4.20 MA 20 Benzie Outwash Management Area

Summary of Use and Management

Vegetation management in the Benzie Outwash management area (MA) will provide forest products; maintain or enhance wildlife habitat; protect areas of unique character, including the Betsie River which is a designated natural river; and threatened, endangered and special concern species and provide for forest-based recreational uses and Native American non-commercial uses of forest products. Timber management for the next 10 years includes improving the age-class distribution of aspen and red pine. Northern hardwoods management includes continued selective or regeneration harvesting of northern hardwoods to achieve an uneven age-class structure or improve timber quality. Wildlife management objectives include increasing the structural complexity of northern hardwood communities for interior forest species and perpetuating early-successional communities for species adapted to young forests. Expected trends in this 10-year planning period are increased recreational pressure on recreational trails and introduced insect and disease concerns, especially emerald ash borer and beech bark disease.

Introduction

This management area is located just east of Frankfort, Michigan and west of Traverse City in Leelanau, Benzie and Grand Traverse counties and contains 43,089 acres of state forest (Figure 4.20.1). The primary attributes which identify the Benzie Outwash management area include:

- Outwash plains landform which accounts for 96% of the management area.
- Current cover types which are dominated by aspen, upland (northern) hardwoods and red pine.
- Due to the proximity of this management area to Traverse City and other population areas, the forest resources contribute social and economic values to the area.
- This management area is almost entirely within the Newaygo Outwash Plain sub-region of the northern Lower Peninsula.
- Dispersed recreation in the form of hunting and mushroom picking as well as concentrated recreation on snowmobile trails, the Lake Ann Pathway and at the Lake Ann Campground and Lake Dubonnet Trail Camp.
- The Betsie River, a designated natural river, which crosses part of the management area.
- There has been limited development of oil/gas resources.
- Surveys have located the threatened, endangered or special concern species red-shouldered hawk, bald eagle, wood turtle, Blanding's turtle, osprey, common loon and ebony boghaunter.
- A history of white-tailed deer, ruffed grouse, woodcock and other game species harvest.
- This management area contains one or more of the northern Lower 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. 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.

