrass	*Calamagrostis lacustris*	T/G3Q/S1	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
Douglas's hawthorn	*Crataegus douglasii*	SC/G5/S3S4	Confirmed			Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
						Sand and gravel beach	Upland open/semi-open	N/A
						Sandstone bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Blue wild rye	*Elymus glaucus*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Open dunes	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
Satiny willow	*Salix pellita*	SC/G5/S2S3	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Northern shrub thicket	Upland open/semi-open	N/A
Torrey's bulrush	*Scripus torreyi*	SC/G5?/S2S3	Confirmed			Intermittent wetland	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.

Although there are no high conservation value areas, there are four ecological reference areas in the management area (Figure 4.7.7) representing the following natural communities: wooded dune and swale complex (two – 382.6 acres and 20.6 acres), Great Lakes marsh (236.6 acres) and sandstone lakeshore cliff (9.9 acres).

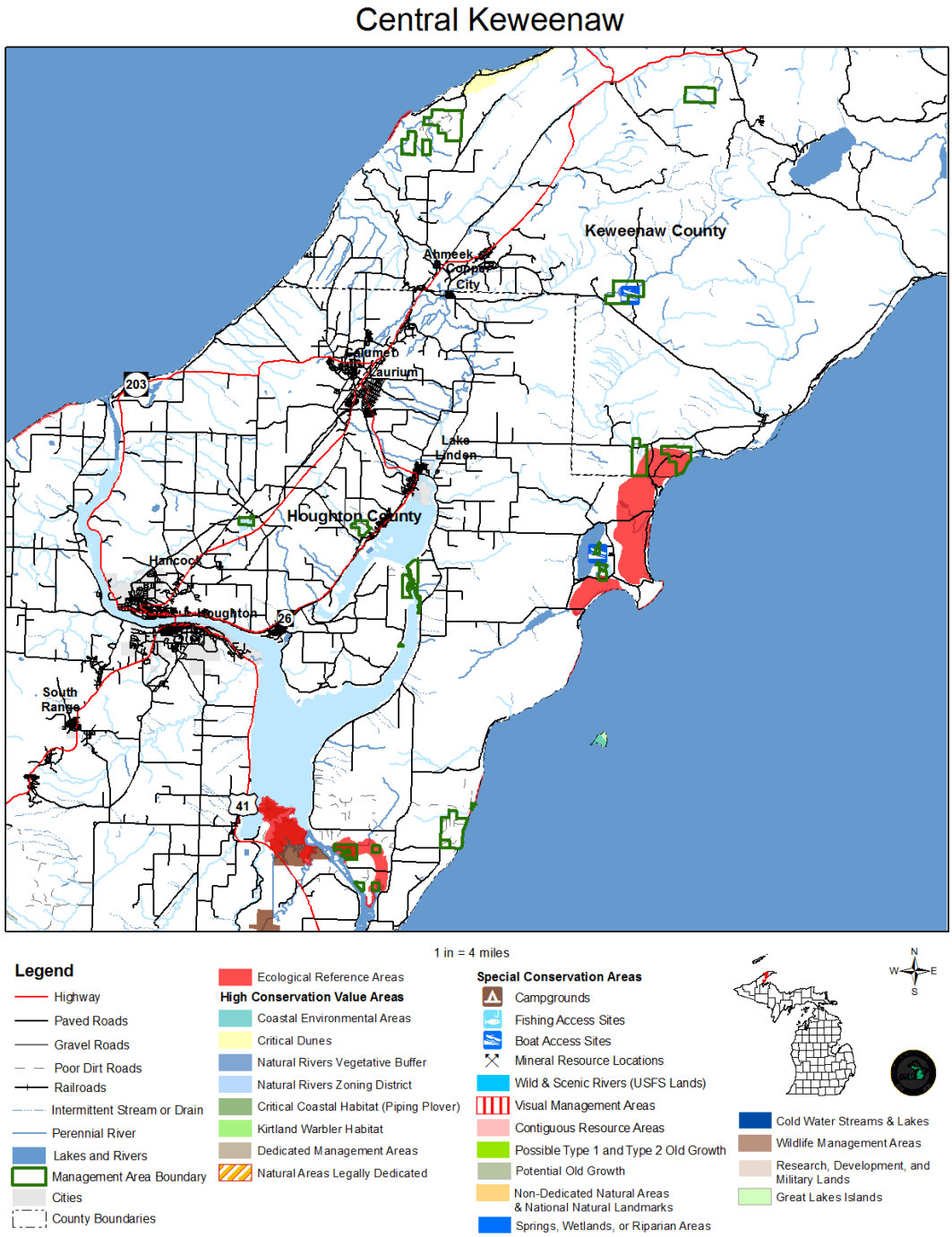

Figure 4.7.7. A map of the Central Keweenaw management area showing the special resource areas.

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 develop and maintain management plans for ecological reference areas on state forest land.

Objective 2-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.7.4 – Forest Health Management

Although forest health issues span the entire landscape, spruce budworm is the most important pest in this management area due to the species composition, site quality or other factors. 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. Following is a list of species of concern that been documented in or near this management area:

- Canada thistle
- Common buckthorn
- Garlic mustard
- Glossy buckthorn
- Japanese barberry
- Japanese knotweed
- Purple loosestrife
- Reed canary grass
- Spotted knapweed

4.7.5 – 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 are shown in Figure 4.7.1.

4.7.6 – Fire Management

This area is dominated by mesic northern forest. Fire impacts were rare, resulting in very long fire return intervals and now all wildfires are subject to appropriate initial attack.

4.7.7 – Public Access and Recreation

This area consists of small isolated parcels with limited public access. There is a network of rail/trails and snowmobile routes (Figure 4.7.1) primarily on private lands. There are boating access sites (Figure 4.7.7) at most of the inland lakes.

- Maintain current management access; and
- Work to expand public access as opportunities arise.

4.7.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of coarse-textured till, in places thin to discontinuous and lacustrine sand and gravel. The glacial drift thickness varies between 10 and 100 feet. Sand and gravel pits are located in the management area and there is potential.

The Precambrian Jacobsville Sandstone, Portage lake Volcanics and Copper Harbor Conglomerate subcrop below the glacial drift. The Jacobsville was used as a building stone in the past.

Old copper mines are located in the area of the management area. Metallic mineral exploration has occurred in the management area in the past, and there could be potential.

4.8 Chain Lakes Moraine Management Area

Summary of Use and Management

Vegetative management in the Chain Lake management area (MA) (Figure 4.8.1) 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, lowland conifer and lowland spruce/fir; 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 increasing diversity and long-term oak sustainability through under planting white and red pine; and to maintain or increase wildlife corridors especially along riparian areas. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and oak regeneration will be priority issues in this 10-year planning period.

Introduction

The Chain Lakes Moraine management area is located in Southwestern Marquette County on a disintegration moraine. The management area covers 84,724 acres, is mostly contiguous and is surrounded by private industrial forest land. The management area is dominated by the aspen, lowland conifer and jack pine cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry-mesic northern forest and poor conifer swamp;
- Mid-range in site quality;
- Two designated off-road vehicle trail systems are within this management area – Porterfield Lake and Bass Lake;
- Provides multiple benefits including forest products dispersed recreational activities; and
- Provides a variety of fish and wildlife habitats.
- This management area contains one of the western Upper Peninsula Grouse Enhanced Management Systems areas. This area plan will emphasize balanced age classes of aspen for timber production which will have habitat benefits for ruffed grouse. The boundaries of Grouse Enhanced Management Systems areas will be delineated and an operational plan will be developed during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager and integrated into the plan through the revision process.

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 Chain Lakes Moraine management area are shown in Table 4.8.1.

Table 4.8.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data).

Cover Type	Cover %	Current Acreage	Hard Factor Limited	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Acreage in 10	Desired Future Harvest (Acres	
					Final Harvest	Partial Harvest		Final Harvest	Partial Harvest
Aspen	37%	31,576	1,258	30,318	6,282	0	31,576	5,053	0
Lowland Conifers	11%	9,226	5,640	3586	399	0	9,226	399	0
Lowland Spruce/Fir	6%	5,451	2,749	2702	300	0	5,451	300	0
Jack Pine	6%	4,900	152	4748	150	0	4,900	678	0
Red Pine	5%	4,544	325	4219	469	1,337	4,544	469	1,660
Northern Hardwood	5%	4,171	98	4073	0	1,911	4,171	0	1,911
Upland Open/Semi-Open Lands	4%	3,217	0	3217	0	0	3,217	0	0
Lowland Open/Semi-Open Lands	8%	6,875	0	6875	0	0	6,875	0	0
Misc Other (Water, Local, Urban)	1%	816	0	816	0	0	816	0	0
Others	16%	13,948	3,294	10654	1,159	1,008	13,948	1,127	1,447
Total		84,724	13,516	71,208	8,759	4,256	84,724	8,026	5,018

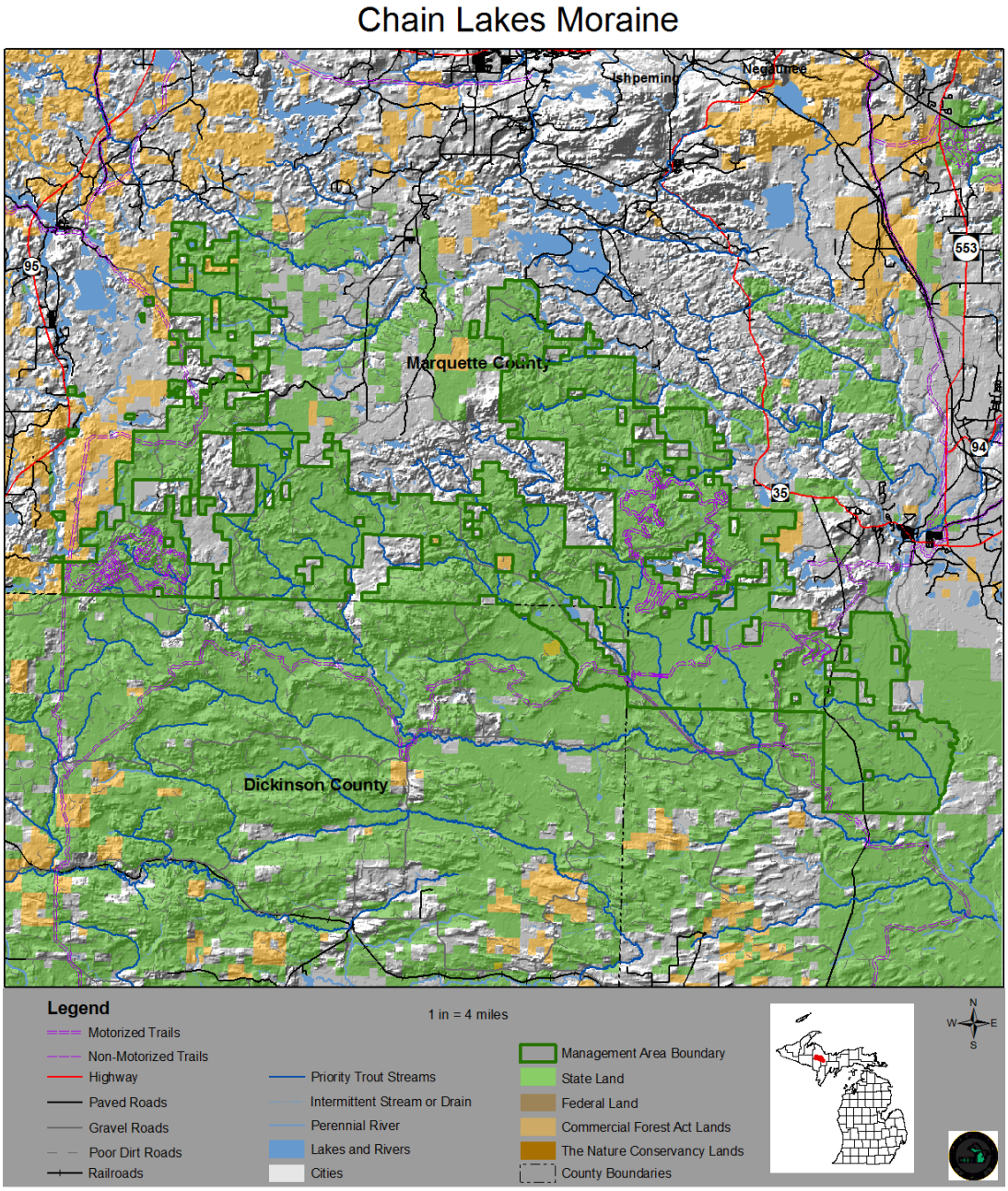

Figure 4.8.1. A map of the Chain Lakes management area (dark green boundary) in relation to surrounding state forest and other lands in Marquette County, Michigan

4.8.1 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 Chain Lake Moraine 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 31,576 acres (37%) of the management area (Table 4.8.1) and is poorly distributed across age classes (Figure 4.8.2). Aspen is growing on dry-mesic to dry sandy soils, which are productive sites for the species. Aspen will be managed on a 60 year rotation to a balanced age-class structure indicated by the red line in Figure 4.8.2. Most of the age classes over the rotation age of 60 years (60-69 years on Table 4.8.1) are in the hard factor limited category, partial harvest category or are part of a regeneration harvest. With a pronounced deficit of aspen in the 40 plus age classes, early entry into younger age classes with surplus acres above the regulation line, is possible, but unlikely during the next 10-year period. Aspen in these age classes are not of merchantable size and have not reached economic maturity.

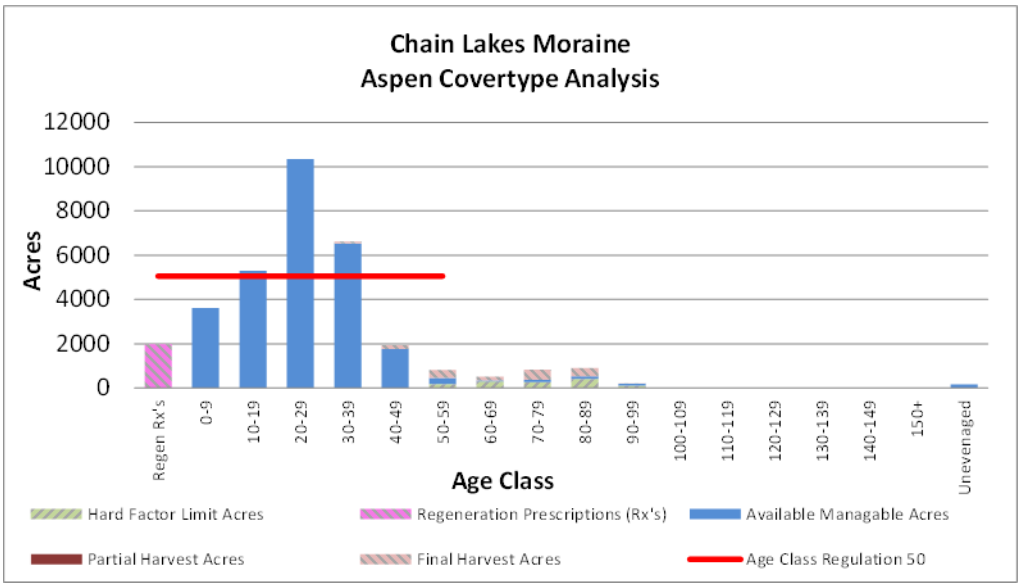

Figure 4.8.2. Graph of the age-class structure for the aspen cover type on the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years (indicated by the red line in Figure 4.8.2);
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length;
- Once age classes are closer to balanced, harvest and regenerate 5,053 acres each decade;
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types;
- Favor regeneration of large-tooth aspen where practical as this species is well suited to the drier, sandy soils of this management area; and
- Mitigate any resulting loss of aspen acreage during this planning period through identification of replacement acreage prior to conversion.

10-Year Management Objectives

- Regenerate 6,282 acres over the 10-year planning period;
- Regenerate stands of 70 - 90 year old aspen that are in decline;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;

- Evaluate younger age classes with surplus acres (acres above the red line in Figure 4.8.2) for early harvest potential as they increase in size and age;
- Aspen within the identified Grouse Enhanced Management Systems area may be managed differently than the rest of the aspen within the management area, with a shorter rotation age**,** small patch cuts and carefully considered stand adjacency; and
- Maintain mature large-tooth aspen if present as retention.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 9,226 acres (11%) of the management area (Table 4.8.1). Lowland conifers are poorly distributed across age classes, over-represented in the older age classes and underrepresented in the younger classes (Figure 4.8.3). This type is found primarily on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Most of these stands have a hard factor limit associated with them which typically makes them unavailable for harvesting. Stands that are available for harvest will be managed on an 80-year rotation (indicated by the red line in Figure 4.8.3) with the goal of approaching a more balanced age-class distribution over multiple rotations. Little harvesting has been done in this cover type over the past 60 years.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation harvesting 399 acres without hard limiting factors per decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir; Harvesting will be done using small clearcuts or strips with clumped retention; and
- Monitor for insect and disease susceptibility and regenerate before widespread mortality occurs.

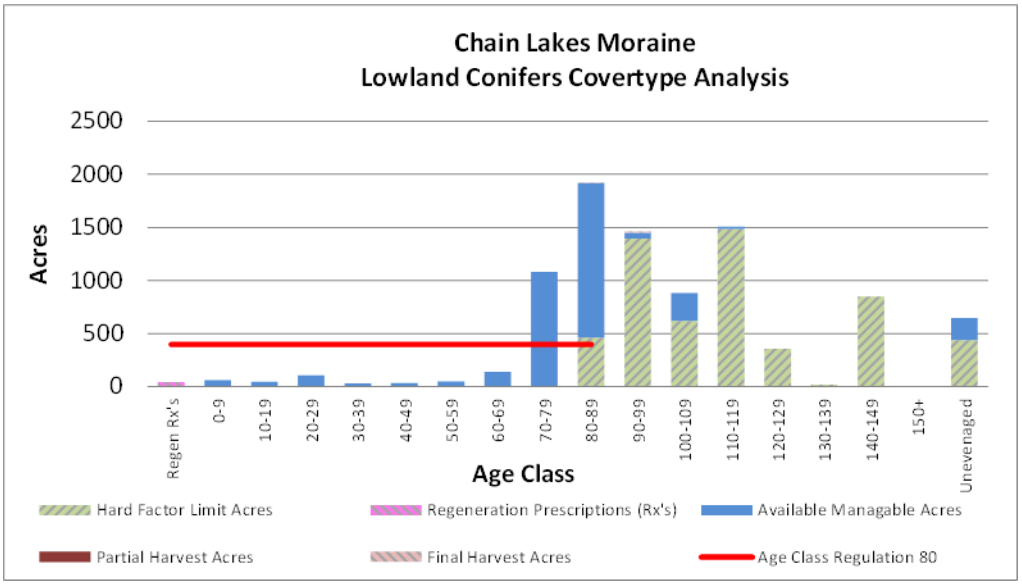

Figure 4.8.3. Graph of the age-class structure for the lowland conifer cover type on the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data)**.**

10-Year Management Objectives

- Harvest 399 acres over the next decade focusing on the use of “low impact” harvesting systems and successful regeneration techniques;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Lowland Spruce/fir Cover Type

Current Condition

The lowland spruce/fir cover type covers 5,451 acres (6%) of the management area (Table 4.8.1). Lowland spruce/fir is poorly distributed across age classes, over-represented in the older age classes and underrepresented in the younger classes (Figure 4.8.4). Lowland spruce-fir is often found in association with lowland conifer, cedar and tamarack cover types. Most stands have a hard factor limit associated with them which typically makes them unavailable for harvesting. Stands that are available for harvest will be managed on an 80-year rotation (indicated by the red line in Figure 4.8.4) with the goal of approaching a more balanced age-class distribution over multiple rotations.

Desired Future Condition

- Maintain approximately the current level of lowland spruce-fir cover type with stands with better representation across all age classes.

Long-Term Management Objectives

- Harvest and regenerate 300 acres per decade on an 80-year rotation; and
- Monitor for insect and disease susceptibility and regenerate before widespread mortality occurs.

10-Year Management Objectives

- Harvest about 300 acres in the next decade;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

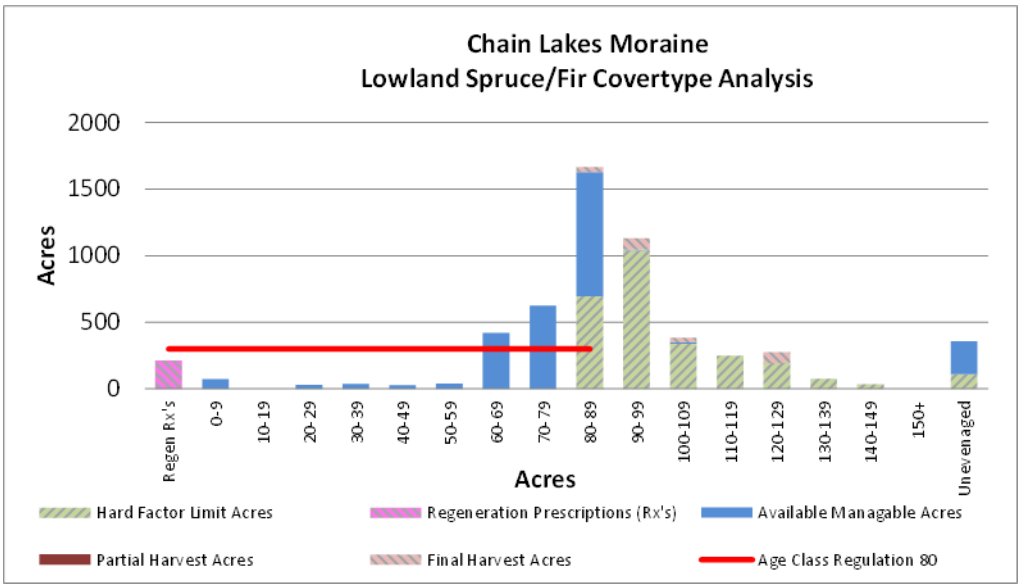

Figure 4.8.4. Graph of the age-class structure for the lowland spruce-fir cover type on the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data).

Jack Pine Cover Type

Current Condition

The jack pine cover type covers 4,900 acres (6%) of the management area (Table 4.8.1) and is poorly distributed across age classes (Figure 4.8.5). Jack pine is growing on dry-mesic to dry-sandy soils, which are productive sites for the species. Jack pine will be managed on a 60-year rotation (indicated by the red line in Figure 4.8.5). Jack pine acres are unevenly distributed across age classes.

Desired Future Condition

- Balanced acres in each age class up to 60 years (indicated by the red line in Figure 4.8.5);
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate jack pine using a 60-year rotation length; and
- Regenerate approximately 678 acres each decade.

10-Year Management Objectives

- While the harvest model suggests harvesting 150 acres over the next decade, this will be challenging due to the lack of older age classes shown in Figure 4.8.5;
- Opportunities to harvest in the age classes with surplus acres (above the red line) presently in the 0-9, 10-19 and 20-29 year age classes will be explored as these classes grow older and reach merchantable size;
- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early and
- Monitor for jack pine budworm and other insect or disease problems.

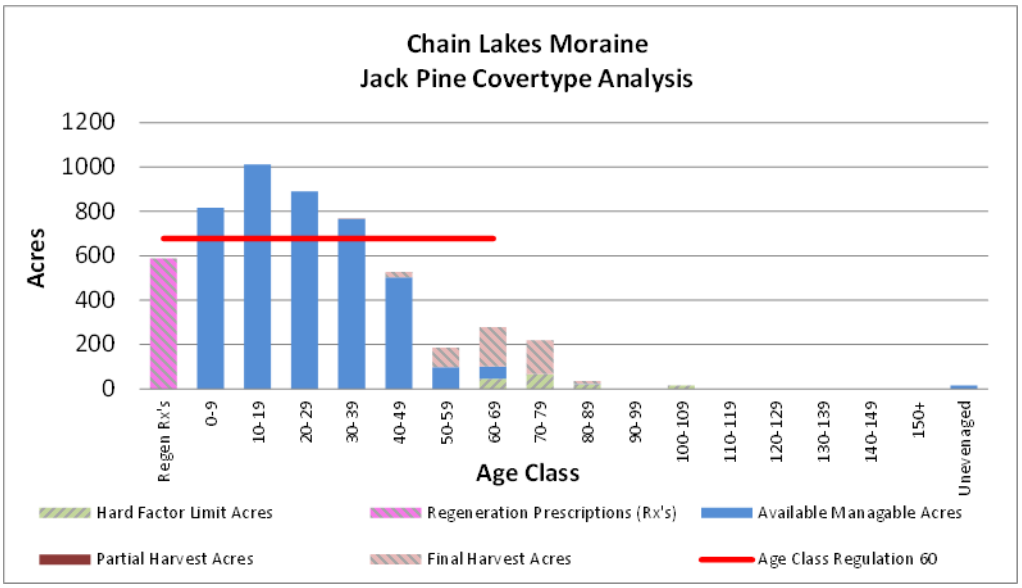

Figure 4.8.5. Graph of the age-class structure for the jack pine cover type on the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data).

Red Pine Cover Type

Current Condition

The red pine cover type covers 4,544 acres (5%) of the management area (Table 4.8.1) and is poorly distributed across age-classes (Figure 4.8.6). This cover type will be managed on an 80-year rotation with a balanced age-class structure of 150 acres in each age class (indicated by the red line in Figure 4.8.6). Red pine stands occur on dry-mesic, sandy soils similar to the aspen stands in this management area. Nearly 60% of the red pine in this management area is of plantation origin. The spike in the 50-59 year-old age class on Figure 4.8.6 is indicative of the planting efforts of the 1950s that established many of these stands.

Desired Future Condition

- Maintain the same number of acres of red pine in the management area and at approximately the same ratio of plantation-pine to natural origin pine (approximately 60% plantation origin);
- Balance age classes of the plantation origin red pine to lessen the spike in the 50-59 year-old age class and
- Where possible along recreation trails, convert plantation red pine to natural origin red pine.

Long-Term Management Objectives

- Harvest and regenerate 469 acres and thin 1,660 acres each decade;
- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) as basal area guidelines are met;
- Maintain stands of natural origin on about 40% of the red pine acreage;
- Manage natural origin stands on an average 150-year rotation using natural regeneration techniques and scarification as needed; and
- Both natural origin and plantation stands will be thinned as necessary.

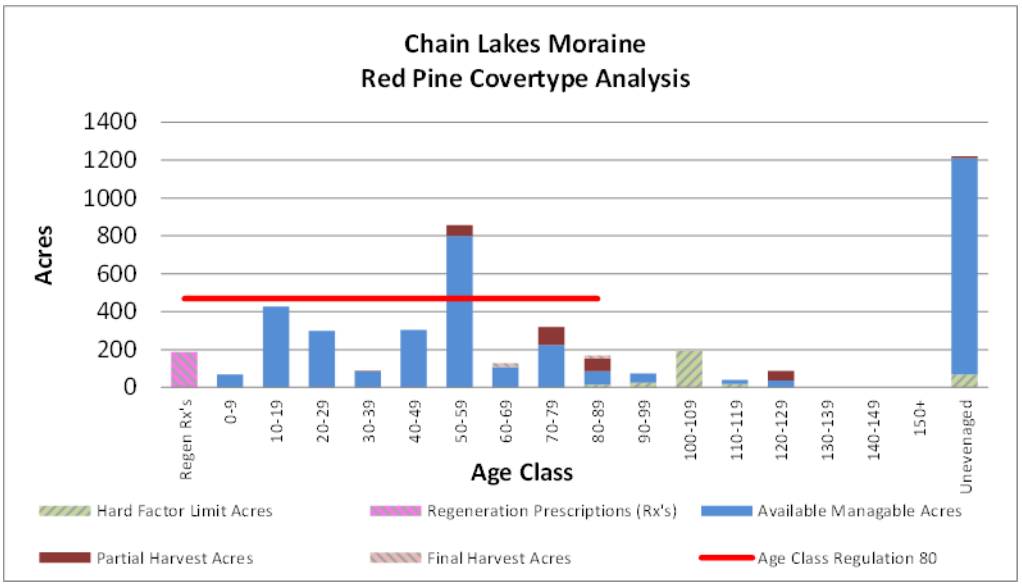

Figure 4.8.6. Graph of the age-class structure for the red pine cover type on the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Regenerate 469 acres of red pine in the next decade;
- Thin about 1,337 acres of red pine during the next 10-year planning period; and
- Thinning should add natural regeneration gaps to promote stand species diversity.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up about 4,171 acres (5%) of this management area (Table 4.8.1). Stands occur mostly on mesic sites producing medium to high-quality hardwoods. Most stands have been managed on a selection harvest basis and are in good condition. Due to low deer numbers in this area, there are few problems with seedling herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age (Figure 4.8.7).

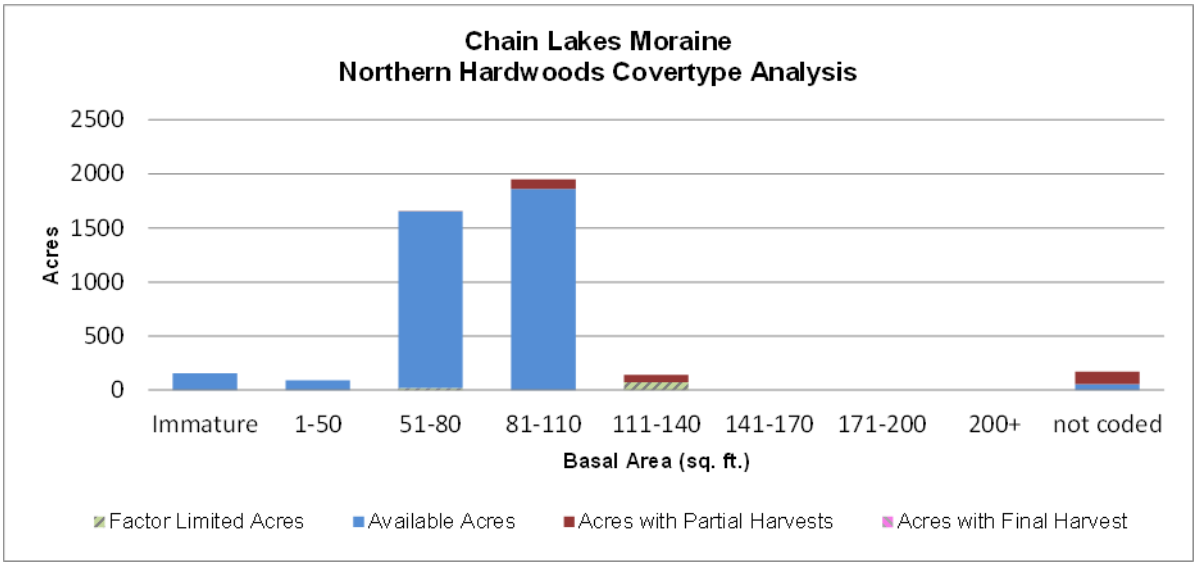

Figure 4.8.7. Graph of the basal area distribution for the northern hardwood cover type on the Chain Lakes Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Sustainable regeneration and recruitment of northern hardwood species leading to an all-age structure with high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- A well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle;
- Harvest an estimated 1,911 acres each decade; and
- Low quality hardwood stands will be managed on an even-aged system with an 80-year rotation.

10-Year Management Objectives

- Harvest 1,911 acres in this planning period; and
- Maintain oak, hemlock, white pine and upland cedar where possible in stands that are harvested.

Other Forested Cover Types

Current Condition

Other forested types make up 13,948 acres. These are made up of cedar (3,239 acres), upland spruce-fir (2,557 acres), white pine (2,069 acres), oak (2,036 acres), paper birch (1,077 acres), tamarack (596 acres), natural mixed pine (549 acres), mixed upland deciduous (523 acres),lowland poplar (389 acres), upland mixed forest (304 acres), upland conifer (261 acres), lowland deciduous (114 acres), planted mixed pine (108 acres), lowland mixed forest (77 acres) and hemlock (49 acres). Together these types make up about 16% of the management area (“Others” in Table 4.8.1).

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;
- Use appropriate silvicultural techniques to assure adequate regeneration;
- Monitor harvested sites;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these cover types will be less than 2,167 acres total.

Other Non-forested Cover Types

Current Condition

Non-forested cover types found on this management area include: upland open/semi-open lands (3,217 acres – 4%), lowland open/semi-open lands (6,875 acres – 8%) and other (water, local, urban) (816 acres – 1%) (Table 4.8.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.8.2 – Featured Wildlife Species Management

The Chain Lakes Moraine management area offers opportunities to increase diversity and perhaps long-term oak sustainability through under planting white and red pine. Another priority is to maintain or increase wildlife corridors especially along riparian area. The primary focus of wildlife habitat management in the Chain Lakes Moraine management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, gray jay, pileated woodpecker, northern goshawk, ruffed grouse and red crossbill. Some of the most significant wildlife management issues in the management area are mast (hard and soft); habitat fragmentation; mature forest conditions; mesic conifer; coarse woody debris; and retention or development of large living and dead standing trees (for cavities). Focus on increasing the oak resource with the management area and to optimize acorn production. This management area represents approximately 25% of the oak resource in the western Upper Peninsula. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., identify large contiguous blocks of potential habitat for northern goshawk) for featured species will be performed.

This management area will include one of the western Upper Peninsula Grouse Enhanced Management System areas. The boundaries will be delineated during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager. Aspen stands that fall within the boundary may be managed to enhance habitat and hunting opportunities for ruffed grouse. Habitat treatments may include managing aspen on a shortened rotation with multiple age classes and smaller stand sizes.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on balancing the age-class distribution and provision of display, feeding, nesting and brood-rearing habitat via upland brush, opening and poorly stocked stand management.

Wildlife habitat specifications:

- Maintain aspen cover types within the management area, especially where associated with alder, riparian zones, or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover for cubs (e.g., white pine and hemlock).

Gray Jay

The goal for gray jay in the western Upper Peninsula is to maintain or increase suitable habitat. Management for gray jay should focus on maintaining boreal forest cover types in a variety of age classes, and ensure that older age classes of boreal forest are maintained. Important considerations in timber harvests are retention of scattered individual spruce and fir trees for food caching within sale boundaries and maintaining spruce and fir buffers along bog edges.

Wildlife habitat specifications:

- Maintain appropriate forest types (birch, lowland deciduous, fir, lowland conifer, lowland spruce/fir, tamarack and bogs) in the management area in a variety of age classes. Fifteen percent of the total acres in the relevant cover types (as stated above) within the management area should be maintained in older age classes (those at least 20 years beyond “normal” rotation length for the cover type). In this management area, older age classes (greater than 100 years) for gray jay habitat are being met by the large number of stands with site conditions that limit harvesting.
- Retain patches within timber harvest sale boundaries; patches are preferred over single trees within timber harvest sale boundaries though it is beneficial to have both.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age class (within the compartment, management area or WUP ecoregion), to minimize impacts on gray jay habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

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 and 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 resource 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. 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.

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches in diameter at breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: Leave scattered retention patches around some 18 inches in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age-class (within the compartment, management area or WUP ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

Red Crossbill

In the western Upper Peninsula, the goal for the red crossbill is to maintain or increase suitable habitat. State forest management should focus on maintaining mature and over mature seed producing trees in priority areas. Declines in crossbill have been associated with declines in the amount of available conifer seeds which are correlated with age of trees (see species account in Section 3); mostly a result of decreases in conifer across the landscape and a shortening of rotation periods for remaining conifer stands. Mature mesic conifer forests (white/red pine, spruce, hemlock) will be the primary habitat issue addressed for red crossbill in this management area.

Wildlife habitat specifications:

- Maintain a minimum of 15% of the total acres of appropriate forest types (upland spruce/fir, upland conifers, natural mixed pine and natural red and white pine) in the management area for red crossbill in a mature forest condition. Mature being defined as greater than 150 years for red pine, greater than 130 years for white pine and greater than 80 years for white spruce. This can be accomplished with existing factor-limited stands or alternatively by extending the rotation length of these types to 150, 130 and 180 years respectively. In this management area, older age classes for red crossbill habitat are being met by the large number of stands with site conditions that limit harvesting.
- Retain large mature and over mature red pine, white pine and spruce in shelter-wood and seed-tree cuts.
- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.

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.
- Manage the aspen cover type for smaller patch size, a shorter rotation and a more deliberate habitat configuration within the designated Grouse Enhanced Management Systems areas where appropriate.
- 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.

4.8.3 – 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, 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 seven listed species and two natural communities of note occurring in the management area as listed in Table 4.8.2. 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 5,803.2 acres of potential old growth have been identified within the Chain Lakes Moraine management area (Figure 4.8.8). 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.8.8.

Table 4.8.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Chain Lakes 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								
Poor conifer swamp		S4/G4	Confirmed				Tamarack	Late
Rich conifer swamp		S3/G4	Confirmed				Tamarack	Late
Birds								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Purple clematis	*Clematis occidentalis*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Volcanic cliff	Upland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Boreal forest	Upland & Lowland Sp/F	Mid
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Canada rice grass	*Oryzopsis canadensis*	T/G5/S2	Confirmed			Pine barrens	Jack Pine	Early
Pearlwort	*Sagina procumbens*	T/G5/S2	Confirmed			Volcanic bedrock lakeshore	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.

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.

4.8.4 – 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
- Jack pine budworm
- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight
- Spruce budworm

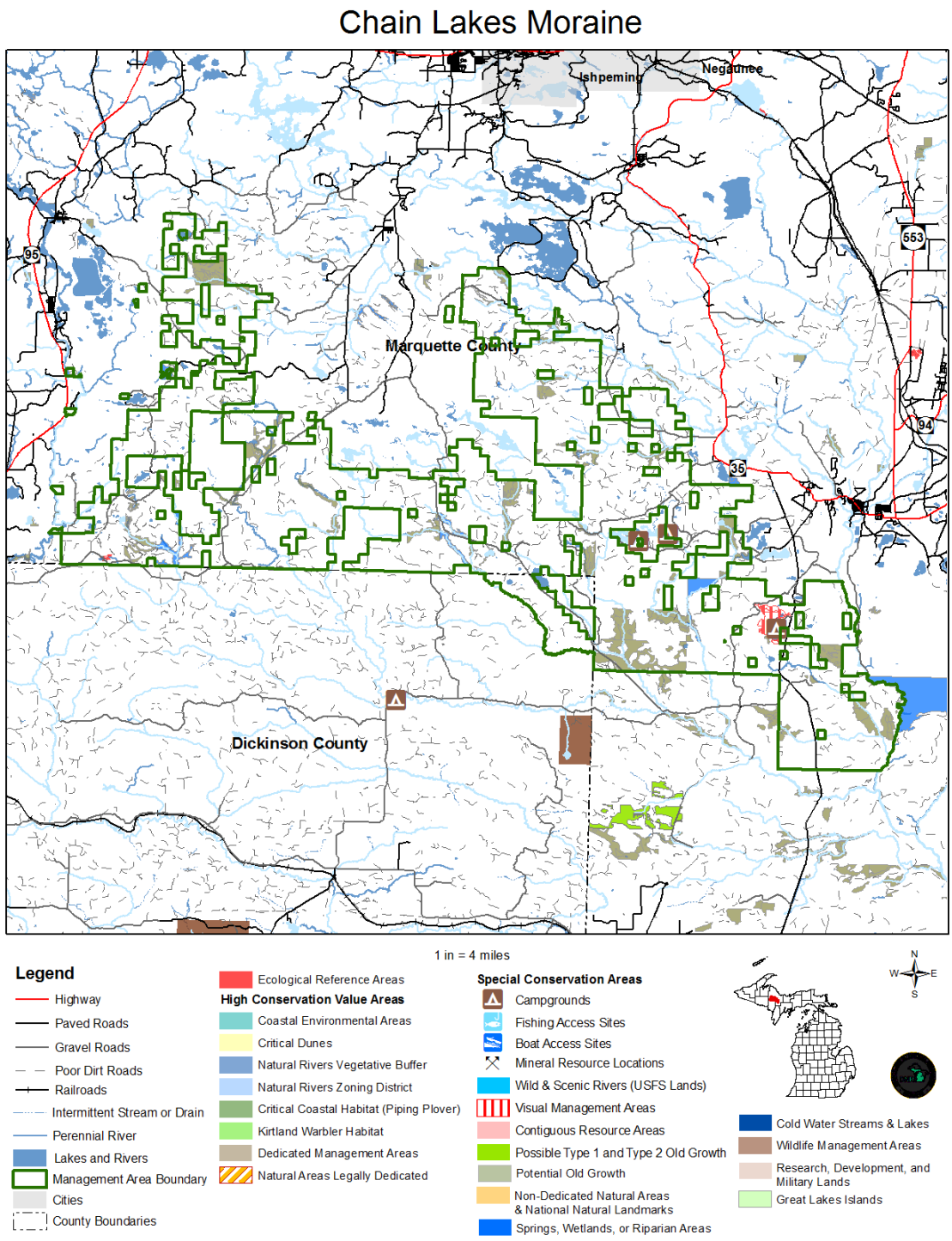

Figure 4.8.8. A map of the Chain Lakes management area showing the special resource areas.

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 documented in or near this management area.

4.8.5 – 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 are shown in Figure 4.8.1.

4.8.6 – Fire Management

With the exception of wetlands associated with the Miller Creek and Chandler Brook on the east side and the Bass Lake drainage on the west, much of this land area overlays dry, sandy soils that once supported a mix of barrens and dry to dry-mesic northern forests. These systems were probably maintained by periodic high-intensity stand replacement fires, perhaps as often as every 75 - 100 years.

- All wildfires within the management area should be subject to appropriate initial attack response; and
- Off-road vehicle trailheads for the Bass Lake and Porterfield Lake Trails, as well as campgrounds provide good opportunities for fire prevention messages.

4.8.7 – Public Access and Recreation

This area has good public and management access. Two motorcycle trails are located in this area, the Porterfield motorcycle trail and the Bass Lake motorcycle trail (Figure 4.7.1). Four state forest campgrounds (Figure 4.8.8) are located in this area, at Bass Lake, Little Lake, Anderson Lake and Pike Lake. Each has a boating access site associated with it. The Anderson Lake Pathway (Figure 4.8.1) is located in this area adjacent to the Anderson Lake State Forest Campground.

Specific hunting recreation improvements such as parking lots, gates, trail planting and trail establishment, as well as the preparation and dissemination of specific promotional material, may be made as a result of Grouse Enhanced Management Systems areas planning in this management area.

- Work to expand public access as opportunities arise.

4.8.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of coarse and medium-textured tills, an end moraine of coarse-textured till, glacial outwash sand and gravel and postglacial alluvium and peat and muck. The glacial drift thickness varies up to 100 feet. Sand and gravel pits are located in the management area and there is potential.

The Precambrian Archean Granite/Gneiss and the Cambrian Munising Group and Trempealeau Formation subcrop below the glacial drift. Some of the Granite/Gneiss could be used as dimension stone.

Old iron mines are located just to the east of the management area. Metallic mineral exploration has occurred in the management area in the past, and there could be potential. A couple metallic mineral leases in this management area are still active.

4.9 Chatham/AuTrain Moraines Management Area

Summary of Use and Management

Vegetative management in the Chatham/AuTrain Moraines management area (MA) (Figure 4.9.1) 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 managing for large grasslands and associated wildlife species. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes, maintaining upland grass openings, and potential insect (emerald ash borer) and disease (beech bark disease) infestations will be issues for this 10-year planning period.

Introduction

The Chatham/AuTrain Moraines management area is located in northeastern Marquette County and western Alger County on a fluted ground moraine. The management area covers about 16,283 acres, in two distinct blocks. The block to the west on the Marquette/Alger County line is primarily hardwood on mesic, medium to high quality upland sites interspersed with poorly drained lowland conifer types. The east block is on the west side of the AuTrain Basin and is characterized by aspen, northern hardwood and large grass openings on dry-mesic to mesic sites. Other attributes that played a role in the definition of this management area include:

- Dominated by mesic northern forest interspersed with poor conifer swamp;
- High- to medium-site quality;
- Contains the AuTrain Basin Waterfowl Project; and
- Provides multiple benefits including forest products, dispersed recreational activities and 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 Chatham/AuTrain Moraines management area are shown in Table 4.9.1.

Table 4.9.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Chatham-AuTrain 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
Northern Hardwood	44%	7,107	225	6,882	0	1,885	7,107	0	3,261
Aspen	20%	3,275	203	3072	615	0	3,275	439	0
Cedar	8%	1,355	0	1355	0	0	1,355	85	0
Lowland Conifers	8%	1,320	623	697	77	0	1,320	77	0
Upland Open/Semi-Open Lands	8%	1,323	0	1323	0	0	1,323	0	0
Lowland Open/Semi-Open Lands	4%	730	0	730	0	0	730	0	0
Misc Other (Water, Local, Urban)	1%	93	0	93	0	0	93	0	0
Others	7%	1,080	353	727	105	54	1,080	84	66
Total		16,283	1,404	14,879	797	1,939	16,283	685	3,327

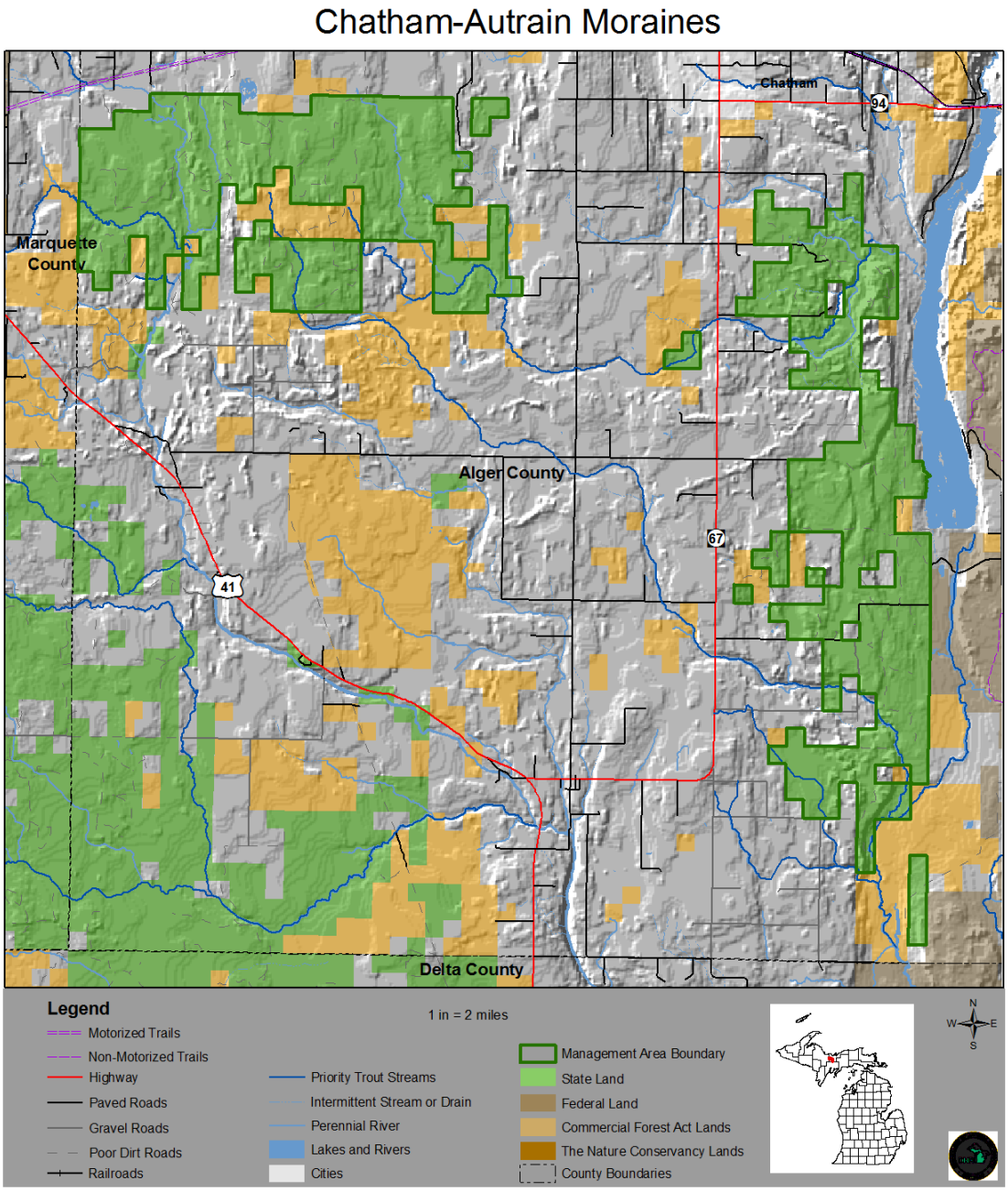

Figure 4.9.1. A map of the Chatham/AuTrain Moraines management area (dark green boundary) in relation to surrounding state forest and other lands in Marquette and western Alger Counties, Michigan.

4.9.1 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 Chatham-AuTrain 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 (e.g., 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 that dominant the canopy.

The following cover types are valued commercially for their forest 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.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 7,107 acres (44%) of this management area (Table 4.9.1). The bulk of the hardwood acres are in the 51-80 basal area class and will not be available for harvest in the next decade. The majority of these stands will be fully stocked within 20 years. Stands occur mostly on mesic sites producing medium to high-quality hardwoods. Most stands have been managed on a selection harvest basis and are in good condition. Due to low deer numbers in this area, there are few problems with seedling herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age (Figure 4.9.2).

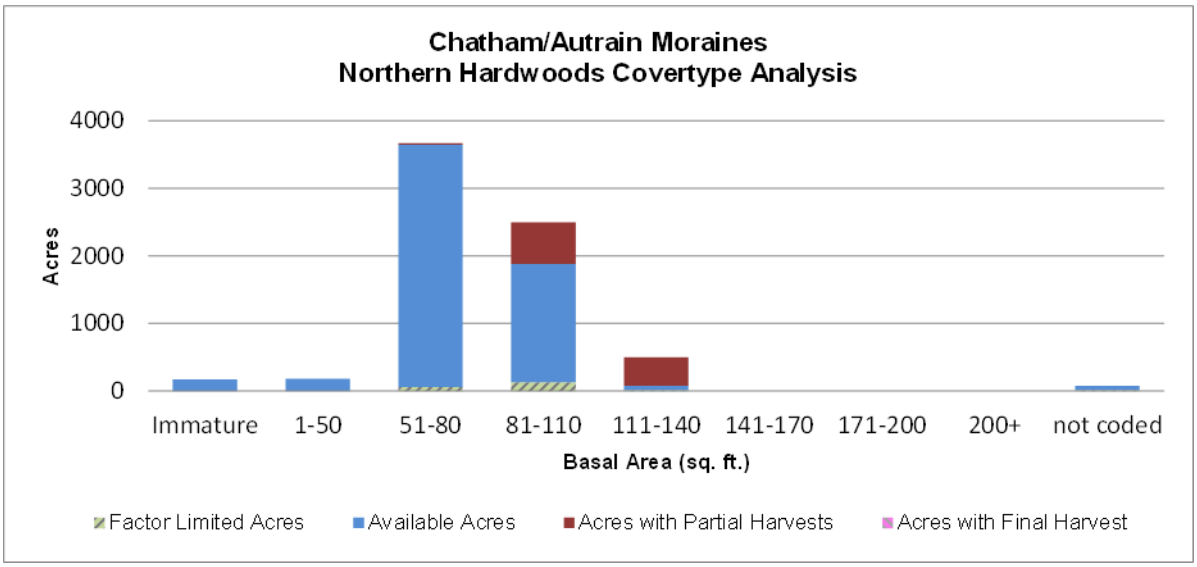

Figure 4.9.2. Graph of the basal area distribution for the northern hardwood cover type on the Chatham/AuTrain Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Sustainable regeneration and recruitment of northern hardwood species leading to an all-age structure with high-value sugar maple sawlogs and a full complement of tree seedlings recruiting into the overstory with well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selective harvest high-quality northern hardwood stands on a 20-year cycle. The harvest cycle will be optimized to maintain high growth rates and minimize stagnant growth periods. To accomplish this objective, harvest cycles may vary slightly from the nominal 20-year cycle. In time this will result in 3,261 acres harvested each decade.
- Low quality hardwood stands will be managed on an even-aged system with an 80-year rotation.

10-Year Management Objectives

- A target harvest of 1,885 acres is planned for the next decade; and
- Maintain or promote hemlock, white pine and upland cedar where possible in stands that are harvested.

Aspen Cover Type

The aspen cover type covers 3,275 acres (20%) of the management area (Table 4.9.1) and is poorly distributed across age classes (Figure 4.9.3). Aspen is growing on mesic sites which are highly productive for the species. Aspen will be managed on a 60 year rotation to a balanced age-class structure indicated by the red line in Figure 4.9.3. Of the relatively few acres over the rotation age of 60 years (60-69 years Figure 4.9.3) most are in the hard factor limited category. With

the deficit of aspen in the 40+ age classes, early entry into younger age classes is unlikely during this 10-year planning period because aspen in these age classes are not of merchantable size.

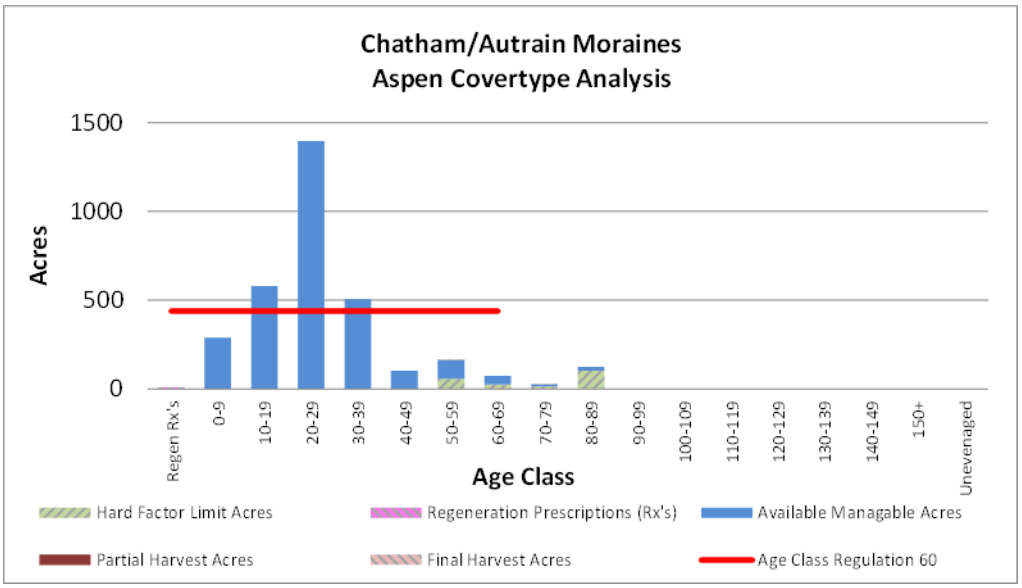

Figure 4.9.3. Graph of the age-class structure for the aspen cover type on the Chatham/AuTrain Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age-class over a 60-year rotation (indicated by the red line in Figure 4.9.3);
- Provide an even supply of forest products; and
- Provide a balanced mix of habitat conditions for a variety of wildlife as well as a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 60-year rotation;
- Once balanced age classes are achieved, harvest and regenerate 439 acres each decade; and
- Over the next 20 years, few acres will be available for harvest because of the absence of aspen in merchantable size and age classes.

10-Year Management Objectives

- Harvest available stands that are over age 60;
- Based on the current age-class structure few acres will be available for harvest in the next decade;
- Identify stands on high-quality sites that have the potential to be managed for quality northern hardwoods; and
- Maintain mature large-tooth aspen if present as retention, because these softwood trees are longer lived, provide opportunities for woodpecker species and other cavity nesters, and generally provide forked/bowl shaped crowns that provide nesting sites for raptors

Cedar Cover Type

Current Condition

The cedar cover type covers 1,355 acres (8%) of the management area (Table 4.9.1). Cedar historically does not regenerate reliably in this management area as illustrated in Figure 4.9.4. The absence of any age classes below 80-89 years indicates that little harvesting has occurred due to regeneration challenges.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Maintain the cedar cover type at the current acreage level.

Long-Term Management Objective

- Explore techniques for regenerating the cedar cover type under high deer browsing pressures.

10-Year Management Objective

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

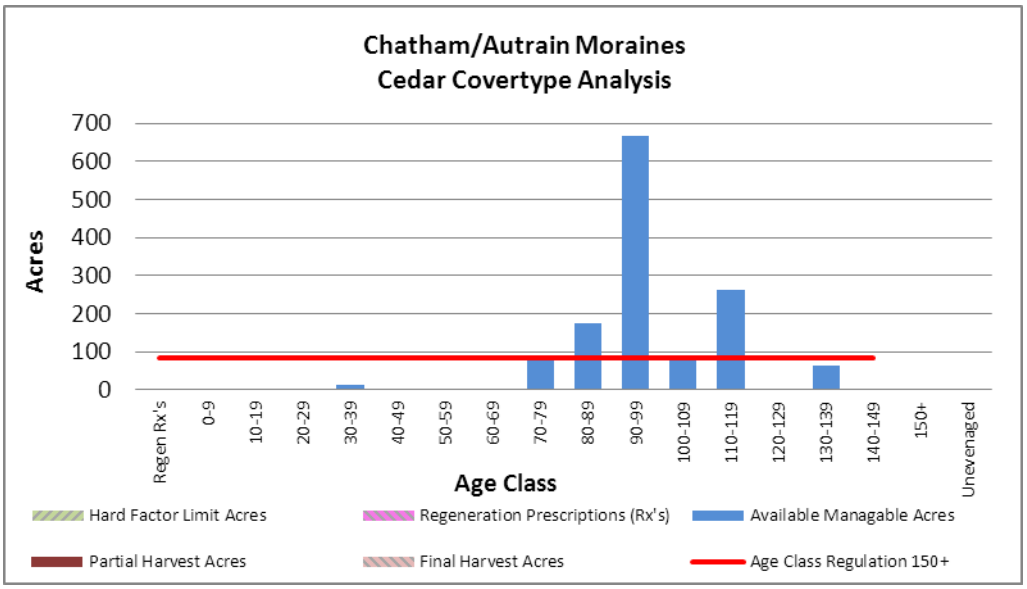

Figure 4.9.4. Graph of the age-class structure for the cedar cover type on the Chatham/AuTrain Moraines management area (2012 Department of Natural Resources inventory data)**.**

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 1,320 acres (8%) of the management area (Table 4.9.1) and occurs on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Mixed lowland conifers have poor age-class distribution, with most of the stands ranging between 80 and 110 years old. As these older stands age, they will become increasingly susceptible to insect and disease problems. Mixed lowland conifer stands provide important winter habitat for deer. Most of these stands have a hard factor limit associated with them making them unavailable for harvesting in the next decade (Figure 4.9.5).

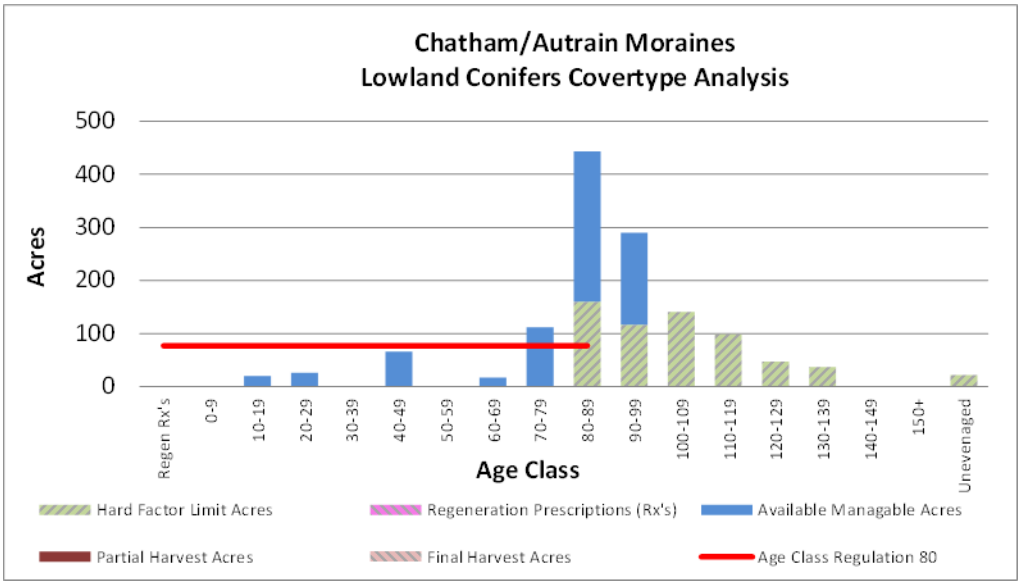

Figure 4.9.5. Graph of the age-class structure for the lowland conifer cover type on the Chatham/AuTrain Moraines management area (2012 Department of Natural Resources Inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage this cover type on an 80-year rotation, leading to harvesting 77 acres per decade in those stands without hard factor limits;
- Regenerate stands to species mixes similar to the pre-harvest conditions with preference for cedar, black spruce and balsam fir;
- Harvesting will be done using small clearcuts with clumped retention or strips; and
- Lowland conifer stands in areas inaccessible for harvest will be subject to natural processes, resulting in a range of successional stages.

10 Year Management Objectives

- Harvest 77 acres over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested types make up 1,080 acres and are made up of lowland deciduous (390 acres), upland spruce/fir (119 acres), mixed upland deciduous (102 acres), lowland poplar (100 acres), red pine (53 acres), upland mixed forest (50 acres), upland conifer (49 acres), hemlock (48 acres), tamarack (45 acres), white pine (45 acres), lowland spruce/fir (34 acres), lowland mixed forest (29 acres) and paper birch (16 acres). Together these types make up about 7% of the management area (“Others” in Table 4.9.1).

Desired Future Condition

- Maintain similar proportions of the minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods;
- Use appropriate silvicultural techniques to assure adequate regeneration of desired species;
- Monitor harvested sites; and
- Featured species habitat requirements will be taken into consideration.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate;
- Expected harvests in these types will be less than 159 acres over this 10-year planning period;
- Leave all hemlock for retention; and
- Maintain and promote oak in this management area through retention and regeneration.

Other Non-forested Cover Types

Current Condition

Non-forested cover types found on this management area include: upland open/semi-open lands (1,323 acres – 8%), lowland open/semi-open lands (730 acres – 4%) and other (water, local, urban) (93 acres – 1%) (Table 4.9.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objectives

- Grass-types will be treated for opening maintenance as needed; and
- Wildlife Division will maintain portions of this area through share-cropping agreements - cutting grass and small grains on a yearly basis.

4.9.2 – Featured Wildlife Species Management

The Chatham/AuTrain Moraines management area provides the best opportunity within the western Upper Peninsula state forest system to manage for large grasslands and associated wildlife species. Large opening management, along with sharecropped agricultural practices will continue to be a high priority. The primary focus of wildlife habitat management in the management area will be to address the habitat requirements identified for the following featured species: black bear, bobolink, Canada goose, sharp-tailed grouse and northern goshawk. Some of the most significant wildlife management issues in the management area are:

- Large open land complexes; habitat fragmentation (patch size for openings); mowing and burning practice modifications (for the eastern compartments); and
- Mature forest (upland deciduous, especially aspen and mixed forest with little understory); habitat fragmentation; coarse woody debris (for the western compartments).

A continued focus on managing for huntable goose populations will be implemented by following the master plan written for the AuTrain Basin Waterfowl Management Project and should guide management activities at a finer scale. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark to provide escape cover for cubs (e.g., white pine and hemlock).

Bobolink

The western Upper Peninsula goal for bobolink is to maintain or increase habitat in select landscapes (management areas). Management should focus on discouraging habitat fragmentation, increasing small grassland fields to a minimum size of 75 acres where feasible and mowing or burning (outside the nesting season) to discourage woody vegetation.

Wildlife habitat specifications:

- Increase grassland (stand) patch size to a minimum of 75 acres and decrease the forest to opening edge ratio;
- Mow or burn patches every 2-3 years to eliminate woody encroachment. May only need to burn every 10 years to reduce woody encroachment;
- Avoid mowing or burning during the breeding and fledging seasons (May through July). Treatments can be done several weeks prior to arrival of migrants in the spring; and
- Mow or burn no more than one third of grassland patches per year to allow for undisturbed refuge where birds can nest while disturbed areas recover.

Canada Goose

The western Upper Peninsula Canada goose goal is to provide recreational opportunities by attracting migrating geese to appropriate state forest lands. The focus of such management is to provide favorable water features and fields.

Wildlife habitat specifications:

- Attract geese to huntable areas during the fall season:
    - Plant green browse such as winter wheat or rye;
    - Manage water features (natural or impounded) as necessary; and
    - Manage small grain fields, leaving the maximum possible amount of waste grain.

Northern Goshawk

The goal for northern goshawk is to maintain suitable habitat. Management at the stand scale should focus on the protection of nest trees, provision of coarse woody debris and on 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. 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.

Sharp-tailed Grouse

In the western Upper Peninsula, the goal for sharp-tailed grouse is to provide suitable habitat within the ecoregion. Management should focus on enhancing large opening complexes so there is an increase of available habitat.

Wildlife habitat specifications:

- Maintain or expand herbaceous open-lands where existing or potential leks could occur;
- Manage adjacent forest to maintain young regenerating forest adjacent to permanent openings to maximize use by sharp-tailed grouse;
- Consolidate grass openings to increase the opening size; and
- Use mechanical, herbicide or prescribed fire treatments where appropriate to maintain openings.

4.9.3 – 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, 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 six listed species and no natural communities of note occurring in the management area as listed in Table 4.9.2. 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 AuTrain Basin Waterfowl Project (a wildlife management area) and the East Branch Whitefish River (a wild and scenic river) are special conservation areas within this management area as shown in Figure 4.9.6.

Approximately 580 acres of potential old growth have been identified within the Chatham-AuTrain management area (Figure 4.9.6). 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.

There are no high conservation value areas or 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 4.9.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Chatham-AuTrain Moraines 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								
Grasshopper sparrow	*Ammodramus savannarum*	SC/G5/S3S4	Confirmed	PS	Moderate	Dry sand prairie	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Lakeplain wet prairie	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Hillside prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Dickcissel	*Spiza americana*	SC/G5/S3	Confirmed	IL	Very High	Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Lakeplain wet prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
Plant								
Canadian milk vetch	*Astragalus canadensis*	T/G5/S1S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Dry-mesic northern forest	White Pine	Late
						Dry-mesic prairie	Upland open/semi-open	N/A
						Hillside prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Mesic prairie	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early

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

4.9.4 – 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
- Spruce budworm
- Emerald ash borer.

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.

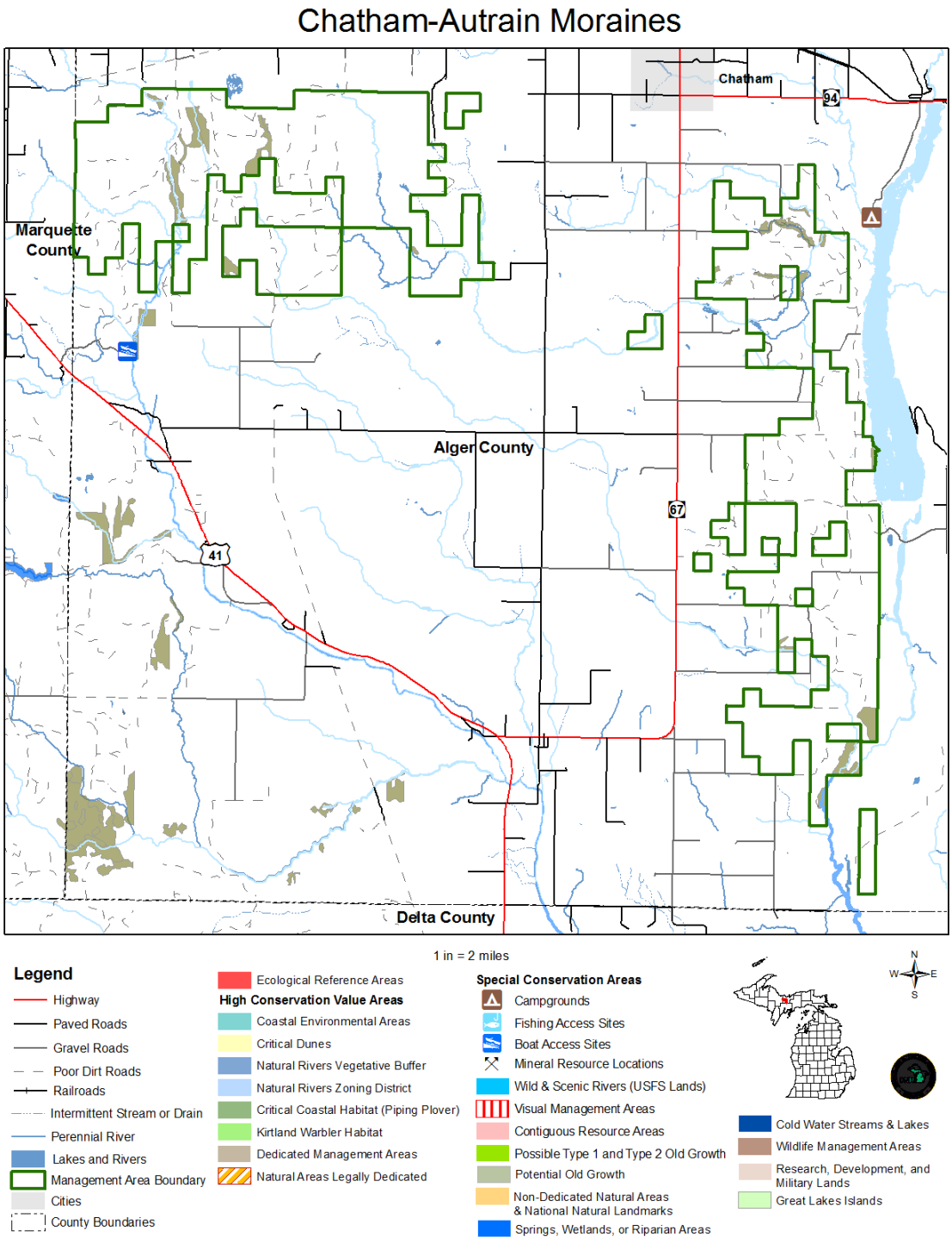

Figure 4.9.6. A map of the Chatham-AuTrain management area showing the special resource areas.

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. Garlic mustard is the only plant species of concern that has been documented in or near this management area.

4.9.5 – 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 are shown in Figure 4.9.1.

4.9.6 – Fire Management

Fire probably did not play a significant role in this mesic northern forest community and associated wetlands, especially due to its proximity to the lake and heavy winter snowfall.

- All wildfires within the management area should be subject to appropriate initial attack response;
- Public use of the waterfowl management area and its access to the AuTrain Basin provide potential for fire prevention messages on information boards; and
- Use prescribed fire to maintain large openings and prepare for no-till agricultural methods in the AuTrain Basin Waterfowl Project area.

4.9.7 – Public Access and Recreation

This area has limited public and management access. No recreational facilities are located on state forest lands. The department maintains and operates a campground on the Cleveland Cliffs Basin.

- Work to expand public and management access as opportunities arise.

4.9.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of medium-textured till, glacial outwash sand and gravel and postglacial alluvium and peat and muck. 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 for additional pits.

The Ordovician Tenton and Black River Formations, Prairie du Chien and the Cambrian Trempealeau Formation subcrop below the glacial drift. The Trenton and Black River are quarried for dolostone/stone in the Upper Peninsula.

Metallic mineral exploration is not known to have occurred in the management area in the past and the likelihood of metallic mineral potential is limited due to the depth of the Precambrian rocks.

4.10 Covington/Ned Lake Management Area

Summary of Use and Management

Vegetative management in the Covington/Ned Lake management area (MA) (Figure 4.10.1) 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 lowland spruce/fir, lowland conifer, and 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 providing spatial arrangement of lowlands and uplands and the provision of summer and winter thermal cover near aquatic feeding sites or moose. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and regeneration of lowland species will be issues for this 10-year planning period.

Introduction

The Covington/Ned Lake management area is mostly on a Ground Moraines in Southern Baraga County. The state forest covers 29,310 acres in somewhat scattered parcels. The major ownerships in this vicinity are forest industry and non-industrial private. The management area is dominated by northern hardwood, lowland spruce/fir and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

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

The management priority in this area is to continue to provide these multiple benefits while minimizing user conflicts. Management for moose has been identified as a priority in this area.

The predominant cover types, composition and projected harvest areas for the Covington/Ned Lake management area are shown in Table 4.10.1.

Table 4.10.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Covington-Ned Lake 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
Northern Hardwood	24%	6,904	808	6,096	0	2,653	6,904	0	2,974
Lowland Spruce/Fir	13%	3,734	1,830	1904	621	0	3,734	212	0
Lowland Conifers	10%	3,005	1,913	1092	223	0	3,005	122	0
Aspen	10%	2,852	96	2756	229	0	2,852	459	0
Upland Open/Semi-Open Lands	3%	742	0	742	0	0	742	0	0
Lowland Open/Semi-Open	16%	4,674	0	4674	0	0	4,674	0	0
Misc Other (Water, Local, Urban)	2%	725	0	725	0	0	725	0	0
Others	23%	6,674	1,427	5247	690	431	6,674	608	461
Total		29,310	6,074	23,236	1,763	3,084	29,310	1,401	3,435

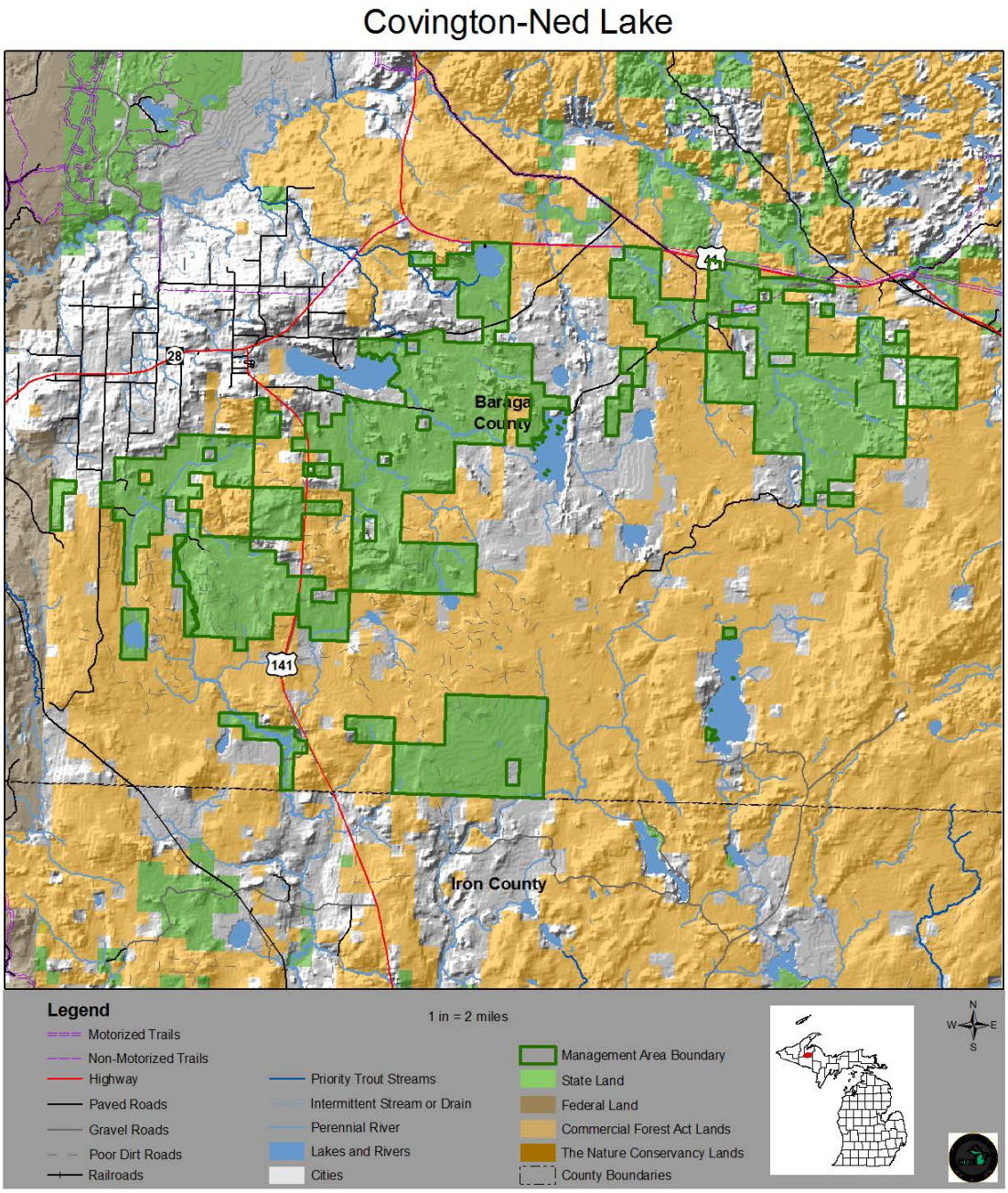

Figure 4.10.1. A map of the Covington/Ned Lake management area (dark green boundary) in relation to surrounding state forest and other lands in Baraga County, Michigan.

4.10.1 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 Covington/Ned Lake 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.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 6,904 acres (24%) of state forest land in this management area (Table 4.10.1). They occur on fair-quality sugar maple sites mixed with wetland sites. Most stands have been managed using the selection harvest system. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age. Figure 4.10.2 shows the current basal area distribution for the management area. There are 808 acres of northern hardwood that have site conditions limiting their harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

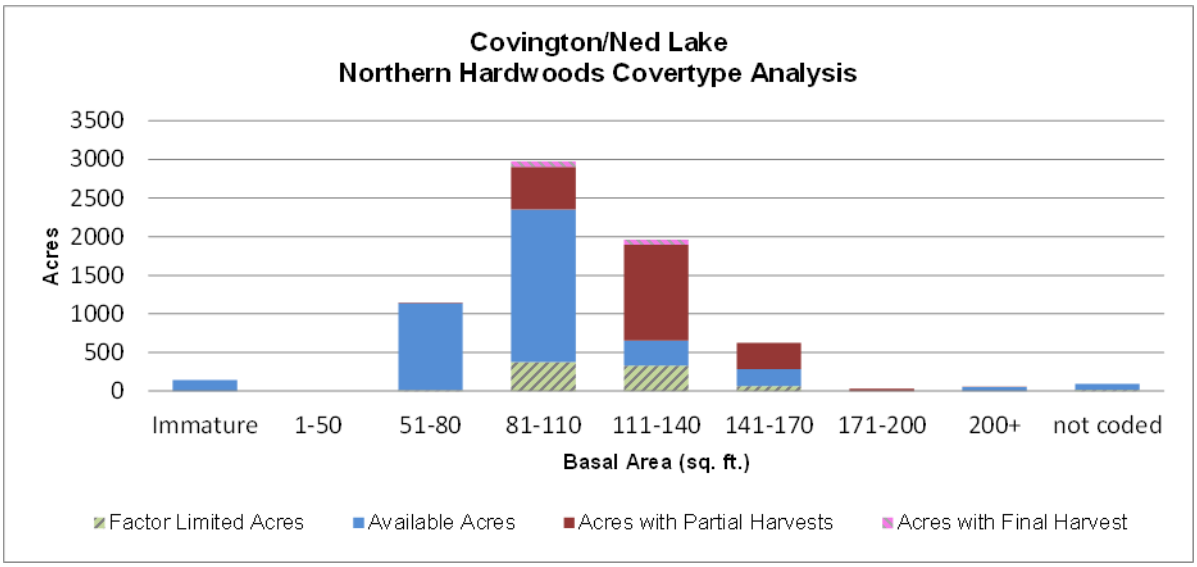

Figure 4.10.2. Graph of the basal area distribution for the northern hardwood cover type on the Covington/Ned Lake management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- A well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest northern hardwood stands on a 20-year cycle; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Approximately 2,653 acres will be select cut in the next decade;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested, favor oak where found; and
- Work to regenerate hemlock components in stands lacking that species.

Lowland Spruce-Fir Cover Type

Current Condition

Currently there are 3,734 acres (13%) of the lowland spruce-fir cover type in the management area (Table 4.10.1). Lowland spruce-fir is often found in association with lowland conifer, cedar and tamarack types. While there are several age classes of lowland spruce-fir in this management area, they are not well-balanced, and there has been little recent harvesting (Figure 4.10.3). Much of the lowland spruce-fir in this area is over 80 years in age. Some of the stands have been coded as uneven-aged, having trees of all sizes and ages. There are 1,830 acres of lowland spruce-fir with factors limiting their harvest. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

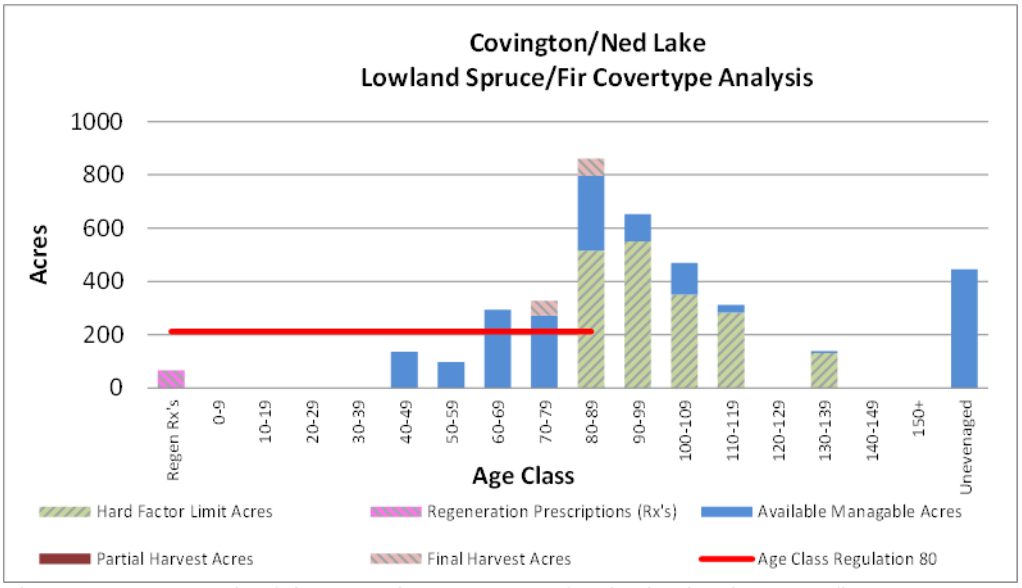

Figure 4.10.3. Graph of the age-class structure for the lowland spruce-fir cover type on the Covington/Ned Lake management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objective

- Regenerate lowland spruce-fir cover types on an 80-year rotation allowing 212 acres to be harvested per decade.

10-Year Management Objectives

- Harvest 212 acres in this planning period;
- Use appropriate silvicultural techniques to assure adequate regeneration;
- Monitor harvested sites; and
- More aggressive harvesting in this type may be needed in this 10-year planning period to reduce mortality losses in the older stands.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 3,005 acres (10%) of the management area (Table 4.10.1). This cover type is found on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 1,913 acres of lowland conifers that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult

operating conditions for harvesting. Mixed lowland conifers are poorly distributed across the age-class distribution. The majority of the stands are over rotation age (Figure 4.10.4). Until recently, little harvesting has been done in this cover type.

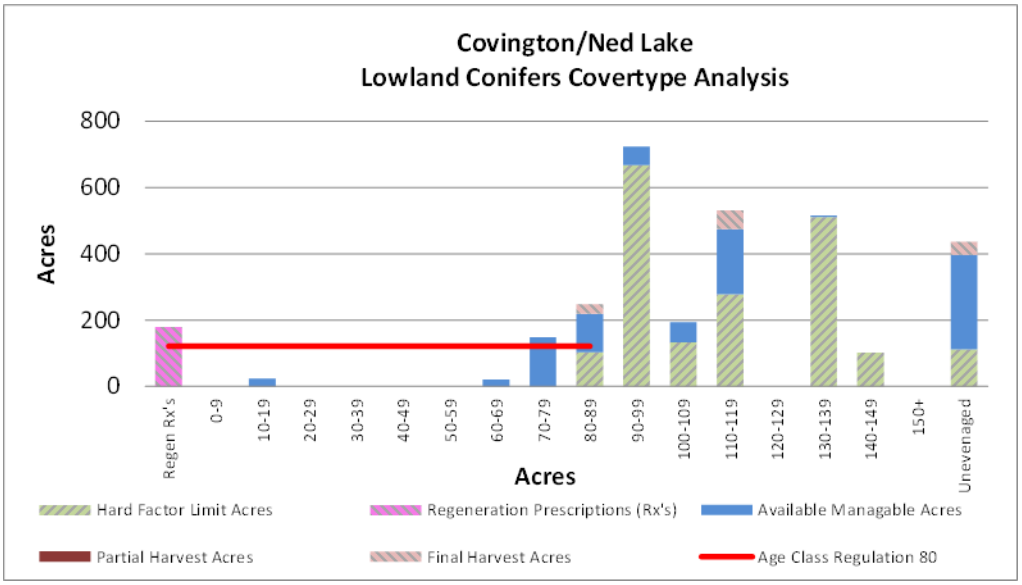

Figure 4.10.4. Graph of the age-class structure of the lowland conifer cover type on the Covington/Ned Lake management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for 122 acres to be harvested per decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir;
- Harvesting will be done using small clearcuts or strips with clumped retention; and
- Lowland conifer stands with harvest limitations will be subject to natural processes, resulting in a range of successional stages.

10-Year Management Objectives

- Harvest 223 acres in this planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques; and
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir; and Monitor harvested sites to assure adequate regeneration of desired species.

Aspen Cover Type

Current Condition

The aspen cover type covers 2,852 acres (10%) of state forest land in this management area (Table 4.10.1). Aspen is poorly distributed across age classes with the majority of the stands in the 0-29 year age classes (Figure 4.10.5). There are 96 acres of aspen that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

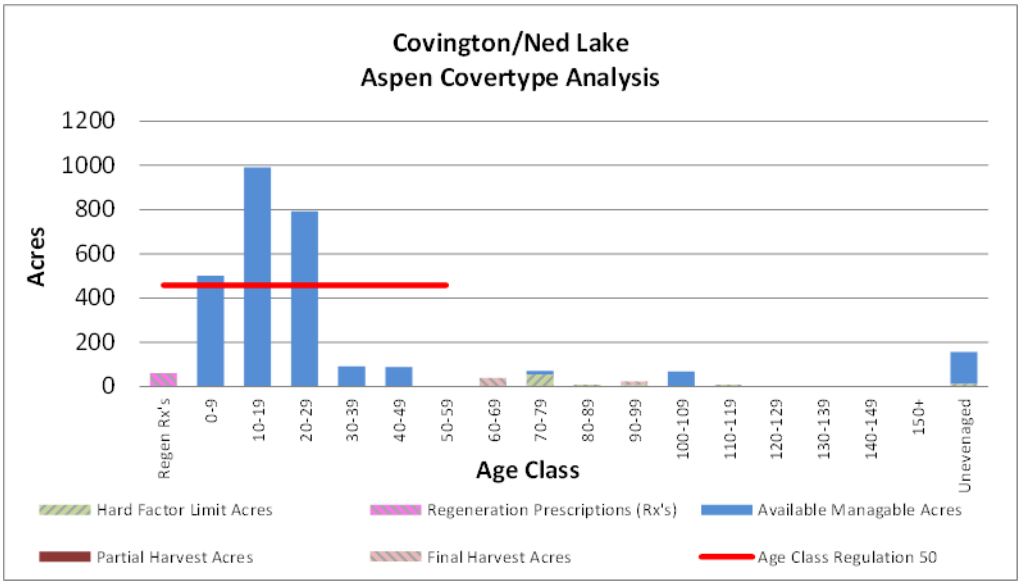

Figure 4.10.5. Graph of the age-class structure for the aspen cover type on the Covington/Ned Lake management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length; and
- Regenerate approximately 459 acres each decade.

10-Year Management Objectives

- Regenerate 229 acres this decade;
- Harvest stands of 70 to 90 year old aspen that are in decline;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest; and
- Over this 10-year planning period, few acres will be available for harvest.

Other Forested Cover Types

Current Condition

Other forested types make up 6,674 acres and are made up of mixed upland deciduous (1,291 acres), upland mixed forest (1,164 acres), cedar (798 acres), upland spruce/fir (635 acres), paper birch (568 acres), tamarack (499 acres), lowland deciduous (483 acres), upland conifers (414 acres), lowland mixed forest (359 acres), white pine (206 acres), lowland poplar (173 acres), red pine (41 acres), natural mixed pines (23 acres) and hemlock (20 acres). Together these types make up about 23% of the management area (Table 4.10.1).

Desired Future Condition

- Maintain similar proportions of minor cover types within the management area.

Long-Term Management Objectives

- Manage minor cover types to maintain representation using appropriate silvicultural methods;
- Harvest as opportunities arise in conjunction with other management activities; and
- Most of the minor cover types in this management area are typically managed with even-age systems, and if opportunities arise, these stands will be harvested and managed at an appropriate rotation.

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
- The projected harvest in these types is 690 acres of final harvest and 431 acres of partial harvest for this planning period.

Other Non-forested Cover Types

Current Condition
Non-forested cover types found on this management area include: upland open/semi-open lands (742 acres – 3%), lowland open/semi-open lands (4,674 acres – 16%) and other (water, local, urban) (725 acres – 2%) (Table 4.10.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses and forbs to dominate.

10-Year Management Objective

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

4.10.2 – Featured Wildlife Species Management

The Covington/Ned Lake management area receives significant snowfall each year and does not offer wintering habitat for deer. As a result, many tree species that do not reliably recruit across all management areas in the ecoregion are found in numerous age classes across this management area. This management area is the heart of the western Upper Peninsula moose country due the spatial arrangement of lowlands and uplands and the provision of summer and winter thermal cover near aquatic feeding sites. The primary focus of wildlife habitat management in the management area will be to address the habitat requirements identified for the following featured species: American marten, black bear, gray jay, moose and northern goshawk. Some of the most significant wildlife management issues in the management area are mast (hard and soft); habitat fragmentation; coarse woody debris; large living and dead standing trees (for cavities); mesic conifer; mature forest; within stand diversity; and early successional forest (hardwood browse adjacent to closed canopy lowland conifer swamps). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The western Upper Peninsula goal for marten during this planning period is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Marten require large tracts of unfragmented forest with corridors between such tracts to maintain genetic/population vigor the conversion of forest to non-forest land-uses or removal of forest cover is not desirable in the management area. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. As marten tend to avoid stands with less canopy cover. Retain patches of retention to minimize potential blow down.
- Discourage land transactions and management activities that facilitate further fragmenting of marten habitat within the management area by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.

- Provide for late successional mesic conifer-dominated stands by extending the normal rotation length for white spruce and balsam fir cover types by 20 years in the upland areas of this management area. Hemlock should not be harvested within the deer wintering complex within this planning period.
- Retain down coarse woody debris present before cutting and that resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Gray Jay

The goal for gray jay in the western Upper Peninsula is to maintain or increase suitable habitat. State forest management for gray jay should focus on maintaining boreal forest cover types in a variety of age classes and ensure that older age classes of boreal forest are maintained. Important considerations in timber harvests are retention of scattered individual spruce and fir trees for food caching within sale boundaries and maintaining spruce and fir buffers along bog edges.

Wildlife habitat specifications:

- Maintain appropriate forest types (birch, lowland deciduous, fir, lowland conifer, lowland spruce/fir, tamarack and bogs) in the management area in a variety of age classes. Fifteen percent of the total acres in the relevant cover types (as stated above) within the management area should be maintained in older age classes (those at least 20 years beyond “normal” rotation length for the cover type). In this management area, older age classes (greater than 100 years) for gray jay habitat are being met by the large number of stands with site conditions that limit harvesting.
- Retain patches within timber harvest sale boundaries; patches are preferred over single trees within timber harvest sale boundaries though it is beneficial to have both.
- Offset salvage harvests deemed necessary due to insect, disease or fire within the same cover type and age class (within the compartment, management area or western Upper Peninsula ecoregion) to minimize impacts on gray jay habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

Moose

The western Upper Peninsula goal for moose is to maintain or increase suitable habitat. Management for moose should focus on providing early successional browse adjacent to lowland conifer complexes, maintenance of hemlock within stands and maintaining or promoting willow, a valuable food source, along riparian and wetland edges.

Wildlife habitat specifications:

- Encourage early successional hardwood browse (in the 0-20 year age classes) in close proximity to closed canopy lowland conifer swamps.

- Balance aspen age-class distribution to ensure a more sustainable supply of browse.
- Maintain or promote thermal refugia in harvested stands by retaining hemlock and other conifers.
- Increase mesic conifer (e.g., hemlock, white pine, non-plantation red pine and upland spruce-fir) component on state forests by: a) Retaining mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source. Increase the percentage of mesic conifers, where suitable, across the landscape by 10% during this planning cycle.
- Willow is an important browse species, as are submergent and emergent aquatic vegetation associated with summer feeding areas. Ensure sustainable supplies of each.

Northern Goshawk

The goal for northern goshawk is to maintain suitable habitat. Management at the stand scale should focus on the protection of nest trees, provision of coarse woody debris, on 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. 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.

4.10.3 – 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, 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 five listed species and no natural communities of note occurring in the management area as listed in Table 4.10.2. 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.

Table 4.10.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Covington-Ned Lake 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								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Butterflies								
Freija fritillary	*Boloria freija*	*SC/G5/S3S4*	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
Red-disked alpine	*Erbia discoidalis*	*SC/G5/S2S3*	Confirmed	MV	Low	Bog	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Muskeg	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Poor fen	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.

Approximately 271.2 acres of potential old growth have been identified within the Covington-Ned Lake management area (Figure 4.10.6). 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.10.6.

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.

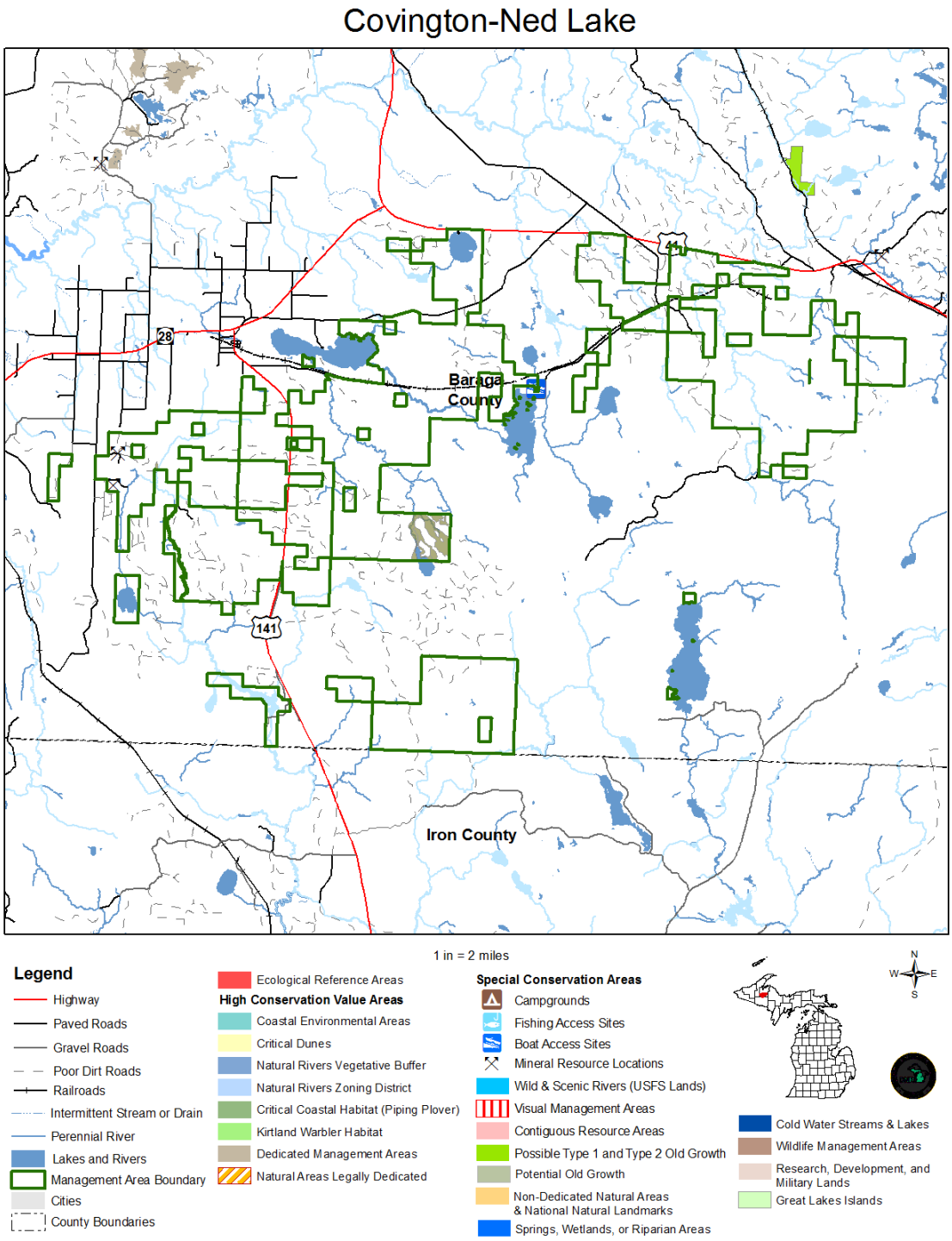

Figure 4.10.6. A map of the Covington-Ned Lake management area showing the special resource areas.

4.10.4 – 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 spruce budworm and emerald ash borer.

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.

Following is a list of species of concern that been documented in or near this management area.

- Bell's honeysuckle
- Common Buckthorn
- Common St. John's-wort
- European swamp thistle
- Morrow's honeysuckle
- Multiflora rose
- Purple Loosestrife
- Reed canary grass
- Spotted knapweed
- Tatarian honeysuckle.

4.10.5 – 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 Prescriptions Geographic Decision Support Environment. Remove or discourage beaver populations on designated high priority trout streams.

High priority trout streams in this management area are shown Figure 4.10.1.

4.10.6 – Fire Management

This area is dominated by mesic northern forest and lowland conifer forest. Fire impacts were rare, resulting in very long fire return intervals.

- All wildfires are subject to appropriate initial attack suppression response.

4.10.7 – Public Access and Recreation

This area has poor public and management access. Two state forest campgrounds are located in this area, at King Lake and Beaufort Lake. Each has a boating access site associated with it. The department also maintains a boating access site on the Net River Flooding on state forest lands.

- Work to expand public and management access as opportunities arise.

4.10.8 – Oil, Gas and Mineral Resources

Surface sediments consist of medium and coarse-textured till, an end moraine of coarse-textured till, and peat and muck. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is good potential for additional pits.

The Precambrian Michigamme Formation subcrops below the glacial drift. There is not a current economic use for the Michigamme.

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

Metallic mineral exploration is not known to have occurred in the management area in the past, but there could be metallic mineral potential in the future.

4.11 Cyr Swamp Management Area

Summary of Use and Management

Vegetative management in the Cyr Swamp management area (MA) (Figure 4.11.1) 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 opportunities are limited due to the wet, lowland conditions in this area. Wildlife management objectives include maintaining an unfragmented, mature forest condition. Management activities will be constrained by site conditions. Insect and disease problems may become important issues in this 10-year planning period.

Introduction

The Cyr Swamp management area is mostly on a Swamp landform in Southeastern Marquette County. The state forest covers 9,358 acres and is mostly contiguous. State forest lands are the major ownership in this vicinity. The management area is dominated by lowland conifer, cedar, and lowland spruce/fir cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by poor conifer swamp natural community;
- Low-range in site quality; and
- Few roads make it mostly inaccessible;

The management priority for this area is to maintain and develop the unfragmented old forest character of this area. Timber management will be limited.

The predominant cover types, composition and projected harvest areas for the Cyr Swamp management area are shown in Table 4.11.1.

Table 4.11.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Cyr Swamp 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
Lowland Conifers	18%	1,706	1,122	584	45	0	1,706	45	0
Cedar	17%	1,620	42	1578	0	0	1,620	99	0
Lowland Spruce/Fir	7%	677	445	232	74	0	677	21	0
Aspen	7%	623	46	577	193	0	623	96	0
Northern Hardwood	6%	564	0	564	0	282	564	0	282
Upland Open/Semi-Open Lands	1%	61	0	61	0	0	61	0	0
Lowland Open/Semi-Open Lands	35%	3,278	0	3278	0	0	3,278	0	0
Misc Other (Water, Local, Urban)	0%	8	0	8	0	0	8	0	0
Others	9%	821	79	742	256	141	821	79	163
Total		9,358	1,734	7,624	568	423	9,358	340	445

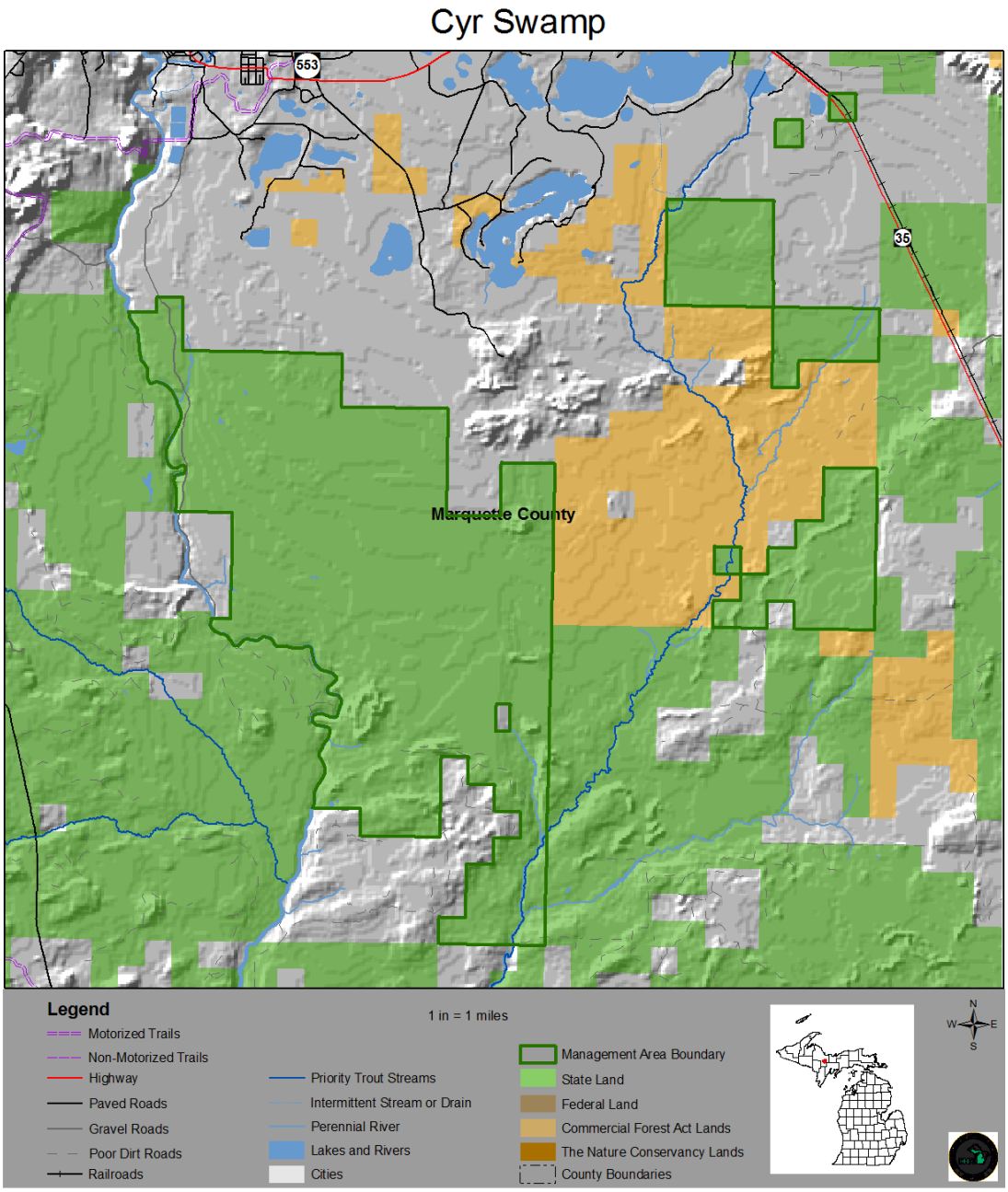

Figure 4.11.1. A map of the Cyr Swamp management area (dark green boundary) in relation to surrounding state forest and other lands) and other ownerships (light gray).

