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

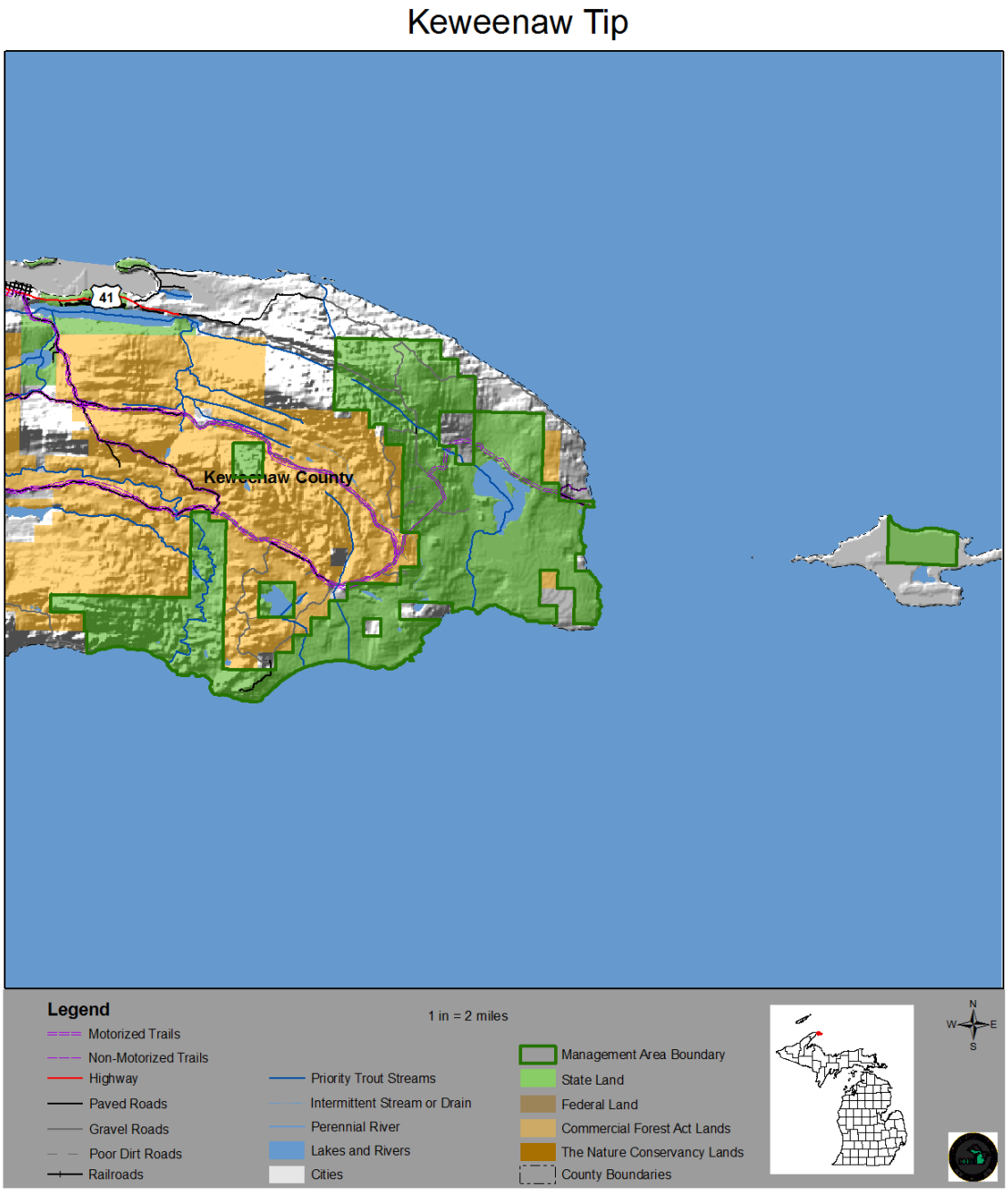

Figure 4.18.1. A map of the Keweenaw Tip management area (dark green boundary) in relation to other property in Keweenaw County, Michigan.

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.