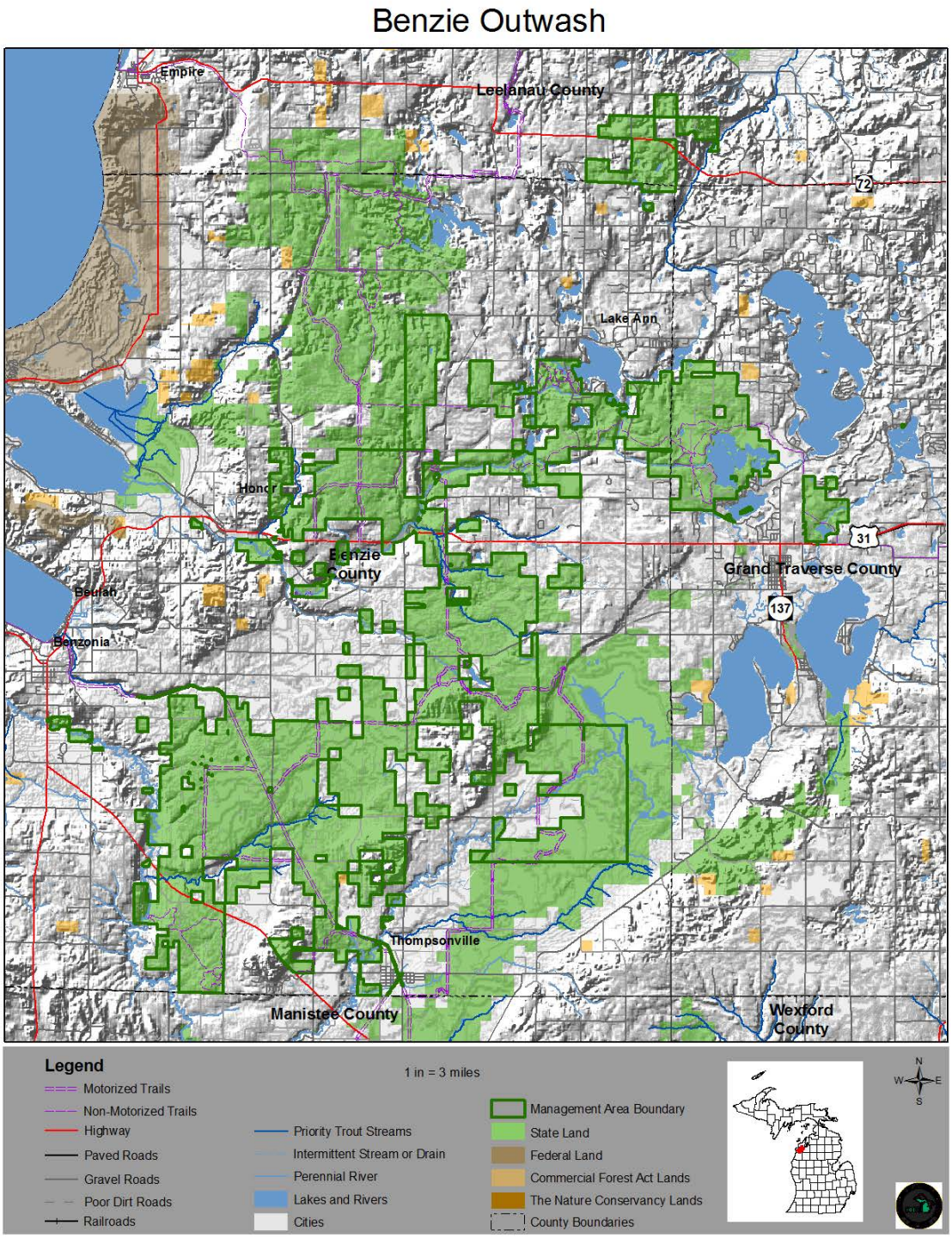

Figure 4.20.1. A map of the Benzie Outwash management area (dark green boundary) in relation to surrounding state forest and other lands in Leelanau, Benzie and Grand Traverse counties, Michigan.

Table 4.20.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Benzie Outwash management area, northern Lower Peninsula ecoregion (2012 Department of Natural Resources inventory data).

Cover Type	Cover %	Current Acreage	Hard Factor Limited Acres	Manageable Acres	10 Year Projected Harvest (Acres)		Projected Acreage in 10 Years	Desired Future Harvest (Acres)	
					Final Harvest	Partial Harvest		Final Harvest	Partial Harvest
Aspen	29%	12,584	1,001	11,583	3,660		12,584	1,931	
Northern Hardwood	26%	11,358	511	10847		4,864	11,358		4,864
Red Pine	10%	4,233	30	4203	872	1,980	4,233	467	2,196
Lowland Deciduous	3%	1,399	984	416	46		1,399	46	
Mixed Upland Deciduous	3%	1,301	8	1293	629	467	1,301	185	613
White Pine	3%	1,272	4	1268	291	376	1,272	115	433
Oak	2%	1,001	385	616	190	210	1,001	56	252
Lowland Aspen/Balsam Poplar	2%	777	398	379	64		777	64	
Natural Mixed Pines	2%	699	8	691	192	294	699	63	294
Upland Open/Semi-Open Lands	8%	3,333		3333			3,333		
Lowland Open/Semi-Open Lands	2%	1,012		1012			1,012		
Misc Other (Water, Local, Urban)	2%	1,048		1048			1,048		
Others	7%	3,072	1,295	1777	393	253	3,072	229	257
Total		43,089	4,623	38,466	6,338	8,444	43,089	3,156	8,909

4.20.1 Forest Cover Type Management Direction

The following sections contain information on vegetation management direction in the form of **Desired Future Conditions, 10-Year Management Objectives and Long-Term Management Objectives** for each of the major cover types or forest communities within the management area. This information applies to those portions of the forest where active management (e.g., timber harvest, prescribed fire, planting or mowing) will be conducted. In other portions of the state forest, natural succession will achieve ecological objectives. While most stands have a variety of trees species and other vegetation, stands or communities are classified by the species which has the dominant canopy coverage.