4.11.1 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 Cyr Swamp 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.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 1,706 acres (18%) of the management area (Table 4.11.1). This cover type is found on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 1,122 acres that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Mixed lowland conifers are poorly distributed across the age-class distribution (Figure 4.11.2). Most of the stands are over 60 years of age. Little harvesting has been done in this type over the past 60 years.

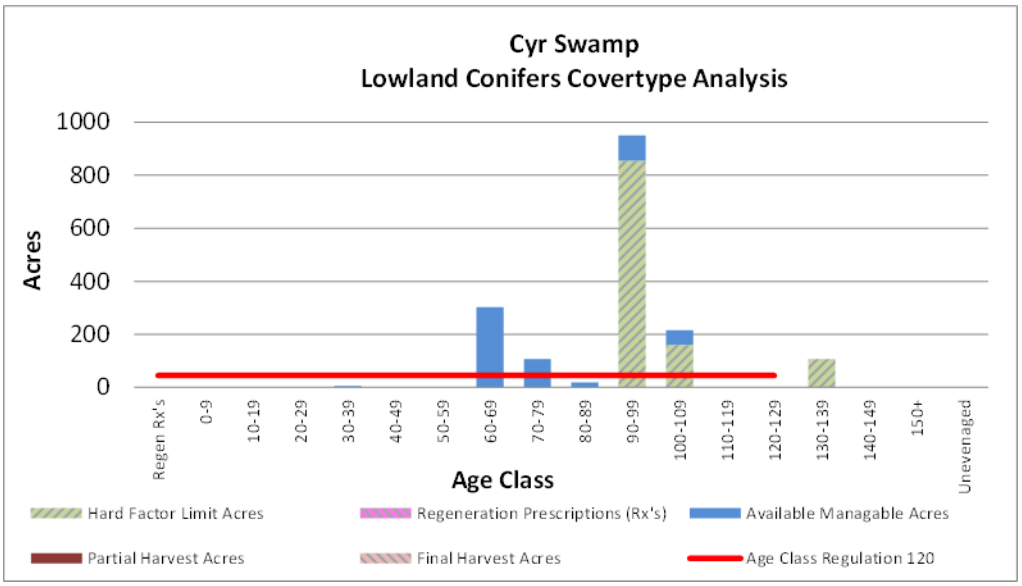

Figure 4.11.2. Graph of the age-class structure for the lowland conifer cover type on the Cyr Swamp management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on a 120-year rotation allowing for approximately 45 acres for harvest each decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest about 45 acres over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Cedar Cover Type

Current Condition

Cedar occurs on 1,620 acres (17%) of the management area (Table 4.11.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack, 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. Cedar types are poorly distributed across the age-class distribution (Figure 4.11.3). All of the stands are over 80 years of age. Regeneration of cedar stands has been problematic in areas with high deer concentration. Currently there are 42 acres of cedar that have factors limiting harvest. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of cedar seedlings and saplings; and
- Maintain the closed canopy (>70%) structure in many cedar stands for winter deer habitat.

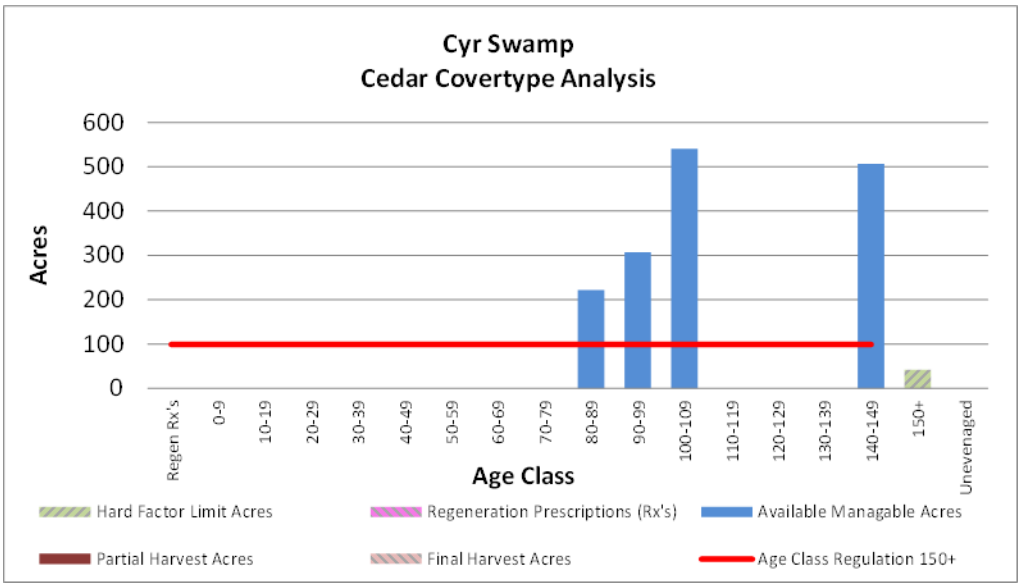

Figure 4.11.3. Graph of the age-class structure for the cedar cover type on the Cyr Swamp management area (2012 Department of Natural Resources inventory data).

Long-Term Management Objective

- Maintain cedar cover type on the landscape.

10-Year Management Objective

- While no harvests are planned for this area in the next decade, limited harvesting may occur to test methods of cedar regeneration.

Lowland Spruce-Fir Cover Type

Current Condition

Currently there are 677 acres (7%) of the lowland spruce-fir cover type in the management area (Table 4.11.1). Lowland spruce-fir is often found in association with lowland conifer, cedar and tamarack cover types. Lowland spruce-fir in this management area does not have a well-balanced age-class distribution with a spike in the 90-99 age class (Figure

4.11.4). There has been no recent harvesting in this cover type. There are 445 acres of lowland spruce/fir that have factors limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Desired Future Condition

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

Long-Term Management Objective

- Regenerate lowland spruce-fir cover types on a 100-year rotation allowing for 21 acres to be harvested each decade; and
- Promote longer rotations in special conservation areas.

10-Year Management Objectives

- Harvest 74 acres in the next decade (this number is higher than the regulated harvest amount due to the current age-class structure where there are no stands less than 70 years old); and
- More aggressive harvesting in this type maybe needed in this 10-year planning period to reduce mortality losses in the older stands.

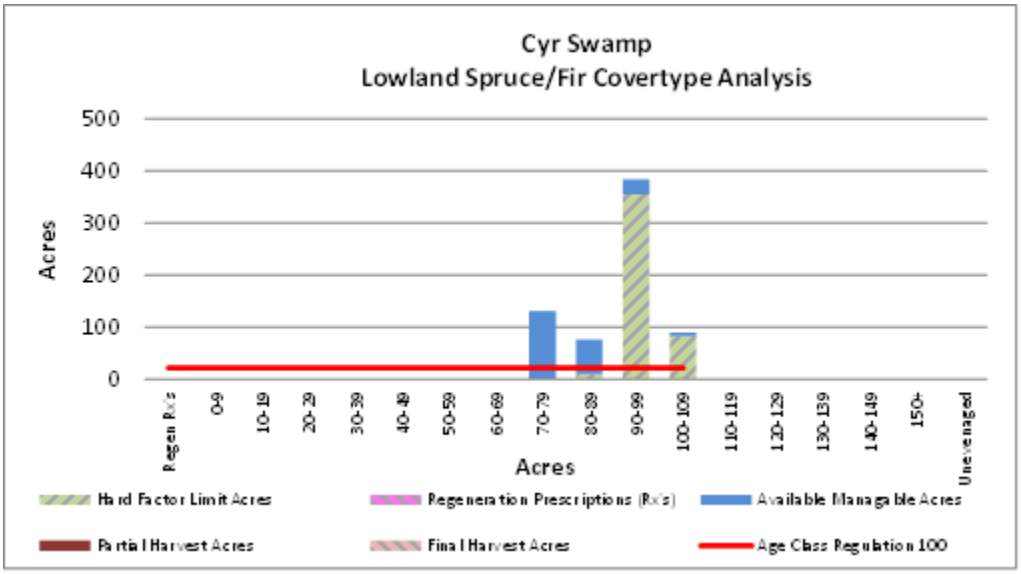

Figure 4.11.4. Graph of the age-class structure for the lowland spruce-fir cover type on the Cyr Swamp management area (2012 Department of Natural Resources inventory data).

Aspen Cover Type

Current Condition

About 623 acres (seven percent) of state forest land in this management area are in the aspen cover type (Table 4.11.1). Aspen is distributed across many age classes, though there are no acres less than 10 years of age. There are 46 acres of aspen that have limiting factors preventing harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Desired Future Condition

- Provide a supply of forest products;
- Provide a mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length allowing for 96 acres to be harvested per decade.

10-Year Management Objectives

- Over this 10-year planning period, regenerate 193 acres of aspen;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest; and
- Maintain mature large-tooth aspen if present as retention, because these softwood trees are longer lived, provide opportunities for woodpecker species and other cavity nesters and generally provide forked/bowl shaped crowns that provide nesting sites for raptors.

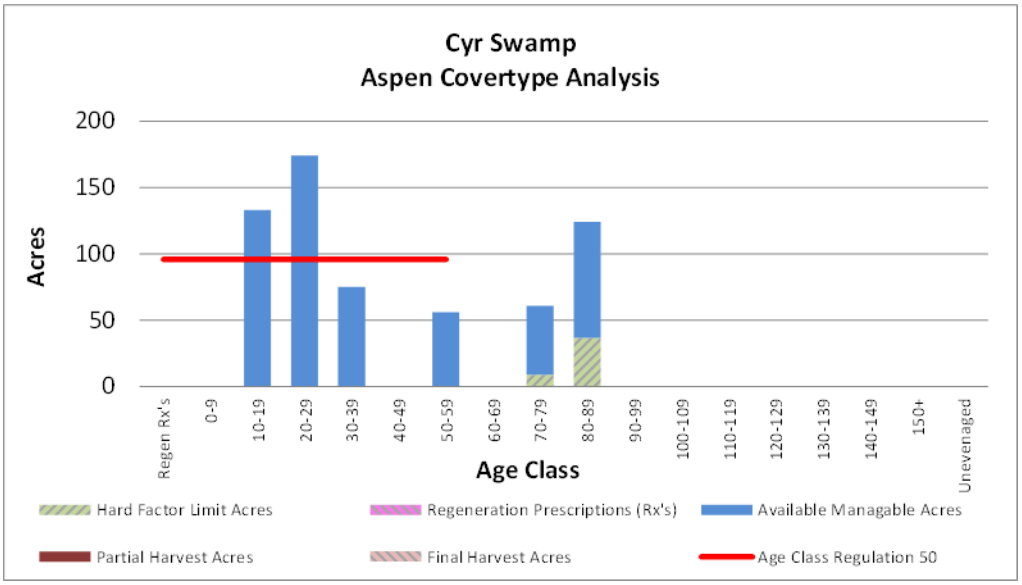

Figure 4.11.5. Graph of the age-class structure for the aspen cover type on the Cyr Swamp management area (2012 Department of Natural Resources inventory data).

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 564 acres (six percent) of state forest land in this management area (Table 4.11.1). They occur on low-quality sugar maple sites mixed with wetland sites. Most stands have been managed using the selection harvest system. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age (Figure 4.11.6). There are a large number of acres with no basal area coded. This is because on-site visits are not currently possible due to poor access. If access improves, basal area will be coded and used in analysis.

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting sugar maple sawlogs;
- Provide a full complement of tree seedlings recruiting into the overstory; and
- Provide well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selectively harvest northern hardwood stands on a 20-year cycle; and
- Maintain and encourage minor species to increase within-stand diversity.

10-Year Management Objectives

- Selectively harvest 282 acres in this 10-year planning period;
- Maintain and promote white pine, oak, hemlock and upland cedar where they occur in stands that are harvested, favor oak if present for retention; and
- Work to regenerate hemlock components in stands lacking that species.

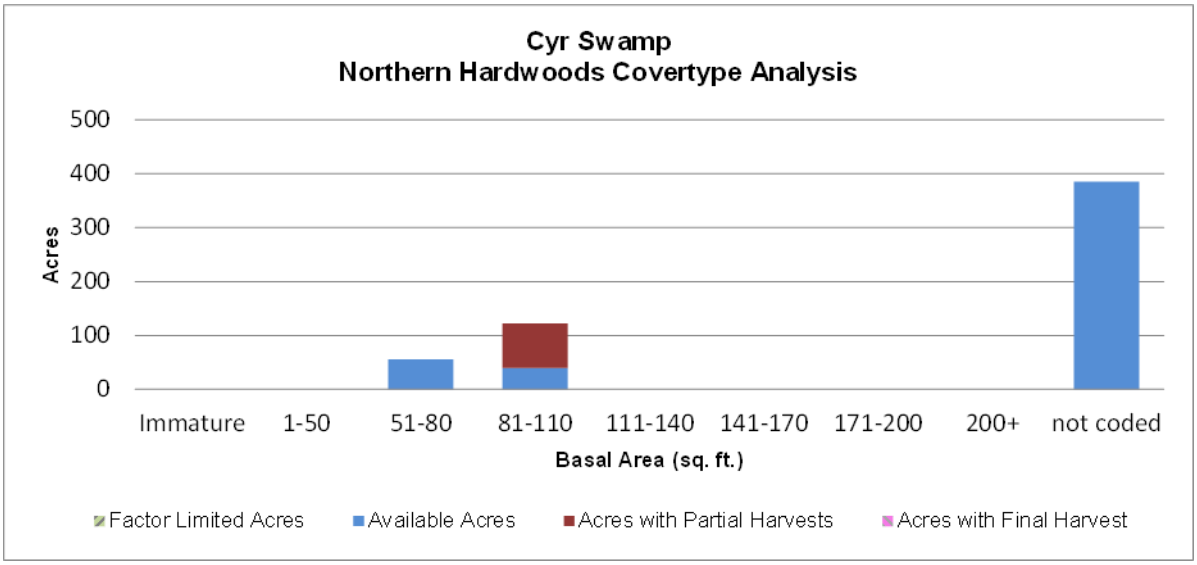

Figure 4.11.6. Graph of the basal area distribution for the northern hardwood cover type on the Cyr Swamp management area (2012 Department of Natural Resources inventory data).

Other Forested Cover Types

Current Condition

Other forested types make up 821 acres and consist of jack pine (203 acres), lowland mixed forest (127 acres), upland conifer (112 acres), natural mixed pines (103 acres), upland mixed forest (93 acres), upland spruce/fir (47 acres), hemlock (46 acres), white pine (44 acres), red pine (41 acres) and paper birch (five acres). Together these types make up about nine percent of the management area (Table 4.11.1).

Approximately 79 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- The ten-year projected final harvest of these types is 256 acres and the projected partial harvest is 141 acres.

Other Non-forested Cover Types

Current Condition

The follow non-forested cover types are found on this management area: upland open/semi- open lands (61 acres – 1%), lowland open/semi-open lands (3,278 acres – 35%) and other (water, local, urban) (eight acres - >1%) (Table 4.11.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.11.2 – Featured Wildlife Species Management

Cyr Swamp is the largest swamp in the western Upper Peninsula associated with state forest lands. The state forest portion of the swamp is about 9,200 acres (mostly contiguous). The management area has few roads and is mostly inaccessible. The management priority for this area is to maintain the unfragmented, mature forest condition of this management area. The primary wildlife focus in the Cyr Swamp management area will be to address the habitat requirements identified for the listed featured species, which include: red-shouldered hawk, spruce grouse and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are coarse woody debris, mature forest and mast. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large contiguous blocks of suitable habitat for red-shouldered hawks) for featured species will be performed.

Red-shouldered Hawk

The goal for red-shouldered hawk is to maintain or improve suitable habitat in the ecoregion. Management activities should focus on the maintenance of large blocks of mesic northern forest with the appropriate level of large diameter trees in priority landscapes.

Wildlife habitat specifications:

- All known woodland raptor nests should be reported to local wildlife staff and included in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. Confirmed red-shouldered hawk nests are to be documented in accordance with the “DNR’s Approach to the Protection of Rare Species on State Forest Lands” (IC4172) and included in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. For red-shouldered hawks, the wildlife habitat specifications contained within Michigan DNR’s *Interim Management Guidelines 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.

Spruce Grouse

The western Upper Peninsula goal for spruce grouse is to maintain or improve habitat. Management will focus on early successional forest (jack pine, mixed swamp conifer, tag alder and aspen), coarse woody debris and encouraging conifer (e.g., jack pine, mixed swamp conifer) understory component.

Wildlife habitat specifications:

- In jack pine harvests, leave mixed conifer and/or jack pine retention strips of mature trees along riparian corridors and lowland margins as well as along upland edges.
- Maintain spruce seed trees through retention, especially at lowland margins.
- Maintain or increase diversity of conifer stands by implementing seed tree/shelterwood prescriptions and limiting the use of herbicides, especially along lowland edges.

- Large clearcuts may isolate populations of spruce grouse so landscape level planning must take into account this species' need for low-density mixed-conifer travel corridors to connect suitable stands. This is especially important in management areas where Kirtland's warbler also is a featured species.
- Ensure black spruce recruitment and regeneration is reliable if harvesting in this cover type. Regeneration monitoring should be required to ensure we are getting desired results from management.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

<u>Wildlife habitat specifications for deer wintering complexes:</u>

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

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, 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 five 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.

Approximately 1,322.4 acres of potential old growth have been identified within the Cyr Swamp 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.11.7.

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 4.11.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Cyr Swamp 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								
Poor fen		S3/G3	Confirmed				Lowland open/semi-open	N/A
Birds								
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Dwarf raspberry	*Rubus acaulis*	E/G5T5/S1	Confirmed			Northern fen	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Poor fen	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.

4.11.4 – 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 spruce budworm, eastern larch beetle and larch casebearer.

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 that been documented in or near this management area.

4.11.5 – 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.

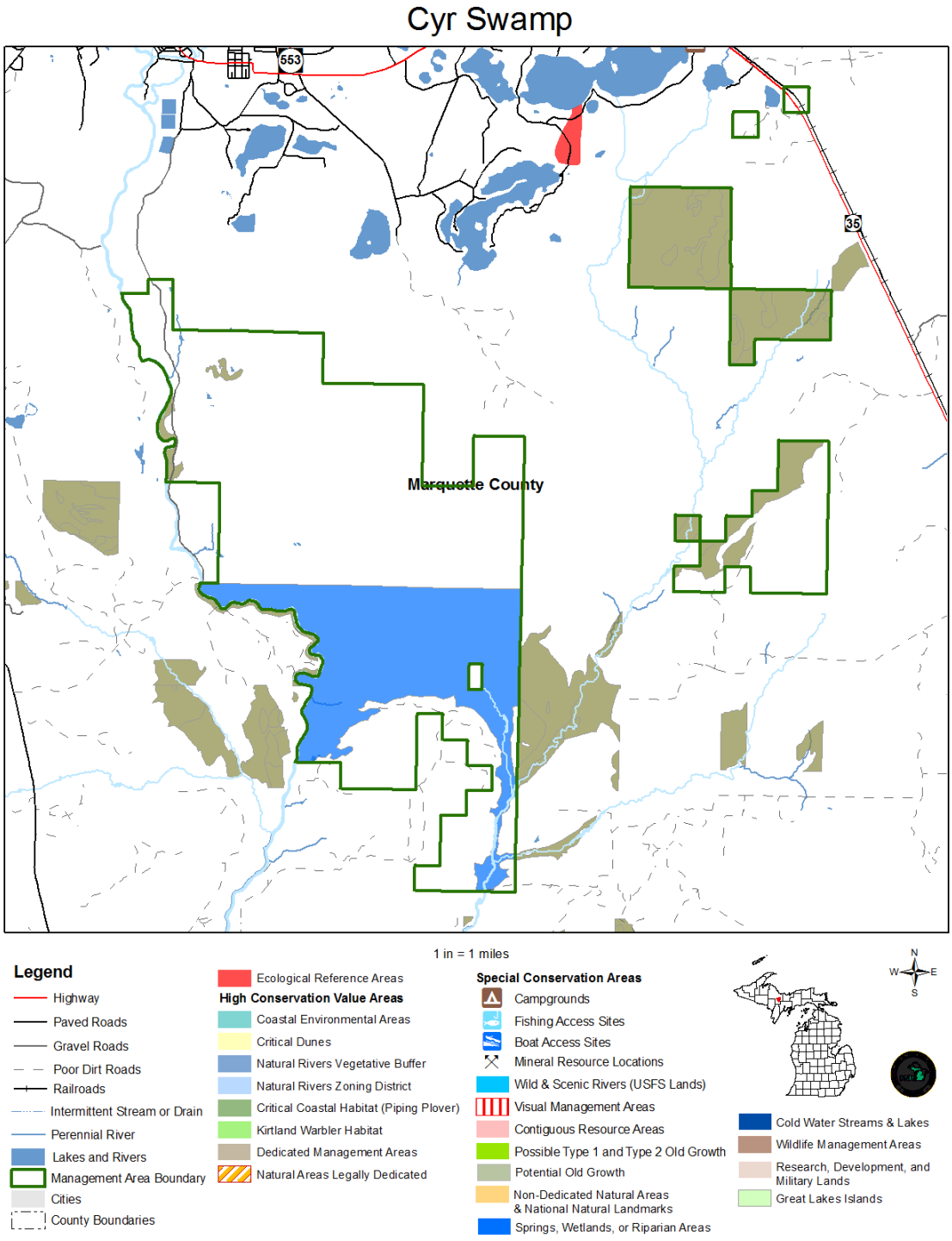

Figure 4.11.7. A map of the Cyr Swamp management area showing the special resource areas.

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 shown in Figure 4.11.1.

4.11.6 – Fire Management

Much of this area, being wetland, is of uncertain fire frequency, areas adjacent to high-risk upland fuels, such as jack pine, probably burned more frequently. Sites dominated by northern white cedar and hardwood islands probably will probably not be significantly impacted by wildland fire. Black spruce treed bogs and marshes may be more receptive to fire ignition and spread with lower water levels.

- All wildfires within the management area should be subject to appropriate initial attack response; and
- Work to develop modified suppression strategies for fires that are ignited in this area, based anticipated weather and interests of adjacent private landowners.

4.11.7 – Public Access and Recreation

This area has limited public and management access. No recreational facilities are located on state forest lands in this area.

- Work to improve the current road system to best management practice standards.

4.11.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist primarily of peat and muck. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are not located in the management area and there is limited potential.

The Ordovician Prairie du Chien Group, the Cambrian Trempealeau Formation and Munising Group and Precambrian Oak Bluff Formation subcrop below the glacial drift. There is not a current economic use for these formations.

Old iron mines are located just to the north of the management area. Metallic mineral exploration is not known to have occurred in the management area in the past, but there could be metallic mineral potential in the future.

4.12 Dead Horse Moraines Management Area

Summary of Use and Management

Vegetative management in the Dead Horse Moraines management area (MA) (Figure 4.12.1) 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: black bear, pileated woodpecker, ruffed grouse and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (emerald ash borer) and diseases (beech bark disease) will be issues for this 10-year planning period.

Introduction

The Dead Horse Moraines management area is mostly on ground moraines in southeastern Marquette, southwestern Alger and northwestern Delta Counties. The state forest covers 87,799 acres and is mostly contiguous. The major ownership in this vicinity is non-industrial private. The management area is dominated by the northern hardwoods, aspen and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by three natural communities: poor conifer swamp, mesic northern forest, and dry 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.
- This management area contains one of the western Upper Peninsula Grouse Enhanced Management Systems areas. This area plan will emphasize balanced age classes of aspen for timber production which will have habitat benefits for a number of the featured species including ruffed grouse and deer. The boundaries of Grouse Enhanced Management Systems areas will be delineated and an operational plan will be developed during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager and integrated into the plan through the revision process.

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 Dead Horse Moraines management area are shown in Table 4.12.1.

Table 4.12.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Dead Horse 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
Northern Hardwood	22%	19,560	1,394	18,166	0	7,137	19,560	0	8,748
Aspen	18%	15,465	704	14761	1,524	0	15,465	2,109	0
Cedar	17%	15,106	140	14966	0	0	15,106	935	0
Lowland Conifers	15%	13,194	8,061	5133	570	0	13,194	570	0
Lowland Deciduous	9%	8,335	3,845	4490	499	0	8,335	499	0
Upland Open/Semi-Open Lands	1%	1,103	0	1103	0	0	1,103	0	0
Lowland Open/Semi-Open Lands	7%	6,024	0	6024	0	0	6,024	0	0
Misc Other (Water, Local, Urban)	1%	695	0	695	0	0	695	0	0
Others	9%	8,317	2,601	5716	721	211	8,317	736	295
Total		87,799	16,746	71,053	3,314	7,348	87,799	4,849	9,043

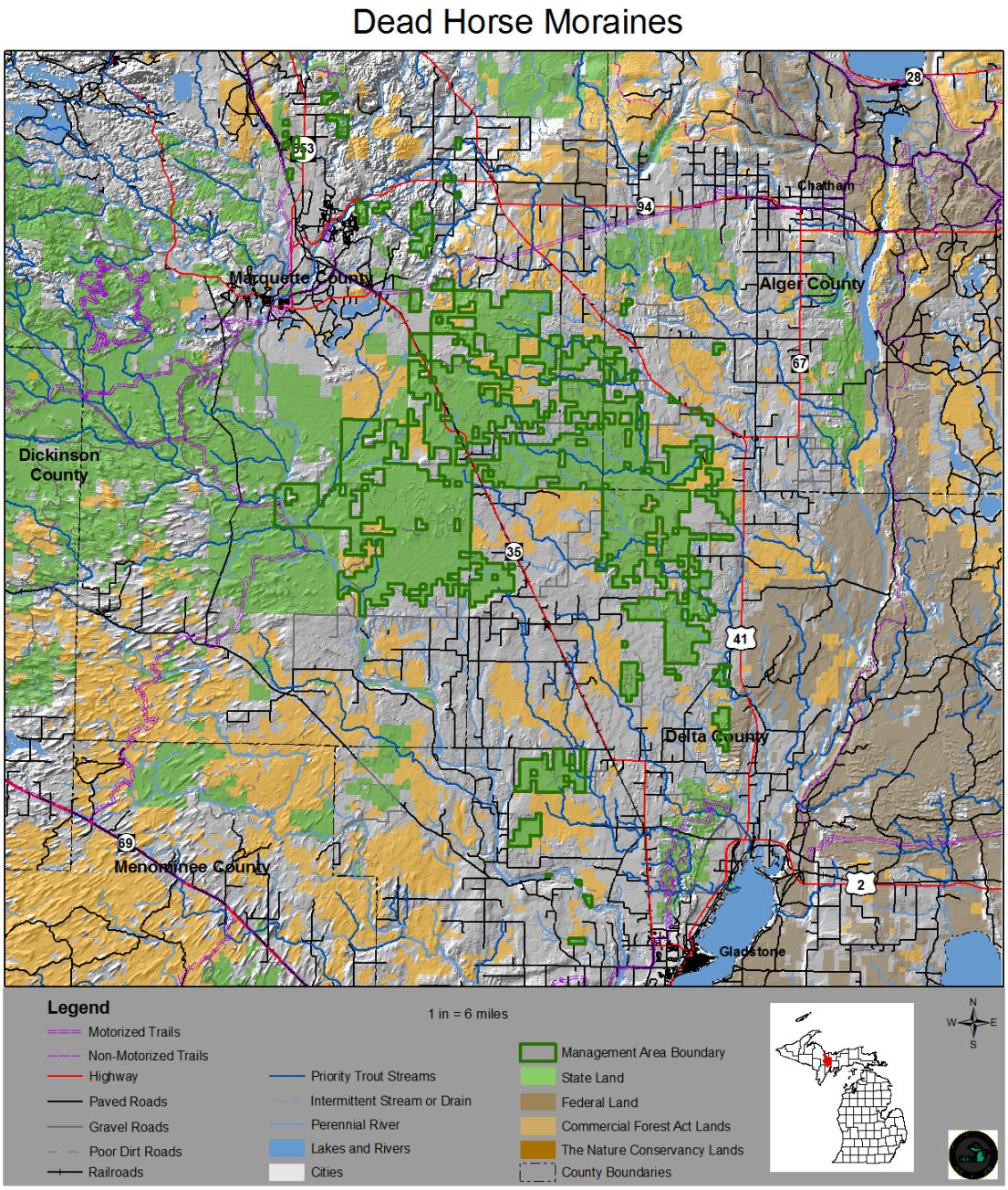

Figure 4.12.1 A map of the Dead Horse Moraines management area (dark green boundary) in relation to surrounding state forest and other lands) in Marquette, Alger and Delta Counties, Michigan.

4.12.1 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 Dead Horse 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 19,560 acres (22%) of state forest land in this management area (Table 4.12.1). They occur on good-quality sugar maple sites mixed with wetland sites. Most stands have been managed using the selection harvest system. There are some problems with regeneration, especially in the southern portions of the management area. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age (Figure 4.12.2). There are 1,343 acres of northern hardwood that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

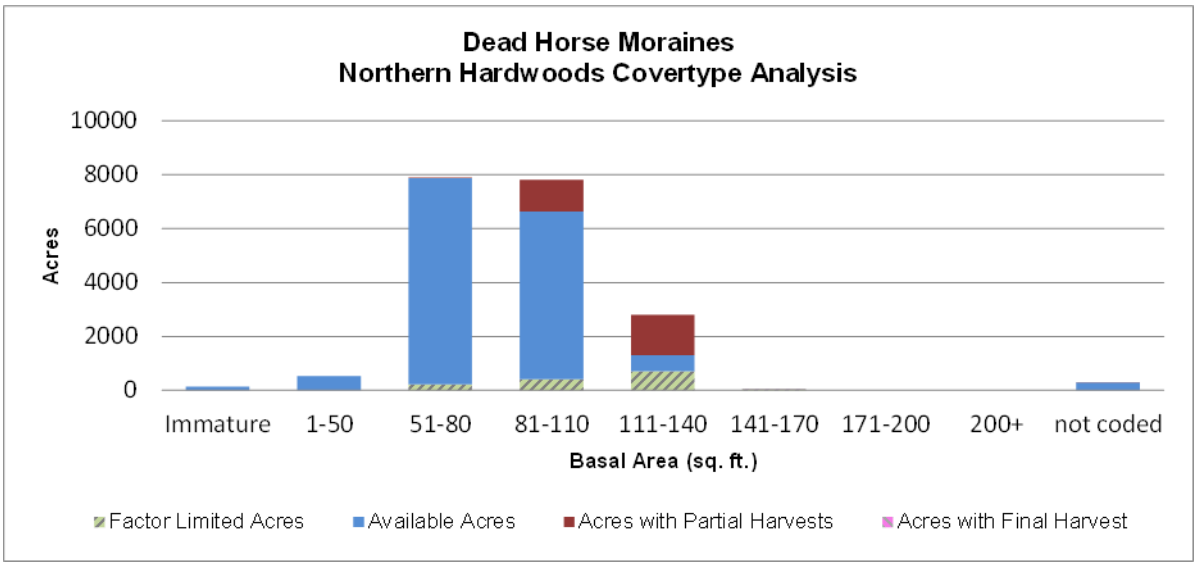

Figure 4.12.2. Graph of the basal area distribution for the northern hardwood cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selective harvest high-quality northern hardwood stands on a 20-year cycle;
- Low quality northern hardwood stands may be managed on an even-aged system with an appropriate rotation age; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Harvest 7,137 acres of northern hardwoods in this 10-year planning period;
- Maintain and promote white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock and white pine components in stands lacking that species where appropriate.

Aspen Cover Type

Current Condition

The aspen cover type covers 15,465 acres (18%) of state forest land in this management area (Table 4.12.1). Aspen has been successfully harvested and regenerated, resulting in the majority of the acres in the 0-39 year age classes (Figure 4.12.3). There are 704 acres of aspen with hard limiting factors on them. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

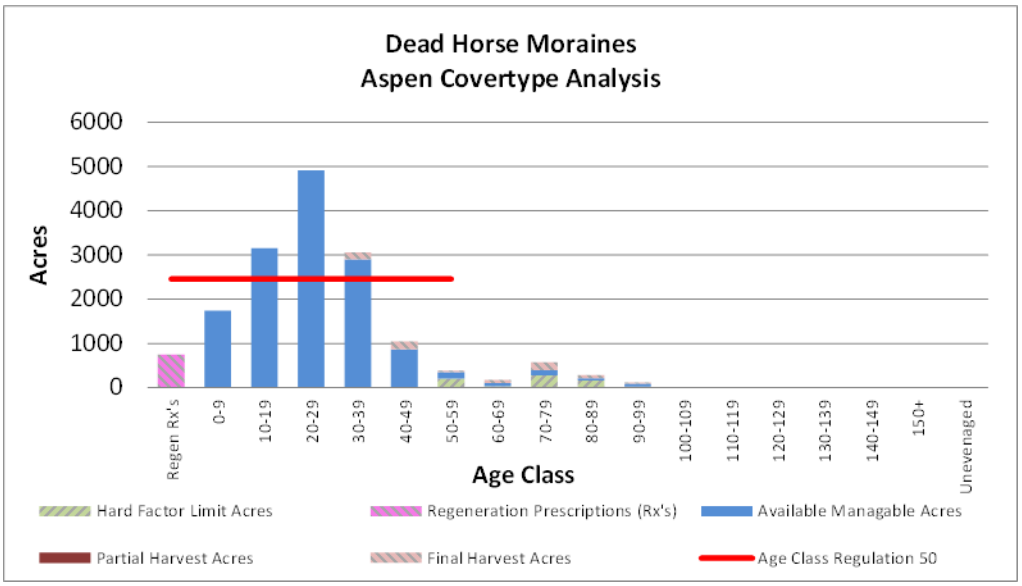

Figure 4.12.3. Graph of the age-class structure for the aspen cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length; and
- Regenerate approximately 2,460 acres each decade.

10-Year Management Objectives

- The projected harvest for this 10-year planning period is 2,717 acres of aspen;
- Identify some of the younger aspen on better sites that could be available for early harvest;
- Aspen within the identified Grouse Enhanced Management Systems area may be managed differently than the rest of the aspen within the management area, with a shorter rotation age, small patch cuts and carefully considered stand adjacency and
- Maintain mature large-tooth aspen if present as retention.

Cedar Cover Type

Current Condition

Cedar occurs on 15,106 acres (17%) of the management area (Table 4.12.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir characterize the cedar type. There are 140 acres of cedar that have 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. Cedar types are poorly distributed across the age-class distribution (Figure 4.12.4). Most of the stands are over 80 years of age.

Regeneration of cedar stand has been problematic in this area. Within this area, cedar regeneration experiments have been conducted in the North Perkins and Lampi Deer wintering complexes. These treatments are being actively monitored for regeneration. Future long-term management may be influenced by the results of these monitoring efforts. Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of cedar seedlings and saplings; and
- Maintain the closed canopy (>70%) structure in many cedar stands for winter deer habitat.

Long-Term Management Objectives

- Maintain cedar cover type on the landscape; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objective

- While no cedar harvests are planned for this area in the next decade, limited harvesting may occur to test methods of cedar regeneration.

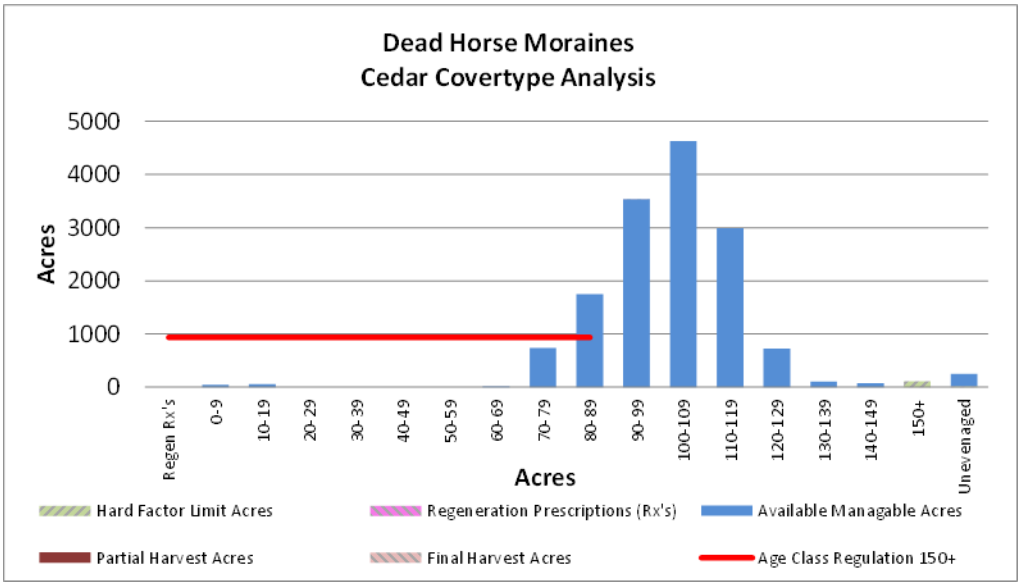

Figure 4.12.4. Graph of the age-class structure for the cedar cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 13,194 acres (15%) of the management area (Table 4.12.1). This cover type is found on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 7,648 acres of lowland conifers that have factor limits due to wet conditions or are reserved for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Mixed lowland conifers are poorly distributed across the age-class distribution, with the majority of the stands over rotation age (Figure 4.12.5). Some harvesting has been done in this type over the past 60 years, somewhat diversifying the age classes.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for approximately 570 acres to be harvested per decade; and
- Regenerate stands to a species-mix similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir.

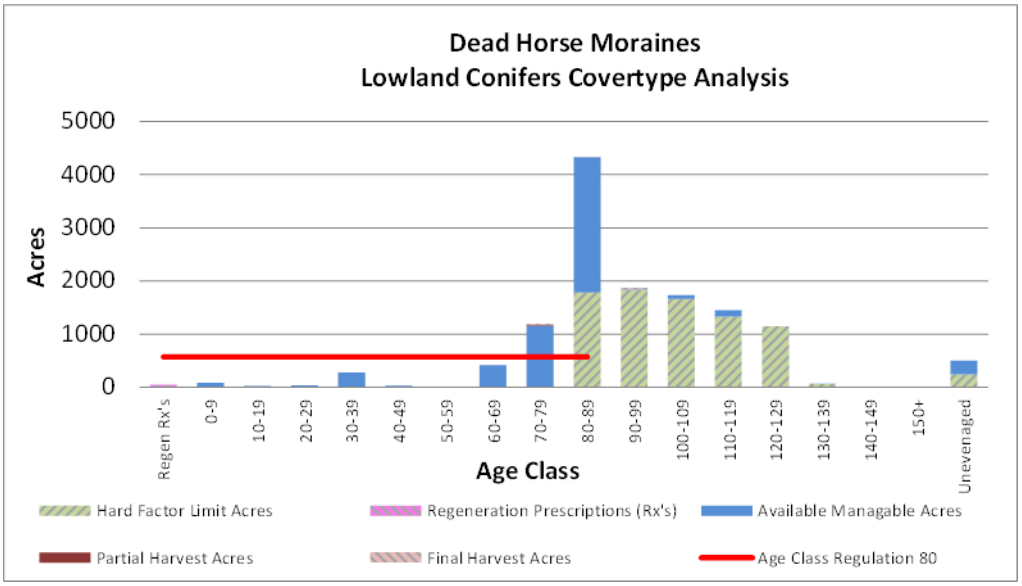

Figure 4.12.5. Graph of the age-class structure for the lowland conifer cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Harvest about 570 acres over the next decade.

Lowland Deciduous Cover Type

Current Condition

Currently there are 8,335 acres (9%) of the lowland deciduous cover type in the management area (Table 4.12.1). This cover type is often found in association with mixed lowland conifer, cedar and tamarack types. There are 3,845 acres that have 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. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Although there has been some recent harvest and regeneration work, the lowland deciduous cover type on this management area does not have a well-balanced age-class distribution (Figure 4.12.6). Most of the stands in this area are over 80 years in age.

Desired Future Condition

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

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for approximately 499 acres to be harvested per decade; and
- Regenerate stands to species mixes similar to the pre-harvest conditions favoring cedar and hemlock retention.

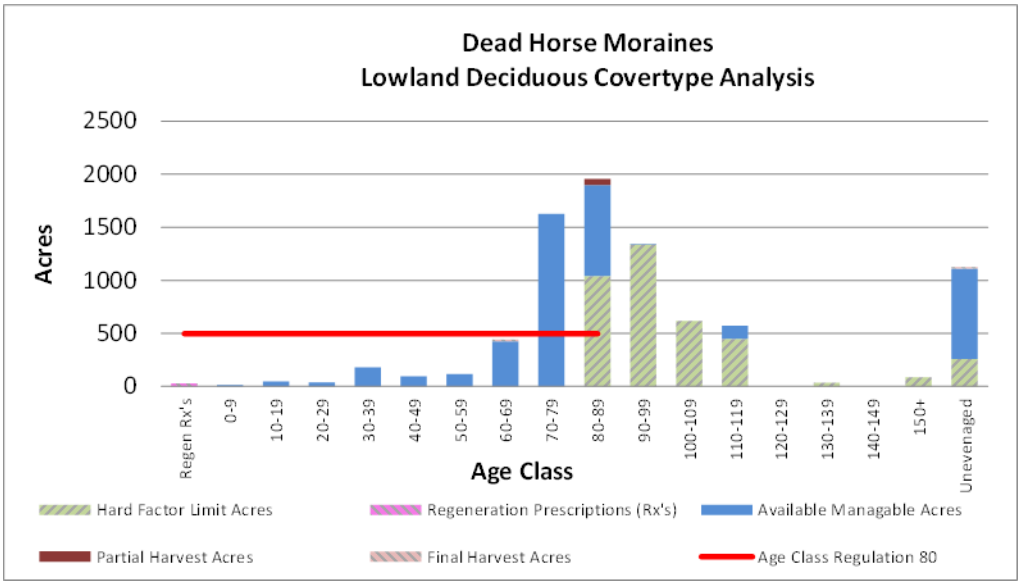

Figure 4.12.6. Graph of the age-class structure for the lowland deciduous cover type on the Dead Horse Moraines management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Harvest about 499 acres over this 10-year 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 8,317 acres and are made up of lowland spruce/fir (2,050 acres), upland spruce/fir (1,560 acres), tamarack (1,257 acres), lowland poplar (1,056 acres), mixed upland deciduous (431 acres), jack pine (428 acres), lowland mixed forest (392 acres), hemlock (275 acres), upland mixed forest (227 acres), red pine (192 acres), paper birch (162 acres), upland conifers (90 acres), oak (83 acres), natural mixed pines (79 acres) and white pine (35 acres). Together these types make up about nine percent of the management area (Table 4.12.1).

Approximately 2,601 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- The projected 10-year final harvest in these types is 721 acres and the projected 10-year partial harvest is 211 acres.

Other Non-forested Cover Types

Current Condition

The follow non-forested cover types are found on this management area: upland open/semi- open lands (1,103 acres-1%), lowland open/semi-open lands (6,024 acres – 7%) and other (water, local, urban) (695 acres – 1%) (Table 4.12.1).

Desired Future Condition

- These areas may be maintained in the current condition.

Long-Term Management Objective

- Grass may be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.12.2 – Featured Wildlife Species Management

The Dead Horse Moraines management area contains a large proportion of hardwood forest with excellent regeneration due to the heavier snow cover and lower deer numbers than the southern portion of this management area where regeneration can be an issue. Managers will focus efforts on attaining reliable hardwood regeneration and improving within-stand vegetative diversity. Efforts will also be made to balance the age-class distribution of aspen. The primary focus of wildlife habitat management in the Dead Horse Moraines management area will be to address the habitat requirements identified for the following featured species: black bear, pileated woodpecker, ruffed grouse and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are mast (hard and soft); mature forest (upland deciduous, especially aspen and mixed forest with little understory); coarse woody debris, early successional forest and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

This management area will include one of the western Upper Peninsula Grouse Enhanced Management System areas. The boundaries will be delineated during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager. Aspen stands that fall within the boundary may be managed to enhance habitat and hunting opportunities for ruffed grouse and deer. Habitat treatments may include managing aspen on a shortened rotation with multiple age classes and smaller stand sizes.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpecker is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inched in diameter at breast height) snags and cavity trees, coarse woody debris, and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: Leave scattered retention patches around some 18 inches in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect, disease, or fire within the same cover type and age class (within the compartment, management area or ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

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.
- Manage the aspen cover type for smaller patch size, a shorter rotation and a more deliberate habitat configuration within the designated Grouse Enhanced Management Systems areas where appropriate.
- 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.12.3 – 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, 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 fourteen listed species as well as one natural community of note occurring in the management area as listed in Table 4.12.2. 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 6,565.8 acres of potential old growth have been identified within the Dead Horse Moraines management area as shown in Figure 4.12.7. 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.

Although there are no high conservation value areas, there is one ecological reference area in the management area representing the alvar natural community (9.4 acres).

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.
Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.12.4 – 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
- Spruce budworm
- Emerald ash borer

Table 4.12.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Dead Horse Moraines management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Alvar		S1/G2?	Confirmed				Upland 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
			Confirmed			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
						Mesic southern forest		
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Mammal								
Tri-colored bat (Eastern pipistrelle	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Wild chives	*Allium schoenoprasum*	T/G5/S2				Alvar	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
Cooper's milk vetch	*Astragalus neglectus*	SC/G4/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak barrens		
						Boreal forest	Upland & Lowland Sp/F	Mid
						Hillside prairie	Upland open/semi-open	N/A
						Lakeplain oak openings		
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
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 comple	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
Purple clematis	*Clematis occidentalis*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Volcanic cliff	Upland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Boreal forest	Upland & Lowland Sp/F	Mid
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Alpine sainfoin	*Hedysarum alpinum*	E/G5/S1	Confirmed			Alvar	Upland open/semi-open	N/A
Mat muhly grass	*Muhlenbergia richardsonis*	T/G5/S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
Western dock	*Rumex occidentalis*	E/G5/S1	Confirmed			Emergent marsh	Lowland open/semi-open	N/A
Prairie dropseed	*Sporobolus heterolepis*	SC/G5/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Wet-mesic sand prairie	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.

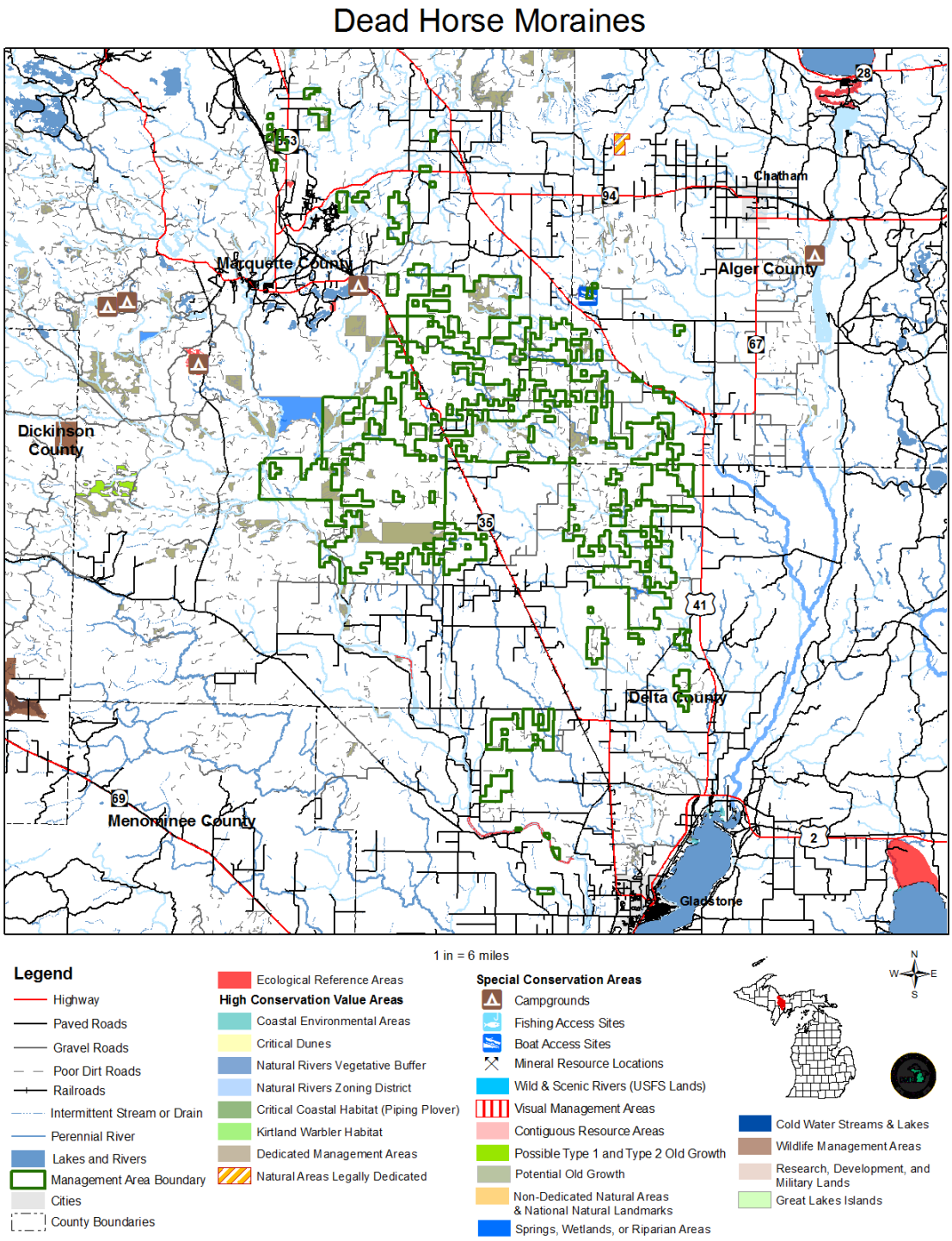

Figure 4.12.7. A map of the Dead Horse Moraines management area showing the special resource areas.

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. Glossy buckthorn, Japanese knotweed and *Phragmites* are species of concern that have been documented in or near this management area.

4.12.5 – 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 are shown in Figure 4.12.1.

4.12.6 – Fire Management

This area is dominated by mesic northern forest and lowland conifer forest. Fire impacts were rare, resulting in very long fire return intervals.

- All wildfires are subject to appropriate initial attack suppression response.

4.12.7 – Public Access and Recreation

This area has fair public and management access. Access is better in the northern half of the area where state ownership is more contiguous. To the south, scattered parcels have limited access through private lands. The only recreational facility in this area on state forest land is a boating access site on Sporley Lake.

Specific hunting recreation improvements such as parking lots, gates, trail planting and trail establishment, as well as the preparation and dissemination of specific promotional material, may be made as a result of Grouse Enhanced Management Systems areas planning in this management area.

- Maintain current management access; and
- Work to expand public access as opportunities arise.

4.12.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist primarily of medium-textured till, peat and muck, end moraines of coarse and medium-textured tills, glacial outwash sand and gravel and postglacial alluvium. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is potential on the uplands for additional pits.

The Ordovician Trenton and Black River Formations and Prairie du Chien Group, the Cambrian Trempealeau Formation and Munising Group and Precambrian Jacobsville and Archean Granite/Gneiss subcrop below the glacial drift. The Trenton and Black River are quarried for dolostone/stone in the Upper Peninsula.

Old iron mines are located just to the northwest of the management area. Metallic mineral exploration is not known to have occurred in the management area in the past, but there could be metallic mineral potential in the future.

4.13 Floodwood Plains Management Area

Summary of Use and Management

Vegetative management in the Floodwood Plains management area (MA) (Figure 4.13.1) 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 managing early successional aspen and pine on appropriate sites; 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 maintaining large non-forest opening complexes found in this area, enhancing the oak component in hardwood stands, Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Floodwood Plains management area is on an outwash plain in northwestern Dickinson County. The state forest covers 10,708 acres and is mostly contiguous. State forest lands are the major ownership in this vicinity. The management area is dominated by aspen, lowland conifer and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry-mesic forest and poor conifer swamp;
- 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. Additional priorities include maintaining large non-forest opening complexes found in this area and managing early successional aspen and pine on appropriate sites.

The predominant cover types, composition and projected harvest areas for the Floodwood Plains management area are shown in Table 4.13.1.

Table 4.13.1. Summary of cover types, composition, limiting factor area, manageable area and projected harvest area for the Floodwood Plains 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	28%	3,048	58	2,990	512	0	3,048	498	0
Lowland Conifers	21%	2,248	1,144	1104	123	0	2,248	123	0
Cedar	16%	1,705	0	1705	0	0	1,705	107	0
Red Pine	7%	795	49	746	282	48	795	83	442
Northern Hardwood	5%	524	0	524	0	262	524	0	262
Jack Pine	5%	512	0	512	18	0	512	73	0
Upland Open/Semi-Open Lands	3%	323	0	323	0	0	323	0	0
Lowland Open/Semi-Open Lands	5%	578	0	578	0	0	578	0	0
Misc Other (Water, Local, Urban)	0%	0	0	0	0	0	0	0	0
Others	9%	975	413	562	126	8	975	65	31
Total		10,708	1,664	9,044	1,062	318	10,708	949	735

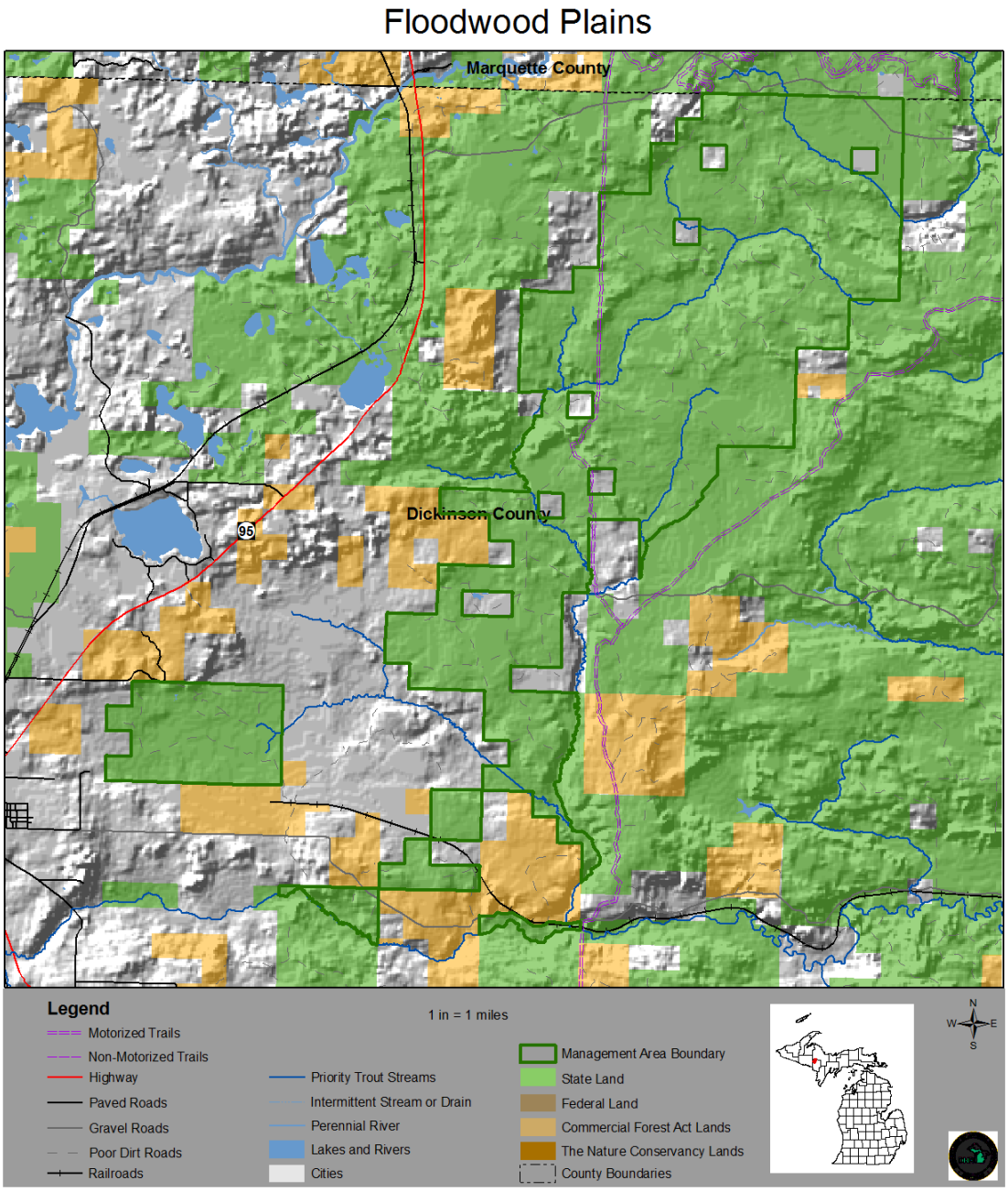

Figure 4.13.1. A map of the Floodwood Plains management area (dark green boundary) in relation to surrounding state forest and other lands in Dickinson County, Michigan.

4.13.1 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 Floodwood Plains 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 3,048 acres (28%) of state forest land in this management area (Table 4.13.1). Aspen is well represented in the first four age classes, but acreage amounts are noticeably lower in the 40-49 year-old age class. Most stands older than this age class are either factor limited or have a harvest prescribed. Stands that are not harvested are expected to succeed to upland spruce-fir.

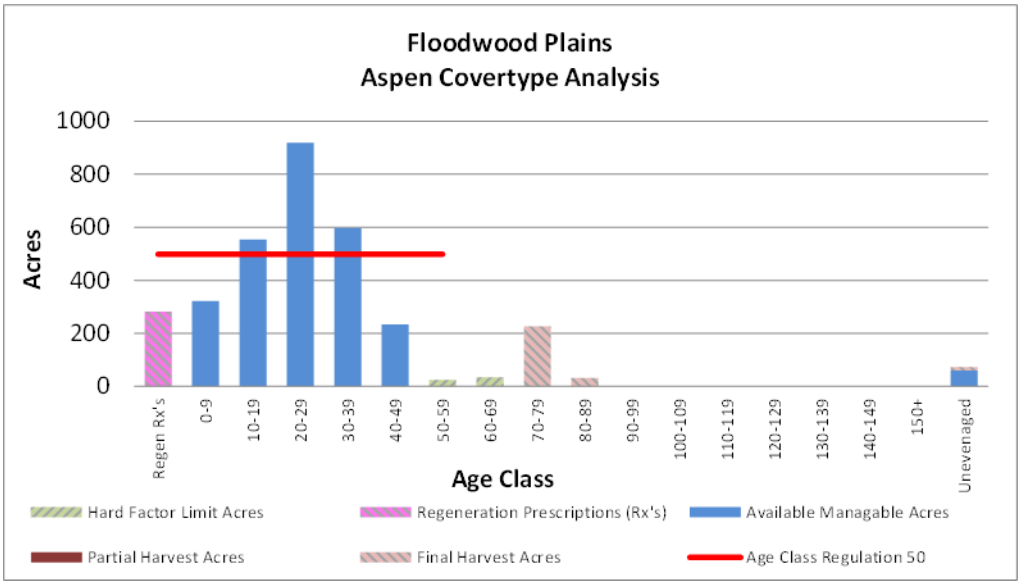

Figure 4.13.2. Graph of the age-class structure for the aspen cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age-class over a 50-year rotation as indicated by the red line in Figure 4.13.2;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Once age classes are more balanced, harvest and regenerate 498 acres each decade; and
- Explore opportunities to harvest in the spikes (above the red line) presently in the 20-29 and 30-39 year-old age classes as these classes grow older and reach merchantable size.

10-Year Management Objectives

- To limit succession to other cover types, harvest stands of 60-90 year old aspen that are in decline;
- Two-aged or uneven-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;
- Identify aspen in some of the younger age classes on higher quality sites that could be harvested early to improve age class;
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types mitigating any aspen acreage loss during this planning period through identification of replacement acreage prior to conversion; and
- Harvest and regenerate 512 acres of aspen during this 10-year planning period.

Lowland Conifers Cover Type

Current Condition

There are 2,248 acres (21%) of this cover type occurring within the management area (Table 4.13.1), These acres occur on poorly drained soils that support mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Age classes are poorly distributed with almost all stands in the 80-89 year-old age class and at rotation age. Very little harvesting has occurred as illustrated by the lack of age classes below the 70-79 class. Some of the stands have factor limits due to wet conditions or for riparian corridors. Due to the wet site conditions, they are susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. As these stands continue to age they become increasingly susceptible to insect and disease problems.

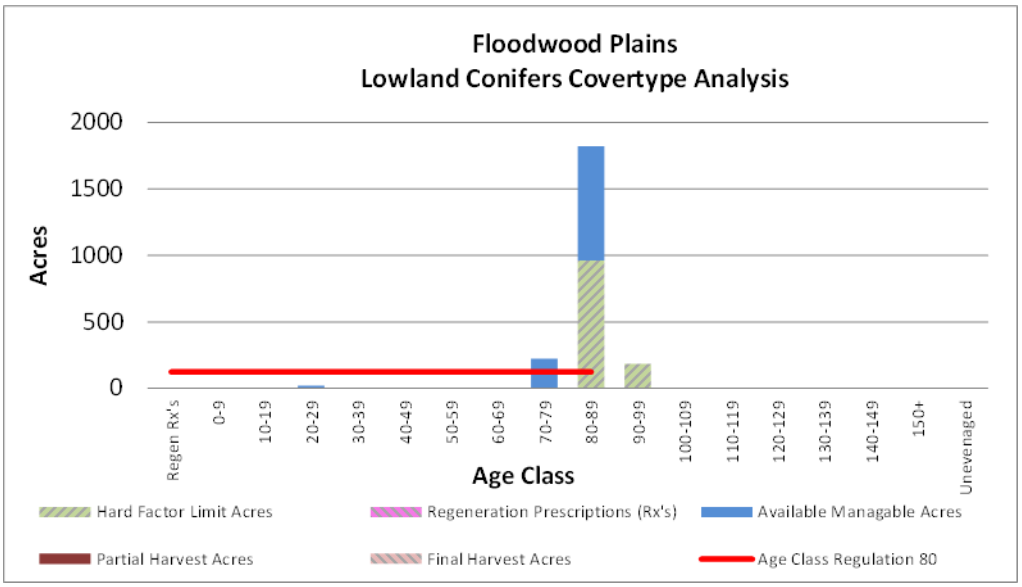

Figure 4.13.3. Graph of the age-class structure for the lowland conifer cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced age classes over an 80-year rotation as represented by the red line in Figure 4.13.3;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Closed canopy stands interspersed with patches of all age classes; and
- Maintain mixed lowland conifer stands with closed canopy structure to provide important winter habitat for deer.

Long-Term Management Objectives

- Once age classes are more balanced, regenerate 123 acres each decade;
- Regenerate stands to a species-mix similar to the pre-harvest conditions with a preference for cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Prioritize stands to harvest and regenerate about 123 acres over this 10-year planning period, making use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Cedar Cover Type

Current Condition

The cedar cover type covers 1,705 acres (16%) of the management area (Table 4.13.1). Sites are poorly drained supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir. Due to the wet site conditions, they are susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Cedar types are poorly distributed across the age spectrum, with all stands being over 80 years of age and in three age classes. Little harvesting has been done in this cover type over the past 80 years and regeneration of cedar stands has been problematic.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings; and
- Maintain cedar cover type on the landscape.

Long-Term Management Objective

- Explore techniques for regenerating the cedar cover type to species mixes similar to the pre-harvest conditions; ideally leading to harvesting 107 acres per decade.

10-Year Management Objective

- While no harvests are planned for this management area in this planning period, limited experimental cedar regeneration and thinning trials may occur, coordinated at the district level.

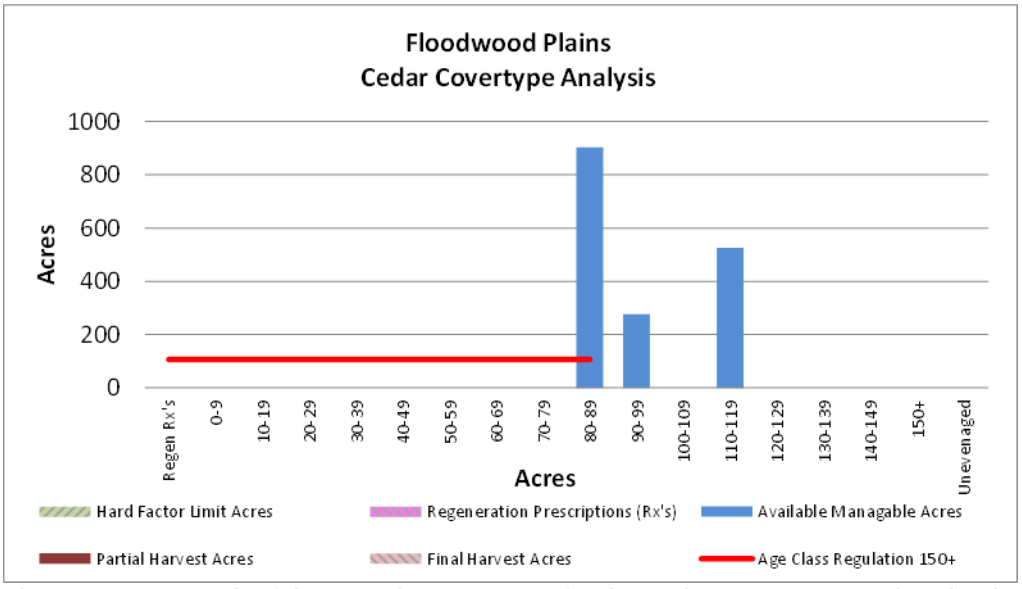

Figure 4.13.4. Graph of the age-class structure for the cedar cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Red Pine Cover Type

Current Condition

The red pine cover type covers 795 acres (7%) of the state forest in this management area (Table 4.13.1). Most of the stands are in the 50-59 year old age-class and are scheduled for a partial harvest (primarily thinning). The spike in this

age class is reflective of planting efforts in the 1950s and 60s. Plantation red pine makes up about 60% (477 acres), with natural origin red pine making up the other 40% (318 acres).

Desired Future Condition

- Provide a supply of forest products;
- Maintain the same number of acres of red pine in the management area and at approximately the same ratio of plantation pine to natural origin pine (318 acres natural origin red pine and 477 acres in plantations); and
- Balanced age classes of the plantation red pine to lessen the spike in the 50-59 year old age-class.

Long-Term Management Objectives

- Once age classes are more balanced, harvest and regenerate 83 acres and thin 442 acres each decade;
- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) as basal area guidelines are met; and
- Maintain stands of natural origin on about 40% of the red pine acreage and manage those stands on a 150-year rotation using natural regeneration techniques with scarification as needed.

10-Year Management Objectives

- Thin 282 acres largely from the 50-59 and 80-89 year-old age classes in this planning period which is less than long-term management indicates because of the current age-class imbalance;
- Harvest and regenerate 48 acres of red pine in this planning period; and
- Look for opportunities to restore red and or white pine on appropriate sites.

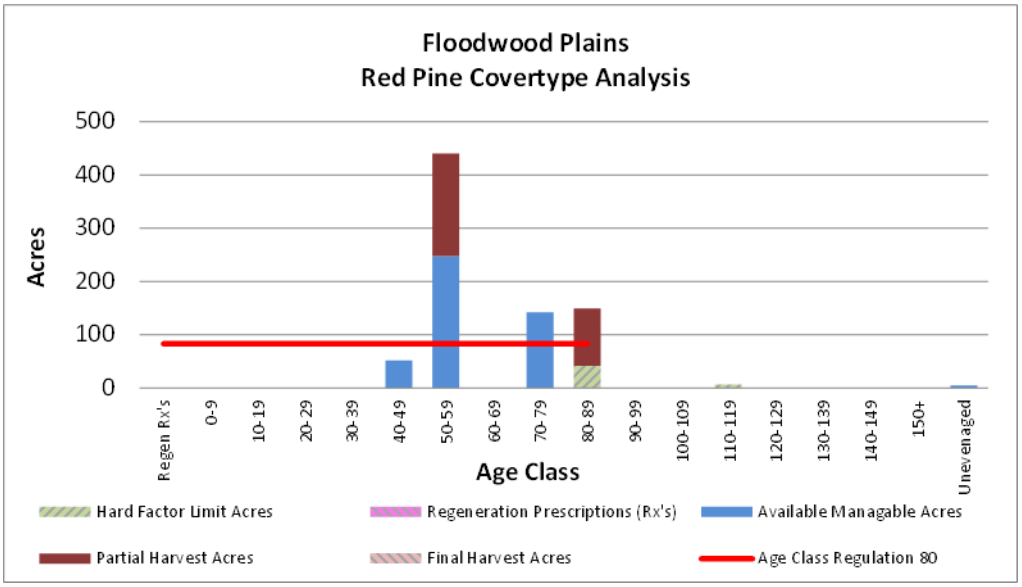

Figure 4.13.5. Graph of the age-class structure for the red pine cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 524 acres (5%) of state forest land in this management area (Table 4.13.1). They occur on good-quality sugar maple sites interspersed with wetland sites. Recruitment of seedlings and saplings into larger size classes is generally not successful due to browse pressure from deer. Northern hardwood is typically managed using an uneven-aged harvest system (selection) based on basal area rather than age. As Figure 4.12.6 indicates, most of the stands have a basal area range of 81-110.

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle with an estimated 262 acres harvested each decade; and
- Maintain and encourage minor species to increase within-stand diversity.

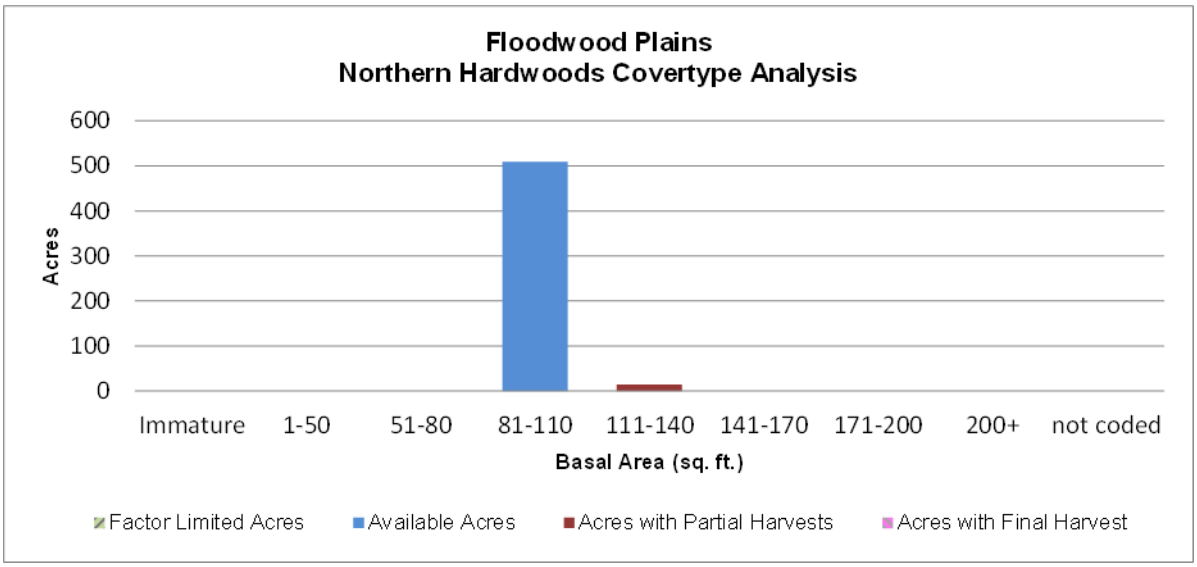

Figure 4.13.6. Graph of the basal area distribution for the northern hardwood cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Approximately 262 acres will be select cut in the next decade;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock and white pine components in stands lacking that species.

Jack Pine Cover Type

Current Condition

The Jack pine cover type comprises about 512 acres (5%) of the management area (Table 4.13.1). Jack pine generally occurs on sandy soils that tend to be nutrient poor. Most of the jack pine is immature and largely contained in the 10-19 and 20-29 age classes. Very few acres are older than 29 years and all stands 50 years old or older are prescribed for a final harvest.

Desired Future Condition

- Using-even aged management, with a rotation age 60 years, work to balance the age-class structure of jack pine within the management area;
- Provide a supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objective

- Once age classes are balanced, harvest and regenerate 73 acres of jack pine every decade.

10-Year Management Objective

- Harvest and regenerate 18 acres over this 10-year planning period.

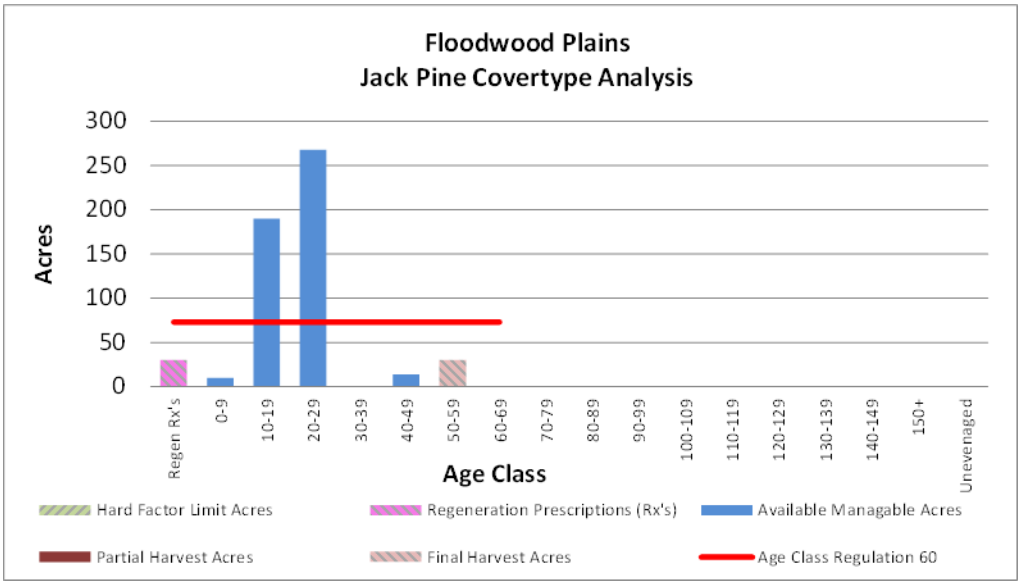

Figure 4.13.7. Graph of the age-class structure for the jack pine cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Other Forested Cover Types

Current Condition

Other forested types make up 975 acres and are made up of lowland spruce-fir (319 acres), upland mixed forest (284 acres), upland conifers (157 acres), upland spruce-fir (104 acres), tamarack (60 acres), oak (23 acres), white pine (18 acres), lowland poplar (five acres) and mixed upland deciduous (five acres). Together these types make up about nine percent of the management area. Of these cover types, 42 percent have a hard factor limitation (Table 4.13.1).

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;
- Featured species habitat requirements will be taken in to consideration; and
- As individual age-class distributions for these species approach balance, about 159 acres will be final harvested and 8 acres partially harvested every decade.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 134 acres over this 10-year planning period which is higher than long-term management would indicate and is due to the current age-class imbalances within the individual cover types.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (323 acres-3%), lowland open/semi-open lands (578 acres – 5%) and other (water, local, urban) (No acres).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass stands (upland open/semi-open cover types) will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types (upland open/semi-open cover types) will be treated for opening maintenance as needed.

4.13.2 – Featured Wildlife Species Management

The Floodwood Plains management area is dominated by sandy soils and poorer quality timber, with the exception of some good quality oak. The oak should be encouraged and expanded, where possible. A large percentage of the management area has been maintained as “open” for decades. A sharp-tail grouse population once existed here, but only occasional birds have been seen in recent times. Sandhill cranes and Canada geese use the area and open fields that were maintained in the past. These openings should be maintained and fire is an ideal tool for the job as it also stimulates blueberry. The primary focus of wildlife habitat management in the Floodwood Plains management area will be to address the habitat requirements for the following featured species: American woodcock, black bear, ruffed grouse, upland sandpiper and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are early successional forest conditions (associated with alder, riparian zones or forested wetlands); mast (hard and soft); large open land complexes; and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to increase abundance. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;

- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

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.
- 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.

Upland Sandpiper

The western Upper Peninsula goal is to provide suitable breeding habitat for upland sandpiper in select appropriate WUP management areas. State forest management during this planning period will focus on maintaining large opening complexes and using the compartment review process to schedule jack-pine harvests associated with permanent openings on a sustainable rotation and schedule harvests adjacent to burns or schedule similarly-aged jack pine treatments in close proximity to each other.

Wildlife habitat specifications:

- Maintain opening complexes of 250 acres or larger.
- Open blocks within complexes should be within one mile of each other.
- Where possible, strive to consolidate patches into larger opening complexes, by creating temporary openings associated with permanent openings. This could be accomplished by scheduling jack pine clear-cuts associated with permanent openings on a sustainable rotation, scheduling harvests adjacent to burns or schedule similarly aged jack-pine treatments in close proximity to each other.
- Work with adjacent landowners within the management area to maximize the amount and distribution of open land habitat.
- Mow or burn patches every 3-5 years to eliminate woody vegetation succession as the budget allows.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.13.3 – 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, 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 no listed species or natural communities of note occurring in the management area. 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 in this management area as illustrated in Figure 4.13.8.

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.

4.13.4 – 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 and 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. The only species of concern that been documented in or near this management area is Japanese knotweed.

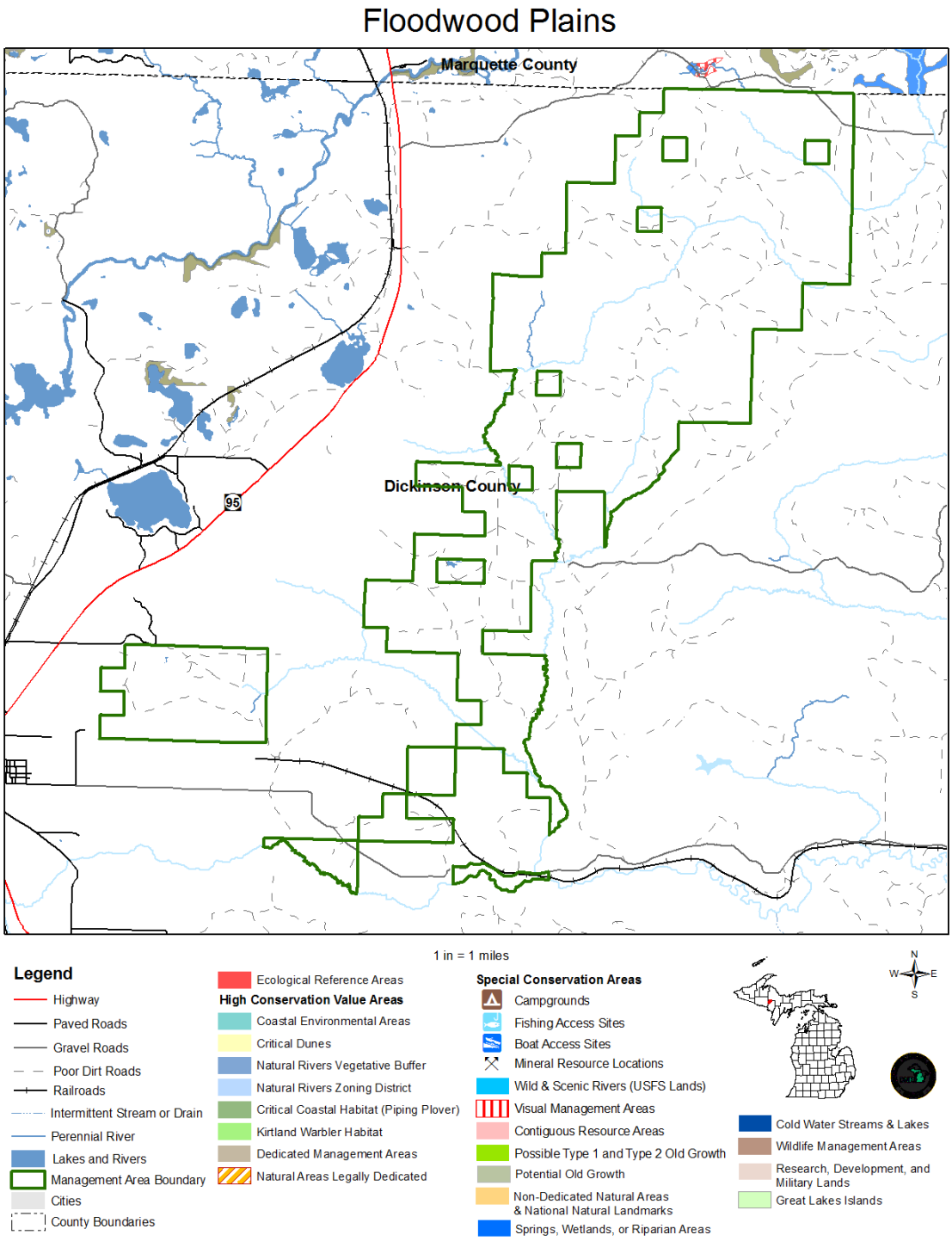

Figure 4.13.8. A map of the Floodwood Plains management area showing the special resource areas.

4.13.5 – 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 are shown in Figure 4.13.1.

4.13.6 – Fire Management

Under natural fire regimes, much of the uplands probably were subject to regular, periodic stand replacement burns, maintaining open dry and dry-mesic northern forest communities. Associated lowlands probably limited overall size of any individual fire.

- All wildfires are subject to appropriate initial attack response.
- The Floodwood Zone Dispatch area provides plans for initial attack, based on fire danger level. It calls for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.
- Due to the high-risk fuels in the management area, private landowners should be encouraged to undertake Firewise practices to protect their properties from possible fires.
- The core barrens community within the management area has no record of being burned, though some areas remain relatively open and may be suitable for large opening management.

4.13.7 – Public Access and Recreation

This area has good public and management access. Two snowmobile trails cross through this area as shown if Figure 4.13.1.

- Maintain current management and public access.

4.13.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of medium-textured till, peat and muck and glacial outwash sand and gravel and postglacial alluvium. The glacial drift thickness varies between 10 and 100 feet. Sand and gravel pits are located in the area of the management area and there could be potential on the uplands.

The Precambrian Michigamme Formation and Archean Granite/Gneiss subcrop below the glacial drift. The Granite/Gneiss sometimes can be used as dimension stone.

Metallic mineral exploration has occurred in the management area in the past. There are a couple Metallic Mineral leases in the northern end of the management area, and metallic mineral potential appears to be possible in the future.

4.13 Floodwood Plains Management Area

Summary of Use and Management

Vegetative management in the Floodwood Plains management area (MA) (Figure 4.13.1) 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 managing early successional aspen and pine on appropriate sites; 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 maintaining large non-forest opening complexes found in this area, enhancing the oak component in hardwood stands, Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Floodwood Plains management area is on an outwash plain in northwestern Dickinson County. The state forest covers 10,708 acres and is mostly contiguous. State forest lands are the major ownership in this vicinity. The management area is dominated by aspen, lowland conifer and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry-mesic forest and poor conifer swamp;
- 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. Additional priorities include maintaining large non-forest opening complexes found in this area and managing early successional aspen and pine on appropriate sites.

The predominant cover types, composition and projected harvest areas for the Floodwood Plains management area are shown in Table 4.13.1.

Table 4.13.1. Summary of cover types, composition, limiting factor area, manageable area and projected harvest area for the Floodwood Plains 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	28%	3,048	58	2,990	512	0	3,048	498	0
Lowland Conifers	21%	2,248	1,144	1104	123	0	2,248	123	0
Cedar	16%	1,705	0	1705	0	0	1,705	107	0
Red Pine	7%	795	49	746	282	48	795	83	442
Northern Hardwood	5%	524	0	524	0	262	524	0	262
Jack Pine	5%	512	0	512	18	0	512	73	0
Upland Open/Semi-Open Lands	3%	323	0	323	0	0	323	0	0
Lowland Open/Semi-Open Lands	5%	578	0	578	0	0	578	0	0
Misc Other (Water, Local, Urban)	0%	0	0	0	0	0	0	0	0
Others	9%	975	413	562	126	8	975	65	31
Total		10,708	1,664	9,044	1,062	318	10,708	949	735

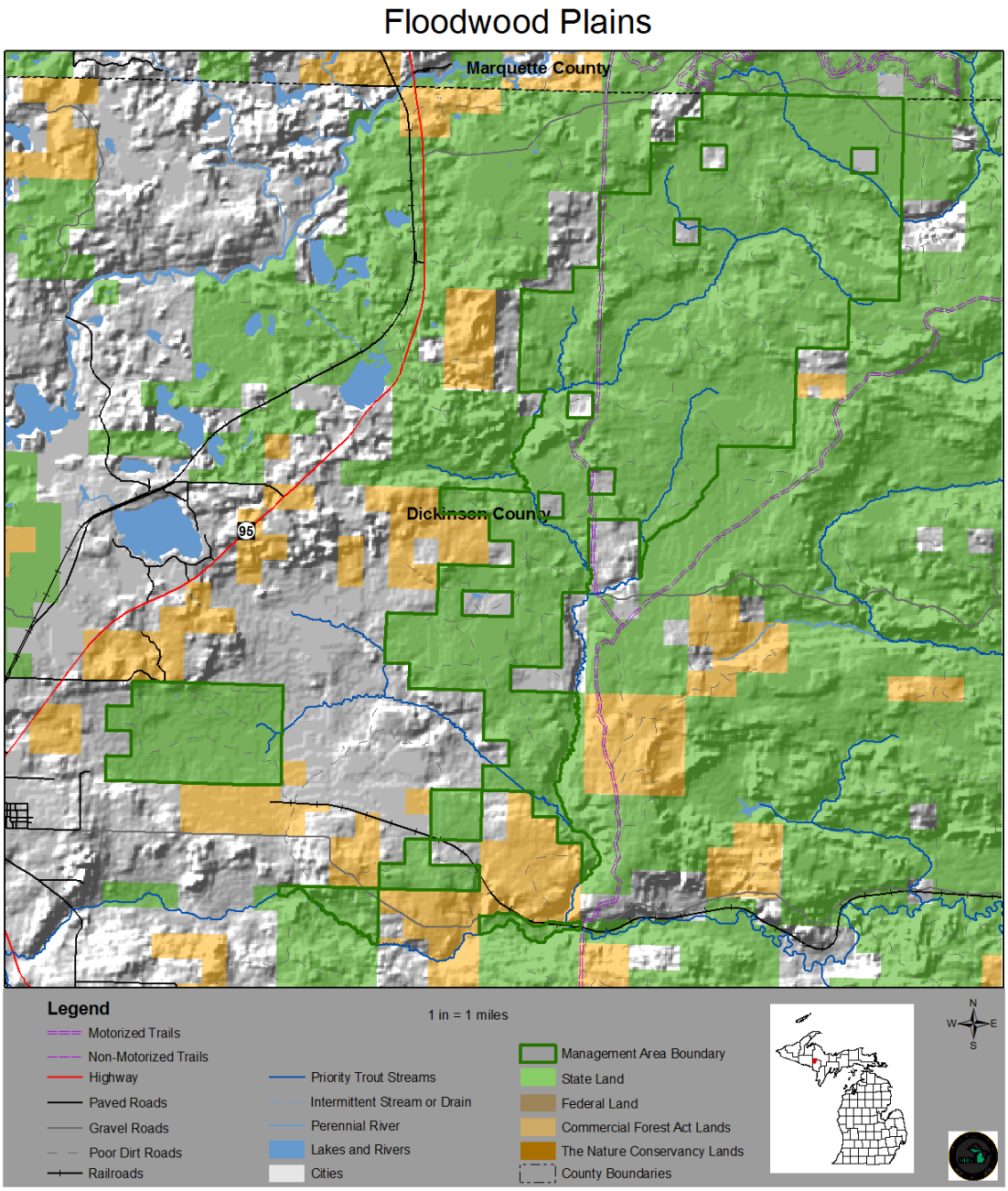

Figure 4.13.1. A map of the Floodwood Plains management area (dark green boundary) in relation to surrounding state forest and other lands in Dickinson County, Michigan.

4.13.1 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 Floodwood Plains 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 3,048 acres (28%) of state forest land in this management area (Table 4.13.1). Aspen is well represented in the first four age classes, but acreage amounts are noticeably lower in the 40-49 year-old age class. Most stands older than this age class are either factor limited or have a harvest prescribed. Stands that are not harvested are expected to succeed to upland spruce-fir.

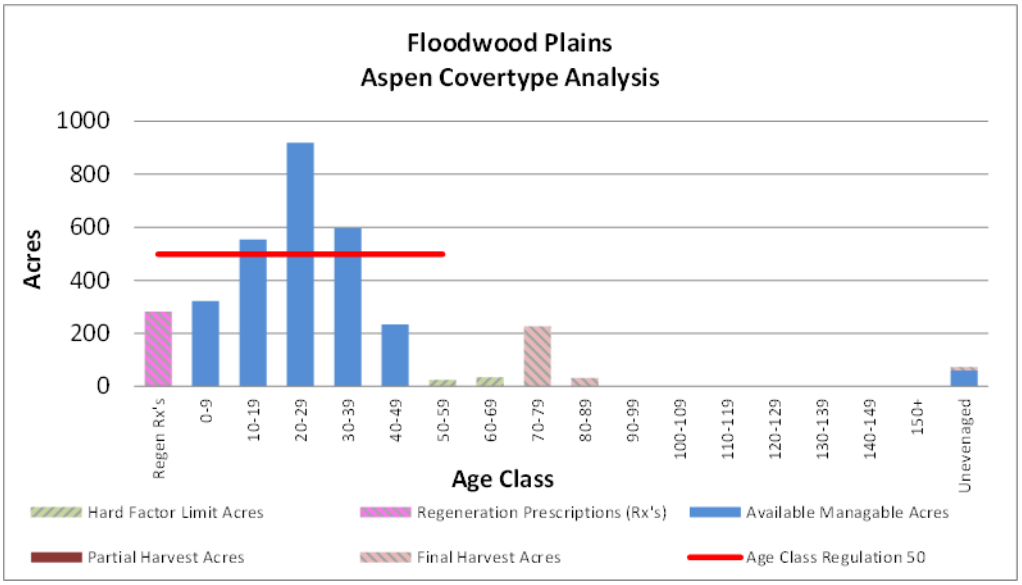

Figure 4.13.2. Graph of the age-class structure for the aspen cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age-class over a 50-year rotation as indicated by the red line in Figure 4.13.2;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Once age classes are more balanced, harvest and regenerate 498 acres each decade; and
- Explore opportunities to harvest in the spikes (above the red line) presently in the 20-29 and 30-39 year-old age classes as these classes grow older and reach merchantable size.

10-Year Management Objectives

- To limit succession to other cover types, harvest stands of 60-90 year old aspen that are in decline;
- Two-aged or uneven-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;
- Identify aspen in some of the younger age classes on higher quality sites that could be harvested early to improve age class;
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types mitigating any aspen acreage loss during this planning period through identification of replacement acreage prior to conversion; and
- Harvest and regenerate 512 acres of aspen during this 10-year planning period.

Lowland Conifers Cover Type

Current Condition

There are 2,248 acres (21%) of this cover type occurring within the management area (Table 4.13.1), These acres occur on poorly drained soils that support mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Age classes are poorly distributed with almost all stands in the 80-89 year-old age class and at rotation age. Very little harvesting has occurred as illustrated by the lack of age classes below the 70-79 class. Some of the stands have factor limits due to wet conditions or for riparian corridors. Due to the wet site conditions, they are susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. As these stands continue to age they become increasingly susceptible to insect and disease problems.

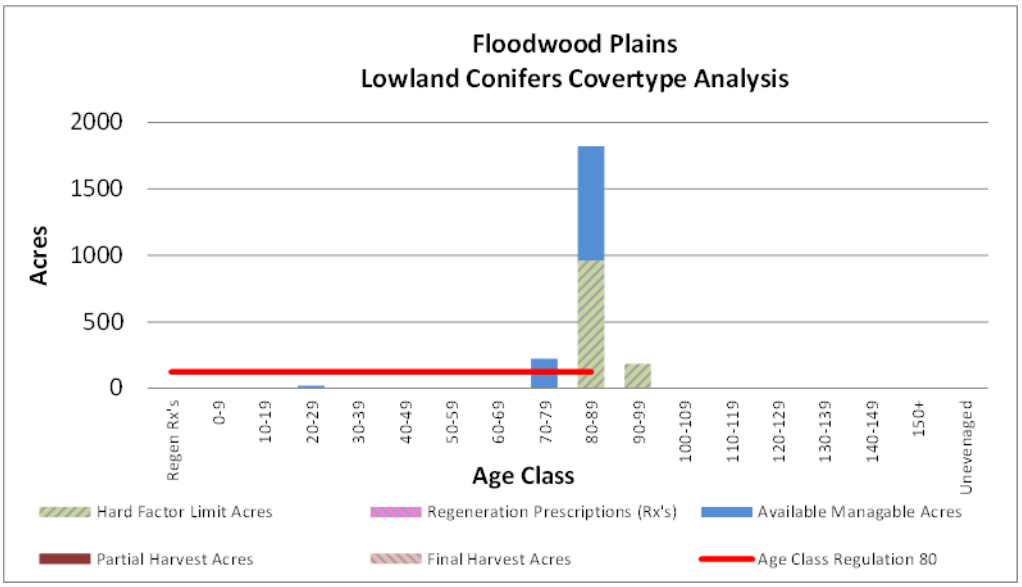

Figure 4.13.3. Graph of the age-class structure for the lowland conifer cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced age classes over an 80-year rotation as represented by the red line in Figure 4.13.3;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Closed canopy stands interspersed with patches of all age classes; and
- Maintain mixed lowland conifer stands with closed canopy structure to provide important winter habitat for deer.

Long-Term Management Objectives

- Once age classes are more balanced, regenerate 123 acres each decade;
- Regenerate stands to a species-mix similar to the pre-harvest conditions with a preference for cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Prioritize stands to harvest and regenerate about 123 acres over this 10-year planning period, making use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Cedar Cover Type

Current Condition

The cedar cover type covers 1,705 acres (16%) of the management area (Table 4.13.1). Sites are poorly drained supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir. Due to the wet site conditions, they are susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Cedar types are poorly distributed across the age spectrum, with all stands being over 80 years of age and in three age classes. Little harvesting has been done in this cover type over the past 80 years and regeneration of cedar stands has been problematic.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings; and
- Maintain cedar cover type on the landscape.

Long-Term Management Objective

- Explore techniques for regenerating the cedar cover type to species mixes similar to the pre-harvest conditions; ideally leading to harvesting 107 acres per decade.

10-Year Management Objective

- While no harvests are planned for this management area in this planning period, limited experimental cedar regeneration and thinning trials may occur, coordinated at the district level.

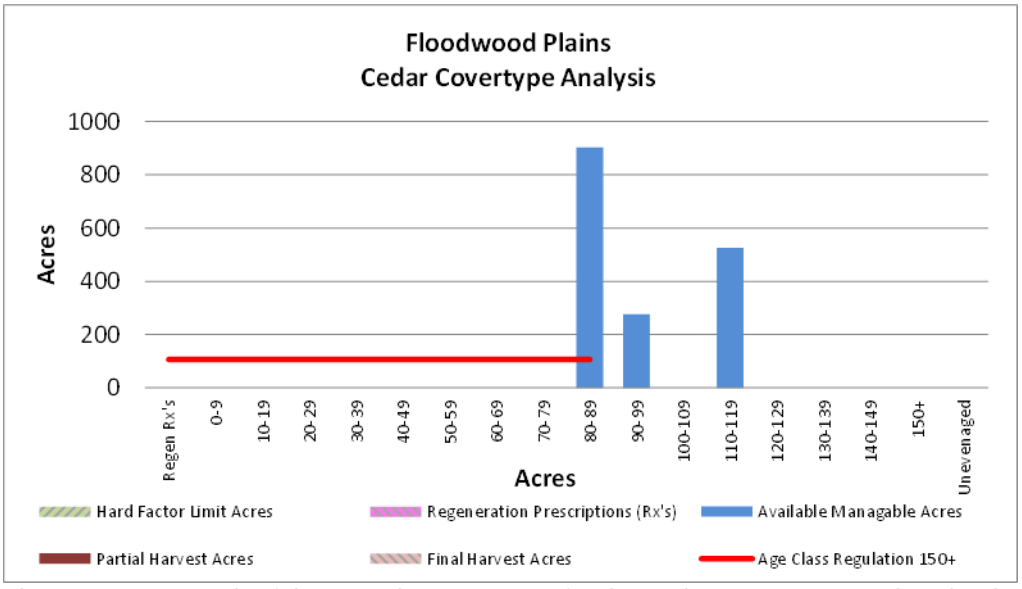

Figure 4.13.4. Graph of the age-class structure for the cedar cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Red Pine Cover Type

Current Condition

The red pine cover type covers 795 acres (7%) of the state forest in this management area (Table 4.13.1). Most of the stands are in the 50-59 year old age-class and are scheduled for a partial harvest (primarily thinning). The spike in this

age class is reflective of planting efforts in the 1950s and 60s. Plantation red pine makes up about 60% (477 acres), with natural origin red pine making up the other 40% (318 acres).

Desired Future Condition

- Provide a supply of forest products;
- Maintain the same number of acres of red pine in the management area and at approximately the same ratio of plantation pine to natural origin pine (318 acres natural origin red pine and 477 acres in plantations); and
- Balanced age classes of the plantation red pine to lessen the spike in the 50-59 year old age-class.

Long-Term Management Objectives

- Once age classes are more balanced, harvest and regenerate 83 acres and thin 442 acres each decade;
- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) as basal area guidelines are met; and
- Maintain stands of natural origin on about 40% of the red pine acreage and manage those stands on a 150-year rotation using natural regeneration techniques with scarification as needed.

10-Year Management Objectives

- Thin 282 acres largely from the 50-59 and 80-89 year-old age classes in this planning period which is less than long-term management indicates because of the current age-class imbalance;
- Harvest and regenerate 48 acres of red pine in this planning period; and
- Look for opportunities to restore red and or white pine on appropriate sites.

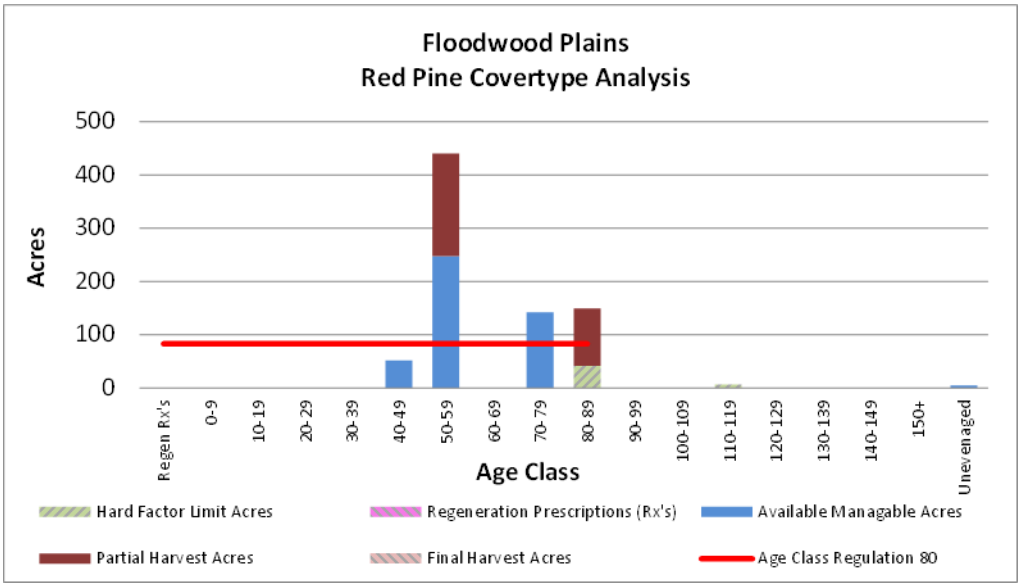

Figure 4.13.5. Graph of the age-class structure for the red pine cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 524 acres (5%) of state forest land in this management area (Table 4.13.1). They occur on good-quality sugar maple sites interspersed with wetland sites. Recruitment of seedlings and saplings into larger size classes is generally not successful due to browse pressure from deer. Northern hardwood is typically managed using an uneven-aged harvest system (selection) based on basal area rather than age. As Figure 4.12.6 indicates, most of the stands have a basal area range of 81-110.

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle with an estimated 262 acres harvested each decade; and
- Maintain and encourage minor species to increase within-stand diversity.