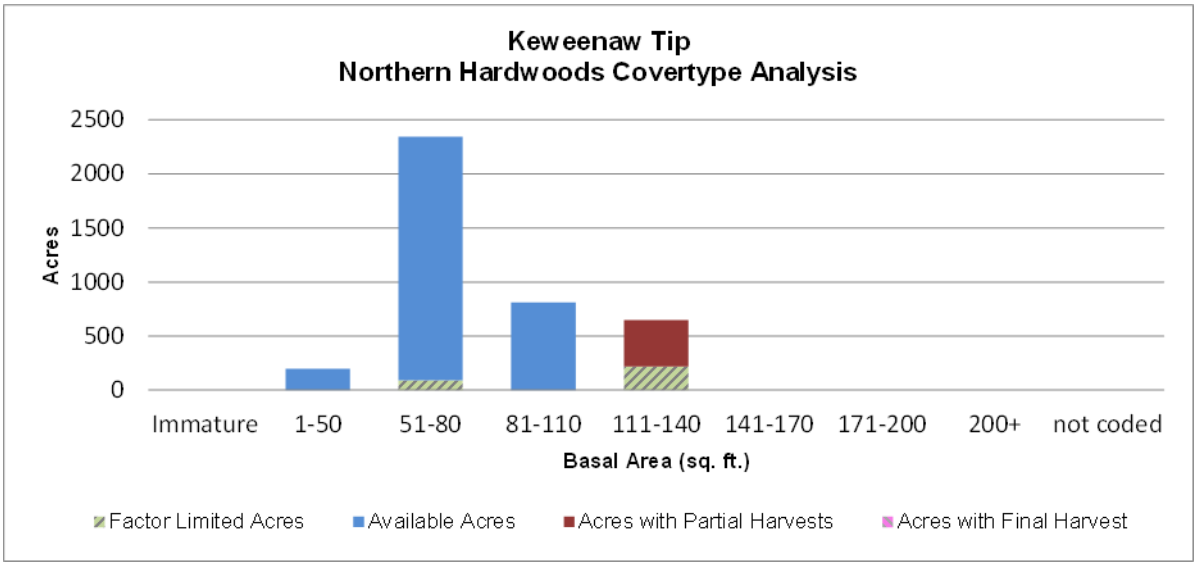

Figure 4.18.2. Graph of the basal area distribution for the northern hardwood cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

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.

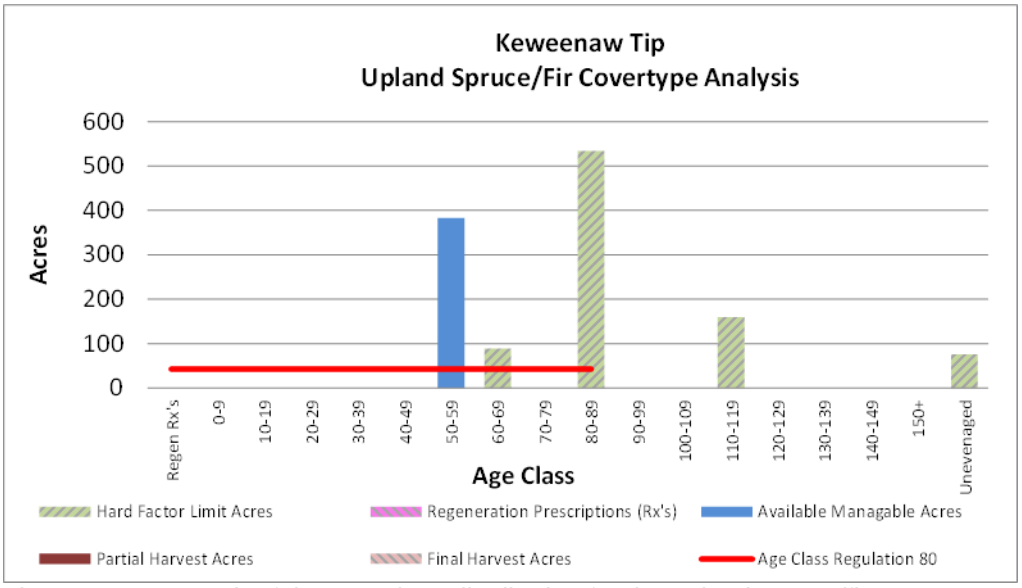

Figure 4.18.3. Graph of the age-class distribution for the upland spruce/fir cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

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.

