

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	3,171	402	0	3,205	529	0
Hemlock	11%	1,696	490	1,206	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	1,132	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	1,689	416	60	2,234	174	133
Total		15,913	2,113	13,800	970	2,396	15,913	855	2,469

Sand River Lake Plain

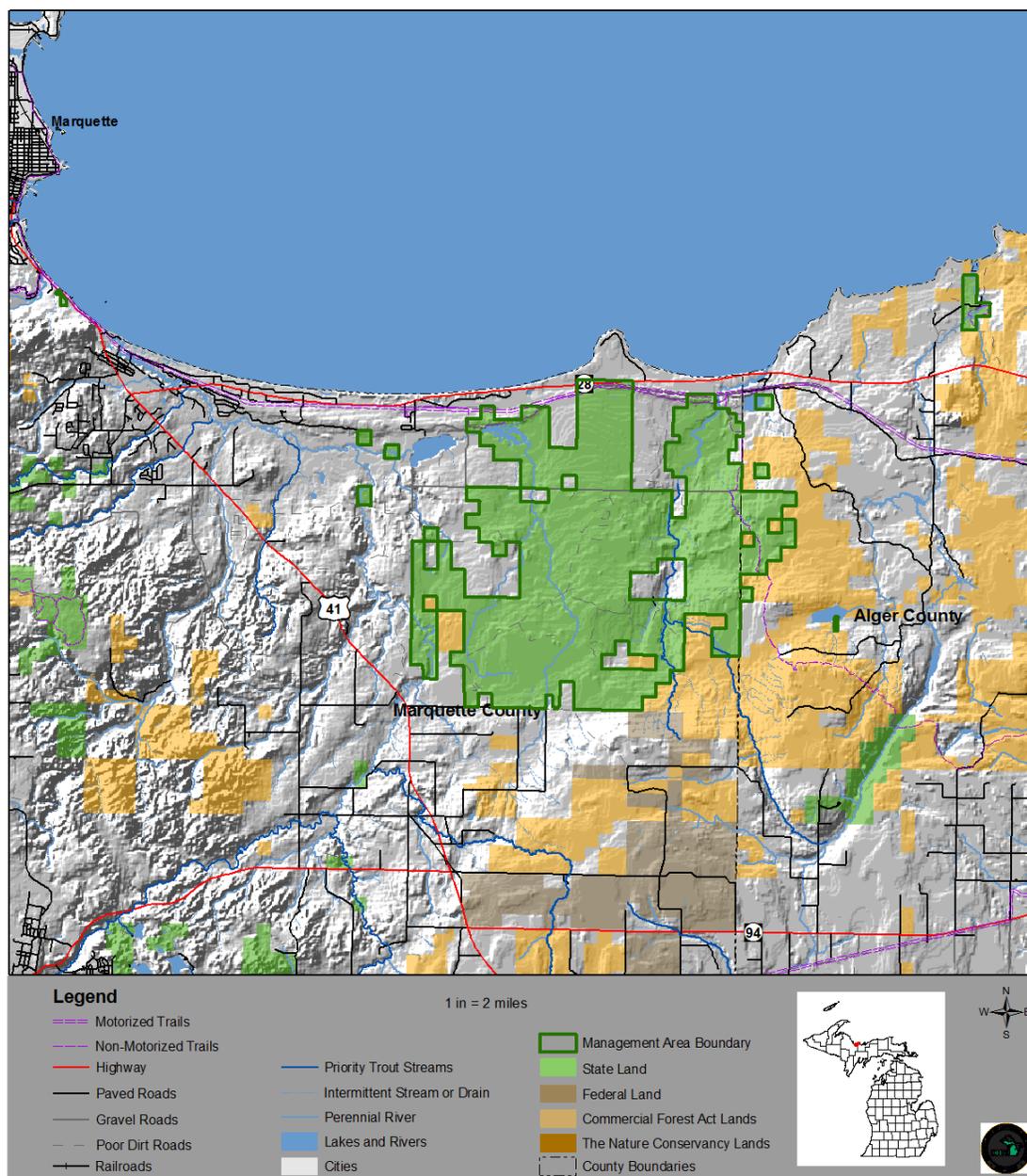


Figure 4.31.1. A map of the Sands River Lake Plain Moraine management area (dark green boundary) in relation to surrounding state forest lands and other ownerships.

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.