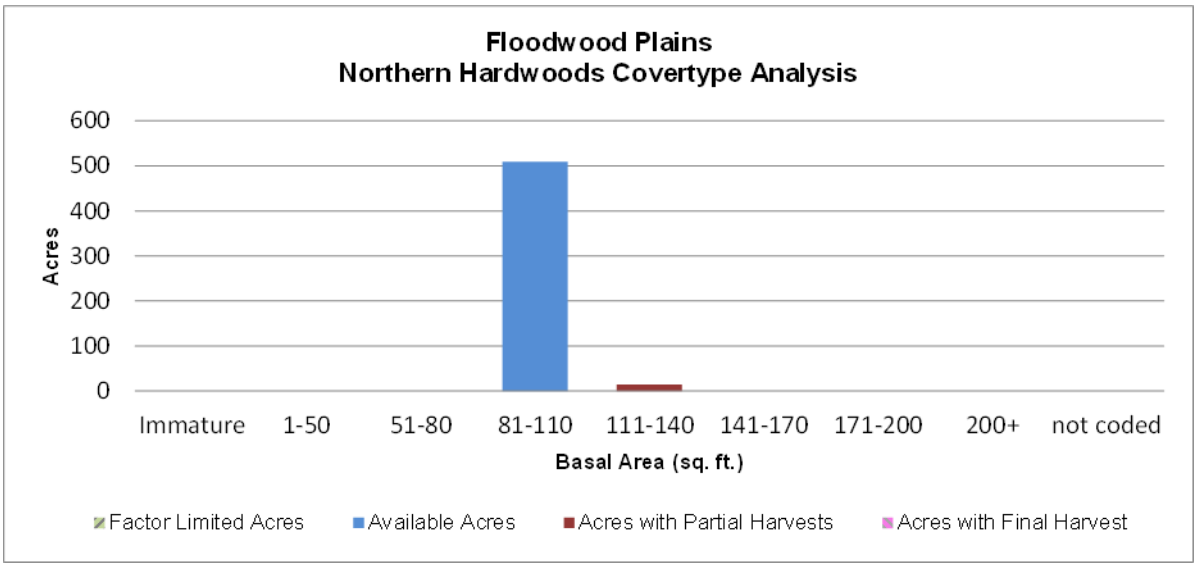

Figure 4.13.6. Graph of the basal area distribution for the northern hardwood cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Approximately 262 acres will be select cut in the next decade;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock and white pine components in stands lacking that species.

Jack Pine Cover Type

Current Condition

The Jack pine cover type comprises about 512 acres (5%) of the management area (Table 4.13.1). Jack pine generally occurs on sandy soils that tend to be nutrient poor. Most of the jack pine is immature and largely contained in the 10-19 and 20-29 age classes. Very few acres are older than 29 years and all stands 50 years old or older are prescribed for a final harvest.

Desired Future Condition

- Using-even aged management, with a rotation age 60 years, work to balance the age-class structure of jack pine within the management area;
- Provide a supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objective

- Once age classes are balanced, harvest and regenerate 73 acres of jack pine every decade.

10-Year Management Objective

- Harvest and regenerate 18 acres over this 10-year planning period.

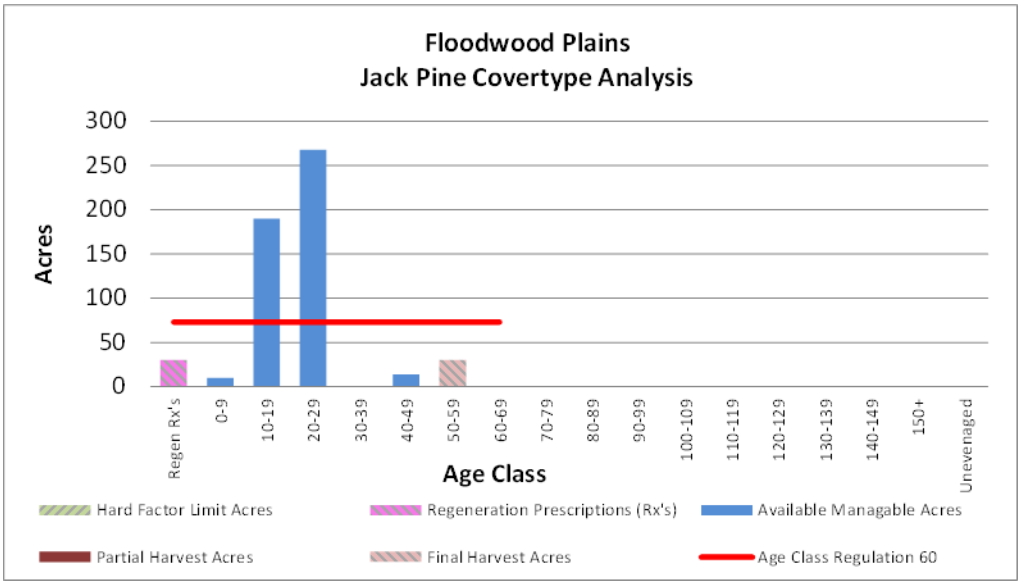

Figure 4.13.7. Graph of the age-class structure for the jack pine cover type on the Floodwood Plains management area (2012 Department of Natural Resources inventory data).

Other Forested Cover Types

Current Condition

Other forested types make up 975 acres and are made up of lowland spruce-fir (319 acres), upland mixed forest (284 acres), upland conifers (157 acres), upland spruce-fir (104 acres), tamarack (60 acres), oak (23 acres), white pine (18 acres), lowland poplar (five acres) and mixed upland deciduous (five acres). Together these types make up about nine percent of the management area. Of these cover types, 42 percent have a hard factor limitation (Table 4.13.1).

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;
- Featured species habitat requirements will be taken in to consideration; and
- As individual age-class distributions for these species approach balance, about 159 acres will be final harvested and 8 acres partially harvested every decade.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 134 acres over this 10-year planning period which is higher than long-term management would indicate and is due to the current age-class imbalances within the individual cover types.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (323 acres-3%), lowland open/semi-open lands (578 acres – 5%) and other (water, local, urban) (No acres).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass stands (upland open/semi-open cover types) will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types (upland open/semi-open cover types) will be treated for opening maintenance as needed.

4.13.2 – Featured Wildlife Species Management

The Floodwood Plains management area is dominated by sandy soils and poorer quality timber, with the exception of some good quality oak. The oak should be encouraged and expanded, where possible. A large percentage of the management area has been maintained as “open” for decades. A sharp-tail grouse population once existed here, but only occasional birds have been seen in recent times. Sandhill cranes and Canada geese use the area and open fields that were maintained in the past. These openings should be maintained and fire is an ideal tool for the job as it also stimulates blueberry. The primary focus of wildlife habitat management in the Floodwood Plains management area will be to address the habitat requirements for the following featured species: American woodcock, black bear, ruffed grouse, upland sandpiper and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are early successional forest conditions (associated with alder, riparian zones or forested wetlands); mast (hard and soft); large open land complexes; and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to increase abundance. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;

- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

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.
- 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.

Upland Sandpiper

The western Upper Peninsula goal is to provide suitable breeding habitat for upland sandpiper in select appropriate WUP management areas. State forest management during this planning period will focus on maintaining large opening complexes and using the compartment review process to schedule jack-pine harvests associated with permanent openings on a sustainable rotation and schedule harvests adjacent to burns or schedule similarly-aged jack pine treatments in close proximity to each other.

Wildlife habitat specifications:

- Maintain opening complexes of 250 acres or larger.
- Open blocks within complexes should be within one mile of each other.
- Where possible, strive to consolidate patches into larger opening complexes, by creating temporary openings associated with permanent openings. This could be accomplished by scheduling jack pine clear-cuts associated with permanent openings on a sustainable rotation, scheduling harvests adjacent to burns or schedule similarly aged jack-pine treatments in close proximity to each other.
- Work with adjacent landowners within the management area to maximize the amount and distribution of open land habitat.
- Mow or burn patches every 3-5 years to eliminate woody vegetation succession as the budget allows.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.13.3 – 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, 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 no listed species or natural communities of note occurring in the management area. 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 in this management area as illustrated in Figure 4.13.8.

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.

4.13.4 – 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 and 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. The only species of concern that been documented in or near this management area is Japanese knotweed.

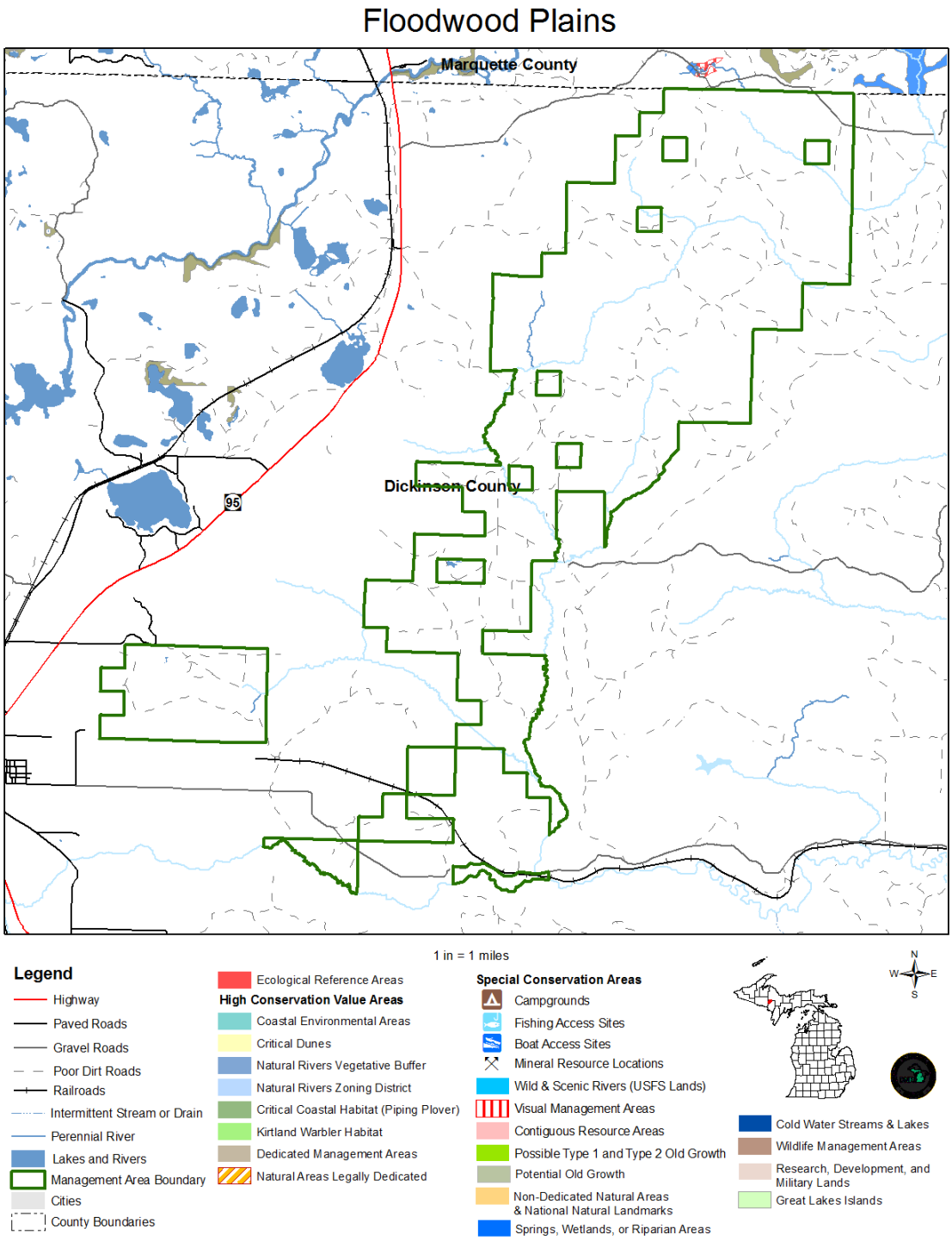

Figure 4.13.8. A map of the Floodwood Plains management area showing the special resource areas.

4.13.5 – 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 are shown in Figure 4.13.1.

4.13.6 – Fire Management

Under natural fire regimes, much of the uplands probably were subject to regular, periodic stand replacement burns, maintaining open dry and dry-mesic northern forest communities. Associated lowlands probably limited overall size of any individual fire.

- All wildfires are subject to appropriate initial attack response.
- The Floodwood Zone Dispatch area provides plans for initial attack, based on fire danger level. It calls for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.
- Due to the high-risk fuels in the management area, private landowners should be encouraged to undertake Firewise practices to protect their properties from possible fires.
- The core barrens community within the management area has no record of being burned, though some areas remain relatively open and may be suitable for large opening management.

4.13.7 – Public Access and Recreation

This area has good public and management access. Two snowmobile trails cross through this area as shown if Figure 4.13.1.

- Maintain current management and public access.

4.13.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of medium-textured till, peat and muck and glacial outwash sand and gravel and postglacial alluvium. The glacial drift thickness varies between 10 and 100 feet. Sand and gravel pits are located in the area of the management area and there could be potential on the uplands.

The Precambrian Michigamme Formation and Archean Granite/Gneiss subcrop below the glacial drift. The Granite/Gneiss sometimes can be used as dimension stone.

Metallic mineral exploration has occurred in the management area in the past. There are a couple Metallic Mineral leases in the northern end of the management area, and metallic mineral potential appears to be possible in the future.

4.14 Fourteen Mile Point Lake Plain Management Area

Summary of Use and Management

Vegetative management in the Fourteen Mile Lake Plain management area (MA) (Figure 4.14.1) 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 are secondary due to remoteness and small ownership in this area. Wildlife management objectives include protection of the Lake Superior shoreline character, protecting thermal cover for wildlife species, and regenerating hemlock where appropriate. Management activities may be constrained by the remoteness of this area on the Lake Superior shoreline with limited access.

Introduction

The Fourteen Mile Point Lake Plain management area is on a till-floored lake plain in northern Ontonagon County. The state forest covers about 3,500 acres and is mostly contiguous. The major ownerships in this vicinity are forest industry and non-industrial private. The management area is dominated by northern hardwood, lowland conifer and hemlock cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by three natural communities: dry mesic northern forest, mesic northern forest, and boreal forest;
- Mid-range in site quality; and
- Remote area on the Lake Superior shoreline with limited access.

The management priorities for this area are the protection of the Lake Superior shoreline character, protecting thermal cover for wildlife species and regenerating hemlock where appropriate. Management for timber products is secondary due to remoteness and small ownership in this area.

The predominant cover types, composition, and projected harvest areas for the Fourteen Mile Point Lake Plain management area are shown in Table 4.14.1.

Table 4.14.1. Summary of cover types, composition, limiting factor area manageable area and projected harvest area for the Fourteen Mile Point Lake 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
Northern Hardwood	27%	917	0	917	0	456	917	0	456
Lowland Conifers	17%	573	129	444	11	0	573	49	0
Hemlock	11%	369	0	369	0	73	369	0	73
Upland Open/Semi-Open Lands	0%	2	0	2	0	0	2	0	0
Lowland Open/Semi-Open Lands	1%	48	0	48	0	0	48	0	0
Misc Other (Water, Local, Urban)	3%	90	0	90	0	0	90	0	0
Others	42%	1,422	487	935	312	74	1,422	123	257
Total		3,421	616	2,805	323	603	3,421	172	786

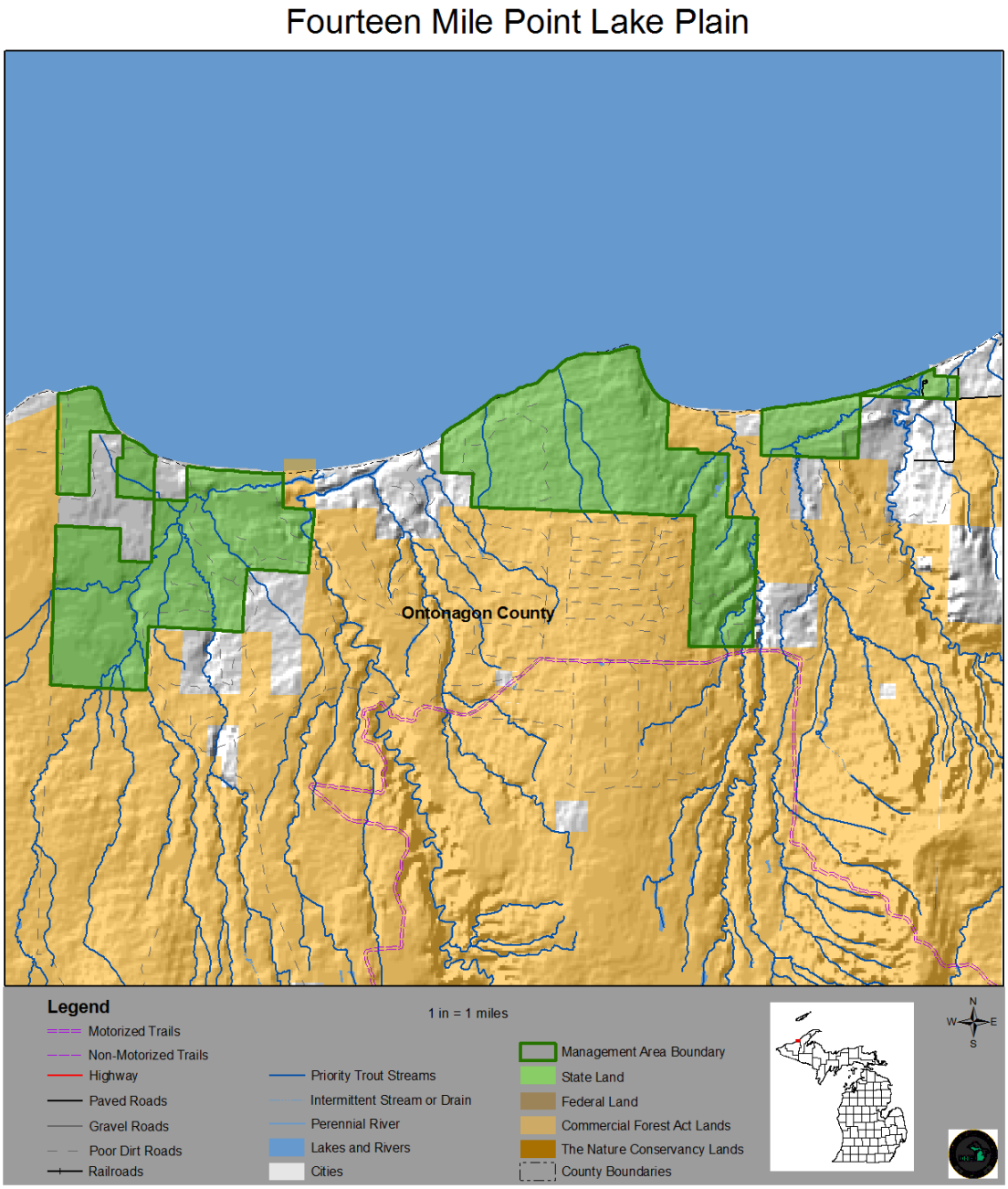

Figure 4.14.1. A map of the Fourteen Mile Point Lake Plain management area (dark green boundary) in relation to surrounding state forest and other lands and other ownerships (light gray).

4.14.1 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 Fourteen Mile Point Lake Plain 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 917 acres (27%) of state forest land in this management area (Table 4.14.1). They occur on good-quality sugar maple sites mixed with wetland sites. Most stands have been managed using the selection harvest system based on basal area to provide uneven-aged stands. Figure 4.14.2 shows the current basal area distribution for the management area.

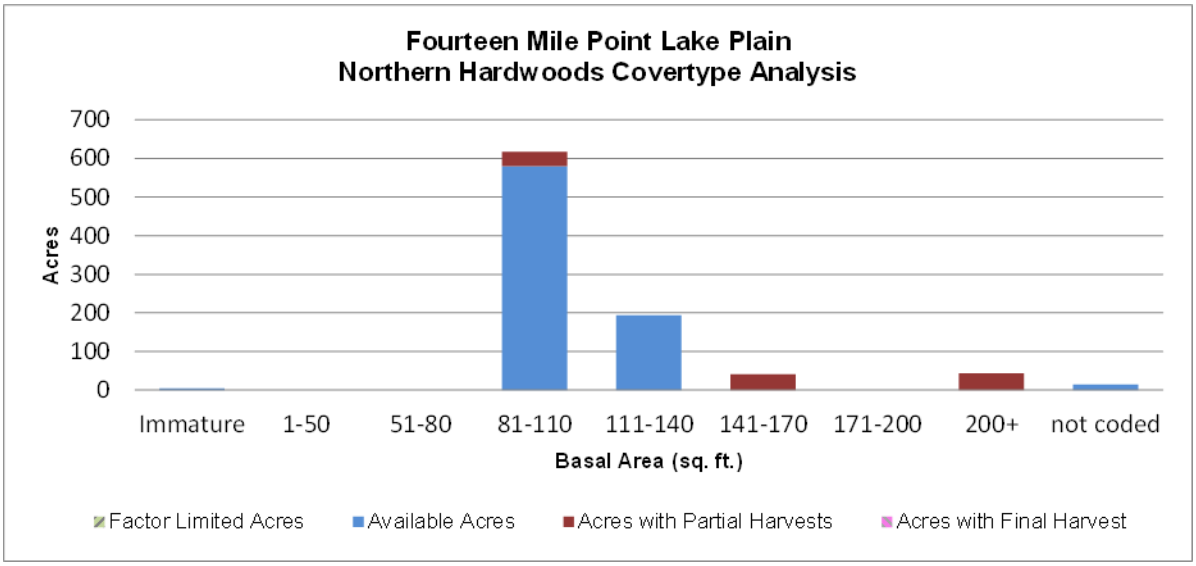

Figure 4.14.2. Graph of the basal area distribution for the northern hardwood cover type on the Fourteen Mile Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selectively harvest northern hardwood stands on a 20-year cycle; and
- Maintain and encourage minor species to increase within-stand diversity.

10-Year Management Objectives

- Selectively harvest 456 acres in this 10-year planning period;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock and white pine components in stands lacking that species.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 573 acres (17%) of the management area (Table 4.14.1). These are poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 129 acres that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to the wet site conditions, they are

more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Lowland conifers are poorly distributed across the age-class distribution (Figure 4.14.3).

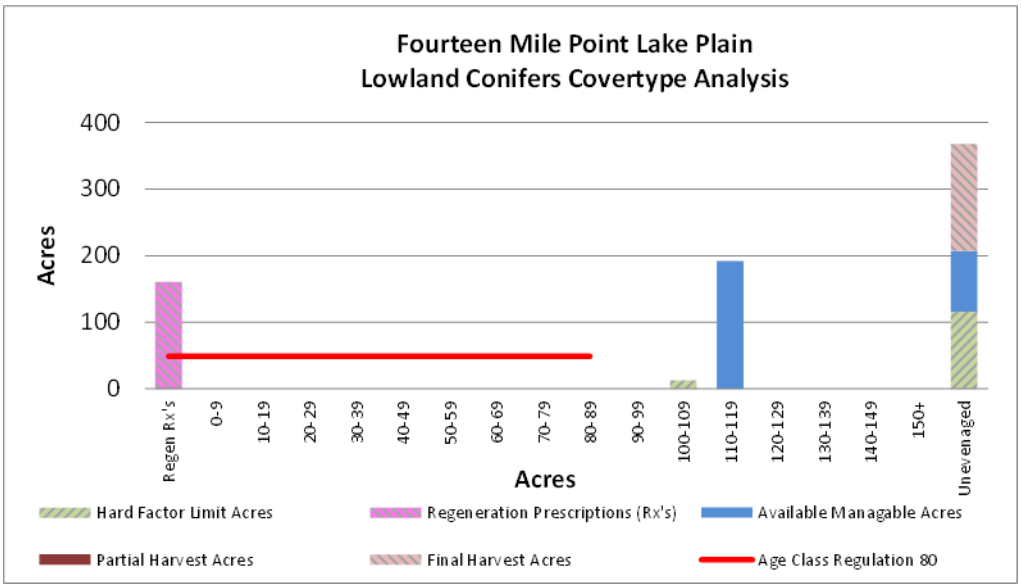

Figure 4.14.3. Graph of the age-class structure for the lowland conifer cover type for the Fourteen Mile Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings; and
- Maintain mixed lowland conifer stands with closed canopy structure to provide important winter habitat for deer.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for 49 acres to be harvested per decade;
- Regenerate stands to species-mix similar to the pre-harvest conditions with a preference for cedar, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 11 acres over this 10-year planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques; and
- Regenerate stands to species-mix similar to the pre-harvest conditions with a preference for cedar, black spruce and balsam fir.

Hemlock Cover Type

Current Condition

Hemlock stands make up 369 acres (11%) of state forest land in this area (Table 4.14.1). This cover type is important to wildlife as a source of thermal cover. Most stands have been managed using the selection harvest system. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Hemlock is often managed using an uneven-aged harvest system based on basal area rather than age prior to final harvest at rotation age (Figure 4.14.4).

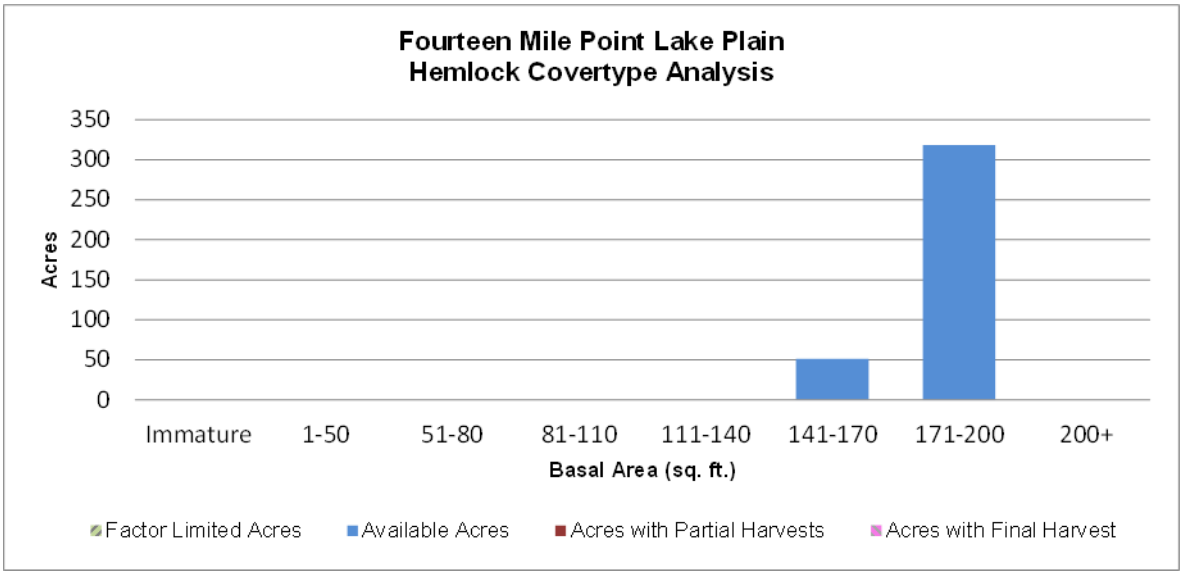

Figure 4.14.4. Graph of the basal area distribution for the hemlock cover type on the Fourteen Mile Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged hemlock stand structure promoting sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Maintain or promote hemlock stands; and
- Maintain and encourage minor species to increase within-stand diversity.

10-Year Management Objectives

- Selectively harvest 73 acres in this planning period to promote hemlock while maintaining canopy structure.

Other Forested Cover Types

Current Condition

Other forested cover types make up 1,422 acres and are made up of mixed upland deciduous (793 acres), upland conifers (246 acres), upland mixed forest (218 acres), aspen (111 acres), lowland deciduous (27 acres) and natural mixed pines (27 acres). Together these cover types make up about 42% of the management area (Table 4.14.1).

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
- Harvest as opportunities arise in conjunction with other management activities.

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;
- Projected harvests in these types are 313 acres of final harvest and 74 acres of partial harvest over this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland/semi-open lands (2 acres - >1%), lowland open/semi-open lands (48 acres – 1%) and other (water, local, urban) (90 acres – 3%) (Table 4.14.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.14.2 – Featured Wildlife Species Management

Wildlife management priorities for Fourteen Mile Point Lake Plain management area are protecting existing thermal cover (particularly hemlock) for deer, bear, marten, fisher and birds that use conifer cover types and maintaining riparian features that provide wildlife movement corridors by minimizing management activities in those areas. The primary focus of wildlife habitat management in the Fourteen Mile Point Lake Plain management area will be to address the habitat requirements identified for the following featured species: American marten, pileated woodpecker and white-tailed deer. Some of the most significant wildlife management issues in the management area are: habitat fragmentation; coarse woody debris; mesic conifer; mature forest; retention or development of large living and dead standing trees (for cavities); and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blow down.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lakes State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.
- Retain down coarse woody debris present before cutting, and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under-planting on suitable sites where a seed source is absent.

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches in diameter at breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: leave scattered retention patches around some 18 inches in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age class (within the compartment, management area or western Upper Peninsula ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.

- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

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, 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 two 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.

There is one potential Type 2 old growth area that is a special conservation area at the Sleeping Misery Bay site that consists of 287 acres of the mesic northern forest natural community type (Figure 4.14.5).

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.14.5.

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 all potential Type 1, potential Type 2 and potential old growth to determine its status as to its special resource status.

Objective 2-1: To evaluate the potential old growth areas by the end of this 10-year planning period.

Table 4.14.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Fourteen Mile Point Lake Plain management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Sandstone bedrock lakeshore		S2/G4G5	Confirmed				Upland open/semi-open	N/A
Sandstone cobble shore		S2/G2G3	Confirmed				Upland open/semi-open	N/A
Bird								
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Plants								
Northern gooseberry	*Ribes oxyacanthoides*	SC/G5/S3	Confirmed			Northern bald	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
Downy oat-grass	*Trisetum spicatum*	SC/G5/S2S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Sandstone lakeshore cliff	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Granite lakeshore cliff	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.

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 area include emerald ash borer and hemlock woolly adelgid.

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 that been documented in or near this management area.

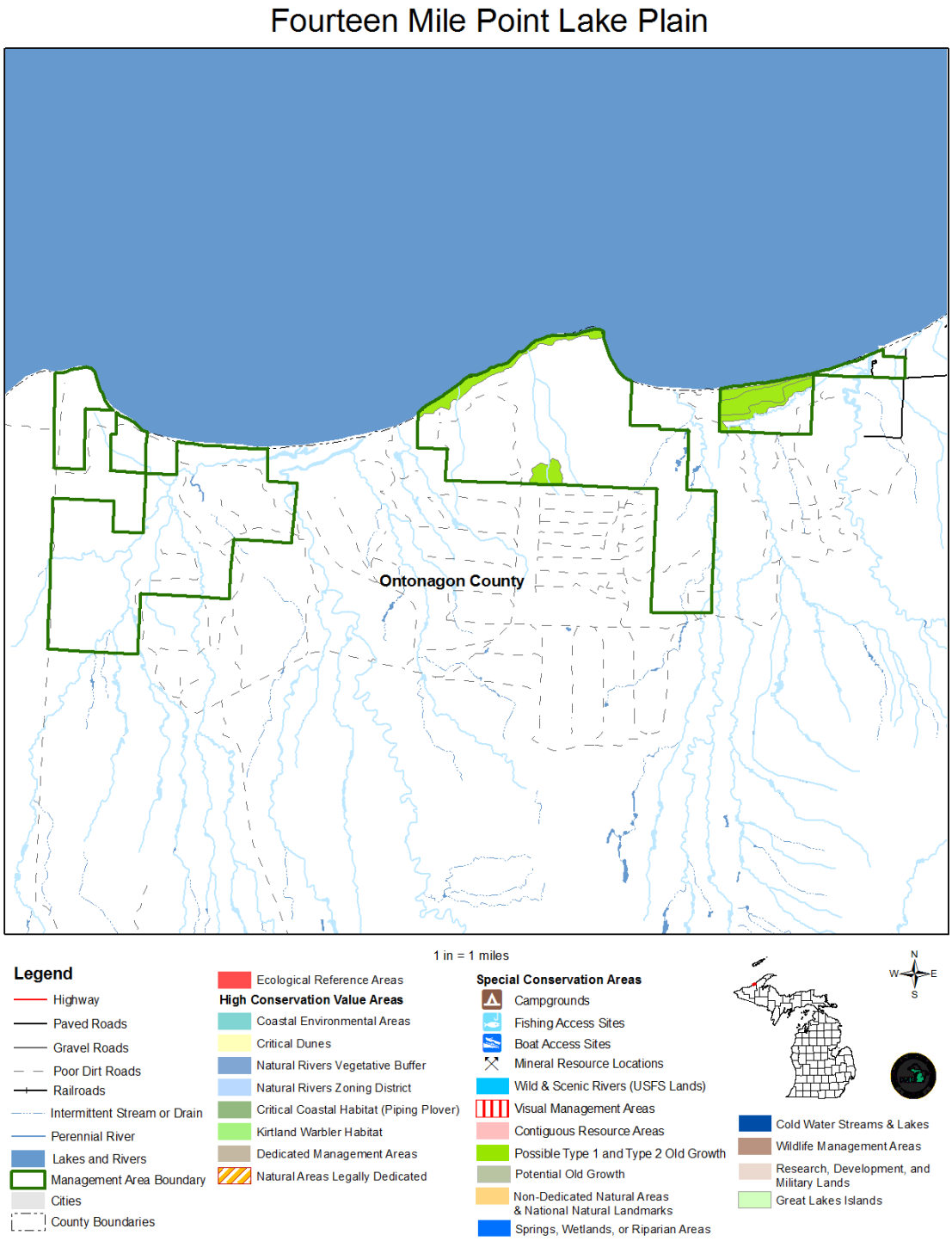

Figure 4.14.5. A map of the Fourteen Mile Point Lake Plain management area showing the special resource areas.

4.14.5 – 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 are shown in Figure 4.14.1.

4.14.6 – Fire Management

This management area is dominated by mesic northern forest. Fire impacts were rare, resulting in very long fire return intervals.

- All wildfires are subject to appropriate initial attack.

4.14.7 – Public Access and Recreation

This area is very remote and there are few public access roads. There are no state forest campgrounds in this area. Boating access sites are located on the Misery River and at Agate Beach.

- Work to establish legal access for management and public use.

4.14.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of lacustrine (lake) clay and silt. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are not located in the area of the management area and there is limited potential.

The Precambrian Freda Sandstone subcrops below the glacial drift. The Freda does not have a current economic use.

Metallic mineral exploration is not known to have occurred in the management area in the past. Metallic mineral potential appears to be limited in this area.

4.15 Green Bay Lake Plain Management Area

Summary of Use and Management

Vegetative management in the Green Bay Lake Plain management area (MA) (Figure 4.15.1) 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; regeneration of hemlock and cedar where appropriate; 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 will be to address the habitat requirements identified for the following featured species: blackburnian warbler, red shoulder hawk, white-tailed deer, wild turkey, ruffed grouse and wood duck. Balancing age classes, potential insect (emerald ash borer) and disease (beech bark disease) infestations and regeneration of lowland conifer cover types will be issues for this 10-year planning period.

Introduction

The Green Bay Lake Plain management area is on a Lake Plain in eastern Menominee and southwestern Delta Counties. The state forest covers 68,630 acres and is mostly contiguous. The major ownerships in this vicinity are non-industrial private. The management area is dominated by cedar, aspen and northern hardwood cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by three natural communities: poor conifer swamp, rich conifer swamp and dry mesic northern forest;
- Low-range in site quality;
- Proximity of the communities of Escanaba, Gladstone and Menominee, this area is heavily used for hunting, motorized and non-motorized forest recreation;
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitats.
- This management area contains one of the western Upper Peninsula Grouse Enhanced Management Systems areas. This area plan will emphasize balanced age classes of aspen for timber production which will have habitat benefits for a number of the featured species including ruffed grouse and deer. The boundaries of Grouse Enhanced Management Systems areas will be delineated and an operational plan will be developed during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager and integrated into the plan through the revision process.

The management priority in this area is to continue to provide these multiple benefits while minimizing user conflicts. Additional priorities include regenerating hemlock and cedar where appropriate. The predominant cover types, composition and projected harvest areas for the Green Bay Lake Plain management area are shown in Table 4.15.1.

Table 4.15.1. Summary of cover types, composition, limiting factor area, manageable area and projected harvest area for the Green Bay Lake Plain 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
Cedar	22%	15,283	490	14,793	0	0	15,283	925	0
Aspen	17%	11,545	329	11216	2,034	0	11,545	1,869	0
Northern Hardwood	11%	7,268	565	6703	0	2,334	7,268	0	2,802
Lowland Deciduous	8%	5,709	1,746	3963	440	0	5,709	440	0
Lowland Spruce/Fir	4%	2,963	1,456	1507	244	0	2,963	167	0
Lowland Conifers	4%	2,736	884	1852	224	0	2,736	206	0
Hemlock	4%	2,463	147	2316	0	0	2,463	0	447
Upland Open/Semi-Open Lands	1%	854	0	854	0	0	854	0	0
Lowland Open/Semi-Open Lands	14%	9,404	0	9404	0	0	9,404	0	0
Misc Other (Water, Local, Urban)	1%	877	0	877	0	0	877	0	0
Others	14%	9,528	1,663	7865	1,128	523	9,528	1,059	1,000
Total		68,630	7,280	61,350	4,069	2,857	68,630	4,666	4,249

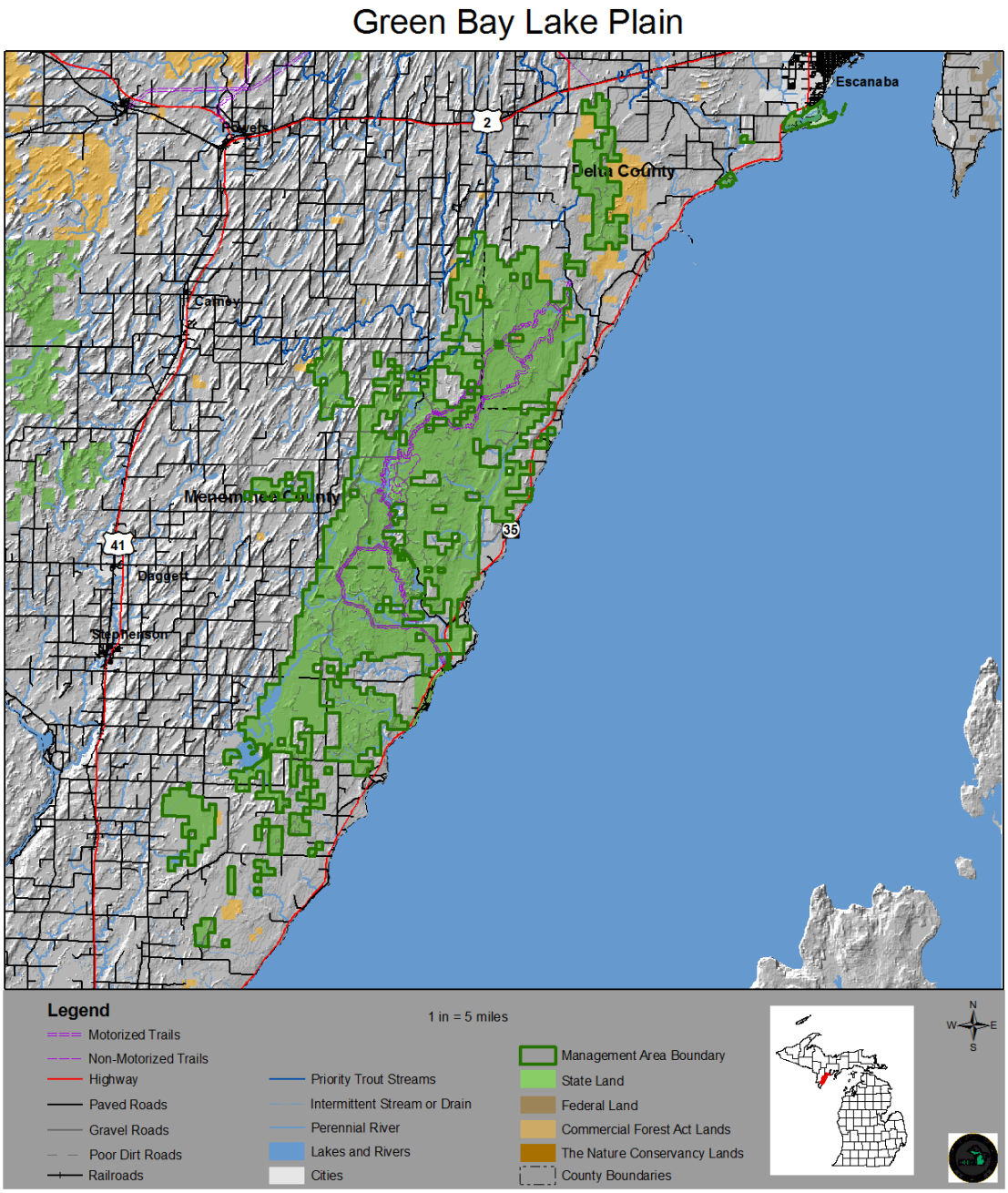

Figure 4.15.1. A map of the Green Bay Lake Plain management area (dark green boundary) in relation to surrounding state forest lands and other ownerships.

4.15.1 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 Green Bay Lake Plain management 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.

Cedar Cover Type

Current Condition

Cedar occurs on 15,283 acres (22%) of the management area (Table 4.15.1). This cover type occurs on poorly drained sites consisting of mostly cedar mixed with black spruce, lowland hardwoods or balsam fir. Cedar is poorly distributed across the age-class distribution (Figure 4.15.2). Most of the stands are over 100 years of age. Little harvesting has been done in this type over the past 60 years. Regeneration of cedar stands has been problematic. At this time there are 490 acres of cedar with site conditions limiting their harvest.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

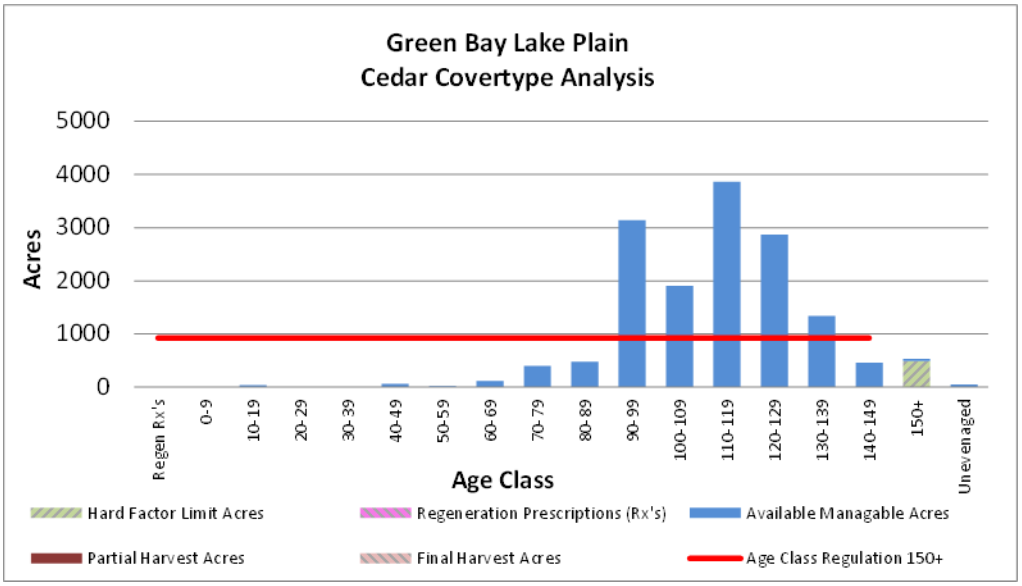

Figure 4.15.2. Graph of the age-class structure for the cedar cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

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

- Maintain cedar cover type on the landscape; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objectives

- No harvests are planned for this area in this 10-year planning period; and
- Allow limited experimental cedar regeneration and thinning trials coordinated at the district level with an adaptive management component.

Aspen Cover Type

Current Condition

The aspen cover type covers 11,545 acres (17%) of state forest land in this management area (Table 4.15.1). Aspen is distributed across age-classes with the majority of acres occurring in the 0-39 year age classes (Figure 4.15.3). There are 329 acres of aspen that have harvest limitations at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

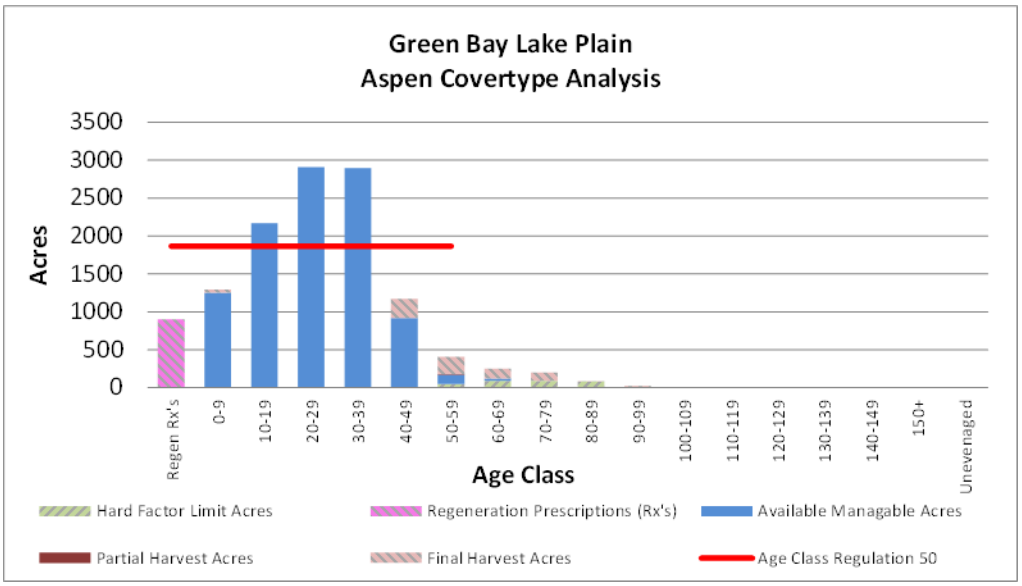

Figure 4.15.3. Graph of the age-class structure for the aspen cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years;
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length; and
- Regenerate approximately 1,869 acres each decade.

10-Year Management Objectives

- Harvest stands of 60-90 year old aspen that are in decline;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;
- Aspen within the identified Grouse Enhanced Management Systems area may be managed differently than the rest of the aspen within the management area, with a shorter rotation age**,** small patch cuts and carefully considered stand adjacency;
- The projected 10-year harvest is 2,034 acres; and
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 7,268 acres (11%) of state forest land in this management area (Table 4.15.1). They occur on good-quality sugar maple sites mixed with wetland sites. While most stands have been managed using the selection harvest system, there are some acres in the immature category showing that they were managed using even aged harvesting (Figure 4.15.4). There are 565 acres that have limiting factors. These hard factor limited acres have been

removed from the total number of manageable acres available for harvest calculations. Many stands have a sedge understory with little tree regeneration, shrub or herbaceous plant communities.

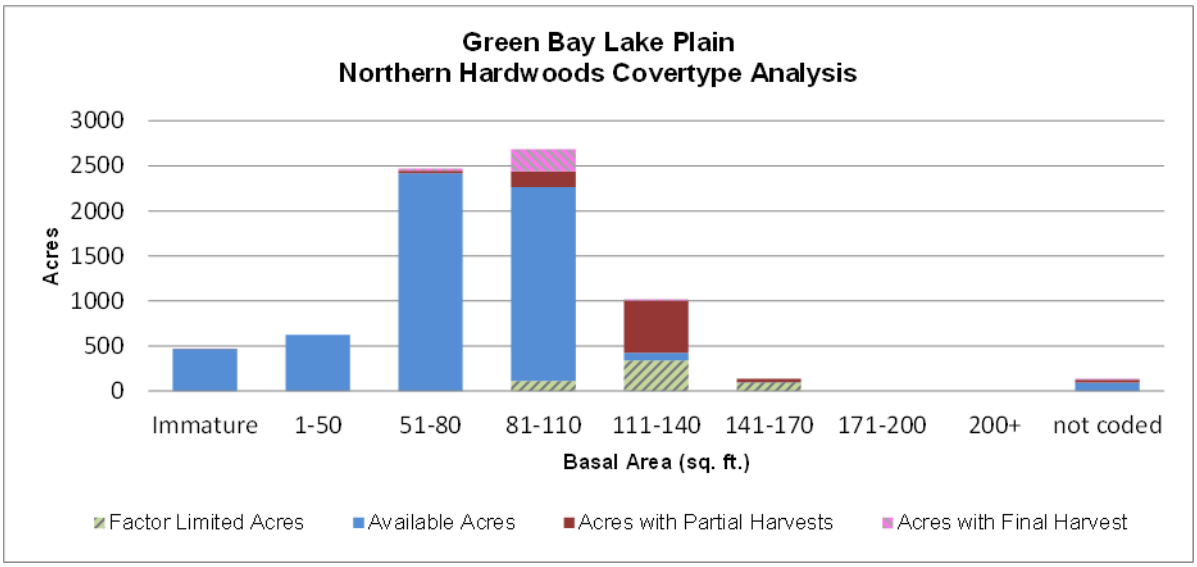

Figure 4.15.4. Graph of the basal area distribution for the northern hardwood cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- The desired future condition is sustainable regeneration and recruitment of upland hardwood species developing an all-age structure.

Long-Term Management Objectives

- Selective harvest high-quality northern hardwood stands on a 20-year cycle; and
- Low quality hardwood stands will be managed on an even-aged system with an 80-year rotation.

10-Year Management Objectives

- Approximately 2,334 acres should be harvested in the next decade; and
- Maintain hemlock, white pine and upland cedar where possible in stands that are harvested.

Lowland Deciduous Cover Type

Current Condition

Currently there are 5,709 acres (8%) of the lowland hardwoods type in the management area (Table 4.15.1). This cover type is often found in association with mixed lowland conifer and cedar cover types. There are 1,746 acres that have 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. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. While lowland hardwoods in this management area are found in all age classes, they do not have a well-balanced age-class distribution (Figure 4.15.5).

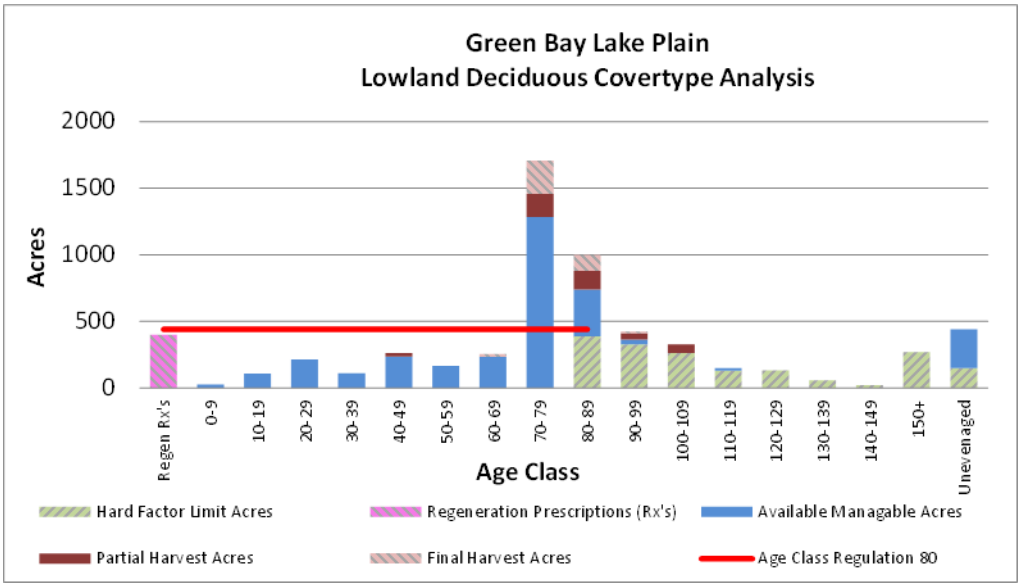

Figure 4.15.5. Graph of the age-class structure for the lowland deciduous cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objectives

- Harvest stands without limiting factors on an 80-year rotation allowing for approximately 440 acres to be harvested per decade; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objectives

- Harvest about 440 acres over this 10-year planning period.

Lowland Spruce/Fir Cover Type

Current Condition

Currently there are 2,963 acres (4%) of the lowland spruce/fir cover type in the management area (Table 4.15.1). Lowland spruce/fir is often found in association with lowland conifer, cedar and tamarack types. While lowland spruce/fir in this management area is found in all age classes, it does not have a well-balanced age-class distribution spiking in the 80-89 and 100-109 age classes (Figure 4.15.6). There are 1,456 acres of lowland spruce/fir that have limiting factors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

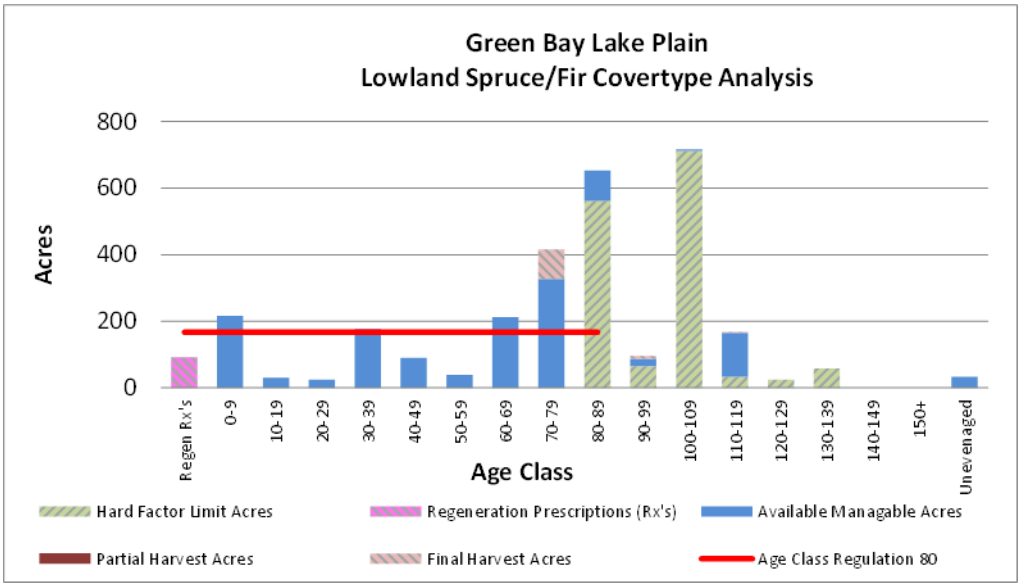

Figure 4.15.6. Graph of the age-class structure for the lowland spruce-fir cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the current level of lowland spruce/fir cover type with stands representing a variety of age classes.

Long-Term Management Objective

- Regenerate mature lowland spruce/fir cover types on an 80-year rotation allowing for 167 acres to be harvested per decade.

10-Year Management Objectives

- Harvest about 244 acres in the next decade; and
- More aggressive harvesting in this type maybe needed in this 10-year planning period to reduce mortality losses in the older stands.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 2,736 acres (4%) of the management area (Table 4.15.1). This cover type occurs on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. There are 884 acres that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Lowland conifers are distributed across all age classes, though the distribution is not even (Figure 4.15.7).

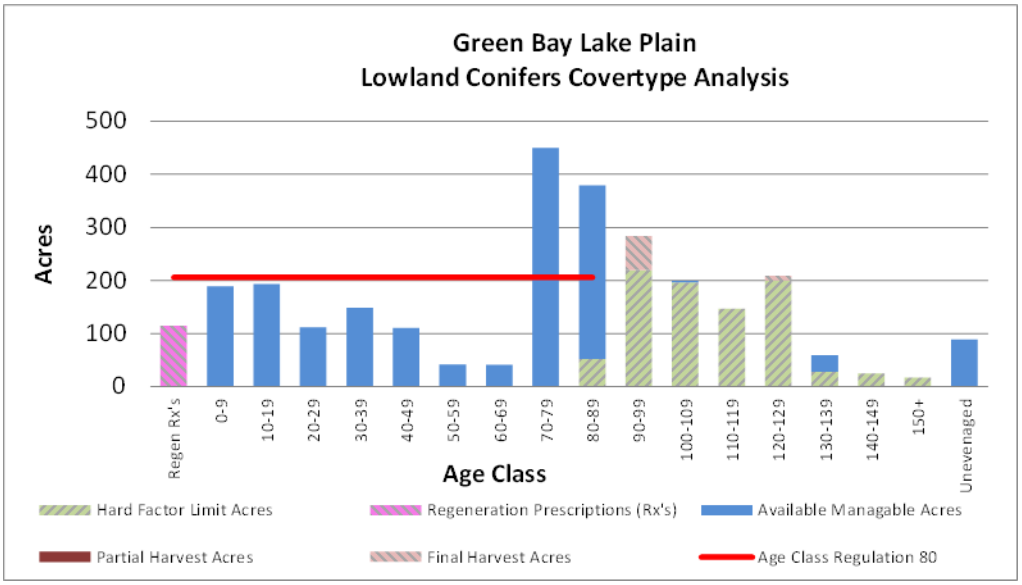

Figure 4.15.7. Graph of the age-class structure for the lowland conifer cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Mostly closed canopy stands interspersed with patches of all age classes; and
- Maintain the closed canopy structure to provide important winter deer habitat.

Long-Term Management Objectives

- Manage stands on an 80-year rotation allowing for 206 acres to be harvested per decade;
- Regenerate stands to species-mix similar to the pre-harvest conditions with preference for cedar, black spruce, hemlock and balsam fir.

10-Year Management Objectives

- Harvest about 224 acres over this 10-year planning period.

Hemlock Cover Type

Current Condition

Hemlock stands make up 2,463 acres (4%) of state forest land in this management area (Table 4.15.1). This cover type is important to wildlife as a source of thermal cover. Due to deer numbers in this area, there are problems with herbivory and most areas do not regenerate successfully. Hemlock is often managed using an uneven-aged harvest system based on basal area rather than age prior to final harvest at rotation age (Figure 4.15.8). There are 147 acres of hemlock that have site conditions limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

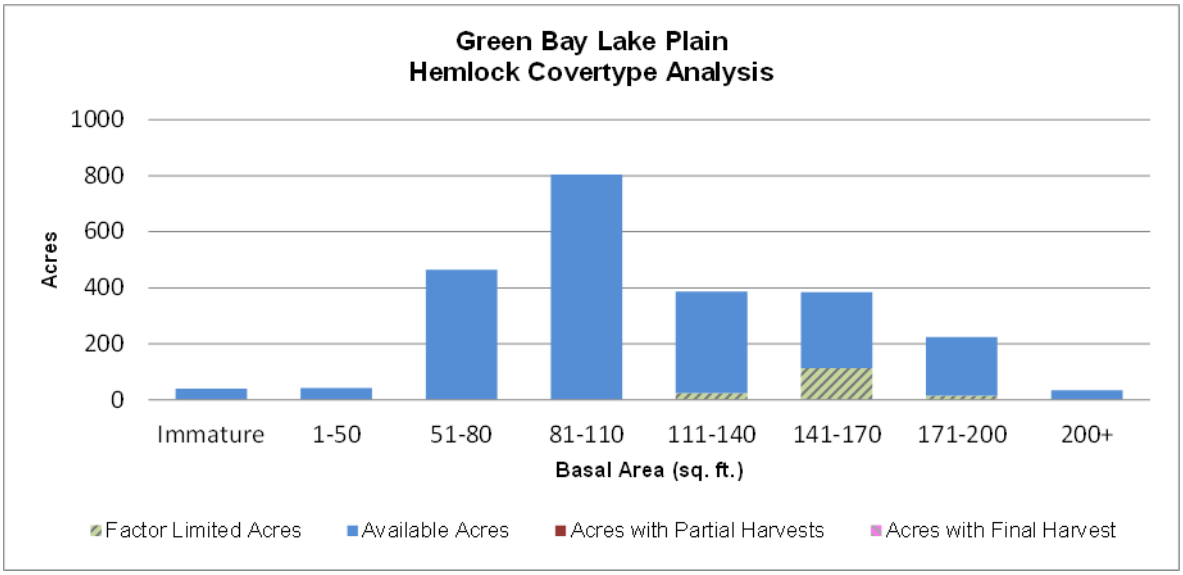

Figure 4.15.8. Graph of the basal area distribution for the hemlock cover type on the Green Bay Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged hemlock stand structure;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objective

- Maintain the hemlock cover type in this management area.

10-Year Management Objectives

- No harvests are planned for this area in this 10-year planning period; and
- Allow limited experimental hemlock regeneration and thinning trials coordinated at the district level with an adaptive management component.

Other Forested Cover Types

Current Condition

Other forested cover types make up 9,528 acres and are made up of lowland poplar (2,177 acres), upland spruce/fir (1,947 acres), red pine (1,763 acres), white pine (1,342 acres), tamarack (790 acres), mixed upland deciduous (569 acres), upland mixed forest (411 acres), upland conifers (224 acres), lowland mixed forest (203 acres), paper birch (61 acres), Natural mixed pines (39 acres) and oak (two acres). Together these types make up about 14% of the management area (Table 4.15.1).

Approximately 1,663 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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
- The projected ten-year final harvest in these cover types is 1,128 acres and the projected partial harvest is 523 acres.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (854 acres – 1%), lowland open/semi-open lands (9,404 acres – 14%) and other (water, local, urban) (877 acres – 1%) (Table 4.15.1).

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 10-year planning period as needed.

4.15.2 – Featured Wildlife Species Management

The Green Bay Lake Plain management area demonstrates a natural propensity to grow white pine and balsam fir (both are common in the understory of many aspen and maple stands within the management area). These conifer species will be encouraged, where appropriate. Cedar and hemlock provide important wildlife habitat, but unfortunately, regeneration of both species is difficult. This management area represents more than 25% of the hemlock resource and almost 20% of the cedar resource on state forest land in the western Upper Peninsula. Management of cedar or hemlock types should be avoided unless regeneration of these cover types can be assured. However, this area provides an excellent opportunity to conduct some well-planned and monitored experimental treatments to help clarify the factors that impact regeneration of these cover types.

The primary focus of wildlife habitat management will be to address the habitat requirements identified for the following featured species: blackburnian warbler, red shoulder hawk, ruffed grouse, white-tailed deer, wild turkey and wood duck. Some of the most significant wildlife management issues in the management area are: within-stand diversity; mesic conifer; mature forest; habitat fragmentation; mast; forest openings; mast (hard); retain or, if absent, develop large living and dead standing trees (for cavities, especially near water); deer wintering complexes; and mature forest. Corridors of mature or old forest will be maintained along some watercourses for wildlife that are associated with mature forest conditions. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

This management area will include one of the western Upper Peninsula Grouse Enhanced Management System areas. The boundaries will be delineated during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager. Aspen stands that fall within the boundary may be managed to enhance habitat and hunting opportunities for ruffed grouse, deer, and turkey. Habitat treatments may include managing aspen on a shortened rotation with multiple age classes and smaller stand sizes.

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retaining a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the economically based rotation length for white spruce and balsam fir cover types to 80 years and not harvesting hemlock in this management area.

Red-shouldered Hawk

The goal for red-shouldered hawk is to maintain or improve suitable habitat in the ecoregion. Management activities should focus on the maintenance of large blocks of mesic northern forest with the appropriate level of large diameter trees in priority landscapes.

Wildlife habitat specifications:

- All known woodland raptor nests should be reported to local wildlife staff and included in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. Confirmed red-shouldered hawk nests are to be documented in accordance with the "DNR's Approach to the Protection of Rare Species on State Forest Lands" (IC4172) and included in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. For red-shouldered hawks, the wildlife habitat specifications contained within Michigan DNR's *Interim Management Guidelines 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.
- Manage the aspen cover type for smaller patch size, a shorter rotation and a more deliberate habitat configuration within the designated Grouse Enhanced Management Systems areas where appropriate.
- 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

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.

Wood Duck

The western Upper Peninsula goal for wood duck is to maintain or increase suitable habitat. Management should focus on the protection of forest wetland, riparian corridors, providing large cavity trees, mast and the management of priority wildlife management areas with suitable habitat.

Wildlife habitat specifications:

- In landscapes that contain streams, beaver ponds and other potential habitat for wood ducks, provide potential nesting sites by providing mature forest and/or big-tree silviculture near water.
- Retain some large diameter over-mature cavity trees within 300 feet of water bodies for cavities in lowland and upland hardwoods. Where adjacent forest is young or cavities limited, nest trees should be promoted.

- Where appropriate, manage for mast in riparian areas.
- Increase potential riparian buffers to 300+ feet, where desired, instead of the standard 100 foot best management practice.

4.15.3 – 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, 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 eighteen listed species and no natural communities of note occurring in the management area as listed in Table 4.15.2. 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 Portage Marsh and the Hayward (North) Lake Wetland Complex are state wildlife management areas are special conservation areas within this management area as shown in Figure 4.15.9.

Approximately 2,087.6 acres of potential old growth have been identified within the Green Bay Lake Plain 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.

There is only one high conservation value area in the management area and that is the 147 acre Green Bay Lake Plain coastal environmental area (Figure 4.15.9). There are no ecological reference areas identified in the 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 4.15.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Green Bay Lake Plain 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								
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
American bittern	*Botaurus lentiginosus*	SC/G4/S3-4	Confirmed	MV	Very High	Great Lakes marsh	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Southern wet meadow	Lowland open/semi-open	N/A
						Lakeplain wet prairie	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Poor fen	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
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
Northern harrier	*Circus cyaneus*	SC/G5/S3	Confirmed	MV	Moderate	Emergent marsh	Lowland open/semi-open	N/A
						Great Lakes marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Lakeplain wet prairie	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Mesic prairie	Lowland open/semi-open	N/A
Marsh wren	*Cistothorus palustris*	SC/G5/S3S4	Confirmed	PS	Very High	Great Lakes marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Emergent Marsh	Lowland open/semi-open	N/A
Yellow rail	*Cotumicops noveboracensis*	T/G4/S1S2	Confirmed	MV	Very High	Northern wet meadow	Lowland open/semi-open	N/A
Merlin	*Falco columbarius*	T/G5/S1S2	Confirmed	PS	Very High	Boreal forest	Upland & Lowland Sp/F	Mid
						Great Lakes barrens	Upland open/semi-open	N/A
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Least bittern	*Ixobrychus exilis*	T/G5/S2	Confirmed	MV	Very High	Great Lakes marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Emergent Marsh	Lowland open/semi-open	N/A
Black-crowned night-heron	*Nycticorax nycticorax*	SC/G5/S2S3	Confirmed	IL	Moderate	Great Lakes marsh	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Inundated shrub swamp	Lowland open/semi-open	N/A
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Caspian tern	*Sterna caspia*	T/G5/S2	Confirmed	MV	Moderate	Sand & gravel beach	Lowland open/semi-open	N/A
Common tern	*Sternia hirundo*	T/G5/S2	Confirmed	MV	Moderate	Sand & gravel beach	Upland open/semi-open	N/A
Mullusk								
Slippershell mussel	*Alasmidonta viridis*	T/G4G5/S2S3	Confirmed	EV	Very High	Headwater Stream	Aquatic	N/A
						Mainstem streams	Aquatic	N/A
						Inland lake	Aquatic	N/A
Snail								
Cherrystone drop snail	*Hendersonia occulta*	T/G4/S1	Confirmed	EV	Low	Limestone cliff	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plant								
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

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

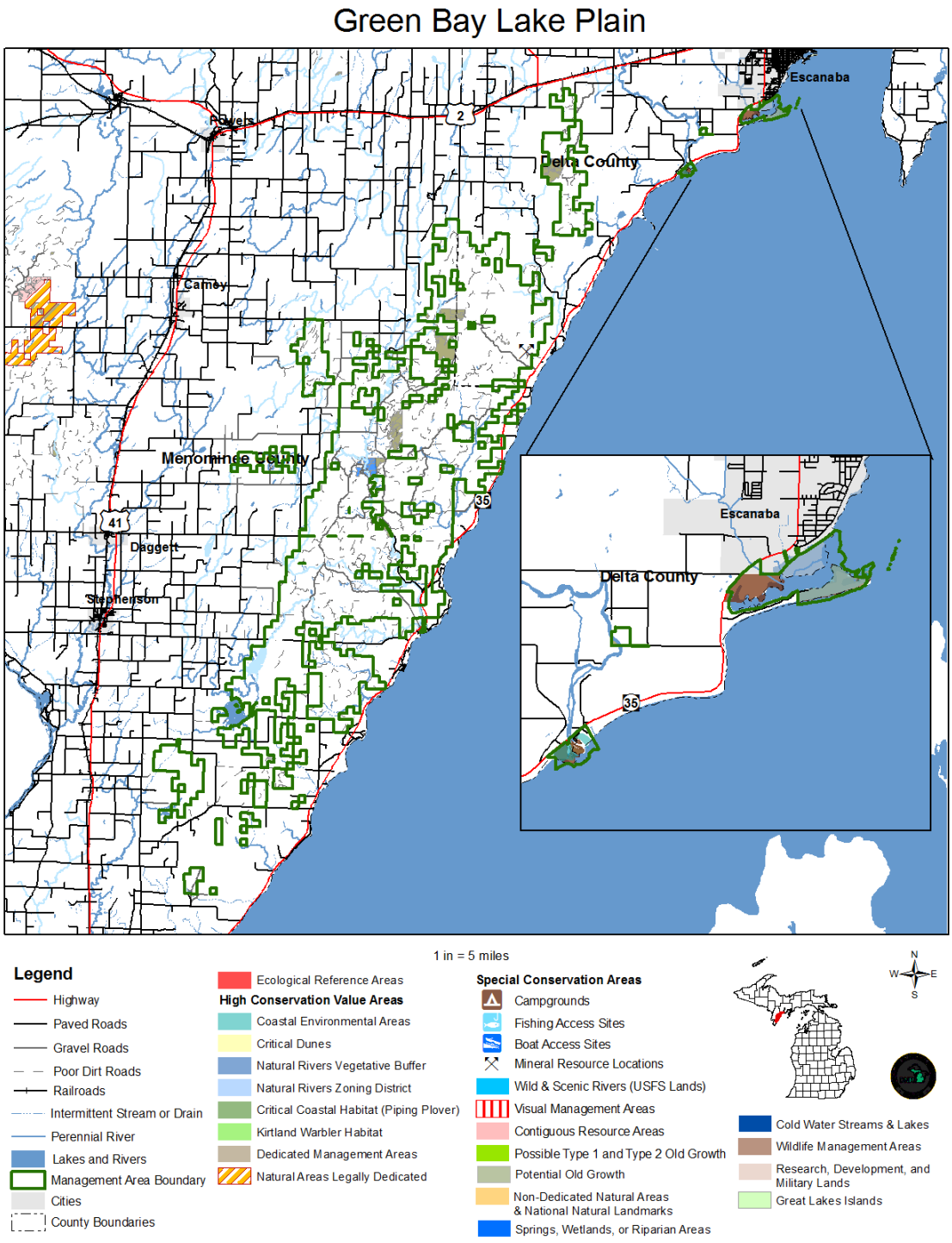

Figure 4.15.9. A map of the Green Bay Lake Plain management area showing the special resource areas.

4.15.4 – 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
- Spruce budworm
- Emerald ash borer
- Beech bark disease

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. Following is a list of species of concern that been documented in or near this management area:

- Glossy buckthorn
- Japanese barberry
- Japanese knotweed
- *Phragmites*
- Autumn olive
- Russian olive

4.15.5 – 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 are shown in Figure 4.5.1.

4.15.6 – Fire Management

Primarily lowland forest with scattered upland forest, this area probably rarely sustained significant fire impacts.

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

4.15.7 – Public Access and Recreation

This area has good public and management access. The Forest Islands Off-Road Vehicle Trail and Route is located in this area as shown in Figure 4.15.1. The Cedar River Pathway (Figure 4.15.1) is also located in this area adjacent to the Cedar River North State Forest Campground.

Specific hunting recreation improvements such as parking lots, gates, trail planting and trail establishment, as well as the preparation and dissemination of specific promotional material, may be made as a result of Grouse Enhanced Management Systems areas planning in this management area.

- Work to expand public and management access as opportunities arise.

4.15.8 – 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 and no economic oil and gas production has been found anywhere in the Upper Peninsula.

Surface sediments consist of lacustrine (lake) sand and gravel, coarse-textured till, an end moraine of coarse-textured till, peat and muck and glacial outwash sand and gravel and post glacial alluvium. The glacial drift thickness varies between 10 and 50 feet. Sand and gravel pits are located in the management area and there is potential on the uplands for additional pits.

The Ordovician Trenton and Black River Formations subcrop below the glacial drift. The Trenton and Black River are quarried for dolostone/stone near Escanaba.

Metallic mineral exploration is not known to have occurred in the management area in the past. Metallic mineral potential appears to be limited in this area.

4.16 Groveland Management Area

Summary of Use and Management

Vegetative management in the Groveland management area (MA) (Figure 4.16.1) 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 and develop its recreational characteristics while preserving and enhancing the native biodiversity. Wildlife management objectives include addressing the habitat requirements identified for the following featured species: black bear, blackburnian warbler, northern goshawk and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes; habitat fragmentation; mast (hard and soft); within-stand diversity; mesic conifer; mature forest; coarse woody debris; and deer wintering complexes will be issues for this 10-year planning period.

Introduction

The Groveland management area is on a bedrock-controlled ground moraine in Southern Dickinson County. The state forest covers about 30,000 acres and is mostly contiguous. State forest lands are the major ownership in this vicinity. The management area is dominated by aspen, northern hardwood and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by three natural communities: dry mesic northern forest, mesic northern forest and poor conifer swamp;
- Mid-range in site quality;
- The Groveland Iron Mine which provides:
    - Recreational opportunities related to camping and fishing.

The Groveland Iron Mine was closed in the early 1980's and acquired by the State of Michigan in the mid-1990s. Some of the old impoundments are now used for fishing and camping sites. The north half of this management area has high recreational interest and has many opportunities to enhance biodiversity.

The management priorities for this area are to develop its recreational characteristics while preserving and enhancing the native biodiversity. The predominant cover types, composition and projected harvest areas for the Groveland management area are shown in Table 4.16.1.

Table 4.16.1. Summary of cover types, composition, limiting factor area, manageable area and projected harvest area for the Groveland 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	39%	11,786	1,766	10,020	1,340	0	11,786	1,670	0
Northern Hardwood	12%	3,667	104	3563	0	1,072	3,667	0	1,587
Lowland Conifers	10%	3,018	2,456	562	106	0	3,018	43	0
Red Pine	7%	1,994	992	1002	217	441	1,994	63	533
White Pine	5%	1,562	108	1454	179	681	1,562	69	681
Cedar	5%	1,465	0	1465	0	0	1,465	92	0
Upland Open/Semi-Open Lands	3%	906	0	906	0	0	906	0	0
Lowland Open/Semi-Open Lands	5%	1,388	0	1388	0	0	1,388	0	0
Misc Other (Water, Local, Urban)	4%	1,365	0	1365	0	0	1,365	0	0
Others	11%	3,289	839	2450	665	817	3,289	275	817
Total		30,440	6,265	24,175	2,506	3,011	30,440	2,212	3,618

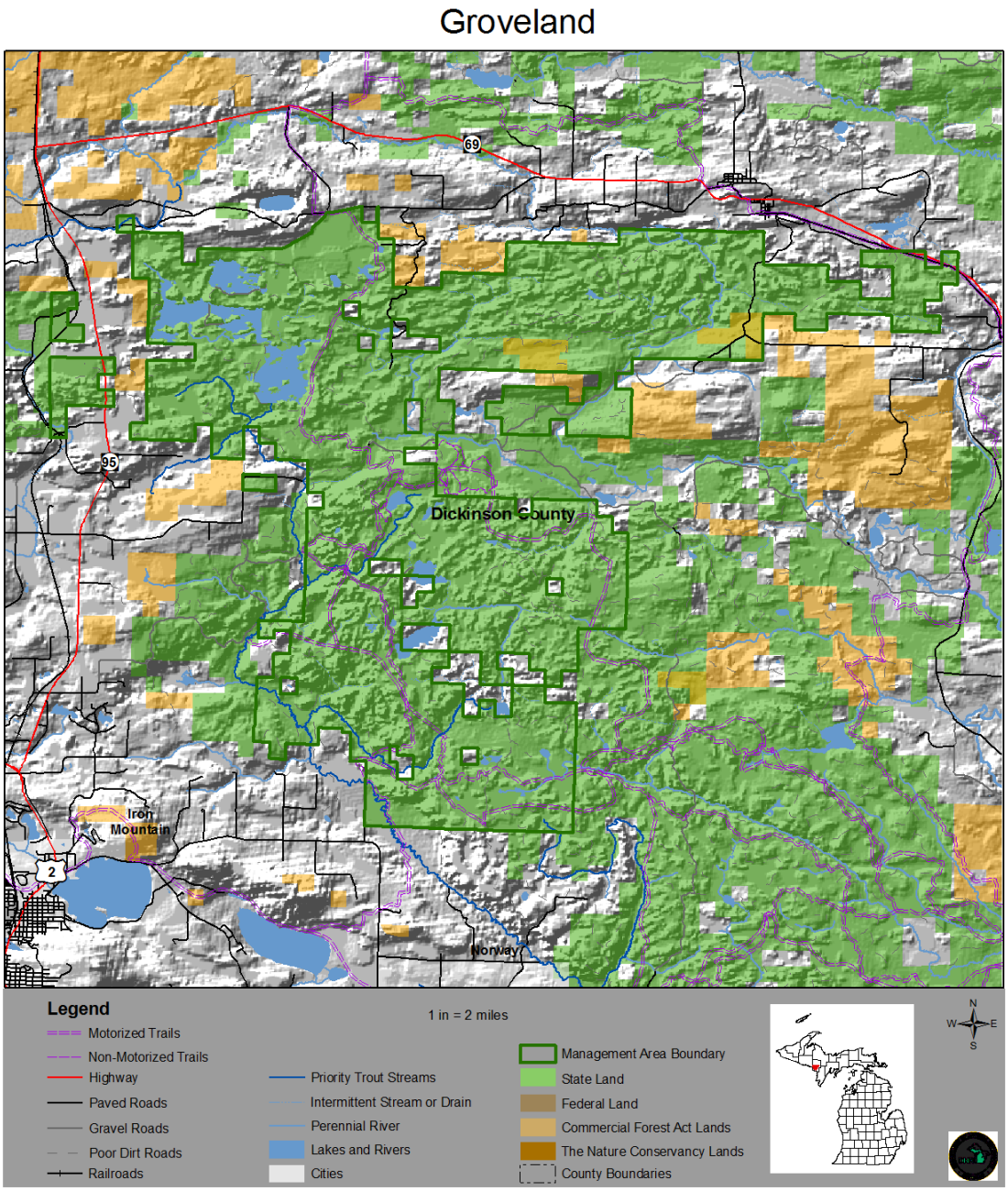

Figure 4.16.1. A map of the Groveland management area (dark green boundary) in relation to surrounding state forest lands and other ownerships.

4.16.1 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 Groveland 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 11,786 acres (39%) of state forest land in this management area (Table 4.16.1). Aspen is in all age classes in this management area, but it is not well distributed across them (Figure 4.16.2). Many acres of aspen are greater than 70 years of age. There are 1,766 acres of aspen that currently have hard limiting factors on them. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

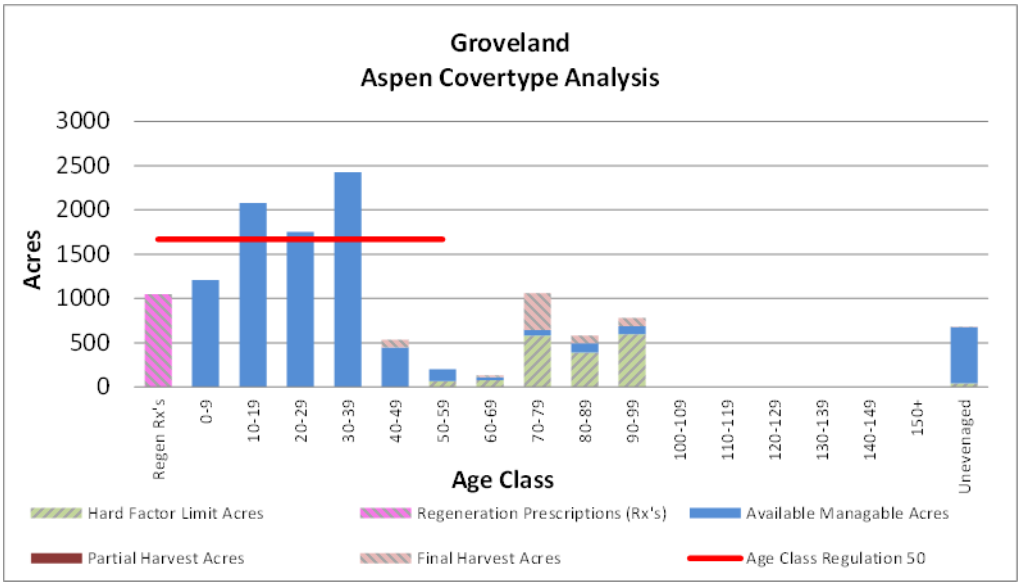

Figure 4.16.2. Graph of the age-class structure for the aspen cover type on the Groveland management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 50 years; and
- Provide an even supply of forest products and a balanced mix of habitat conditions for a variety of wildlife as well as a range hunting opportunities.

Long-Term Management Objectives

- Harvest and regenerate aspen stands using a 50-year rotation length; and
- Regenerate approximately 1,670 acres each decade.

10-Year Management Objectives

- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest;
- The projected 10-year harvest is 1,340 acres; and
- Identify some of the younger aspen on better sites that could be available for early harvest.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 3,667 acres (12%) of state forest land in this management area (Table 4.16.1). They occur on fair-quality sugar maple sites. Most stands have been managed on a selection harvest basis. Many stands have sedge understory with little tree regeneration, shrub or herbaceous plant communities. There are 104 acres that have limiting factors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

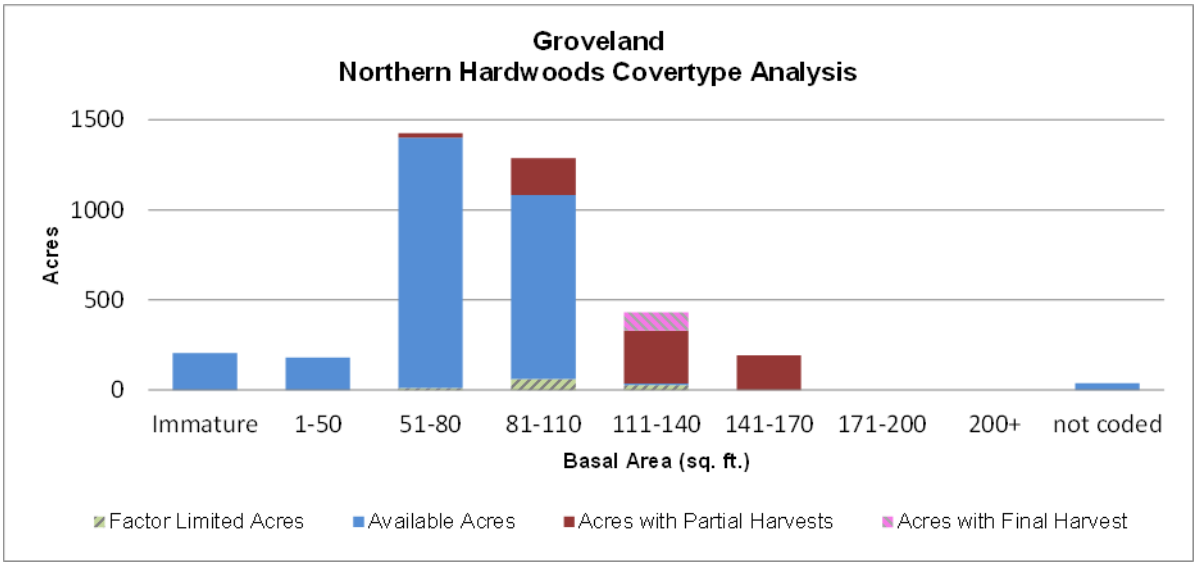

Figure 4.16.3. Graph of the basal area classes for the northern hardwood cover type on the Groveland management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory; and
- Well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selective harvest northern hardwood stands on a 20-year cycle; and
- Work to increase hardwood regeneration and reduce the sedge component.

10-Year Management Objectives

- Approximately 1,072 acres will be select cut in this 10-year planning period;
- 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;
- Work to regenerate hemlock and white pine components in stands lacking that species; and
- Identify low quality hardwood to manage on an even-aged regime.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 3,018 acres (10%) of the management area (Table 4.16.1). These are poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar characterize the mixed lowland conifer type. There are 2,456 acres that have factor limits due to wet conditions or for riparian corridors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Lowland conifers are poorly distributed across the age-class distribution, with the majority of the stands over 80 years of age (Figure 4.16.4). Little harvesting has been done in this type over the past 60 years.

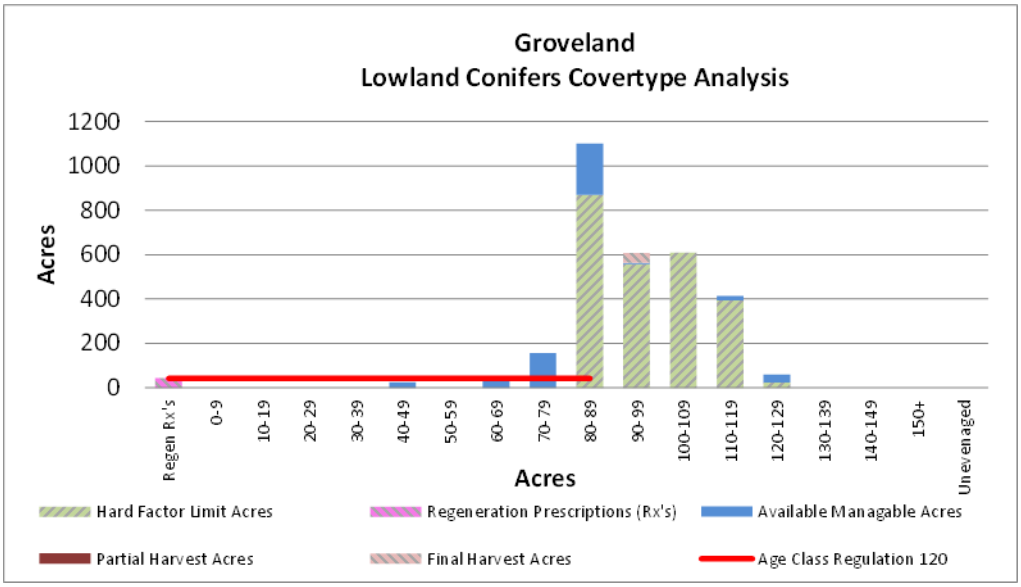

Figure 4.16.4. Graph of the age-class structure for the lowland conifer cover type on the Groveland management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Maintain the closed canopy structure to provide important winter deer habitat; and
- Plan to harvest the oldest available stands to regenerate them before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on a 120-year rotation, allowing for 43 acres to be harvested per decade.
- Regenerate stands to species-mix similar to the pre-harvest conditions favoring cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 106 acres over this planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Red Pine Cover Type

Current Condition

Over 1,994 acres (7%) of the state forest in this management area is red pine (Table 4.16.1). While red pine occurs in most age classes, it is poorly distributed across them (Figure 4.16.5). Red pine stands occur on the same sites and soil conditions as aspen in this management area - dry-mesic sandy soils. Red pine is ideally suited for these kinds of sites. There are 992 acres of red pine that have factors limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

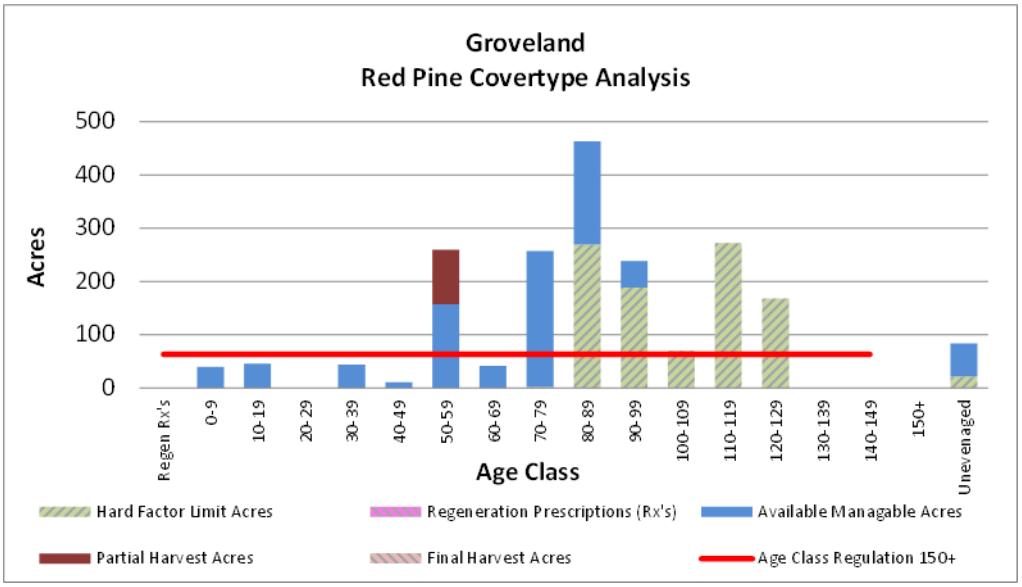

Figure 4.16.5. Graph of the age-class structure for the red pine cover type on the Groveland management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain natural origin red pine in this management area.

Long-Term Management Objectives

- Manage natural origin stands on a 150-year rotation using natural regeneration techniques; allowing for approximately 63 acres for final harvested and regenerated per decade. Thin as needed.

10-Year Management Objectives

- Thin about 441 acres in the next decade; and
- Harvest and regenerate 217 acres of natural origin stands within the next decade.

White Pine Cover Type

Current Condition

Over 1,562 acres (5%) of the state forest in this management area is white pine (Table 4.16.1). White pine acres are poorly distributed across age-classes spiking in the 80-99 year age classes (Figure 4.16.6). Most of the white pine in this area is of natural origin, and is found on alluvial sands in the Mitchell Valley and on the rocky knobs on the management area. There are 108 acres of white pine that have factors limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

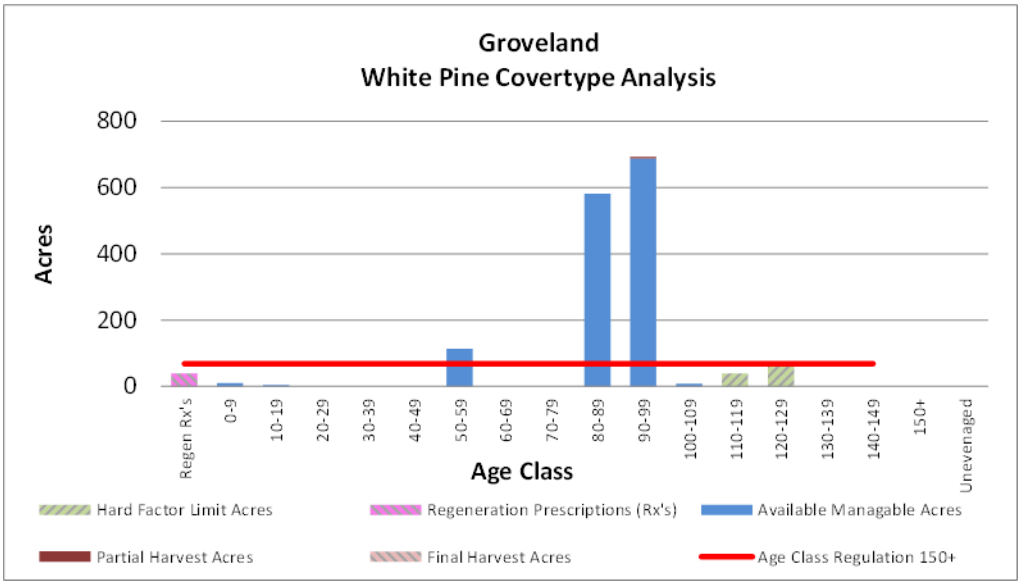

Figure 4.16.6. Graph of the age-class structure for the white pine cover type on the Groveland management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain natural origin white pine in this management area.

Long-Term Management Objectives

- Manage natural origin stands on a 200-year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed allowing for 69 acres to be final harvested per decade.
- Thin stands as necessary.

10-Year Management Objectives

- Regenerate 179 acres of natural origin stands within the next decade using shelterwood and small patch cuts; and
- Thin about 681 acres in this 10-year planning period.

Cedar Cover Type

Current Condition

Cedar occurs on 1,465 acres (5%) of the management area (Table 4.16.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack, 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. Cedar types are poorly distributed across the age-class distribution (Figure 4.16.7). Most of the stands are over 80 years of age. Little harvesting has been done in this type over the past 60 years.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

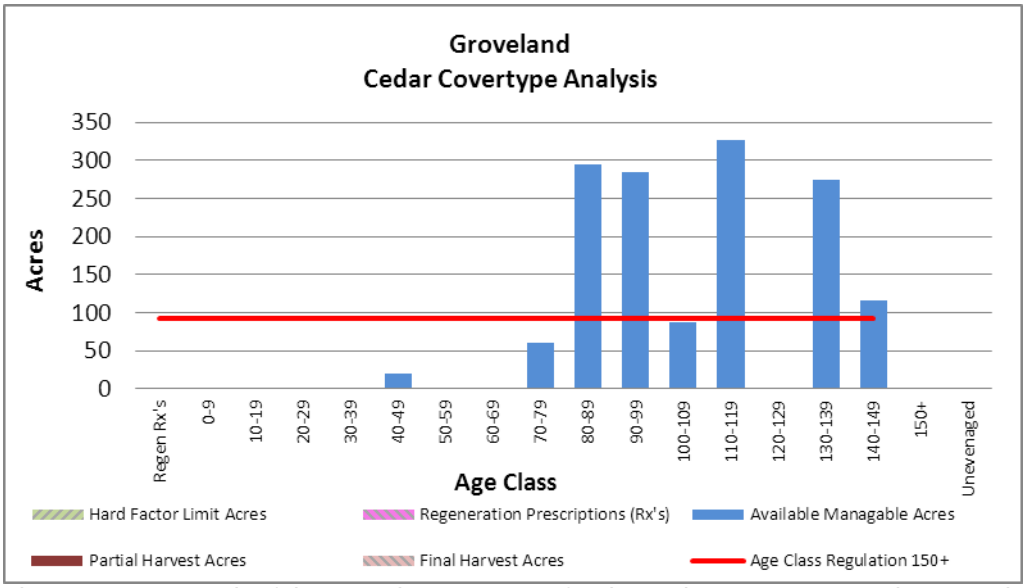

Figure 4.16.7. Graph of the age-class structure for the cedar cover type on the Groveland management area (2012 Department of Natural Resources inventory data).

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

- Maintain cedar cover type on the landscape; and
- Regenerate stands to species mixes similar to the pre-harvest conditions.

10-Year Management Objectives

- No harvests are planned for this area in this 10-year planning period; and
- Allow limited experimental cedar regeneration and thinning trials coordinated at the district level with an adaptive management component.

Other Forested Cover Types

Current Condition

Other forested types make up 3,289 acres and are made up of natural mixed pines (750 acres), upland conifers (529 acres), lowland deciduous (379 acres), upland spruce/fir (353 acres), mixed upland deciduous (311 acres), paper birch (213 acres), lowland poplar (201 acres), upland mixed forest (161 acres), oak (150 acres), lowland mixed forests (99 acres), lowland spruce/fir (76 acres), hemlock (36 acres) and tamarack (31 acres). Together these types make up about 11% of the management area (Table 4.16.1).

Approximately 839 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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 and habitat conditions indicate that harvesting is appropriate; and
- The projected ten-year final harvest in these types is 665 acres and the projected partial harvest is 817 acres.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (906 acres – 3%), lowland open/semi-open lands (1,388 acres – 5%) and misc. other (water, local, urban) (1,365 acres – 4%) (Table 4.16.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.16.2 – Featured Wildlife Species Management

The Groveland management area has great potential to support wintering deer in the mixed complex of lowland conifer and upland pine. White pine is still found throughout this complex and should be encouraged as a major component in the uplands. The primary focus of wildlife habitat management in the Groveland management area will be to address the habitat requirements identified for the following featured species: black bear, blackburnian warbler, northern goshawk and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: habitat fragmentation; mast (hard and soft); within-stand diversity; mesic conifer; mature forest; coarse woody debris; and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retaining a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years in upland areas.

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 the 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.

- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.16.3 – 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, 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 five listed species and five natural communities of note occurring in the management area as listed in Table 4.16.2. 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 Groveland Mine Flooding and the Hancock Creek Flooding are state wildlife management areas and special conservation areas within this management area as shown in Figure 4.16.8.

Approximately 946.5 acres of potential old growth have been identified within the Groveland 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.

Table 4.16.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Groveland management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Granite Bedrock Glade		S2/G4G5	Confirmed				Upland open/semi-open	N/A
Granite Cliff		S2/G4G5	Confirmed				Upland open/semi-open	N/A
Northern hardwood swamp		S3?/G4	Confirmed				Black Ash	Late
Poor fen		S3/G3	Confirmed				Lowland open/semi-open	N/A
Submergent Marsh		S4/GU	Confirmed				Lowland open/semi-open	N/A
Birds								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plant								
Fragrant cliff woodfern	*Dryopteris fragrans*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	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.

Although there are no high conservation value areas, there is one ecological reference area in the management area (Figure 4.16.8) representing the granite bedrock glade natural community (88.5 acres).

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.

Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

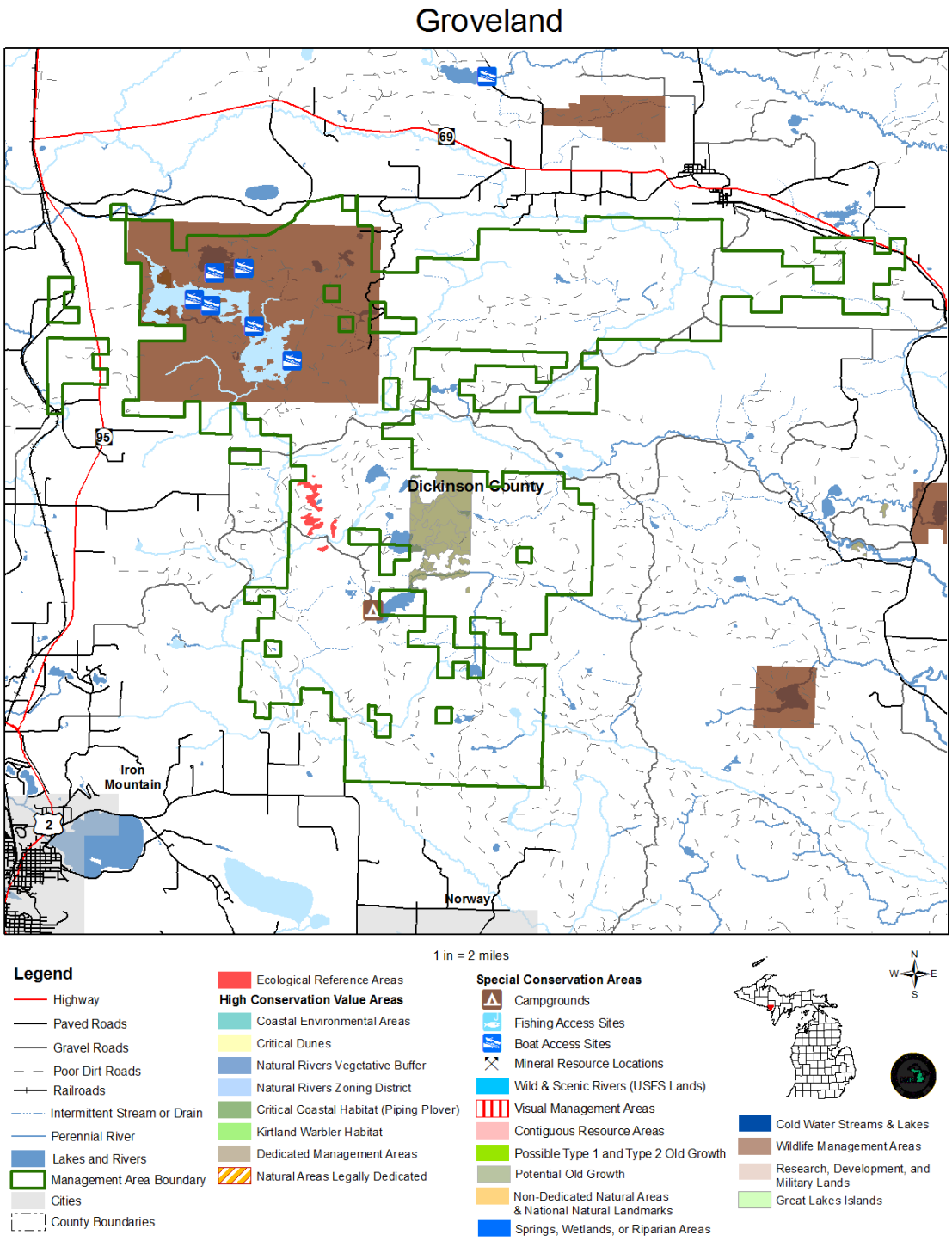

Figure 4.16.8. A map of the Groveland management area showing the special resource areas.

4.16.4 – 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
- Spruce budworm
- Emerald ash borer.

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. Following is a list of species of concern that been documented in or near this management area.

- Common buckthorn
- Garlic mustard
- Glossy buckthorn
- Japanese barberry
- Japanese knotweed.

4.16.5 – 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 are shown in Figure 4.16.1.

4.16.6 – Fire Management

This area was probably subject to high intensity stand-replacement fires on an infrequent basis. Fire rotation intervals may have been as long as 250 years, promoting white pine and hemlock among other fire tolerant hardwoods and conifers.

- All wildfires within the management area should be subject to appropriate initial attack response.
- Depending on anticipated fire potential and identified treatment needs in a given area, it may be possible to use prescription firing to contain wildfires using agreed to wetland and road boundaries.
- Boundaries of harvesting treatments should be aligned with defensible features, such as wetlands and roads, to accommodate prescribed fire and containment suppression tactics.
- The Carney Lake State Forest Campground provides opportunity for targeted prevention information for recreation users.

4.16.7 – Public Access and Recreation

This area has good public and management access. Snowmobile trails cross this area from north to south and the Felch Off-Road Vehicle route crosses the northeast corner on the area (Figure 4.16.1). The Merriman Ski Trail is located in this area as shown in Figure 4.16.1. Three new boating access sites have been built on the Groveland Mine Ponds bringing the total to six (Figure 4.16.8). Additional boating access is located on Carney Lake near the Carney Lake State Forest Campground and at Rock Lake (Figure 4.16.8).

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

4.16.8 – 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 thin to discontinuous glacial sediments over bedrock. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is some potential for additional pits.

The Cambrian Munising Group and Precambrian Michigamme and Chocolay Formations and Archean Granite/Gneiss subcrop below the glacial drift. These rocks do not have a current economic use. A new nonmetallic mineral lease is in process just south of the abandoned Groveland Mine. The tailings deposits are being researched as a potential soil nutrient.

Old iron mines are located to the north and southwest of the management area. Metallic mineral exploration has occurred in the management area in the past and there is metallic mineral potential.