4.20.1.1 Forest Cover Type – Aspen

Current Condition

Aspen acres total 12,584 acres or 29% of the management area (Table 4.20.1). The habitat classification is unavailable for Benzie County which comprises the majority of the management area. Forest communities dominated aspen in this management area are valued ecologically as sources of habitat for numerous species of wildlife including ruffed grouse, chestnut-sided warbler, golden- winged warbler and white tail deer; commercially for pulp and saw logs; and recreationally by hunters and mushroom hunters.

The age classes of aspen are unbalanced, with a spike in the 20-49 year-old age classes (Figure 4.20.2). There are 1,001 acres of aspen that have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres). There are 1,071 acres that have a final harvest pending and these acres are included in the regeneration prescription class.

Desired Future Condition

- Aspen will be located on suitable sites with acres balanced in the 0-59 year age class rotation. Aspen acres will be maintained on currently operable sites to provide early successional habitat for species viability, recreation opportunities and a sustainable level of wood fiber.

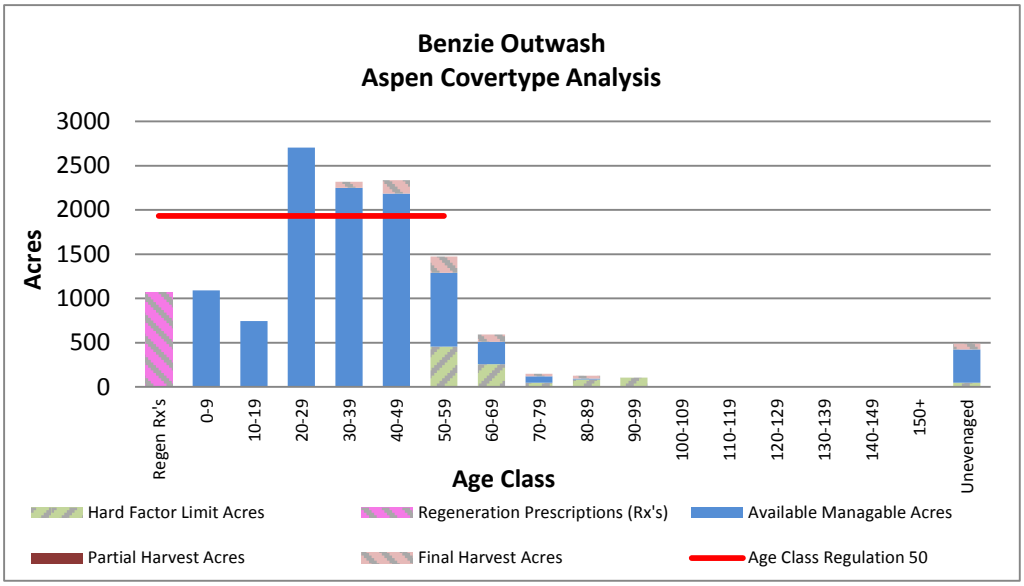

Figure 4.20.2. Age-class distribution for aspen in the Benzie Outwash management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct stand regeneration harvests on a projected 3,660 acres per decade;
- Concentrate harvests on the oldest age classes first;
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite the balancing of age-class distributions; and
- Aspen within the identified Grouse Enhanced Management Systems areas 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.

Long-Term Management Objectives

- As the aspen in the younger age classes reach maturity, implement treatments to balance the age-class distribution; and
- A desired future harvest level is projected at 1,931 acres for final harvest per 10-year period.