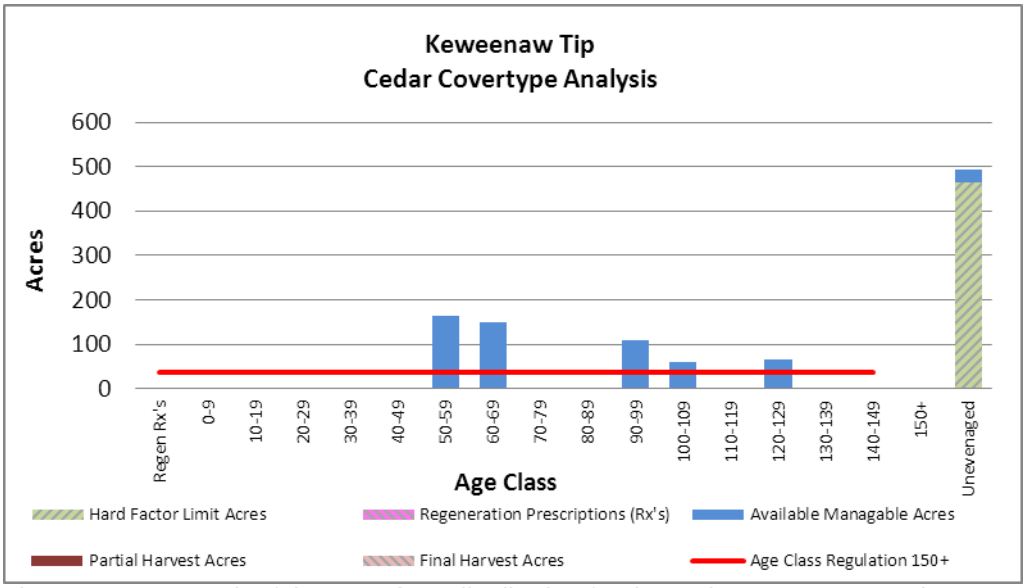

Figure 4.18.4. Graph of the age-class distribution for the cedar cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

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.

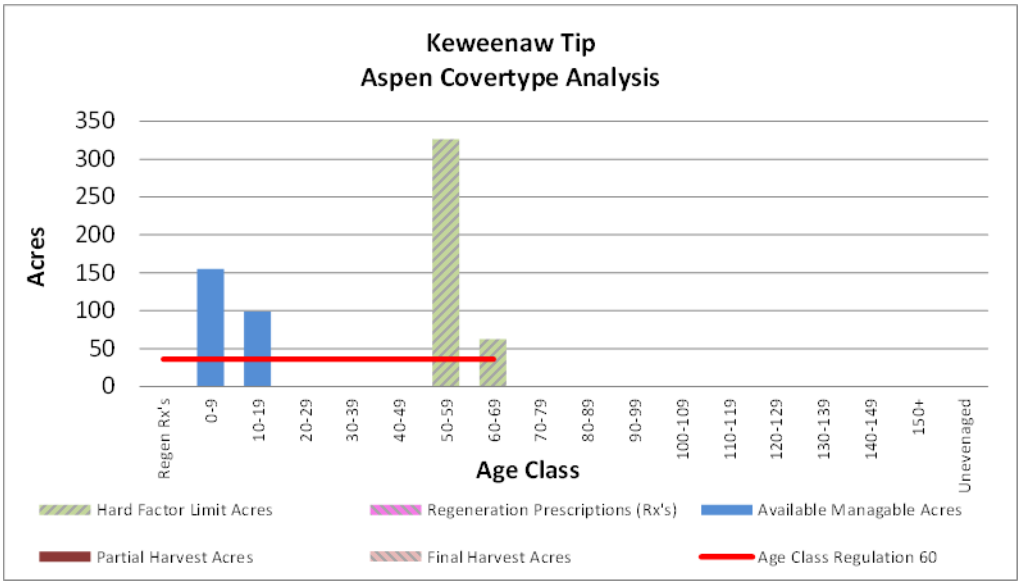

Figure 4.18.5. Graph of the age-class distribution for the aspen cover type on the Keweenaw Tip management area (2012 Department of Natural Resources inventory data).