4.17 Huron Mountains Management Area

Summary of Use and Management

Vegetative management in the Huron Mountains management area (MA) (Figure 4.17.1) will provide a variety of forest products; maintain or enhance wildlife habitat; protect areas with unique characteristics; and provide for forest based recreational uses. Management objectives for the 10-year planning period include enhancing recreational values while preserving and enhancing the native biodiversity. Wildlife management objectives are to manage for old growth forest characteristics in a fairly unfragmented condition, with particular emphasis on protecting the hemlock component. Management activities may be constrained by site conditions. Balancing recreational and other interests will be issues for this 10-year planning period.

Introduction

The Huron Mountains management area is on bedrock controlled ground moraines and till-floored lake plains in northern Baraga and Marquette Counties. The state forest covers 13,637 acres and is widely scattered in small parcels. The major ownerships in this vicinity are forest industry and non-industrial private. The management area is dominated by northern hardwood, aspen and hemlock cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: mesic northern forest and poor conifer swamp;
- Mid-range in site quality;
- Two popular Lake Superior shoreline recreation areas are within this management area (the Mouth of the Huron River along the Baraga/Marquette County border and Little Presque Isle north of Marquette); and
- This is a popular area for hunting and non-motorized trail recreation, close to the communities of Marquette and Big Bay.

The management priorities for this area are to develop its recreational characteristics while preserving and enhancing the native biodiversity. Timber management will focus on treatments that promote those values.

The predominant cover types, composition and projected harvest areas for the Huron Mountains management area are shown in Table 4.17.1.

Table 4.17.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Huron Mountain 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
Northern Hardwood	27%	3,649	736	2,913	0	1,438	3,649	0	1,438
Aspen	14%	1,869	416	1453	94	0	1,869	208	0
Hemlock	13%	1,735	680	1055	0	201	1,735	0	201
Red Pine	8%	1,109	1,057	52	10	20	1,109	3	20
Lowland Conifers	6%	780	725	55	21	0	780	6	0
Upland Open/Semi-Open Lands	0%	38	0	38	0	0	38	0	0
Lowland Open/Semi-Open Lands	6%	773	0	773	0	0	773	0	0
Misc Other (Water, Local, Urban)	3%	455	0	455	0	0	455	0	0
Others	24%	3,229	818	2411	475	357	3,229	289	483
Total		13,637	4,432	9,205	600	2,016	13,637	506	2,142

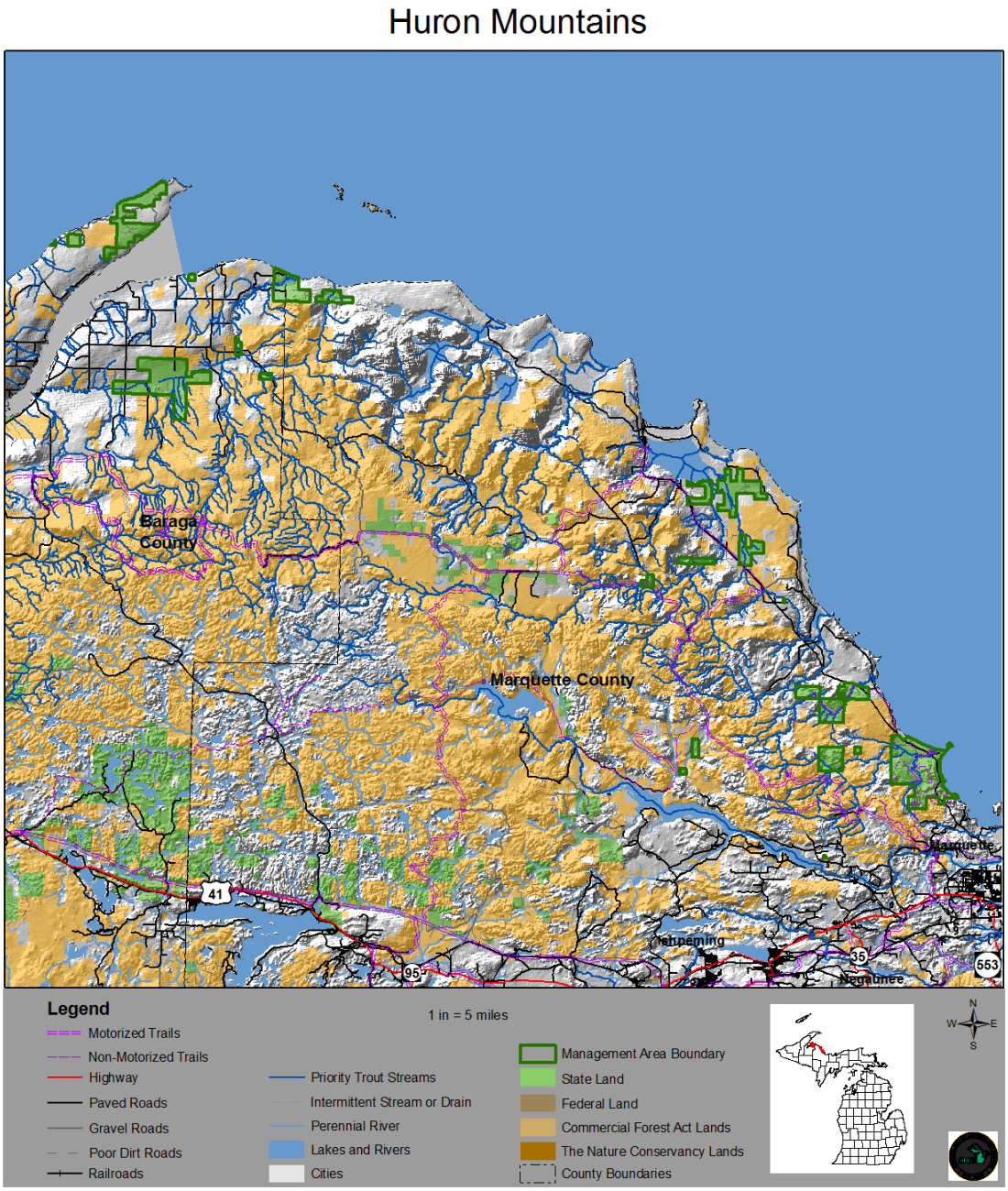

Figure 4.17.1. A map of the Huron Mountains management area (dark green boundary) in relation to surrounding state forest and other lands in Baraga and Marquette Counties.

4.17.1 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 Huron Mountains 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands are on 3,649 acres (27%) of the management area (Table 4.17.1). They occur on medium-quality sugar maple sites. Most stands have been managed on a selection harvest basis. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate and recruit successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

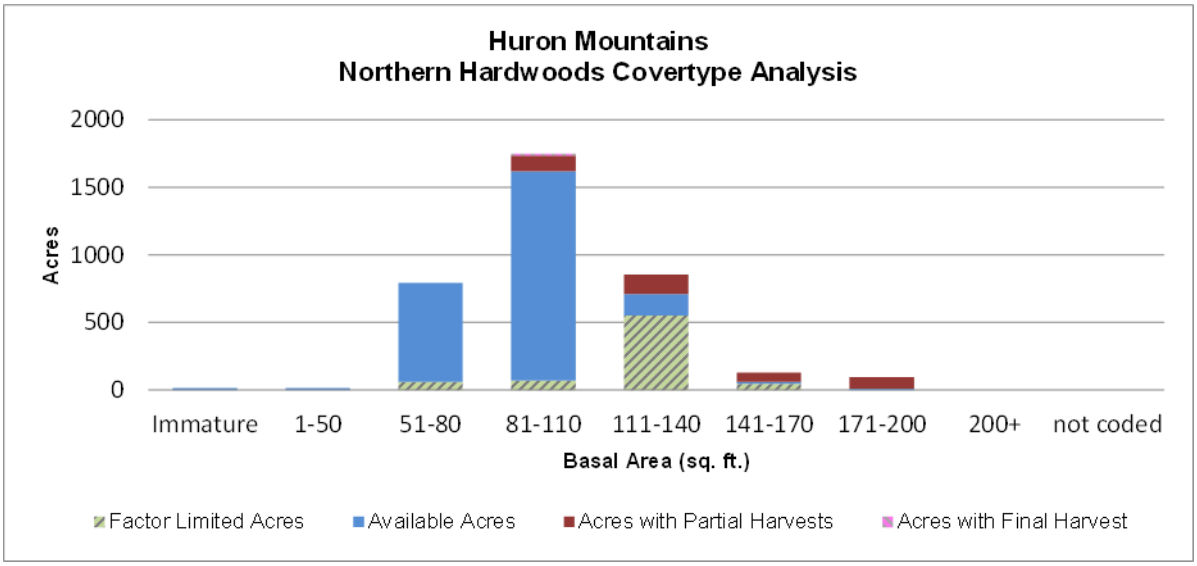

Figure 4.17.2. Graph of the basal area distribution for the northern hardwood cover type on the Huron Mountains management area (2012 Department of Natural Resources inventory data).

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 northern hardwood stands on a 20-year cycle to promote high-value sugar maple sawlogs, hemlock and a well-developed shrub and herbaceous layer.

10-Year Management Objectives

- Selectively harvest 1,438 acres in this 10-year planning period; and
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested.

Aspen Cover Type

Current Condition

The aspen cover type covers1,869 acres (14%) of this management area (Table 4.17.1). Most of the aspen cover type in this management area is growing on sites of medium productivity. Aspen is relatively well distributed across the younger age classes, but lacking in the 50-69 year age classes (Figure 4.17.3). There are 416 acres of aspen that have hard limiting factors on them. These acres are in the 70-89 year age classes and many of these acres will succeed to upland spruce/fir.

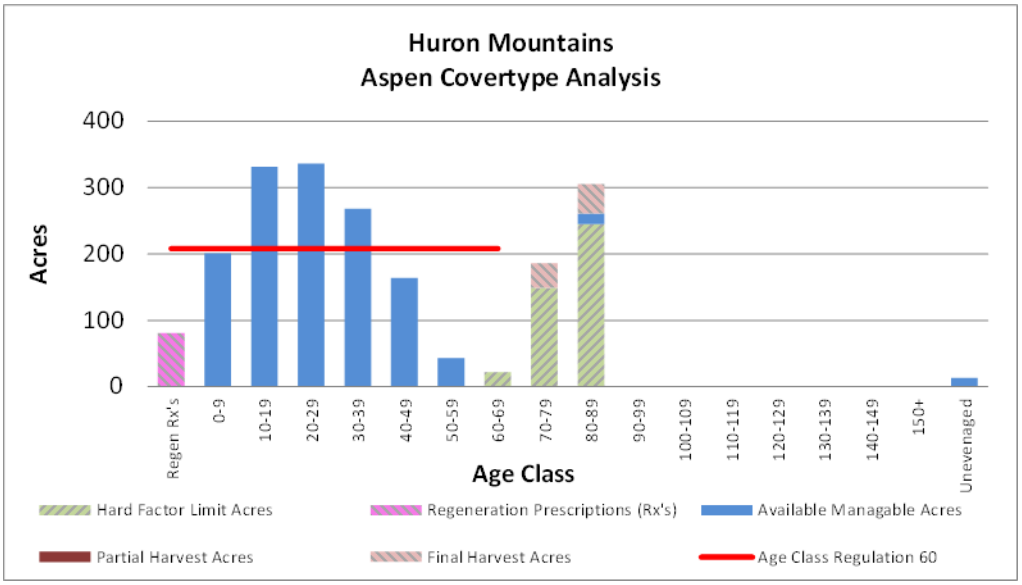

Figure 4.17.3. Graph of the age-class distribution for the aspen cover type on the Huron Mountains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 60-year rotation (indicated in the red line in Figure 4.17.3);
- Provide a supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Regenerate approximately 208 acres each decade; and
- Maintain mature big tooth aspen, if present, as retention.

10-Year Management Objectives

- Approximately 94 acres will be harvested during this 10-year planning period; and
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest.

Hemlock Cover Type

Current Condition

Hemlock stands make up 1,735 acres (13%) of the management area (Table 4.17.1) and is important to wildlife as a source of thermal cover. Most stands have been managed on a selection harvest basis. In areas away from the Lake Superior shoreline, low deer numbers allow successful regeneration and recruitment of hemlock.

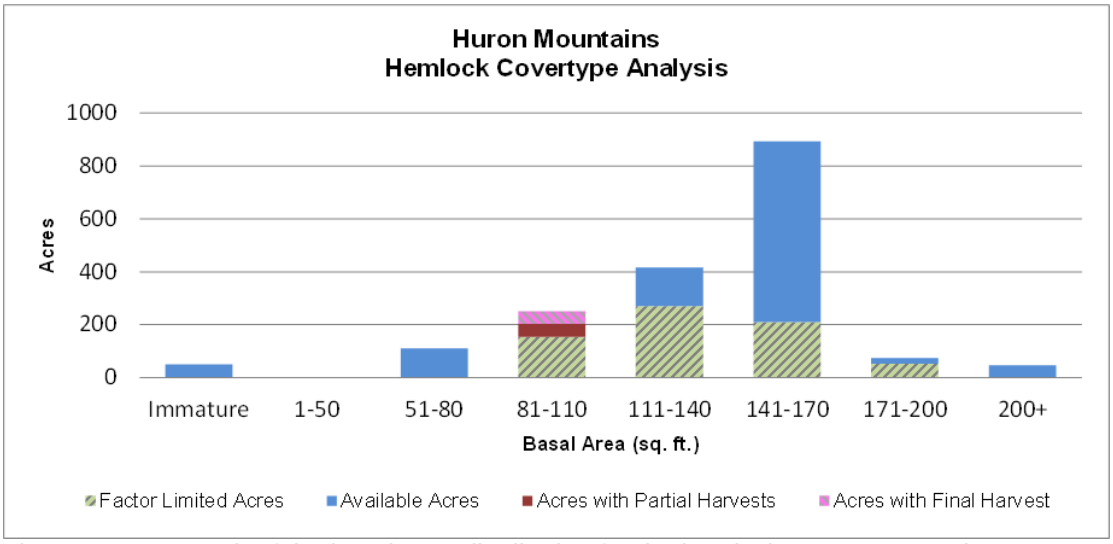

Figure 4.17.4. Graph of the basal area distribution for the hemlock cover type on the Huron Mountains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Provide uneven-aged hemlock stand structure while promoting sawlogs;
- Provide a full complement of tree seedlings recruiting into the overstory; and
- Provide well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selectively harvest hemlock stands on a 50-year cycle, cutting approximately 201 acres each decade; and
- Using the uneven-aged system, maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objective

- Due to the proximity and nature of the stands, no harvests are expected during this 10-year planning period.

Red Pine Cover Types

Current Condition

Over 1,109 acres (8%) of the management area is red pine. Most of the red pine in this area is located in the Little Presque Isle area growing on old beach, dune and swale complex. This area is a highly recreated area resulting in the majority of acreage having hard limiting factors assigned to them.

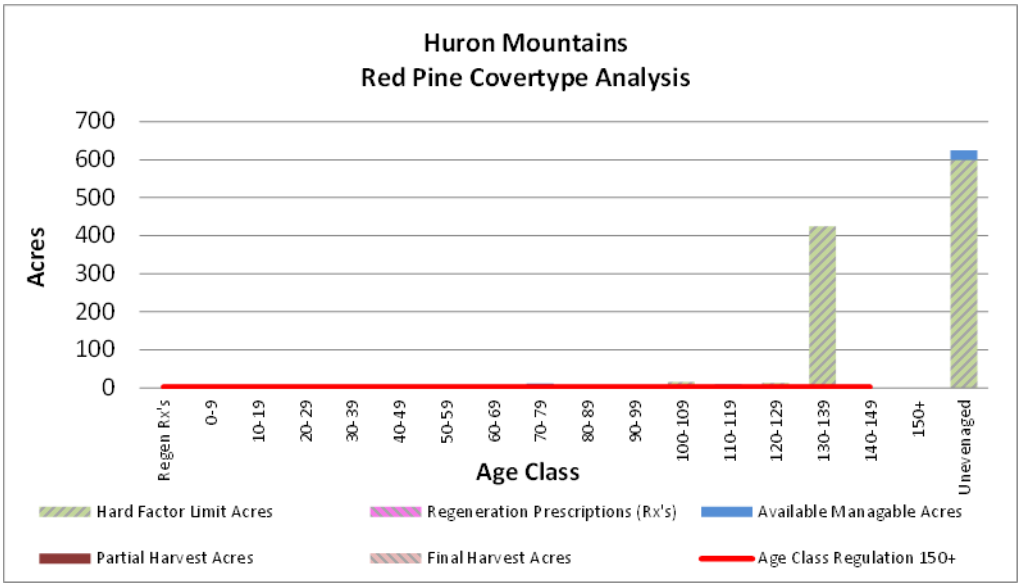

Figure 4.17.5. Graph of the age-class distribution for the red pine cover type on the Huron Mountains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain mixed-age red pine stands by removing groups of trees only as they become hazards to recreational users.

Long-Term Management Objective

- Harvesting in this area is limited, occurring on approximately 20 acres per decade. When it does occur, natural origin stands will be managed on a 150-year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed; and
- Stands will be thinned at age 80 and 110 with the option of additional thinning as necessary.

10-Year Management Objective

- No harvesting is planned for this 10-year planning period.

Lowland Conifers Cover Types

About 780 acres (6%) of the management area are in this type. These are poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Many of these stands have 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. Mixed lowland conifers have a poor age-class distribution with the majority of acreage being in the 100-109 and uneven-aged classes (Figure 4.17.6). Little harvesting has been done in this type over the past 60 years.

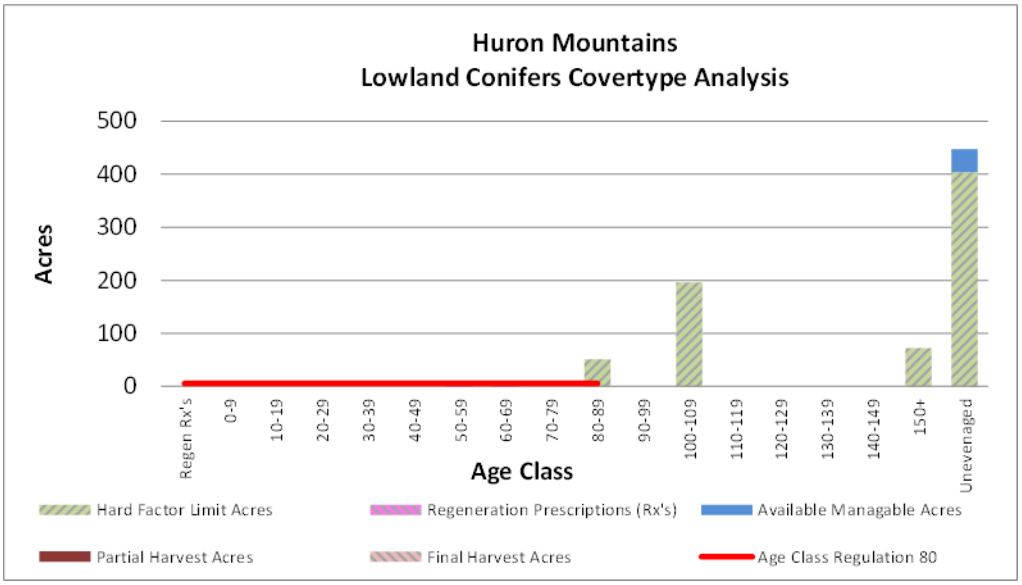

Figure 4.17.6. Graph of the age-class distribution for the lowland conifer cover type on the Huron Mountains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage this cover type on a 120-year rotation resulting in approximately six acres harvested each decade in those stands without hard factor limits.
- Regenerate stands to a species-mix similar to the pre-harvest conditions with preference for cedar, black spruce and balsam fir and;
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 21 acres over 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 3,229 acres and are made up of mixed upland deciduous (626 acres), cedar (562 acres), lowland deciduous (537 acres), oak (391 acres), jack pine (200 acres), upland spruce/fir (179 acres), upland conifer (173 acres), lowland mixed forest (140 acres), upland mixed forest (131 acres), paper birch (92 acres), natural mixed pines (81 acres), lowland poplar (46 acres), lowland spruce/fir (39 acres) and white pine (32 acres). Together these types make up about 24% 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 and habitat conditions indicate that harvesting is appropriate;
- Expected harvests in these types will be less than 832 acres over this planning period;
- Leave all hemlock for retention; and
- Maintain and promote oak in this management area through retention and regeneration.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (38 acres - >1%), lowland open/semi-open lands (773 acres – 6%) and miscellaneous other (water, local, urban) (455 acres – 3%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.17.2 – Featured Wildlife Species Management

The Huron Mountains management area receives significant snowfall and represents almost 20% of the western Upper Peninsula state forest hemlock resource. This provides critical wintering habitat to white tailed deer, especially along the Lake Superior shoreline, in the highest WUP snowfall zone. Additionally, some of the largest tracts of mature forest in the Great Lakes (e.g., McCormick Tract, Craig Lake State Park and the Huron Mountain Club) occur within or adjacent to this management area. The current condition and spatial arrangement of these areas provide some of the best opportunities within the western Upper Peninsula, state and Great Lakes for area sensitive wildlife that require large tracts of mature forest, mesic conifer or corridors between such areas. The wildlife priority here is to manage for old growth forest characteristics in a fairly unfragmented condition, with particular emphasis on protecting the hemlock component. This strategy will protect thermal cover, provide for wildlife movement corridors, and provide habitat for a variety of species. The primary focus of wildlife habitat management in the Huron Mountains management area will be to address the habitat requirements identified for the following featured species: American marten, blackburnian warbler and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: habitat fragmentation; coarse woody debris; retain or develop large living and dead standing trees (for cavities); mesic conifer; mature forest; within-stand diversity; closed canopy forest; and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blowdown.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.
- Retain down coarse woody debris present before cutting and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the normal rotation length for upland spruce/fir cover types by 20 years in this management area.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.17.3 –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, 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 eleven listed species as well as five natural communities of note occurring in the management area as listed in Table 4.17.2. 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.

Little Presque Isle has two non-dedicated natural areas (one of 529 acres and one of 15 acres) and 15 acres of Great Lakes island that are all special conservation areas within this management area as shown in Figure 4.17.7.

Approximately 499.2 acres of potential old growth have been identified within the Huron Mountains 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.

This management area has the Little Presque Isle Amendment (3134 acres) and Huron Mountain coastal environmental area (13 acres) that are high conservation value areas as well as five ecological reference areas (ERAs) as shown in Figure 4.17.7. The ERAs represent the following natural communities: wooded dune and swale complex (two areas, one of 547.1 acres and one of 16.6 acres), granite bedrock glade (two – 13 acres and 9.7 acres) and Great Lakes marsh (815.3 acres).

Table 4.17.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Huron Mountains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Granite bedrock glade		S2/G3G5	Confirmed				Upland open/semi-open	N/A
Great Lakes marsh		S3/G2	Confirmed				Lowland open/semi-open	N/A
Mesic northern forest		S3/G4	Confirmed				Northern Hardwood	Late
Sandstone lakeshore cliff		S2/G3	Confirmed				Upland open/semi-open	N/A
Wooded dune and swale complex		S3/G3	Confirmed				Upland open/semi-open	N/A
Birds								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
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
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plants								
Shortstalk chickweed	*Cerastium brachypodum*	T/G5/S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Sandstone bedrock lakeshore	Upland open/semi-open	N/A
Narrow-leaved gentian	*Gentiana linearis*	T/G5/S2S3	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
Big-leaf sandwort	*Moehringia macrophylla*	T/G4/S1	Confirmed			Volcanic bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
Pine-drops	*Pterospora andromedea*	T/G5/S2	Confirmed			Boreal forest	Upland & Lowland Sp/F	Mid
						Dry-mesic northern forest	White Pine	Late
						Dry northern forest	Jack Pine, Red Pine	Late
						Granite bedrock glade	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
Blunt-lobbed woodsia	*Woodsia obtusa*	T/G5/S1S2	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Limestone cliff	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite cliff	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.

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.

Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

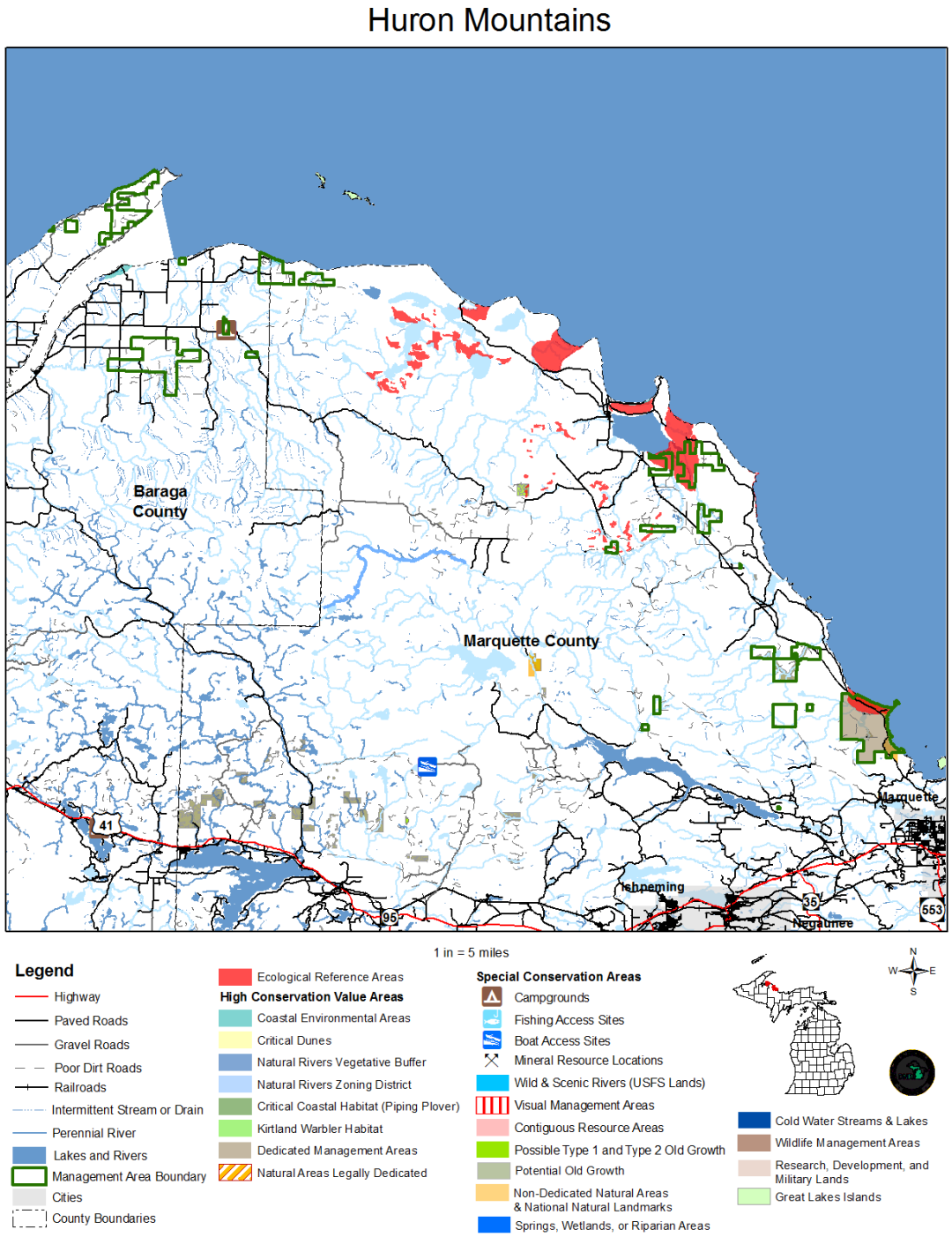

Figure 4.17.7. A map of the Huron Mountains management area showing the special resource areas.

4.17.4 – 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
- Hemlock woolly adelgid.

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. Following is a list of species of concern that been documented in or near this management area:

- Black locust
- Garlic mustard
- Glossy buckthorn
- Japanese barberry
- Japanese knotweed
- Purple loosestrife
- Spotted knapweed
- Tatarian honeysuckle.

4.17.5 – 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 4.17.1.

4.17.6 – Fire Management

Fire probably did not play a significant role in this largely mesic northern forest community, especially due to its proximity to Lake Superior and heavy winter snowfall. Small areas associated with beach sands and an area that transitions to drier soils near Marquette may have been more receptive to periodic stand replacement fires.

- All wildfires within the management area should be subject to appropriate initial attack response;
- Public use on some of these dry beach communities provides potential for prevention activities such as home hazard assessments and campfire prevention messages; and
- Post-harvest fuel reduction practices in the dry beach communities should be used, especially in areas of heavy public use and high value private development.

4.17.7 – Public Access and Recreation

This area has good public and management access. There are motorized vehicle and non-motorized trails in this management area as shown in Figure 4.17.1. Two major recreation areas are located in this area at Little Presque Isle and the Mouth of the Huron. Big Eric's Bridge State Forest Campground is located on the Huron River as shown in Figure 4.17.7.

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

4.17.8 – 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 coarse-textured till, lacustrine (lake) sand and gravel, glacial outwash sand and gravel and postglacial alluvium and peat and muck sometimes thin to discontinuous over bedrock. The glacial drift thickness varies up to 50 feet. A few sand and gravel pits are located in the management area and there is some potential for additional pits.

The Precambrian Michigamme and Oak Bluff Formations and Archean Granite/Gneiss and Volcanics and Sedimentary Rocks subcrop below the glacial drift. The Granite/Gneiss sometimes can be used as dimension stone.

Old iron mines are located to the southeast of the management area. Metallic mineral exploration has occurred in the management area, and there are active metallic mineral leases in part of the Baraga County portion of the management area.

4.18 Keweenaw Tip Management Area

Summary of Use and Management

Vegetative management in the Keweenaw Tip management area (MA) (Figure 4.18.1) 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 will be limited to when compatible with the other priorities. Wildlife management objectives include addressing the habitat requirements identified for the following featured species: black bear, blackburnian warbler, pileated woodpecker and red crossbill. Management activities may be constrained by site conditions, the skewed age-class distributions, and the remoteness of this area. Balancing age classes and recovery from the heavy cutting of past owners will be issues for this 10-year planning period.

Introduction

The Keweenaw Tip management area is on a bedrock ridge complex in northern Keweenaw County. The state forest covers 8,716 acres and is mostly contiguous. The major ownerships in this vicinity are forest industry and non-industrial private. The management area is dominated by the northern hardwood, upland spruce/fir and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: mesic northern forest and boreal forest;
- Mid-range in site quality;
- Most of the lands in this management area were acquired after 2000;
- High recreational interest (recommendations of the Keweenaw Point Citizens Advisory Committee); and
- Opportunities to enhance biodiversity.

The management priorities for this area are to develop its recreational characteristics while preserving and enhancing the native biodiversity. Management for timber products will be limited to when compatible with the other priorities.

The predominant cover types, composition and projected harvest areas for the Keweenaw Tip management area are shown in Table 4.18.1.

Table 4.18.1. Summary of cover types, composition, limited factor area manageable area, and projected harvest area for the Keweenaw Tip 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
Northern Hardwood	46%	4,002	311	3,691	0	812	4,002	0	1,746
Upland Spruce/Fir	14%	1,242	859	383	146	0	1,242	43	0
Cedar	12%	1,044	463	581	0	0	1,044	36	0
Aspen	7%	643	389	254	0	0	643	36	0
Upland Open/Semi-Open Lands	0%	3	0	3	0	0	3	0	0
Lowland Open/Semi-Open Lands	11%	987	0	987	0	0	987	0	0
Misc Other (Water, Local, Urban)	5%	428	0	428	0	0	428	0	0
Others	4%	367	198	169	92	0	367	27	2
Total		8,716	2,220	6,496	238	812	8,716	142	1,748

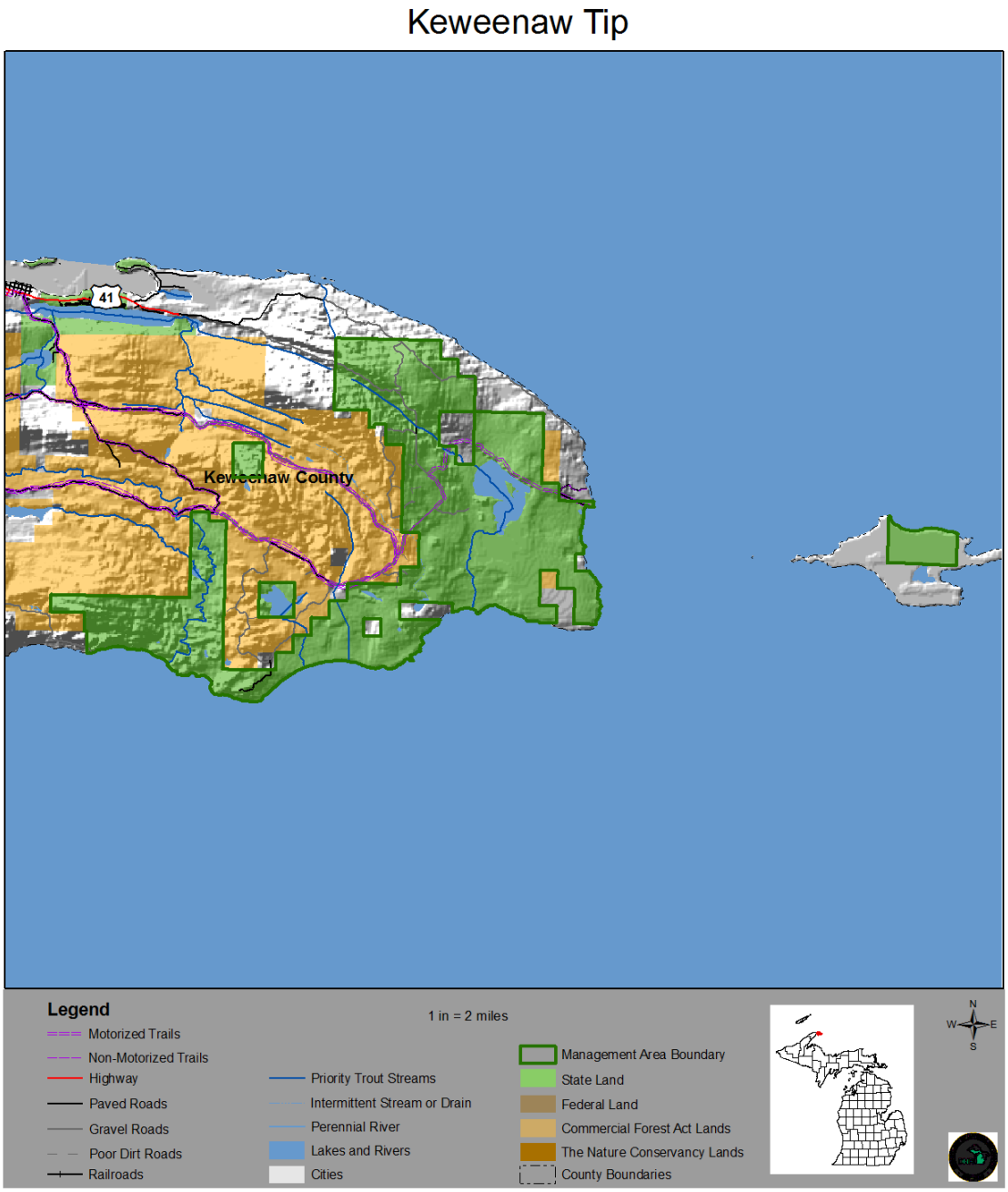

Figure 4.18.1. A map of the Keweenaw Tip management area (dark green boundary) in relation to other property in Keweenaw County, Michigan.

4.18.1 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 Keweenaw Tip 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 4,002 acres (46%) of the management area (Table 4.18.1). They occur on medium-quality sugar maple sites. Most stands were high graded before being purchased by the state. Due to low deer numbers in this area, most stands regenerate and recruit successfully.

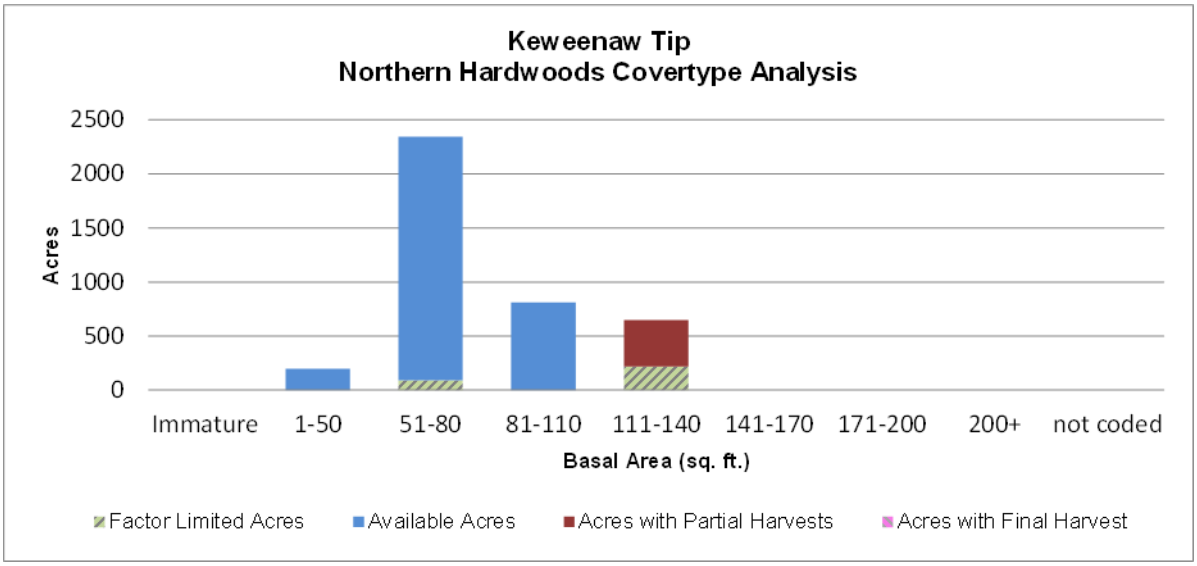

Figure 4.18.2. Graph of the basal area distribution for the northern hardwood cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Sustainable regeneration and recruitment of northern hardwood species leading to an all-age structure;
- Development of well-developed shrub and herbaceous layers; and
- Manage oak for hard mast production.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest northern hardwood stands on a 30-year cutting cycle resulting in the harvest of approximately 1,746 each decade once regulation is reached; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Selectively harvest 812 acres during this 10-year planning period;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock components in stands lacking that species.

Upland Spruce/Fir Cover Type

Current Condition

There are 1,242 acres (14%) of upland spruce/fir on this management area (Table 4.18.1). About 79% percent of the stands have factor limits that preclude harvest activities. Upland spruce/fir stands are generally short-lived reaching maturity in 60-70 years. Left unmanaged they may experience insect damage (spruce budworm) and/or windthrow. Mortality will be followed by natural regeneration of spruce/fir and/or aspen. Alternatively, they may succeed to shade tolerant hardwoods like red maple. Upland spruce/fir stands in this management area are unevenly distributed by age class. The majority of the acreage is in the 50-59 and 80-89 year-old age classes. Upland spruce/fir typically occurs as small stands occupying the transition zone between larger upland types (aspen and northern hardwood) and lowlands.

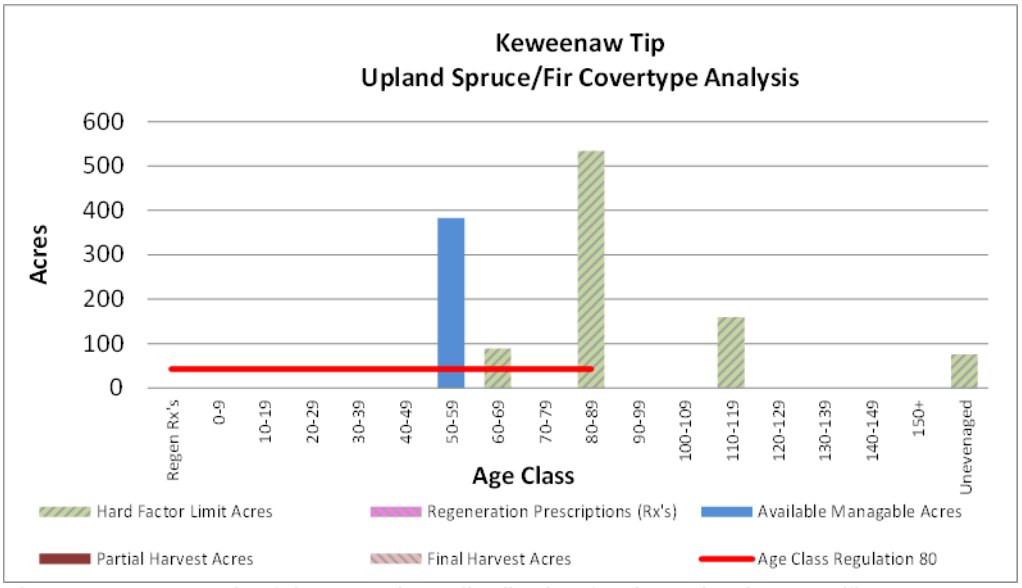

Figure 4.18.3. Graph of the age-class distribution for the upland spruce/fir cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class using an 80-year rotation.

Long-Term Management Objective

- Harvest and regenerate upland spruce/fir stands on a sustainable basis using an 80-year rotation length resulting in the harvest of 43 acres each decade.

10-Year Management Objectives

- Harvest the oldest stands first to minimize mortality loss;
- Harvest in this type for this planning period is expected to be about 146 acres; and
- Evaluate the oldest stands with factor limits to determine which stands should be permanently withdrawn from timber production and which stands are only temporarily limited.

Cedar Cover Type

Current Condition

Currently, cedar makes up 1,044 acres (7%) of this management area (Table 4.18.1). Poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir characterize this type. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Cedar types are poorly distributed across the age-class distribution. Most of the stands are over 80 years of age. Little harvesting has been done in this type over the past 50 years. Approximately 463 acres have a hard limiting factor assigned to them.

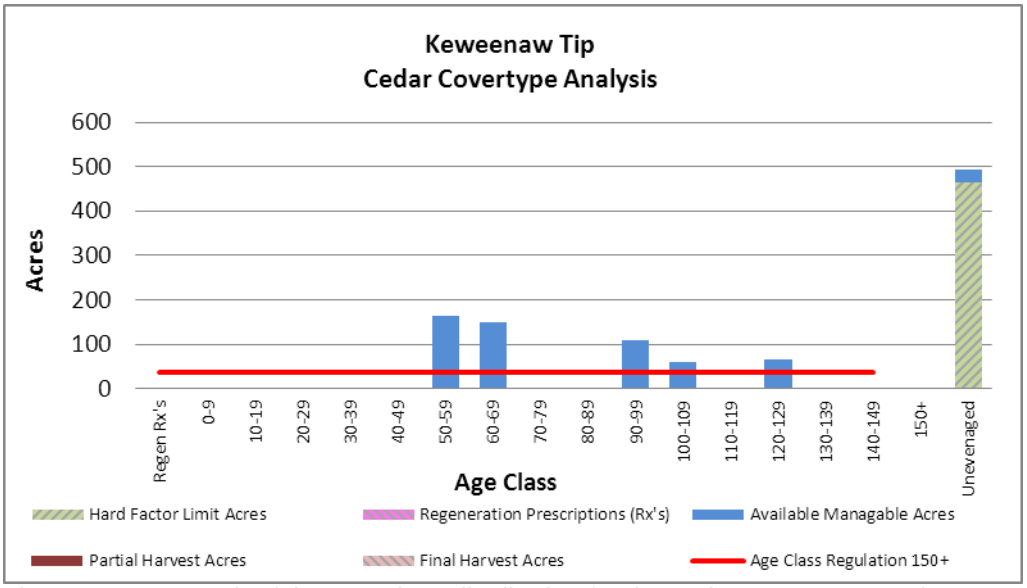

Figure 4.18.4. Graph of the age-class distribution for the cedar cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objectives

- Maintain cedar cover type on the landscape; and
- Regenerate stands to species mixes similar to the pre-harvest conditions by harvesting approximately 36 acres per decade.

10-Year Management Objectives

- No harvests are planned for this area in this planning period; and
- While no active management is planned for this 10-year planning period, some limited experimental cedar regeneration harvests and thinning trials may be conducted.

Aspen Cover Type

Current Condition

About 643 acres (7%) of this management area are in the aspen cover type (Table 4.18.1). Most of the aspen cover type in this management area is found on sites of medium productivity. Aspen is poorly distributed across age classes. The majority of the acreage is in the 50-69 year-old age class.

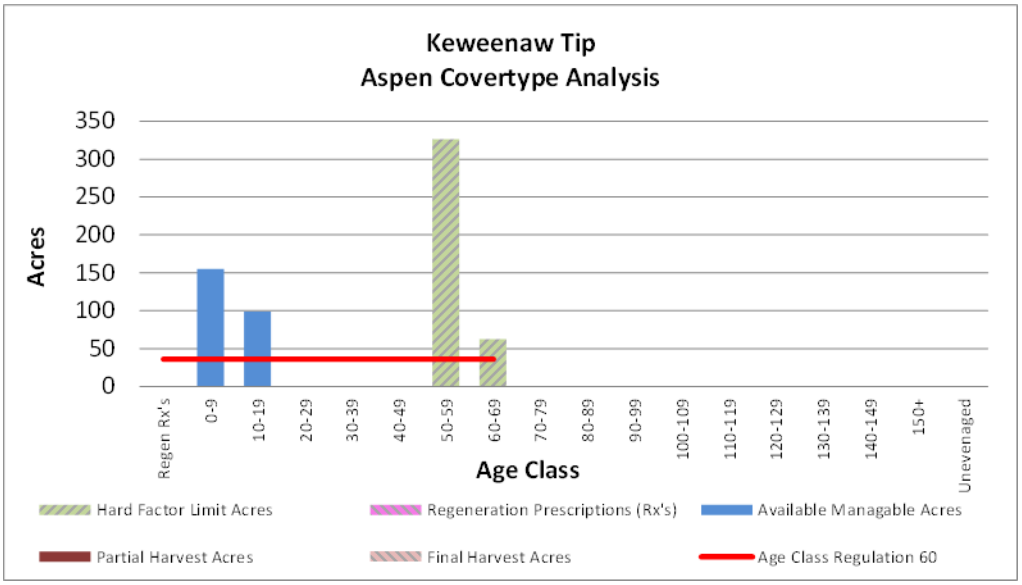

Figure 4.18.5. Graph of the age-class distribution for the aspen cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balance acres in each age class over a 60-year rotation;
- Provide a supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Regenerate approximately 36 acres each decade; and
- Maintain mature large-tooth aspen, if present, as retention.

10-Year Management Objective

- Little harvesting is expected over this 10-year planning period due to the age-class imbalance.

Other Forested Cover Types

Current Condition

Other forested types make up 367 acres and are made up of paper birch (247 acres), lowland spruce/fir (82 acres), white pine (27 acres) and lowland conifer (11 acres). Together these types make up about 4% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 92 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (three acres- >1%), lowland open/semi-open lands (987 acres – 11%) and misc. other (water, local, urban) (428 acres – 5%).

Desired Future Condition

- Maintain current acreage in grasses and other non-forested cover types.

Long-Term Management Objective

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses and forbs to dominate.

10-Year Management Objective

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

4.18.2 – Featured Wildlife Species Management

The Keweenaw Tip management area is unique for wildlife in that it provides merlin breeding habitat in addition to serving as a critical Great Lake raptor migration corridor. Provision of mature forest conditions (e.g., shelter, perch and rest areas) is important in this area. Mature conifers should be provided to provide a prey base for raptors. Shoreline areas should be managed to preserve and encourage rare, disjunct plant species. The primary focus of wildlife habitat management in the Keweenaw Tip management area will be to address the habitat requirements identified for the following featured species: black bear, blackburnian warbler, pileated woodpecker and red crossbill. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: habitat fragmentation; mesic conifer; within-stand diversity; mature forest; retention or development of large living and dead standing trees (for cavities); and mast (hard and soft). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the normal rotation length for upland spruce/fir cover types by 20 years in this management area.

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches in diameter at breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/ foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred. These should be identified and marked by foresters while setting up timber sales.
- Even-aged managed stands: Leave scattered retention patches around some 18 inched in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age class (within the compartment, management area or WUP ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

Red Crossbill

In the western Upper Peninsula, the goal for the red crossbill is to maintain or increase suitable habitat. State forest management should focus on maintaining mature and over mature seed producing trees in priority areas. Declines in crossbill have been associated with declines in the amount of available conifer seeds which are correlated with age of trees (see species account in Section 3); mostly a result of decreases in conifer across the landscape and a shortening of rotation periods for remaining conifer stands. Mature mesic conifer forests (white/ red pine, spruce, hemlock) will be the primary habitat issue addressed for red crossbill in this management area.

Wildlife habitat specifications:

- Maintain a minimum of 15% of the total acres of appropriate forest types (upland spruce/fir, upland conifers, natural mixed pine and natural red and white pine) in the management area for red crossbill in a mature forest condition. Mature being defined as greater than 150 years for red pine, greater than 130 years for white pine and greater than 80 years for white spruce. This can be accomplished with existing factor-limited stands or alternatively by extending the rotation length of these types to 150, 130 and 80 years respectively.
- Retain large mature and over mature red pine, white pine and spruce in shelter-wood and seed tree cuts.
- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source

4.18.3 – 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, 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 thirty-two listed species as well as twelve natural communities of note occurring in the management area as listed in Table 4.18.2. 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.

Manitou Island has 300 acres of the Great Lakes island special conservation area as shown in Figure 4.18.6 and there are two Type 2 potential old growth areas at Keweenaw Point, one is 795 acres of the boreal forest natural community and one is 148 acres of the poor conifer swamp natural community.

Although there are no high conservation value areas, there are five ecological reference areas as shown in Figure 4.18.6. The ecological reference areas represent the following natural communities: volcanic bedrock lakeshore (four areas – 15.5 acres, 10 acres, 9.8 acres and 27.2 acres) and volcanic bedrock glade (94.4 acres).

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.

Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.18.4 – 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
- Spruce budworm
- Emerald ash borer.

Table 4.18.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Keweenaw Tip management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Boreal forest		S3/GU	Confirmed				Upland & Lowland Sp/F	Mid
Northern bald		S1/GU	Confirmed				Upland open/semi-open	N/A
Northern fen		S3/G3	Confirmed				Lowland open/semi-open	N/A
Patterned fen		S2/GU	Confirmed				Lowland open/semi-open	N/A
Poor conifer swamp		S4/G4	Confirmed				Tamarack	Late
Rich conifer swamp		S3/G4	Confirmed				Tamarack	Late
Sand and gravel beach		S2/G3?	Confirmed				Upland open/semi-open	N/A
Submergent marsh		S4/GU	Confirmed				Lowland open/semi-open	N/A
Volcanic bedrock glade		S2/GU	Confirmed				Upland open/semi-open	N/A
Volcanic cobble shore		S3/G4G5	Confirmed				Upland open/semi-open	N/A
Volcanic lakeshore cliff		S1/GU	Confirmed				Upland open/semi-open	N/A
Volcanic bedrock lakeshore		S2/G4G5	Confirmed				Upland open/semi-open	N/A
Bird								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4		IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
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
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Heart-leaved arnica	*Arnica cordifolia*	E/G5/S1	Confirmed			Dry-mesic northern forest	White Pine	Late
						Mesic northern forest	Northern Hardwood	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
						Volcanic cliff	Upland open/semi-open	N/A
Northern reedgrass	*Calamagrostis lacustris*	T/G3Q/S1	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland 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
Ross' sedge	*Carex rossii*	T/G5/S2	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Pale Indian paintbrush	*Castilleja septentrionalis*	T/G5/S1S2	Confirmed			Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
Small flowered blue-eyed Mary	*Collinsia parviflora*	T/G5/S2	Confirmed			Volcanic bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Northern bald	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
Douglas's hawthorn	*Crataegus douglasii*	CS/G5/S3S4	Confirmed			Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
						Sand and gravel beach	Upland open/semi-open	N/A
						Sandstone bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Rock whitlow grass	*Draba arabisans*	SC/G4/S3	Confirmed			Volcanic cliff	Upland open/semi-open	N/A
						Limestone cliff	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland open/semi-open	N/A
						Northern bald	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
English sundew	*Drosera anglica*	SC/G5/S3	Confirmed			Prairie fen	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Interdunal wetland	Lowland open/semi-open	N/A
						Poor fen	Lowland open/semi-open	N/A
						Volcanic bedrock lakeshore	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.

Table 4.18.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Keweenaw Tip management area (Continued).

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Plants (Cont'd)								
Male fern	*Dryopteris filix-mas*	SC/G5/S3	Confirmed			Mesic northern forest	Northern Hardwood	Late
						Limestone cliff	Upland open/semi-open	N/A
						Sinkhole	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
Blue wild rye	*Elymus glaucus*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Wooded dune & swale complex	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Open dunes	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
Black crowberry	*Empetrum nigrum*	T/G5/S2	Confirmed			Limestone cobble shore	Upland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Sandstone cliff	Upland open/semi-open	N/A
						Sandstone lakeshore cliff	Upland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
Narrow-leaved gentian	*Gentiana linearis*	T/G5/S2S3	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
Fir clubmoss	*Huperzia selago*	SC/G5/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
Auricled twayblade	*Listera auriculata*	SC/G3G4/S2S3	Confirmed			Northern shrub thicket	Upland open/semi-open	N/A
American shore-grass	*Littorella uniflora*	SC/G5/S2S3	Confirmed			Submergent marsh	Lowland open/semi-open	N/A
Small-flowered wood rush	*Luzula parviflora*	T/G5/S1	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Poor conifer swamp	Tamarack	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
Big-leaf sandwort	*Moehringia macrophylla*	T/G4/S1	Confirmed			Volcanic bedrock glade	Upland open/semi-open	N/A
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
Alternate-leaved water-milfoil	*Myriophyllum alterniflorum*	SC/G5/S2S3	Confirmed			Submergent marsh	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
Sweet cicely	*Osmorhiza depauperata*	T/G5/S2	Confirmed			Dry-mesic northern forest	White Pine	Late
Purple cliff brake	*Pellaea atropurpurea*	T/G5/S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Limestone cliff	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland open/semi-open	N/A
Alpine bluegrass	*Poa alpine*	T/G5/S1S2				Alvar	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
Alpine bistort	*Polygonum viviparum*	T/G5/S1S2	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
Pearlwort	*Sagina procumbens*	T/G5/S2	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
Northern ragwort	*Senecio indecorus*	T/G5/S1	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Dry-mesic northern forest	White Pine	Late
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
Downy oat-grass	*Trisetum spicatum*	SC/G5/S2S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Sandstone lakeshore cliff	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Granite lakeshore cliff	Upland open/semi-open	N/A
Dwarf bilberry	*Vaccinium cespitosum*	T/G5/S1S2	Confirmed			Dry sand prairie	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Sandstone lakeshore cliff	Upland open/semi-open	N/A
						Sandstone cliff	Upland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Late
Northern marsh violet	*Viola epipsila*	E/G4/SH	Confirmed			Boreal forest	Upland & Lowland Sp/F	Mid

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

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. The only species of concern that been documented in or near this management area is Japanese knotweed.

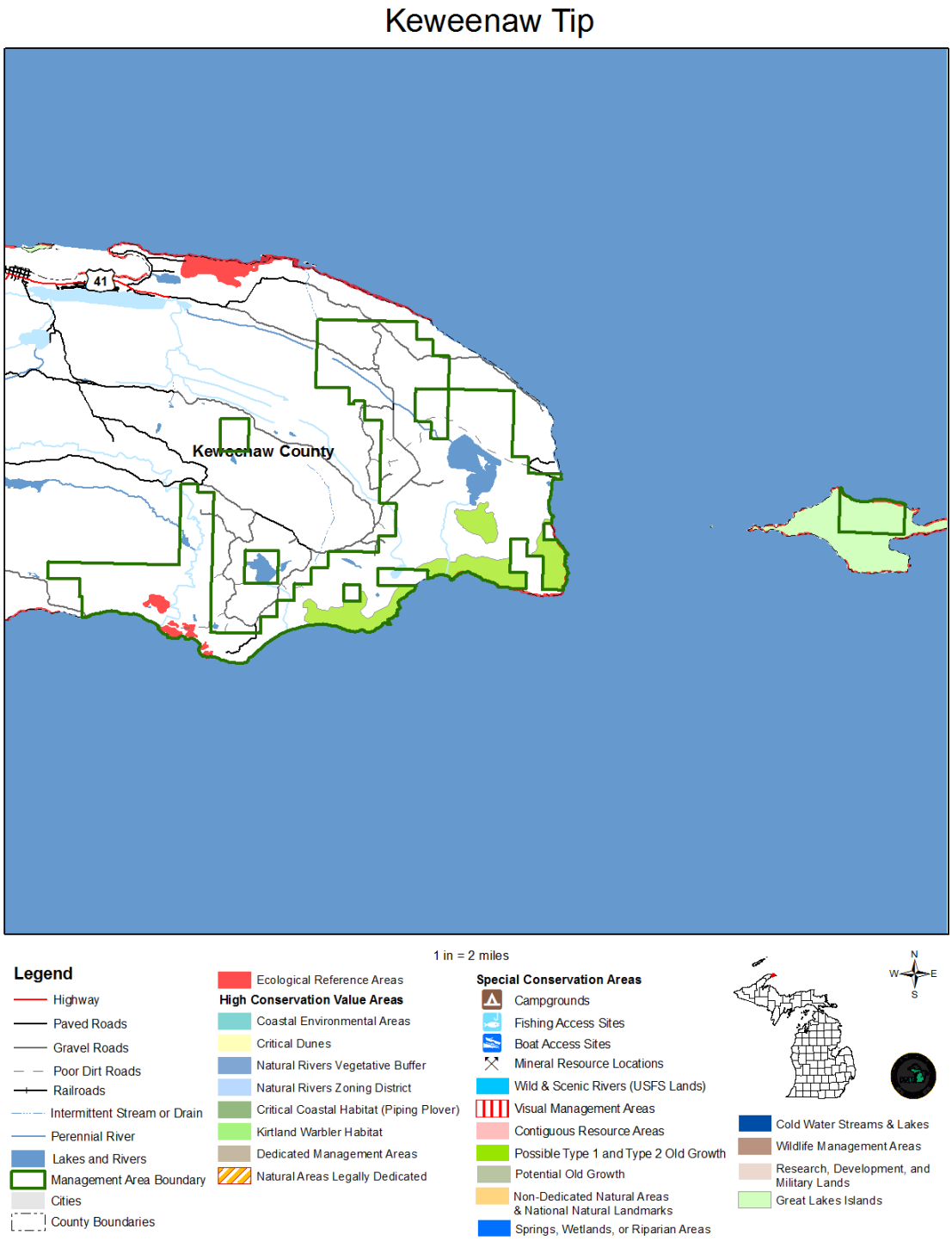

Figure 4.18.6. A map of the Keweenaw Tip management area showing the special resource areas.

4.18.5 – 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 4.18.1.

4.18.6 – Fire Management

Under natural conditions, the state forest lands at the east end of this management area were probably subject to high intensity stand-replacement fires on an infrequent basis. Imbedded wetlands would burn alongside the uplands. Shallow rocky soils are prone to summer drying and the potential of fires starting from lightning strikes. Dry summer fires can consume heavy loads of dead and down spruce, fir and aspen; killing overstory trees and creating favorable mineral soil exposure. Black spruce lowlands adjacent to Schlatter Lake may burn intensely as well. Hardwood forests further west and interior may have been subject to lightning strikes and summer drying as well, though spread rates and fire intensity were probably not sufficient to allow fire to be a significant disturbance except under the extreme drought conditions. Support for and coordination with the local fire department and state park is important to effective management of wildfires in this remote location.

- All wildfires within the area are subject to appropriate initial attack response;
- Work to develop modified suppression strategies for the areas east of Union Creek and Schlatter Lake; and
- On Manitou Island, seek agreements with other landowners to limit suppression to monitoring under all but the most extreme weather conditions.

4.18.7 – Public Access and Recreation

This area has fair public and management access. Snowmobile trails crisscross this area as shown in Figure 4.16.1. This is a popular snowmobiling destination. There are no state forest campgrounds or boating access sites in this area.

- Work to expand public access and recreation facilities as opportunities arise considering the recommendations of the Keweenaw Point Citizens Advisory Committee.

4.18.8 – Oil, Gas and Mineral Resources

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

Surface sediments consist of coarse-textured till and lacustrine (lake) sand and gravel sometimes thin to discontinuous over bedrock. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are not located in the management area but there could be some potential for additional pits .

The Precambrian Copper Harbor Comglomerate and Portage Lake Volcanics subcrop below the glacial drift. These rocks do not have a current economic use.

Old copper mines are located in the management area and other metallic mineral exploration has occurred in the area. There may be additional metallic mineral potential in the management area.

4.19 Menge Creek Management Area

Summary of Use and Management

Vegetative management in the Menge Creek management area (MA) (Figure 4.19.1) 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 address the habitat requirements identified for the following featured species: American marten, black bear and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Menge Creek management area is on a dissected moraine in central Baraga County. The state forest covers 7,656 acres and is in scattered blocks on the landscape. The major ownership in this vicinity is non-industrial private and the Keweenaw Bay Indian Community. The management area is dominated by the aspen, northern hardwood and paper birch cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: 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 Menge Creek management area are shown in Table 4.19.1.

Table 4.19.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Menge Creek 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	34%	2,631	520	2,111	531	0	2,631	352	0
Northern Hardwood	24%	1,814	205	1609	0	595	1,814	0	729
Paper Birch	5%	380	355	25	0	0	380	3	0
Upland Open/Semi-Open Lands	3%	228	0	228	0	0	228	0	0
Lowland Open/Semi-Open Lands	3%	212	0	212	0	0	212	0	0
Misc Other (Water, Local, Urban)	1%	106	0	106	0	0	106	0	0
Others	30%	2,285	426	1859	247	393	2,285	211	412
Total		7,656	1,507	6,149	778	988	7,656	566	1,141

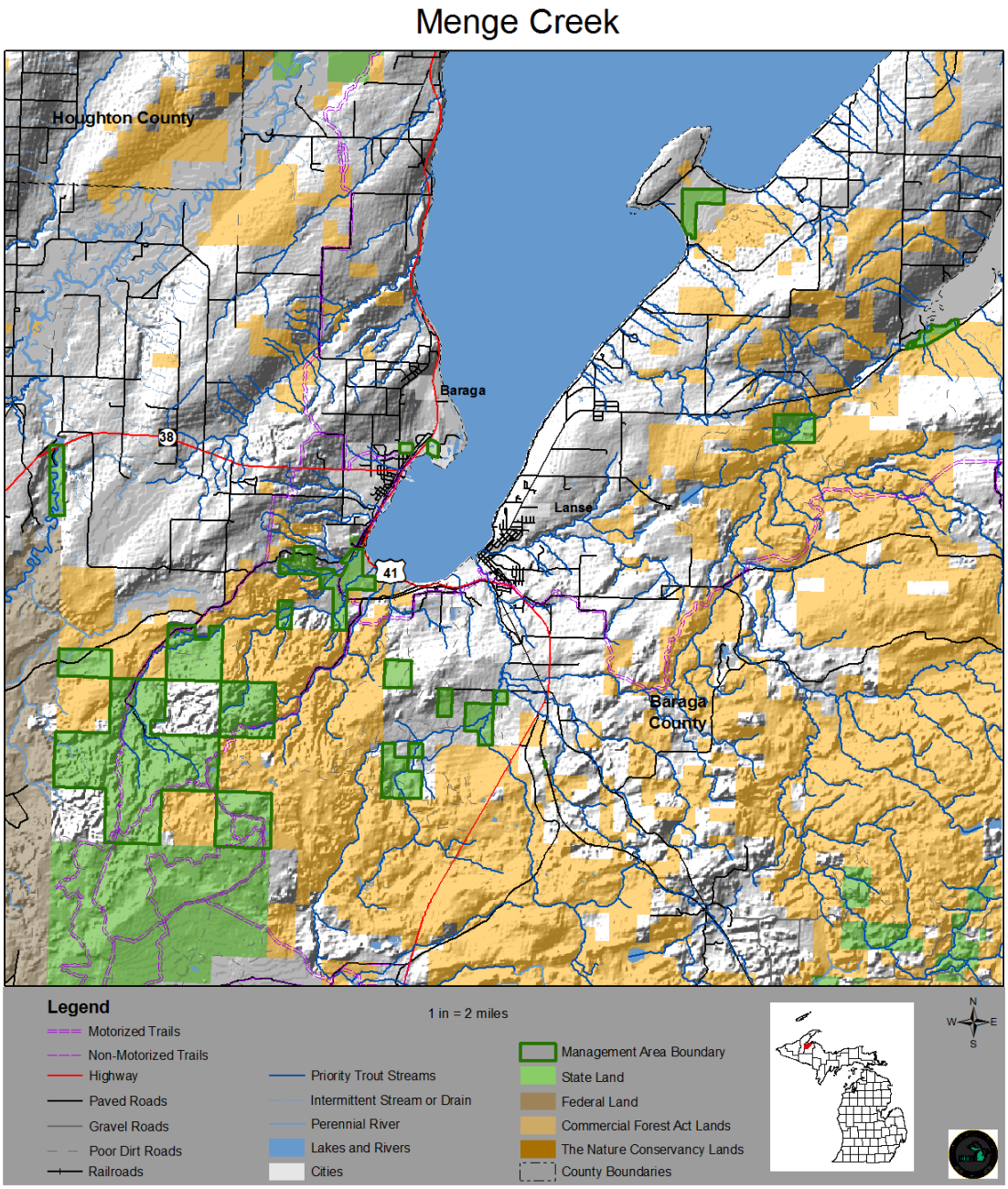

Figure 4.19.1. A map of the Menge Creek management area (dark green boundary) in relation to surrounding state forest and other lands in Baraga County Michigan.

4.19.1 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 Menge Creek 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 2,631 (34%) of this management area (Table 4.19.1). Most of the aspen cover type in this management area is found on sites of medium productivity.

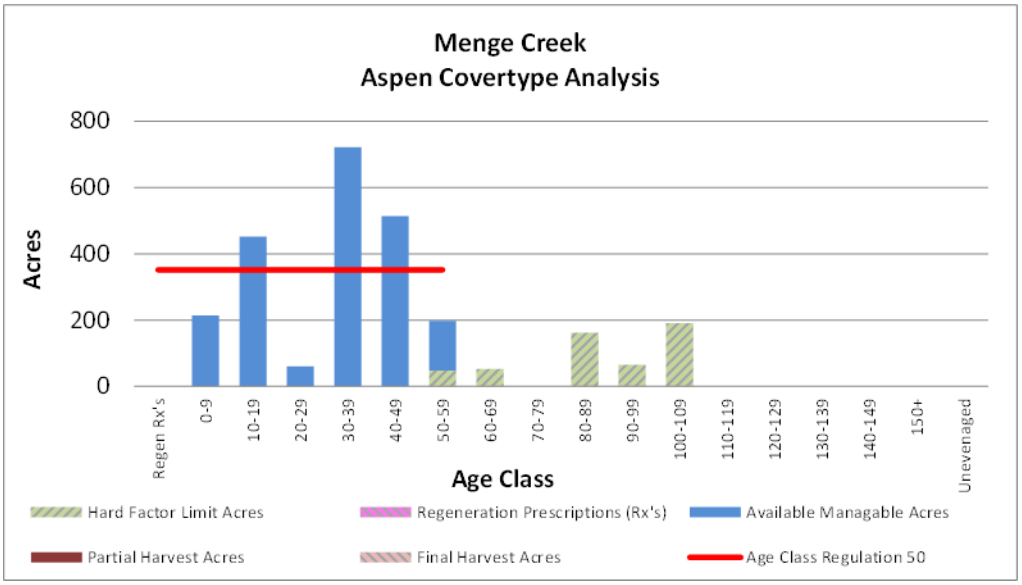

Figure 4.19.2. Graph of the age-class distribution for the aspen cover type on the Menge Creek management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide a supply of forest products;
- Provide a mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objective

- Harvest aspen stands on a sustainable basis using a 50-year rotation length amounting to the harvest and regeneration of 352 acres each decade.

10-Year Management Objectives

- Harvest 531 acres in this 10-year planning period; and
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 1,814 acres (24%) of the management area (Table 4.19.1). They occur on medium quality sites. Due to low deer numbers in this area, there are few problems with herbivory and most stands regenerate and recruit successfully.

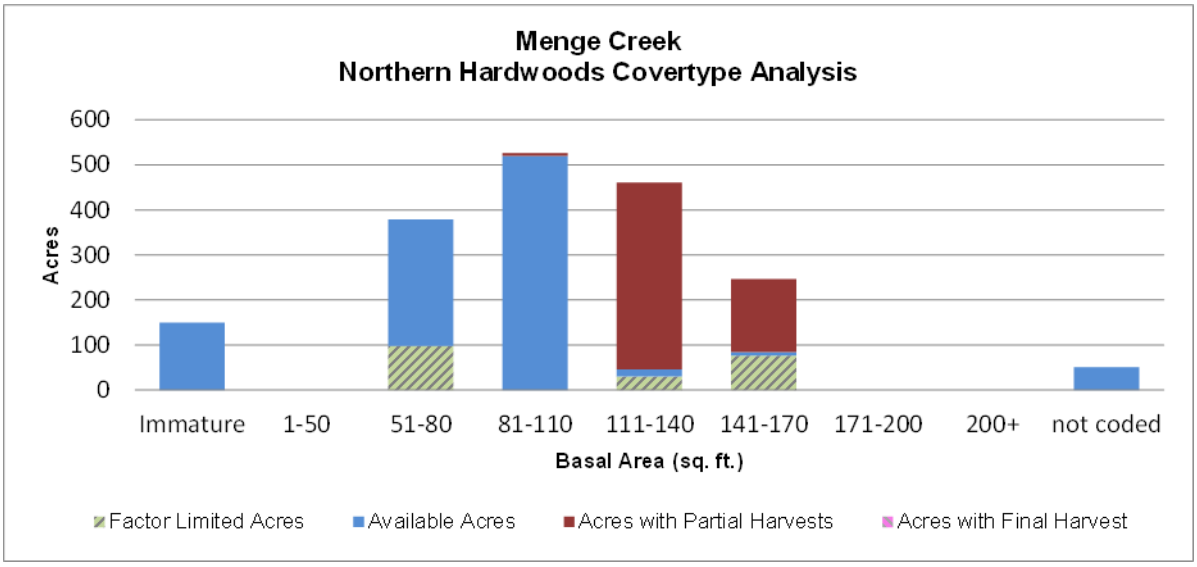

Figure 4.19.3. Graph of the basal area distribution for the northern hardwood cover type on the Menge Creek management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objective

- Selectively harvest northern hardwood stands on a 20-year cycle, consisting of 729 acres per decade, promoting high-value sugar maple sawlogs;
- A full complement of tree seedlings recruiting into the overstory;
- Well-developed shrub and herbaceous layers; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objective

- Selectively harvest 595 acres this 10-year planning period (this number is lower than the target acreage due to the high number of acres with low basal area);
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock components in stands lacking that species.

Paper Birch Cover Type

Current Condition

About 380 acres (5%) of this management area are in the paper birch cover type (Table 4.19.1). Paper birch is poorly distributed across age-classes ranging in age between 70 and 100, well over the biological maturity of paper birch. It is expected that some of the paper birch will succeed to aspen or northern hardwood types as most of this cover type has a hard limiting factor assigned to it.

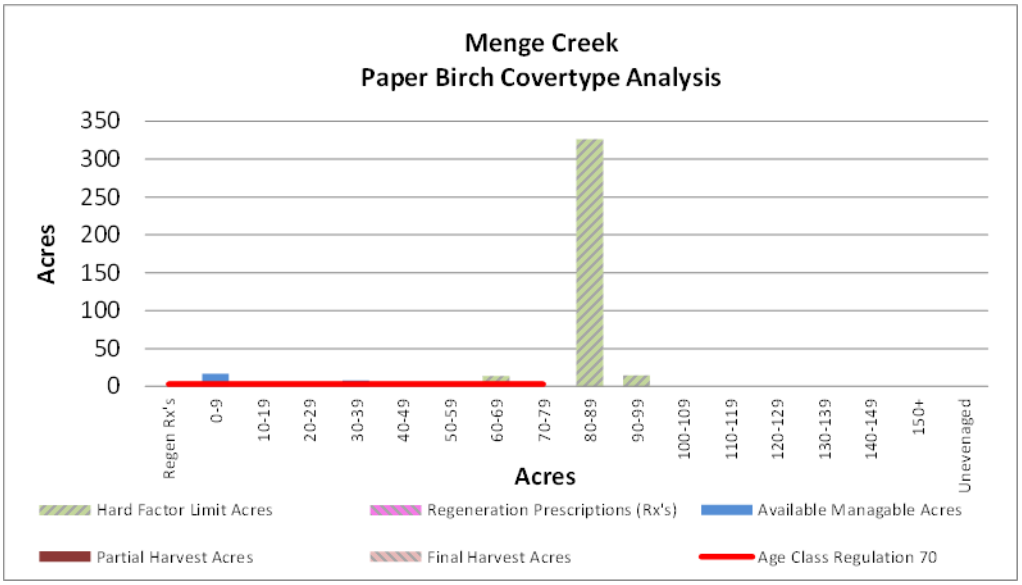

Figure 4.19.4. Graph of the age-class distribution for the paper birch cover type on the Menge Creek management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the paper birch cover type on the management area.

Long-Term Management Objective

- Harvest and regenerate paper birch stands using a 60-year rotation length with three acres per decade being harvested.

10-Year Management Objective

- Very limited if any harvesting will occur over this planning period.

Other Forested Cover Types

Current Condition

Other forested types make up 2,285 acres and are made up of mixed upland deciduous (1,039 acres), cedar (191 acres), upland conifers (190 acres), hemlock (179 acres), tamarack (161 acres), upland spruce/fir (129 acres), lowland conifer (96 acres), red pine (96 acres), oak (72 acres), upland mixed forest (63 acres), lowland deciduous (30 acres), lowland spruce/fir (24 acres), natural mixed pines (14 acres) and planted mixed pines (1 acre). Together these types make up about 30% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 598 acres over this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (228 acres – 3%), lowland open/semi-open lands (212 acres – 3%) and misc. other (water, local, urban) (106 acres – 1%).

Desired Future Condition

- Maintain current acreage in grasses and other non-forested cover types.

Long-Term Management Objective

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses and forbs to dominate.

10-Year Management Objective

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

4.19.2 – Featured Wildlife Species Management

Wildlife management priorities in the Menge Creek management area include maintaining the hemlock and oak habitat components that offer high wildlife values, particularly for deer and bear. The protection of north-south movement corridors created by topography and tree characteristics is also important through protection of mesic conifer thermal cover. The primary focus of wildlife habitat management in the management area will be to address the habitat requirements identified for the following featured species: American marten, black bear and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: habitat fragmentation; coarse woody debris; large living and dead standing trees (for cavities); mesic conifer; mature forest; mast (hard and soft); and deer wintering habitat. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blow down.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.
- Retain down coarse woody debris present before cutting, and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.

- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.

- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.19.3 – 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, 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 four listed species as well as one natural communities of note occurring in the management area as listed in Table 4.19.2. 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.

Table 4.19.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Menge Creek 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								
Great Lakes marsh		S3/G2	Confirmed				Lowland open/semi-open	N/A
Birds								
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Butterflies								
Henry's elfin	*Callophrys henrici*	T/G4/S1S2	Confirmed	PS	Moderate	Oak-pine barrens	Oak	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
Red-disked alpine	*Erbia discoidalis*	*SC/G5/S2S3*	Confirmed	MV	Low	Bog	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Muskeg	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Poor fen	Lowland open/semi-open	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late

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

Approximately 111.6 acres of potential old growth have been identified within the Menge Creek 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.

This management area has the Menge Creek coastal environmental area (71 acres) that is a high conservation value area as well as the Pequaming Great Lakes Marsh ecological reference area (161.8 acres), as shown in Figure 4.19.5, representing the Great Lakes marsh natural community type.

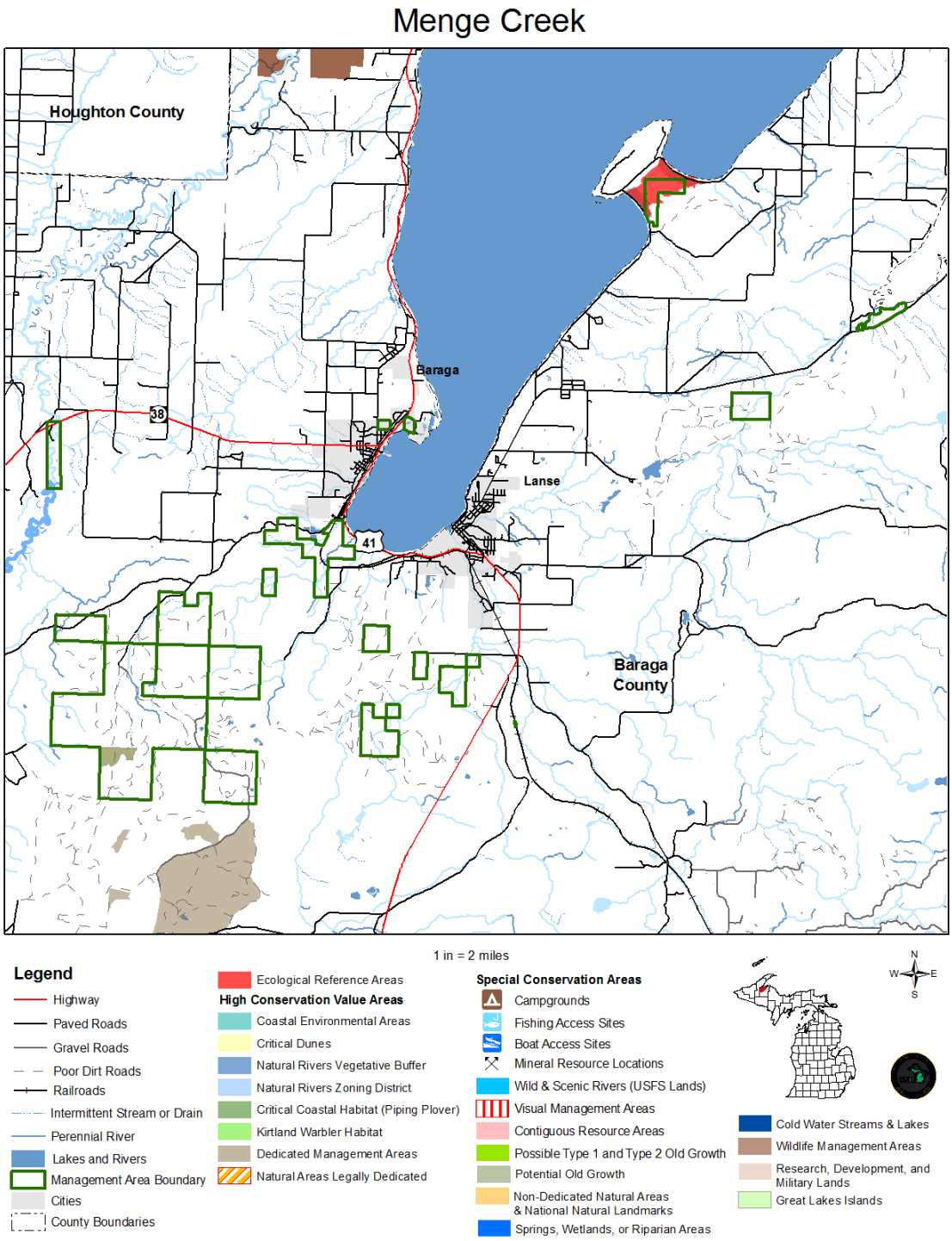

Figure 4.19.5. A map of the Menge Creek management area showing the special resource areas.

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.
Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.19.4 – 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 and emerald ash borer.

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. Following is a list of species of concern that been documented in or near this management area:

- Bell's honeysuckle
- European swamp thistle
- Glossy buckthorn
- Japanese barberry
- Japanese knotweed
- Purple loosestrife
- Spotted knapweed
- Tatarian honeysuckle.

4.19.5 – 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 4.19.1.

4.19.6 – Fire Management

These areas are subjected to periodic high intensity stand replacing fires, perhaps more frequently that would normally be expected due to the proximity to the Baraga Plains. Fire return intervals were probably between 75 and 250 years, supporting development into long-lived pine communities. Fire suppression and harvesting practices have seen these areas trend toward northern hardwoods and aspen.

- All wildfires within this area are subject to appropriate initial attack response. No plans for modified suppression are considered at this time.
- Efforts to encourage oak and pine could be enhanced by management practices that use prescribed fire.

4.19.7 – Public Access and Recreation

This area has somewhat limited management and public access. Several snowmobile trails pass through this area as shown in Figure 4.19.1.

- Work to establish legal access for management and public use.

4.19.8 – 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 coarse-textured till, lacustrine (lake) sand and gravel and an end moraine of coarse-textured till. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area, and there is good potential for additional pits.

The Precambrian Jacobsville Sandstone and Michigamme Formation subcrop below the glacial drift. The Jacobsville was previously used as a building stone.

An old iron mine is located a few miles to the southeast of this management area. Some metallic mineral exploration has occurred in the management area in the past and there may be potential.

4.20 Menominee End Moraine Management Area

Summary of Use and Management

Vegetative management in the Menominee End Moraine management area (MA) (Figure 4.20.1) 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 and lowland conifers; 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 will be to address the habitat requirements identified for the following featured species: black bear, eastern bluebird and ruffed grouse. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (two-line chestnut bore) and disease infestations (oak wilt) will be issues for this 10-year planning period.

Introduction

The Menominee End Moraine management area is on an end moraine in western Menominee County. The state forest covers about 22,410 acres and is in scattered blocks. The major ownership in this vicinity is non-industrial private. The management area is dominated by the aspen, oak and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by the following natural communities: mesic northern forest, poor conifer swamp and barrens;
- Mid-range in site quality;
- This is a popular hunting and recreation area near the communities of Menominee, Iron Mountain and Escanaba;
- 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 benefit in a sustainable manner while minimizing user conflicts. Additional priorities include the maintenance of the oak cover type and oak/pine barrens found in this area.

The predominant cover types, composition and projected harvest areas for the Menominee End Moraine management area are shown in Table 4.20.1.

Table 4.20.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Menominee End Moraine 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	39%	8,668	221	8,447	774	0	8,668	1,409	0
Oak	11%	2,513	857	1656	193	171	2,513	184	389
Cedar	10%	2,185	0	2185	0	0	2,185	137	0
Northern Hardwood	8%	1,846	190	1656	0	736	1,846	0	736
Lowland Conifers	8%	1,708	408	1300	144	0	1,708	144	0
Upland Open/Semi-Open Lands	4%	934	0	934	0	0	934	0	0
Lowland Open/Semi-Open Lands	3%	780	0	780	0	0	780	0	0
Misc Other (Water, Local, Urban)	1%	154	0	154	0	0	154	0	0
Others	16%	3,623	830	2793	255	299	3,623	307	420
Total		22,411	2,506	19,905	1,365	1,206	22,411	2,181	1,545

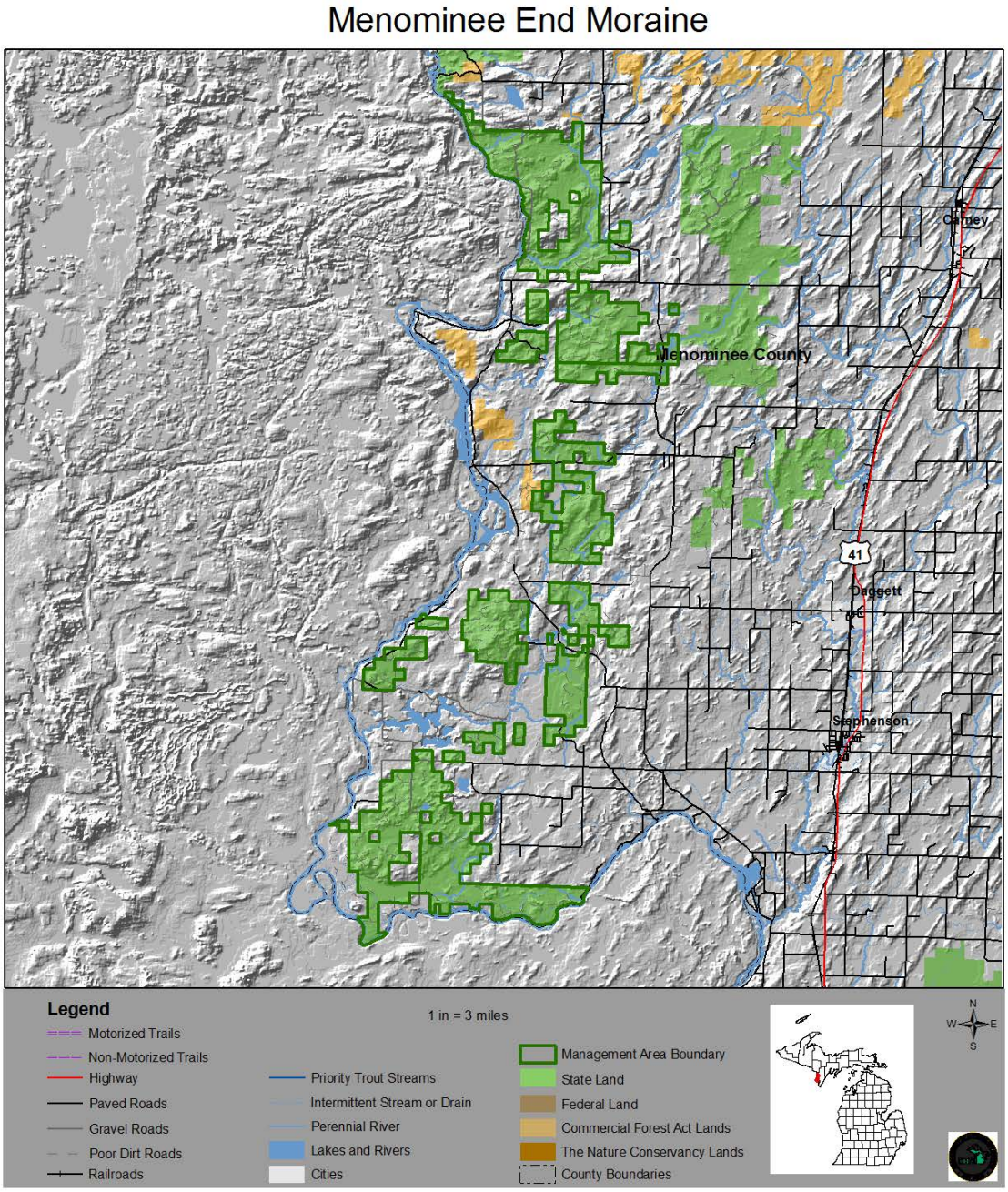

Figure 4.20.1**.** A map of the Menominee End Moraine management area (dark green boundary) in relation to surround state forest and other lands in Menominee County, Michigan.

4.20.1 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 Menominee End Moraine 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 8,668 acres (39%) of this management area (Table 4.20.1). Most of the aspen cover type in this management area is found on medium productive sites. Aspen is fairly well distributed across age classes (Figure 4.20.2). A few acres of aspen have limiting factors on them. Many of these acres will succeed to upland spruce/fir.

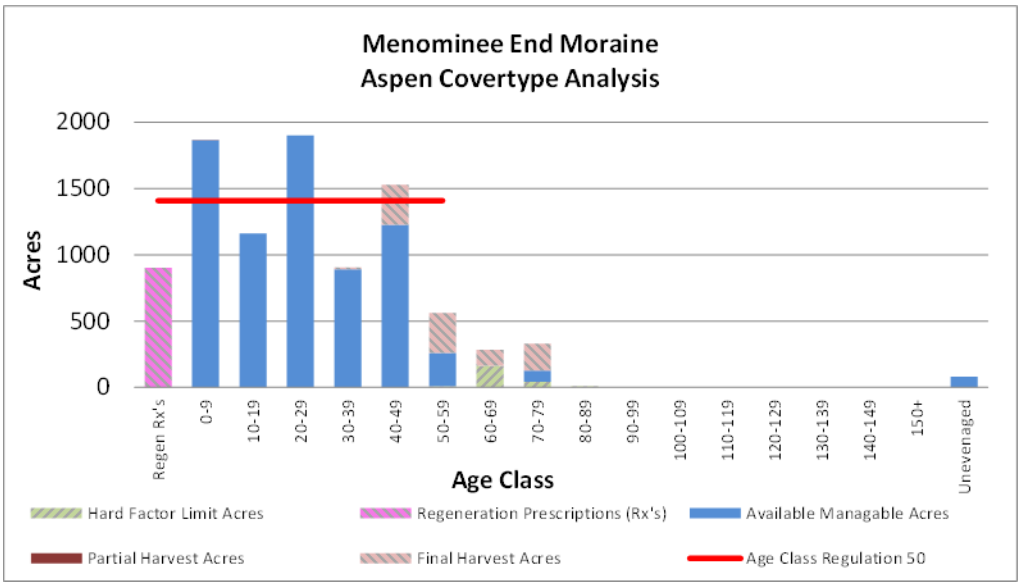

Figure 4.20.2. Graph of the age-class distribution for the aspen cover type on the Menominee End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide a supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objective

- Regenerate approximately 1,409 acres each decade.

10-Year Management Objectives

- Harvest 774 acres mostly from the 40-49 year and older age classes; and
- As biomass markets improve opportunities to harvest from the younger age-classes will be explored.

Oak Cover Type

Current Condition

Oak is present on 2,513 acres (11%) in this management area (Table 4.20.1) and is important to wildlife for mast production. Most of the oak is over 60 years old and many of the stands are in decline. Oak in this management area consists of pin oak, a scrubby oak of poor timber quality and fair-quality red oak.

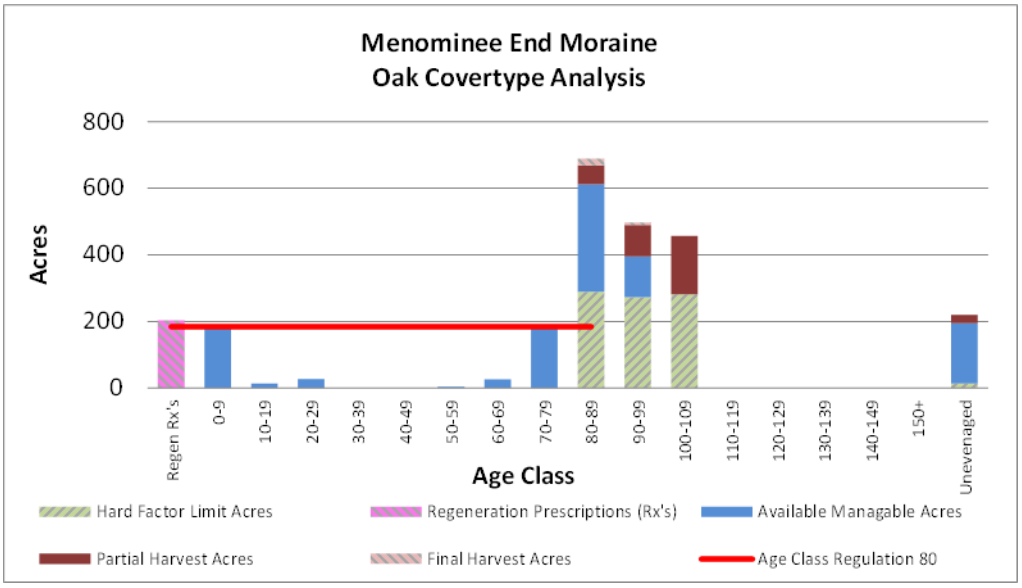

Figure 4.20.3. Graph of the age-class distribution for the oak cover type on the Menominee End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain a component of oak in mixture with natural red and white pine; and
- Some oak and aspen mixed stands will be maintained where opportunities exist.

Long-Term Management Objectives

- Regenerate approximately 184 acres of oak per decade;
- Pin oak stands will be regenerated on an 80-year rotation whereas higher quality red oak will be managed on a longer rotation length;
- Thin approximately 389 acres of oak per decade;
- Maintain oak as a component of mixed upland types through harvesting; and
- Monitor oak stands for oak wilt.

10-Year Management Objectives

- Thin up to 171 acres this decade of oak in this 10-year planning period to increase hard mast production;
- Harvest and regenerate 193 acres of oak; and
- In oak stands affected by oak wilt, convert to pine types or oak barrens.

Cedar Cover Type

Current Condition

The cedar cover type covers 2,185 acres (10%) are in this management area (Table 4.20.1). These are poorly drained sites supporting stands of mostly cedar mixed with black spruce, tamarack and balsam fir. The cedar type is poorly distributed across age classes (Figure 4.20.4). Most of the stands are over 80 years of age. Little harvesting has been done in this type over the past 60 years.

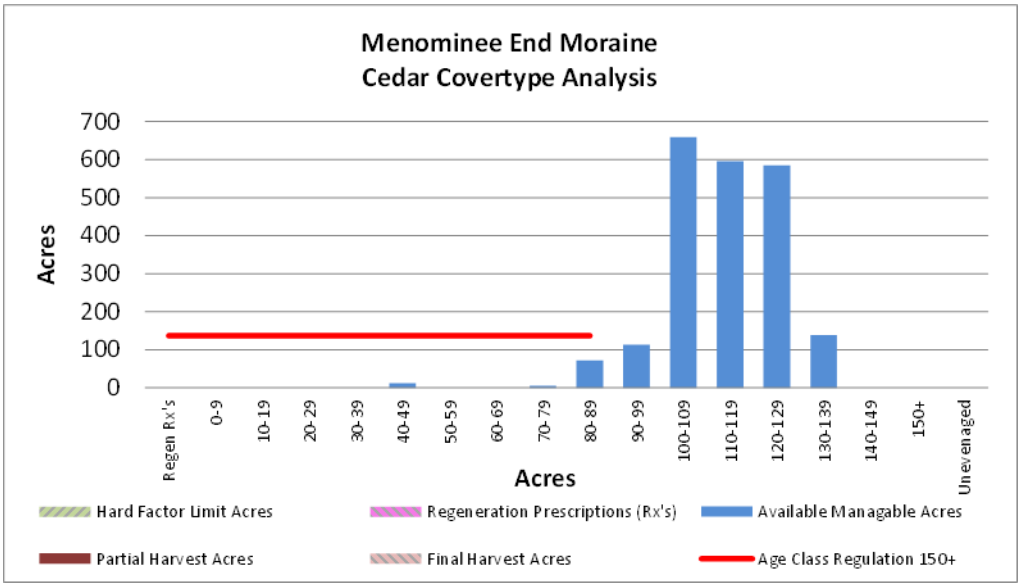

Figure 4.20.4. Graph of the age-class distribution for the cedar cover type on the Menominee End Moraine management area (2012 Department of Natural Resources inventory data).

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

- Maintain cedar cover type on the landscape; and
- Regenerate 137 acres per decade to a species-mix similar to the pre-harvest conditions.

10-Year Management Objectives

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

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up about 1,846 acres (8%) of this management area (Table 4.20.1) and occur on medium-quality sites. Most stands have been managed on a selection harvest basis, but regeneration success has been limited. Some stands have well-established sedge understory with little tree regeneration, shrub or herbaceous plant communities present.

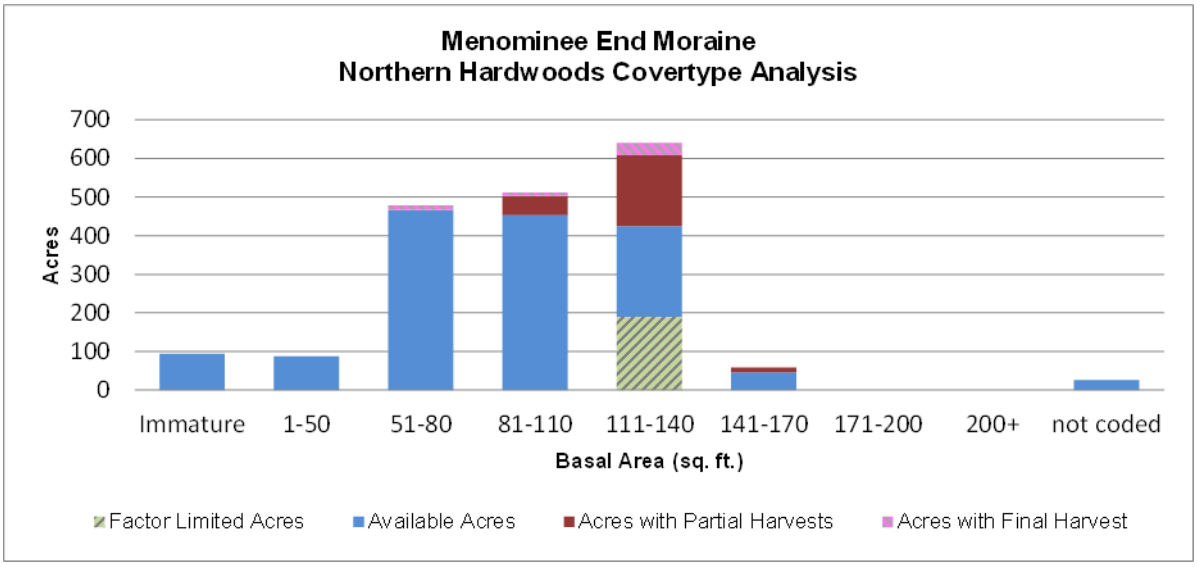

Figure 4.20.5. Graph of the basal area distribution for the northern hardwood cover type on the Menominee End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objectives

- Selectively harvest high quality northern hardwood stands on a 20-year cycle, resulting in 736 acres being harvested each decade;
- Low quality hardwood stands dominated by red maple will be managed on an even-aged basis using an 80-year rotation; and
- Maintain and encourage minor species to increase within-stand diversity.

10-Year Management Objectives

- Selectively harvest 736 acres during this 10-year planning period;
- Maintain a component of white pine, oak, hemlock and upland cedar where they occur in stands that are harvested;
- Experiment with mechanical and chemical treatments of the sedge understory to establish hardwood regeneration and improve understory diversity; and
- Monitor even-aged hardwood regeneration.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 1,708 acres (8%) of the management area (Table 4.20.1). These are poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Mixed lowland conifers are poorly distributed across age classes, spiking in the 70-89 year age classes (Figure 4.20.6). Some harvesting has been done in this type over the past 70 years.

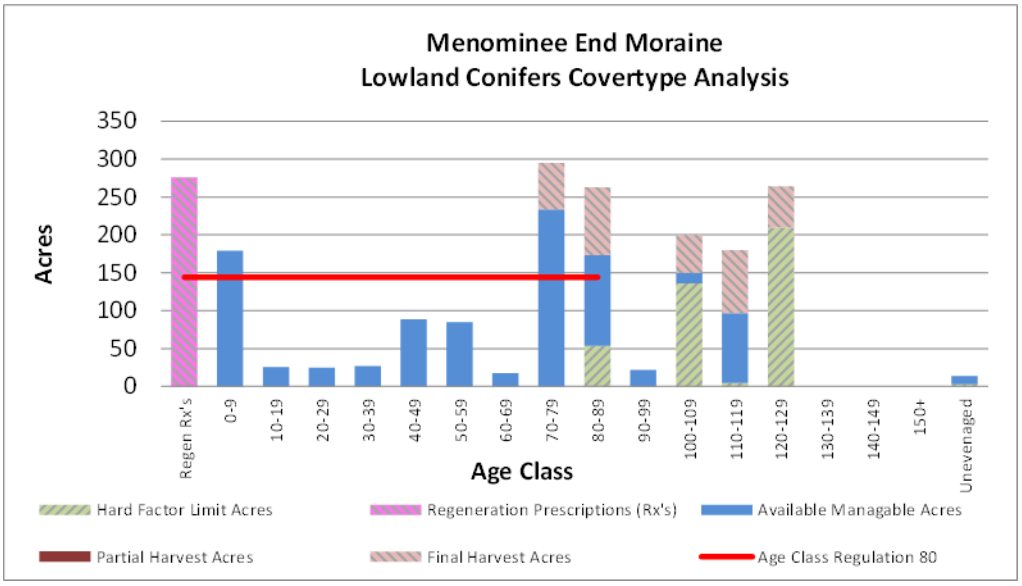

Figure 4.20.6. Graph of the age-class distribution for the lowland confiers cover type on the Menominee End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management

- Manage stands on an 80-year rotation resulting in the harvest of 144 acres each decade.
- Regenerate stands to species mixes similar to the pre-harvest conditions favoring cedar, black spruce, hemlock and balsam fir; and
- Harvesting will be done using the appropriate silvicultural techniques.

10-Year Management

- Harvest 144 acres during this 10-year planning period.

Other Forested Cover Types

Current Condition

Other forested types make up 3,623 acres and are made up of white pine (874 acres), lowland deciduous (633 acres), tamarack (400 acres), upland spruce/fir (370 acres), red pine (204 acres), mixed upland deciduous (194 acres), lowland mixed forest (186 acres), lowland poplar (171 acres), upland mixed forest (169 acres), lowland spruce/fir (161 acres), natural mixed pine (92 acres), upland conifers (81 acres), jack pine (77 acres) and paper birch (11 acres). 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 554 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (934 acres – 4%), lowland open/semi-open lands (780 acres – 3%) and miscellaneous other (water, local, urban) (154 acres – 1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.20.2 – Featured Wildlife Species Management

The Menominee End Moraine management area contains forest types that are adapted to sandy outwash plain conditions. Most of the western Upper Peninsula oak resource on state forest is located here and the enhancement of this cover type is a high priority for wildlife. The presence of oak wilt disease increases the urgency to find management solutions to oak regeneration challenges. There are also opportunities to expand and link forest openings and upland brush habitats through the use of prescribed burns and mechanical treatments. Another high priority is restoration of oak-pine barrens savanna in Compartment 109.

The primary focus of wildlife habitat management in the Menominee End Moraine management area will be to address the habitat requirements identified for the following featured species: black bear, eastern bluebird and ruffed grouse. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: early successional forest; mast (hard and soft); large open land complexes (with snags in open lands); and retention of patches of dead trees left by fire, disease and insect outbreaks. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Eastern Bluebird

The western Upper Peninsula goal for bluebirds is to maintain or improve habitat. State forest management efforts during this planning period will focus on maintaining or expanding open land conditions, protection of snags or dying standing trees associated with openings and managing opening complexes/ savanna with prescribed fire.

Wildlife habitat specifications:

- Maintain herbaceous open-land complexes within the management area using prescribed burns or mowing and consider the spatial arrangement.
- Protect snags or dying standing trees within the open-lands. If nest cavities are not present, consider: leaving standing live trees (e.g., aspen) trees in final harvest timber sales; and/or planting scattered oak.
- Leave a ½-chain buffer around openings to limit aspen encroachment following timber harvest.

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.
- 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.

4.20.3 – 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, 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 seventeen listed species as well as two natural communities of note occurring in the management area as listed in Table 4.20.2. 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 Shaky Lakes natural area is a 1,527 acre special conservation area as shown in Figure 4.20.7.