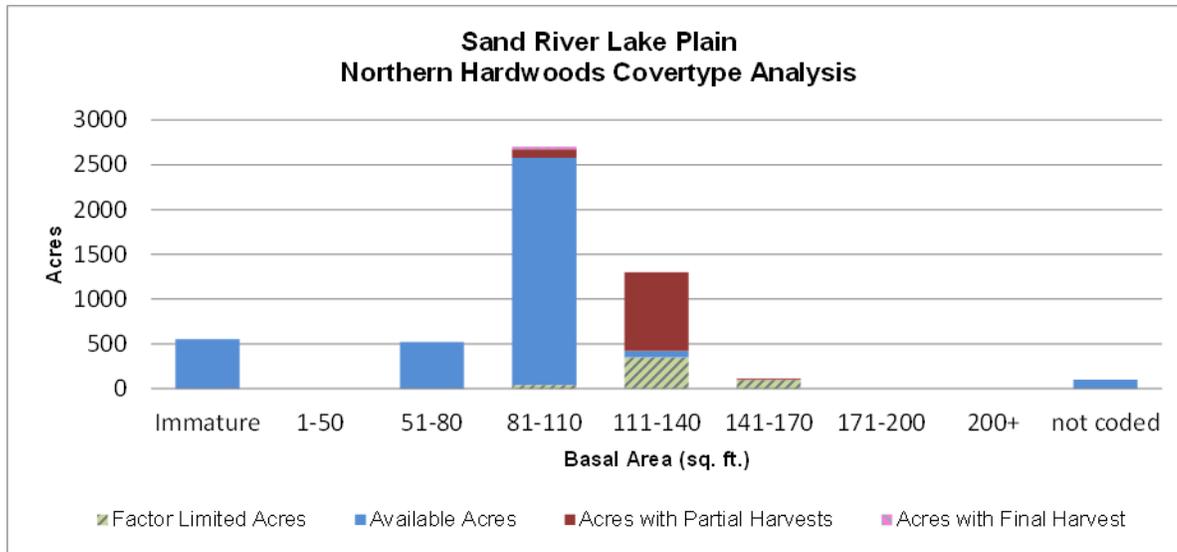


Figure 4.31.2. Graph of the basal area distribution for the northern hardwoods cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

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.

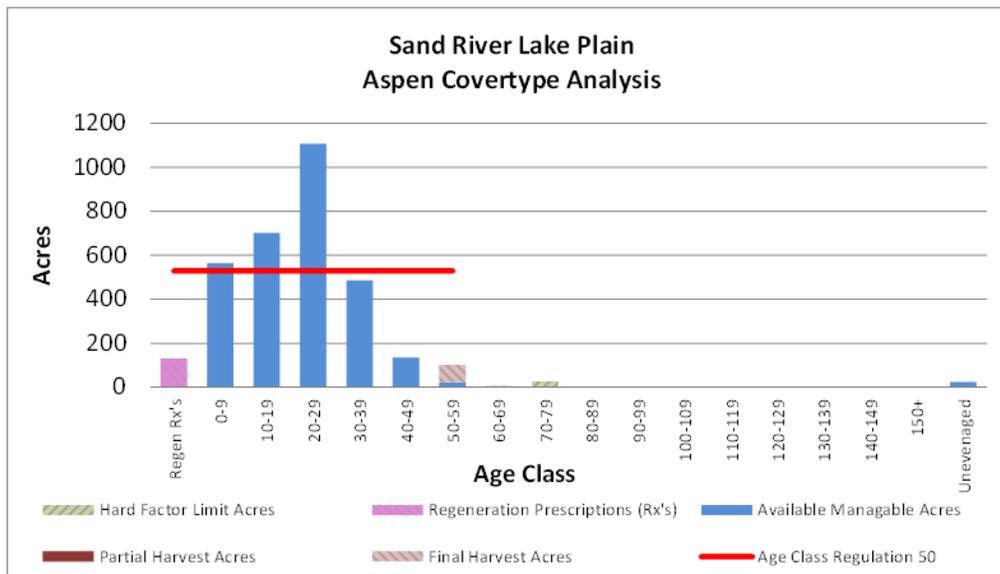


Figure 4.31.3. Graph of the age-class distribution for the aspen cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

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).