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.

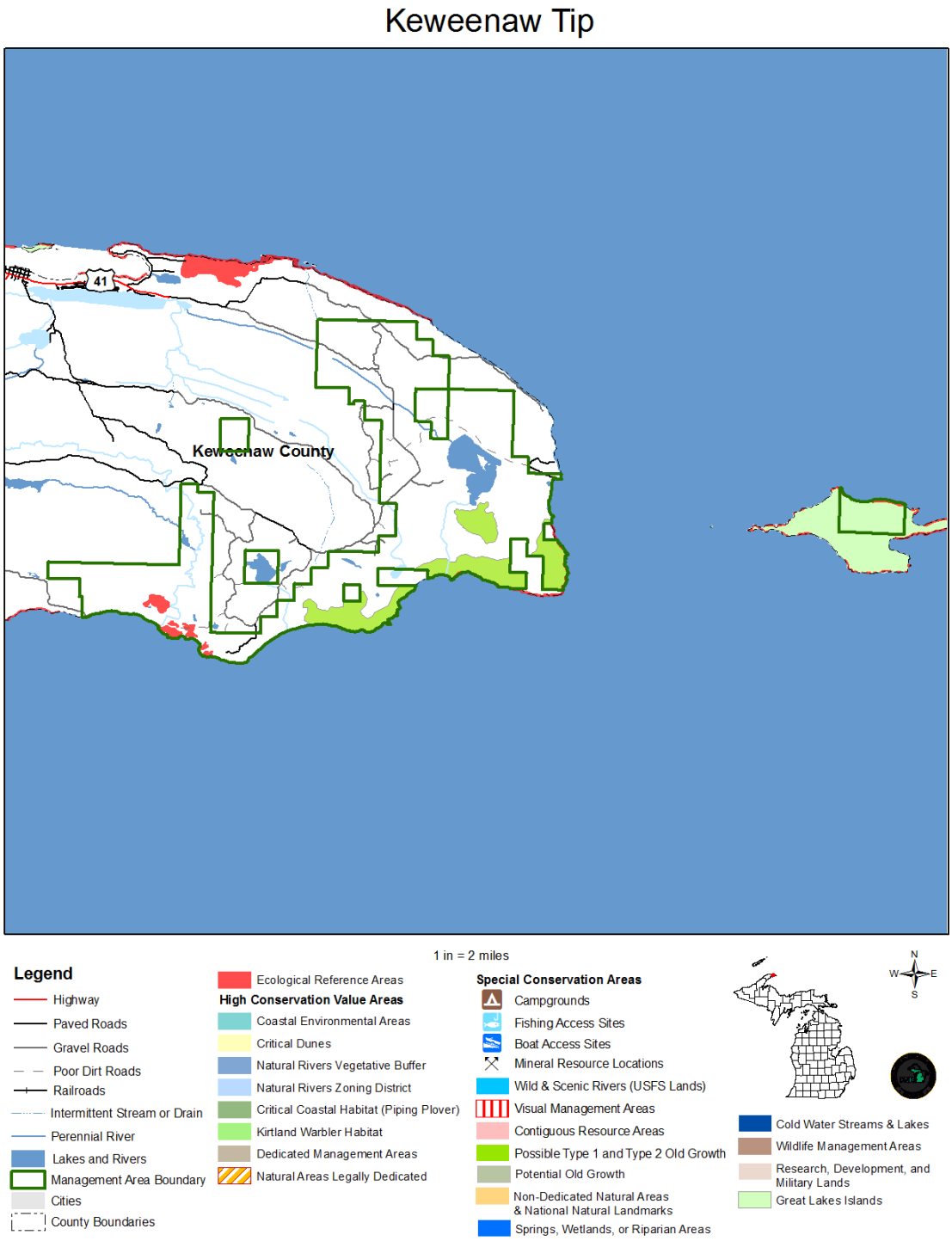

Figure 4.18.6. A map of the Keweenaw Tip management area showing the special resource areas.

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.