Approximately 537.1 acres of potential old growth have been identified within the Menominee End Moraine 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 Menominee River Natural Resources Area (2,539 acres) is a dedicated management area that is a high conservation value area found within this management area. There are also two ecological reference areas as shown in Figure 4.20.7. The ecological reference areas represent the hillside prairie natural community (1.3 acres) and the oak-pine barrens natural community (1,559 acres).

Table 4.20.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Menominee End 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 Communites								
Hillside prairie		S1/G3	Confirmed				Upland open/semi-open	N/A
Oak-Pine barrens		S2/G3	Confirmed				Oak	Mid
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
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Rich Tamarack 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
Fish								
Lake sturgeon	*Acipenser fulvescens*	T/G3G4/S2	Confirmed	HV	Moderate	Great Lakes	Aquatic	N/A
						Rivers	Aquatic	N/A
						Mainstem streams	Aquatic	N/A
Beetle								
American burying beetle	*Nicrophorus americanus*	X/LE/SH/G2G3	**Unconfirmed**	N/A	N/A	Dry-mesic prairie	Upland open/semi-open	N/A
						Bur oak plains	Oak	Mid
						Mesic prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Mesic northern forest	Northern Hardwood	Late
Mullusks								
Elktoe	*Alasmidonta marginata*	SC/G4/S2S3	Confirmed	HV	Low	Mainstem streams	Aquatic	N/A
Slippershell mussel	*Alasmidonta viridis*	T/G4G5/S2S3	Confirmed	EV	Low	Headwater Stream	Aquatic	N/A
						Mainstem streams	Aquatic	N/A
						Inland lake	Aquatic	N/A
Black sandshell	*Ligumia recta*	E/G5/SNR	Confirmed	?	?	Unknown		
Hickorynut	*Obovaria olivaria*	E/G4/S2S3	Confirmed	MV	Low	Rivers	Aquatic	N/A
Round pigtoe	*Pleurobema sintoxia*	SC/G4G5/S2S3	Confirmed	HV	Low	Mainstem streams	Aquatic	N/A
						Rivers	Aquatic	N/A
Plant								
Western mugwort	*Artemisia ludoviciana*	T/G5/S1	Confirmed			Oak barrens	Oak	Mid
						Oak-pine barrens	Oak	Mid
						Hillside prairie	Upland open/semi-open	N/A
Dwarf milkweed	*Asclepias ovalifolia*	E/G5?/S1	Confirmed			Oak-pine barrens	Oak	Mid
						Dry northern forest	Jack Pine, Red Pine	Late
Cooper's milk vetch	*Astragalus neglectus*	SC/G4/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak barrens	Oak	Mid
						Boreal forest	Upland & Lowland Sp/F	Mid
						Hillside prairie	Upland open/semi-open	N/A
						Lakeplain oak openings	Upland open/semi-open	
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
Richardson's sedge	*Carex richardsonii*	SC/G4/S3S4	Confirmed			Alvar	Upland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Dry-mesic prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Hillside prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
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
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
Vasey's rush	*Juncus vaseyi*	T/G5?/S1S2	Confirmed			Intermittent wetland	Lowland open/semi-open	N/A
						Lakeplain wet prairie	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
Torrey's bulrush	*Scripus torreyi*	SC/G5?/S2S3	Confirmed			Intermittent wetland	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

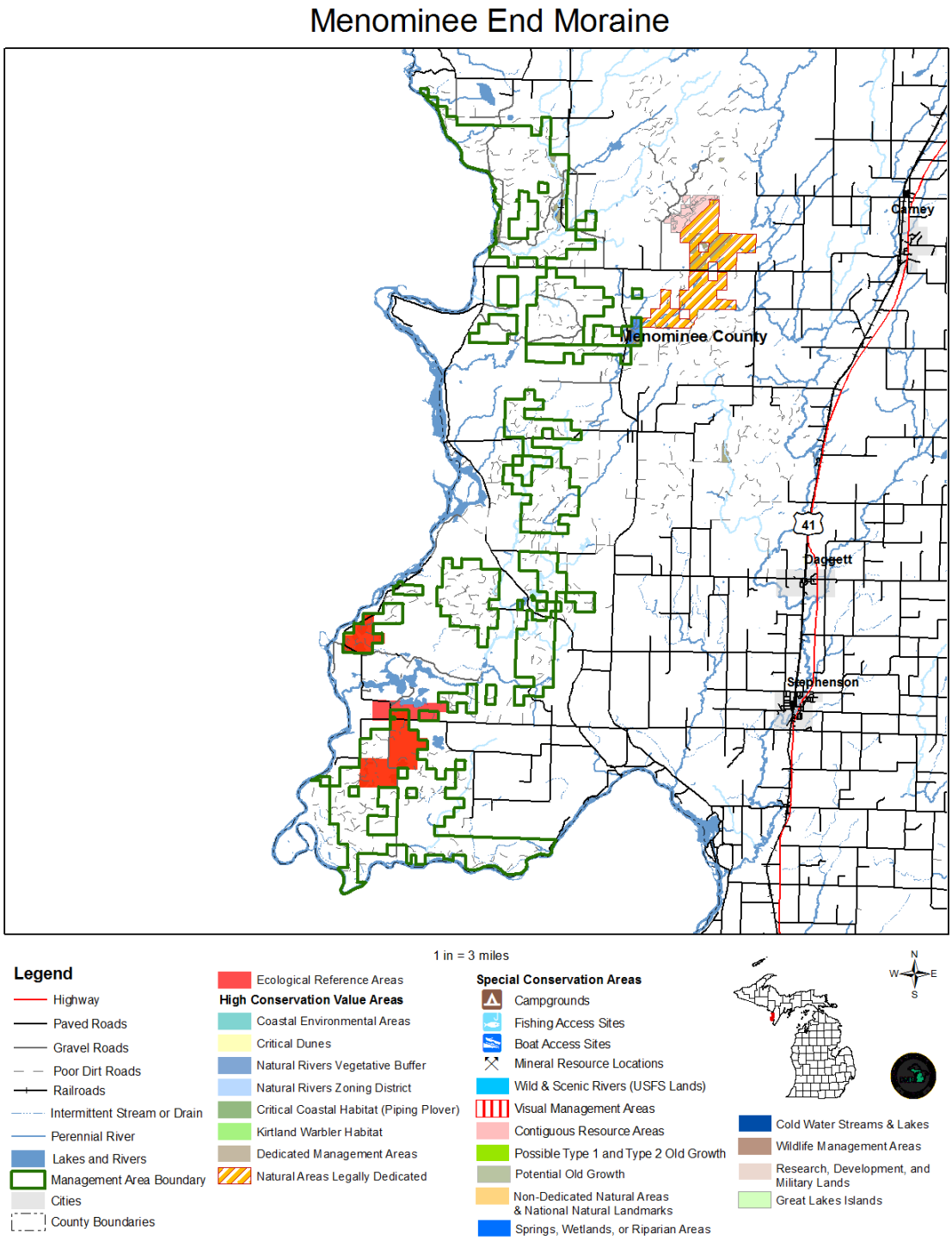

Figure 4.20.7. A map of the Menominee End Moraine management area showing the special resource areas.

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.
Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.20.4 – 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
- Two-lined chestnut borer
- Oak wilt.

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. Following is a list of species of concern that been documented in or near this management area:

- St. Johns-wort
- Common mullein
- Leafy spurge
- Spotted knapweed
- Giant hogweed.

4.20.5 – 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 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 are shown in Figure 4.20.1.

4.20.6 – Fire Management

Primarily a mixture of barrens, dry and dry mesic northern forests with imbedded wetlands, this area was adapted to periodic stand replacement fires, with the shortest fire return intervals at the south end.

- All wildfires within the management area will be subject to appropriate initial attack response.
- Included in this area is the Shakey Lakes Zone Dispatch area. Initial attack is pre-planned, based on fire danger level, calling for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.
- The county park at Shakey Lakes, as well as several campgrounds and public access sites along the Menominee River provide numerous opportunities for emphasizing prevention of fires from outdoor recreation activities in the area.
- Properties along the Menominee River and between G-12, CR 356 and the river should be provided with information about Firewise practices and the risks wildland fire poses to their property.
- Maintenance of the oak type and barrens community on state forestland will require practices to discourage aspen and maple reproduction after harvests. Silvicultural systems should incorporate intermediate treatments to discourage advanced maple reproduction and post-harvest practices to both encourage oak seedling sprouting and discourage aspen/maple reproduction.
- Within the zone dispatch area, slash fuel loads may pose ignition potential and control problems. Post-harvest loads should be evaluated and fuel reduction needs coordinated with other prescribed fire needs.

4.20.7 – Public Access and Recreation

This area has good public and management access. There are a number of good quality roads that provide access into a large portion of the state forest land. The department maintains five boating access sites on state forest lands. Three access sites on the Menominee River, one access site on Lake Mary and one that accesses Lake Ann.

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

4.20.8 – 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 end moraines of coarse and medium-textured tills, glacial outwash sand and gravel and postglacial alluvium and peat and muck. The glacial drift thickness varies between 10 and 100 feet. Sand and gravel pits are located in the management area and there is good potential for additional pits for additional pits.

The Cambrian Trempealeau Formation and Munising Group and Precambrian Quinnesec Formation and Intrusives subcrop below the glacial drift. There is not a current economic use for these rocks.

The “Back Forty” exploration area is located in this management area and state lands are leased. Additional metallic mineral exploration and leasing has occurred in the management area in the past and there may be additional potential.

4.21 Michigamme Reservoir Management Area

Summary of Use and Management

Vegetative management in the Michigamme Reservoir management area (MA) (Figure 4.21.1) 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 address the habitat requirements identified for the following featured species: American woodcock, black bear, pileated woodpecker, northern goshawk, ruffed grouse and white-tailed deer. 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 Michigamme Reservoir management area is on a disintegration moraine in eastern Iron County. The state forest covers 37,592 acres and is in scattered blocks. The major ownerships in this vicinity are forest industry and non-industrial private. The management area is dominated by aspen, northern hardwood and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: mesic northern forest and poor conifer swamp;
- 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 Michigamme Reservoir management area are shown in Table 4.21.1.

Table 4.21.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Michigamme Reservoir 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	49%	18,239	1,058	17,181	2,988	0	18,239	2,867	0
Northern Hardwood	16%	6,181	119	6062	0	2,975	6,181	0	2,975
Lowland Conifers	10%	3,910	2,049	1861	207	0	3,910	207	0
Upland Open/Semi-Open Lands	1%	319	0	319	0	0	319	0	0
Lowland Open/Semi-Open Lands	8%	2,841	0	2841	0	0	2,841	0	0
Misc Other (Water, Local, Urban)	2%	838	0	838	0	0	838	0	0
Others	14%	5,264	1,898	3366	461	354	5,264	339	438
Total		37,592	5,125	32,467	3,655	3,329	37,592	3,413	3,413

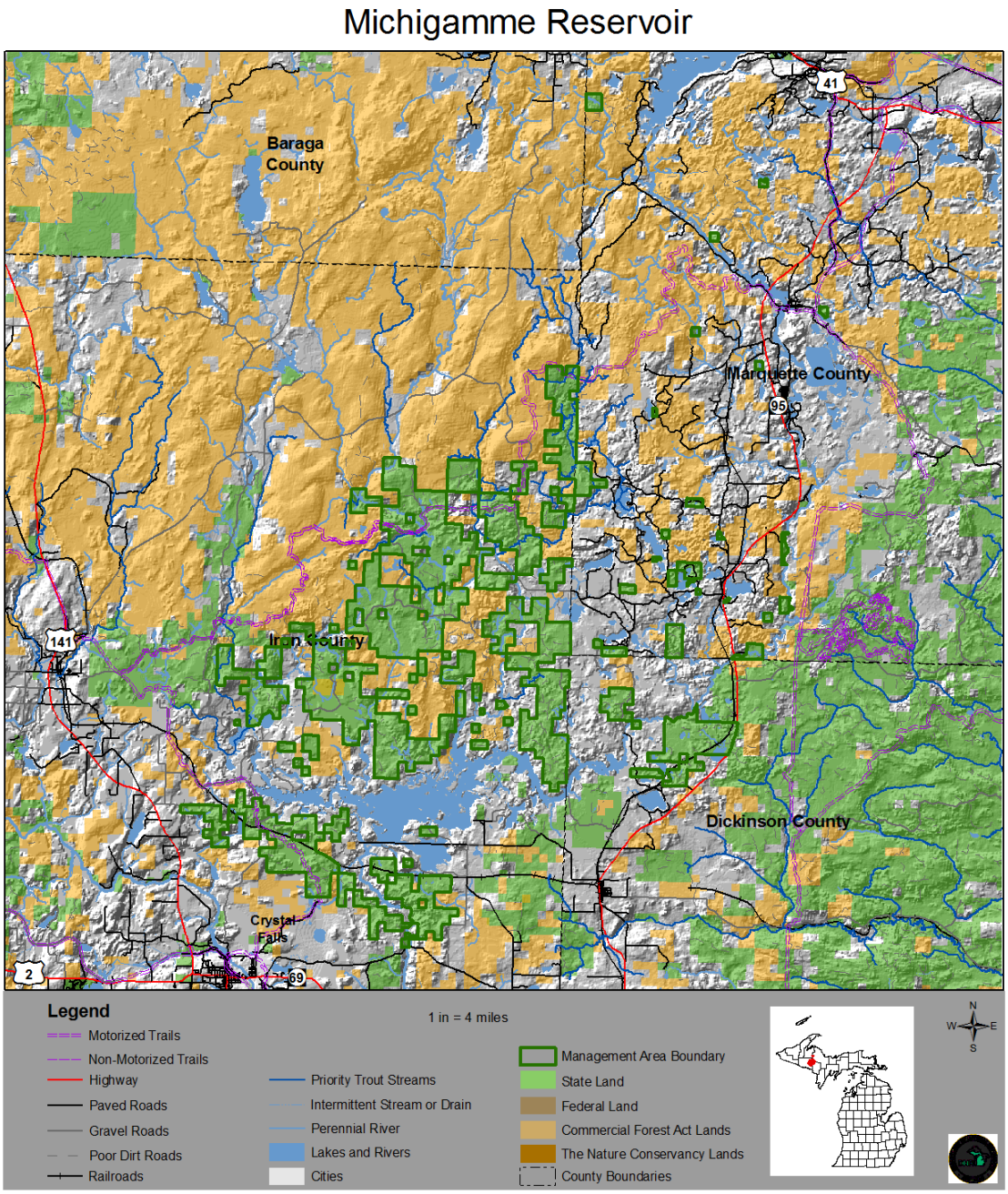

Figure 4.21.1. A map of the Michigamme Reservoir management area (dark green boundary) in relation to surrounding state forest and other land in Iron County, Michigan.

4.21.1 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 Michigamme Reservoir 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 18,239 acres (49%) of this management area are (Table 4.21.1). Aspen is relatively well distributed across age classes with a spike occurring in the 20-29 year age class. Few acres of aspen have limiting factors on them. Many of these limited factor acres will succeed to upland spruce/fir.

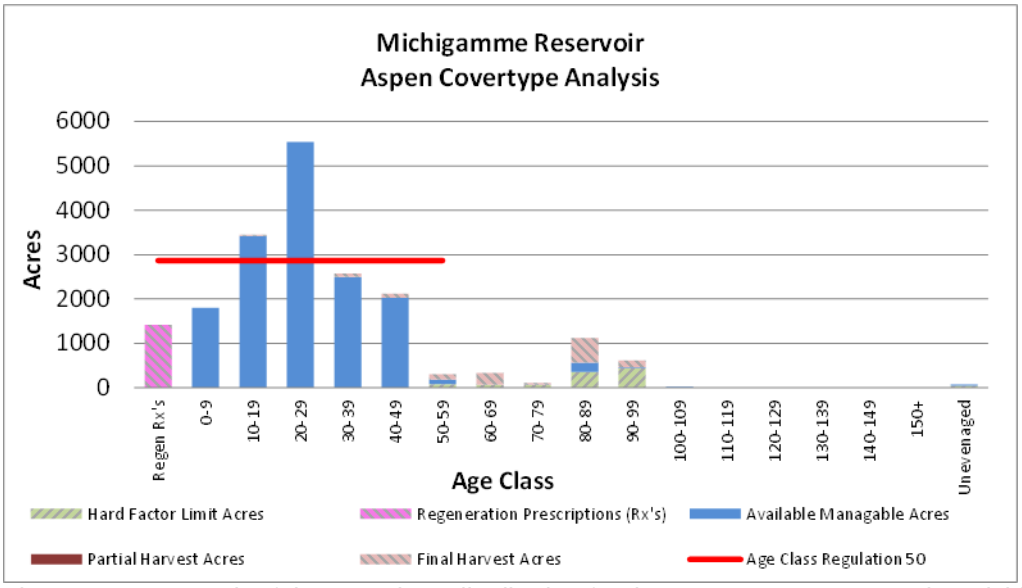

Figure 4.21.2. Graph of the age-class distribution for the aspen cover type on the Michigamme Reservoir management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class using a 50-year rotation; and
- Provide an even supply of forest products.

Long-Term Management Objective

- Harvest and regenerate aspen stands using a 50-year rotation length leading to the regeneration of approximately 2,867 acres each decade.

10-Year Management Objectives

- Over the next 10 years, few acres over the age of 50 will be available for harvest. Identify some of the younger aspen on better sites that could be available for early harvest; and
- Two-aged stands with mature aspen over younger stands should be identified as well and scheduled for harvest.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up about 6,181 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.

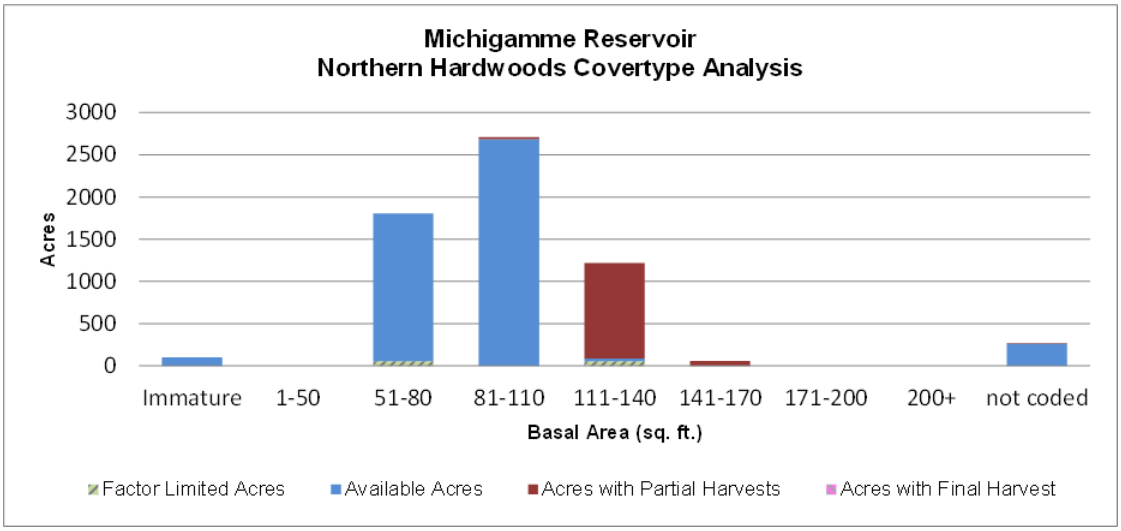

Figure 4.21.3. Graph of the basal area distribution for the northern hardwood cover type on the Michigamme Reservoir management area (2012 Department of Natural Resources inventory data).

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, selectively harvest stands on a 20-year cutting cycle to promote high-value sugar maple sawlogs resulting in a harvest of 2,975 acres each decade;
- Provide a full complement of tree seedlings recruiting into the overstory;
- Provide well-developed shrub and herbaceous layers; and
- Work to increase hardwood regeneration through the use of scarification and herbicide.

10-Year Management Objectives

- Selectively harvest 2,975 acres during this 10-year planning period;
- Maintain white pine, hemlock, oak and upland cedar where they occur in stands that are cut; and
- Monitor hardwood regeneration.

Lowland Conifers Cover Type

Current Condition

Lowland conifers cover 3,910 acres (10%) in this management area. These are poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Mixed lowland conifers are poorly distributed across age classes, spiking in the 80-89 year age classes (Figure 4.21.4). Little harvesting has been done in this type over the past 60 years.

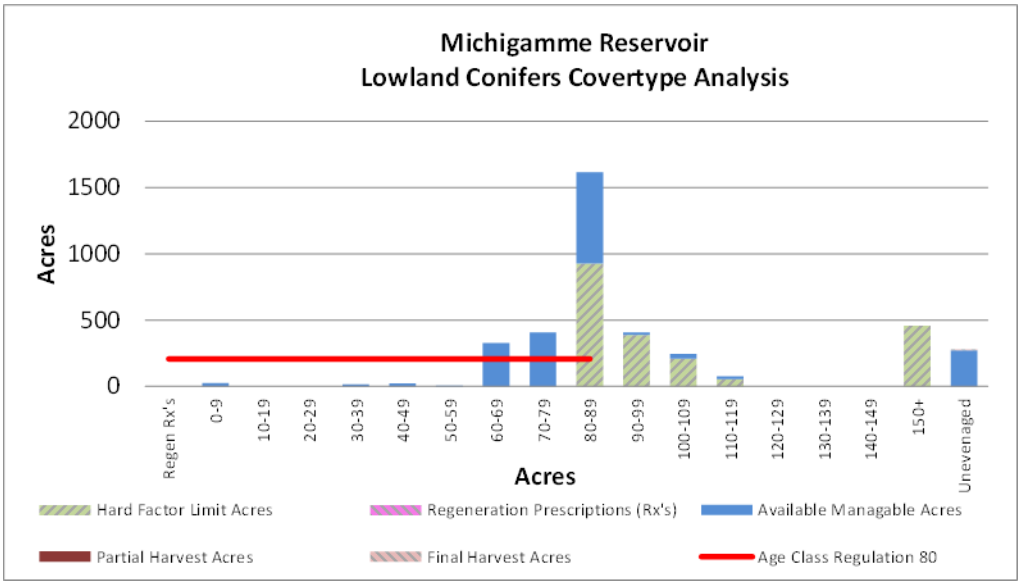

Figure 4.21.4. Graph of the age-class distribution for the lowland conifer cover type on the Michigamme Reservoir management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation, leading to the harvest of 207 acres each decade;
- Regenerate stands to species mixes similar to the pre-harvest conditions favoring cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 207 acres over this 10-year planning periods 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 5,264 acres and are made up of lowland spruce/fir (1,245 acres), upland spruce/fir (976 acres), cedar (926 acres), lowland deciduous (688 acres), upland mixed forest (288 acres), red pine (279 acres), white pine (256 acres), paper birch (210 acres), oak (74 acres), natural mixed pines (72 acres), upland conifers (72 acres), tamarack (55 acres), mixed upland deciduous(48 acres), lowland poplar (31 acres), hemlock (29 acres) and lowland mixed forest (15 acres). Together these types make up about 14% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 815 acres during this 10-year period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (319 acres – 1%), lowland open/semi-open lands (2,841 acres – 8%) and miscellaneous other (water, local, urban) (838 acres – 2%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.21.2 – Featured Wildlife Species Management

The main feature in the Michigamme Reservoir management area is a large reservoir complex maintained for hydro electrical power production by Wisconsin Electric. The Deerfoot Lodge deer wintering complex makes up a large part of the state forest lands in the management area and is one of the most important wintering areas in Iron County. Every effort should be made to protect lowland conifer stands and enhance upland conifer in hardwood stands. It is desirable to distribute aspen cover types in 6-8 age classes present in equal acreages to provide multiple benefits to a wide variety of species, including wintering deer. The primary focus of wildlife habitat management in the Michigamme Reservoir management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, pileated woodpecker, northern goshawk, ruffed grouse and white-tailed deer. Some of the most significant wildlife management issues in the management area are: deer wintering complex; mast (hard and soft); habitat fragmentation; coarse woody debris; early successional forest; mature forest; and retention or development of large living and dead standing trees (for cavities). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on balancing the age-class distribution and provision of display, feeding, nesting and brood-rearing habitat via upland brush, opening and poorly stocked stand management.

Wildlife habitat specifications:

- Maintain aspen cover types within the management area, especially where associated with alder, riparian zones, or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

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 and 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.

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches in diameter breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: Leave scattered retention patches around some 18 inches in diameter breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18" diameter breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease or fire within the same cover type and age class (within the compartment, management area or WUP ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.

- Provide fall foods in the form of hard and soft mast and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.21.3 – 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, 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 4.21.2. 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 Michigamme Reservoir Flooding is a state wildlife management area and is a special conservation area within this management area as shown in Figure 4.21.5.

Approximately 284.4 acres of potential old growth have been identified within the Michigamme Reservoir 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.

Table 4.21.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Michigamme Reservoir 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								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Plant								
Alternate-leaved water-milfoil	*Myriophyllum alterniflorum*	SC/G5/S2S3	Confirmed			Submergent marsh	Lowland open/semi-open	N/A
						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

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.21.5.

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.

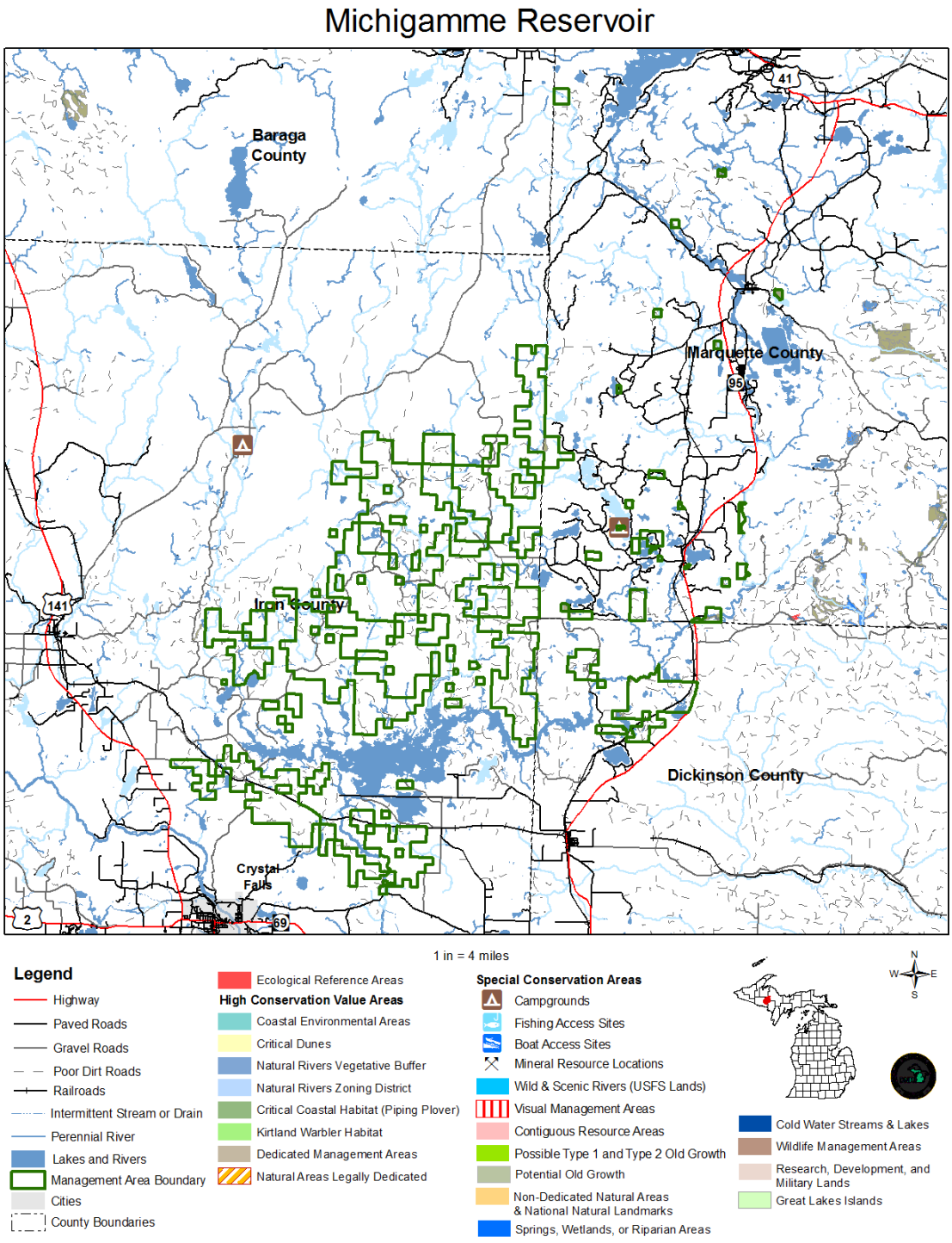

Figure 4.21.5. A map of the Michigamme Reservoir management area showing the special resource areas.

4.21.4 – 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
- Spruce budworm
- Emerald ash borer

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. Following is a list of species of concern that been documented in or near this management area:

- Common buckthorn
- Japanese barberry
- Japanese knotweed

4.21.5 – 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 are shown in Figure 4.21.1.

4.21.6 – Fire Management

Mixtures of wetland communities in a matrix of mesic hardwoods produced long fire return intervals for much of the area. Significant areas on southeast side of the management area probably supported dry-mesic pine communities with somewhat shorter fire return intervals.

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

4.21.7 – Public Access and Recreation

This area has fair public and management access. Two state forest campgrounds are located in this area at Squaw Lake and Horseshoe Lake; both have boating access sites located with them. Additional access sites are located on Lake Edey, Lake Ellen and Silver Lake.

- Maintain current management and public access.

4.21.8 – 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 end moraines of coarse-textured till, coarse-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 for additional pits.

The Precambrian Michigamme and Hemlock Formations, Randville Dolomite, Archean Granite/Gneiss and Intrusives subcrop below the glacial drift. The Granite/Gneiss sometimes could be used as dimension stone.

Old iron mines are located to the south and north of this management area. Metallic mineral exploration has occurred in the management area in the past and there may be additional potential.

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

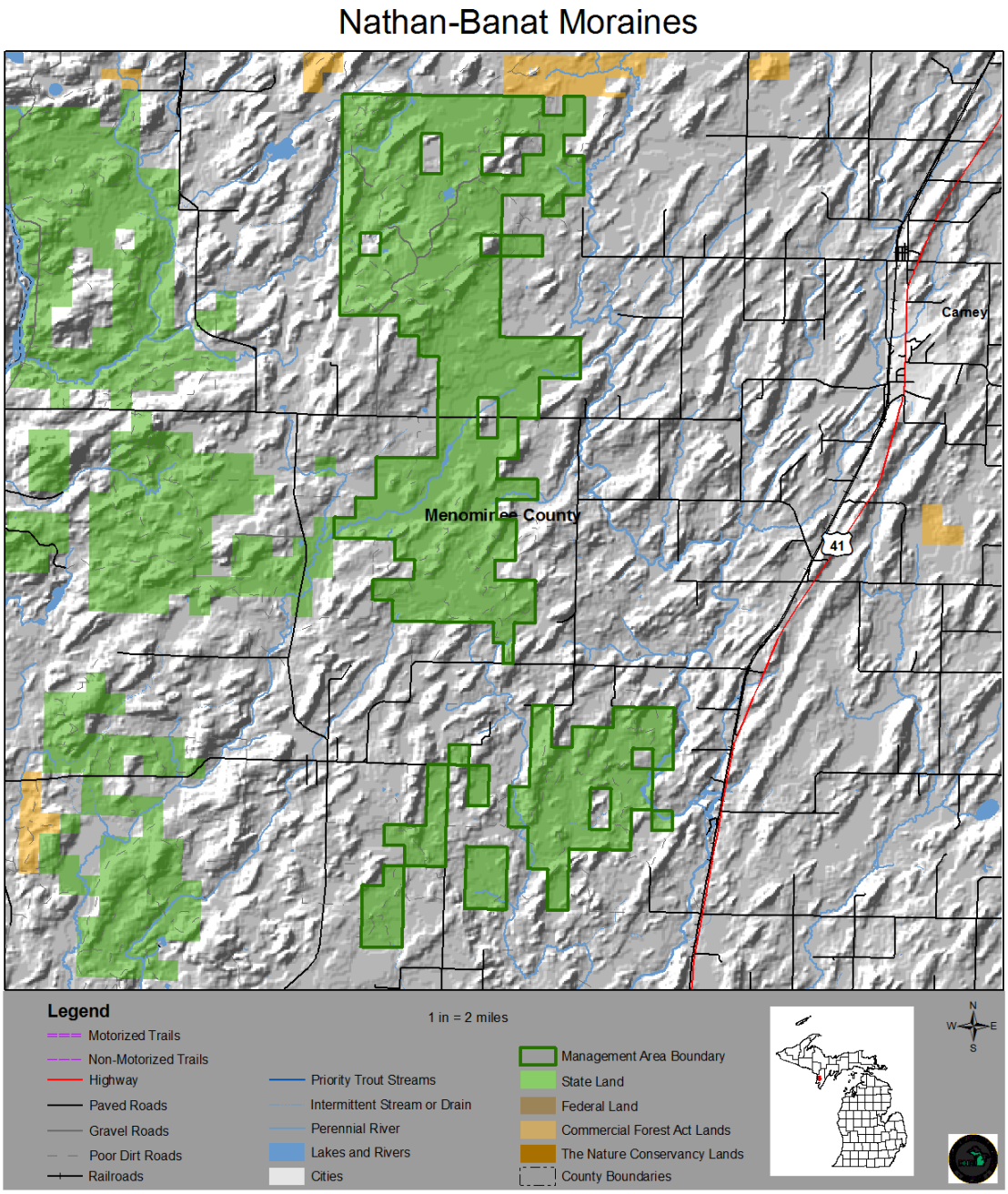

Figure 4.22.1. A map of the Nathan/Banat Moraines management area (dark green boundary) in relation to surrounding state forest and other land in Menominee County, Michigan.

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.

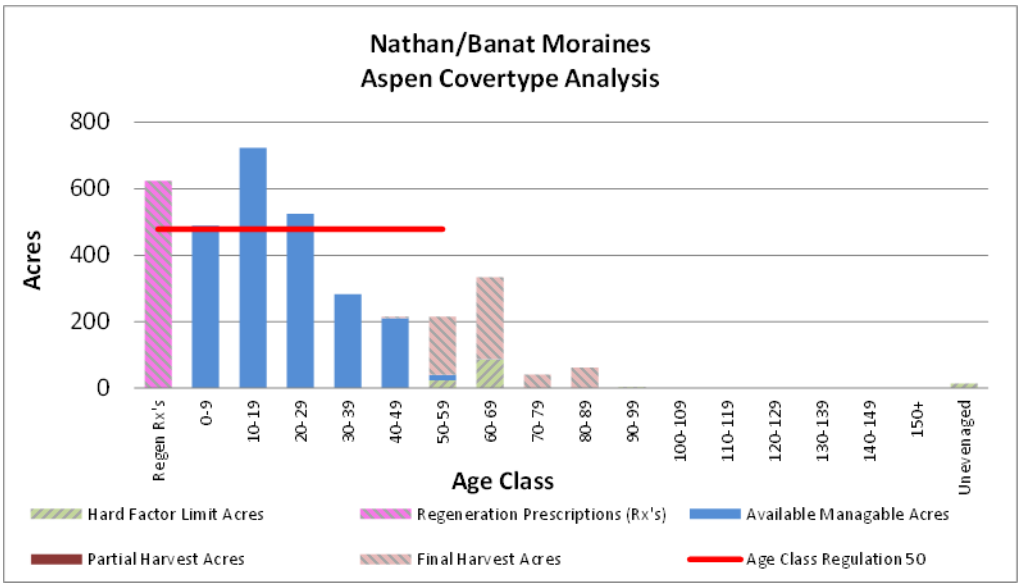

Figure 4.22.2. Graph of the age-class distribution for the aspen cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

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.

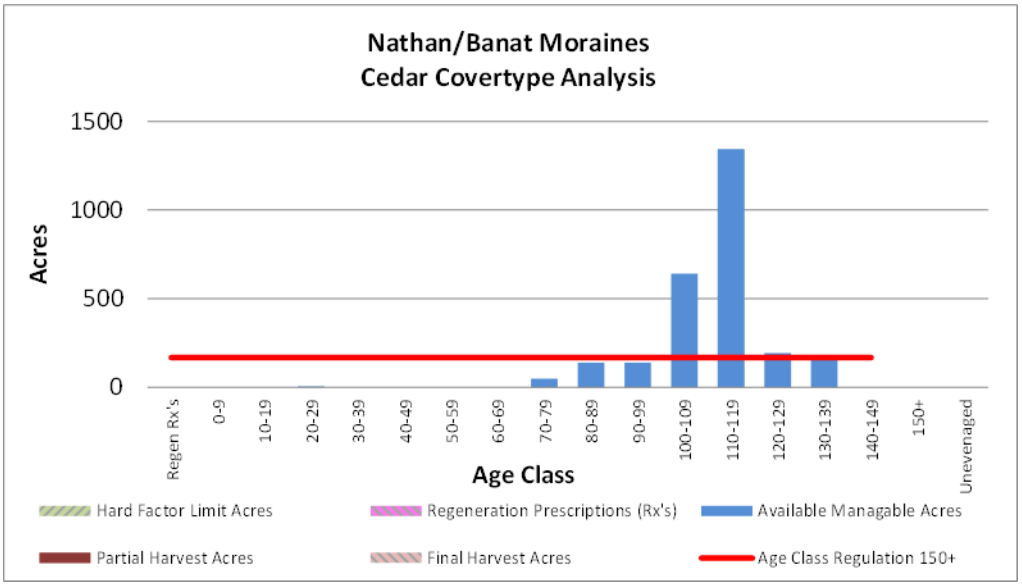

Figure 4.22.3. Graph of the age-class distribution for the cedar cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

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.

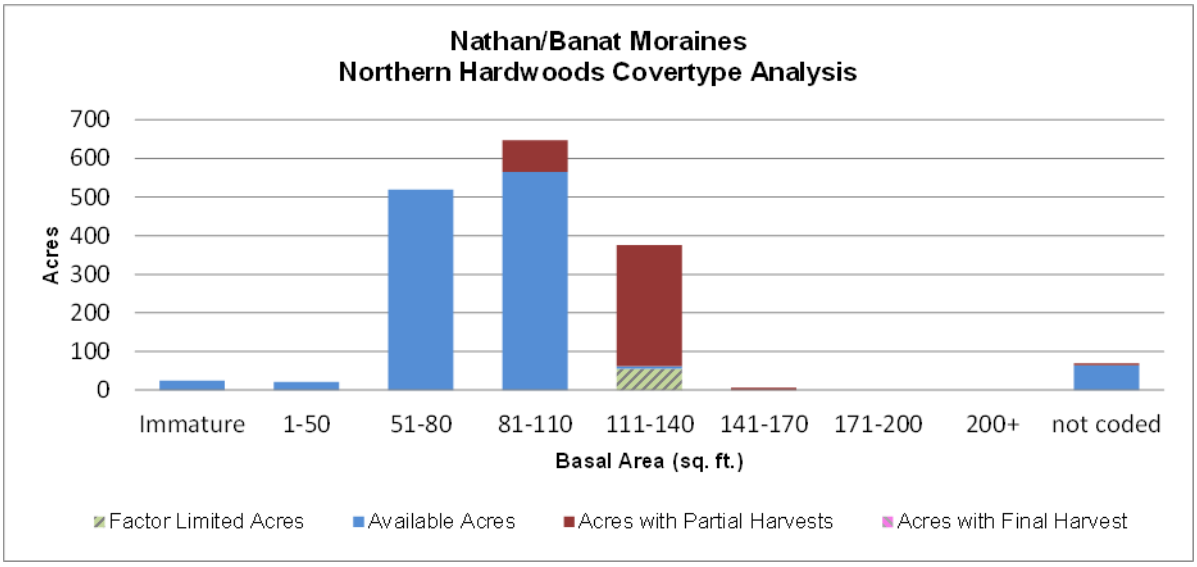

Figure 4.22.4. Graph of the basal area distribution for the northern hardwood cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

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.

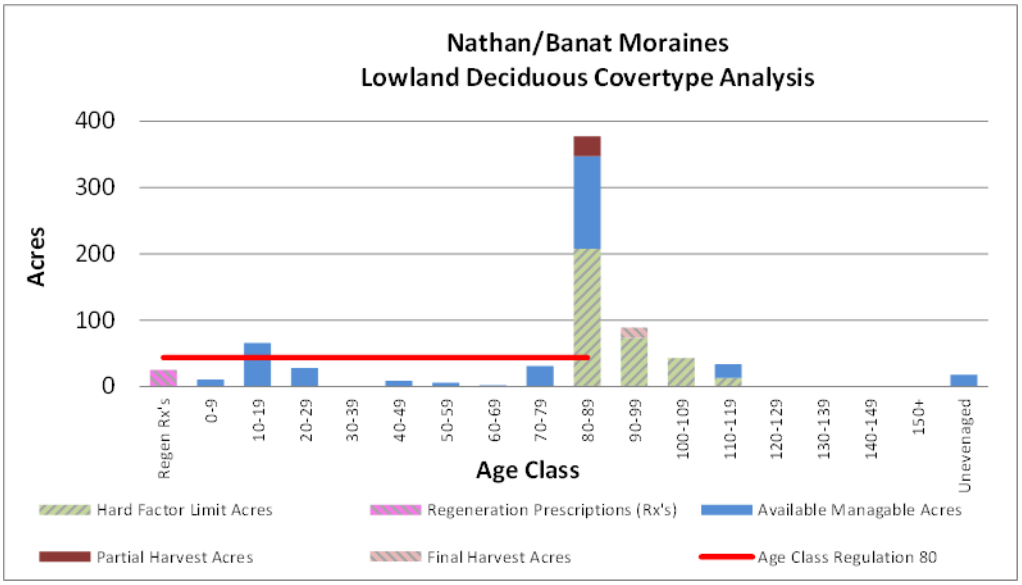

Figure 4.22.5. Graph of the age-class distribution for the lowland deciduous cover type on the Nathan/Banat Moraines management area (2012 Department of Natural Resources inventory data).

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

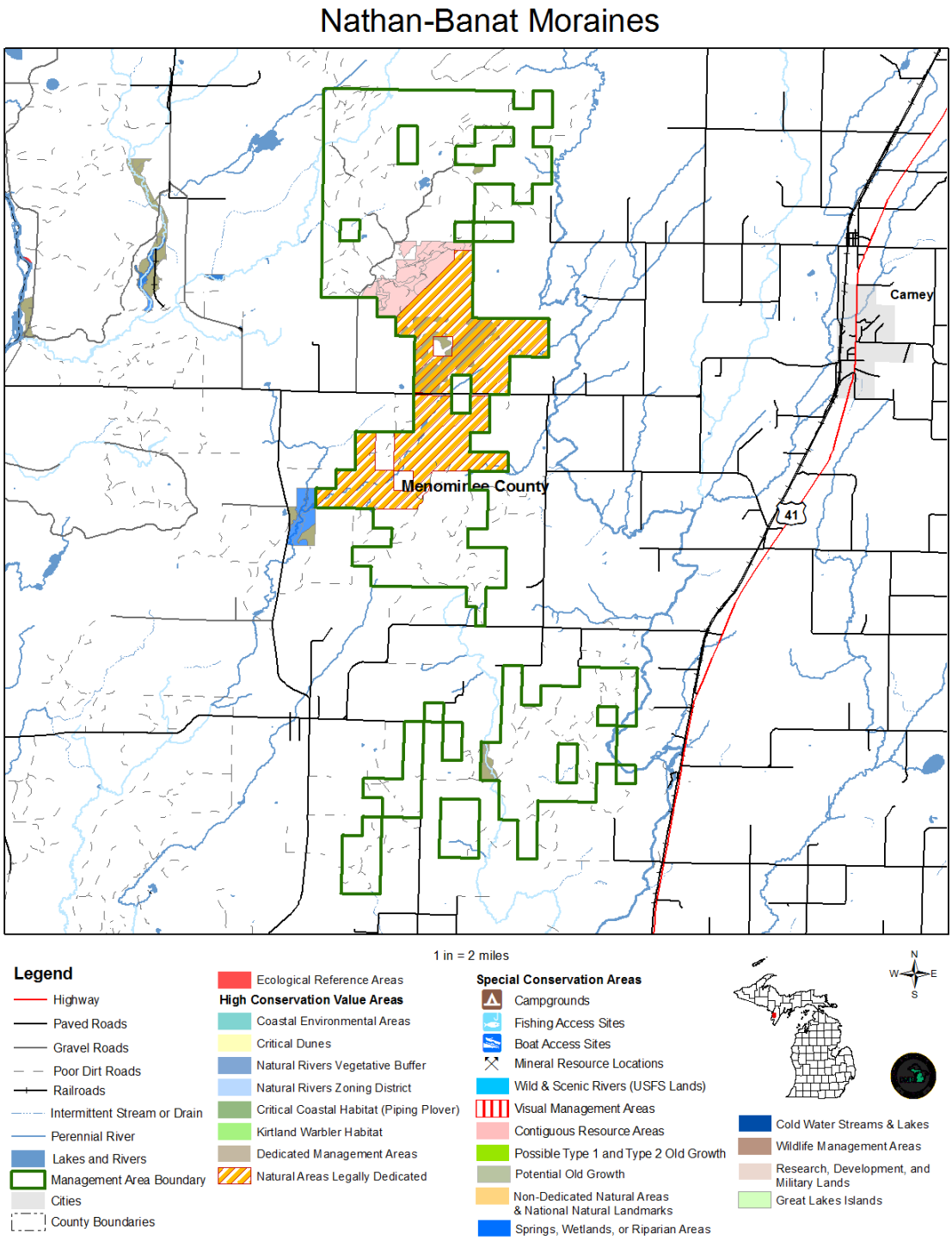

Figure 4.22.6. A map of the Nathan-Banat Moraines management area showing the special resource areas.

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.

4.23 Net River Management Area

Summary of Use and Management

Vegetative management in the Net River management area (MA) (Figure 4.23.1) 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: American woodcock, American marten, black bear, moose, white-tailed deer and wood duck. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Net River management area is on a drumlinized ground moraine in central Iron County. The state forest covers 14,355 acres in scattered small parcels. The major ownership in this vicinity is forest industry. The management area is dominated by the northern hardwood, aspen and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: mesic northern forest and poor conifer swamp;
- Mid-range in site quality;
- This is a popular hunting and recreation area near the community of Crystal Falls;
- Most of the state forest parcels in this area have frontage or are within a mile of the Net or Paint Rivers;
- 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 Net River management area are shown in Table 4.23.1.

Table 4.23.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Net River 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
Northern Hardwood	26%	3,686	81	3,605	0	1,743	3,686	0	1,795
Aspen	25%	3,627	130	3497	511	0	3,627	583	0
Lowland Conifers	13%	1,863	562	1301	144	0	1,863	144	0
Upland Spruce/Fir	8%	1,159	542	617	0	0	1,159	88	0
Upland Open/Semi-Open Lands	2%	238	0	238	0	0	238	0	0
Lowland Open/Semi-Open Lands	13%	1,825	0	1825	0	0	1,825	0	0
Misc Other (Water, Local, Urban)	2%	325	1	324	0	0	325	0	0
Others	11%	1,632	452	1180	207	222	1,632	111	222
Total		14,355	1,768	12,587	862	1,965	14,355	926	2,017

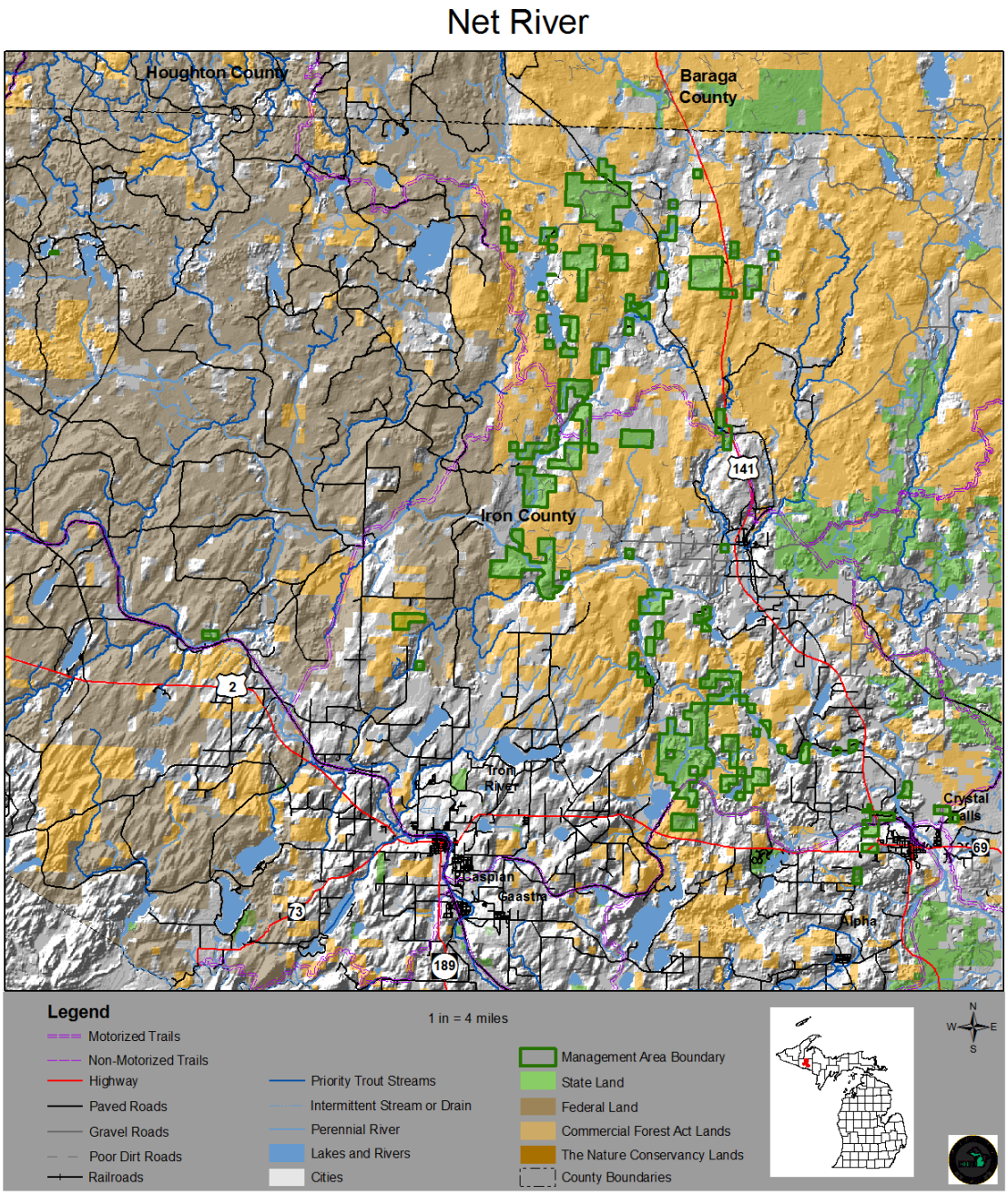

Figure 4.23.1. A map of the Net River management area (dark green boundary) in relation to surrounding state forest and other land in Iron County, Michigan.

4.23.1 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 Net River 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 3,686 acres 26%) of this management area. They occur on medium-quality sugar maple sites. Most stands have been managed on a selection harvest basis and are in good condition. Recruitment of seedlings and saplings into larger size classes is generally not successful due to browse pressure. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

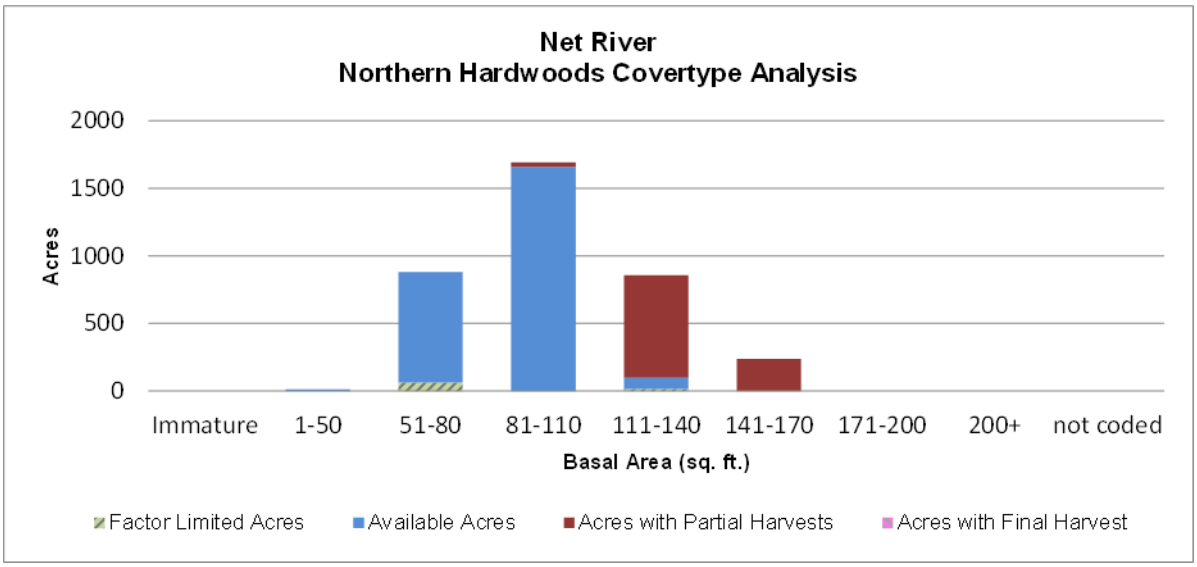

Figure 4.23.3. Graph of the basal area distribution for the northern hardwood cover type on the Net River management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objective

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle resulting in 1,795 acres harvested each decade.

10-Year Management Objectives

- Approximately 1,743 acres will be selectively cut 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; and
- Monitor hardwood regeneration.

Aspen Cover Type

Current Condition

The aspen cover type covers 3,627 acres (25%) of state forest land in this management area. Aspen is poorly distributed across age-classes spiking in the 10-19 and 20-29 year age classes and again in the 80-89 year age class. A few acres of aspen have limiting factors on them. Many of these acres will succeed to upland spruce/fir.

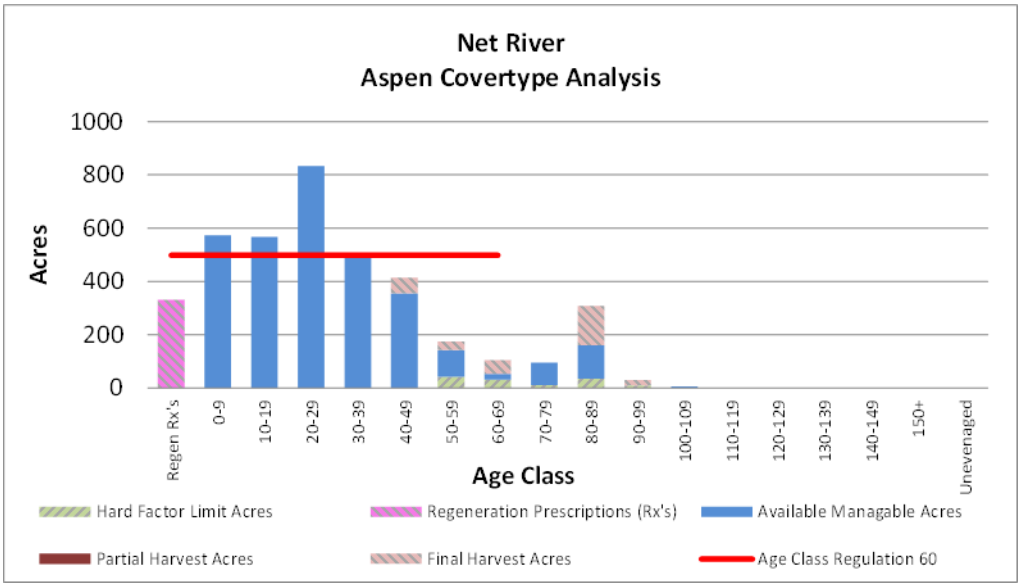

Figure 4.23.4. Graph of the age-class distribution for the aspen cover type on the Net River management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation (indicated by the red line in Figure 4.23.4);
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide a variety of hunting-type opportunities.

Long-Term Management Objectives

- Regenerate approximately 583 acres each decade;
- Opportunities to harvest in the spikes (above the red line) presently in the 20-29 year-old age class will be explored as these classes grow older and reach merchantable size; and
- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early.

10-Year Management Objectives

- Harvest and regenerate 511 acres over this 10-year planning period with much of this acreage coming from the 40-49 year and older age class; and
- As biomass markets improve opportunities to harvest from the 30-39 year-old age class will be explored.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 1,863 acres (13%) of the management area and occurs on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Mixed lowland conifers have poor age-class distribution, with most of the stands ranging between 70 and 109 years old. Most of these stands have a hard factor limit associated with them which makes them unavailable for harvesting this entry period. Little harvesting has been done in this type over the past 60 years.

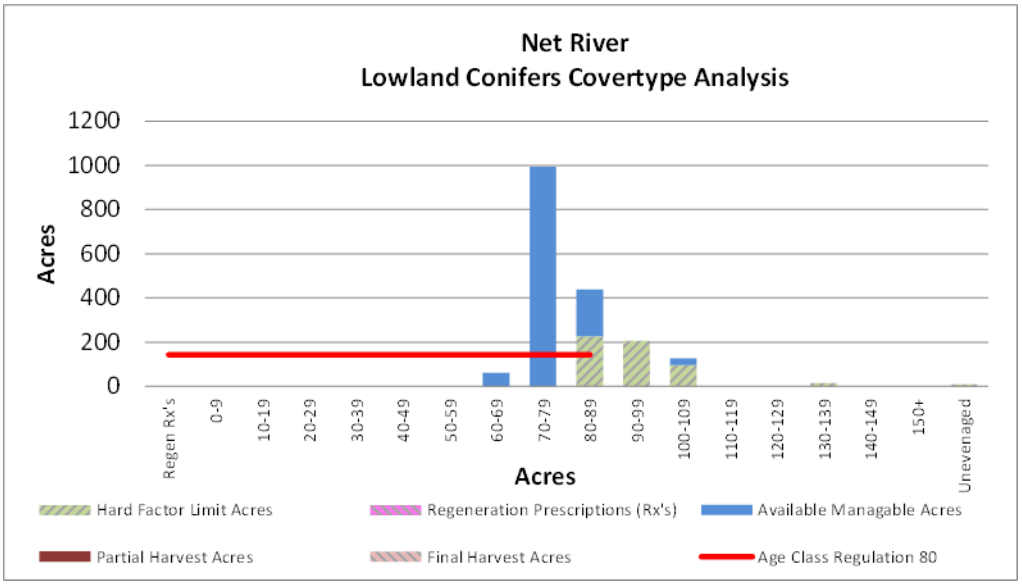

Figure 4.23.5. Graph of the age-class distribution for the lowland conifer cover type on the Net River management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage this cover type on an 80-year rotation, leading to harvesting 144 acres per decade in those stands without hard factor limits;
- Regenerate stands to a species-mix similar to the pre-harvest conditions with preference for cedar, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest about 144 acres during this 10-year planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Upland Spruce/Fir Cover Type

Current Condition

There are about 1,159 acres (8%) of upland spruce/fir on this management area. Many of the stands have factor limits that preclude harvest activities. Upland spruce/fir stands are generally short-lived reaching maturity in 60-70 years. Left unmanaged they may experience insect (spruce budworm) and/or windthrow mortality will be followed by natural regeneration of spruce/fir and/or aspen. Alternatively, they may succeed to shade tolerant hardwoods like red maple. Upland spruce/fir stands in this management area are unevenly distributed by age class. Upland spruce/fir typically occurs as small stands occupying the transition zone between larger upland types (aspen and northern hardwood) and lowlands.

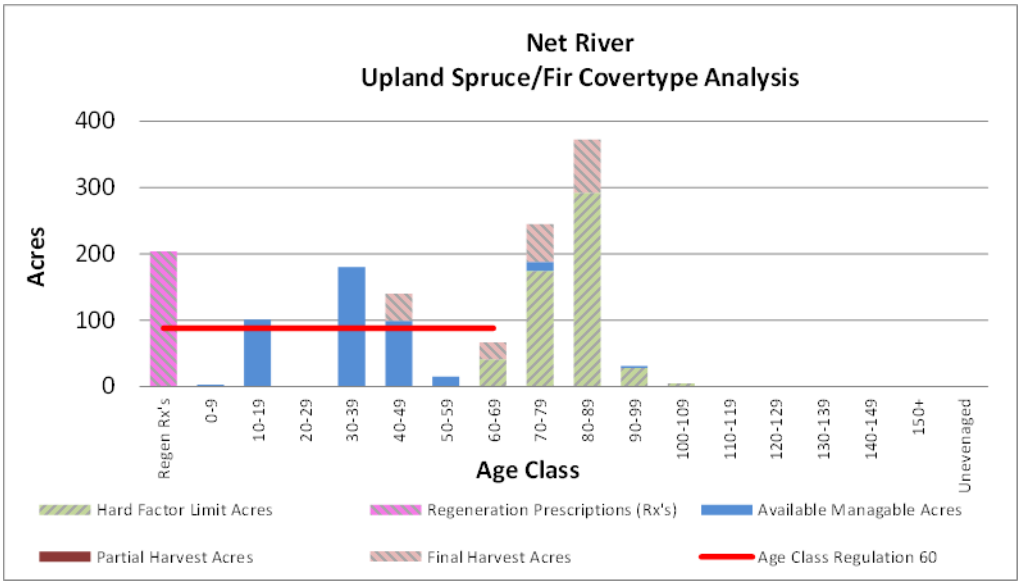

Figure 4.23.6. Graph of the age-class distribution for the upland spruce/fir cover type on the Net River management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 60-year rotation.

Long-Term Management Objective

- Harvest and regenerate upland spruce/fir stands on a sustainable basis using a 60-year rotation length, leading to harvesting 88 acres per decade in those stands without hard factor limits.

10-Year Management Objectives

- Harvest in this type for the next decade is expected to be about zero acres; and
- Evaluate the oldest stands with factor limits to determine which stands should be permanently withdrawn from timber production and which stands are only temporarily limited.

Other Forested Cover Types

Current Condition

Other forested types make up 1,632 acres and are made up of cedar (374 acres), lowland spruce/fir (342 acres), red pine (235 acres), upland mixed forest (200 acres), lowland deciduous (150 acres), tamarack (136 acres), white pine (73 acres), mixed upland deciduous (32 acres), natural mixed pines (32 acres), upland conifers (24 acres), paper birch (19 acres), hemlock (12 acres) and oak (three acres). Together these types make up about 11% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 429 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (238 acres – 2%), lowland open/semi-open lands (1,825 acres – 13%) and miscellaneous other (water, local, urban) (325 acres – 2%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.23.2 – Featured Wildlife Species Management

The Net River management area contains the Cable – Porter deer wintering complex and portions of the Hemlock Rapids deer wintering complex. The lowland conifer stands in this management area should be managed for wintering deer and conifer should be promoted in the upland hardwood stands. This management area is the heart of western Upper Peninsula moose country due the spatial arrangement of lowlands and uplands and the provision of summer and winter thermal cover near aquatic feeding sites. The primary focus of wildlife habitat management in the Net River management area will be to address the habitat requirements identified for: American woodcock, American marten, black bear, moose, white-tailed deer and wood duck. Some of the most significant wildlife management issues in the management area are: habitat fragmentation; coarse woody debris; large living and dead standing trees (for cavities), especially near water; mesic conifer; mature forest (especially near water); mast (hard and soft); early successional forest (hardwood browse adjacent to closed canopy lowland conifer swamps); and deer wintering habitat. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on balancing the age-class distribution and provision of display, feeding, nesting and brood-rearing habitat via upland brush, opening and poorly stocked stand management.

Wildlife habitat specifications:

- Maintain aspen cover types within the management area, especially where associated with alder, riparian zones, or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blow down.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.
- Retain down coarse woody debris present before cutting and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Moose

The western Upper Peninsula goal for moose is to maintain or increase suitable habitat. Management for moose should focus on providing early successional browse adjacent to lowland conifer complexes, maintenance of hemlock within stands and maintaining or promoting willow, a valuable food source, along riparian and wetland edges.

Wildlife habitat specifications:

- Encourage early successional hardwood browse (in the 0-20 year age class) in close proximity to closed canopy lowland conifer swamps.
- Balance aspen age-class distribution to ensure a more sustainable supply of browse.
- Maintain or promote thermal refugia in harvested stands by retaining hemlock and other conifers.

- Increase mesic conifer (e.g., hemlock, white pine, non-plantation red pine, and upland spruce-fir) component on state forests by: a) Retaining mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source. Increase the percentage of mesic conifers, where suitable, across the landscape by 10% during this 10-year planning period.
- Willow is an important browse species, as are submergent and emergent aquatic vegetation associated with summer feeding areas. Ensure sustainable supplies of each.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast and provide dense escape cover or bedding areas in the form of early successional forests, brush, and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

Wood Duck

The western Upper Peninsula goal for wood duck is to maintain or increase suitable habitat. Management should focus on the protection of forest wetland, riparian corridors, providing large cavity trees, mast and the management of priority wildlife management areas with suitable habitat.

Wildlife habitat specifications:

- In landscapes that contain streams, beaver ponds and other potential habitat for wood ducks, provide potential nesting sites by providing mature forest (possibly special conservation area designations) and/or big-tree silviculture near water.
- Retain all large diameter over-mature cavity trees within 300 feet of water bodies for cavities in lowland and upland hardwoods. Where adjacent forest is young or cavities limited, nest trees should be promoted.
- Where appropriate, manage for mast in riparian areas.
- Increase potential riparian buffers to 300+ feet, where desired, instead of the standard 100 foot best management practice.

4.23.3 – Rare Species and Special Conservation 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, 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 six listed species and no natural communities of note occurring in the management area as listed in Table 4.23.2. 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.

Table 4.23.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Net River 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								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Dragonflies								
Rapids clubtail	*Gomphus quadricolor*	SC/G3G4/S2S3	Confirmed	PS	Very High	Headwater & Mainstem Streams	Aquatic	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
						Northern hardwood swamp	Black Ash	Late
						Emergent marsh	Lowland open/semi-open	N/A
						Great Lakes marsh	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Floodplain forest	Lowland mixed	Mid
						Mesic northern forest	Northern Hardwood	Late
Extra-striped snaketail	*Ophiogomphus anomalus*	SC/G4/S1	Confirmed	PS	Very High	Headwater & Mainstem Streams	Aquatic	N/A
Pygmy snaketail	*Ophiogomphus hineana*	T/G3/S1	Confirmed	PS	Very High	Inland lake	Aquatic	N/A
						Headwater & Mainstem Streams	Aquatic	N/A
						Alvar	Upland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Early
						Mesic northern forest	Northern Hardwood	Late

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

The Paint River is a wild and scenic river in this management area that is a special conservation area as shown in Figure 4.23.7.

Approximately 22.9 acres of potential old growth have been identified within the Net River 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.

There are no high conservation value areas ecological reference areas identified in this management area as indicated it Figure 4.23.7.

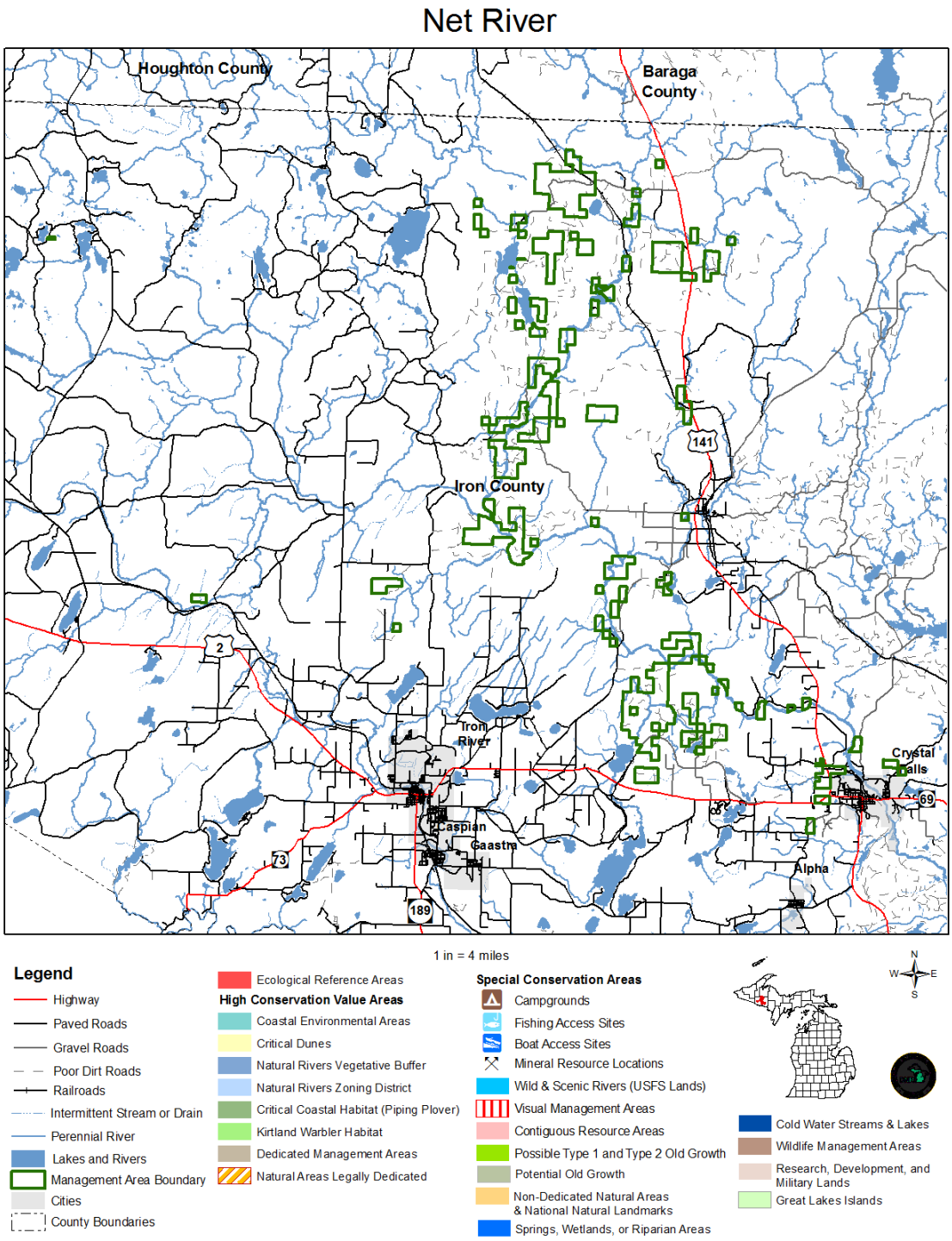

Figure 4.23.7. A map of the Net River management area showing the special resource areas.

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.

4.23.4 – Forest Health Management

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

- White trunk rot of aspen
- *Hypoxylon* canker
- Spruce budworm
- Emerald ash borer

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. Following is a list of species of concern that been documented in or near this management area:

- Bell's honeysuckle
- Canada thistle
- Common buckthorn
- Common St. John's-wort
- European swamp thistle
- Japanese barberry
- Japanese knotweed
- Morrow's honeysuckle
- Narrow-leaved cat-tail
- *Phragmites*
- Purple loosestrife
- Reed canary grass
- Spotted knapweed
- Tatarian honeysuckle

4.23.5 – 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 are shown in Figure 4.23.1.

4.23.6 – Fire Management

Dominated by mesic deciduous forests and wetland communities, fire return intervals were very long. Fire disturbance was probably not a significant factor in community development.

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

4.23.7 – Public Access and Recreation

This area has poor public and management access. General management access can be gained through private parcels on an as needed basis. Boating access sites are located on Cable Lake, Fire Lake, Long Lake and three sites along the Net/Paint river systems. Several snowmobile trails cross this area (Figure 4.23.1). No state forest campgrounds are located in this area.

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

4.23.8 – 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 an end moraine of coarse-textured till, coarse-textured till and glacial outwash sand and gravel and postglacial alluvium. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are located in the management area and there is good potential on the uplands for additional pits.

The Precambrian Dunn Creek and Michigamme Formations and Badwater Greenstone subcrop below the glacial drift. There is not a current economic use for these rocks.

Old iron mines are located to the east and south of the management area. Metallic mineral exploration has occurred in the management area in the past and there may be additional potential.

4.24 North Menominee Moraines Management Area

Summary of Use and Management

Vegetative management in the Northern Menominee Moraines management area (MA) (Figure 4.24.1) 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 and lowland conifer; 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: snowshoe hare and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (spruce budworm) outbreaks will be issues for this 10-year planning period.

Introduction

The North Menominee Moraines management area is on a drumlinized ground moraine in north Menominee and south Marquette Counties. The state forest covers 20,240 acres and is in scattered blocks. The major ownership in this vicinity is forest industry. The management area is dominated by the cedar, aspen and lowland conifer cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: poor conifer swamp and 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 North Menominee Moraines management area are shown in Table 4.24.1.

Table 4.24.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the North Menominee 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
Cedar	34%	6,903	48	6,855	0	0	6,903	428	0
Aspen	23%	4,730	545	4185	804	0	4,730	698	0
Lowland Conifers	9%	1,866	942	924	0	0	1,866	103	0
Northern Hardwood	8%	1,657	51	1606	0	730	1,657	0	739
Tamarack	6%	1,211	541	670	97	0	1,211	96	0
Lowland Spruce/Fir	4%	882	190	692	187	0	882	77	0
Upland Open/Semi-Open Lands	2%	313	0	313	0	0	313	0	0
Lowland Open/Semi-Open Lands	5%	1,103	0	1103	0	0	1,103	0	0
Misc Other (Water, Local, Urban)	1%	132	0	132	0	0	132	0	0
Others	7%	1,443	180	1263	211	92	1,443	163	109
Total		20,240	2,497	17,743	1,299	822	20,240	1,565	848

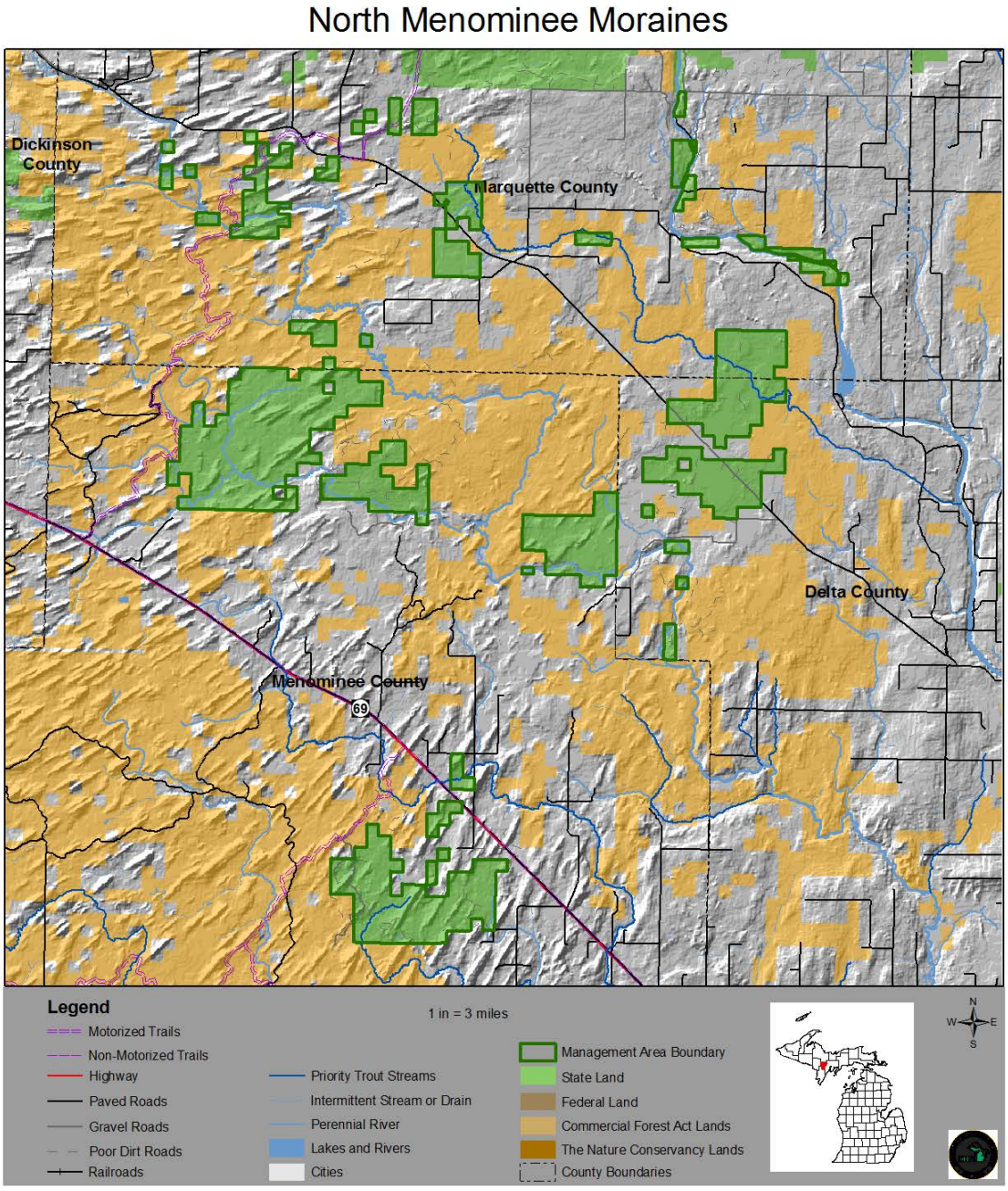

Figure 4.24.1. A map of the North Menominee Moraines management area (dark green boundary) in relation to surrounding state forest and other land in Menominee and Marquette Counties, Michigan.

4.24.1 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 North Menominee 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.

Cedar Cover Type

Current Condition

The cedar cover type covers 8,222 acres (34%) of the management area (Table 4.24.1). Cedar historically does not regenerate reliably especially in high deer population areas such as the North Menominee Moraines management area and this is well illustrated in Figure 4.24.2. The absence of any age-classes below 80-89 years indicates little harvesting has occurred in this type; largely due to regeneration challenges.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives

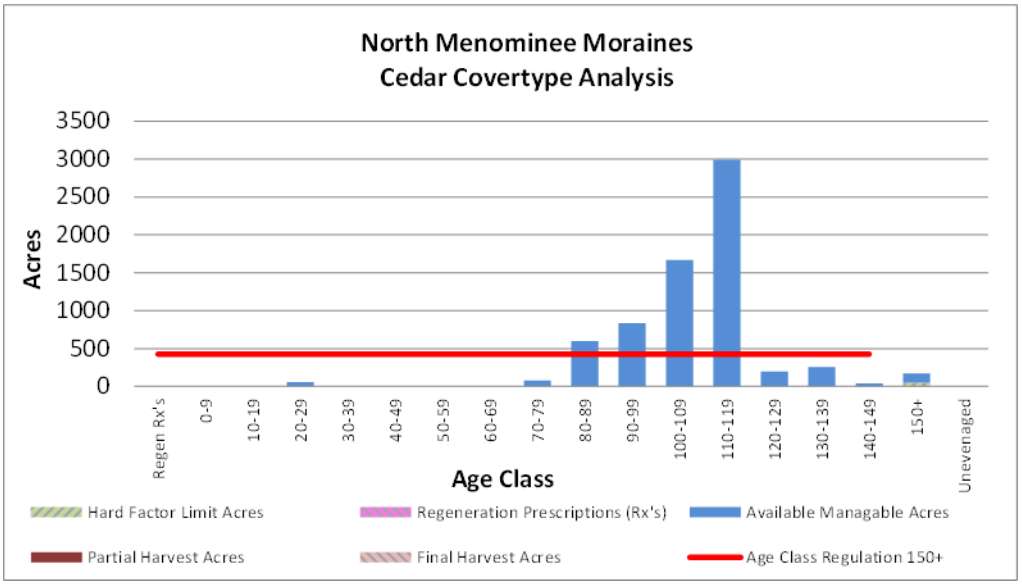

Figure 4.24.2. Graph of the age-class distribution for cedar on the North Menominee Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the cedar cover type at the current acreage level.

Long-Term Management Objective

- Explore techniques for regenerating the cedar cover type under high browsing pressure, ideally leading to harvesting 428 acres per decade.

10-Year Management Objective

- No harvests are planned for this area in the next decade; and
- 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.

Aspen Cover Type

Current Condition

The aspen cover type covers 4730 acres (23%) of the management area (Table 4.24.1) and is poorly distributed across age classes (Figure 4.24.4). Most of the age classes over the rotation age of 50 years (50-59 years on the graph) are in the hard factor limited category, partial harvest category or are part of a regeneration harvest. With an absence of aspen in the 40-49 year to 60-69 year old age classes, early entry into those age classes above the age-class regulation line is possible, but unlikely during the next 10-year period because aspen in these age classes in this management area are not of merchantable size.

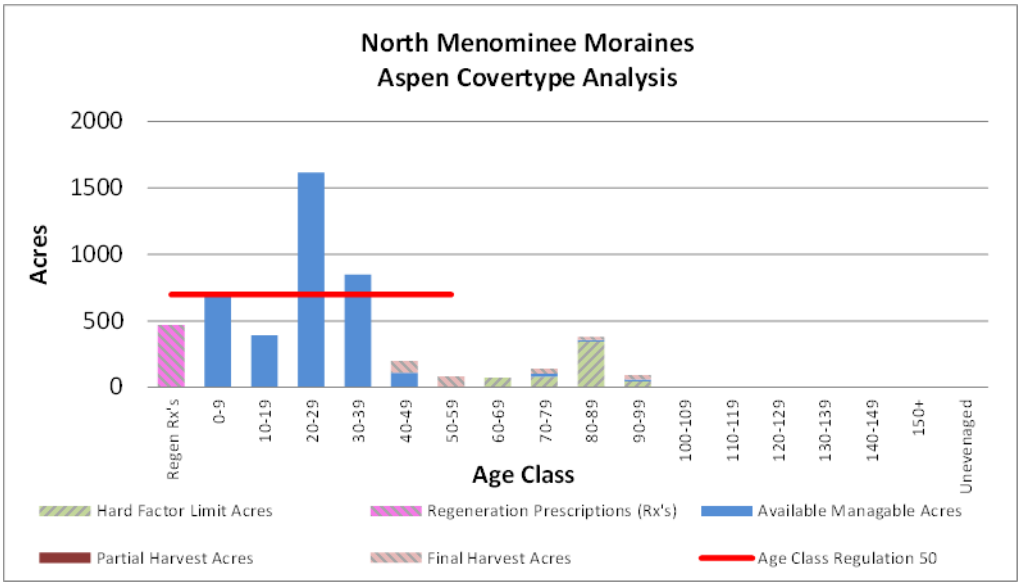

Figure 4.24.3. Graph of the age-class distribution for aspen on the North Menominee Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a50-year rotation (indicated by the red line in Figure 4.3.2);
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Once age classes are closer to balanced, harvest and regenerate approximately 698 acres each decade.

10-Year Management Objectives

- Due to the current age-class structure it will be challenging to harvest and regenerate 804 acres over this 10-year planning period;
- Opportunities to harvest in the spikes (above the red line in Figure 4.24.3) presently in the 20-29 and 30-39 year-old age classes will be explored as these classes grow older; and
- As biomass markets improve opportunities to harvest from the 30-39 year-old age class will be explored.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 1866 acres (9%) of the management area. These stands occur on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Mixed lowland conifers have poor age-class distribution, with most of the stands ranging between 80 and 119 years old (Figure 4.24.4). Most of these stands have a hard factor limit associated with them which makes them unavailable for harvesting this entry period. A significant amount harvesting has been done in this type over the past 10 years.

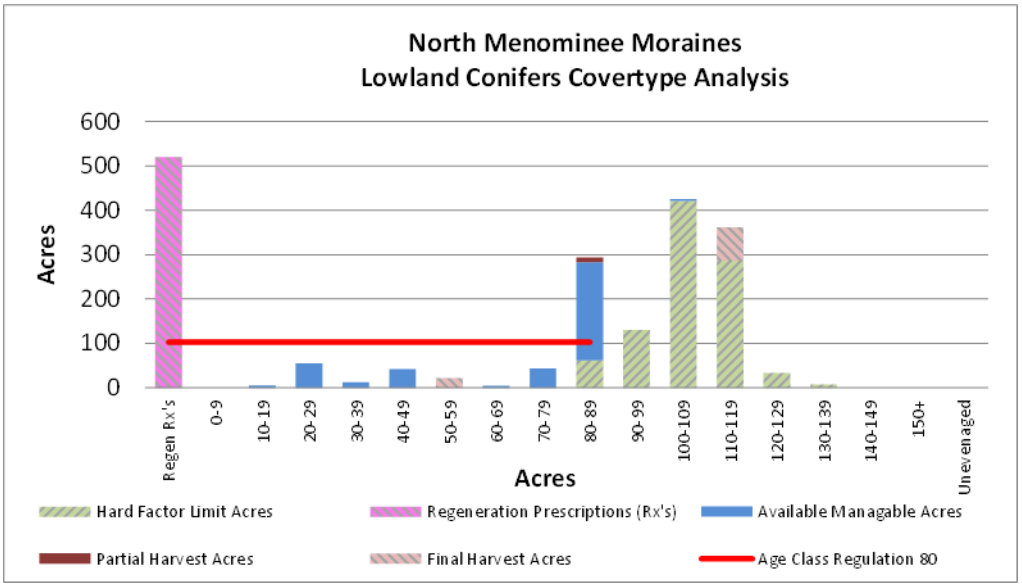

Figure 4.24.4. Graph of the age-class distribution for lowland conifer on the North Menominee Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Once age classes are balanced, manage this cover type on an 80-year rotation, leading to harvesting 103 acres per decade in those stands without hard factor limits; and
- Regenerate stands to a species-mix similar to the pre-harvest conditions favoring cedar, black spruce and balsam fir.

10-Year Management Objectives

- Harvest 103 acres during this 10-year planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.
- Most of the stands harvested should come from the 80 year-old age class and older.
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up about 1,657 acres (8%) of state forest land in this area. They occur on medium-quality sugar maple sites. Some stands have well-established sedge understories with little tree regeneration, shrub or herbaceous plant communities. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

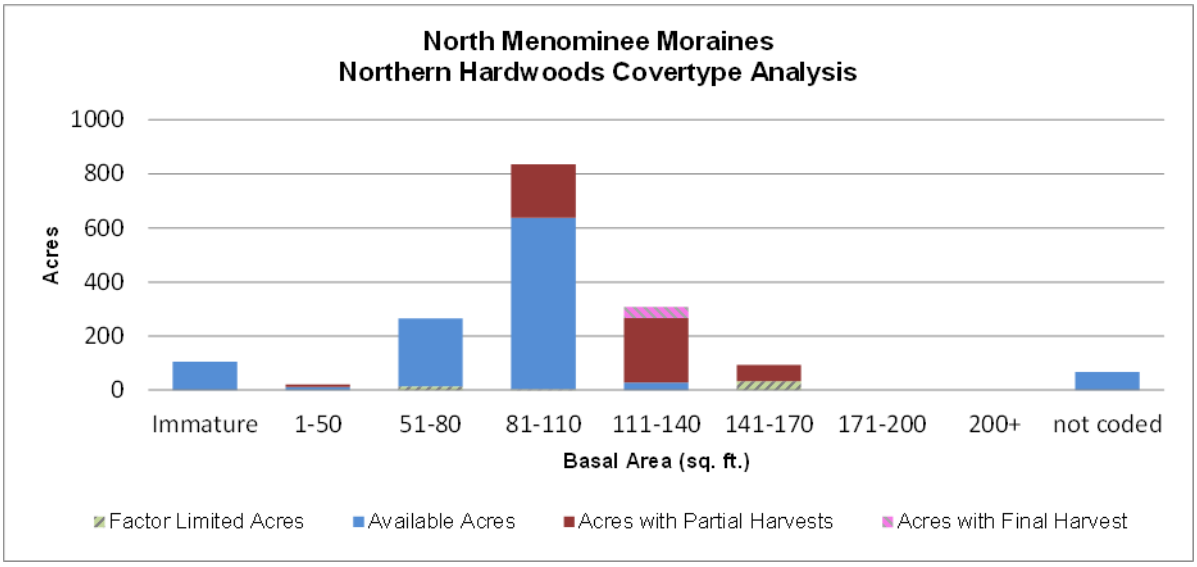

Figure 4.24.5. Graph of the basal area distribution for northern hardwood on the North Menominee Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year resulting in estimated harvest of 739 acres each decade; and
- Low quality hardwood stands will be managed on an even-aged system with an 80-year rotation.

10-Year Management Objectives

- Selectively harvest 730 acres during this 10-year planning period;
- Maintain and promote 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 where appropriate; and
- Monitor hardwood regeneration.

Tamarack Cover Type

Current Condition

Currently there are 1,211 acres (6%) of the tamarack type in the management area. Tamarack is often found in association with mixed lowland conifer, cedar and lowland spruce/fir types. Tamarack in this management area has a better balanced age-class distribution then most in the region.

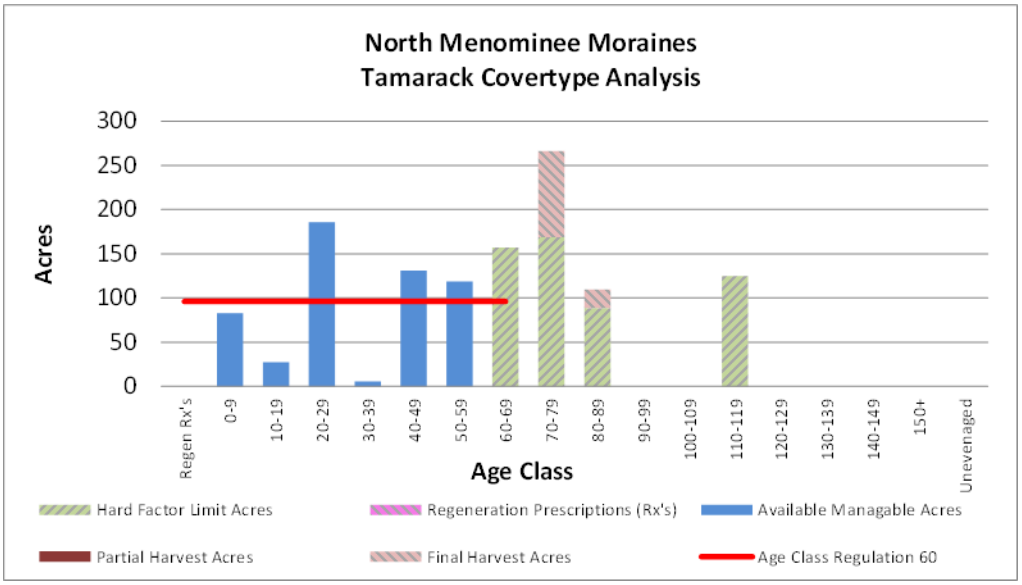

Figure 4.24.6. Graph of the age-class distribution for tamarack on the North Menominee Moraines management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objective

- Continue to work on age-class distribution, ultimately harvesting and regenerating the mature tamarack-type on a 60-year rotation resulting in 96 acres harvested each decade.

10-Year Management Objectives

- Harvest about 97 acres in this 10-year planning period; and
- More aggressive harvesting in this type maybe needed during this 10-year planning period to reduce mortality losses in the older stands.

Other Forested Cover Types

Current Condition

Other forested types make up 2,325 acres and are made up of lowland spruce/fir (882 acres), upland spruce/fir (307 acres), lowland poplar (259 acres), upland mixed deciduous (228 acres), paper birch (114 acres), upland conifers (108 acres), lowland deciduous (94 acres), lowland mixed forest (92 acres), hemlock (74 acres), upland mixed forest (73 acres), white pine (52 acres) and red pine (42 acres). Together these types make up about 11% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 490 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (313 acres – 2%), lowland open/semi-open lands (1,103 acres – 5%) and miscellaneous other (water, local, urban) (132 acres – 1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.2423 – Featured Wildlife Species Management

The North Menominee management area is comprised of scattered state holdings in a landscape dominated largely by corporate forest. Over half of the forest in the area is lowland conifer cover type (cedar, spruce, tamarack) interspersed with uplands of aspen and northern hardwoods. Historically this management area has been important deer winter range. Due to difficulties in regenerating cedar, most of this cover type will be protected, except for purposeful regeneration experiments. The primary focus of wildlife habitat management in the North Menominee management area will be to address the habitat requirements identified for the following featured species: snowshoe hare and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: habitat fragmentation; mesic conifer (in a broad array of age-classes); mature forest; early successional forest (jack pine, mixed swamp conifer, tag alder and aspen); and deer wintering habitat. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

Snowshoe Hare

The goal for snowshoe hare in the western Upper Peninsula is to increase available habitat in the ecoregion. In priority landscapes, management should focus on maintaining early successional forest (jack pine, mixed swamp conifer, tag alder and aspen), especially in areas adjacent to lowlands, promotion of the mesic conifer within stands and leaving coarse woody debris following harvest.

Wildlife habitat specifications:

- Encourage a conifer component in young aspen and lowland shrub communities (e.g., alder or willow) that have a conifer understory or young aspen stands that are adjacent to lowland/swamp conifer and mesic conifers. Hold or increase the conifer component in aspen stands, leaving conifers under four inches diameter breast height.
- Small gap (<1/2-acre) selection in lowland conifer types may more closely mimic natural wind throw disturbance and provide young conifer regeneration and recruitment.
- Promote conifer:
    - Regenerate lowland spruce/fir stands to young, dense stocking adjacent to uplands; and
    - Young forests with an abundant conifer understory component should be encouraged.
- In snowshoe hare habitat, limit biomass harvesting and chipping operations within the management area.

- Retain down coarse woody debris slash already present and resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Retain slash, and create brush piles within timber sales associated with hare habitat. In biomass timber sales, apply Michigan Biomass Harvesting Guidance, retaining the maximum residues.
- When using herbicide treatments to prepare sites for planting red and jack pine in snowshoe hare habitat, encourage more diverse stands of pine and aspen by using application skips in pockets or along stand edges.
- Avoid extensive stands of even-aged management.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

<u>Wildlife habitat specifications for deer wintering complexes:</u>

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.24.3 – 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, 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 six listed species as well as two natural communities of note occurring in the management area as listed in Table 4.24.2. 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.

Table 4.24.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the North Menominee Moraines management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Alvar		S1/G2?	Confirmed				Upland open/semi-open	N/A
Poor conifer swamp		S4/G4	Confirmed				Tamarack	Late
Birds								
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Mammal								
Moose	*Alces alces americana*	SC/G5/S4	Confirmed	HV	Very High	Bog	Lowland open/semi-open	N/A
						Emergent Marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Muskeg	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Poor fen	Lowland open/semi-open	N/A
						Poor conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Northern shurb thicket	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Mesic northern forest	Northern Hardwood	Late
						Dry-mesic northern forest	White Pine	Late
Plants								
Wild chives	*Allium schoenoprasum*	T/G5/S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Granite bedrock lakeshore	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
Wild oat-grass	*Danthonia spicata*	SC/G5/S1S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
New England violet	*Viola novae-angliae*	T/G4Q/S2	Confirmed			Alvar	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Wet-mesic sand prairie	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

Approximately 687.6 acres of potential old growth have been identified within the North Menominee Moraines management area (Figure 4.24.7). 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.

Although there are no high conservation value areas, there is one ecological reference area, the Escanaba River North Alvar (112 acres) representing the alvar natural community, as shown in Figure 4.24.7.

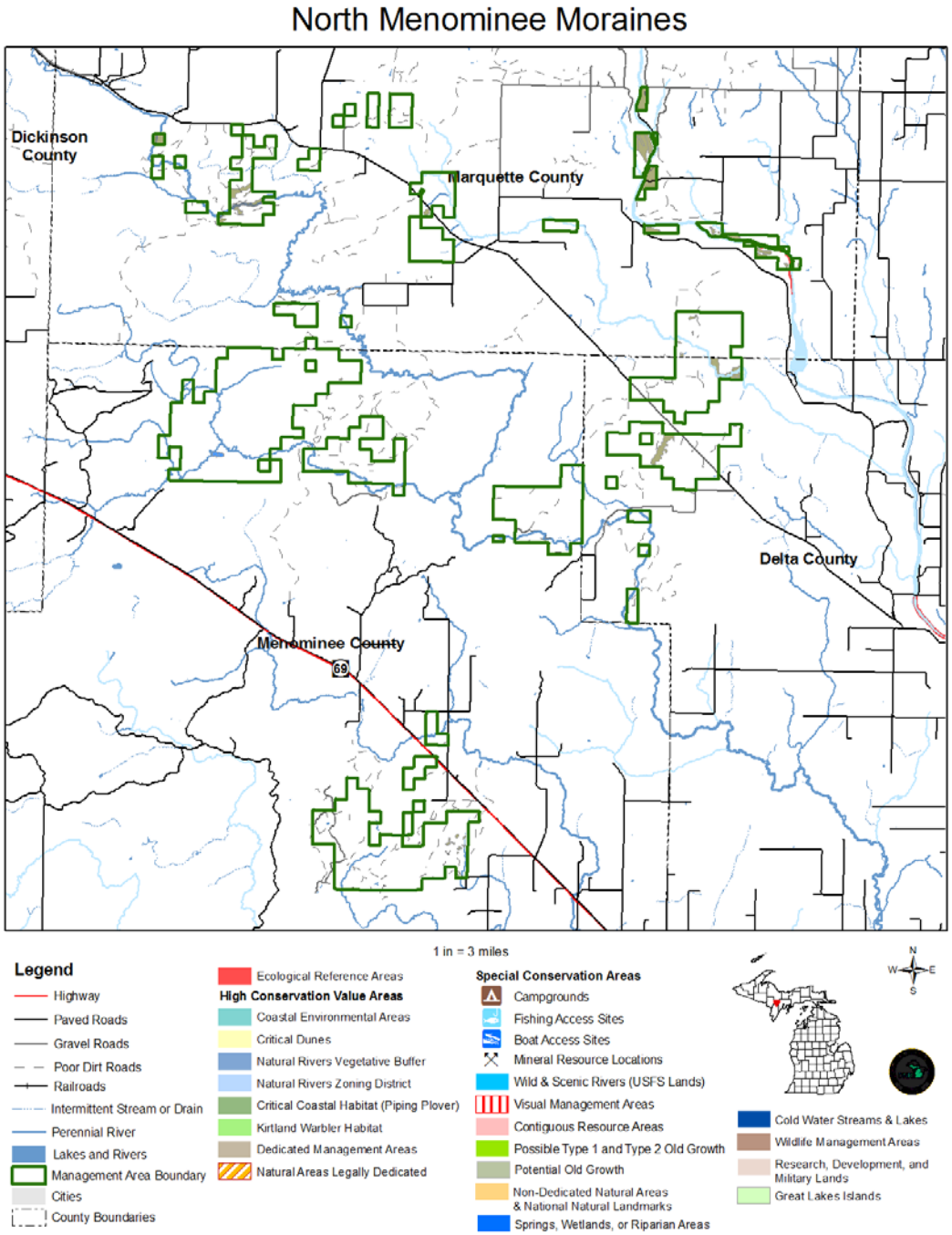

Figure 4.24.7. A map of the North Menominee Moraines management area showing the special resource areas.

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.
Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.24.4 – 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
- Spruce budworm
- Emerald ash borer
- Eastern larch beetle.

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 species of concern that been documented in or near this management area.

4.24.5 – 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 are shown in Figure 4.24.1.

4.24.6 – 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 will be subject to appropriate initial attack response.

4.24.7 – Public Access and Recreation

This area has fair public and management access. The Felch Grade Off-Road Vehicle Route crosses this area, as do several snowmobile trails as shown in Figure 4.24.1. No other recreational facilities are located in this area.

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

4.24.8 – 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 an end moraine of medium-textured till, medium-textured till with minor peat and muck 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 Black River Formation and Prairie du Chien Group and Cambrian Munising Group subcrop below the glacial drift. The Black River is quarried for dolosone/stone in the Upper Peninsula.

Metallic mineral exploration has not occurred in the management area in the past, but there could be some potential.

4.25 Norwich Plains Management Area

Summary of Use and Management

Vegetative management in the Norwich Plains management area (MA) (Figure 4.25.1) 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 address the habitat requirements identified for the following featured species: American woodcock, black bear and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (emerald ash borer) outbreaks will be issues for this 10-year planning period.

Introduction

The Norwich Plains management area is on a dissected till plain in north Ontonagon County. The state forest covers about 4,600 acres and is in a contiguous block. The major ownership in this vicinity is non-industrial private. The management area is dominated by the aspen and northern hardwood cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by the mesic northern forest natural community;
- 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 Norwich Plains management area are shown in Table 4.25.1.