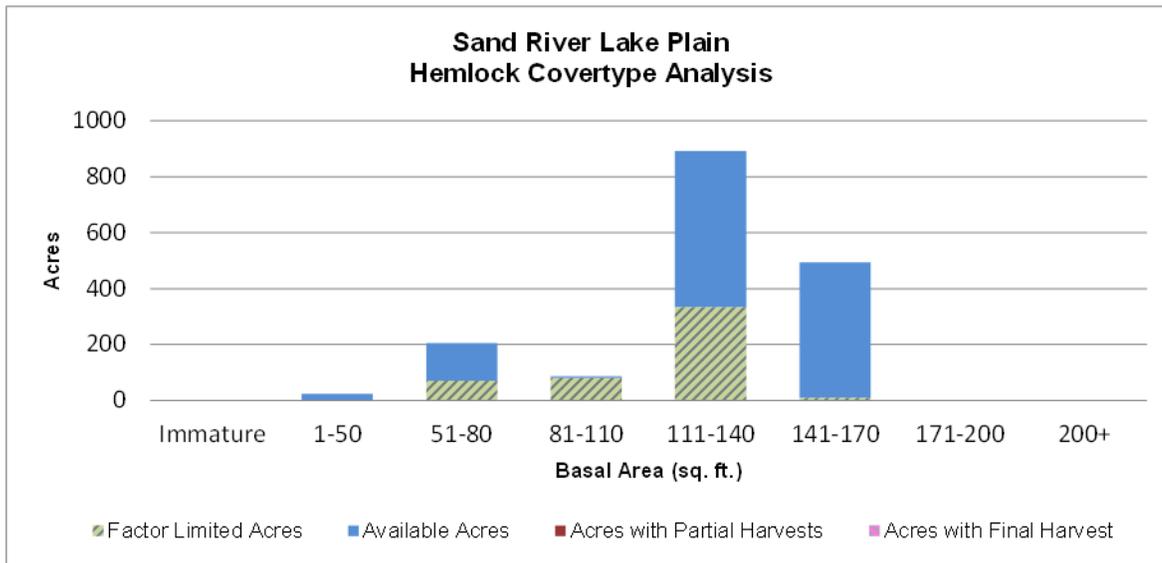


Figure 4.31.4. Graph of the basal area distribution for the hemlock cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

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.

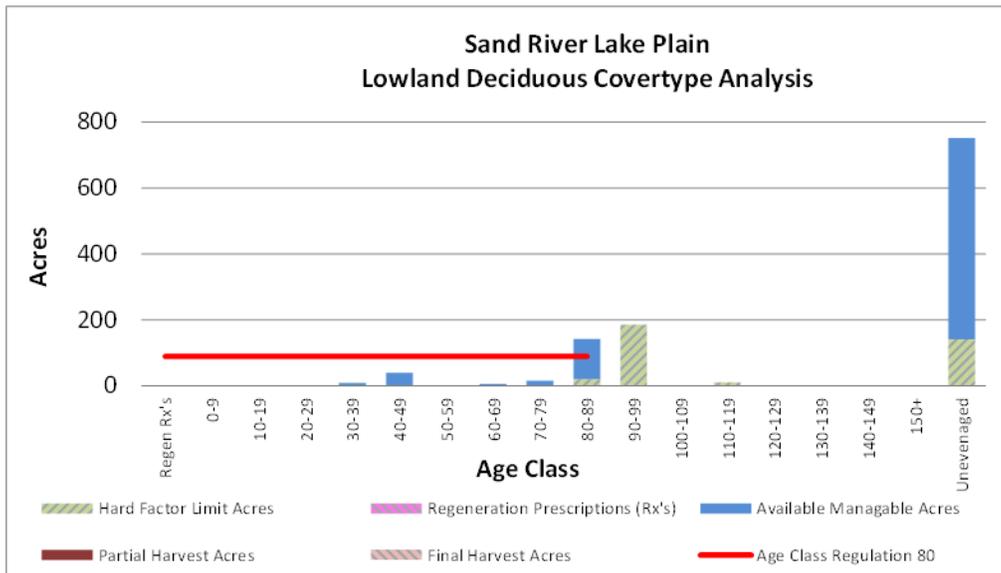


Figure 4.31.5. Graph of the age-class distribution for the lowland deciduous cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

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.

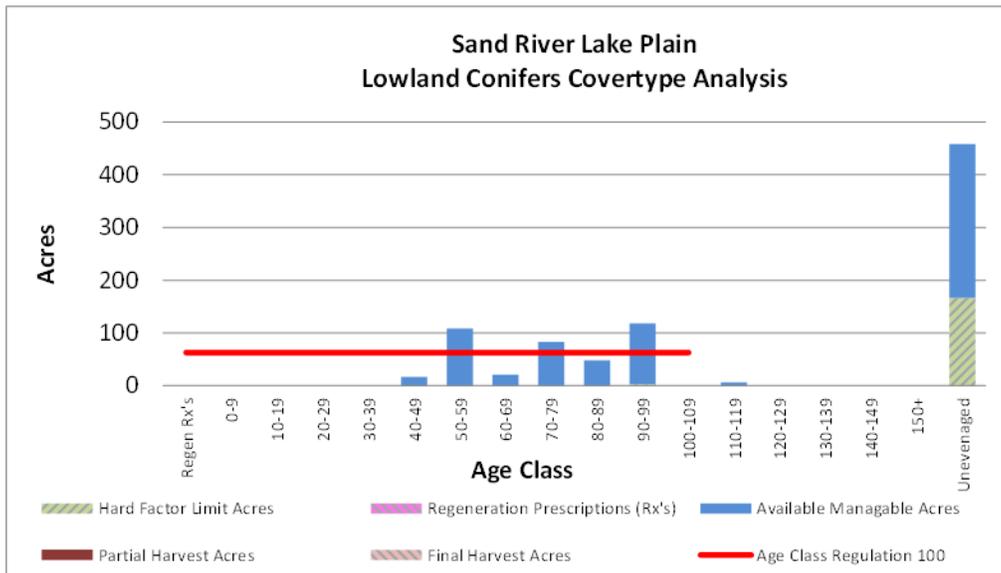


Figure 4.31.6. Graph of the age-class distribution of the lowland conifer cover type on the Sand River Lake Plain management area (2012 Department of Natural Resources inventory data).