Table 4.25.1. Summary of cover types, composition, limiting factor area, manageable area and projected harvest area for the Norwich Plains 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
Northern Hardwood	46%	2,115	734	1,381	0	67	2,115	0	645
Aspen	39%	1,772	0	1772	0	0	1,772	253	0
Upland Open/Semi-Open Lands	2%	69	0	69	0	0	69	0	0
Lowland Open/Semi-Open Lands	5%	244	0	244	0	0	244	0	0
Misc Other (Water, Local, Urban)	1%	56	0	56	0	0	56	0	0
Others	7%	313	0	313	114	98	313	35	105
Total		4,569	734	3,835	114	165	4,569	288	750

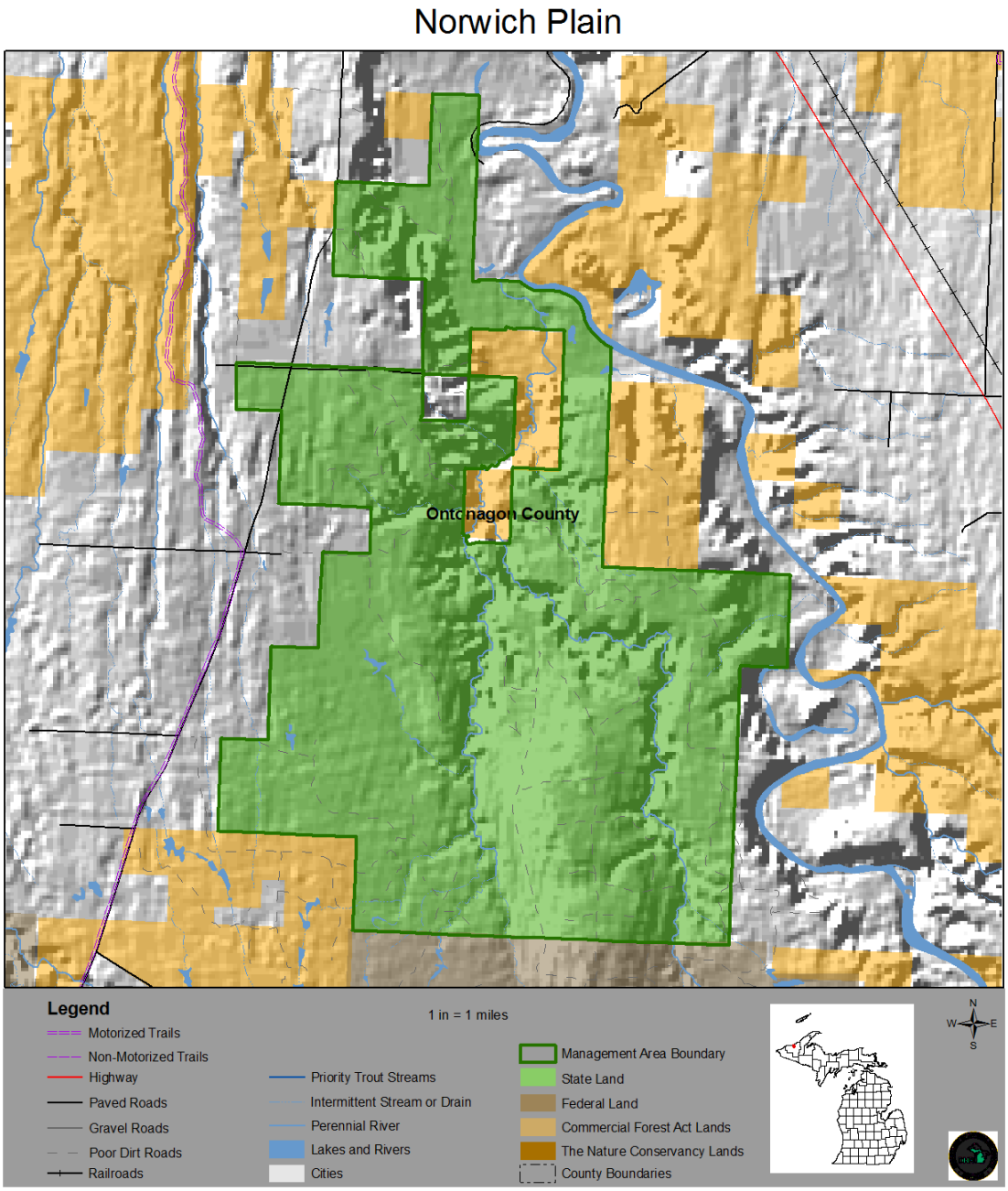

Figure 4.25.1. A map of the Norwich Plains management area (dark green boundary) in relation to surrounding state forest lands and other ownerships.

4.25.1 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 Norwich Plains 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 2,115 acres (46%) of state forest land in this management area (Table 4.25.1). They occur on high-quality sugar maple sites. Most stands have been managed on a selection harvest basis, and harvesting is based on basal area distribution rather than age (Figure 4.25.2). About 35% of the stands in this area (734 acres) have limiting factors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully.

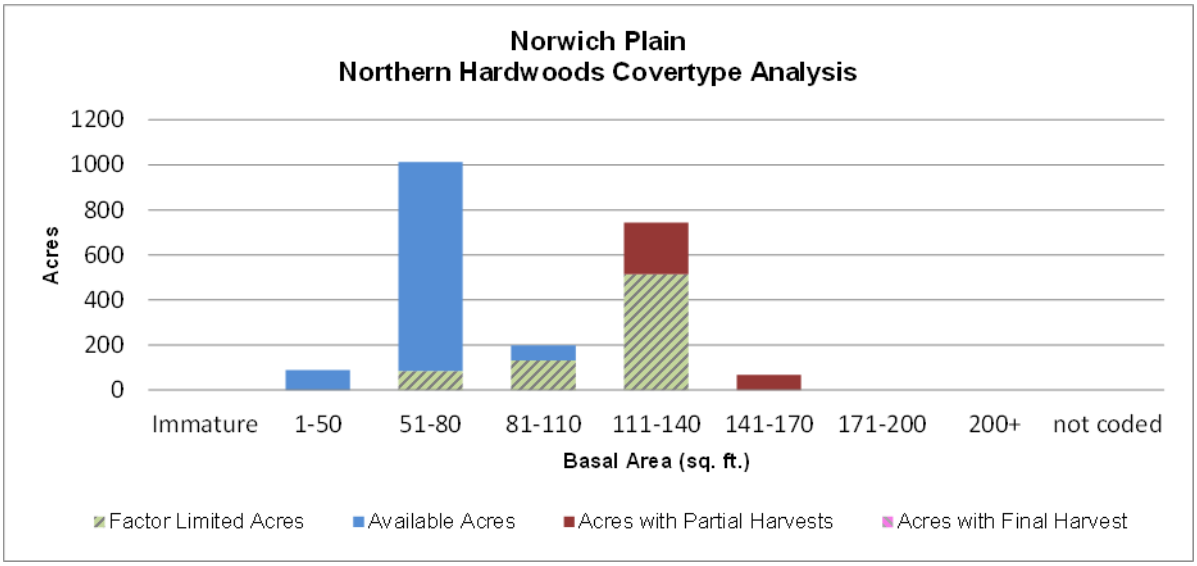

Figure 4.25.2. Graph of the basal area distribution for the northern hardwood cover type on the Norwich Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selectively harvest northern hardwood stands on a 20-year cycle; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Selectively harvest 67 acres over the 10-year planning period;
- Resolve factors limiting harvest to increase the allowable harvest area;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested;
- Favor oak where found for retention; and
- Work to regenerate hemlock components in stands lacking that species.

Aspen Cover Type

Current Condition

The aspen cover type covers 1,772 acres (39%) of state forest land in this management area (Table 4.25.1). Aspen has been successfully harvested and regenerated over recent years and the majority of the acres are in the 0-9, 10-19 and 20-29 year age classes (Figure 4.25.3).

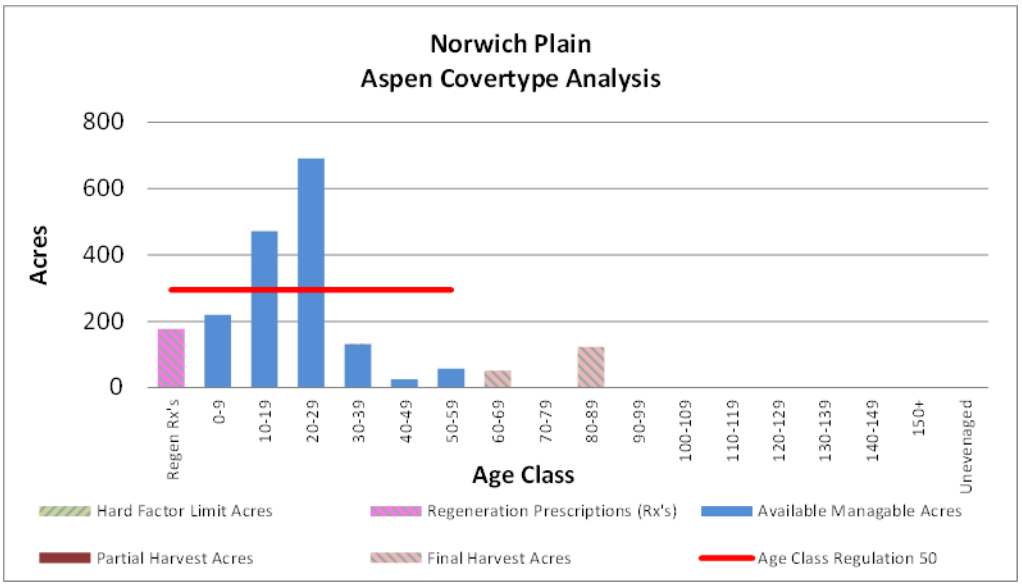

Figure 4.25.3. Graph of the age-class distribution for the aspen cover type on the Norwich Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Provide a supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objective

- Regenerate approximately 295 acres each decade.

10-Year Management Objectives

- The projected harvest is 134 acres for this 10-year planning period;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest; and
- Retain mature large-tooth aspen where appropriate.

Other Forested Cover Types

Current Condition

Other forested types make up 313 acres and are made up of mixed upland deciduous (197 acres), cedar (46 acres), hemlock (39 acres), lowland deciduous (17 acres), oak (seven acres) and upland spruce/fir (seven acres). Together these types make up about 7% of the management area (Table 4.25.1).

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
- Harvest as opportunities arise in conjunction with other management activities.

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
- The projected 10-year harvest is 212 acres of final harvest and 98 acres of partial harvest in these types.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (69 acres – 2%), lowland open/semi-open lands (244 acres – 5%) and miscellaneous other (water, local, urban) (56 acres – 1%) (Table 4.25.1).

Desired Future Condition

- Maintain current acreage in grasses and other non-forested cover types.

Long-Term Management Objective

- Permanent grass openings will be maintained with frequent low-intensity fires and mechanical treatments allowing native grasses and forbs to dominate.

10-Year Management Objective

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

4.25.2 – Featured Wildlife Species Management

The primary focus of wildlife habitat management in the Norwich Plains management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: mast (hard and soft); early successional forest conditions (associated with alder, riparian zones or forested wetlands); and deer wintering habitat. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.25.3 – 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, 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 two listed species and no natural communities of note occurring in the management area as listed in Table 4.24.2. 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.

Table 4.24.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Norwich Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late

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

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.24.4.

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.

4.25.4 – 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 and emerald ash borer.

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. Following is a list of species of concern that have been documented in or near this management area:

- Bell's honeysuckle
- Black locust
- Common buckthorn
- Crack willow
- European swamp thistle; Giant knotweed
- Glossy buckthorn

- Japanese barberry
- Morrow's honeysuckle
- Narrow-leaved cat-tail
- Wild parsnip
- Norway maple
- Phragmites
- Purple loosestrife
- Scots pine
- Spotted knapweed
- Tatarian honeysuckle
- Wild parsnip.

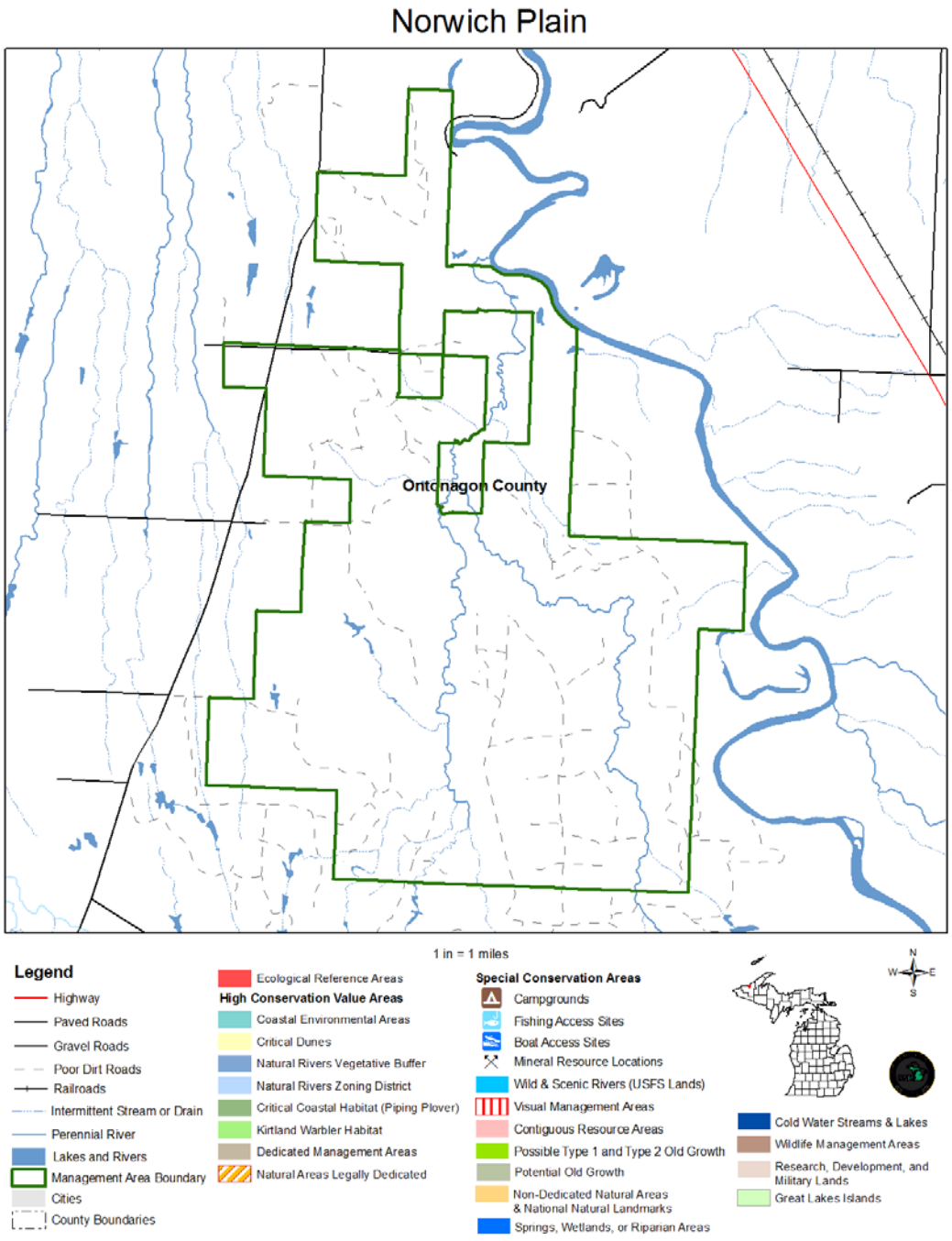

Figure 4.24.4. A map of the Norwich Plains management area showing the special resource areas.

4.25.5 – 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 are shown in Figure 4.25.1.

4.25.6 – Fire Management

Fire probably did not play a significant role in this mesic northern forest community, especially due to its proximity to the lake and heavy winter snowfall.

- All wildfires within the management area should be subject to appropriate initial attack response; and
- Work to develop modified suppression strategies for the area between the main branch and east branch of Mill Creek.

4.25.7 – Public Access and Recreation

This area is very remote and there are few public access roads. There are no state forest campgrounds or boating access sites in this area.

- Work to establish legal access for management and public use as opportunities arise.

4.25.8 – 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 lacustrine (lake) clay and silt. The glacial drift thickness varies between 10 and 50 feet. Sand and gravel pits are not located in the management area and there is limited potential for additional pits.

The Precambrian Freda Sandstone subcrops below the glacial drift. The Freda does not have a current economic use.

Metallic mineral exploration has not occurred in the management area in the past, but there could be some potential.

4.26 Palmer Moraine Management Area

Summary of Use and Management

Vegetative management in the Palmer Moraine management area (MA) (Figure 4.26.1) 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 maintaining white pine, red pine and oak especially on rocky outcrops and maintaining wildlife movement corridors along riparian areas. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Palmer Moraine management area is on a bedrock-controlled ground moraine in central Marquette County. The state forest covers over 9,100 acres and is somewhat scattered parcels. The major ownership in this vicinity is non-industrial private. The management area is dominated by the aspen, white pine and jack pine cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by the natural communities: boreal forest, mesic northern forest and dry mesic northern forest;
- Mid-range in site quality;
- The Escanaba River and several tributaries including the Cataract Basin are features in this area;
- This is a popular area for hunting, fishing, paddling and other types of recreation;
- The community of Gwinn is located near this management area;
- 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 benefit in a sustainable manner while minimizing user conflicts. Additional priorities include promoting mesic-conifers and oak regeneration on appropriate sites.

The predominant cover types, composition and projected harvest areas for the Palmer Moraines management area are shown in Table 4.26.1.

Table 4.26.1. Summary of cover types, composition, limiting factor area manageable area and projected harvest area for the Palmer Moraine management area (2012 Department of Natural Resources inventory data).

Cover Type	Cover %	Current Acreage	Hard Factor Limited	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Acreage in 10	Desired Future Harvest (Acres)	
					Final Harvest	Partial Harvest		Final Harvest	Partial Harvest
Aspen	34%	3,161	512	2,649	75	0	3,161	442	0
Jack Pine	10%	939	108	831	50	0	939	119	0
Paper Birch	2%	217	175	42	0	0	217	7	0
White Pine	6%	512	38	474	59	74	512	30	184
Upland Open/Semi-Open Lands	2%	177	0	177	0	0	177	0	0
Lowland Open/Semi-Open Lands	4%	388	0	388	0	0	388	0	0
Misc Other (Water, Local, Urban)	4%	387	0	387	0	0	387	0	0
Others	37%	3,400	697	2703	473	522	3,400	295	559
Total		9,181	1,530	7,651	657	596	9,181	893	743

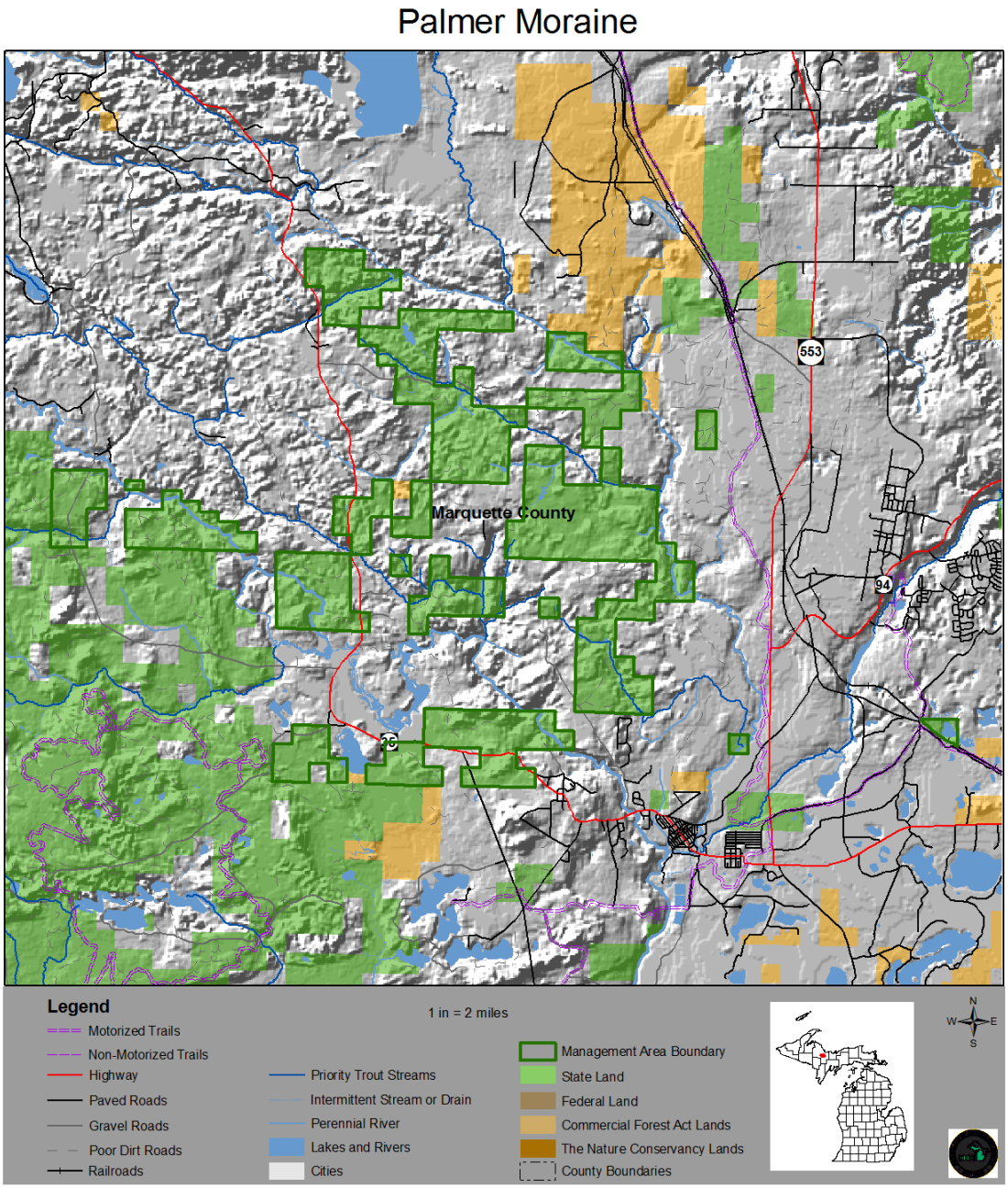

Figure 4.26.1. A map of the Palmer Moraine management area (dark green boundary) in relation to surrounding state forest lands and other ownerships.

4.26.1 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 Palmer Moraine 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 3,161 acres (34%) of state forest land in this management area (Table 4.26.1). Aspen is poorly distributed across age classes with a large portion of the acres in the 0-9 and 10-19 year age classes due to recent harvest and regeneration work (Figure 4.26.2). There are a large number of acres over rotation age and 512 of those acres have limiting factors on them. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

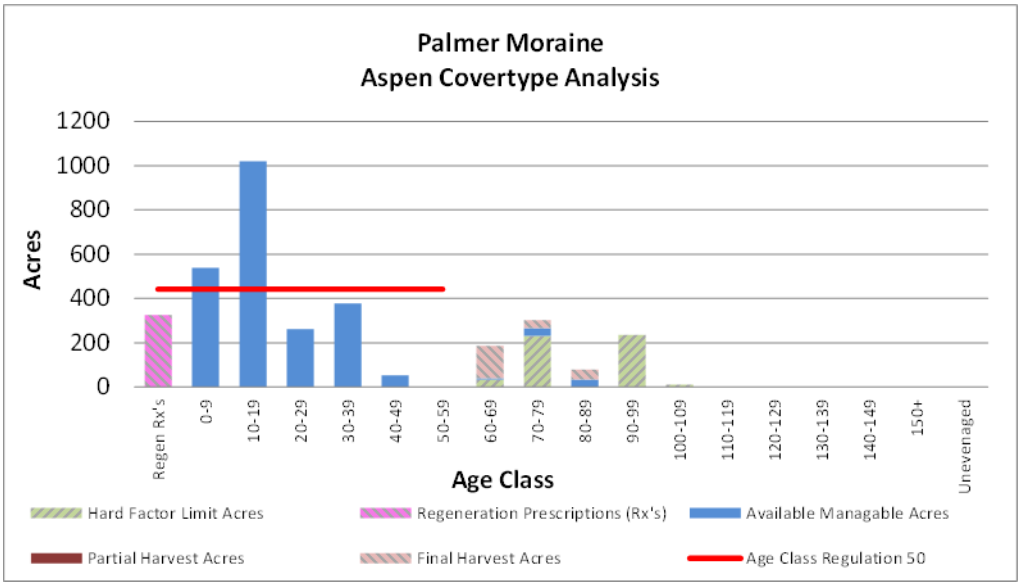

Figure 4.26.2. Graph of the age-class distribution of the aspen cover type on the Palmer Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide a supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Regenerate approximately 442 acres each decade.

10-Year Management Objectives

- The projected 10-year harvest is 75 acres;
- Evaluate younger stands for early harvest to work toward balancing the age classes;
- Harvest stands of 60-110 year-old aspen that are in decline; and
- Maintain mature large-tooth aspen if present as retention.

Jack Pine Cover Type

Current Condition

The jack pine cover type comprises about 939 acres (10%) of the management area (Table 4.26.1). Most of the jack pine is unevenly distributed across age classes, with the majority of the acres in the 0-9, 10-19 and 20-29 year age classes, with a spike in the 70-79 year age class (Figure 4.26.3). There are 108 acres of jack pine that have site conditions limiting their harvest this entry period. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

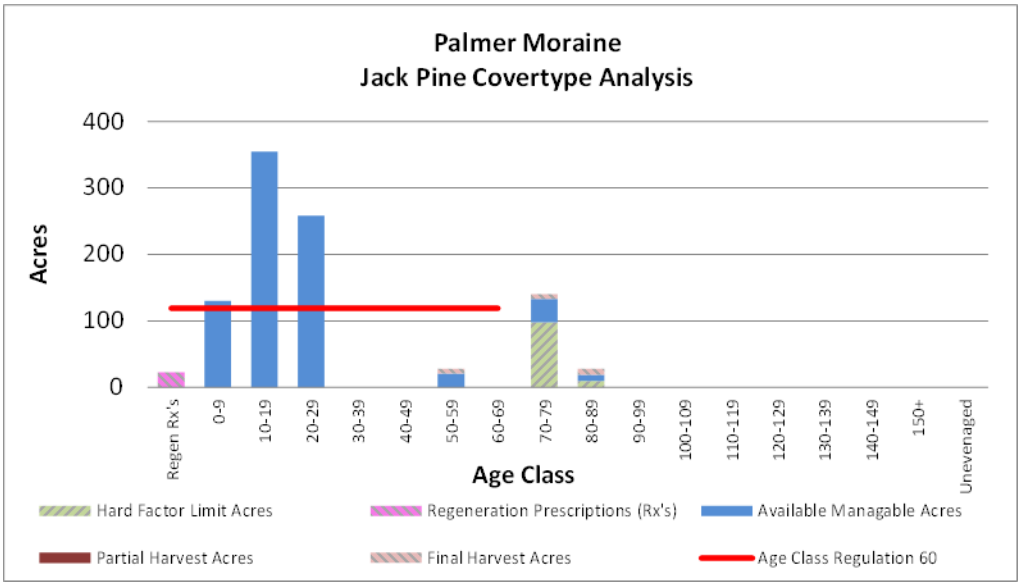

Figure 4.26.3. Graph of the age-class distribution for the jack pine cover type on the Palmer Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Provide a supply of forest products;
- Provide for a mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Manage jack pine on a 60-year rotation, regenerating approximately 119 acres each decade.

10-Year Management Objectives

- Harvest about 50 acres during this 10-year planning period; and
- More aggressive harvesting in this type maybe needed in this 10-year planning period to reduce mortality losses in the older stands.

Lowland Spruce/Fir Cover Type

Current Condition

Currently there are 817 acres (9%) of the lowland spruce/fir type in the management area (Table 4.26.1). Lowland spruce/fir is often found in association with lowland conifer, cedar and tamarack types. Lowland spruce/fir in this management area does not have a well-balanced age-class distribution (Figure 4.26.4). About 682 acres of the lowland spruce/fir in this area is over 80 years in age, and 453 acres of that has factors limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

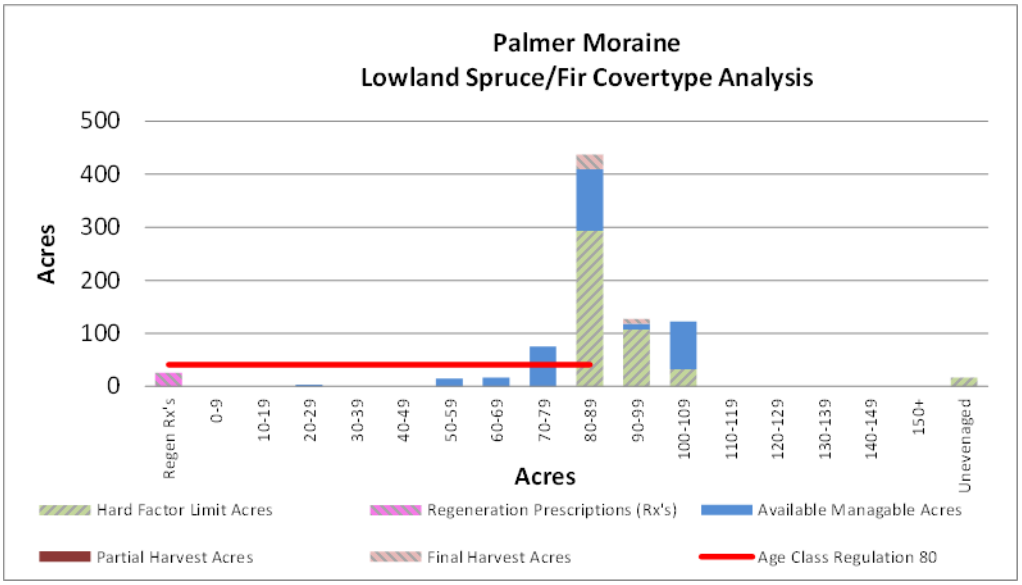

Figure 4.26.4. Graph of the age-class distribution for the lowland spruce/fir cover type on the Palmer Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objective

- Regenerate mature lowland spruce/fir types on an 80-year rotation allowing 41 acres to be harvested per decade; and
- Resolve factors limiting harvest to increase the allowable harvest level.

10-Year Management Objectives

- Harvest about 107 acres in this 10-year planning period; and
- Aggressively harvest this type in this 10-year planning period to reduce mortality losses in the older stands.

White Pine Cover Type

Current Condition

There are 512 acres (6%) of the state forest in this management area in white pine (Table 4.26.1). This type is poorly distributed across age classes and the majority of the stands have been coded as uneven-aged. Most of the white pine is of natural origin. There are 38 acres of white pine that have factors limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

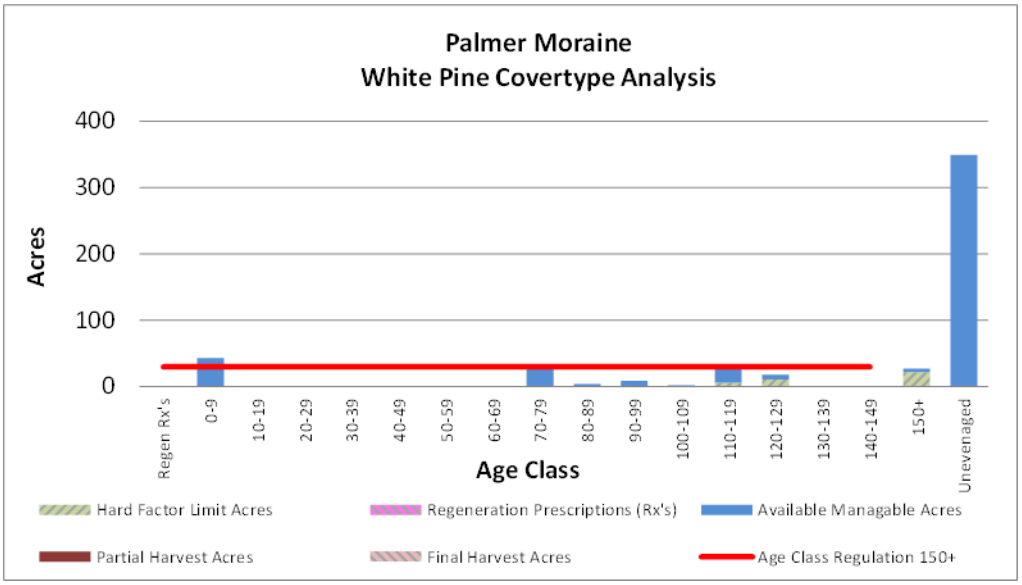

Figure 4.26.5. Graph of the age-class distribution of the white pine cover type on the Palmer Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain and promote natural origin white pine in this management area.

Long-Term Management Objectives

- Manage natural origin stands on a 150-year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed allowing approximately 30 acres to be final harvested per decade; and
- Stands will be thinned as necessary.

10-Year Management Objectives

- Regenerate 59 acres of natural origin stands within the next decade using shelterwood and small patch cuts; and
- Thin about 74 acres this decade.

Other Forested Cover Types

Current Condition

Other forested types make up 2,800 acres and are made up of upland mixed forest (688 acres), Mixed upland deciduous (652 acres), northern hardwoods (219 acres), paper birch (217 acres), natural mixed pines (198 acres), upland spruce/fir (190 acres), red pine (172 acres), upland conifers (172 acres), lowland conifers (130 acres), planted mixed pines (55 acres), cedar (50 acres), lowland mixed forest (40 acres), oak (15 acres) and lowland poplar (two acres). Together these types make up about 30% of the management area (Table 4.26.1).

Approximately 419 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- The projected ten-year final harvest in these types is 278 acres and the projected partial harvest is 889 acres.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (177 acres – 2%), lowland open/semi-open lands (388 acres – 4%) and miscellaneous other (water, local, urban) (387 acres – 2%) (Table 4.26.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.26.2 – Featured Wildlife Species Management

Wildlife priorities in the Palmer Moraine management area include maintaining white pine, red pine and oak especially on rocky outcrops and maintaining wildlife movement corridors along riparian areas. The primary focus of wildlife habitat management will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, pileated woodpecker and red crossbill. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: early successional forest conditions (associated with alder, riparian zones or forested wetlands), mast (hard and soft); mature forest (coniferous and deciduous stands); retention or development of large living and dead standing trees (for cavities) and mesic conifer. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches in diameter breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: Leave scattered retention patches around some 18 inches in diameter breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect, disease or fire within the same cover type and age class (within the compartment, management area or WUP ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

Red Crossbill

In the western Upper Peninsula, the goal for the red crossbill is to maintain or increase suitable habitat. State forest management should focus on maintaining mature and over mature seed producing trees in priority areas. Declines in red crossbill have been associated with declines in the amount of available conifer seeds which are correlated with age of trees (see species account in Section 3); mostly a result of decreases in conifer across the landscape and a shortening of rotation periods for remaining conifer stands. Mature mesic conifer forests (white/ red pine, spruce, hemlock) will be the primary habitat issue addressed for red crossbill in this management area.

Wildlife habitat specifications:

- Maintain a minimum of 15% of the total acres of appropriate forest types (upland spruce/fir, upland conifers, natural mixed pine and natural red and white pine) in the management area for red crossbill in a mature forest condition. Mature being defined as greater than 150 years for red pine, greater than 130 years for white pine and greater than 80 years for white spruce. This can be accomplished with existing factor-limited stands or alternatively by extending the rotation length of these types to 150, 130 and 80 years respectively.
- Retain large mature and over mature red pine, white pine and spruce in shelter-wood and seed tree cuts.
- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.

4.26.3 – 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, 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 two listed species and no natural communities of note occurring in the management area as listed in Table 4.26.2. 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 278.9 acres of potential old growth have been identified within the Palmer Moraine management area (Figure 4.26.6). 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.

Table 4.26.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Palmer 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
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plant								
Purple clematis	*Clematis occidentalis*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Dry-mesic northern forest	White Pine	Late
						Volcanic cliff	Upland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Boreal forest	Upland & Lowland Sp/F	Mid
						Granite bedrock glade	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	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

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.26.6.

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 all potential Type 1, potential Type 2 and potential old growth to determine its status as to its special resource status.

Objective 2-1: To evaluate the potential old growth areas by the end of this 10-year planning period.

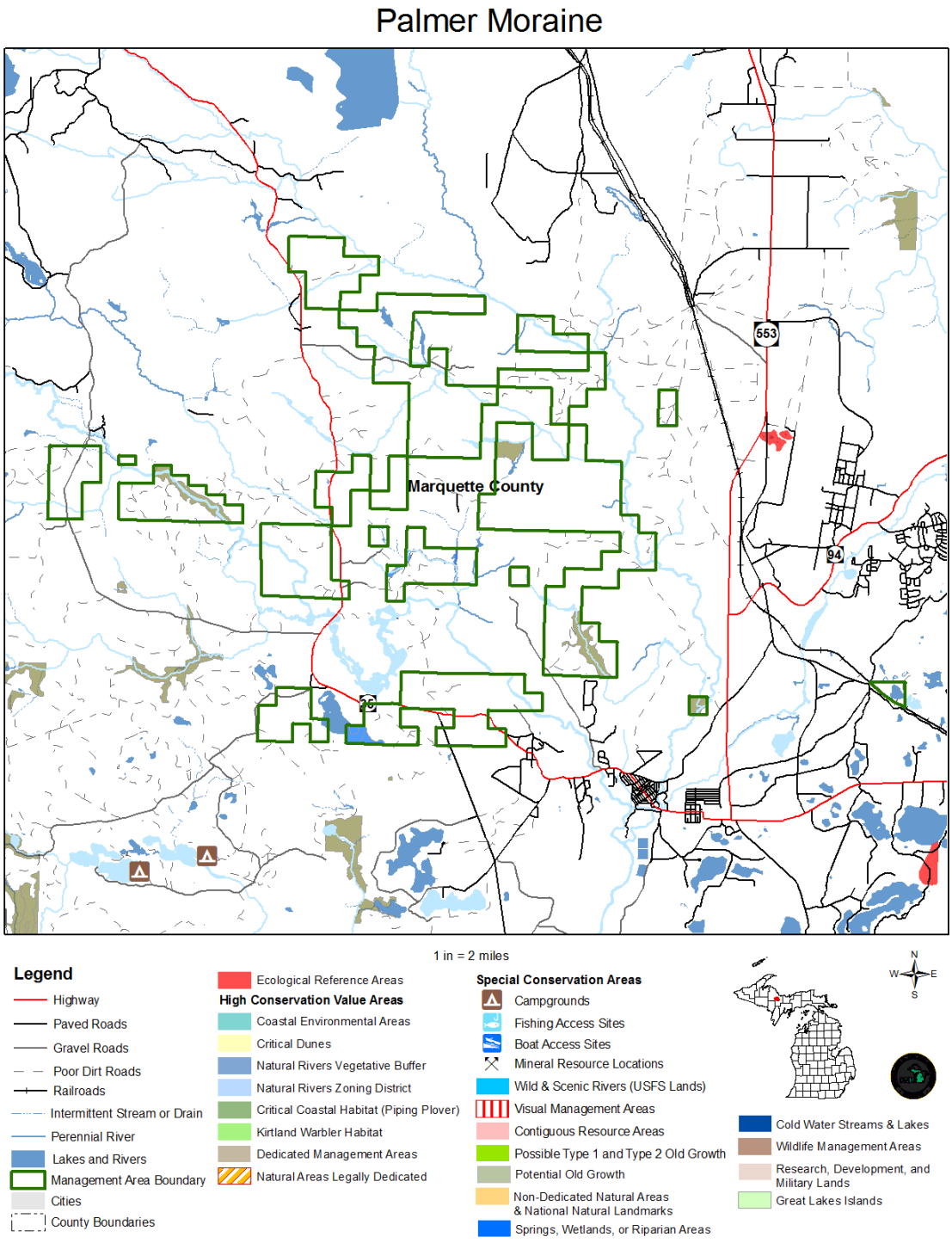

Figure 4.26.6. A map of the Palmer Moraine management area showing the special resource areas.

4.26.4 – 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
- Jack pine budworm
- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight
- 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 that been documented in or near this management area.

4.26.5 – 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 are shown in Figure 4.26.1.

4.26.6 – Fire Management

This area is a mixture of mesic and dry-mesic forests with interspersed wetlands. Fire occurrence due to lightning in the recent past indicates the potential for periodic stand-replacement fire in some areas that would have encouraged pine and oak.

- All wildfires are subject to appropriate initial attack suppression response.
- Part of this management area falls within the Sands Plains Zone Dispatch area, which provides plans for initial attack, based on fire danger level. It calls for elevated readiness (additional staffing at Gwinn, Ishpeming and Escanaba Field Offices) and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.

4.26.7 – Public Access and Recreation

This area is very remote and there are few public access roads. There are no state forest campgrounds or boating access sites in this area.

- Work to establish legal access for management and public use as opportunities arise.

4.26.8 – 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 glacial outwash sand and gravel and postglacial alluvium, medium and coarse-textured till in places thin to discontinuous. The glacial drift thickness varies between 100 and 200 feet. Sand and gravel pits are located in the management area and there should be some potential for additional pits.

The Precambrian Archean Granite/Gneiss and Oak Bluff and Bijiki Iron Formations subcrop below the glacial drift. The Bijiki has been mined for iron ore in the past.

Old iron mines are located along the south edge of the management area. Other metallic mineral exploration has occurred in the management area in the past and there could be additional potential.

4.27 Panola Plains Management Area

Summary of Use and Management

Vegetative management in the Panola Plains Management Area (MA) (Figure 4.27.1) 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: American woodcock, black bear, eastern bluebird, Kirtland's warbler and ruffed grouse. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Panola Plains management area is on a Pitted Outwash Plain in southeastern Iron County. The state forest covers 13,183 acres and is somewhat contiguous blocks. The major ownership in this vicinity is non-industrial private. The management area is dominated by aspen, red pine and jack pine cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry mesic forest and dry northern forest;
- Moderate site quality;
- Provides multiple benefits including forest products and dispersed recreational activities; and
- Provides a variety of fish and wildlife habitats.

Additional priorities include the establishment of early successional aspen and pine on appropriate sites and oak regeneration.

The predominant cover types, composition and projected harvest areas for the Panola Plains management area are shown in Table 4.7.1.

Table 4.27.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Panola Plains 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	36%	4,719	219	4,500	618	0	4,719	750	0
Red Pine	16%	2,172	74	2098	682	817	2,172	233	1,259
Jack Pine	13%	1,690	32	1658	0	0	1,690	237	0
Lowland Conifers	6%	776	365	411	161	0	776	46	0
Oak	4%	505	282	223	48	71	505	14	101
Upland Open/Semi-Open Lands	9%	1,137	0	1137	0	0	1,137	0	0
Lowland Open/Semi-Open Lands	4%	474	0	474	0	0	474	0	0
Misc Other (Water, Local, Urban)	1%	154	0	154	0	0	154	0	0
Others	12%	1,556	500	1056	174	103	1,556	108	149
Total		13,183	1,471	11,712	1,682	991	13,183	1,388	1,509

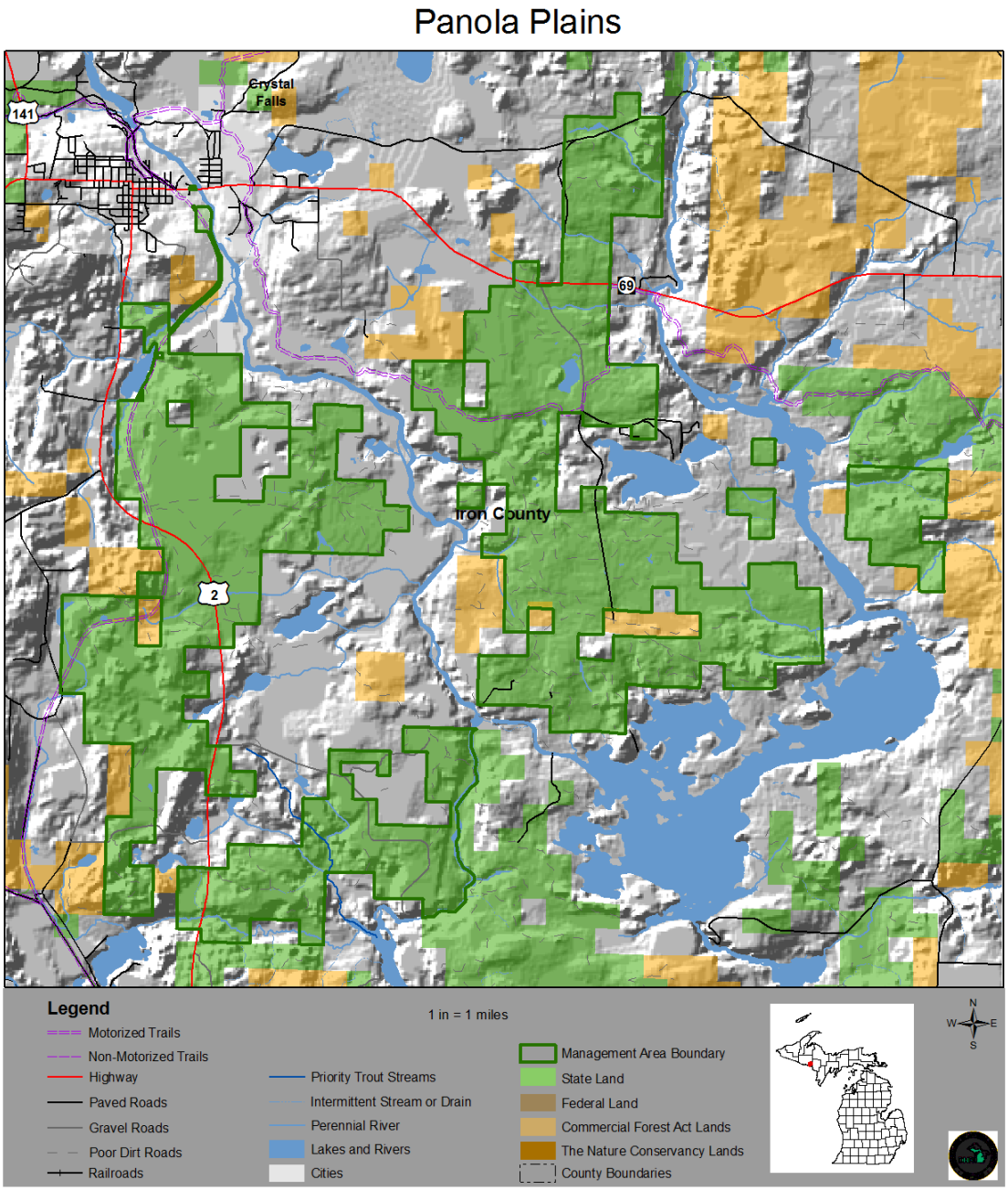

Figure 4.27.1. A map of the Panola Plains management area (dark green boundary) in relation to surrounding state forest and other lands in Iron County, Michigan.

4.27.1 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 Panola Plains 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 occurs on 4,709 acres (36%) of state forest land in this management area (Table 4.27.1). High-quality large-tooth aspen grows within the management area. Younger age classes are over long-term management levels (red line in Figure 4.27.2) and there is an absence of acres in the older age classes. Many of these older age classes are either prescribed for harvest or have hard factor limitations.

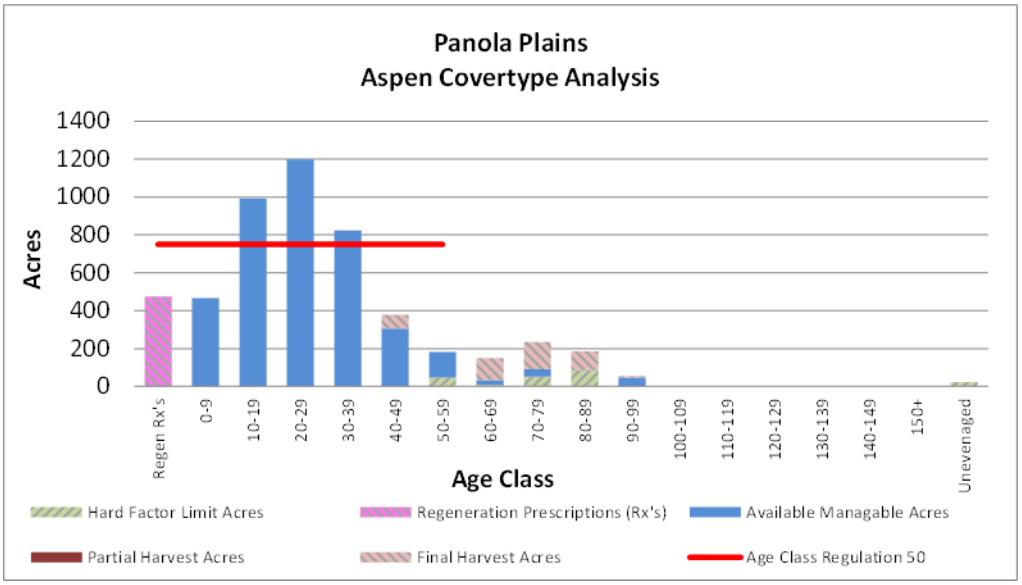

Figure 4.27.2. Graph of the age-class distribution for the aspen cover type on the Panola Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objective

- Once age classes are better distributed, harvest and regenerate approximately 750 acres each decade.

10-Year Management Objectives

- Harvest 618 acres over the 10-year planning period;
- Assess younger age classes for potential harvest acres;
- Harvest stands of 70-90 year-old aspen that are in decline;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest; and
- Allow extended rotations on high-quality large-tooth aspen.

Red Pine Cover Type

Current Condition

There are 2,172 acres (16%) of the state forest in this management area is in the red pine cover type (Table 4.27.1). Red pine is poorly distributed across age classes spiking in the 50-59 year age class (Figure 4.27.2). Red pine stands occur on the same sites and soil conditions as aspen in this management area: dry-mesic sandy soils. Red pine is ideally suited for these types of sites. Nearly 67% of the red pine is of plantation origin.

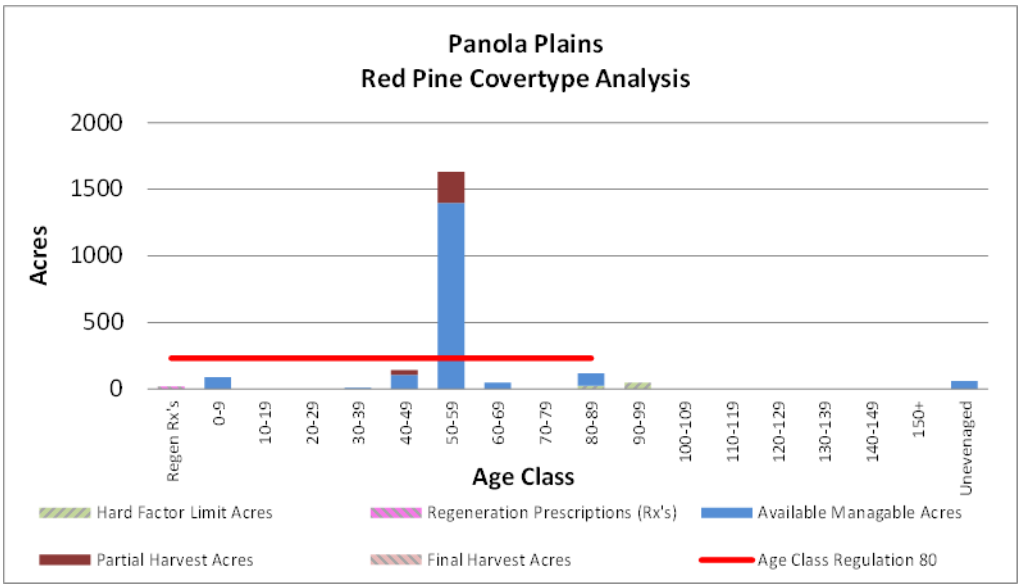

Figure 4.27.3. Graph of the age-class distribution for the red pine cover type on the Panola Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the current level of red pine cover type, both naturally occurring and red pine plantation; and
- Maintain the current ratio of red pine plantation acres (67%) to naturally occurring red pine acres (33%).

Long-Term Management Objectives

- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) resulting in 233 acres of final harvests and 1,259 acres of partial harvests each decade;
- Manage natural origin stands on a 150-year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed; and
- Thin stands as necessary.

10-Year Management Objectives

- Begin working on the age class spike in the 50-59 year old age-class to try and create a better age-class distribution (Figure 4.27.1);
- Thin 817 acres of red pine in this planning period; and
- Regenerate 682 acres of red pine in this planning period; prioritizing those stands that are over rotation age or in poor health.

Jack Pine Cover Type

Current Condition

The jack pine cover type comprises about 1,690 acres (13%) of the management area (Table 4.27.1). Lots of harvesting has occurred in the past decade, creating a spike in the 0-9 year-old age classes (Figure 4.27.4). There a few acres with factor limitations in the 70-79 year-old age class and a noticeable absence of acres in the 30-39 and 40-49 year-old age classes. Hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

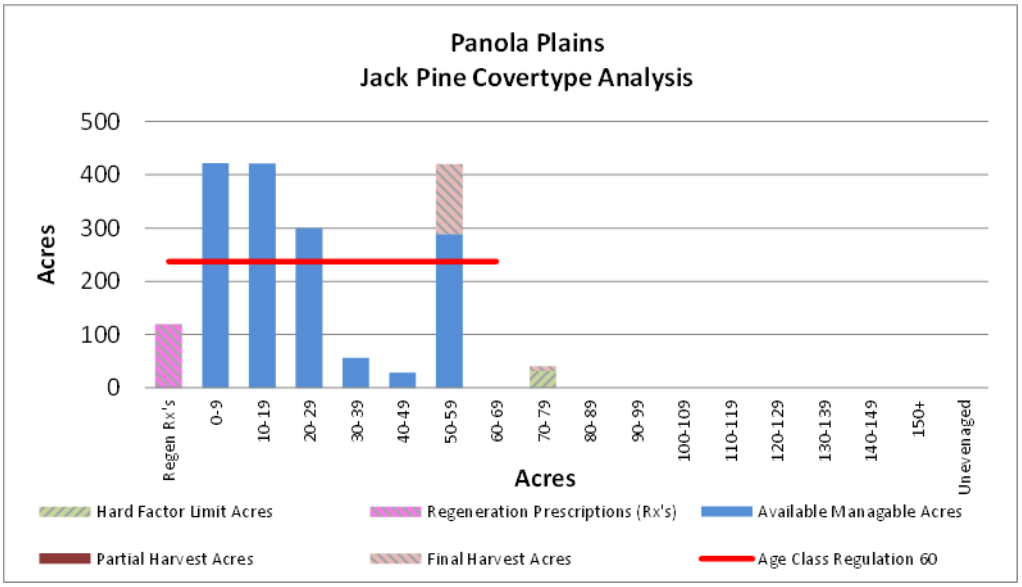

Figure 4.27.4. Graph of the age-class distribution for the jack pine cover type on the Panola Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balance age classes to provide an even, sustainable flow of forest products
- Provide for a mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Manage jack pine on a 60-year rotation; and
- Once age classes are balanced, harvest and regenerate 237 acres of jack pine each decade.

10-Year Management Objective

- Harvest and regenerate zero acres during this 10-year planning period.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type constitutes about 776 acres (6%) of the state forest land in this management area (Table 4.27.1) These stands grow on poorly drained sites and support mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. There are 365 acres of hard factor limited acres and they have been removed from the total number of manageable acres available for harvest calculations. Lowland conifers are poorly distributed across age classes, spiking in the 80-89 year age class (Figure 4.27.5). Little harvesting has been done in this type over the past 60 years.

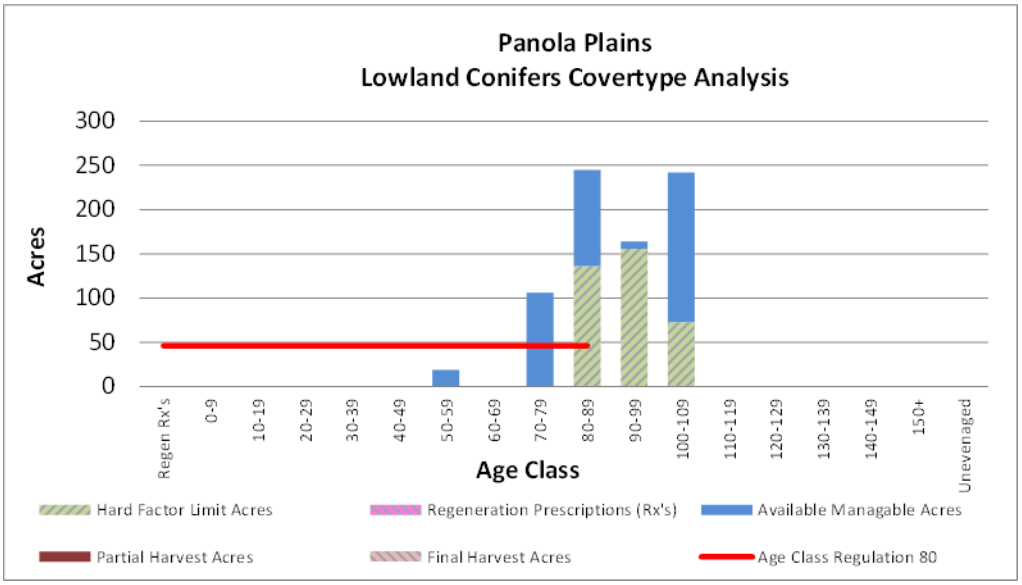

Figure 4.27.5. Graph of the age-class distribution for the lowland conifer cover type on the Panola Plains Management Area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes; Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation providing 46 acres of final harvest each decade;
- Regenerate stands to a species-mix similar to the pre-harvest conditions preferring cedar, hemlock, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest about 161 acres over the 10-year planning period focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques; and
- Additional harvesting may be desired to improve age-class distribution.

Oak Cover Type

Current Condition

The oak cover type is present on about 505 acres (4%) in this management area (Table 4.27.1). It is an important species to wildlife for mast production. Most of the oak is over 60 years old and little harvesting has occurred. This has created an absence of younger age classes. Over 50% of the oak is factor limited. The red oak is of fair quality.

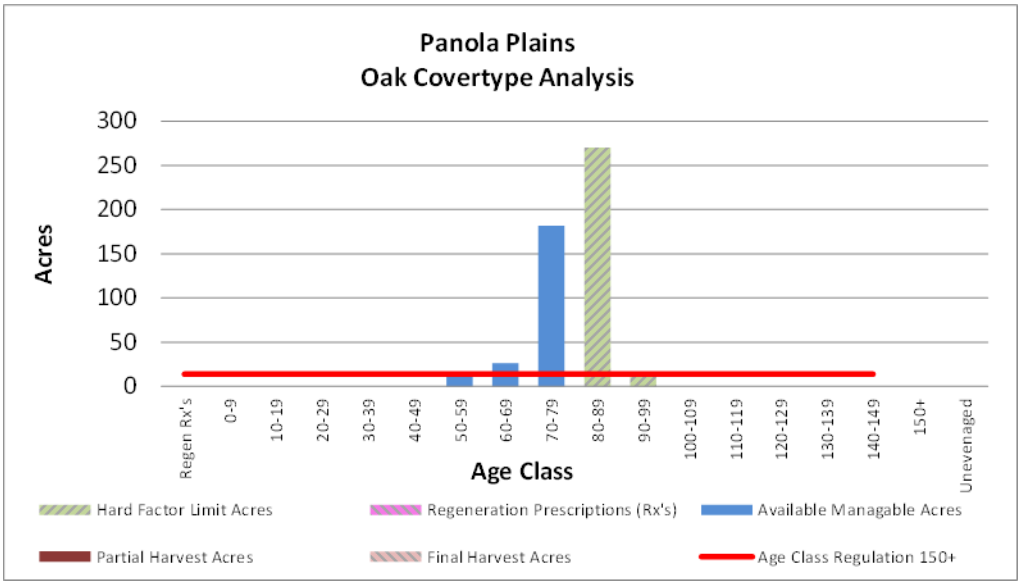

Figure 4.27.6. Graph of the age-class distribution for the oak cover type on the Panola Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the current component of oak in mixture with natural red and white pine.

Long-Term Management Objectives

- Maintain oak as a component of mixed upland types;
- Red oak stands will be regenerated on a 150-year rotation resulting in 14 acres of final harvest and 101 acres of thinning each decade; and
- Monitor oak stands for oak wilt.

10-Year Management Objectives

- Thin 71 acres of oak to increase hard mast production;
- Harvest and regenerate 48 acres of red oak; and
- In oak stands affected by oak wilt, convert to a pine type or oak barrens.

Other Forested Cover Types

Current Condition

Other forested types make up 1,556 acres and are made up of lowland spruce/fir (456 acres), upland spruce/fir (354 acres), cedar (198 acres), upland conifers (146 acres), white pine (118 acres), natural mixed pines (75 acres), lowland deciduous (64 acres), northern hardwoods (64 acres), upland mixed forest (36 acres), mixed upland deciduous (30 acres), hemlock (10 acres) and lowland poplar (5 acres). Together these types make up about 5% 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;
- Featured species habitat requirements will be taken into consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 277 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (1,137 acres – 9%), lowland open/semi-open lands (474 acres – 4%) and miscellaneous other (water, local, urban) (154 acres – 1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass (open/semi-open lands) will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types (open/semi-open lands) will be treated for opening maintenance as needed.

4.27.2 – Featured Wildlife Species Management

Early successional forest types, openings and oak dominate the Panola Plains management area. The red and jack pine and lowland conifer stands provide some cover for wintering deer. In general, the aspen in this management area should be harvested on a slightly shorter rotation because of the quality of the soils. Oak should be promoted at every opportunity and opening complexes should be maintained with fire. The primary focus of wildlife habitat management in the Panola Plains management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, eastern bluebird, Kirtland's warbler and ruffed grouse. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: early successional forest conditions (associated with alder, riparian zones or forested wetlands), mast (hard and soft); habitat fragmentation; early successional forest; large open land complexes (with snags in open lands); and mast (soft). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Eastern Bluebird

The western Upper Peninsula goal for bluebirds is to maintain or improve habitat. State forest management efforts during this planning period will focus on maintaining or expanding open land conditions, protection of snags or dying standing trees associated with openings and managing opening complexes/savanna with prescribed fire.

Wildlife habitat specifications:

- Maintain herbaceous open-land complexes within the management area using prescribed burns or mowing and consider the spatial arrangement; and
- Protect snags or dying standing trees within the open-lands. If nest cavities are not present, consider: leaving standing live trees (e.g., aspen) trees in final harvest timber sales and/or planting scattered oak.

Kirtland's Warbler

The western Upper Peninsula goal for Kirtland’s warbler during this planning period is to provide suitable breeding and foraging habitat within this management area. Management will focus on providing large patches (300-550 acres where possible) of early successional jack-pine forest with appropriate structural and compositional diversity on droughty outwash plains. When possible, large blocks should be created by managing several smaller harvest blocks adjacent to each other simultaneously.

Wildlife habitat specifications:

Develop landscape level plans for Kirtland’s warbler habitat within and across management areas to ensure suitable habitat is provided at any point in time across management areas within the ecoregion. Jack pine should be harvested in a manner that attempts to mimic both the size and structure of the stands that would result from fire.

- Develop harvest plans in the context of landscape-level plans. Strive to increase patch size to meet Kirtland’s warbler habitat needs. Consider current and desired future patch size, age-class distribution and distance to other jack pine stands. When developing harvest plans, identify opportunities for increasing patch size:
    - Review state forest inventory in management area and identify adjacent stands with similar age classes that could reasonably be combined into one stand.
    - Collaborate in planning of the spatial arrangement and timing of harvest with willing major landowners within this outwash plain (e.g., U.S. Forest Service, Michigan Technological University).
    - Large blocks of regenerating jack pine adjacent to herbaceous openings are desirable as they function as open-lands until the trees are 3-4 feet in height and benefit open-land species as well.
- Post-disturbance legacies include simulated skips or fingers of jack pine; snags; and larger diameter, fire-tolerant trees such as red pine. These features should be left in stands of harvested jack pine as retention to benefit Kirtland’s warbler.
- Scarify stands quickly after stands are harvested or use prescribed fire where feasible to maintain jack pine and to ensure maximum stem density.

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.
- 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.27.3 – 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, 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 six listed species and no natural communities of note occurring in the management area as listed in Table 4.27.2. 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 Panola Goose State Wildlife Management Area is a special conservation area within this management area as shown in Figure 4.27.7.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.27.7.

Table 4.27.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Panola Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Birds								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Butterflies								
Freija fritillary	*Boloria freija*	*SC/G5/S3S4*	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
Frigga fritillary	*Boloria frigga*	SC/G5/S3S4	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
Red-disked alpine	*Erbia discoidalis*	*SC/G5/S2S3*	Confirmed	MV	Low	Bog	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Muskeg	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Poor fen	Lowland open/semi-open	N/A
Mullusk								
Slippershell mussel	*Alasmidonta viridis*	T/G4G5/S2S3	Confirmed	EV	Very High	Headwater Stream	Aquatic	N/A
						Mainstem streams	Aquatic	N/A
						Inland lake	Aquatic	N/A

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

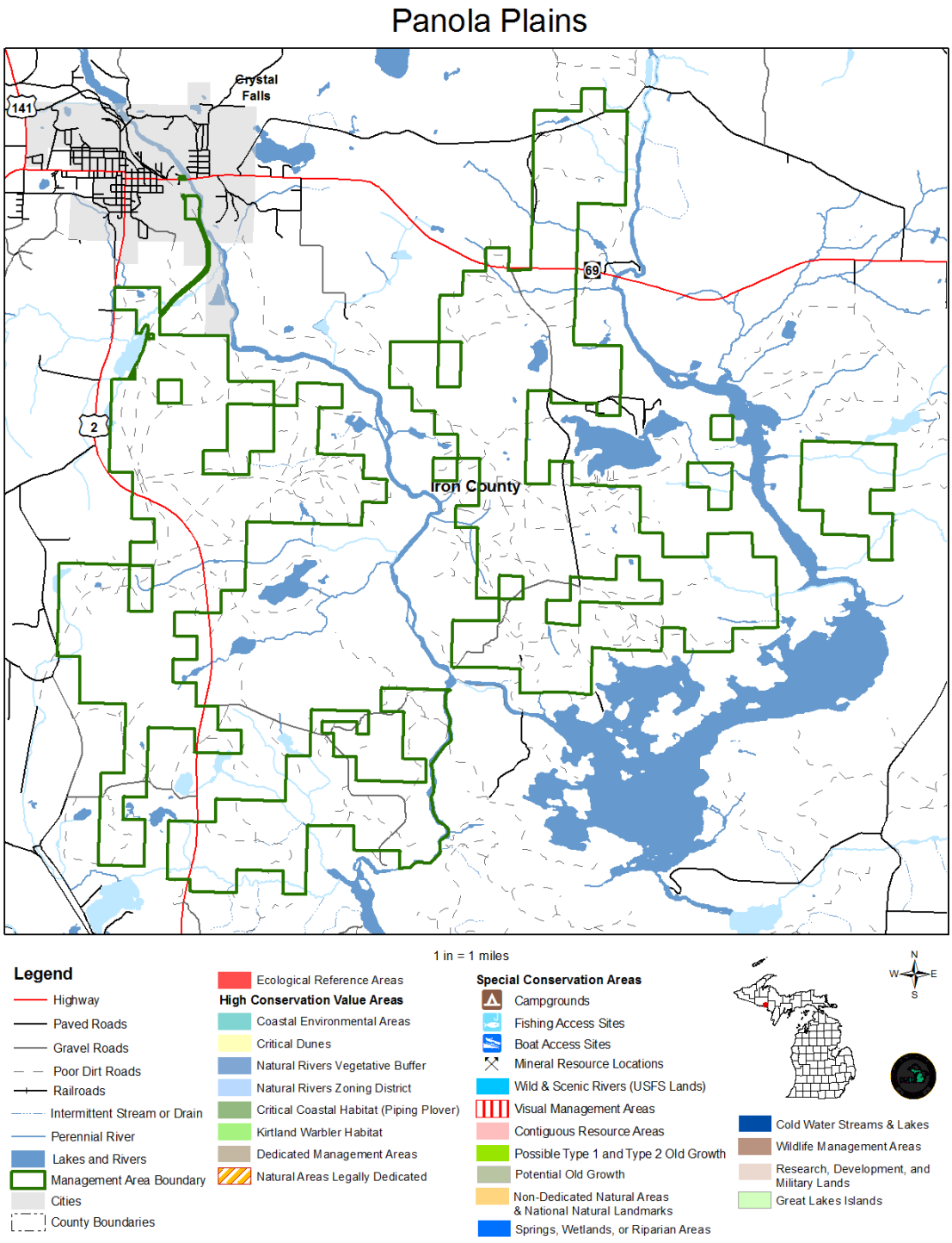

Figure 4.27.7. A map of the Panola Plains management area showing the special resource areas.

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.

4.27.4 – 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
- Jack pine budworm
- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight.

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. Following is a list of species of concern that been documented in or near this management area.

- Common buckthorn
- Japanese barberry
- Japanese knotweed
- Purple loosestrife
- Spotted knapweed.

4.27.5 – 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 are shown in Figure 4.27.1.

4.27.6 – Fire Management

Dominated by dry, sandy outwash soils, this area was probably subject to frequent, stand replacement fires. The result was likely a mixture of barrens and dry northern forest.

- This area falls within the Panola-Lake Mary Plains Zone Dispatch area. Initial attack is pre-planned, based on fire danger level, calling for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.
- With considerable development on private lands between and adjacent to state forestlands, home hazard assessment and mitigation programs can effectively augment suppression efforts and control of prescribed burns.
- Public access at Glidden Lake State Forest Campground, at the state rest area along U.S.-2 and at the township parks at Dawson Lake and Dead Man’s Lake provide good opportunities for prevention messages for forest users.

4.27.7 – Public Access and Recreation

This area has good public and management access. The Glidden Lake State Forest Campground is located in this area (Figure 4.27.7). Associated with this campground are a boating access site and the Lake Mary Plains Ski Trail/Pathway. Two snowmobile trails cross this area on the north and west as shown in Figure 4.27.1.

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

4.27.8 – 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 glacial outwash sand and gravel and postglacial alluvium and coarse-textured till in places thin to discontinuous. The glacial drift thickness varies between 50 and 100 feet. Sand and gravel pits are located in the management area and there should be potential for additional pits.

The Precambrian Badwater Greenstone, and the Dunn Creek, Michigamme and Hemlock Formations subcrop below the glacial drift. These rocks do not have a current economic use.

Old iron mines are located just to the north and west of the management area. Metallic mineral exploration has occurred in the management area in the past, and there could be additional potential.

4.28 Peavy End Moraines Management Area

Summary of Use and Management

Vegetative management in the Peavy End Moraines management area (MA) (Figure 4.28.1) 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: American woodcock, black bear, eastern bluebird, white-tailed and wood duck. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (spruce budworm) and disease (oak wilt) infestations will be issues for this 10-year planning period.

Introduction

The Peavy End Moraine management area is on an end moraine in southeastern Iron County. The state forest covers 11,596 acres and is somewhat scattered blocks. The major ownership in this vicinity is non-industrial private. The management area is dominated by the aspen, northern hardwood and oak cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: 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 Peavy End Moraine management are shown in Table 4.28.1.

Table 4.28.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Peavy End 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	52%	5,996	586	5,410	1,388	0	5,996	902	0
Northern Hardwood	16%	1,880	0	1880	0	940	1,880	0	940
Oak	6%	639	276	363	23	81	639	23	81
Lowland Conifers	5%	549	465	84	32	0	549	9	0
Red Pine	4%	432	54	378	143	195	432	42	250
Upland Spruce/Fir	4%	409	147	262	0	0	409	37	0
Upland Open/Semi-Open Lands	2%	203	0	203	0	0	203	0	0
Lowland Open/Semi-Open Lands	2%	285	0	285	0	0	285	0	0
Misc Other (Water, Local, Urban)	1%	104	0	104	0	0	104	0	0
Others	9%	1,099	276	823	260	48	1,099	86	112
Total		11,596	1,803	9,793	1,846	1,264	11,596	1,099	1,383

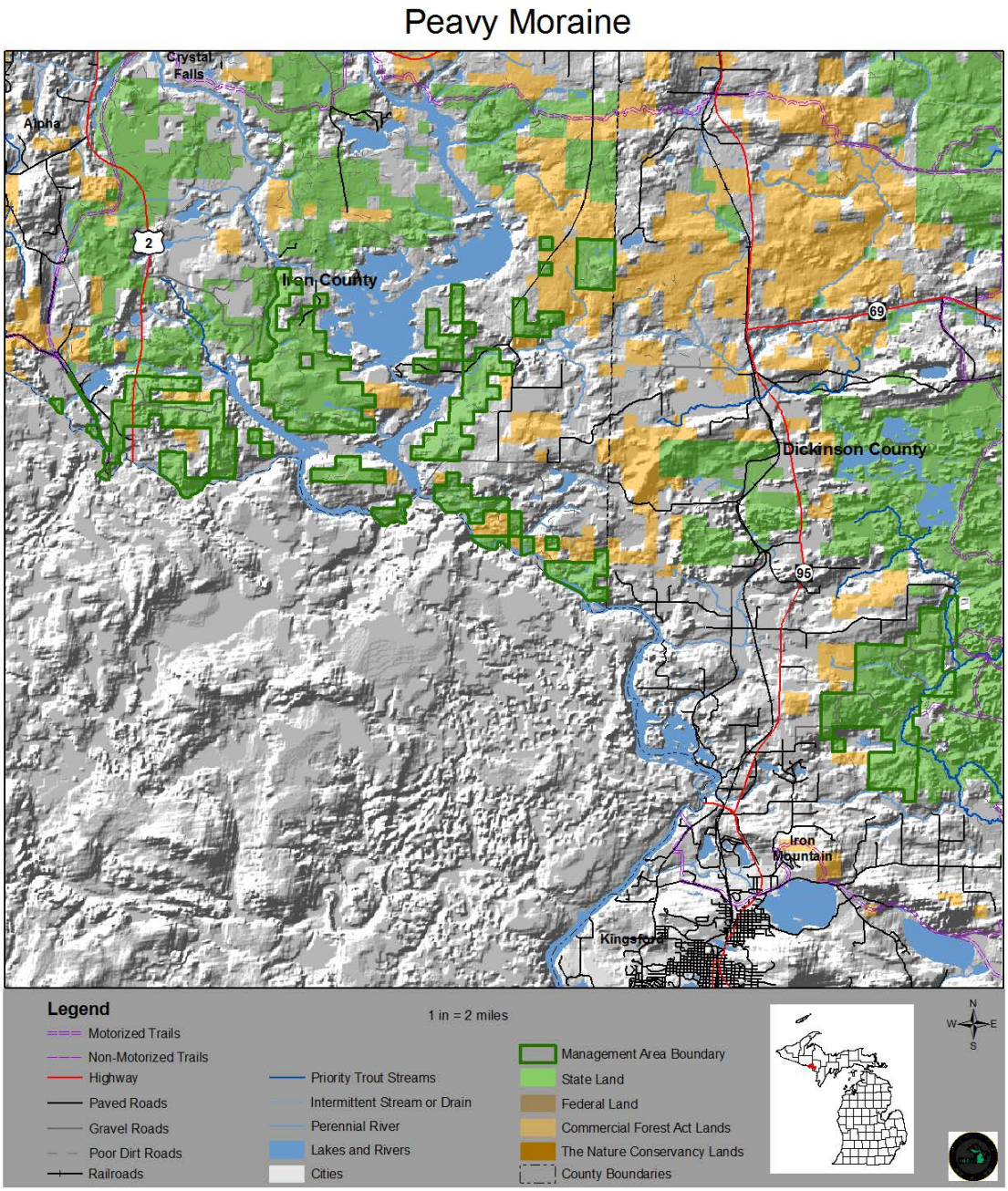

Figure 4.28.1. A map of the Peavy End Moraines management area (dark green boundary) in relation to surrounding state forest and other lands in Iron County, Michigan.

4.28.1 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 Peavy End 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 5,996 acres (52%) of state forest land in this management area (Table 4.28.1). There is a lack of aspen acreage in the 10-19, 50-59 and 60-69 year-old age classes and there are spikes in the 0-9, 20-29 and the 30-39 year-old age classes (Figure 4.28.2). Hard factor limits occur on 586 acres and have been removed from the total number of manageable acres available for harvest calculations. Many of these acres will succeed to upland spruce/fir.

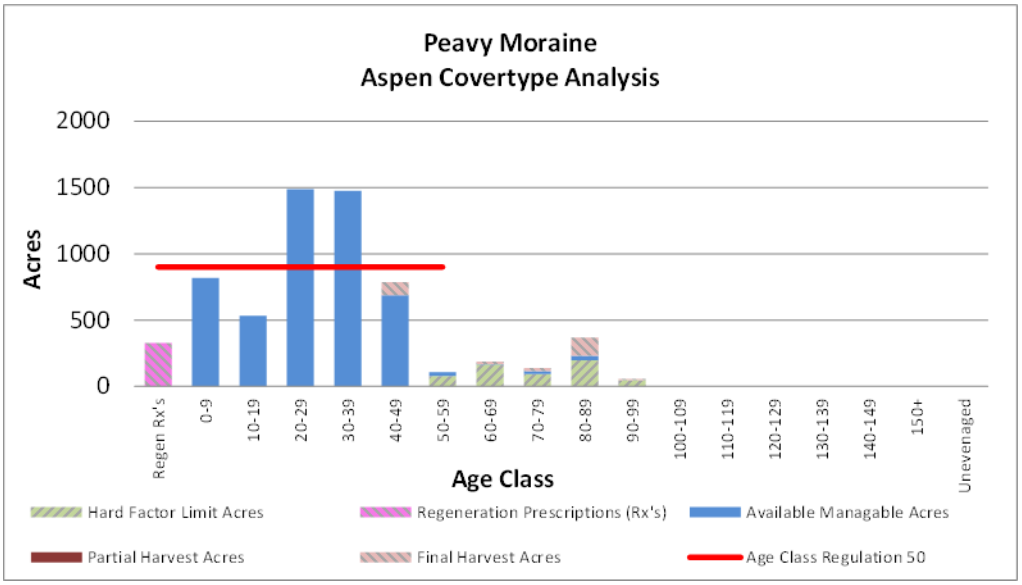

Figure 4.28.2. Graph of the age-class distribution for the aspen cover type on the Peavy End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objective

- Once age classes are better distributed, harvest and regenerate approximately 902 acres each decade.

10-Year Management Objectives

- Harvest 1,388 acres during this 10-year planning period;
- Two-aged stands with mature aspen over younger stands should be identified and scheduled for harvest; and
- Identify some of the 40-49 and 50-59 year-old aspen on better sites that could be available for early harvest.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up about 1,880 acres (16%) of state forest land in this area (Table 4.28.1). They occur on medium-quality sugar maple sites. Most stands have been managed on an uneven-aged system using the selection method of harvesting, which uses basal area criteria for a harvest decision rather than rotation age (Figure 4.28.3). Regeneration of trees, shrubs and herbaceous plant communities has been limited because of well-established sedge competition.

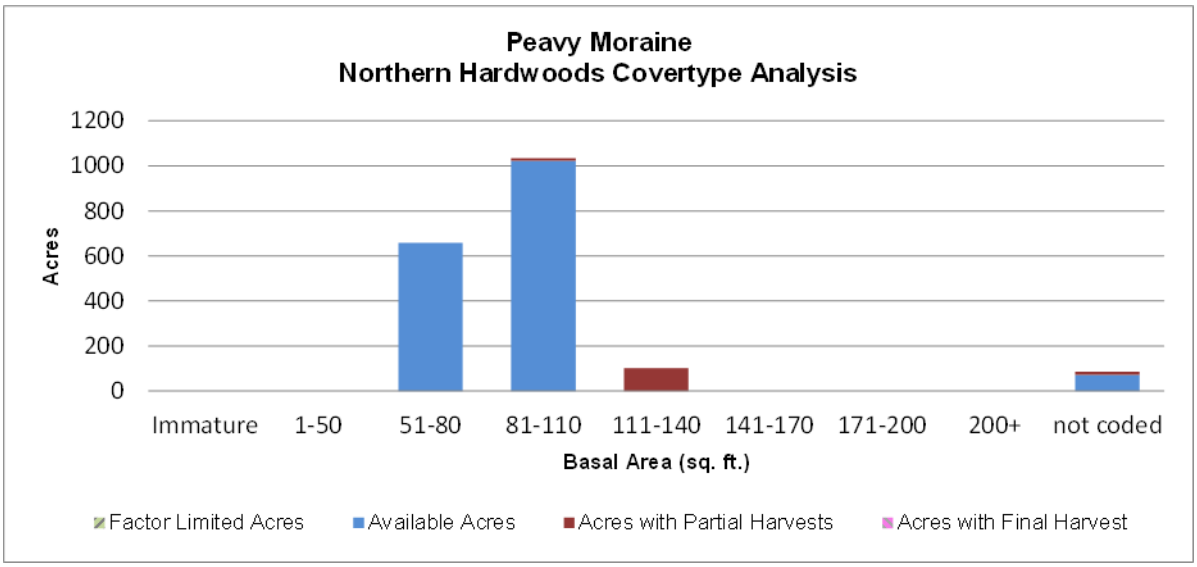

Figure 4.28.3. Graph of the basal area distribution for the northern hardwood cover type on the Peavy End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest northern hardwood stands on a 20-year cycle resulting in an estimated 940 acres harvested each decade; and
- Work to increase hardwood regeneration and reduce the sedge component.

10-Year Management Objectives

- Approximately 940 acres will be selectively cut in this planning period (Table 4.28.1);
- 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 understories to establish northern hardwood tree regeneration and improve understory diversity; and
- Monitor hardwood regeneration.

Oak Cover Type

Current Condition

The oak cover type is present on 639 acres (6%) in this management area (Table 4.28.1). It is an important species to wildlife for mast production. Most of the oak is over 80 years old and historical harvesting has been sporadic, producing acres in only three of eight age classes below 80 years old (Figure 4.28.4). There are hard factor limits on 276 acres and over 100 acres classified as uneven-aged. The red oak is of fair-quality.

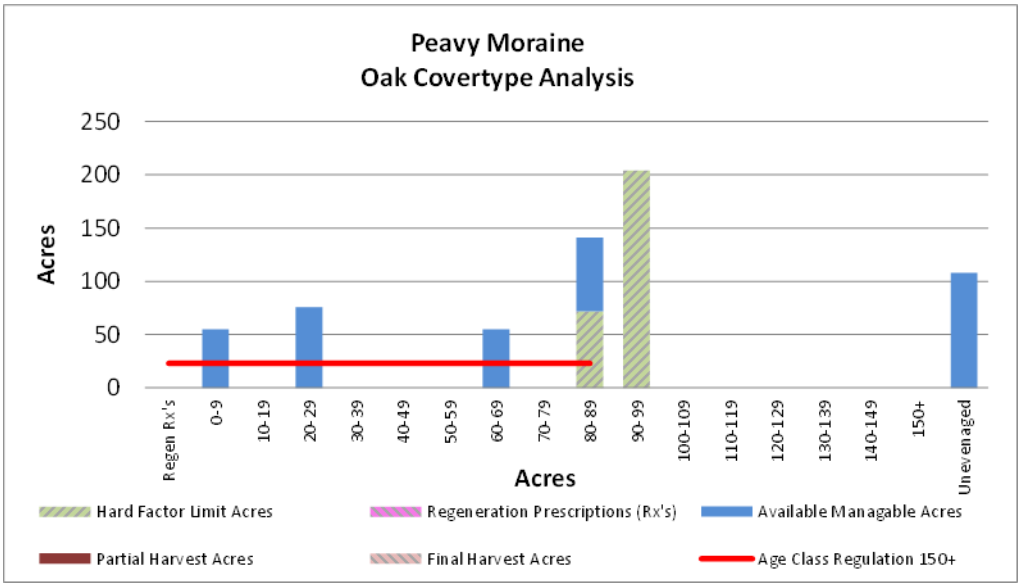

Figure 4.28.4. Graph of the age-class distribution for the oak cover type on the Peavy End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain a component of oak in mixture with natural red and white pine.

Long-Term Management Objectives

- Maintain oak as a component of mixed upland types;
- Red oak stands will be regenerated on a 150-year rotation resulting in 23 acres of final harvest and 81 acres of thinning each decade; and
- Monitor oak stands for oak wilt.

10-Year Management Objectives

- Thin about 81 acres of oak stands to increase hard mast production;
- Harvest and regenerate 23 acres of red oak; and
- In oak stands affected by oak wilt, convert to a pine type or oak barrens.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 549 acres (5%) of the state forest land in this management area (Table 4.28.1). These stands grow on poorly drained sites and support mixed stands of cedar, black spruce, hemlock, tamarack, balsam fir, white birch and balsam poplar. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. There are 465 acres of hard factor limited acres and they have been removed from the total number of manageable acres available for harvest Lowland conifers are poorly distributed across age classes, spiking in the 80-89 year-old age class (Figure 4.28.4). Little harvesting has been done in this type over the past 80 years.

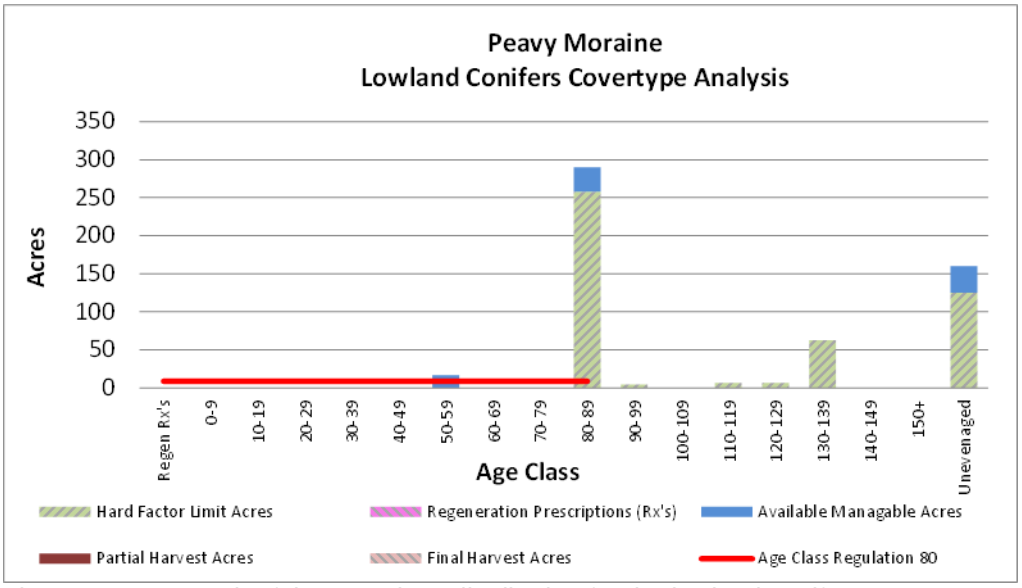

Figure 4.28.4. Graph of the age-class distribution for the lowland conifers cover type on the Peavy End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on an 80-year rotation providing 9 acres of final harvest each decade.
- Regenerate stands to a species-mix similar to the pre-harvest conditions favoring cedar, hemlock black spruce and balsam fir are preferred; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 32 acres over the next decade focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Red Pine Cover Type

Current Condition

The red pine cover type covers 432 acres (4%) of the state forest in this management area (Table 4.28.1). Red pine is poorly distributed across age classes spiking in the 40-49 year-old age class (Figure 4.28.5). About 75% of the red pine is of plantation origin, with the remaining stands being of natural origin. There also are a large number of acres classified as uneven-aged.

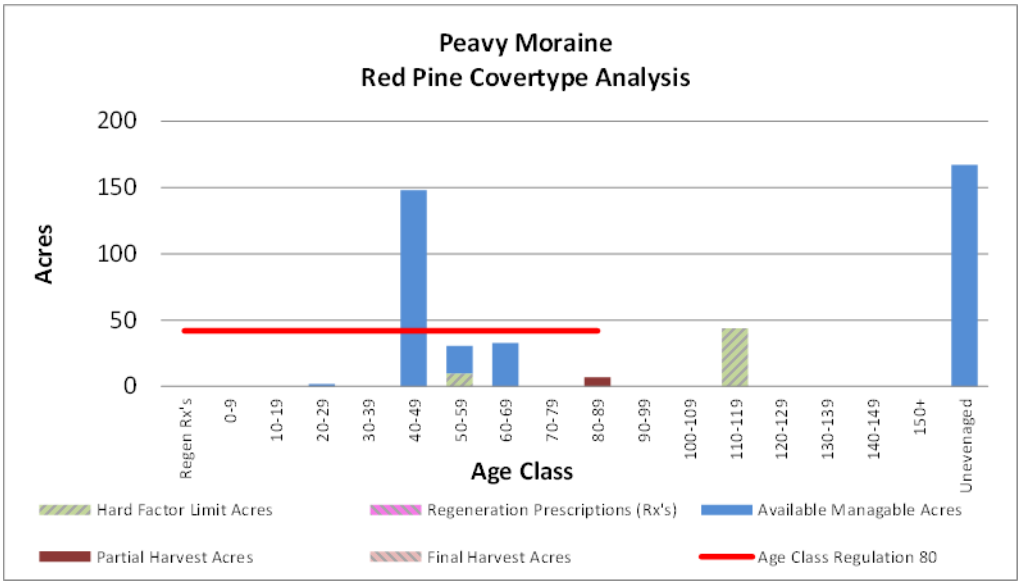

Figure 4.28.4. Graph of the age-class distribution for the red pine cover type on the Peavy End Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the current level of red pine cover type, both naturally occurring and red pine plantation; and
- Maintain the current ratio of red pine plantation acres (75%) to naturally occurring red pine acres (25%).

Long-Term Management Objectives

- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) resulting in 42 acres of final harvests and 250 acres of partial harvests each decade (Table 4.28.1);
- Manage natural origin stands on a 150 year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed; and
- Thin stands as necessary.

10-Year Management Objectives

- Begin working on the age-class spike in the 40-49 year-old age class to try and create a better age-class distribution (Figure 4.28.1);
- Thin about 195 acres of red pine stands during this 10-year planning period; and
- Final harvest and regenerate 143 acres of red pine in this 10-year planning period.

Other Forested Cover Types

Current Condition

Other forested types make up 1,508 acres and are made up of upland spruce/fir (409 acres), lowland deciduous (251 acres), mixed upland deciduous (246 acres), white pine (117 acres), natural mixed pines (93 acres), hemlock (78 acres), upland mixed forest (68 acres), cedar (65 acres), lowland spruce/fir (61 acres), upland conifer (40 acres), lowland poplar (38 acres), lowland mixed forest (21 acres), paper birch (15 acres) and jack pine (six acres). Together these types make up about 9% 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;
- Monitor to assure adequate regeneration of desired species;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 308 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (203 acres – 2%), lowland open/semi-open lands (285 acres – 2%) and miscellaneous other (water, local, urban) (104 acres – 1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass (open/semi-open lands) will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.28.2 – Featured Wildlife Species Management

The Peavy End Moraine management area has some of the highest quality oak and large-tooth aspen in the Crystal Falls forest management unit. It provides excellent habitat for multiple species and should be managed to ensure maximum mast production and the aspen cover types should be divided into a minimum of six age classes. The lowland conifer stands should be managed as deer winter range. White pine and hemlock should be encouraged in the uplands to protect and enhance the viability of the wintering complexes contained here. The primary focus of wildlife habitat management in the Peavy End Moraine management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, eastern bluebird, white-tailed deer and wood duck. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: mast (hard and soft); large open land complexes (with snags in open lands); deer wintering habitat; mature forest (especially near water); and retain or develop large living and dead standing trees (for cavities, especially near water). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on balancing the age-class distribution and provision of display, feeding, nesting and brood-rearing habitat via upland brush, opening and poorly stocked stand management.

Wildlife habitat specifications:

- Maintain aspen cover types within the management area, especially where associated with alder, riparian zones, or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and

- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Eastern Bluebird

The western Upper Peninsula goal for bluebirds is to maintain or improve habitat. State forest management efforts during this planning period will focus on maintaining or expanding open land conditions, protection of snags or dying standing trees associated with openings and managing opening complexes/savanna with prescribed fire.

Wildlife habitat specifications:

- Maintain herbaceous open-land complexes within the management area using prescribed burns or mowing and consider the spatial arrangement.
- Protect snags or dying standing trees within the open-lands. If nest cavities are not present consider: leaving standing live trees (e.g., aspen) trees in final harvest timber sales and/or planting scattered oak
- Leave a ½-chain buffer around openings to limit aspen encroachment following aspen timber harvests.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.

- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

Wood Duck

The western Upper Peninsula goal for wood duck is to maintain or increase suitable habitat. Management should focus on the protection of forest wetland, riparian corridors, providing large cavity trees, mast and the management of priority wildlife management areas with suitable habitat.

Wildlife habitat specifications:

- In landscapes that contain streams, beaver ponds and other potential habitat for wood ducks, provide potential nesting sites by providing mature forest (possibly special conservation area designations) and/or big-tree silviculture near water.
- Retain all large diameter over-mature cavity trees within 300 feet of water bodies for cavities in lowland and upland hardwoods. Where adjacent forest is young or cavities limited, nest trees should be promoted.
- Where appropriate, manage for mast in riparian areas.
- Increase potential riparian buffers to 300+ feet, where desired, instead of the standard 100 foot best management practice.

4.28.3 – 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, 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 4.28.2. 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 in this management area as in Figure 4.28.5.

Table 4.28.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Peavy End Moraines 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								
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late

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

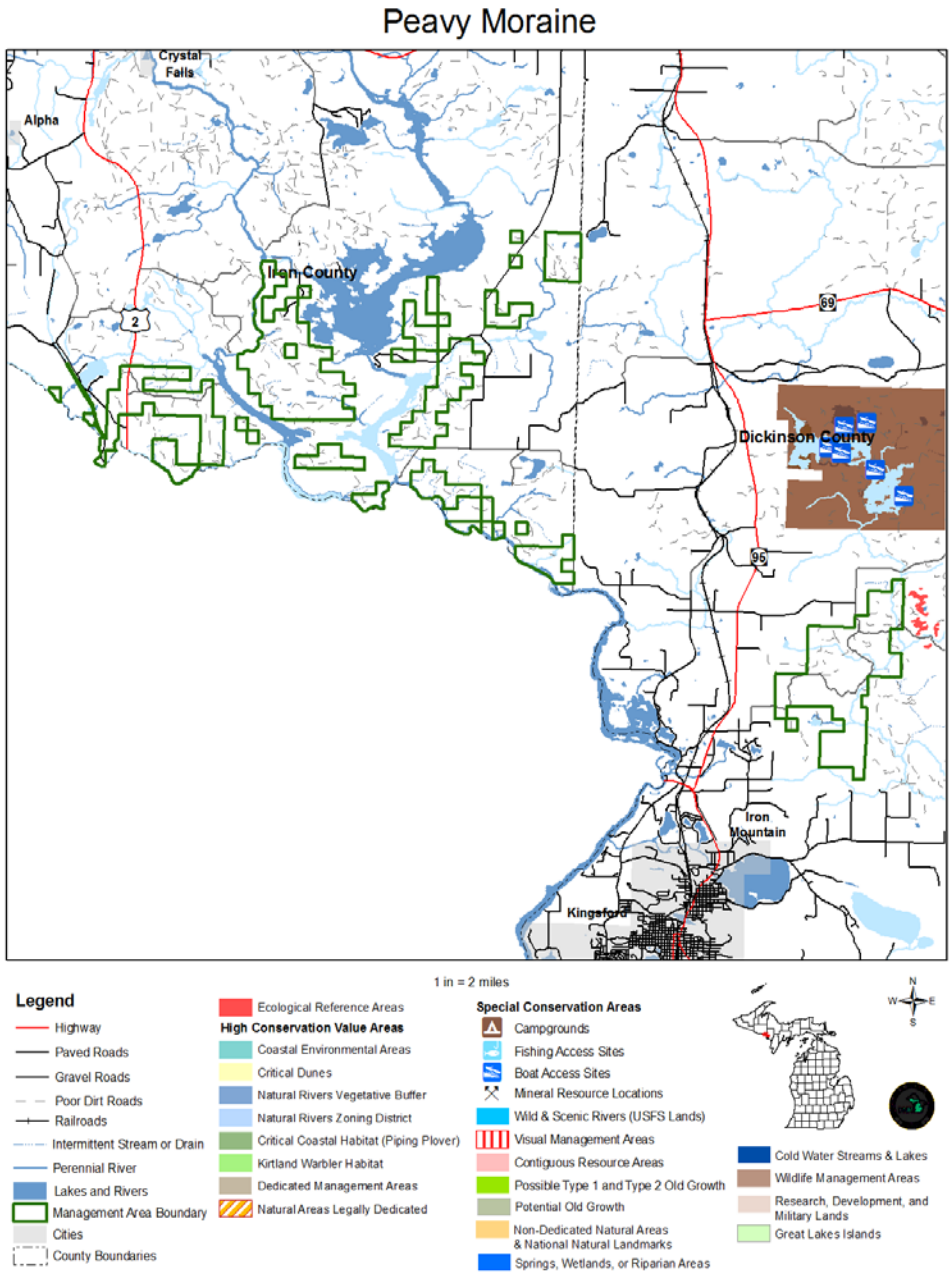

Figure 4.28.5. A map of the Peavy End Moraine management area showing the special resource areas.

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.

4.28.4 – 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
- Two-lined chestnut borer
- Oak wilt

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. Following is a list of species of concern that been documented in or near this management area.

- Common buckthorn
- Garlic mustard
- Glossy buckthorn
- Japanese barberry
- Japanese knotweed

4.28.5 – 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 4.28.1.

4.28.6 – Fire Management

Largely mesic forest communities, fire interval was probably very long. Area at the west end along the river may have been subject to pre-settlement management fire and area adjacent to the Groveland management area probably supported pine communities with somewhat shorter fire regimes.

- Portions of this area on the west side falls are within the Panola-Lake Mary Plains Zone Dispatch area. In that portion, initial attack is pre-planned, based on fire danger level, calling for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.
- In the remainder of the area, all wildfires are subject to appropriate initial attack response.

4.28.7 – Public Access and Recreation

This area has fair public and management access. Some tracts have limited access across private ownerships. No recreational facilities are located in this area.

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

4.28.8 – 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 an end moraine of coarse-textured till and glacial outwash sand and gravel and postglacial alluvium in places thin to discontinuous. The glacial drift thickness varies between 10 and 100 feet. Sand and gravel pits are located in the management area and there should be potential for additional pits.

The Precambrian Badwater Greenstone, the Dunn Creek, Michigamme and Hemlock Formations, Menominee and Chocolay Groups, Archean Granite/Gneiss, Volcanics and Sedimentary Rocks and Intrusives subcrop below the glacial drift. These rocks do not have a current economic use.

Metallic mineral exploration has occurred in the management area in the past and there could be additional potential.

4.29 Peshekee Highlands Management Area

Summary of Use and Management

Vegetative management in the Peshekee Highlands management area (MA) (Figure 4.29.1) 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: American marten, blackburnian warbler, gray jay, moose, northern goshawk and pileated woodpecker. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be issues for the next ten years.

Introduction

The Peshekee Highlands management area is on a bedrock controlled ground moraine in east-central Baraga and northwestern Marquette County. The state forest covers 20,670 acres and is in widely scattered parcels. The major ownership in this vicinity is forest industry and non-industrial private. The management area is dominated by the northern hardwood, lowland conifer and upland spruce/fir cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: mesic northern forest, poor conifer swamp, and boreal forest;
- Mid-range in site quality;
- This area has very rugged terrain and limited access;
- 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 benefit in a sustainable manner while minimizing user conflicts. Habitat management for moose has also been identified as a priority in this area.

The predominant cover types, composition and projected harvest areas for the Peshekee Highlands management area are shown in Table 4.29.1.

Table 4.29.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Peshekee Highlands 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
Northern Hardwood	35%	7,186	1,346	5,840	0	2,761	7,186	0	2,761
Lowland Conifers	11%	2,328	891	1437	296	0	2,328	131	0
Aspen	9%	1,897	191	1706	69	0	1,897	284	0
Upland Spruce/Fir	9%	1,874	926	948	0	0	1,874	135	0
Paper Birch	4%	918	613	305	0	0	918	44	0
Lowland Spruce/Fir	4%	750	190	560	71	0	750	62	0
Upland Open/Semi-Open Lands	1%	183	0	183	0	0	183	0	0
Lowland Open/Semi-Open Lands	10%	2,009	0	2009	0	0	2,009	0	0
Misc Other (Water, Local, Urban)	3%	545	0	545	0	0	545	0	0
Others	14%	2,980	410	2570	451	417	2,980	296	540
Total		20,670	4,567	16,103	886	3,178	20,670	952	3,301

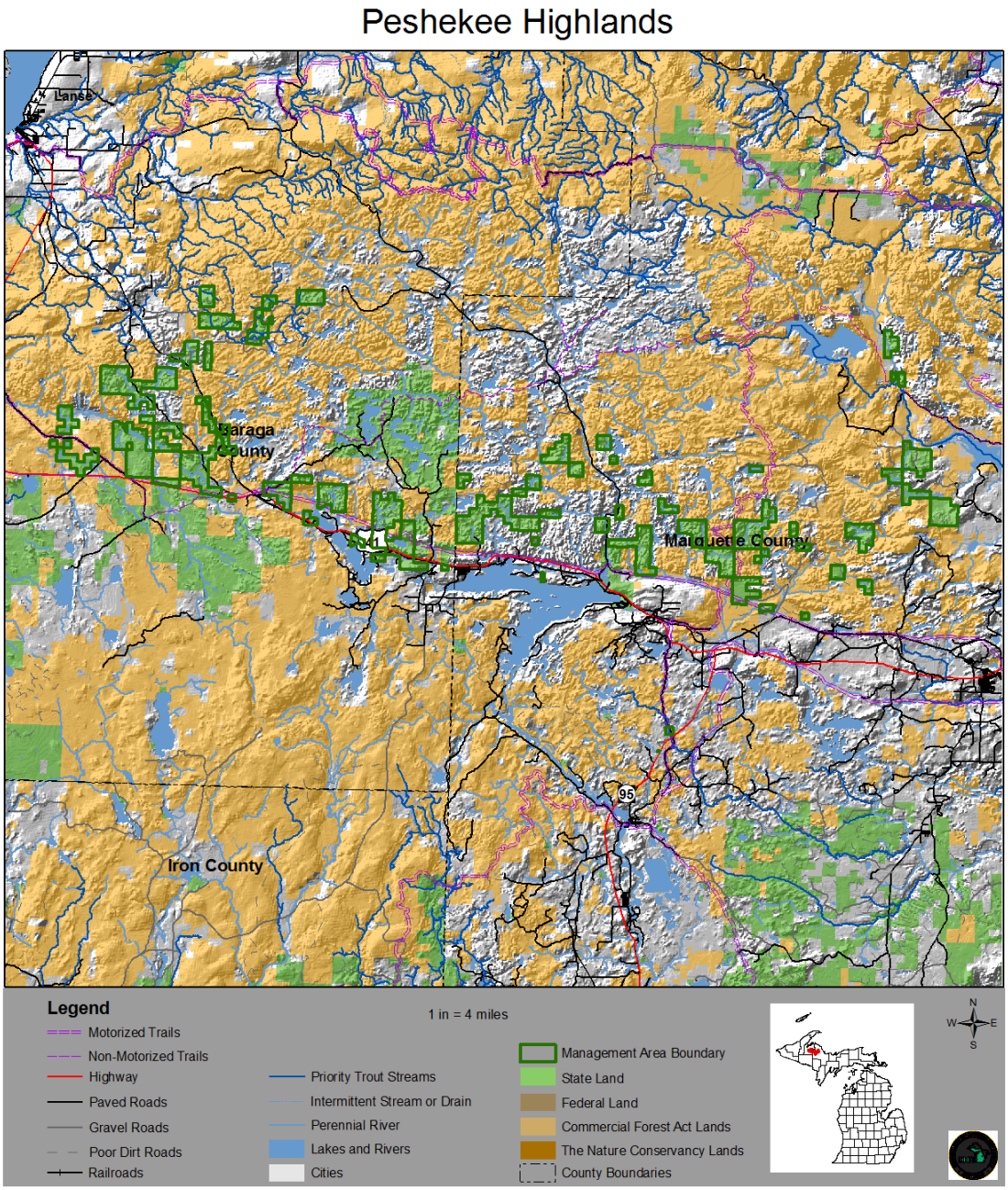

Figure 4.29.1. A map of the Peshekee Highlands management area (dark green boundary) in relation to other state forest and other lands in Baraga and Marquette Counties, Michigan.

4.29.1 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 Peshekee Highlands 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.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 7,186 acres (35%) of state forest land in this management area (Table 4.29.1). They occur on medium-quality sugar maple sites. Most stands have been managed on a selection harvest basis. Some of the stands in this area have limiting factors (Figure 4.29.2) and have been removed for harvest calculations. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

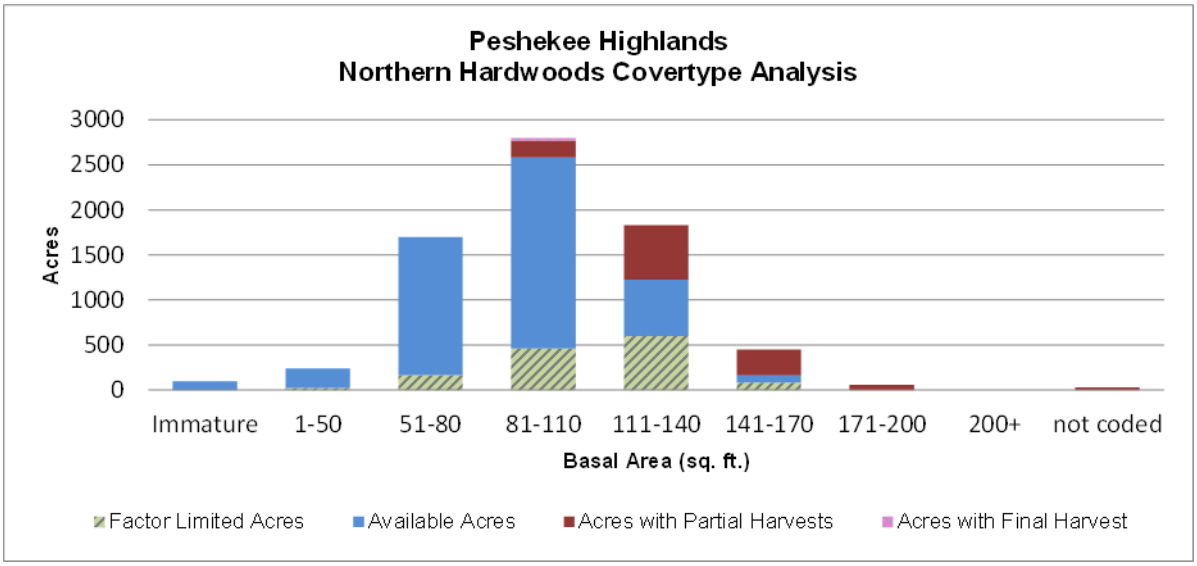

Figure 4.29.2. Graph of the basal area distribution for the northern hardwood cover type on the Peshekee Highlands management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle resulting in an estimated 2,761 acres harvested each decade;
- Maintain and encourage minor species to increase in-stand diversity; and
- Maintain hemlock as retention.

10-Year Management Objectives

- Selectively harvest 2,761 acres during this 10-year planning period;
- Maintain and regenerate white pine, oak, hemlock and upland cedar where they occur in stands that are harvested; and
- Work to regenerate hemlock components in stands lacking that species.

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 2,328 acres (11%) of the management area (Table 4.29.1). These stands occur on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Mixed lowland conifers have poor an age-class distribution, with most of the stands ranging between 80 and 110 years old. Many of these stands have a hard factor limit associated with them which makes them unavailable for harvesting this entry period. Some harvesting has been done in this type over the past 10 years.

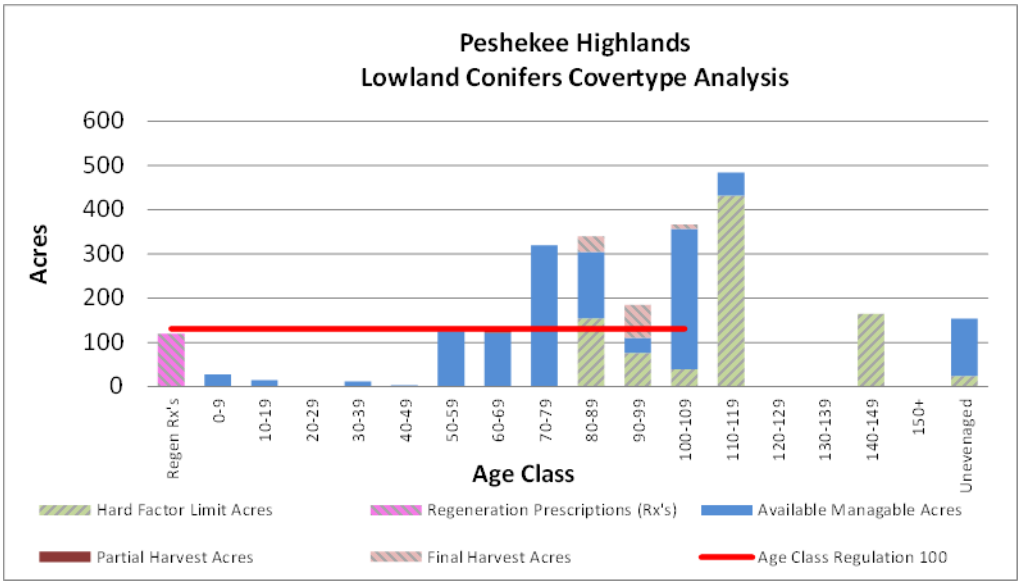

Figure 4.29.3. Graph of the age-class distribution for the lowland conifer cover type on the Peshekee Highlands management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage stands on a 100-year rotation leading to harvesting 131 acres per decade in those stands without hard factor limits (Figure 4.29.2);
- Regenerate stands to a species-mix similar to the pre-harvest conditions favoring cedar, black spruce and balsam fir; and
- Harvesting will be done using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 296 acres over this 10-year planning period, focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques;
- Use appropriate silvicultural techniques to assure adequate regeneration; and
- Monitor harvested sites.

Aspen Cover Type

Current Condition

The aspen cover type covers 1,897 acres (9%) of the management area (Table 4.29.1) and is poorly distributed across age classes (Figure 4.29.4). Aspen will be managed on a 60-year rotation to a balanced age-class structure indicated by the red line in Figure 4.29.2. Most of the age classes over the rotation age of 50 years (70-99 years on the graph) are in the hard factor limited category or are part of a regeneration harvest. With an absence of aspen in the 40-49, 50-59 and 60-69 year-old age classes, early entry into those age classes above the age-class regulation line, is possible, but unlikely during the next 10-year period.

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation (indicated by the red line in Figure 4.29.5);
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Once age classes are balanced, harvest and regenerate 284 acres each decade.

10-Year Management Objectives

- Harvest and regenerate 269 acres over this 10-year planning period with many of these acres coming from the 90-99 age class;
- Explore opportunities to harvest in the spikes (above the red line) presently in the 30-39 year-old age class as this age class grows older and reaches merchantable size;
- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early; and
- Maintain mature large-tooth aspen if present as retention.

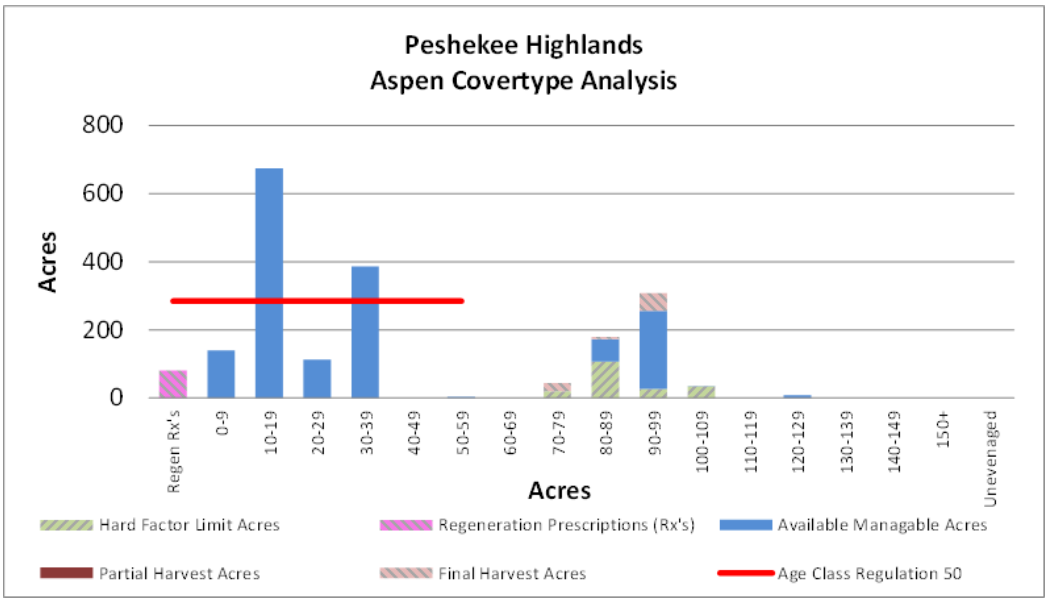

Figure 4.29.4. Graph of the age-class distribution for the aspen cover type on the Peshekee Highlands management area (2012 Department of Natural Resources inventory data).

Upland Spruce/Fir Cover Type

Current Condition

There are 1,874 acres (10%) of upland spruce/fir on this management area. About 53% percent of the stands have factor limits that preclude harvest activities (Table 4.29.1). Upland spruce/fir stands are generally short-lived reaching maturity in 60-70 years. Left unmanaged they may experience insect (spruce budworm) and/or windthrow mortality and will be

followed by natural regeneration of spruce-fir and/or aspen. Alternatively, they may succeed to shade tolerant hardwoods like red maple. Upland spruce/fir stands in this management area are unevenly distributed by age class. Upland spruce/fir typically occurs as small stands occupying the transition zone between larger upland types (aspen and northern hardwood) and lowlands.

Desired Future Condition

- Balanced acres in each age class over a 60-year rotation; and
- Provide older-aged spruce for moose loafing sites.

Long-Term Management Objective

- Harvest and regenerate upland spruce/fir stands using a 60-year rotation length harvesting about 135 acres each decade once age classes are better distributed.

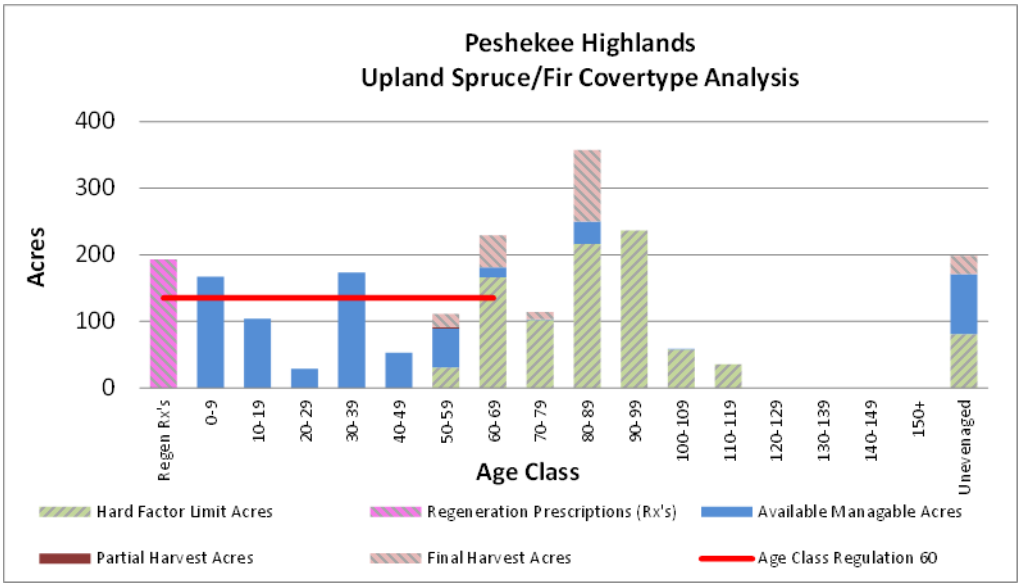

Figure 4.29.5. Graph of the age-class distribution for the upland spruce/fir cover type on the Peshekee Highlands management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Harvest the oldest stands first to minimize mortality loss;
- Harvest in this type for this planning period is expected to be zero acres;
- Evaluate the oldest stands with factor limits to determine which stands should be permanently withdrawn from timber production and which stands are only temporarily limited; and
- Harvesting in this type maybe needed in this planning period to reduce mortality losses in the older stands.

Paper Birch Cover Type

Current Condition

The paper birch cover type covers 918 acres (6%) of state forest land in this management area. Paper birch is poorly distributed across age classes ranging in age between 70 and 100, which is well over the biological maturity of paper birch. Many of the older age classes are subject to hard factor limits which may preclude harvesting (Figure 4.29.6). In the absence of disturbance, these older age classes will convert to other successional cover types.

Desired Future Condition

- Maintain the paper birch cover type on the management area.

Long-Term Management Objective

- Harvest and regenerate paper birch stands using a 60-year rotation length harvesting 44 acres each decade.

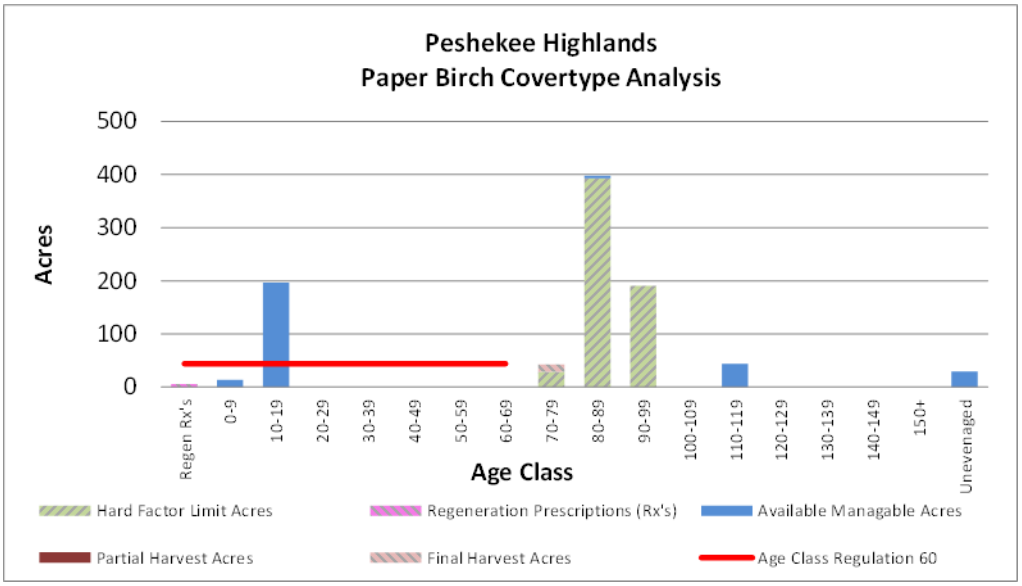

Figure 4.29.6. Graph of the age-class distribution for the paper birch cover type on the Peshekee Highlands management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Harvest and regenerate zero acres of paper birch in this 10-year planning period;
- Harvest stands of 70-90 year-old paper birch that is in decline; and
- More aggressive harvesting in this type maybe needed in this 10-year planning period to reduce mortality losses in the older stands.

Other Forested Cover Types

Current Condition

Other forested types make up 3,730 acres and are made up of mixed upland deciduous (840 acres), lowland spruce/fir (750 acres), upland mixed forest (541 acres), upland conifers (330 acres), lowland deciduous (256 acres), white pine (243 acres), cedar (233 acres), red pine (212 acres), , jack pine (152 acres), tamarack (73 acres), lowland mixed forest (58 acres), hemlock (25 acres) and oak (17 acres). Together these types make up about 18% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 939 acres during this 10-year planning period.

Other Non-Forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (183 acres – 1%), lowland open/semi-open lands (2,009 acres – 10%) and miscellaneous other (water, local, urban) (545 acres – 3%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.29.2 – Featured Wildlife Species Management

The Peshekee Highlands management area receives significant snowfall and does not offer wintering habitat for deer. As a result, many tree species that do not reliably recruit across other parts of the ecoregion are found in numerous age classes across this management area. Additionally, three of the largest tracts of mature forest in the Great Lakes region (e.g., McCormick Tract, Craig Lake State Park and the Huron Mountain Club) occur within or adjacent to this management area, the best example of a dry-mesic northern forest (Rocking Chair Lakes) in the state and two of the top eight examples of mesic northern forest statewide occur here. The current condition and spatial arrangement of these areas provide some of the best opportunities within the western Upper Peninsula, state and Great Lakes region for area sensitive wildlife requiring large tracts of mature forest, mesic conifer or corridors between such areas. The primary focus of wildlife habitat management in the Peshekee Highlands management area will be to address the habitat requirements identified for the following featured species: American marten, blackburnian warbler, gray jay, moose, northern goshawk and pileated woodpecker. Some of the most significant wildlife management issues in the management area are: habitat fragmentation; coarse woody debris; retain or develop large living and dead standing trees (for cavities); mesic conifer; mature forest; within-stand diversity; early successional forest (hardwood browse adjacent to closed canopy lowland conifer swamps); and coarse woody debris. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blow down.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.

- Retain down coarse woody debris present before cutting, and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags, coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the normal rotation length for upland spruce/fir cover types by 20 years in this management area.

Gray Jay

The goal for gray jay in the western Upper Peninsula is to maintain suitable habitat. State forest management for gray jay should focus on maintaining or increasing boreal forest cover types in a variety of age classes and ensure that older age classes of boreal forest are maintained. Important considerations in timber harvests are retention of spruce and fir and scattered individual trees for food caching within sale boundaries and maintaining spruce and fir buffers along bog edges.

Wildlife habitat specifications:

- Maintain appropriate forest types (birch, lowland deciduous, fir, lowland conifer, lowland spruce/fir, tamarack and bogs) in the management area in a variety of age classes. Fifteen percent of the total acres in the relevant cover types (as stated above) within the management area should be maintained in older age classes (those at least 20 years beyond “normal” rotation length for the cover type). In this management area, older age classes (greater than 100 years) for gray jay habitat are being met by the large number of stands with site conditions that limit harvesting.
- Retain patches within timber harvest sale boundaries; patches are preferred over single trees within timber harvest sale boundaries though it is beneficial to have both.
- Offset salvage harvests deemed necessary due to insect, disease or fire within the same cover type and age class (within the compartment, management area or western Upper Peninsula ecoregion), to minimize impacts on gray jay habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

Moose

The western Upper Peninsula goal for moose is to maintain or increase suitable habitat. Management for moose should focus on providing early successional browse adjacent to lowland conifer complexes, maintenance of hemlock within stands and maintaining or promoting willow, a valuable food source, along riparian and wetland edges.

Wildlife habitat specifications:

- Encourage early successional hardwood browse (in the 0-9 and 10-19 year-old age classes) in close proximity to closed canopy lowland conifer swamps.
- Balance aspen age-class distribution to ensure a more sustainable supply of browse.
- Retain hemlock and other conifer as thermal refuge in all harvested stands.
- Increase mesic conifer (e.g., hemlock, white pine, non-plantation red pine and upland spruce-fir) component on state forests by: a) Retaining a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine and white spruce in hardwood-dominated stands on suitable sites without a seed source. Increase the percentage of mesic conifers, where suitable, across the landscape by 10% during this planning cycle.
- Willow is an important browse species, as are submergent and emergent aquatic vegetation associated with summer feeding areas. Ensure sustainable supplies of each.

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 and on addressing fragmentation. Landscape scale management should provide mature and old aspen stands in the 60-69year-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.

Pileated Woodpecker

The western Upper Peninsula goal for pileated woodpeckers is to maintain or improve habitat. State forest management for the species should address mature forest and retention or development of large living and dead standing trees (for cavities) in this management area. Focusing such efforts on riparian and animal movement corridors will benefit additional species.

Wildlife habitat specifications:

- Identify and retain as many existing large (>15 inches in diameter at breast height) snags and cavity trees, coarse woody debris and reserve green trees, as possible to ensure a sustainable supply of future cavity/foraging trees and associated coarse woody debris. Poorly formed trees and those damaged by natural disturbance or earlier harvests, particularly deciduous trees, are good candidates for future snags and cavity trees. Large diameter aspen and other soft hardwoods are preferred.
- Even-aged managed stands: Leave scattered retention patches around some 18 inches in diameter at breast height or greater (if unavailable, identify future potential 18 inch secure trees) to be recruited as a nucleus, using the upper end of the retention guidelines.
- Uneven-aged managed stands: Retain a minimum of three secure cavity or snags per acre with one exceeding 18 inches in diameter at breast height. If snags or cavity trees are lacking, leave trees with defects of the maximum available size that will likely develop and be recruited as cavity trees.
- Offset salvage harvests deemed necessary due to insect or disease, or fire within the same cover type and age class (within the compartment, management area or western Upper Peninsula ecoregion), to minimize impacts on pileated woodpecker habitat. Total allowable harvest in these situations will be evaluated on a case-by-case basis.

4.29.3 – 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, 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 nine listed species as well as four natural communities of note occurring in the management area as listed in Table 4.29.2. 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 Rocking Chair Lakes natural area is a 235 acres special conservation area in this management area (Figure 4.29.7). There are also two potential Type 2 old growth areas as shown in Figure 4.29.7 representing 795 acres of the boreal forest natural community and 148 acres of the poor conifer swamp community.

Approximately 2,337.4 acres of potential old growth have been identified within the Peshekee Highlands management area (Figure 4.29.7). 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.

Table 4.29.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Peshekee Highlands management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Bog		S4/G3G5	Confirmed				Lowland open/semi-open	N/A
Northern shrub thicket		S5/G4	Confirmed				Upland open/semi-open	N/A
Northern wet meadow		S4/G4	Confirmed				Lowland open/semi-open	N/A
Rich conifer swamp		S3/G4	Confirmed				Tamarack	Late
Birds								
Kirtland's warbler	*Dendroica kirtlandii*	LE/E/G1/S1	Confirmed	PS	Very High	Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Early
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Butterfly								
Freija fritillary	*Boloria freija*	*SC/G5/S3S4*	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Rock whitlow grass	*Draba arabisans*	SC/G4/S3	Confirmed			Volcanic cliff	Upland open/semi-open	N/A
						Limestone cliff	Upland open/semi-open	N/A
						Limestone bedrock lakeshore	Upland open/semi-open	N/A
						Limestone cobble shore	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Limestone lakeshore cliff	Upland open/semi-open	N/A
						Northern bald	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
Fragrant cliff woodfern	*Dryopteris fragrans*	SC/G5/S3	Confirmed			Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Granite cliff	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	Upland open/semi-open	N/A
Narrow-leaved gentian	*Gentiana linearis*	T/G5/S2S3	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late

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

Although there are no high conservation value areas or ecological reference area in the management area as shown in Figure 4.29.7.

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.

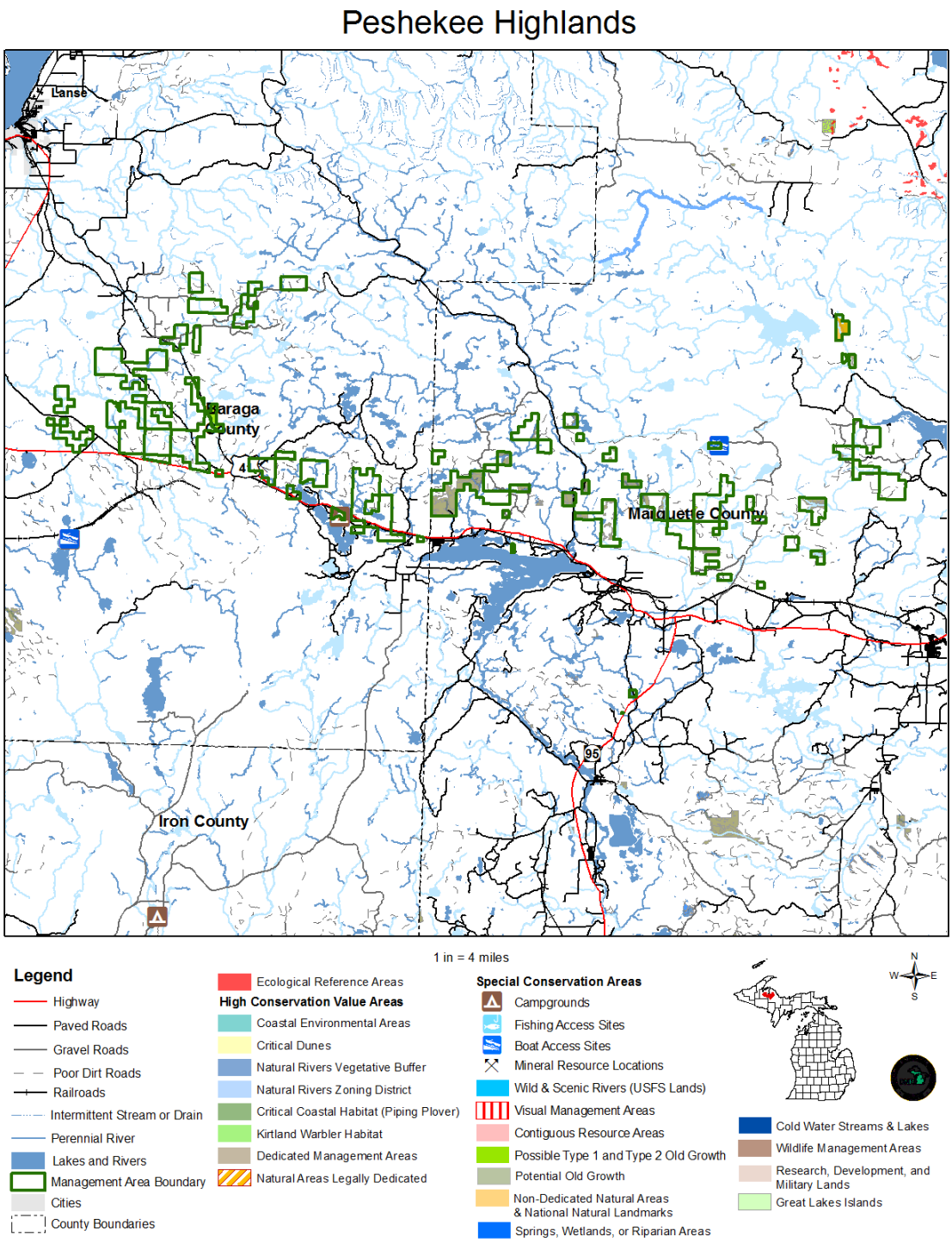

Figure 4.29.7. A map of the Peshekee Highlands management area showing the special resource areas.

4.29.4 – 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 spruce budworm and emerald ash borer.

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. Following is a list of species of concern that been documented in or near this management area:

- Common buckthorn
- Common St. John's-wort
- European swamp thistle
- Japanese knotweed
- Multiflora rose
- Reed canary grass
- Spotted knapweed
- Tatarian honeysuckle.

4.29.5 – 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 4.29.1.

4.29.6 – Fire Management

Lightning fires on rocky hills are common during summer months in this area. Dry and dry-mesic forests, which may have experienced periodic stand-replacement fire, line the Dead River Basin north of Negaunee. Otherwise, much of the area, and most of the state land, is covered by mesic northern forest that was little impacted by wildland fire.

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

4.29.7 – Public Access and Recreation

This area is very remote and rugged. There are few public access roads although there are a couple of motorized vehicle trails that run through the management area as shown in Figure 4.29.1. There are no state forest campgrounds and one boating access site on Ruth Lake in this area (Figure 4.29.7).

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

4.29.8 – 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 coarse-textured till and glacial outwash sand and gravel and postglacial alluvium in places thin to discontinuous. The glacial drift thickness varies up to 200 feet. Sand and gravel pits are located in the management area and there should be potential for additional pits.

The Precambrian Michigamme Formation, Archean Granite/Gneiss and the Siamo Slate and Ajibik Quartzite subcrop below the glacial drift. The Granite/Gneiss can sometimes be used as dimension stone.

Old iron mines and other explorations are located along the south edge of the management area. Metallic mineral exploration has occurred in the management area in the past and there could be additional potential.

4.30 Ralph Ground Moraine Management Area

Summary of Use and Management

Vegetative management in the Ralph Ground Moraine management area (MA) (Figure 4.30.1) 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 address the habitat requirements identified for the following featured species: American woodcock, black bear, northern goshawk, ruffed grouse and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes will be an issue for this 10-year planning period.

Introduction

The Ralph Ground Moraine management area is on ground moraines in northern Dickinson and southern Marquette Counties. The state forest covers 189,965 acres and is mostly contiguous. State forest lands are the major ownership in this vicinity. The management area is dominated by the aspen, northern hardwood and cedar cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by three natural communities: mesic northern forest, poor conifer swamp 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.
- This management area contains one of the western Upper Peninsula Grouse Enhanced Management Systems areas. This area plan will emphasize balanced age classes of aspen for timber production which will have habitat benefits for a number of the featured species including ruffed grouse and deer. The boundaries of Grouse Enhanced Management Systems areas will be delineated and an operational plan will be developed during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager and integrated into the plan through the revision process.

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 Ralph Ground Moraine management area are shown in Table 4.30.1.

Table 4.30.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the 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	38%	71,514	3,705	67,809	14,964	0	71,514	11,301	0
Northern Hardwood	16%	30,020	609	29411	0	12,687	30,020	0	14,425
Cedar	13%	24,519	2,209	22310	0	0	24,519	1,394	0
Lowland Conifers	11%	21,324	11,303	10021	1,114	0	21,324	1,114	0
Upland Open/Semi-Open Lands	4%	6,851	0	6851	0	0	6,851	0	0
Lowland Open/Semi-Open Lands	6%	12,152	0	12152	0	0	12,152	0	0
Misc Other (Water, Local, Urban)	1%	1,729	0	1729	0	0	1,729	0	0
Others	12%	21,856	4,476	17380	2,252	2,400	21,856	2,052	3,041
Total		189,965	22,302	167,663	18,330	15,087	189,965	15,861	17,466

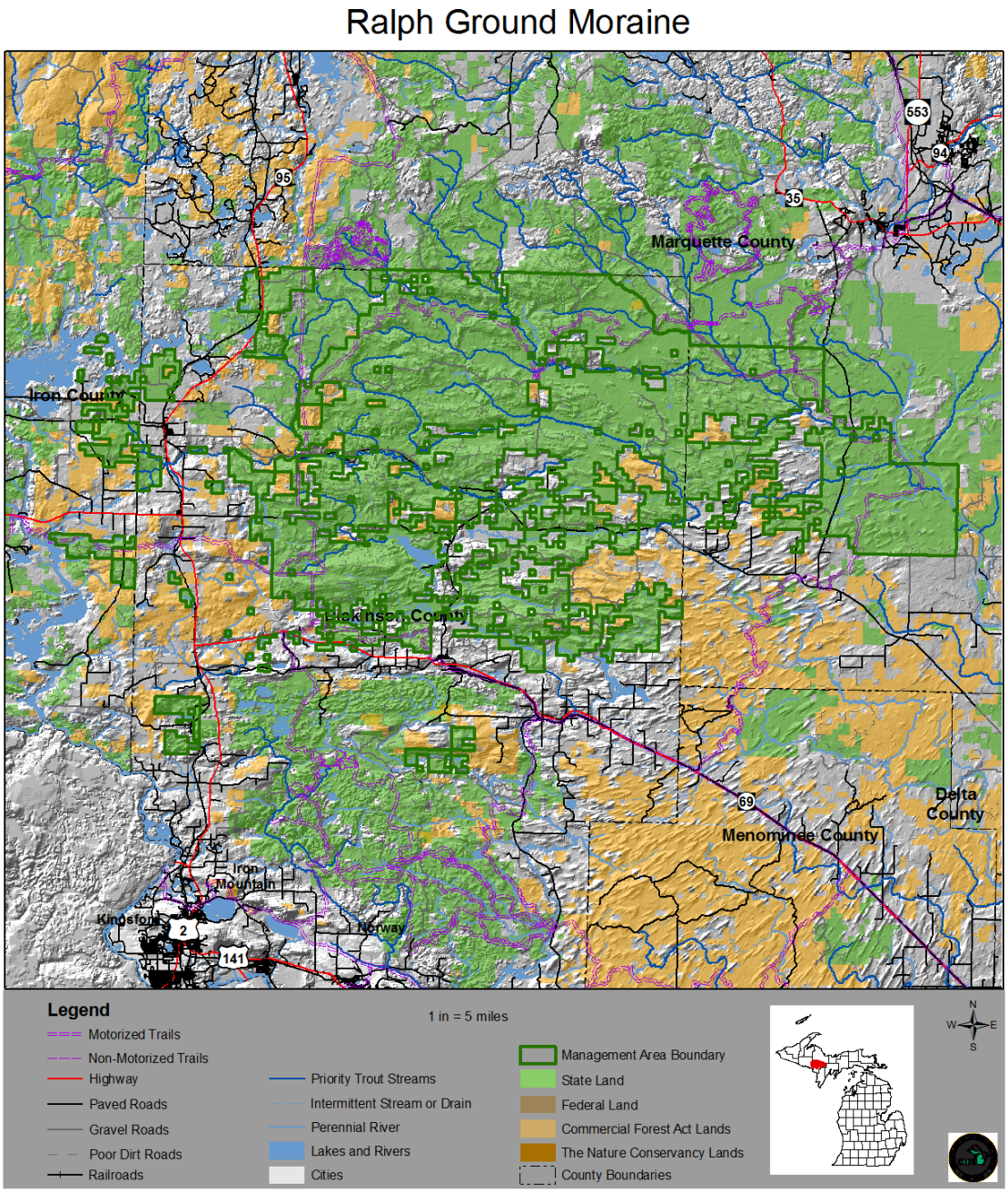

Figure 4.30.1. A map of the Ralph Ground Moraine management area (dark green boundary) in relation to surrounding state forest and other lands in Dickinson and Marquette Counties, Michigan.

4.30.1 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 Ralph Ground Moraine 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 71,514 acres (38%) of state forest land in this management area (Table 4.30.1) and is poorly distributed across age classes (Figure 4.30.2). Aspen will be managed on a 50-year rotation to a balanced age-class structure indicated by the red line in Figure 4.30.2. Most of the age classes over the rotation age of 50 years (50-59 years on the graph) are in the hard factor limited category or are part of a regeneration harvest. With an absence of aspen in the 50-59 year-old and 60-69 year-old age classes, early entry into those age classes above the age-class regulation line is possible, but unlikely during this 10-year planning period because aspen in these age classes in this management area are not of merchantable size.

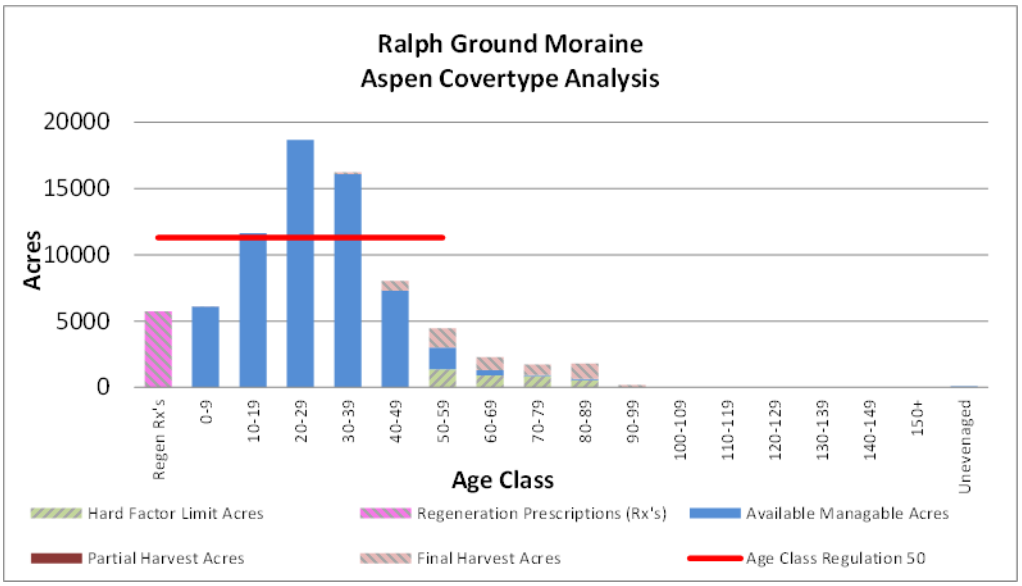

Figure 4.30.2. Graph of the age-class distribution for the aspen cover type on the Ralph Ground Moraine management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation (indicated by the red line in Figure 4.30.2);
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate approximately 11,301 acres each decade.

10-Year Management Objectives

- Because of the lack of older age classes it will be challenging to meet 10-year harvest goals. Identify some younger aspen on better sites that could be available for early harvest up to 14,964 acres. Much of this acreage will come from the 40-49 year-old and older age classes.
- Opportunities to harvest in the spikes (above the red line) presently in the 20-29 and 30-39 year-old age classes will be explored as these classes grow older and reach merchantable size;
- Aspen within the identified Grouse Enhanced Management Systems area may be managed differently than the rest of the aspen within the management area, with a shorter rotation age, small patch cuts and carefully considered stand adjacency;

- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early; and
- Maintain mature large-tooth aspen if present as retention.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up 30,020 acres (16%) of state forest land in this management area (Table 4.30.1). They occur on medium-quality sugar maple sites. Most stands have been managed on a selection harvest basis and are in good condition. Recruitment of seedlings and saplings into larger size classes is generally not successful due to browse pressure. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle resulting in an estimated 14,425 acres harvested each decade; and
- Work to improve hardwood regeneration.

10-Year Management Objectives

- Selectively harvest 12,687 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 and promote white pine, hemlock, oak and upland cedar where they occur in stands that are cut, favoring oak for retention;
- Experiment with mechanical and chemical treatments of the sedge understories to establish northern hardwood tree regeneration and improve understory diversity; and
- Monitor hardwood regeneration.

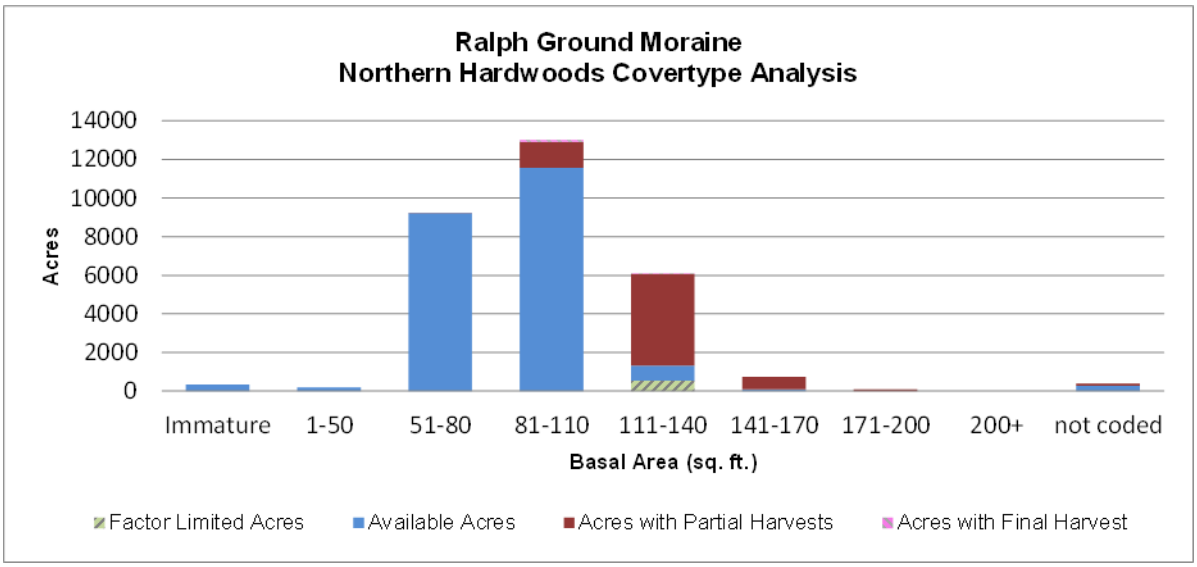

Figure 4.30.3. Graph of the basal area distribution for the northern hardwood cover type on the Ralph Ground Moraine management area (2012 Department of Natural Resources inventory data).

Cedar Cover Type

Current Condition

The cedar cover type covers 24,519 acres (13%) of the management area (Table 4.30.1). Stands occur on poorly drained sites and support mostly cedar mixed with black spruce, tamarack and balsam fir. Cedar historically does not regenerate reliably especially in high deer population areas such as the Ralph Ground Moraine management area and this is well illustrated in Figure 4.30.5. The absence of any age classes below 70-79 years old indicates little harvesting has occurred in this type; largely due to regeneration challenges. Most of the stands are over 80 years old.

Although there will be no harvesting of cedar within deer wintering complexes, there is a need to address future cedar cover. Limited cedar harvests will occur outside the wintering complexes recognizing that cedar takes many years to regenerate and escape deer browsing. Reliable and timely regeneration of cedar is a concern from both wildlife and forest management perspectives.

Desired Future Condition

- Improved age-class distribution with closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of cedar seedlings and saplings; and
- Maintain the cedar cover type at the current acreage level.

Long-Term Management Objectives

- Maintain the cedar cover type current representation on the landscape;
- Regenerate stands to a species mix similar to the pre-harvest conditions; and
- Explore techniques for regenerating the cedar cover type under high browsing pressures, ideally leading to balanced age-classes and harvesting 1,394 acres per decade.

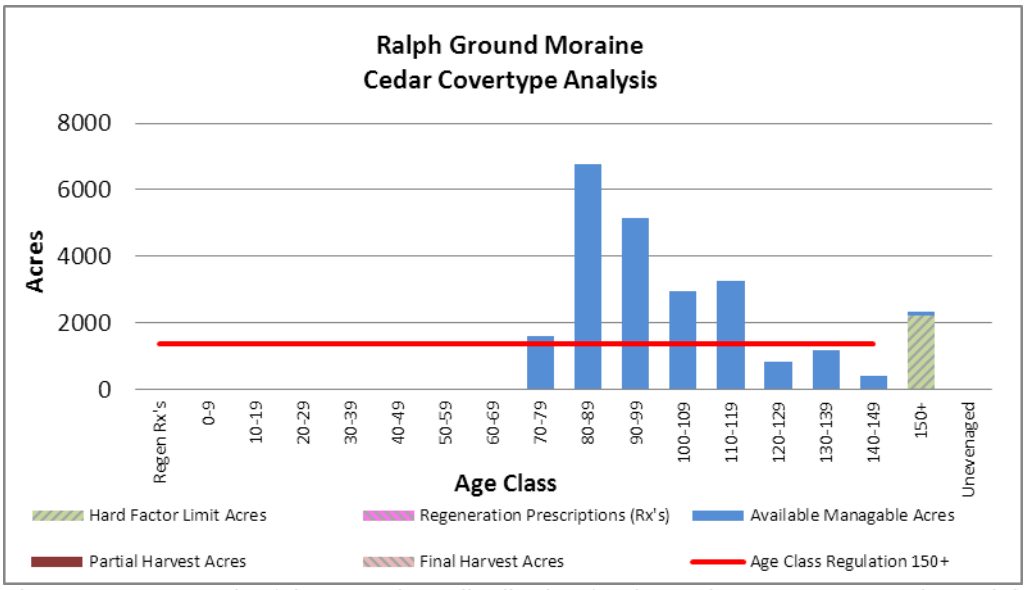

Figure 4.30.4. Graph of the age-class distribution for the cedar cover type on the Ralph Ground Moraine management area (2012 Department of Natural Resources inventory data).

10-Year Management Objective

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

Lowland Conifers Cover Type

Current Condition

The lowland conifer cover type covers 21,324 acres (11%) of the management area. These stands occur on poorly drained sites supporting mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Mixed lowland conifers have poor age-class distribution, with most of the stands ranging between 80 and 119 years old (Figure 4.30.5). Most of these stands have a hard factor limit associated with them which makes them unavailable for harvesting this entry period. Some harvesting has been done in this type over the past 10 years.

Desired Future Condition

- Improved age-class distribution including closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

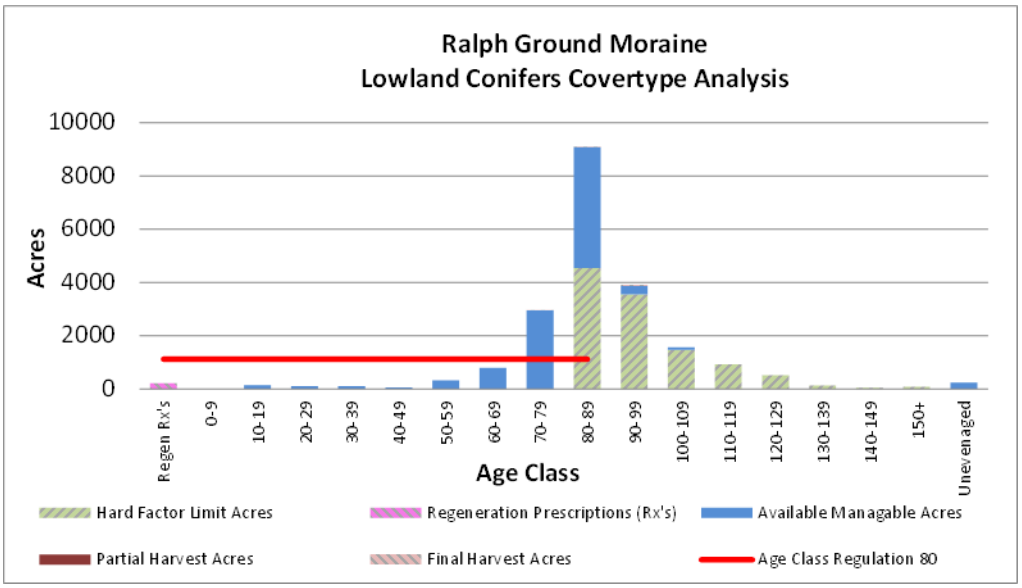

Figure 4.30.5. Graph of the age-class distribution for the lowland conifer cover type on the Ralph Ground Moraine management area (2012 Department of Natural Resources inventory data).

Long-Term Management Objectives

- Manage stands on an 80-year rotation leading to harvesting 1,114 acres per decade in those stands without hard factor limits;
- Regenerate stands to a species mix similar to the pre-harvest conditions favoring cedar, hemlock black spruce and balsam fir are preferred.

10-Year Management Objectives

- Begin to improve the distribution of age classes by harvesting those stands beyond rotation age leading to harvesting 1,114 acres over the next decade; and
- Focus on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.
- Use appropriate silvicultural techniques to assure adequate regeneration of desirable species; and
- Monitor harvested sites.

Other Forested Cover Types

Current Condition

Other forested types make up 21,856 acres and are made up of lowland spruce/fir (5,735 acres), upland spruce/fir (3,053 acres), red pine (2,869 acres), lowland poplar (1,615 acres), white pine (1,588 acres), lowland deciduous (1,162 acres), tamarack (892 acres), upland mixed forest (863 acres), jack pine (834 acres), mixed upland deciduous (633 acres), paper birch (631 acres), lowland mixed forest (533 acres), natural mixed pines (464 acres), oak (387 acres), hemlock (304 acres) and upland conifers (293 acres). Together these types make up about 12% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 4,652 acres during this 10-year planning period.

Other Non-Forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (6,851 acres – 4%), lowland open/semi-open lands (12,152 acres – 6%) and miscellaneous other (water, local, urban) (1,729 acres – 1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.30.2 – Featured Wildlife Species Management

The Ralph Ground Moraine management area is a very large management area that is dominated by state ownership. Almost every cover type and associated species can be found within the management area including several deer wintering complexes. The lowland conifer stands in deer wintering complexes should be managed to benefit wintering deer. This management area provides some of the finest grouse and woodcock hunting in the Midwest and this wildlife management priority will continue. This single management area represents 29% of the western Upper Peninsula's aspen resource and it is desirable to maintain this resource in a wide range of age classes. The primary focus of wildlife habitat management in the Ralph Ground Moraine management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, northern goshawk, ruffed grouse and white-tail deer. Some of the most significant wildlife management issues in the management area are: early successional forest conditions (associated with alder, riparian zones or forested wetlands); mast (hard and soft); habitat fragmentation; mature forest

(upland deciduous, especially aspen and mixed forest with little understory); coarse woody debris; and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

This management area will include one or more Grouse Enhanced Management System areas. The boundaries will be delineated during this planning period by the local biologist in collaboration with the Forest Resources Division unit manager. Aspen stands that fall within the boundary may be managed to enhance habitat and hunting opportunities for ruffed grouse, woodcock, and deer. Habitat treatments may include managing aspen on a shortened rotation with multiple age classes and smaller stand sizes.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

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 and on 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.
- Manage the aspen cover type for smaller patch size, a shorter rotation and a more deliberate habitat configuration within the designated Grouse Enhanced Management Systems areas where appropriate.
- 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states “Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer.” There is a complex relationship between deer abundance; available summer and winter habitat, timber management and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.

- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.30.3 – 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, 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 ten listed species and no natural communities of note occurring in the management area as listed in Table 4.30.2. 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 Norway Truck Trail is a natural beauty road and a special conservation area that is within the Ralph Ground Moraine management area as shown in Figure 4.30.6.

Approximately 2,570.9 acres of potential old growth have been identified within the Ralph Ground Moraine 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.30.6.

Table 4.30.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Ralph Ground 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
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
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Black-backed woodpecker	*Picoides arcticus*	SC/G5/S3	Confirmed	IL	Very High	Rich conifer swamp	Tamarack	Late
						Bog	Lowland open/semi-open	N/A
						Dry northern forest	Jack Pine, Red Pine	Early
						Muskeg	Lowland open/semi-open	N/A
						Mesic northern Forest	Northern Hardwood	Late
						Boreal forest	Upland & Lowland Sp/F	Mid
Butterflies								
Freija fritillary	*Boloria freija*	*SC/G5/S3S4*	Confirmed	HV	Low	Bog	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
Red-disked alpine	*Erbia discoidalis*	*SC/G5/S2S3*	Confirmed	MV	Low	Bog	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Muskeg	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Poor fen	Lowland open/semi-open	N/A
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plant								
Western dock	*Rumex occidentalis*	E/G5/S1	Confirmed			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

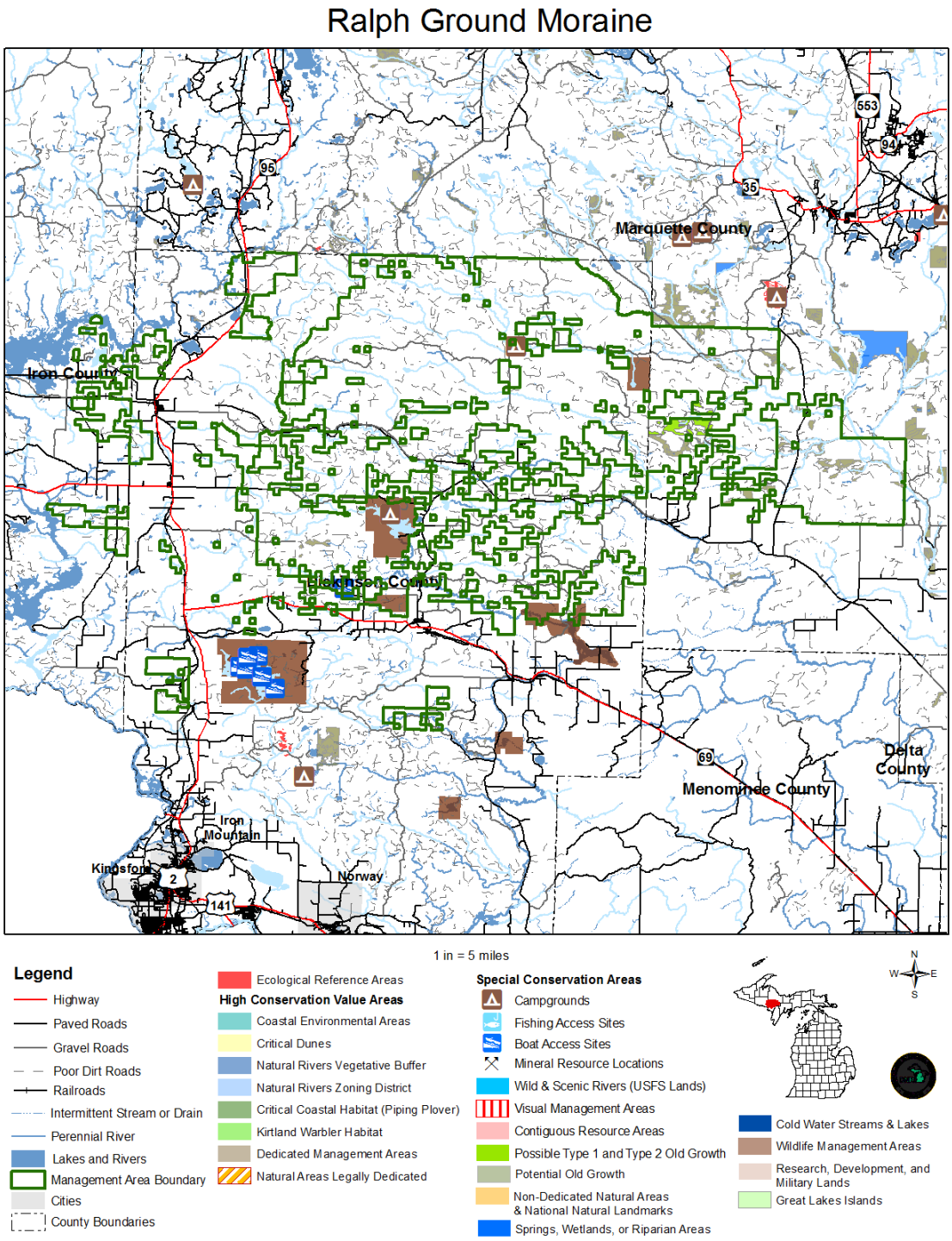

Figure 4.30.6. A map of the Ralph Ground Moraine management area showing the special resource areas.

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.

4.30.4 – 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
- 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. The only species of concern that been documented in or near this management area is Japanese knotweed.

4.30.5 – 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 are shown in Figure 4.30.1.

4.30.6 – Fire Management

Largely mesic and wetland forest communities were probably not significantly affected by fire disturbance overall. Portions of this area adjacent to Chain Lakes and Floodwood management areas probably supported pine communities with somewhat shorter fire regimes.

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

4.30.7 – Public Access and Recreation

This area has good public and management access. Gene's Pond and West Branch state forest campgrounds are located in this area as shown in Figure 4.30.6. Gene's Pond has a boating access site associated with it. Additional boating access sites are located on Pickerel Lake, Six Mile Lake and Solberg Lake. Several snowmobile trails cross this area as shown in Figure 4.30.1.

Specific hunting recreation improvements such as parking lots, gates, trail planting and trail establishment, as well as the preparation and dissemination of specific promotional material, may be made as a result of Grouse Enhanced Management Systems areas planning in this management area.

- Work to expand recreation facilities as opportunities arise.

4.30.8 – 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 an end moraine of coarse-textured till, medium and coarse-textured till, peat and muck and glacial outwash sand and gravel and postglacial alluvium in places thin to discontinuous. The glacial drift thickness varies up to 200 feet. Sand and gravel pits are located in the management area and there is potential for additional pits.

The Ordovician Black River Formation and Prairie du Chien Group, Cambrian Trempealeau Formation and Munising Group and Precambrian Michigamme, Hemlock, Menominee and Chocolay Formations, Archean Granite/Gneiss, Volcanics and Sedimentary Rocks and Randville Dolomite subcrop below the glacial drift. The Black River is quarried for dolostone/stone in the Upper Peninsula and the Randville and Granite/Gneiss are sometimes be used as dimension stone.

Old iron mines and other explorations are located along the west edge of the management area. Metallic mineral exploration has occurred in the management area in the past, and several locations within the management area are currently leased, with additional exploration in the management area likely.

4.31 Sand River Lake Plain Management Area

Summary of Use and Management

Vegetative management in the Sand River Lake Plain management area (MA) (Figure 4.31.1) 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: American marten, blackburnian warbler, red-shouldered hawk and white-tailed deer. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and ensuring reliable regeneration of lowland species will be issues for this 10-year planning period.

Introduction

The Sand River Lake Plain management area is on a till-floored lake plain in northeastern Marquette County. The state forest covers 15,913 acres and is mostly contiguous. The major ownership in this vicinity is non-industrial private. The management area is dominated by the northern hardwood, aspen and hemlock cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: mesic northern forest and poor conifer swamp;
- Low-range in site quality;
- Opportunities to enhance biodiversity;
- 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 Sand River Lake Plain management area are shown in Table 4.31.1.

Table 4.31.1. Summary of cover types, composition, limiting factor area, manageable area and projected harvest area for the Sand River Lake Plain 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
Northern Hardwood	33%	5,270	514	4,756	0	2,100	5,270	0	2,100
Aspen	20%	3,205	34	3171	402	0	3,205	529	0
Hemlock	11%	1,696	490	1206	0	236	1,696	0	236
Lowland Deciduous	7%	1,162	360	802	89	0	1,162	89	0
Lowland Conifers	5%	864	170	694	63	0	864	63	0
Upland Open/Semi-Open Lands	0%	35	0	35	0	0	35	0	0
Lowland Open/Semi-Open Lands	7%	1,132	0	1132	0	0	1,132	0	0
Misc Other (Water, Local, Urban)	2%	315	0	315	0	0	315	0	0
Others	14%	2,234	545	1689	416	60	2,234	174	133
Total		15,913	2,113	13,800	970	2,396	15,913	855	2,469

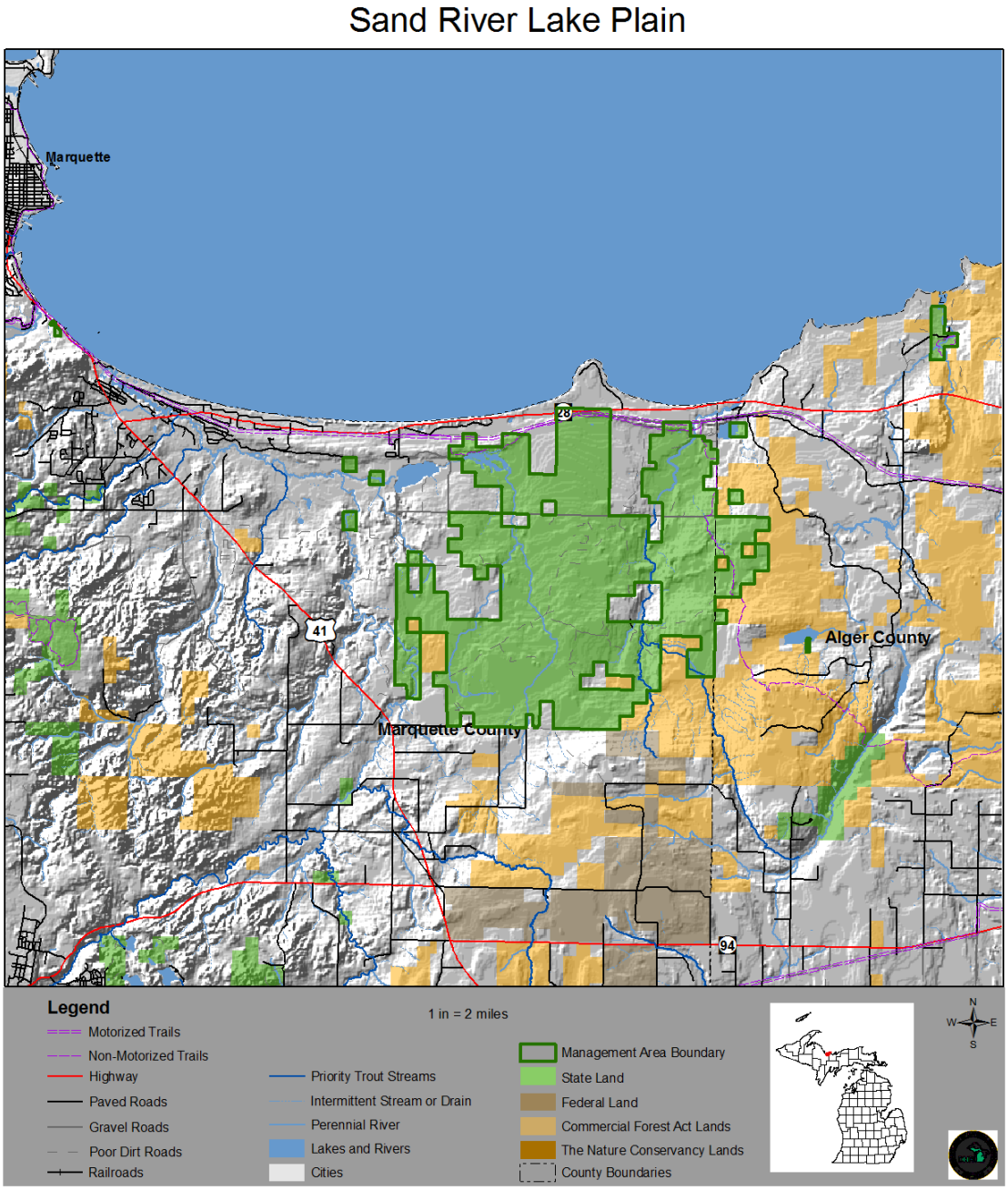

Figure 4.31.1. A map of the Sands River Lake Plain Moraine management area (dark green boundary) in relation to surrounding state forest lands and other ownerships.

4.31.1 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 Sand River Lake Plain 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.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 5,270 acres (33%) of state forest land in this management area (Table 4.31.1). They occur on medium-quality sugar maple sites. While most stands have been managed on a selection harvest basis, there are some acres in the immature category showing that they were managed using even-aged harvesting (Figure 4.31.2). There are 514 acres that have limiting factors. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully.

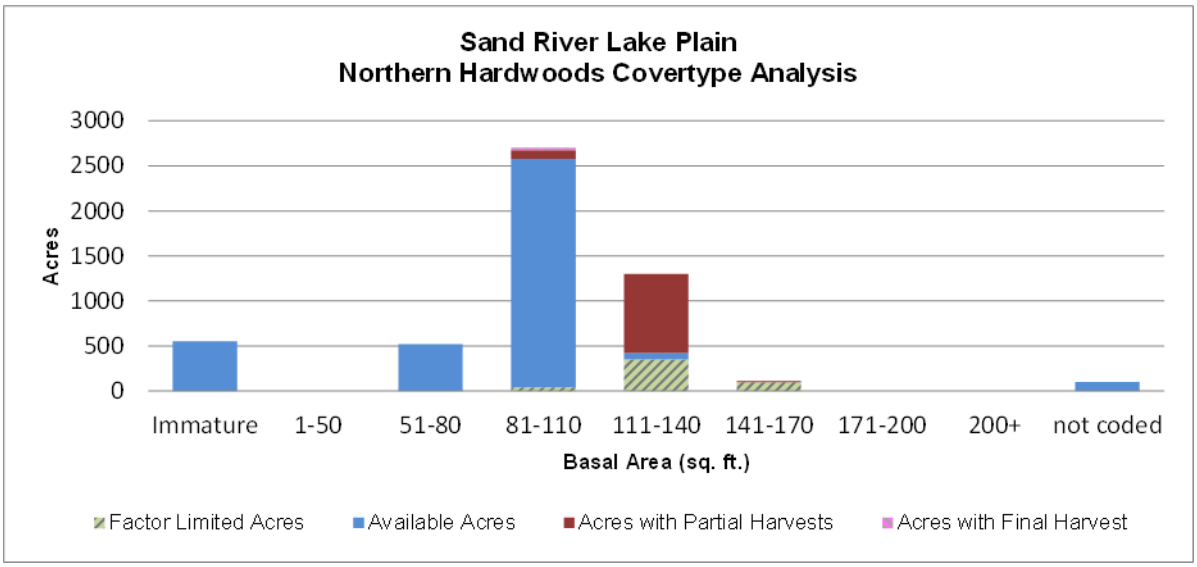

Figure 4.31.2. Graph of the basal area distribution for the northern hardwoods cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selectively harvest high quality northern hardwood stands on a 20-year cycle;
- Manage low quality northern hardwood stands on an even-aged system with an 80-year rotation; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Approximately 2,100 acres will be selectively cut during this 10-year planning period;
- Maintain and promote white pine, oak, hemlock and upland cedar where they occur in stands that are harvested favoring oak for retention where found; and
- Work to regenerate and increase hemlock components in stands.

Aspen Cover Type

Current Condition

The aspen cover type covers 3,205 acres (20%) of state forest land in this management area (Table 4.31.1). Aspen has been successfully harvested and regenerated over recent years and the majority of the acres are in the 0-9, 10-19, 20-29 and 30-39 year-old age classes (Figure 4.31.3). Few acres of aspen are greater than 60 years of age. There are 34 acres of aspen that have limiting factors on them. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

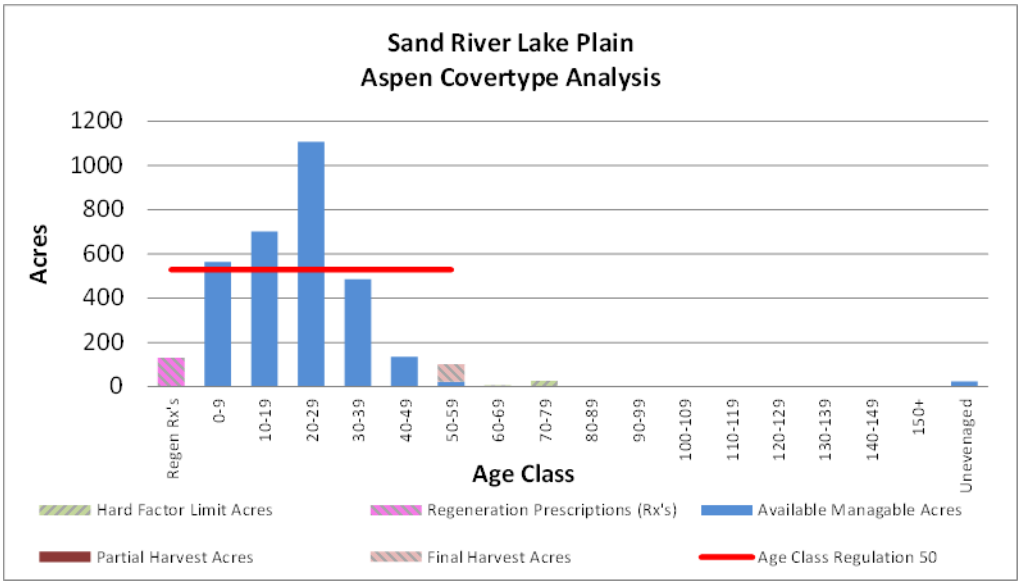

Figure 4.31.3. Graph of the age-class distribution for the aspen cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 50-year rotation;
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Harvest and regenerate 529 acres each decade.

10-Year Management Objectives

- The projected 10-year harvest is 402 acres;
- Evaluate younger stands for early harvest to work toward balancing the age classes; and
- Maintain mature large-tooth aspen if present as retention.

Hemlock Cover Type

Current Condition

Hemlock stands make up 1,696 acres (11%) of state forest land in this area (Table 4.31.1). This cover type is important to wildlife to reduce snow depths and as a source of thermal cover. Most stands have been unmanaged. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Hemlock is often managed using an uneven-aged harvest system based on basal area rather than age prior to final harvest at rotation age (Figure 4.31.4).

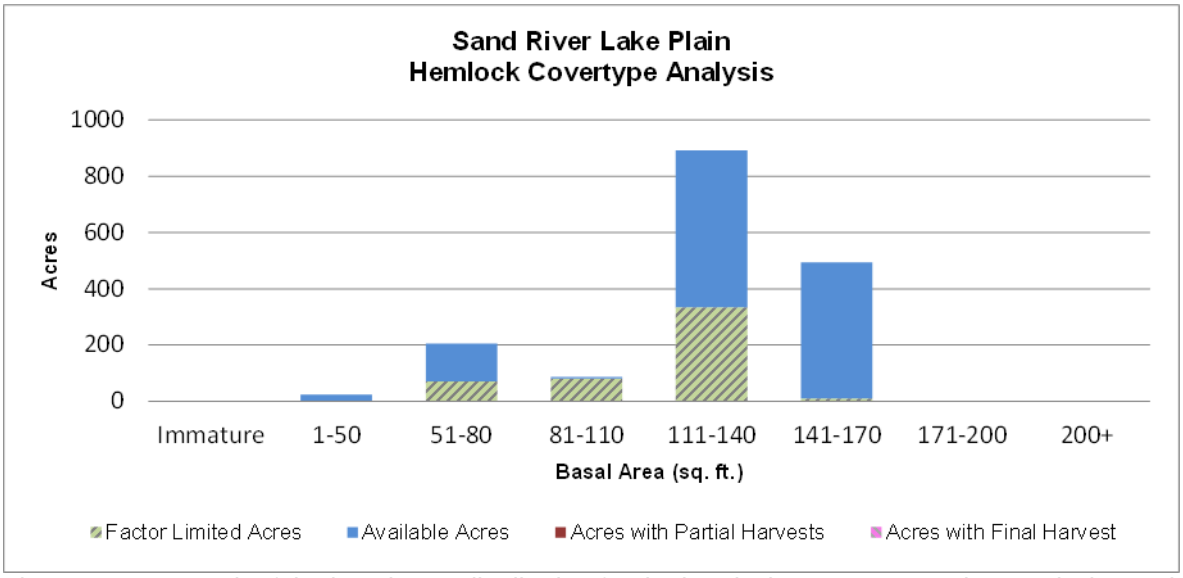

Figure 4.31.4. Graph of the basal area distribution for the hemlock cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged hemlock stand structure promoting sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Selectively harvest hemlock stands on a 50-year cycle entering every 50 years for a partial harvest with a rotation age for final harvest of 150 years; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objective

- Partially harvest 236 acres in this 10-year planning period.

Lowland Deciduous Cover Type

Current Condition

Currently there are about 1,162 acres (7%) of the lowland deciduous type in the management area (Table 4.31.1). This type is often found in association with mixed lowland conifer, cedar and tamarack cover types. There are 360 acres that have 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. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations. The lowland hardwoods on this management area do not have a well-balanced age-class distribution (Figure 4.31.5). Most stands in this management area are over 80 years in age or classed as uneven-aged.

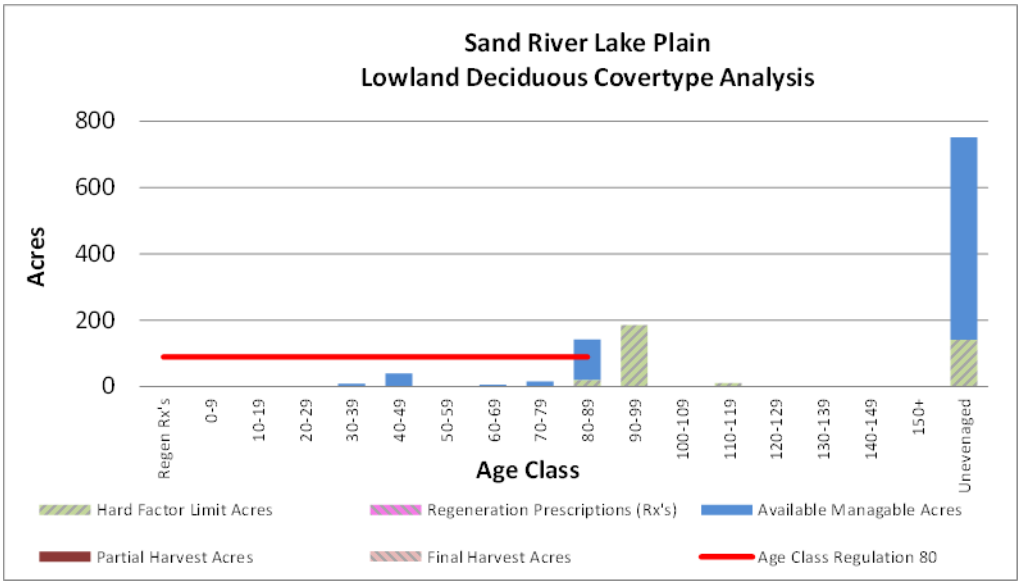

Figure 4.31.5. Graph of the age-class distribution for the lowland deciduous cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objectives

- Harvest stands without limiting factors on an 80-year rotation allowing approximately 90 acres to be harvested per decade;
- Resolve site conditions currently limiting harvest to increase the allowable harvest;
- Regenerate stands to a species mix similar to the pre-harvest conditions;
- Harvest using small clearcuts or strips with clumped retention; and
- Favor cedar, oak and hemlock for retention species.

10-Year Management Objectives

- Harvest 89 acres over this planning period, focusing on the use of “low impact” harvesting systems and successful, reliable regeneration techniques.

Lowland Conifers Cover Type

Current Condition

Lowland conifers occur on 864 acres (5%) of the management area (Table 4.31.1). These stands are on poorly drained sites and support mixed stands of cedar, black spruce, tamarack, balsam fir, white birch and balsam poplar. Due to the wet site conditions, they are more susceptible to rutting damage from logging equipment and present difficult operating conditions for harvesting. Mixed lowland conifers are poorly distributed across age classes, and no harvesting has occurred in this type over the past 40 years (Figure 4.31.6). There are 170 acres that have factors limiting harvest at this time. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

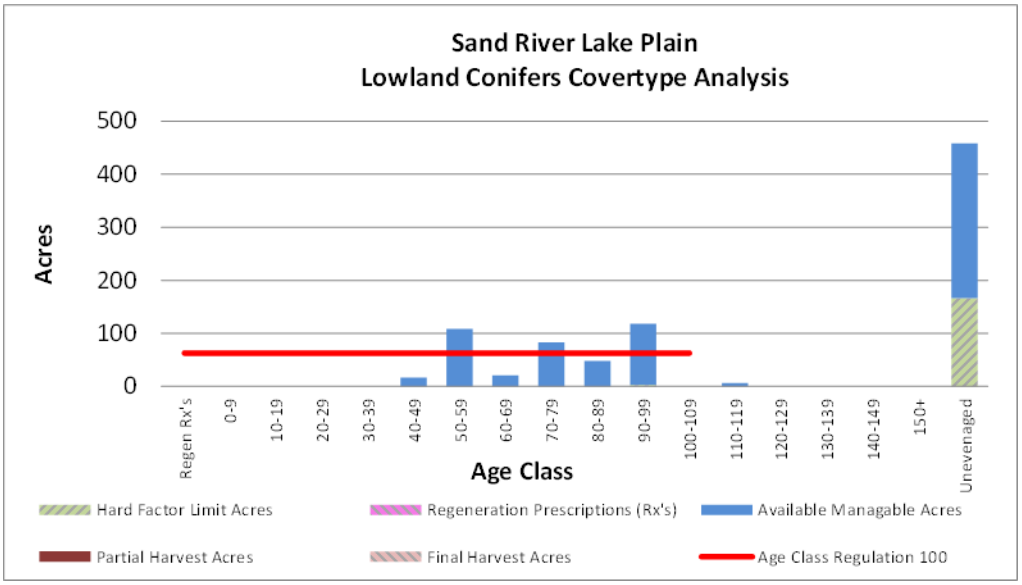

Figure 4.31.6. Graph of the age-class distribution of the lowland conifer cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Closed canopy stands interspersed with patches of all age classes;
- Sustainable regeneration and recruitment of seedlings and saplings;
- Mixed lowland conifer stands provide important winter habitat for deer and it is necessary to maintain the closed canopy (>70%) structure in many stands for that purpose; and
- Harvesting will be planned to regenerate stands before widespread mortality occurs.

Long-Term Management Objectives

- Manage on a 100-year rotation allowing 63 acres to be harvested per decade;
- Regenerate stands to a species mix similar to the pre-harvest conditions favoring cedar, black spruce and balsam fir; and
- Harvest using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 63 acres over 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 2,234 acres of this management area and are made up of cedar (572 acres), upland spruce/fir (304 acres), lowland mixed forest (268 acres), mixed upland deciduous (230 acres), upland conifers (191 acres), jack pine (161 acres), lowland spruce/fir (148 acres), upland mixed forest (128 acres), red pine (103 acres), white pine (61 acres), tamarack (38 acres) and paper birch (30 acres). Together these types make up about 14% of the management area (Table 4.31.1).

Approximately 545 acres of these other minor cover types have site conditions limiting their harvest this decade. These hard factor limited acres have been removed from the total number of manageable acres available for harvest calculations.

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;
- Use appropriate silvicultural techniques to assure adequate regeneration of the desired species;
- Monitor harvested sites;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- The projected 10-year final harvest of other cover types is 416 acres and the projected partial harvest is 60 acres.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (35 acres - >1%), lowland open/semi-open lands (1,132 acres – 7%) and miscellaneous other (water, local, urban) (315 acres – 2%) (Table 4.31.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.31.2 Featured Wildlife Species Management

Wildlife species considerations in the Sand River Lake Plain management area include managing to provide coniferous thermal cover for deer wintering complexes. The emphasis should be on hemlock in this management area as it represents approximately 20% of the western Upper Peninsula hemlock resource and is one of the few management areas where hemlock reliably regenerates and recruits reasonably well. Maintaining wildlife movement corridors along vernal and permanent riparian watercourses is also very important. The primary focus of wildlife habitat management in the Sand River Lake Plain management area will be to address the habitat requirements identified for the following featured species: American marten, blackburnian warbler, red-shouldered hawk and white-tailed deer. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: habitat fragmentation; coarse woody debris; retain or develop large living and dead standing trees (for cavities); mesic conifer; mature forest; within-stand diversity; and deer wintering complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., large suitable patches of contiguous habitat and dispersal corridors for marten) for featured species will be performed.

American Marten

The goal for marten is to maintain or increase suitable habitat and strive to identify, maintain and connect known populations to facilitate genetic exchange. Management during this planning period should focus on providing mature conifer forest conditions (e.g., coarse woody debris and large living cavity trees) across cover types in marten habitat.

Wildlife habitat specifications:

- Maintain a minimum of 30% canopy cover in key even-aged managed stands of northern hardwood and conifer stands as marten tend to avoid stands with less canopy cover. Retention patches should be oriented to minimize potential blow down.
- Discourage land transactions and management activities that facilitate additional fragmentation of marten habitat by identifying and maintaining corridors between large forested tracts (e.g., Huron Mountains, Craig Lake State Park, McCormick Wilderness, portions of The Nature Conservancy's Northern Great Lakes Forest Project and several smaller natural areas) west to Ottawa National Forest and south Chequamegon-Nicolet National Forest (WI) and Whisker Lake Wilderness.
- Provide late successional conifer-dominated stands in this management area.
- Provide for late successional mesic conifer-dominated stands in the area by extending the normal rotation length for white spruce and balsam fir cover types by 20 years.
- Retain down coarse woody debris present before cutting and debris resulting from incidental breakage of tops and limbs in the general harvest area, except on skid trails and landings, to the extent feasible. Where coarse woody debris is lacking, increase both standing dead and down dead wood by leaving at least three secure large diameter (>14 inches in diameter at breast height) live trees to serve as future den trees, snags and coarse woody debris and logs on the ground per acre harvested.
- Limit biomass harvesting, whole tree chipping and limit firewood permits and retain the maximum residues in the Woody Biomass Harvesting Guidelines within this management area.
- Increase the within-stand component of mesic conifers in forested stands and mange to increase mesic conifer forest types by group or gap selective harvest. Consider under planting on suitable sites where a seed source is absent.

Blackburnian Warbler

The goal for blackburnian warbler is to maintain suitable breeding habitat. Management efforts for blackburnian warblers should focus on within stand diversity, discouraging habitat fragmentation and maintaining mature forest with a conifer component in priority landscapes. Specifically, increase mesic conifer cover types (i.e., hemlock, white pine, red pine, upland spruce-fir) and allow some to mature beyond standard rotation ages, retain a larger percentage of mesic conifer during harvests, employ silvicultural practices that encourage the regeneration of mesic conifers and where feasible, under plant hemlock, white pine and white spruce in hardwood-dominated stands.

Wildlife habitat specifications:

- Increase the mesic conifer (e.g., hemlock, white pine, natural red pine and upland spruce-fir) component on state forests by: a) Retain a larger percentage of mesic conifer during harvests; b) Using silvicultural practices that encourage the regeneration of mesic conifer; and c) Where desired/feasible, under planting hemlock, white pine, and white spruce in hardwood-dominated stands on suitable sites without a seed source.
- Provide for late successional mesic conifer-dominated, particularly hemlock, stands in the management area by extending the normal rotation length for upland spruce/fir cover types by 20 years in this management area.

Red-shouldered Hawk

The goal for red-shouldered hawk is to maintain or improve suitable habitat in the ecoregion. Management activities should focus on the maintenance of large blocks of mesic northern forest with the appropriate level of large diameter trees in priority landscapes.

Wildlife habitat specifications:

- All known woodland raptor nests should be reported to local wildlife staff and included in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. Confirmed red-shouldered hawk nests are to be documented in accordance with the "DNR's Approach to the Protection of Rare Species on State Forest Lands" (IC4172) and included in the Integrated Forest Monitoring Assessment and Prescription Geographic Decision Support Environment. For red-shouldered hawks, the wildlife habitat specifications contained within Michigan DNR's *Interim Management Guidelines 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.

White-tailed Deer

The western Upper Peninsula goals for white-tailed deer are to: 1) Maintain existing deer wintering complexes and 2) Expand the extent of areas suitable as winter deer habitat, especially in the medium and high snowfall zones. Management should focus on maintaining habitat quality in priority wintering complexes. DNR department procedure 32.22-07 states "Coniferous swamps are important as winter deeryards and shall be managed primarily for deer. The objective shall be to maintain them for this purpose and through commercial cuttings and silvicultural practices, improve these areas to provide winter cover and food for deer." There is a complex relationship between deer abundance; available summer and winter habitat; timber management; and regeneration tree species, particularly white cedar and hemlock. It is recognized that meeting both timber management and deer goals presents challenges for the department and our stakeholders. Information on deer wintering complexes is currently being updated and new management guidelines are being developed. When completed, these will provide additional direction for managing these critical areas for white-tailed deer.

Wildlife habitat specifications for deer wintering complexes:

- Strive to maintain > 50% of the land area within deer wintering complexes in mixed or pure stands of cedar, hemlock, white and black spruce, white and natural red pine, balsam fir, mixed swamp conifer and mixed upland conifer-hardwood.
- In northern white cedar and hemlock cover types that are commonly occupied by deer during severe winters, especially in medium and high snowfall zones, maintain canopy closure of >65%.
- In deer wintering complexes in low snowfall areas, and within ¼-mile of severe-winter cover in the higher snowfall zones, write prescriptions that strive to maintain canopy closure of 40-65%, favoring cedar, hemlock, white spruce, black spruce, balsam fir and white pine.
- Provide winter forage in deer wintering complexes through stands of regenerating hardwood or brush, including preferred species of red maple, sugar maple, aspen, yellow birch, ashes, oaks, dogwood, crabapple, elderberry, high-bush cranberry, sumac and hazel.
- Enhance accessibility to winter browse within deer wintering complexes by maintaining mature mesic conifer components within upland hardwood stands or by maintaining or enhancing sheltered travel corridors between areas of conifer cover and browse.
- Provide spring break out areas by maintaining open hardwood stands on southern exposures and herbaceous openings adjacent to deer wintering complexes.
- When possible, timber harvests within deer wintering complexes should be carried out only during winter months and tops should be left. Chipping of non-bole wood and whole-tree harvesting in the deer wintering complexes should be avoided, but will be discussed on a case-by-case basis through the compartment review process.
- Harvests of cedar and hemlock may only be conducted when:
    - There is reasonable confidence of successful recruitment/regeneration of the cover types; or
    - There is a forest health issue (e.g., hemlock wooly adelgid); or
    - Part of an approved research project; or
    - Removal of selected trees will facilitate a reduction of harvest trails, landings, etc. to minimize soil sedimentation and possible soil compaction issues.
- Provide fall foods in the form of hard and soft mast, and provide dense escape cover or bedding areas in the form of early successional forests, brush and warm-season grasses that will encourage fall deer use in areas open to public hunting. Where habitat types are appropriate, increase diversity of hard mast by planting oak.

4.31.3 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, 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 4.31.2. 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.

Table 4.31.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Sand River Lake Plain 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								
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	*Pandion haliaetus*	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Reptile								
Blanding's turtle	*Emydoidea blandingii*	SC/G4/S3	Confirmed	HV	Very High	Mesic southern forest		
						Mesic prairie	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Northern fen	Lowland open/semi-open	N/A
						Submergent marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Prairie fen	Lowland open/semi-open	N/A
						Great Lakes marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Floodplain forest	Lowland mixed	Mid
						Inundated shrub swamp	Lowland open/semi-open	N/A

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

The Sand River Lake Plain management area has the Lake LaVasseur state wildlife management area as shown in Figure 4.31.7 that is a special conservation area.

Approximately 2,553.3 acres of potential old growth have been identified within the Sand River Lake Plain management area (Figure 4.31.7). 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.31.7.

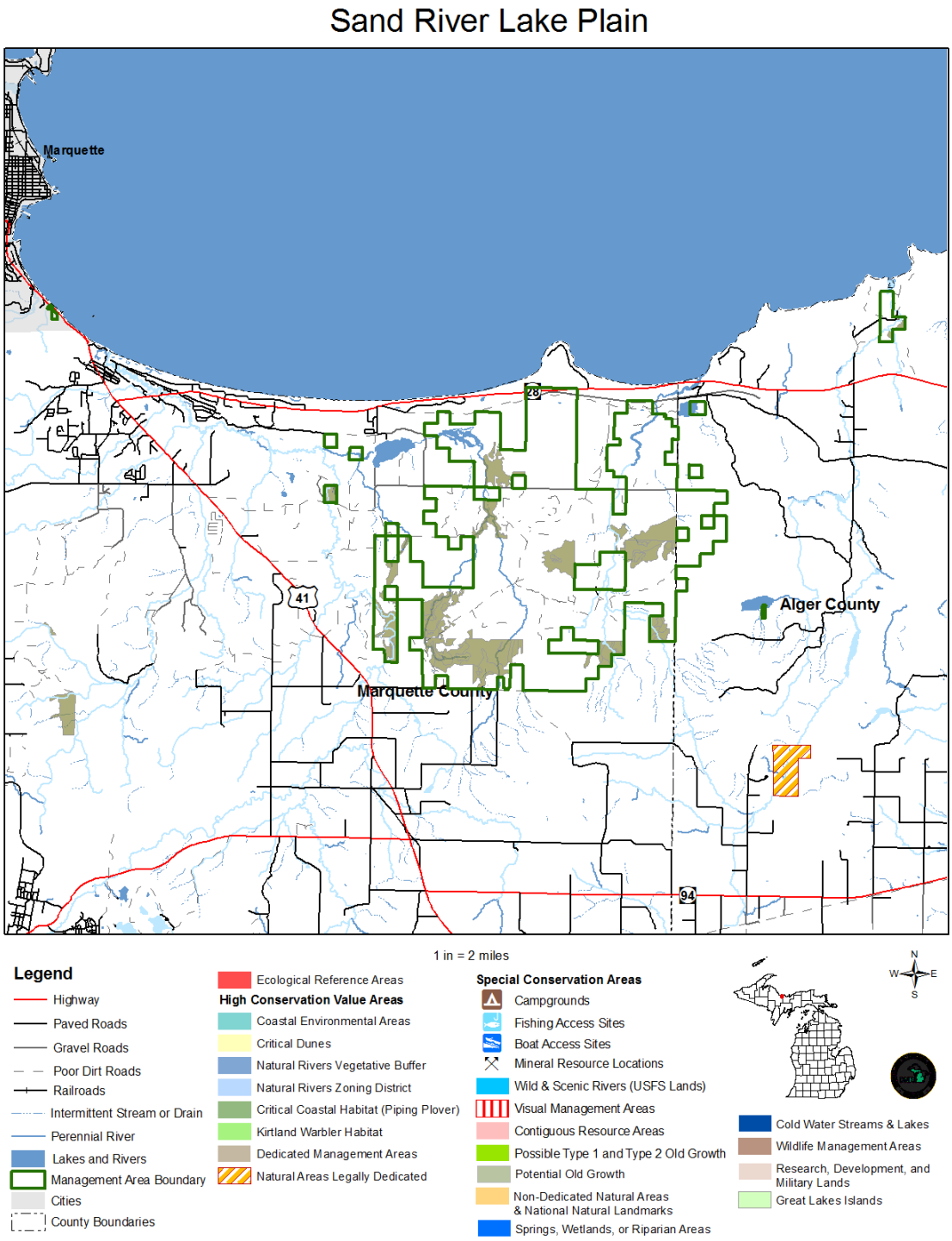

Figure 4.31.7. A map of the Sand River Lake Plain management area showing the special resource areas.

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.

4.31.4 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
- Hemlock woolly adelgid.

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. Following is a list of species of concern that been documented in or near this management area:

- Black locust
- Garlic mustard
- Glossy buckthorn
- Japanese barberry
- Japanese knotweed
- Norway maple
- Purple loosestrife
- Reed canary grass
- Spotted knapweed
- Tatarian honeysuckle.

4.31.5 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 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 are shown in Figure 4.31.1.

4.31.6 Fire Management

Other than a narrow band of barrens soils on the beach sands, this area is dominated by lowland forest and mesic northern forest communities that were not significantly impacted by fire based on very long fire return intervals.

- All wildfires are subject to appropriate initial attack suppression response; and
- Work to develop modified suppression strategies for the area between Mangum and Yalmer Road based on anticipated weather conditions and accessibility.

4.31.7 Public Access and Recreation

This area has good public and management access. No state forest campgrounds are located in this area. A boating access site is located on Lake LeVasseur (Figure 4.31.1). The North Country National Scenic Trail crosses this area as does a snowmobile trail (Figure 4.31.1). The Tyoga Historical Pathway is also located in this area.

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

4.31.8 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 lacustrine (lake) sand, gravel, clay and silt in places thin to discontinuous. The glacial drift thickness variesbetween 10 and 50 feet. Sand and gravel pits are located in the management area and there is some potential for additional pits.

The Precambrian Jacobsville Sandstone subcrops below the glacial drift. The Jacobsville was used as a building stone in the past.

Metallic mineral exploration has not occurred in the management area in the past and appears to be unlikely.

4.32 Sands Plains Management Area

Summary of Use and Management

Vegetative management in the Sands Plains management area (MA) (Figure 4.32.1) 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 and jack pine; maintaining the conifer component in northern hardwood stands; promoting longer lived species in recreational areas; 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: Kirtland's warbler, spruce grouse and upland sandpiper. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (jack pine budworm) infestations will be issues for this 10-year planning period.

Introduction

The Sands Plains management area is on an outwash plain in central Marquette County. The state forest covers 5,724 acres and is in widely scattered parcels. The major ownership in this vicinity is non-industrial private and county forest lands. The management area is dominated by the aspen, red pine and jack pine cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry-mesic northern forest and dry northern forest;
- low-range in site quality;
- This area is a popular recreational area for hunting, motorized and non-motorized forest recreation close to the communities of Marquette and Gwinn;
- 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 Sands Plains management area are shown in Table 4.32.1.

Table 4.32.1 Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Sands Plains 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	25%	1,428	40	1,388	462	0	1,428	278	0
Red Pine	17%	973	0	973	150	322	973	88	322
Jack Pine	17%	952	7	945	244	0	952	135	0
Northern Hardwood	11%	650	35	615	0	299	650	0	299
Oak	9%	487	0	487	156	160	487	49	213
Upland Open/Semi-Open Lands	7%	391	0	391	0	0	391	0	0
Lowland Open/Semi-Open Lands	1%	75	0	75	0	0	75	0	0
Misc Other (Water, Local, Urban)	1%	49	0	49	0	0	49	0	0
Others	13%	719	105	614	188	78	719	66	172
Total		5,724	187	5,537	1,200	859	5,724	616	1,006

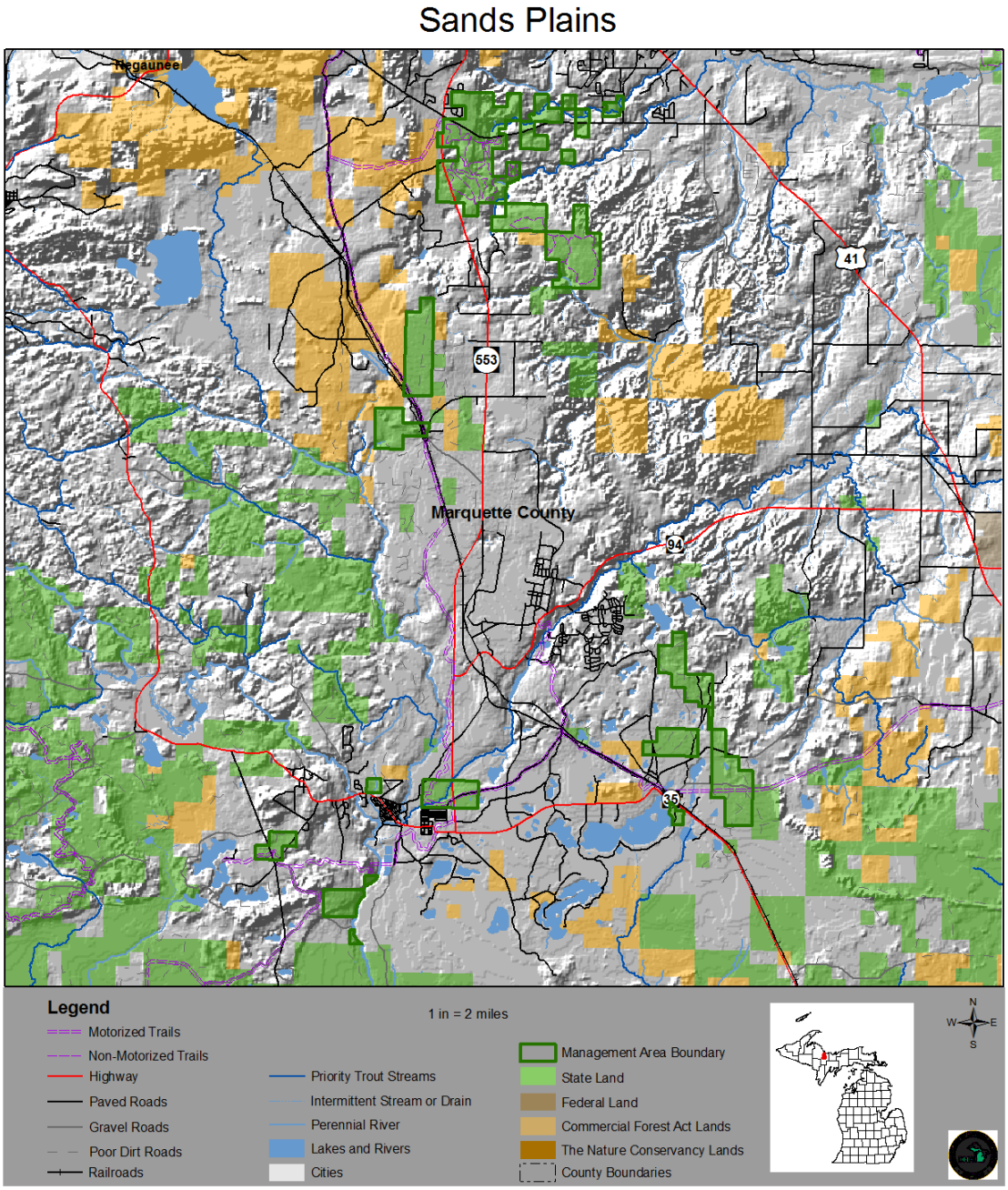

Figure 4.32.1. Sands Plains management area (dark green boundary) in relation to surrounding state forest and other lands in Marquette County, Michigan.

4.32.1 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 Sands Plains 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 1,428 acres (25%) of the management area (Table 4.32.1) and is poorly distributed across age-classes (Figure 4.32.2).

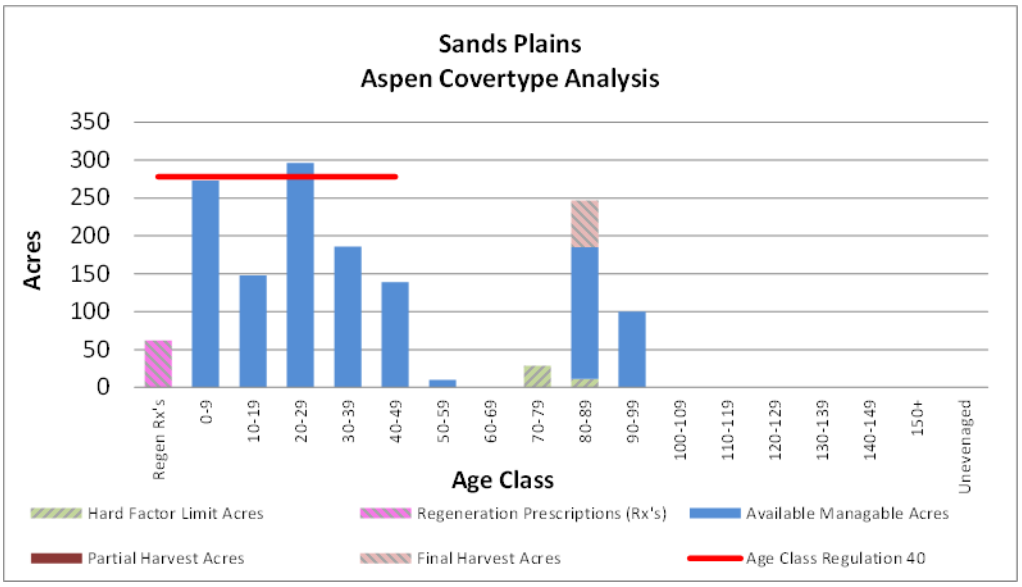

Figure 4.32.2. Graph of the age-class distribution for the aspen cover type on the Sands Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Work towards a more balanced age class over a 40-year rotation (indicated by the red line in Figure 4.32.2);
- Provide a supply of forest products;
- Provide for a mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objective

- Harvest and regenerate approximately 278 acres each decade.

10-Year Management Objectives

- Harvest and regenerate 462 acres over this 10-year planning period with much of this acreage will coming from older age classes;
- Identify low quality off-site aspen stands for conversion to more ecologically appropriate cover types mitigating an aspen acreage loss during this planning period through identification of replacement acreage prior to conversion; and
- Maintain mature large-tooth aspen if present as retention.

Red Pine Cover Type

Current Condition

The red pine cover type covers 973 acres (17%) of the management area (Table 4.32.1) and is poorly distributed across age classes (Figure 4.32.3). Red pine stands occur on dry-mesic sandy soils, similar to the aspen stands in this management area. Red pine is ideally suited for these soil types. Nearly 80% of the red pine in this management area is of plantation origin. The spike in the 40-49 year-old age class and in the 80-89 year-old age class on Figure 4.32.3 is indicative of the planting efforts that established many of these stands.

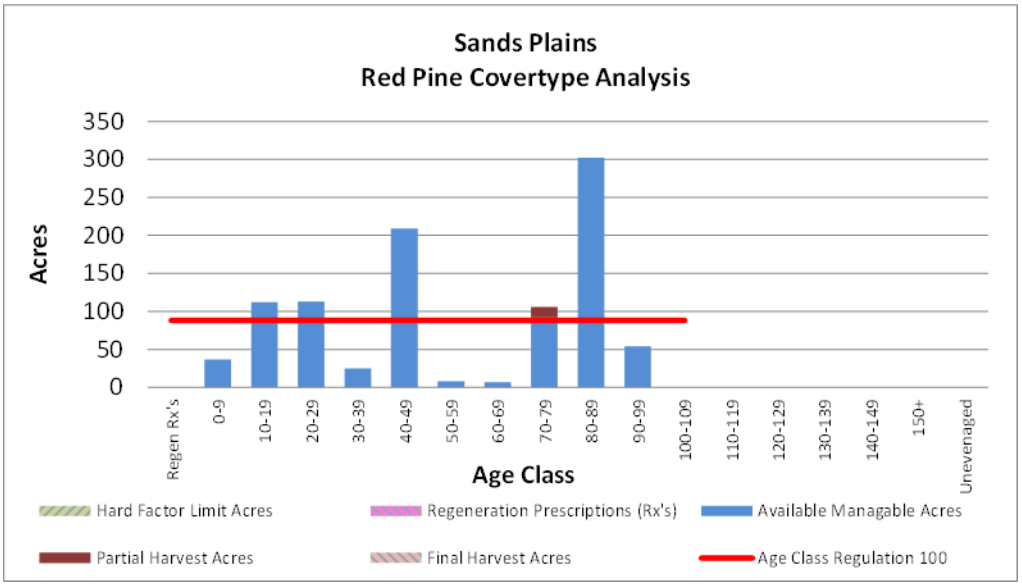

Figure 4.32.3. Graph of the age-class distribution for the red pine cover type on the Sands Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the same number of acres of red pine in the management area and at approximately the same ratio of plantation pine to natural origin pine (973 acres total red pine and 774 acres in plantations); and
- Work toward a more balanced age classes in the plantation origin red pine by reducing the spikes in the 40-49 year-old and 80-89 year-old age classes to provide an even supply of forest products.

Long-Term Management Objectives

- Once age-class distribution is improved, harvest and regenerate 88 acres and thin 322 acres each decade;
- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) as basal area guidelines are met;
- Where possible along recreation trails, convert plantation red pine to natural origin red pine; and
- Both natural origin and plantation stands will be thinned as necessary.

10-Year Management Objectives

- Thin 322 acres of red pine stands during this 10-year planning period; and
- Harvest and regenerate 150 acres of red pine stands in this planning period.

Jack Pine Cover Type

Current Condition

The jack pine cover type comprises 952 acres (17%) of the management area. Most of the jack pine is unevenly distributed across age classes spiking in the 20-29 year-old age class (Figure 4.32.4). Few acres of jack pine have limiting factors and these stands are expected succeed to white or red pine.

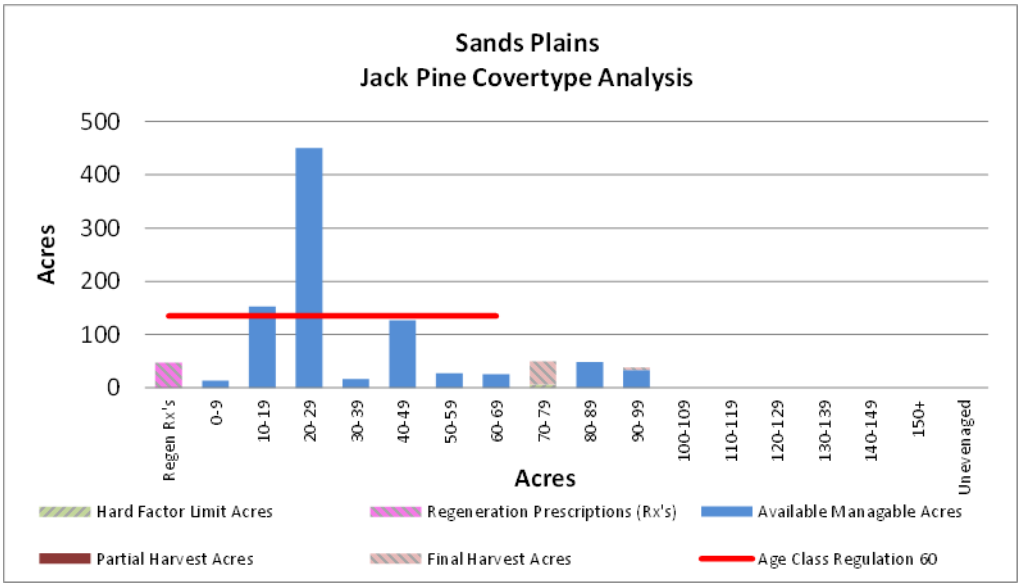

Figure 4.32.4. Graph of the age-class distribution for the jack pine cover type on the Sands Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 60 years;
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Manage jack pine on a 60-year rotation, harvesting about 135 acres per decade once age classes are balanced;
- Work to reduce the spike in the 20-29 year-old age class; and
- Manage portions of the jack pine in this area in older age classes in retention patches.