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 manage 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	<i>Haliaeetus leucocephalus</i>	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	<i>Pandion haliaetus</i>	SC/G5/S2-3
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Reptile								
Blanding's turtle	<i>Emydoidea blandingii</i>	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.

Sand River Lake Plain

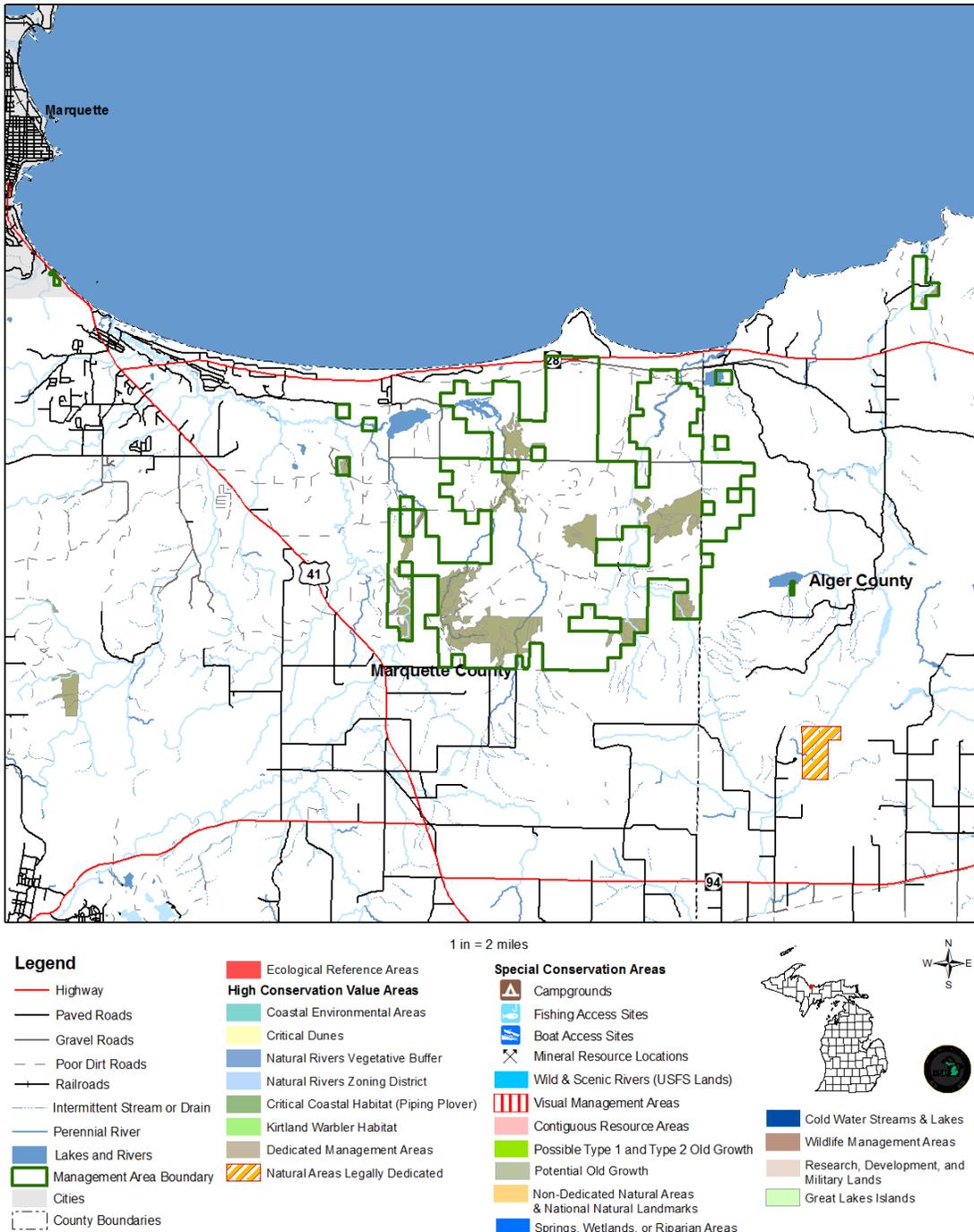


Figure 4.31.7. A map of the Sand River Lake Plain management area showing the special resource areas.

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 varies between 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.