10-Year Management Objective

- Harvest 244 acres during this planning period coming from stands above the 70-79 year-old age class.

Northern Hardwood Cover Type

Current Condition

Northern hardwood stands make up about 650 acres (11%) of this management area. They occur on medium-quality sugar maple sites. Few of the stands in this area have limiting factors. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

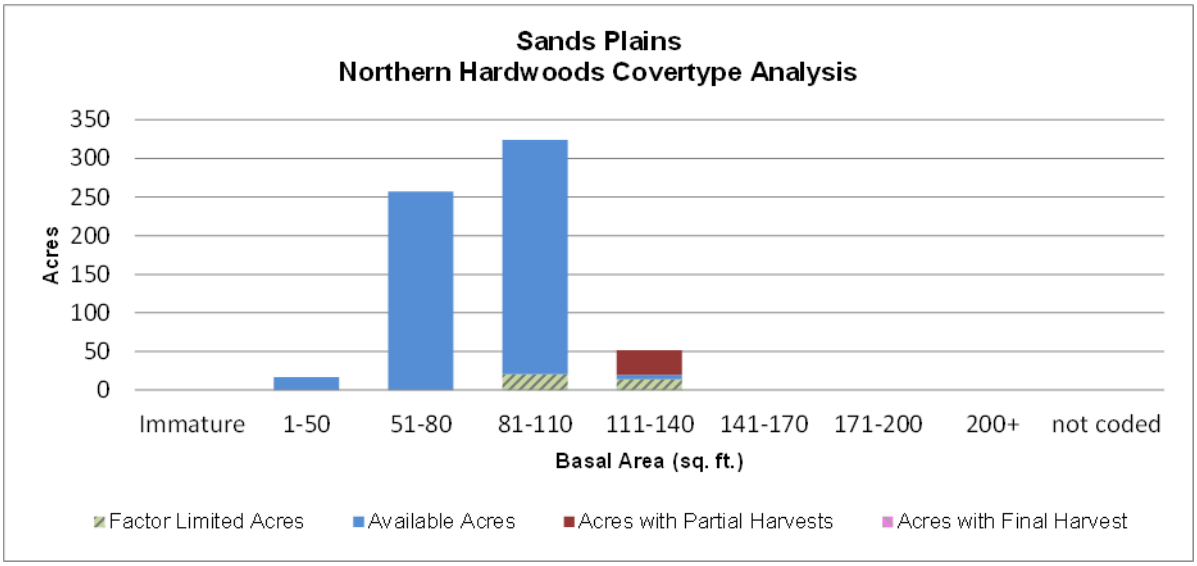

Figure 4.32.5. Graph of the basal area class distribution for the northern hardwoods cover type on the Sands Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objective

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle resulting in an estimated 299 acres harvested each decade.

10-Year Management Objective

- Approximately 299 acres should be harvested in this 10-year planning period. Maintain hemlock, white pine and upland cedar where possible in stands that are harvested.

Oak Cover Type

Current Condition

Oak is present on 487 acres (9%) of this management area (Table 4.32.1) and is important to wildlife for mast production. Most of the oak is over 60 years old and many of the stands are in decline. Some of the oak in this area is pin oak, a scrubby oak of poor timber quality. The remaining red oak is of fair quality.

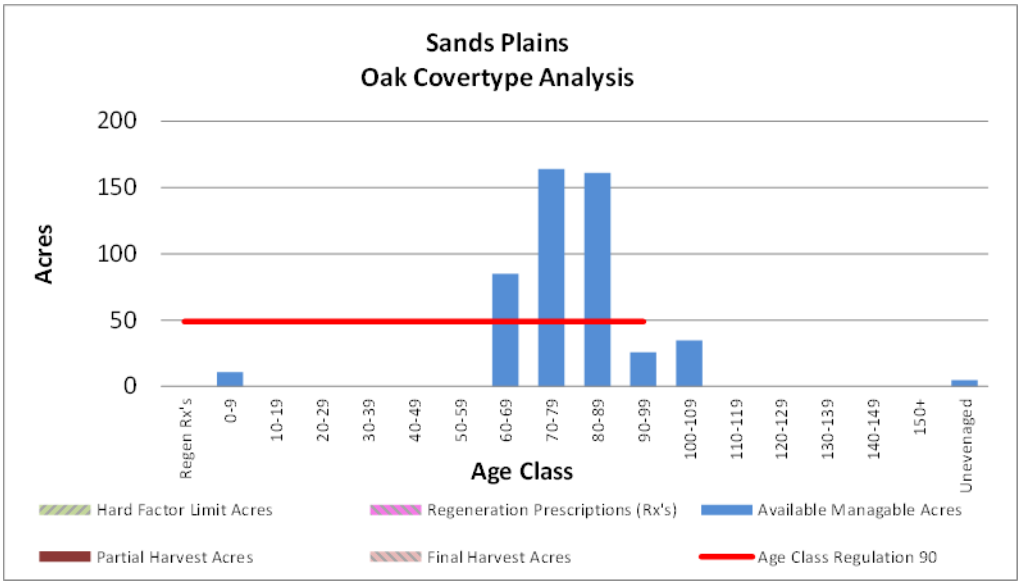

Figure 4.32.6. Graph of the age-class distribution for the oak cover type on the Sands Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain a component of oak in mixture with natural red and white pine;
- Some oak and aspen mixed stands will be maintained where opportunities exist; and
- Oak will be managed in this management area for hard mast production.

Long-Term Management Objectives

- Maintain oak as a component of mixed upland types through harvesting;
- Pin oak will be regenerated on a 90-year rotation;
- Red oak stands will be regenerated on a 160-year rotation;
- Improve age-class distribution by harvesting and regenerating 49 acres and thinning 213 acres of oak each decade; and
- Monitor oak stands for oak wilt.

10-Year Management Objectives

- Thin about 160 acres of oak stands to increase hard mast production
- Harvest and regenerate about 156 acres of oak over this 10-year planning period; and
- Convert oak stands affected by oak wilt to a pine type.

Other Forested Cover Types

Current Condition

Other forested types make up 719 acres and are made up of white pine (194 acres), lowland spruce/fir (178 acres), upland mixed forest (109 acres), lowland conifers (72 acres), upland spruce/fir (39 acres), natural mixed pines (36 acres), mixed upland deciduous (29 acres), planted mixed pines (25 acres), upland conifers (24 acres), paper birch (nine acres) and cedar (four acres). Together these types make up about 13% 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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 266 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (391 acres – 7%), lowland open/semi-open lands (75 acres – 1%) and miscellaneous other (water, local, urban) (49 acres – 1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.32.2 Featured Wildlife Species Management

Wildlife considerations in the Sands Plains management area include accommodation of many species associated with xeric forest habitat such as Kirtland's warbler, upland sandpiper, black-backed woodpecker, eastern bluebird and spruce grouse. The primary focus of wildlife habitat management will be to address the habitat requirements identified for the following featured species: Kirtland's warbler, spruce grouse and upland sandpiper. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: large open land complexes; habitat fragmentation; mature forest (jack pine, black and white spruce and tamarack); and early successional forest. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

Kirtland's Warbler

The western Upper Peninsula goal for Kirtland’s warbler during this planning period is to provide suitable breeding and foraging habitat within this management area. Management will focus on providing large patches (300-550 acres where possible) of early successional jack pine forest with appropriate structural and compositional diversity on droughty outwash plains systems. When possible, large blocks should be created by managing several smaller harvest blocks adjacent to each other simultaneously.

Wildlife habitat specifications:

- Develop landscape level plans for Kirtland’s warbler habitat within and across management areas to ensure suitable habitat is provided at any point in time across management areas within the ecoregion. Jack pine should be harvested in a manner that attempts to mimic both the size and structure of the stands that would result from fire.

- Develop harvest plans in the context of landscape-level plans. Strive to increase patch size to meet Kirtland's warbler habitat needs. Consider current and desired future patch size, age-class distribution and distance to other jack pine stands. When developing harvest plans, identify opportunities for increasing patch size:
  - Review state forest inventory in management area and identify adjacent stands with similar age classes that could reasonably be combined into one stand.
  - Collaborate in planning of the spatial arrangement and timing of harvest with willing major landowners within this outwash plain (e.g., U.S. Forest Service and Michigan Technological University).
  - Large blocks of regenerating jack pine adjacent to herbaceous openings are desirable as they function as open-lands until the trees are 3-4 feet in height and benefit open-land species as well.
- Post-disturbance legacies include simulated skips or fingers of jack pine; snags; and larger diameter, fire-tolerant trees such as red pine. These features should be left in stands of harvested jack pine as retention to benefit Kirtland's warbler.
- Scarify stands quickly after stands are harvested or use prescribed fire where feasible to maintain jack pine and to ensure maximum stem density.

Spruce Grouse

The western Upper Peninsula goal for spruce grouse is to maintain or improve habitat. Management will focus on early successional forest (jack pine, mixed swamp conifer, tag alder and aspen), coarse woody debris and encouraging conifer (e.g., jack pine and mixed swamp conifer) understory component.

Wildlife habitat specifications:

- In jack pine harvests, leave mixed conifer and/or jack pine retention strips of mature trees along riparian corridors and lowland margins as well as along upland edges.
- Maintain spruce seed trees through retention, especially at lowland margins.
- Maintain or increase diversity of conifer stands by implementing seed tree/shelterwood prescriptions and limiting the use of herbicides, especially along lowland edges.
- Large clearcuts may isolate populations of spruce grouse so landscape level planning must take into account this species' need for low-density mixed-conifer travel corridors to connect suitable stands. This is especially important in management areas where Kirtland's warbler also is a featured species.
- Ensure black spruce recruitment and regeneration is reliable if harvesting in this cover type. Regeneration monitoring should be required to assess whether or not we are getting desired results from management.

Upland Sandpiper

The western Upper Peninsula goal is to provide suitable breeding habitat for upland sandpiper in select appropriate WUP management areas. State forest management during this planning period will focus on maintaining large opening complexes and using the compartment review process to schedule jack-pine harvests associated with permanent openings on a sustainable rotation and schedule harvests adjacent to burns or schedule similarly-aged jack pine treatments in close proximity to each other.

Wildlife habitat specifications:

- Maintain dynamic opening complexes of 250 acres or larger.
- Open blocks within complexes should be within one mile of each other.
- Where possible, strive to consolidate patches into larger opening complexes, by creating temporary openings associated with permanent openings. This could be accomplished by scheduling jack pine clear-cuts associated with permanent openings on a sustainable rotation, scheduling harvests adjacent to burns or schedule similarly aged jack-pine treatments in close proximity to each other.
- Work with adjacent landowners within the management area to maximize the amount and distribution of open land habitat.
- Mow or burn patches every 3-5 years to eliminate woody vegetation succession as the budget allows.

4.32.3 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, 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 four listed species and no natural communities of note occurring in the management area as listed in Table 4.32.2. 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 151acres of potential old growth have been identified within the Sands Plains management area (Figure 4.32.7). 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.32.7.

Table 4.32.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Sands Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Bird								
Kirtland's warbler	*Dendroica kirtlandii*	LE/E/G1/S1	Confirmed	PS	Very High	Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Early
Mammal								
Tri-colored bat (Eastern pipistrelle)	*Perimyotis subflavus*	SC/G5/S2S3	Confirmed	PS	Very High	Caves	Caves	N/A
Plants								
Narrow-leaved gentian	*Gentiana linearis*	T/G5/S2S3	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
Fir clubmoss	*Huperzia selago*	SC/G5/S3	Confirmed			Open dunes	Upland open/semi-open	N/A
						Intermittent wetland	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

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.

4.32.4 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
- Jack pine budworm
- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight.

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. Garlic mustard and Japanese knotweed are the only species of concern that been documented in or near this management area.

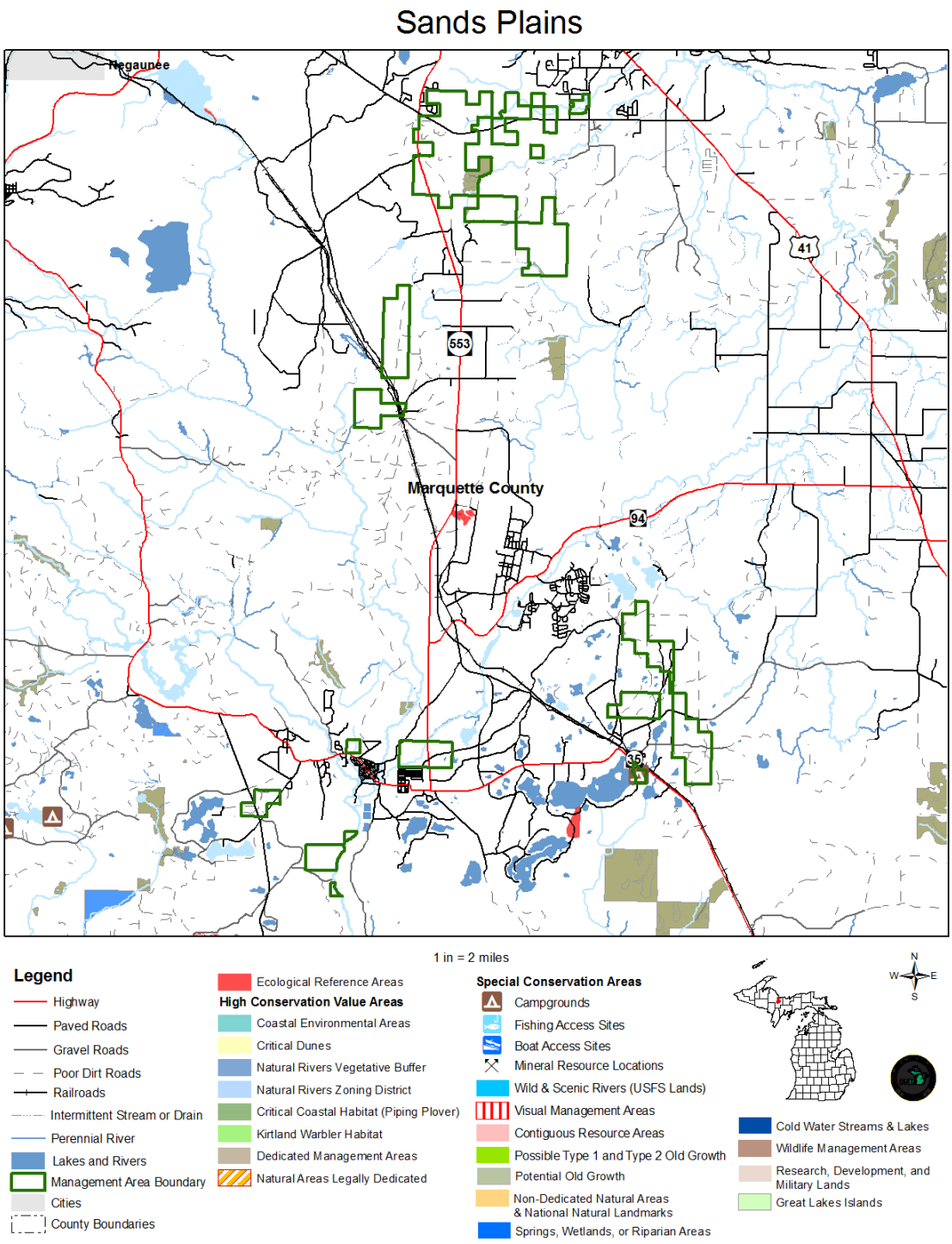

Figure 4.32.7. A map of the Sands Plains management area showing the special resource areas.

4.32.5 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 are shown in Figure 4.32.1.

4.32.6 Fire Management

This area is dominated by fire-adapted communities ranging from barrens at its heart. Dry and dry mesic northern forest communities make up the bulk of the land area that remains. This area was probably always subject to periodic stand replacement fires that spread rapidly over large areas, frequently in single events. Wildland-urban interface and intermix issues remain a primary concern within this management area.

- This management area falls within the Sands Plains Zone Dispatch area, which provides plans for initial attack, based on fire danger level. It calls for elevated readiness and aggressive response to reported wildfires during periods of VERY HIGH and EXTREME fire danger.
- Continued evaluation and maintenance of establish fuel breaks adjacent to the Sawyer development.

4.32.7 Public Access and Recreation

This area has good public and management access. The Little Lake State Forest Campground and its boating access site are located in this area as shown in Figure 4.32.7. The Blueberry Ridge Pathway and Thunder Valley Equestrian Trail are located in this area and shown in Figure 4.32.1.

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

4.32.8 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 an end moraine of coarse-textured till, glacial outwash sand and gravel and postglacial alluvium and lacustrine (lake) sand and gravel. The glacial drift thickness varies between 100 and 400 feet. Sand and gravel pits are located in the management area and there is potential for additional pits.

The Precambrian Jacobsville Sandstone and Archean Granite/Gneiss subcrop below the glacial drift. The Jacobsville was used as a building stone in the past.

Old iron mines are located five miles to the west of the management area. Metallic mineral exploration has occurred in the general area of the management area in the past and there could be some potential.

4.33 Sturgeon Sloughs Management Area

Summary of Use and Management

Vegetative management in the Sturgeon Sloughs management area (MA) (Figure 4.33.1) 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; maintaining existing cover types on the landscape; and maintaining non-forest vegetation types. Wildlife management objectives addressing the habitat requirements identified for the following featured species: American woodcock, black bear, Canada goose and eastern bluebird. Management activities may be constrained by site conditions and special conservation area objectives. Early successional forest conditions (associated with alder, riparian zones or forested wetlands); mast (hard and soft); providing green browse such as winter wheat or rye for the fall (hunting) season; and large open land complexes (with snags in open lands) will be issues for during this 10-year planning period.

Introduction

The Sturgeon Sloughs management area is on a floodplain in northwestern Baraga and eastern Houghton Counties. The state forest covers 8,073 acres and is mostly contiguous. The major ownership in this vicinity is non-industrial private. The management area is dominated by the tamarack, northern hardwood and lowland deciduous cover types. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: poor conifer swamp and deciduous lowlands;
- Low-range in site quality;
- Most of this area is in lowland open/semi-open lands.

The management priority for this area is waterfowl habitat management. Timber management will be limited.

The predominant cover types, composition and projected harvest areas for the Sturgeon Sloughs management area are shown in Table 4.33.1.

Table 4.33.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Sturgeon Sloughs 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
Tamarack	25%	2,043	851	1,192	170	0	2,043	170	0
Northern Hardwood	11%	894	321	573	0	101	894	0	286
Lowland Deciduous	10%	801	645	156	60	0	801	17	0
Upland Open/Semi-Open Lands	11%	915	0	915	0	0	915	0	0
Lowland Open/Semi-Open Lands	31%	2,513	0	2513	0	0	2,513	0	0
Misc Other (Water, Local, Urban)	2%	200	0	200	0	0	200	0	0
Others	9%	707	192	515	56	19	707	56	19
Total		8,073	2,010	6,063	285	120	8,073	243	305

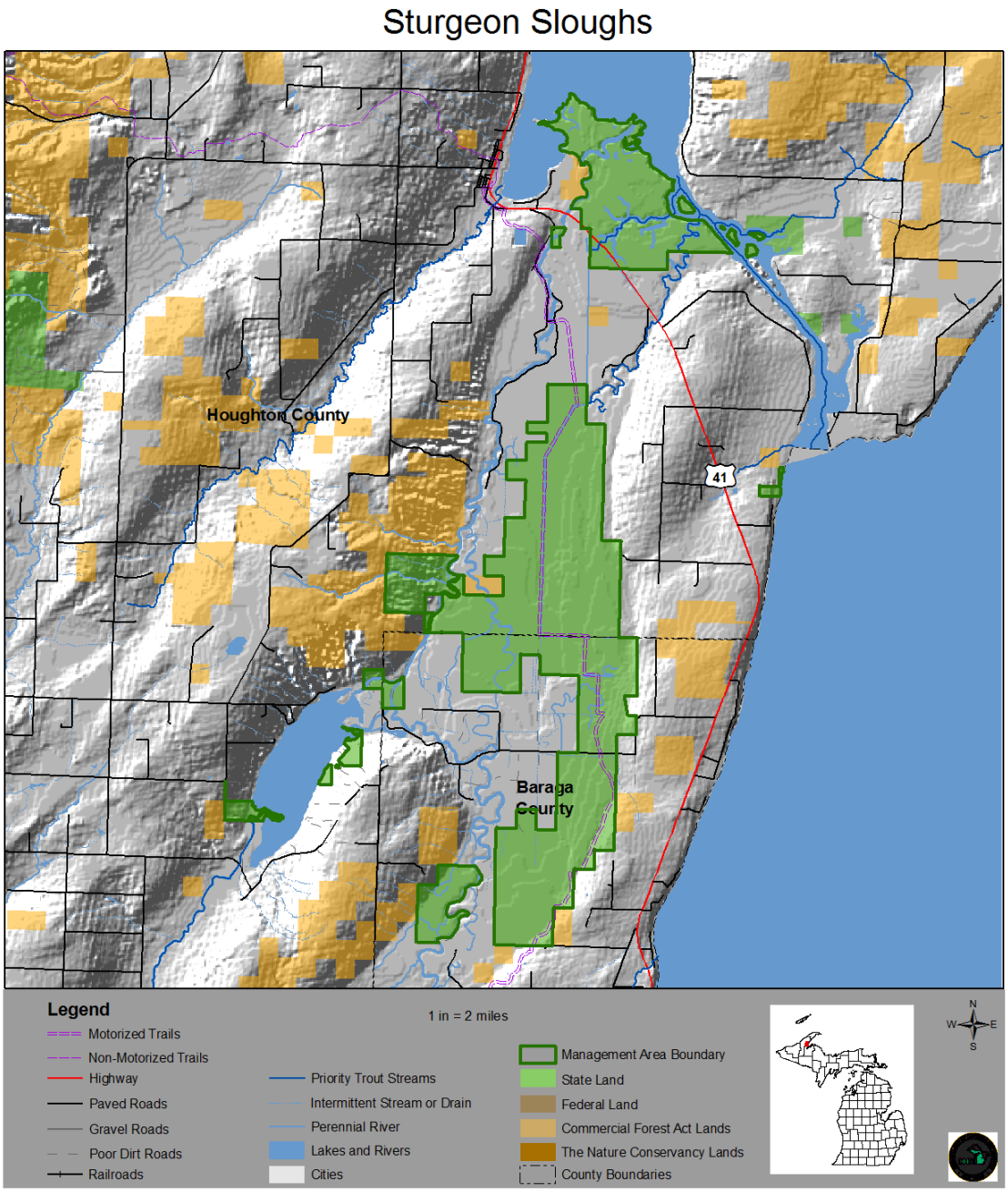

Figure 4.33.1. A map of the Sturgeon Sloughs management area (dark green boundary) in relation to surrounding state forest and other lands in Baraga and Houghton Counties Michigan.

4.33.1 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 Sturgeon Sloughs 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.

Tamarack Cover Type

Current Condition

Currently there are about 2,043 acres (25%) of the tamarack type in the management area (Table 4.33.1). Tamarack is often found in association with mixed lowland conifer, cedar and lowland spruce/fir types. Tamarack in this management area does not have a well-balanced age-class distribution. Most of the tamarack in this area is over 80 years in age. There are 851 acres that have hard factor limitations and they have been removed from harvest calculations.

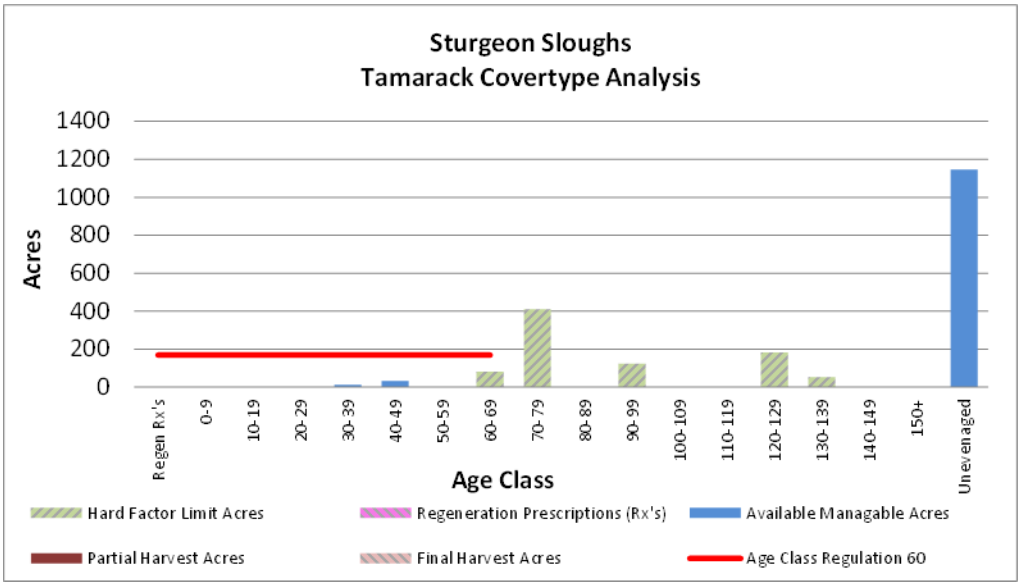

Figure 4.33.2. Graph of the age-class distribution for the tamarack cover type on the Sturgeon Sloughs management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain approximately the current level of tamarack type with stands representing a variety of age classes; and
- Balanced age classes for those stands that are not factor limited.

Long-Term Management Objective

- Once equal age-class distribution is established, harvest and regenerate mature tamarack types on a 60-year rotation resulting in an estimated 170 acres harvested each decade.

10-Year Management Objectives

- Harvest 170 acres in this 10-year planning period with much of this acreage coming from those stands classified as uneven-aged (Figure 4.33.2).
- More aggressive harvesting in this type maybe needed in this 10-year planning period to reduce mortality losses in the older stands.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 894 acres (11%) of this management area (Table 4.33.1). They occur on medium-quality sugar maple sites. Most stands have been managed on a selection harvest basis. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood is typically managed using an uneven-aged harvest system based on basal area rather than age.

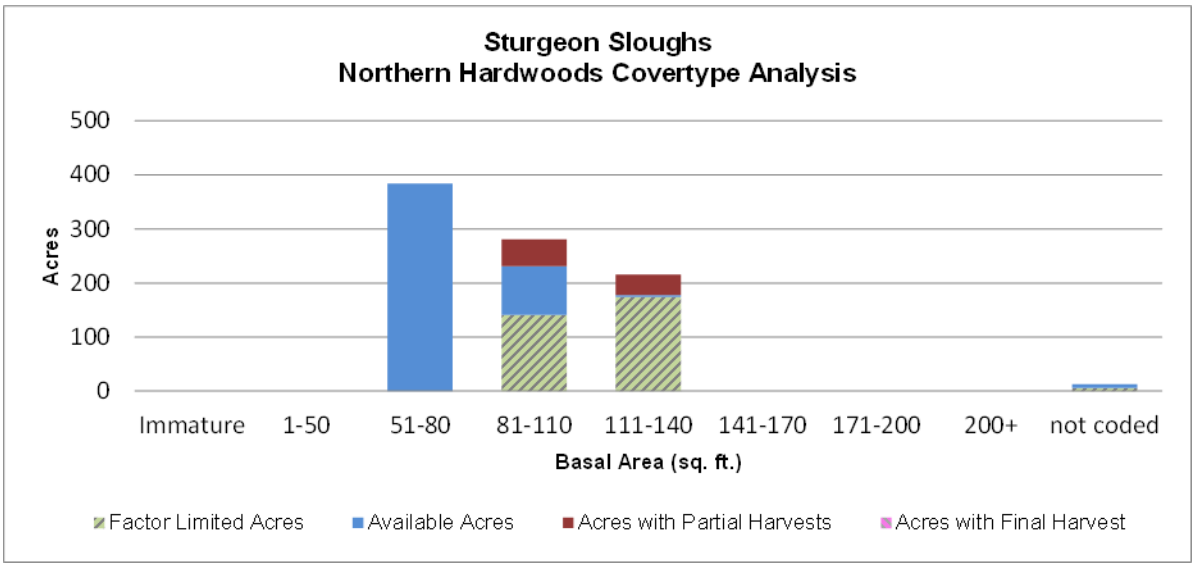

Figure 4.33.3. Graph of the basal area distribution for the northern hardwood cover type on the Sturgeon Sloughs management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs;
- Provide for a full complement of tree seedlings recruiting into the overstory; and
- Provide for well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle resulting in an estimated 286 acres harvested each decade; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Selectively harvest 101 acres during this 10-year planning period (this number is lower than the estimated long-term amount due to the current low basal areas); and
- Maintain and promote white pine, oak, hemlock and upland cedar where they occur in stands that are harvested.

Lowland Deciduous Cover Type

Current Condition

Currently there are 801 acres (10%) of the lowland deciduous type in the management area (Table 4.33.1). This type is often found in association with the lowland conifer, cedar and tamarack cover types. Many of the stands have 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 cover type on this management area does not have a well-balanced age-class distribution. Most of the stands in this management area are over 80 years in age or classed as uneven-aged.

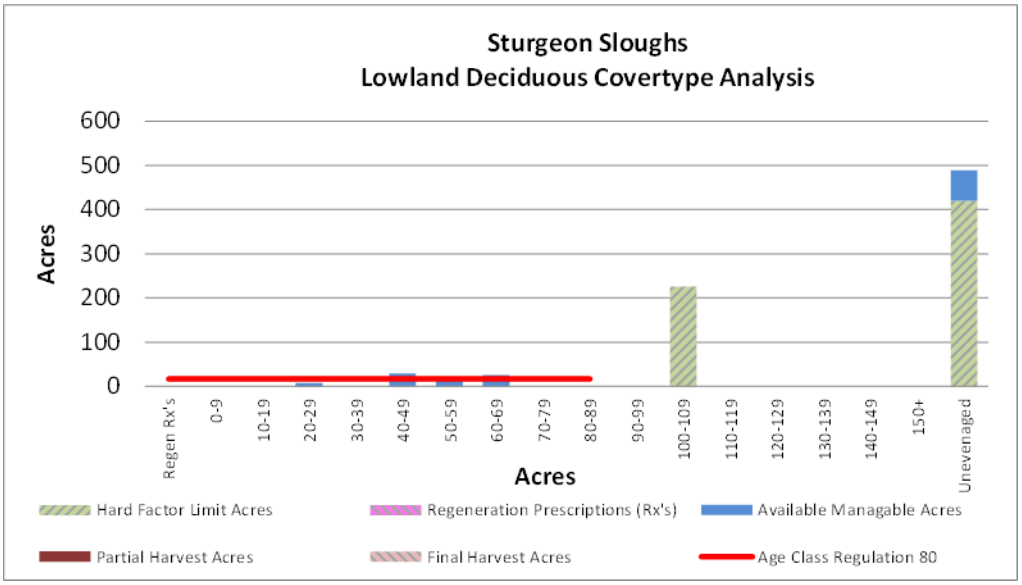

Figure 4.33.4. Graph of the age-class distribution for the lowland deciduous cover type on the Sturgeon Sloughs management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

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

Long-Term Management Objectives

- Harvest stands without limiting factors on an 80-year rotation resulting in an estimated 60 acres harvested each decade;
- Regenerate stands to a species mix similar to the pre-harvest conditions; and
- Harvest using small clearcuts or strips with clumped retention.

10-Year Management Objectives

- Harvest 17 acres over this 10-year 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 707 acres and are made up of lowland poplar (216 acres), cedar (178 acres), mixed lowland conifers (103 acres), lowland spruce/fir (86 acres), aspen (68 acres), upland conifer (24 acres), lowland mixed forest (12 acres), hemlock (10 acres) and upland mixed forest (10 acres). Together these types make up about 9% of the management area. None of these stands have limiting factors.

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
- Harvest as opportunities arise in conjunction with other management activities.

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 75 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (915 acres – 11%), lowland open/semi-open lands (2,513 acres – 31%) and miscellaneous other (water, local, urban) (200 acres – 2%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.33.2 Featured Wildlife Species Management

The wildlife management priority for the Sturgeon Sloughs management area is waterfowl. This area contains the Sturgeon River Sloughs Wildlife Area and Great Lakes marsh. A master plan has been written for the "sloughs" and should guide management activities at a finer scale. The primary focus of wildlife habitat management in the Sturgeon Sloughs management area will be to address the habitat requirements identified for the following featured species: American woodcock, black bear, Canada goose and eastern bluebird. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: early successional forest conditions (associated with alder, riparian zones or forested wetlands); mast (hard and soft); providing green browse such as winter wheat or rye for the fall (hunting) season; large open land complexes (with snags in open lands). During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Canada Goose

The western Upper Peninsula Canada goose goal is to provide recreational opportunity by attracting migrating geese to state forest lands. The focus of such management is to provide favorable water features and fields.

Wildlife habitat specifications:

- Attract geese to hunt able areas during the fall season;
- Plant green browse such as winter wheat or rye;
- Manage water features as necessary; and
- Manage small grain fields, leaving the maximum possible amount of waste grain.

Eastern Bluebird

The western Upper Peninsula goal for bluebirds is to maintain or improve habitat. State forest management efforts during this planning period will focus on maintaining or expanding open land conditions, protection of snags or dying standing trees associated with opening and managing opening complexes/savanna with prescribed fire.

Wildlife habitat specifications:

- Maintain herbaceous open-land complexes within the management area using prescribed burns or mowing and consider the spatial arrangement.
- Protect snags or dying standing trees within the open-lands. If nest cavities are not present, consider: leaving standing live trees (e.g., aspen) trees in final harvest timber sales; and/or planting scattered oak.
- Leave a ½-chain buffer around openings to limit aspen encroachment following aspen timber harvests.

4.33.3 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, 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 as well as one natural community of note occurring in the management area as listed in Table 4.33.2. 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 Sturgeon Sloughs management area has the Sturgeon River Sloughs and the Otter Lake Dam Flooding state wildlife management areas as shown in Figure 4.33.5 that are special conservation areas.

Table 4.33.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Sturgeon Sloughs 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 Comminity								
Great Lakes marsh		S3/G2	Confirmed				Lowland open/semi-open	N/A
Birds								
American bittern	*Botaurus lentiginosus*	SC/G4/S3-4	Confirmed	MV	Very High	Great Lakes marsh	Lowland open/semi-open	N/A
						Emergent marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Lakeplain wet prairie	Lowland open/semi-open	N/A
						Lakeplain wet-mesic prairie	Lowland open/semi-open	N/A
						Wet-mesic sand prairie	Lowland open/semi-open	N/A
						Wet prairie	Lowland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Poor fen	Lowland open/semi-open	N/A
						Coastal fen	Lowland open/semi-open	N/A
Common moorhen	*Gallinula chloropus*	T/G5/S3-4	Confirmed	PS	Very High	Great Lakes marsh	Lowland open/semi-open	N/A
						Coastal plain marsh	Lowland open/semi-open	N/A
						Emergent Marsh	Lowland open/semi-open	N/A
Common loon	*Gavia immer*	T/G5/S3-4	Confirmed	HV	Very High	Emergent Marsh	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
Bald eagle	*Haliaeetus leucocephalus*	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Floodplain forest	Lowland mixed	Mid
						Dry northern forest	Jack Pine, Red Pine	Early
						Dry-mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Fish								
Lake sturgeon	*Acipenser fulvescens*	T/G3G4/S2	Confirmed	HV	Moderate	Great Lakes	Aquatic	N/A
						Rivers	Aquatic	N/A
						Mainstem streams	Aquatic	N/A
Bigmouth shiner	*Notropis dorsalis*	SC/G5/S4	Confirmed	MV	Moderate	Rivers	Aquatic	N/A
Sauger	*Sander canadensis*	T/G5/S1	Confirmed	HV	Low	Rivers	Aquatic	N/A
						Great Lakes	Aquatic	N/A
Reptile								
Wood turtle	*Glyptemys insculpta*	SC/G4/S2S3	Confirmed	MV	Moderate	Northern wet meadow	Lowland open/semi-open	N/A
						Bog	Lowland open/semi-open	N/A
						Rich conifer swamp	Tamarack	Late
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern shrub thicket	Upland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
Plants								
Douglas's hawthorn	*Crataegus douglasii*	CS/G5/S3S4	Confirmed			Volcanic bedrock glade	Upland open/semi-open	N/A
						Volcanic bedrock lakeshore	Upland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Mesic northern forest	Northern Hardwood	Late
						Northern bald	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A
						Sand and gravel beach	Upland open/semi-open	N/A
						Sandstone bedrock lakeshore	Upland open/semi-open	N/A
						Volcanic cliff	Upland open/semi-open	N/A
						Volcanic cobble shore	Upland open/semi-open	N/A
						Volcanic lakeshore cliff	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

Although there are no high conservation value areas, there are two ecological reference areas, the Sturgeon River Great Lakes Marshes (991.1 acres and 5.3 acres) representing the Great Lakes marsh natural community, as shown in Figure 4.32.5.

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 develop and maintain management plans for ecological reference areas on state forest land.

Objective 2-1: Complete ecological reference area planning by the end of this 10-year planning period.

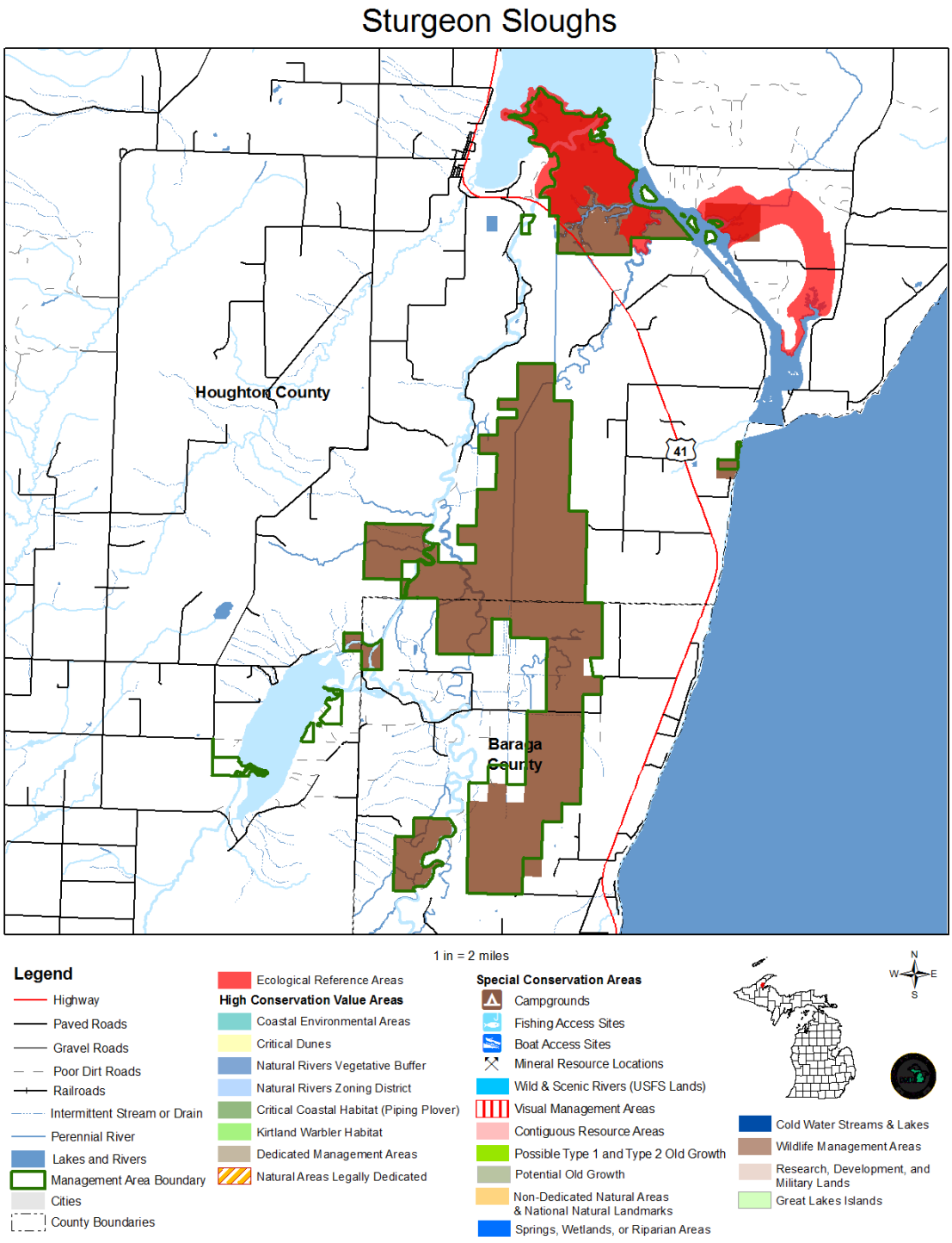

Figure 4.33.5. A map of the Sturgeon Sloughs management area showing the special resource areas.

4.33.4 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:

- Spruce budworm
- Emerald ash borer
- Eastern larch beetle
- Larch casebearer.

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. Following is a list of species of concern that been documented in or near this management area:

- Canada thistle
- Glossy buckthorn
- Japanese knotweed
- Purple loosestrife
- Reed canary grass
- Spotted knapweed
- Tatarian honeysuckle.

4.33.5 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 4.33.1.

4.33.6 Fire Management

This area is dominated by wetland communities. Fire return interval is uncertain, with significant fire growth possible where absence of canopy would see higher winds and grass fuels becoming flammable with low water levels during periods of drought.

- All wildfires are subject to appropriate initial attack suppression response.

4.33.7 Public Access and Recreation

This area is a popular waterfowl hunting and wildlife viewing area. The Baraga/Chassell snowmobile trail crosses the area from south to north as shown in Figure 4.33.1. There are several boating access sites on inland lakes. Access is across mostly small private ownerships.

- Work to establish legal access for management and public use.

4.33.8 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 coarse-textured till, postglacial alluvium and peat and muck. The glacial drift thickness variesbetween 10 and 50 feet. Sand and gravel pits are not located in the management area and potential for additional pits is unlikely.

The Precambrian Jacobsville Sandstone subcrops below the glacial drift. The Jacobsville was used as a building stone in the past.

Metallic mineral exploration has not occurred in the general area of the management area in the past and potential appears to be limited.

4.34 Voelker Plains Management Area

Summary of Use and Management

Vegetative management in the Voelker Plains management area (MA) (Figure 4.34.1) 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 jack pine, aspen and lowland spruce/fir; 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: American woodcock, beaver, black bear and Kirtland's warbler. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and spruce budworm will be issues for this 10-year planning period.

Introduction

The Voelker Plains management area is located on an outwash plain in central Marquette County. The management area covers 13,785 acres. The state forest ownership is somewhat fragmented interspersed with non-industrial and industrial private ownership. The major cover types are jack pine, aspen and lowland spruce/fir. Other attributes that played a role in the definition of this management area include:

- Dominated by two natural communities: dry northern forest and dry-mesic northern forest;
- Low- to medium-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 includes the use of intensive early successional jack pine management for timber production on appropriate sites.

The predominant cover types, composition and projected harvest areas for the Voelker Plains Area management area are shown in Table 4.34.1.

Table 4.34.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Voelker Plains 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
Jack Pine	47%	6,427	163	6,264	136	0	6,427	895	0
Lowland Spruce/Fir	11%	1,485	142	1343	453	0	1,485	149	0
Aspen	11%	1,457	16	1441	522	0	1,457	288	0
Red Pine	6%	878	131	747	0	278	878	68	278
Upland Spruce/Fir	4%	559	82	477	0	0	559	68	0
White Pine	4%	496	0	496	31	173	496	31	173
Upland Open/Semi-Open Lands	1%	196	0	196	0	0	196	0	0
Lowland Open/Semi-Open Lands	11%	1,581	0	1581	0	0	1,581	0	0
Misc Other (Water, Local, Urban)	0%	55	0	55	0	0	55	0	0
Others	5%	651	9	642	151	55	651	60	138
Total		13,785	543	13,242	1,293	506	13,785	1,559	589

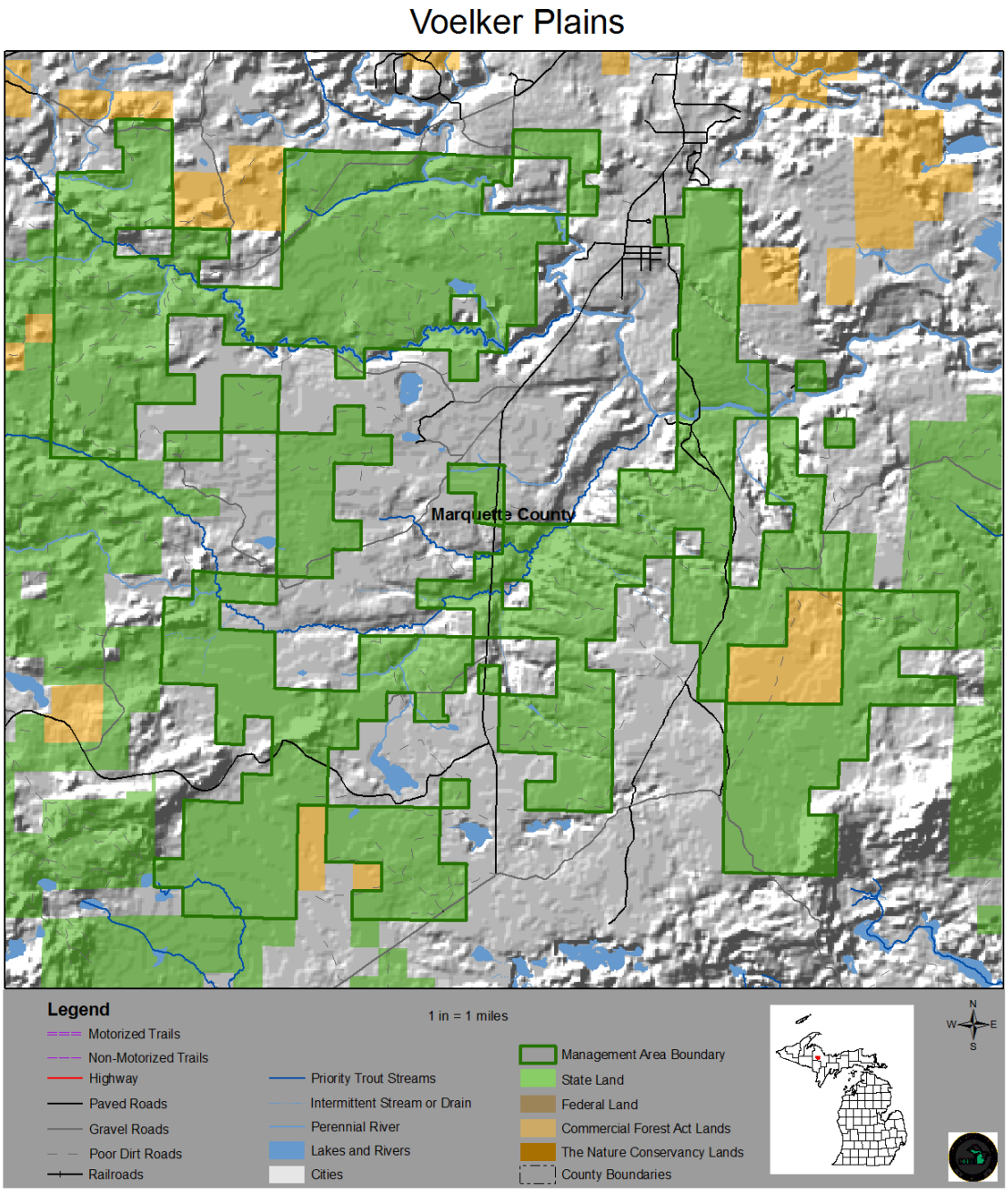

Figure 4.34.1. A map of the Voelker Plains management area (dark green boundary) in relation to surround state forest and other land in Marquette County, Michigan.

4.34.1 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 Voelker Plains 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.

Jack Pine Cover Type

Current Condition

The jack pine cover type covers 6,427 acres (47%) of the management area (Table 4.34.1) and is poorly distributed across age classes (Figure 4.34.2). Jack pine is growing on dry-mesic to dry-sandy soils, which are productive for the species. Jack pine will be managed on a 60-year rotation (indicated by the red line in Figure 4.34.2). Jack pine acres are unevenly distributed across age classes. Over the last 20 years overmature jack pine stands have been harvested to reduce losses to jack pine budworm and windthrow. This has caused the surplus of young age class acres as seen in Figure 4.34.2. Extended drought conditions and subsequent jack pine plantation failures over the past five years has extended the time and increased the cost of regenerating some stands.

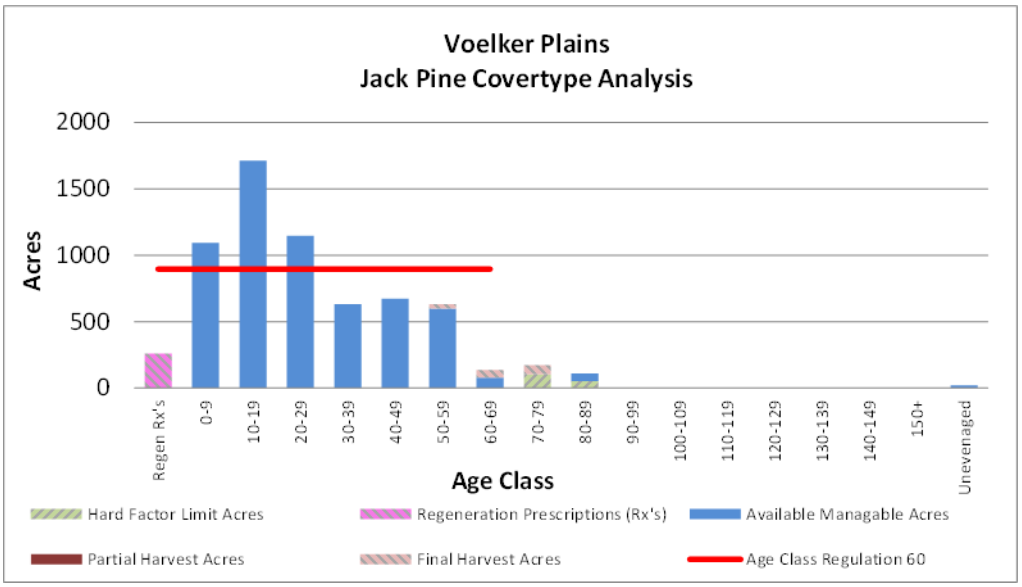

Figure 4.34.2. Graph of the age-class structure for the jack pine cover type on the Voelker Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class up to 60 years (indicated by the red line in Figure 4.34.2);
- Promote larger stands where practical;
- Provide an even supply of forest products; and
- Provide for a balanced mix of habitat conditions for a variety of wildlife.

Long-Term Management Objectives

- Harvest and regenerate jack pine using a 60-year rotation length;
- Regenerate approximately 895 acres each decade;
- Explore opportunities to harvest in the age classes with surplus acres (above the red line) presently in the 0-9, 10-19 and 20-29 year-old age classes as these classes grow older and reach merchantable size; and
- Biomass harvesting may facilitate the opportunities needed to harvest in these age classes early.

10-Year Management Objectives

- Harvest older age classes wherever practical;
- Monitor for jack pine budworm and other insect or disease problems; and
- Identify higher quality sites that may be suitable for conversion to aspen or red pine.

Lowland Spruce/Fir Cover Type

Current Condition

The lowland spruce/fir cover type covers 1,485 acres (11%) of the management area (Table 4.34.1). Lowland spruce/fir is poorly distributed across age classes, over-represented in the older age classes and underrepresented in the younger age classes (Figure 4.34.3). Lowland spruce-fir is often found in association with lowland conifer, cedar and tamarack cover types.

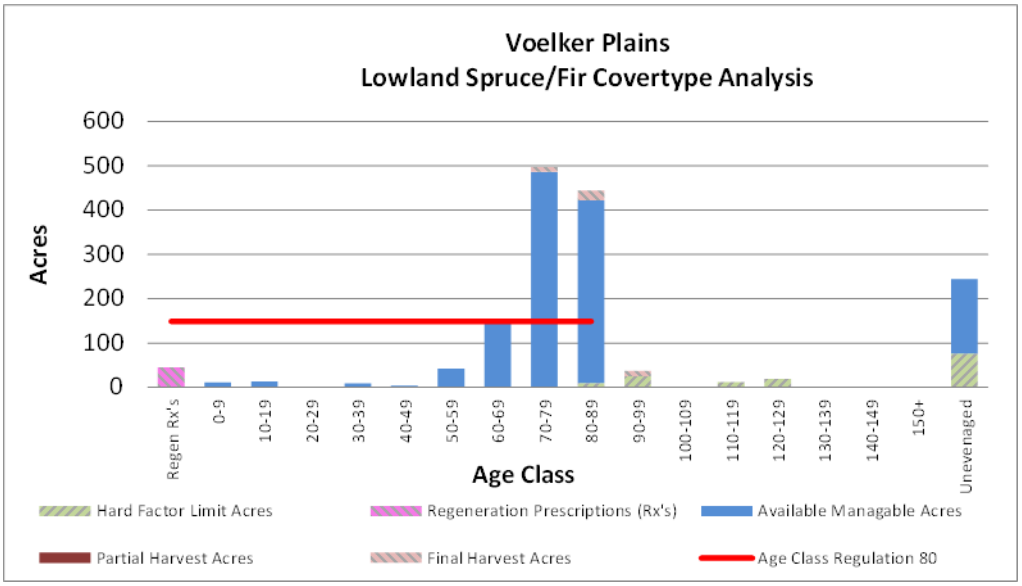

Figure 4.34.3. Graph of the age-class structure for the lowland spruce/fir cover type on the Voelker Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain approximately the current level of lowland spruce/fir cover type with better representation across all age classes.

Long-Term Management Objectives

- Work to improve age-class distribution, ultimately leading to harvesting and regenerating 149 about acres per decade on an 80-year rotation; and
- Monitor for insect and disease susceptibility and regenerate before widespread mortality occurs.

10-Year Management Objectives

- Harvest about 453 acres during this 10-year planning period; and
- Salvage harvesting may be needed during this 10-year planning period to reduce mortality losses in the older stands.

Aspen Cover Type

Current Condition

The aspen cover type covers 1,457 acres (11%) of the management area (Table 4.34.1) and is poorly distributed across age classes (Figure 4.34.4). Aspen is growing on dry-mesic to dry-sandy soils. Of the relatively few acres over the rotation

age of 40 years (40-49 years old on the graph) most are already scheduled for harvest. Early entry into younger age classes is unlikely during the next 10-year planning period because aspen in these age classes are neither of merchantable size nor economic maturity. The surplus of acres in the 30-39 year old age class will be an issue requiring more attention in the next 10-20 years.

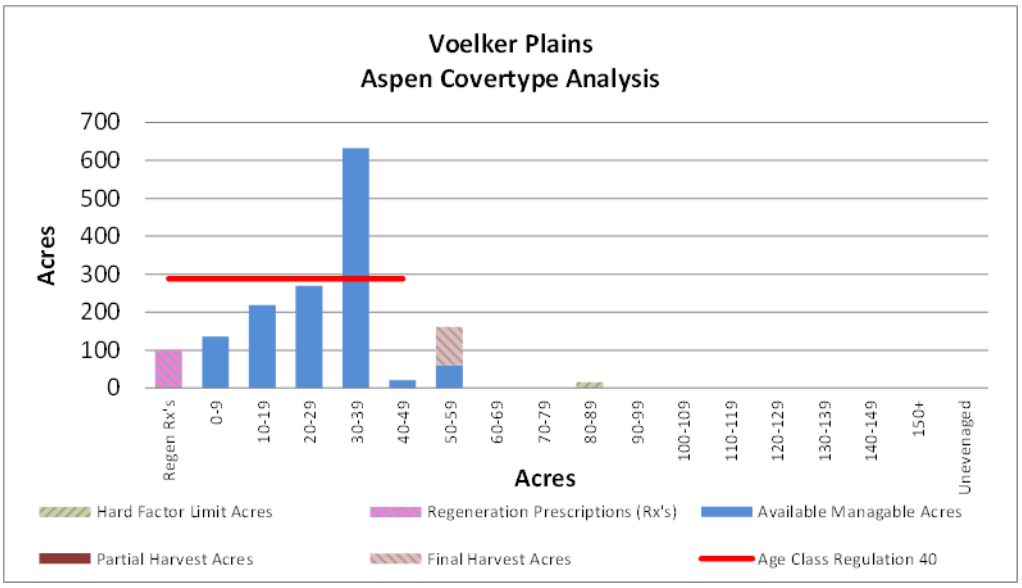

Figure 4.34.4. Graph of the age-class structure for the aspen cover type on the Voelker Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class over a 40-year rotation (indicated by the red line in Figure 4.34.4);
- Provide an even supply of forest products;
- Provide a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Regenerate approximately 288 acres each decade.

10-Year Management Objectives

- Harvest aspen in older age classes wherever practical up to 522 acres. However, there are relatively few acres that meet harvestable criteria so aspen production from this management area will be below target in this 10-year planning period.

Red Pine Cover Type

Current Condition

The red pine cover type covers 878 acres (6%) of the management area (Table 4.34.1) and is poorly distributed across age-classes (Figure 4.34.5). Red pine stands occur on dry-mesic sites similar to the aspen stands in this management area. Nearly 60% of the red pine in this management area is of plantation origin. The surplus in the 50-59 year-old age class on Figure 4.34.5 is indicative of the planting efforts of the 1950s that established many of these stands.

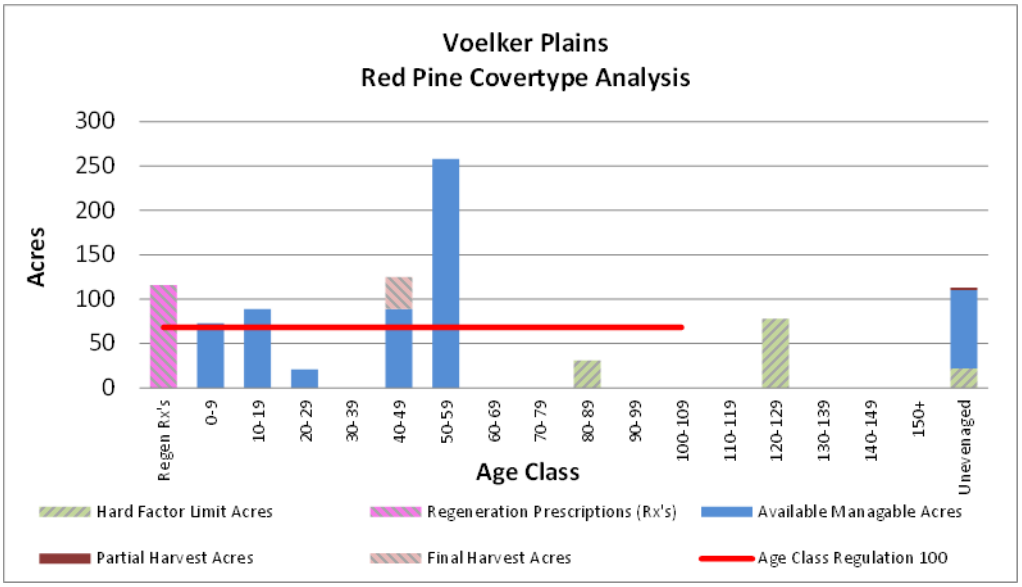

Figure 4.34.5. Graph of the age-class structure for the red pine cover type on the Voelker Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain the same number of acres of red pine in the management area and at approximately the same ratio of plantation pine to natural origin pine (approximately 33% plantation origin); and
- Balance age classes of the plantation origin red pine to reduce the surplus acres in the 50-59 year-old age class (indicated by the red line in Figure 4.34.5).

Long-Term Management Objectives

- Harvest and regenerate 68 acres and thin 278 acres each decade;
- Plantation stands will be managed on an 80-year rotation with intermediate harvests (thinning) as basal area guidelines are met;
- Maintain stands of natural origin on about 67% of the red pine acreage;
- Manage natural origin stands on an average 100-year rotation using natural regeneration techniques and scarification as needed; and
- Both natural origin and plantation stands will be thinned as necessary.

10-Year Management Objectives

- Harvest and regenerate zero acres of red pine in this planning period;
- Thin about 278 acres of red pine in this planning period; and
- Thinning should add natural regeneration gaps to promote stand species diversity.

Upland Spruce/Fir Cover Type

Current Condition

The upland spruce/fir cover type covers 559 acres (4%) of the management area (Table 4.34.1) and is poorly distributed across age classes (Figure 4.34.6). Spruce/fir is found on dry-mesic to mesic sites, which are productive for the species. Spruce/fir typically occurs as small stands occupying the transition zone between larger upland types (aspen and northern hardwood) and lowlands. These transitions have important wildlife values. Spruce/fir will be managed on a 60-year rotation to approximate a balanced age-class structure indicated by the red line in Figure 4.34.6. Of the relatively few acres over the rotation age of 60 years (60-69 years old on the graph) most are already scheduled for harvest or have hard limiting factors. Early entry into younger age classes is unlikely during the next 10-year period because spruce/fir in these age-classes is neither of merchantable size nor economic maturity.

Desired Future Condition

- Maintain approximately the current level of upland spruce-fir acreage.

Long-Term Management Objective

- Harvest and regenerate upland spruce/fir stands on a using a 60-year rotation.

10-Year Management Objective

- Harvest and regenerate zero acres of upland spruce/fir during this 10-year planning period.

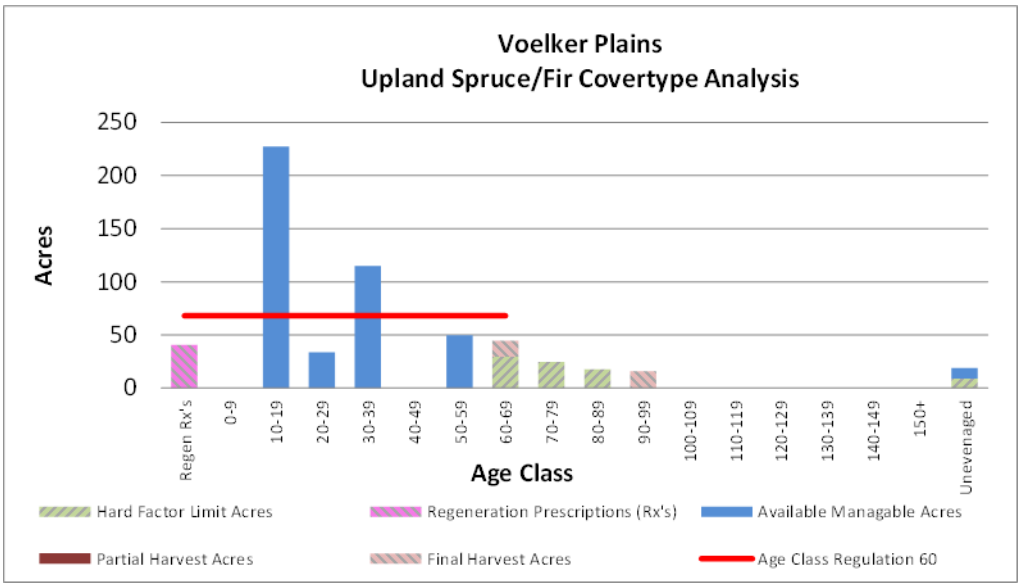

Figure 4.34.6. Graph of the age-class structure for the upland spruce/fir cover type on the Voelker Plains management area (2012 Department of Natural Resources inventory data).

White Pine Cover Type

Current Condition

Over 496 acres (4%) of the state forest land in this management area is white pine (Table 4.34.1). It is poorly distributed across age classes as seen in Figure 4.34.7. All of the white pine is of natural origin. There are no white pine plantations in the management area.

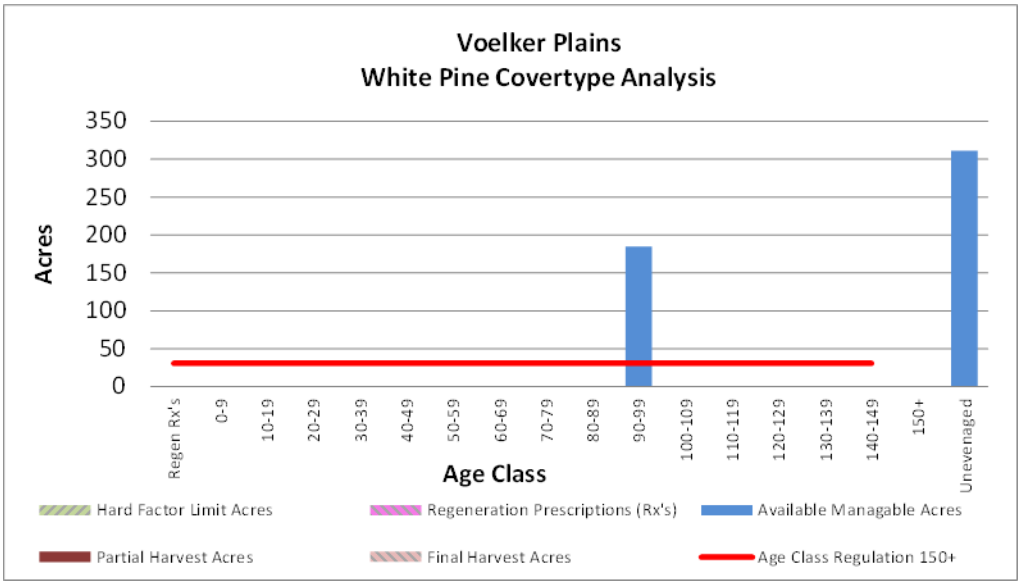

Figure 4.34.7. Graph of the age-class structure for the white pine cover type on the Voelker Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain natural origin white pine in this management area.

Long-Term Management Objective

- Manage natural origin stands on a 150-year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed; and
- Thin stands as necessary.

10-Year Management Objectives

- Thin about 173 acres of white pine over this planning period; and
- Regenerate 31 acres of natural origin stands within the next decade using shelterwood and small patch cuts.

Other Forested Cover Types

Current Condition

Other forested types make up 651 acres and are made up of natural mixed pines (246 acres), tamarack (94 acres), upland mixed forests (75 acres), northern hardwoods (70 acres), planted mixed pines (70 acres), lowland conifer (61 acres), cedar (31 acres) and mixed upland deciduous (four acres). Together these types make up about 5% of the management area ("Others" in Table 4.34.1).

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;
- Featured species habitat requirements will be taken in to consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 206 acres during this 10-year planning period.

Other Non-forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (196 acres – 11%), lowland open/semi-open lands (1,581 acres – 31%) and miscellaneous other (water, local, urban) (55 acres – 2%) (Table 4.34.1).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.34.2 Featured Wildlife Species Management

Wildlife considerations in the Voelker Plains management area consist of: managing jack pine habitat with strategies that more closely mimic natural fire disturbance regimes and increasing stand size and striving to accommodate many species associated with xeric forest habitat is desirable. The primary focus of wildlife habitat management in the Voelker Plains management area will be to address the habitat requirements identified for the following featured species: American woodcock, beaver, black bear and Kirtland's warbler. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: early successional forest conditions (associated with alder, riparian zones or forested wetlands), mast (hard and soft); habitat fragmentation, early successional forest; and large open land complexes. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas (e.g., priority beaver streams) for featured species will be performed.

American Woodcock

The western Upper Peninsula goal for woodcock is to maintain or increase woodcock habitat. In priority areas, management should focus on maintaining early successional habitat associated with riparian zones and forested lowlands.

Wildlife habitat specifications:

- Maintain aspen cover type within the management area where associated with alder, riparian zones or forested wetlands;
- Balance aspen age-class distribution within the management area;
- Use silvicultural practices that encourage the aspen component in mixed stands associated with alder, riparian zones or forested wetlands; and
- Maintain or create rough openings associated with alder, riparian zones, regenerating aspen or forested wetlands within the management area.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Beaver

The western Upper Peninsula goal for beaver is to maintain suitable habitat for beaver. Management for the species should focus on providing favorable food within 100 feet of streams that are not designated high priority trout streams. Consideration will be given to best management practices, trout stream management and trends in beaver nuisance permits issued.

Wildlife habitat specifications:

- Maintain or promote alder, aspen, birch, maple or willow within 100 feet of non-high priority trout streams with gradients of less than 15% and other bodies of water.

Kirtland's Warbler

The western Upper Peninsula goal for Kirtland's warbler during this planning period is to provide suitable breeding and foraging habitat within this management area. Management will focus on providing large patches (300-550 acres where possible) of early successional jack-pine forest with appropriate structural and compositional diversity on droughty outwash plains systems. When possible, large blocks should be created by managing several smaller harvest blocks adjacent to each other simultaneously.

Wildlife habitat specifications:

- Develop landscape level plans for Kirtland's warbler habitat within and across management areas to ensure suitable habitat is provided at any point in time across management areas within the ecoregion. Jack pine should be harvested in a manner that attempts to mimic both the size and structure of the stands that would result from fire.
- Develop harvest plans in the context of landscape-level plans. Strive to increase patch size to meet Kirtland's warbler habitat needs. Consider current and desired future patch size, age class distribution, and distance to other jack pine stands. When developing harvest plans, identify opportunities for increasing patch size:
    - Review state forest inventory in management area and identify adjacent stands with similar age classes that could reasonably be combined into one stand.
    - Collaborate in planning of the spatial arrangement and timing of harvest with willing major landowners within this outwash plain (e.g., U.S. Forest Service and Michigan Technological University).
    - Large blocks of regenerating jack pine adjacent to herbaceous openings are desirable as they function as open-lands until the trees are 3-4 feet in height and benefit open-land species as well.
- Post-disturbance legacies include simulated skips or fingers of jack pine; snags; and larger diameter, fire-tolerant trees such as red pine. These features should be left in stands of harvested jack pine as retention to benefit Kirtland's warbler.
- Scarify stands quickly after stands are harvested or use prescribed fire where feasible to maintain jack pine and to ensure maximum stem density.

4.34.3 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, 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 two listed species and no natural communities of note occurring in the management area as listed in Table 4.34.2. 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.

Table 4.34.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Voelker Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Community								
Poor conifer swamp		S4/G4	Confirmed				Tamarack	Late
Bird								
Kirtland's warbler	*Dendroica kirtlandii*	LE/E/G1/S1	Confirmed	PS	Very High	Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Early
Butterflies								
Red-disked alpine	*Erbia discoidalis*	*SC/G5/S2S3*	Confirmed	MV	Low	Bog	Lowland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Pine barrens	Jack Pine	Early
						Muskeg	Lowland open/semi-open	N/A
						Patterned fen	Lowland open/semi-open	N/A
						Poor fen	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

Approximately 215.8 acres of potential old growth have been identified within the Voelker Plains management area (Figure 4.34.8). 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.

There are no high conservation value areas or ecological reference areas identified in this management area as illustrated in Figure 4.34.8.

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.

4.34.4 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
- Jack pine budworm

- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight
- 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 that been documented in or near this management area.

4.34.5 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 4.34.1.

4.34.6 Fire Management

This area is dominated by fire-adapted communities ranging from barrens at its heart to dry and dry-mesic northern forest communities make up the bulk of the land area that remains. This area was probably always subject to periodic stand replacement fires that spread rapidly over large areas, frequently in single events.

- This management area falls within the South 581 Zone Dispatch area, which calls for elevated readiness and response. Aggressive suppression is planned for the entire management area due to the potential for large fire growth.
- High-risk fuels combined with substantial wildland urban interface and intermix make this a prime area for Firewise practices and community wildfire protection planning.
- Recreational properties and public recreation sites provide good opportunities for establishing prevention messages for dispersed recreation causes.

4.34.7 Public Access and Recreation

This area has good public and management access. No recreational facilities are located in this area.

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

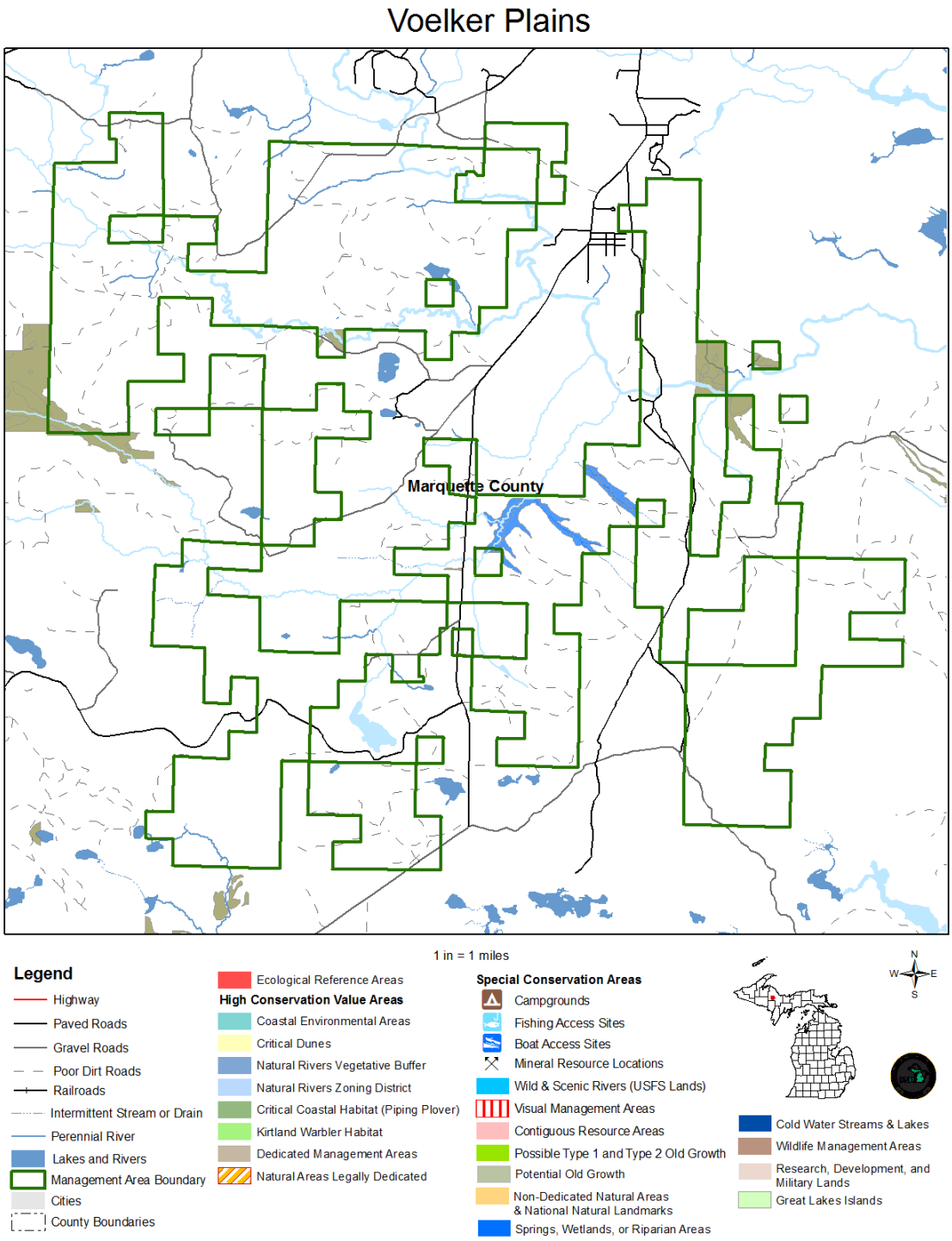

Figure 4.34.8. A map of the Voelker Plains management area showing the special resource areas.

4.34.8 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 glacial outwash sand and gravel and postglacial alluvium, coarse-textured till, and peat and muck. The glacial drift thickness variesbetween 10 and 100 feet. Sand and gravel pits are located in the management area and there is some potential for additional pits.

The Precambrian Archean Granite/Gneiss subcrops below the glacial drift.The Granite/Gniess could be used as dimension stone.

Metallic mineral exploration has not occurred in the general area of the management area in the past, but there could be potential.

4.35 Yellow Dog Plains Management Area

Summary of Use and Management

Vegetative management in the Yellow Dog Plains management area (MA) (Figure 4.35.1) 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 jack pine; 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: black bear, Kirtland's warbler and spruce grouse. Management activities may be constrained by site conditions and the skewed age-class distributions. Balancing age classes and potential insect (jack pine budworm) outbreaks will be issues for this 10-year planning period.

Introduction

The Yellow Dog Plains management area is on an outwash plain in northern Marquette County. The state forest covers about 3,800 acres and is somewhat scattered parcels. The major ownership in this vicinity is forest industry. The management area is dominated by the jack pine cover type. Other attributes that played a role in the definition of this management area include:

- Dominated by the dry northern forest natural community;
- Low-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 Yellow Dog Plains management area are shown in Table 4.35.1.

Table 4.35.1. Summary of cover types, composition, limited factor area, manageable area and projected harvest area for the Yellow Dog Plains 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
Jack Pine	68%	2,567	104	2,463	214	0	2,567	352	0
Northern Hardwood	10%	362	44	318	0	157	362	0	157
White Pine	6%	225	0	225	48	86	225	14	86
Upland Open/Semi-Open Lands	0%	0	0	0	0	0	0	0	0
Lowland Open/Semi-Open Lands	2%	91	0	91	0	0	91	0	0
Misc Other (Water, Local, Urban)	0%	2	0	2	0	0	2	0	0
Others	14%	515	213	302	124	72	515	36	82
Total		3,762	361	3,401	385	315	3,762	402	325

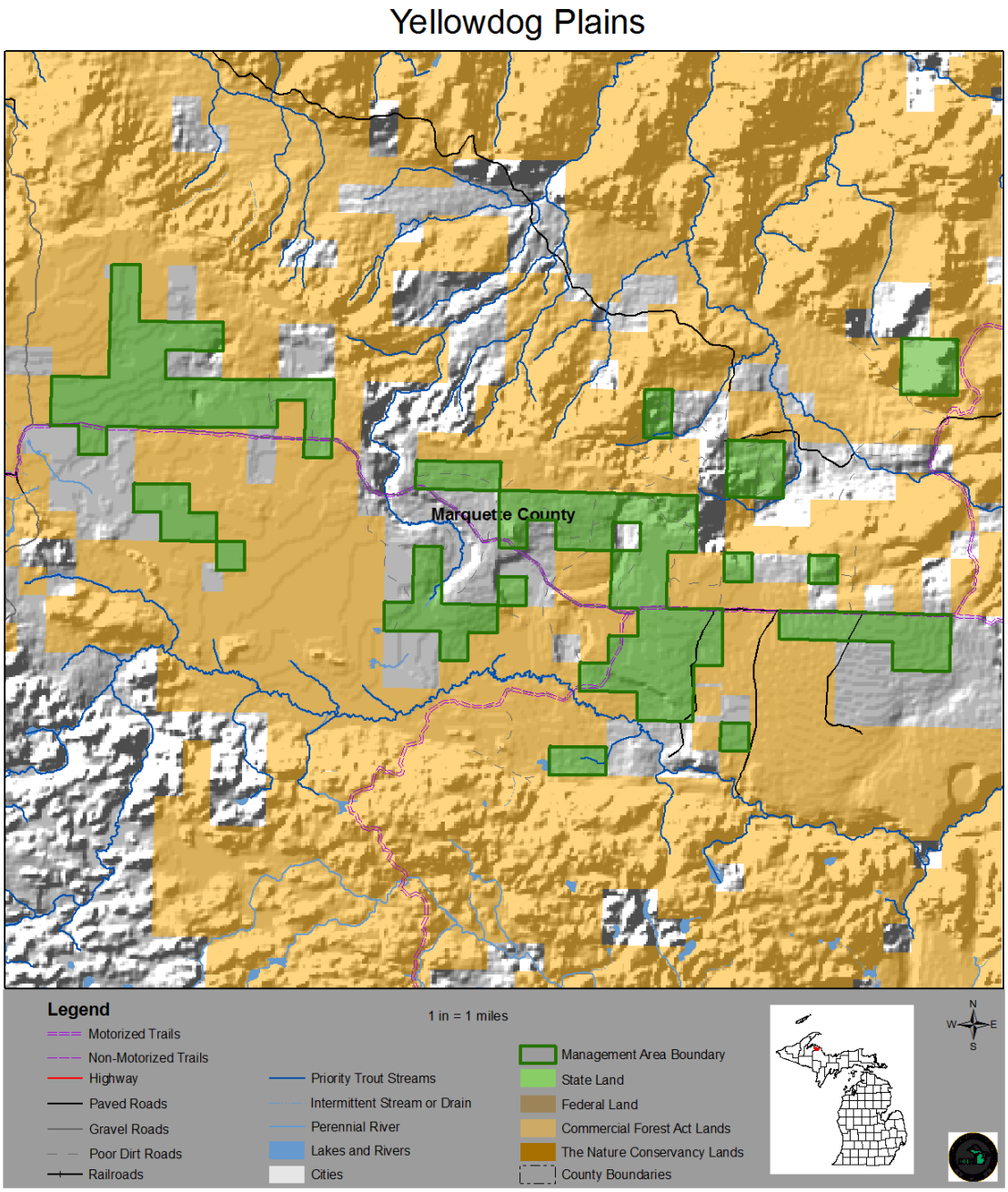

Figure 4.35.1. A map of the Yellow Dog Plains management area (dark green boundary) in relation to other state forest lands in Marquette County, Michigan.

4.35.1 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 Yellow Dog Plains 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 (e.g., 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.

Jack Pine Cover Type

Current Condition

The jack pine cover type comprises 2,567 acres (68%) of the management area (Table 4.35.1). Most of the jack pine is unevenly distributed across age-classes with considerable surplus in the 0-9, 10-19 and 30-39 year-old age classes (Figure 4.35.2). Few acres of jack pine have limiting factors.

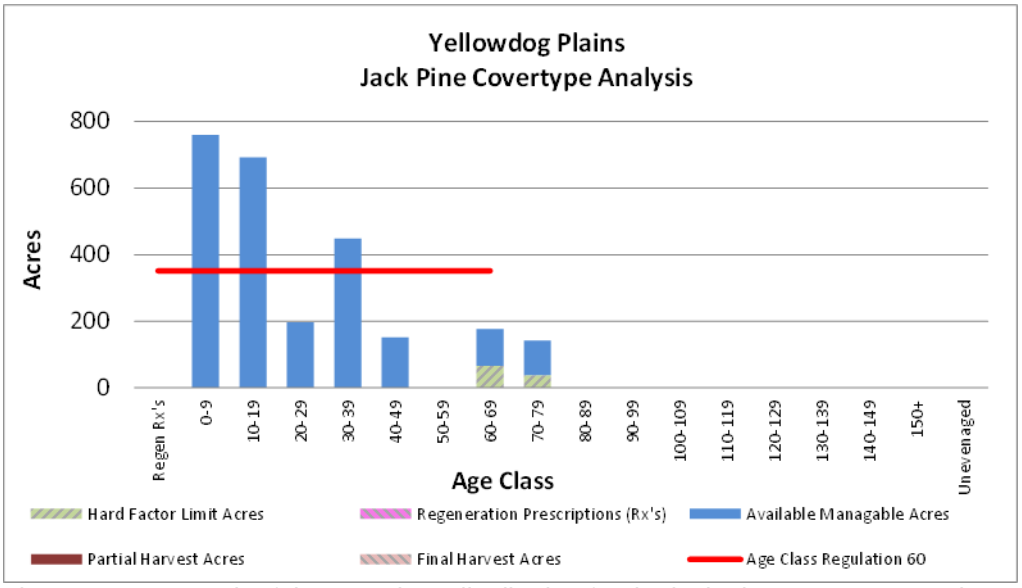

Figure 4.35.2. Graph of the age-class distribution for the jack pine cover type on the yellow Dog Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Balanced acres in each age class with a rotation age of 60 years;
- Provide an even supply of forest products;
- Provide for a balanced mix of habitat conditions for a variety of wildlife; and
- Provide for a variety of hunting-type opportunities.

Long-Term Management Objectives

- Manage jack pine on a 60-year rotation resulting in an estimated 352 acres harvested each decade; and
- Work to reduce the spikes in the younger age classes.

10-Year Management Objectives

- Harvest 214 acres during this 10-year planning period; and
- Manage portions of the jack pine in this management area as older age classes in retention patches.

Northern Hardwoods Cover Type

Current Condition

Northern hardwood stands make up 362 acres (10%) of state forest land in this area (Table 4.35.1). They occur on medium-quality sugar maple sites. Most stands have been managed on an uneven-aged basis using the selection harvest system. Some of the stands in this area have limiting factors. Due to low deer numbers in this area, there are few problems with herbivory and most areas regenerate successfully. Northern hardwood managed on an uneven-aged system is based on basal area rather than a rotation age.

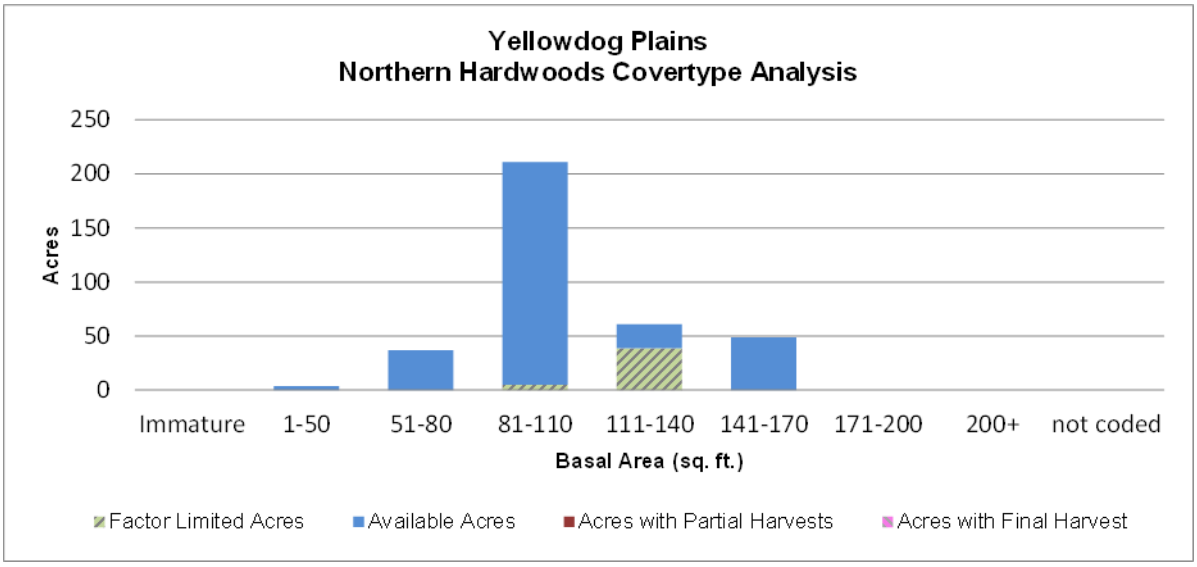

Figure 4.35.3. Graph of the basal area distribution for the northern hardwood cover type on the yellow Dog Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Uneven-aged northern hardwood stand structure promoting high-value sugar maple sawlogs with a full complement of tree seedlings recruiting into the overstory, well-developed shrub and herbaceous layers.

Long-Term Management Objectives

- Using an uneven-aged system, selectively harvest high-quality northern hardwood stands on a 20-year cycle to maintain high growth rates and minimize stagnant growth periods resulting in an estimated 157 acres harvested each decade; and
- Maintain and encourage minor species to increase in-stand diversity.

10-Year Management Objectives

- Selectively harvest 157 acres during this 10-year planning period;
- Maintain and promote white pine, oak, hemlock and upland cedar where they occur in stands that are harvested, favoring oak as retention; and
- Work to regenerate hemlock components in stands lacking that species.

White Pine Cover Type

Current Condition

The white pine cover type covers 225 acres (6%) of the state forest in this management area. It is poorly distributed across age classes, with most of the acres in the 70-79 and 80-89 year-old age classes. All the white pine is of natural origin.

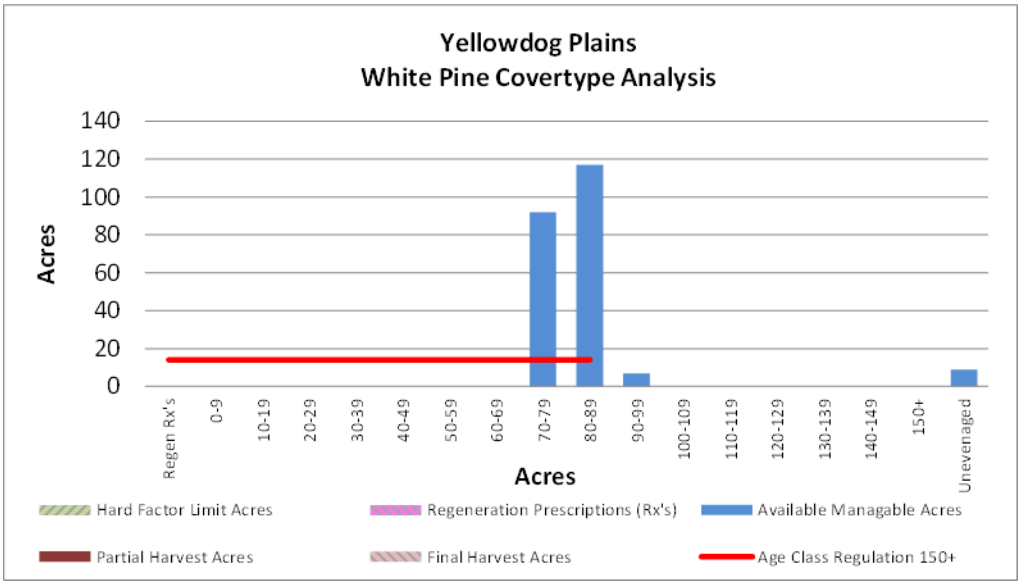

Figure 4.35.4. Graph of the age-class distribution for the white pine cover type on the Yellow Dog Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Maintain natural origin white pine in this management area.

Long-Term Management Objectives

- Manage natural origin stands on a 150-year rotation using natural regeneration techniques with shelterwood or patch clearcuts and scarification as needed;
- Thin stands as necessary; and
- Harvest and regenerate 14 acres and carry out partial harvest on 86 acres each decade.

10-Year Management Objectives

- Thin 86 acres of white pine in this 10-year planning period; and
- Work to improve age-class distribution by harvesting and regenerating 48 acres of natural origin stands in this 10-year planning period using shelterwood and small patch cuts.

Other Forested Cover Types

Current Condition

Other forested types make up 515 acres and are made up of oak (127 acres), hemlock (111 acres), mixed upland deciduous (90 acres), lowland spruce/fir (87 acres), lowland conifer (46 acres), upland mixed forest (24 acres), natural mixed pines (18 acres) and paper birch (12 acres). Together these types make up about 14% of the management area (Table 4.35.1).

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;
- Use appropriate silvicultural techniques to assure adequate regeneration of desired species;
- Monitor harvested sites;
- Featured species habitat requirements will be taken into consideration; and
- Maintain hemlock as it occurs.

10-Year Management Objectives

- Harvest those stands without harvest limitations adjacent to other planned harvest activities and where stand and habitat conditions indicate that harvesting is appropriate; and
- Expected harvests in these types will be less than 196 acres during this 10-year planning period.

Other Non-Forested Cover Types

Current Condition

The following non-forested cover types are found on this management area: upland open/semi- open lands (none), lowland open/semi-open lands (91 acres – 2%) and miscellaneous other (water, local, urban) (2 acres - >1%).

Desired Future Condition

- These areas will be maintained in the current condition.

Long-Term Management Objective

- Grass will be burned or mowed to prevent forest encroachment.

10-Year Management Objective

- Grass-types will be treated for opening maintenance as needed.

4.35.2 – Featured Wildlife Species Management

Wildlife considerations in the Yellow Dog Plains management area consist of managing jack pine habitat with strategies that more closely mimic natural fire disturbance regimes. Increasing stand size and striving to accommodate many species associated with xeric forest habitat is desirable. The primary focus of wildlife habitat management in the Yellow Dog Plains management area will be to address the habitat requirements identified for the following featured species: black bear, Kirtland's warbler and spruce grouse. Based on the selected featured species, some of the most significant wildlife management issues in the management area are: mast (hard and soft); habitat fragmentation; within stand diversity; mature forest condition; mesic conifer; large open land complexes; and early successional forest. During this 10-year planning period, additional analyses to better define the spatial extent of priority areas for featured species will be performed.

Black Bear

The western Upper Peninsula black bear goal is to maintain or improve habitat. Management for bear should focus on improving existing habitat (e.g., maintaining corridors, mast and refuge trees) in this management area.

Wildlife habitat specifications:

- Maintain or increase the oak cover type and within stand oak component of hardwood forests within the management area;
- Maintain or increase mast by providing forest clearings that promote food sources such as pin cherry, juneberry/serviceberry, hazel, raspberry, blackberry and blueberry;
- Minimize herbicide use that would be detrimental to mast production;
- Maintain lowland conifer and hardwoods along and around drainages, vernal pools and forested wetlands; and
- Maintain refuge tree species with rough bark for cubs to escape (e.g., white pine and hemlock).

Kirtland's Warbler

The western Upper Peninsula goal for Kirtland’s warbler during this planning period is to provide suitable breeding and foraging habitat within this management area. Management will focus on providing large patches (300-550 acres where possible) of early successional jack pine forest with appropriate structural and compositional diversity on droughty outwash plains systems. When possible, large blocks should be created by managing several smaller harvest blocks adjacent to each other simultaneously.

Wildlife habitat specifications:

- Develop landscape level plans for Kirtland's warbler habitat within and across management areas to ensure suitable habitat is provided at any point in time across management areas within the ecoregion. Jack pine should be harvested in a manner that attempts to mimic both the size and structure of the stands that would result from fire.
- Develop harvest plans in the context of landscape-level plans. Strive to increase patch size to meet Kirtland's warbler habitat needs. Consider current and desired future patch size, age class distribution and distance to other jack pine stands. When developing harvest plans, identify opportunities for increasing patch size:
    - Review state forest inventory in management area and identify adjacent stands with similar age classes that could reasonably be combined into one stand;
    - Collaborate in planning of the spatial arrangement and timing of harvest with willing major landowners within this outwash plain (e.g., Commercial Forest Act landowners); and
    - Large blocks of regenerating jack pine adjacent to herbaceous openings are desirable as they function as open-lands until the trees are 3-4 feet in height and benefit open-land species as well.
- Post-disturbance legacies include simulated skips or fingers of jack pine; snags; and larger diameter, fire-tolerant trees such as red pine. These features should be left in stands of harvested jack pine as retention to benefit Kirtland's warbler.
- Scarify stands quickly after stands are harvested or use prescribed fire where feasible to maintain jack pine and to ensure maximum stem density.

Spruce Grouse

The western Upper Peninsula goal for spruce grouse is to maintain or improve habitat. State forest management will focus on early successional forest (jack pine, mixed swamp conifer, tag alder and aspen), coarse woody debris and encouraging conifer (e.g., jack pine and mixed swamp conifer) understory component.

Wildlife habitat specifications:

- In jack pine harvests, leave mixed conifer and/or jack pine retention strips of mature trees along riparian corridors and lowland margins as well as along upland edges.
- Maintain spruce seed trees through retention, especially at lowland margins.
- Maintain or increase diversity of conifer stands by implementing seed tree/shelterwood prescriptions and limiting the use of herbicides, especially along lowland edges.
- Large clearcuts may isolate populations of spruce grouse so landscape level planning must take into account this species' need for low-density mixed conifer travel corridors to connect suitable stands. This is especially important in management areas where Kirtland's warbler is also a featured species.
- Ensure black spruce recruitment/regeneration is reliable if harvesting in this cover type. Regeneration monitoring should be required to assess whether or not we are getting desired results from management.

4.35.3 – 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, 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 as well as one natural community of note occurring in the management area as listed in Table 4.35.2. 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 12.7 acres of potential old growth have been identified within the Yellow Dog Plains management area (Figure 4.35.5). 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.

Although there are no high conservation value areas, there is one ecological reference area, the Powell Township Granite Bedrock Glade (15.7 acres) representing the granite bedrock glade natural community, as shown in Figure 4.35.5.

Table 4.35.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Yellow Dog Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Community								
Granite Bedrock Glade		S2/G4G5	Confirmed				Upland open/semi-open	N/A
Birds								
Kirtland's warbler	*Dendroica kirtlandii*	LE/E/G1/S1	Confirmed	PS	Very High	Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Early
Spruce grouse	*Falcipennis canadensis*	SC/G5/S2-3	Confirmed	MV	Very High	Bog	Lowland open/semi-open	N/A
						Boreal forest	Upland & Lowland Sp/F	Mid
						Poor conifer swamp	Tamarack	Late
						Dry northern forest	Jack Pine, Red Pine	Mid
Plant								
Narrow-leaved gentian	*Gentiana linearis*	T/G5/S2S3	Confirmed			Sand and gravel beach	Upland open/semi-open	N/A
						Northern wet meadow	Lowland open/semi-open	N/A
						Intermittent wetland	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late

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

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.

Goal 3: To develop and maintain management plans for ecological reference areas on state forest land.
Objective 3-1: Complete ecological reference area planning by the end of this 10-year planning period.

4.35.4 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:

- Jack pine budworm
- *Diplodia* shoot blight of pine
- *Sirococcus* shoot blight
- *Scleroderris* canker.

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. Common St. John's-wort, European swamp thistle and spotted knapweed are species of concern that have been documented in or near this management area.

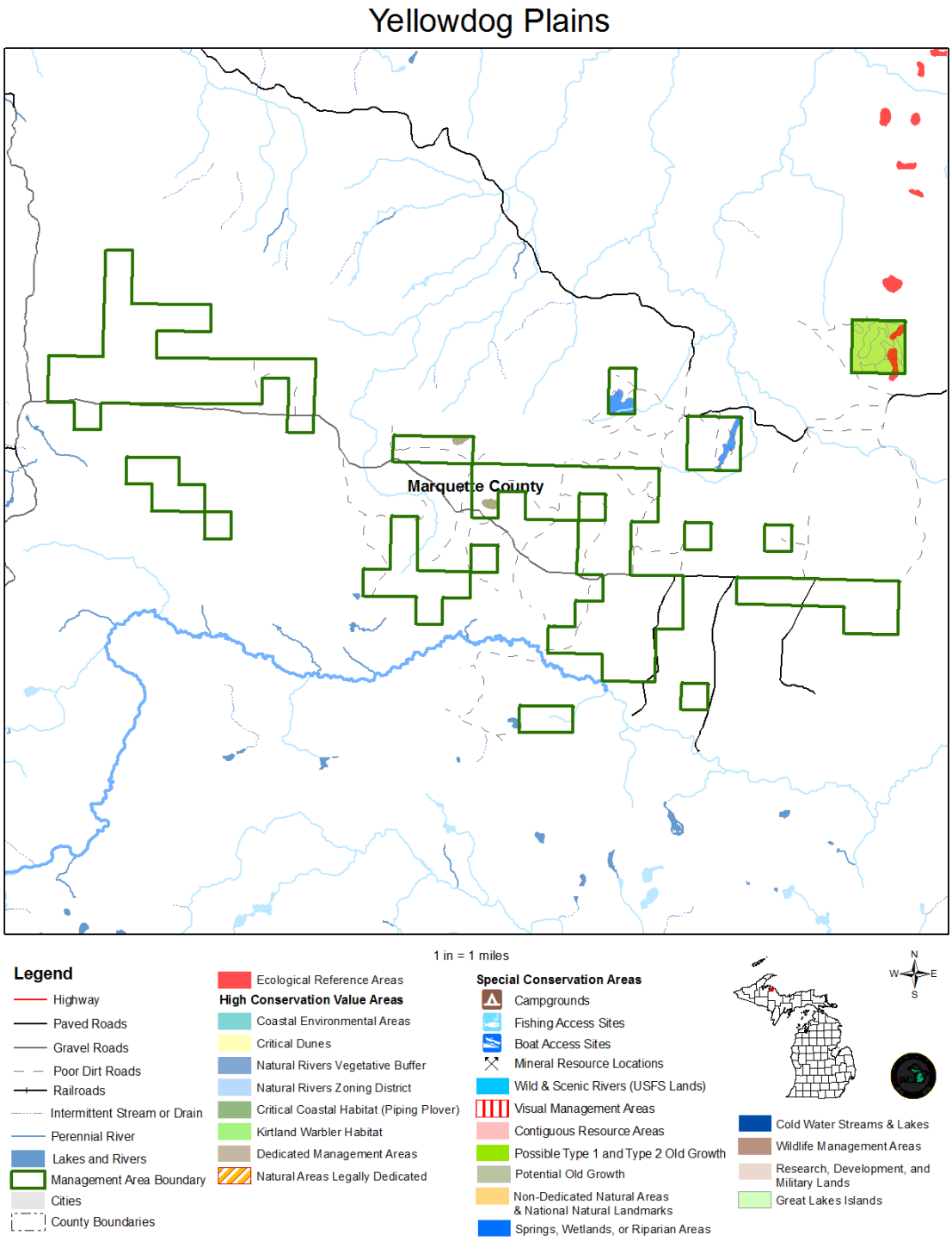

Figure 4.35.5. A map of the Voelker Plains management area showing the special resource areas.

4.35.5 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 4.35.1.

4.35.6 Fire Management

This area, comprised largely of dry and dry-mesic northern forest, was historically prone to periodic stand replacement fires.

- All wildfires are subject to appropriate initial attack suppression response; and
- Strategic placement of fire prevention signs in this area would raise awareness among public users.

4.35.7 Public Access and Recreation

This area has good public and management access. A snowmobile trail crosses this area as shown in Figure 4.35.1.

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

4.35.8 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 glacial outwash sand and gravel and postglacial alluvium and coarse-textured till. There is insufficient data to determine the glacial drift thickness. Sand and gravel pits are not located in the management area, but there may be some potential for pits.

The Precambrian Michigamme Formation subcrops below the glacial drift. There is not a current economic use for the Michigamme.

Almost all state lands are leased and extensive exploration has been conducted in this area. Kennecott has begun to build the portal for the “Eagle” mine and hope to be producing ore in 2013. Additional mineral exploration is occurring on other state lands in this management area.