4.20.1.2 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwood acres total 11,358 acres or 26% of the management area (Table 4.20.1). Since northern hardwood stands have trees of varying ages, stand density, described as basal area, is a more appropriate measure of stand condition for upland hardwood areas. As shown in Figure 4.20.3, nearly half of the northern hardwood acres are in stands with a basal area between 81-110 square feet per acre. There are 511 acres of northern hardwoods have met harvest criteria, but have site conditions that limit harvest (hard factor limit acres).

There are 1,045 acres with a partial harvest pending and these acres are included in their current age-class.

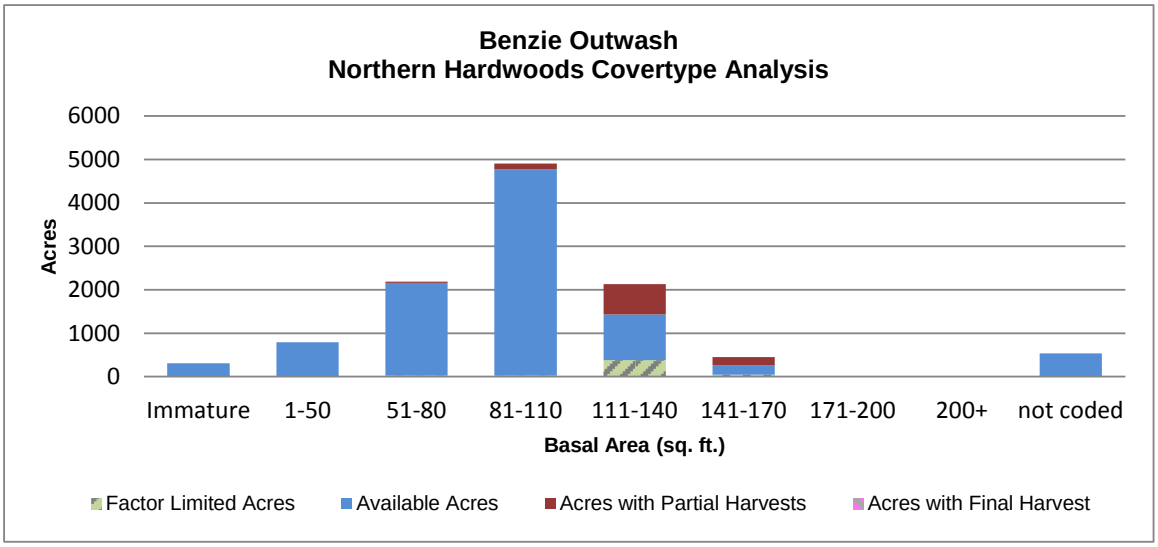

Figure 4.20.3. Basal area distribution for northern hardwood in the Benzie Outwash management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Northern hardwoods will be located on suitable sites and will produce a sustainable yield of forest products along with wildlife habitat and recreational opportunities; and
- Where feasible, stands will be in relatively large contiguous patches of all-aged, compositionally diverse forest which contain coarse woody debris, scattered large trees and scattered snags.

10-Year Management Objectives

- Conduct partial harvests on a projected 4,864 acres;
- Where present, retain hemlock and white pine for within-stand diversity; and
- Where necessary and feasible, consider harvesting stands below the rotation age to expedite the balancing of basal area distributions.

Long-Term Management Objectives

- Continue management through individual tree selection harvests to develop an all-aged stand structure;
- Continue to conduct salvage harvests of beech and ash where present in northern hardwood stands and affected by affected by beech bark disease and emerald ash borer, using Beech Bark Disease Management Guidelines and Emerald Ash Borer Guidelines. If needed, delay further selection harvesting due to resultant lower than normal residual basal area in post-salvage harvest stands.
- A desired future harvest level is projected at 4,864 acres for partial harvest per 10-year period.

4.20.1.3 Forest Cover Type Management – Red Pine

Current Condition

Red pine acres total 4,233 acres or 10% of the management area (Table 4.20.1). Currently, there is a large spike of red pine in the age classes from 40-59 years of age (Figure 4.20.4) which will be suitable for thinning. There are 268 acres that have a final harvest pending and these acres are shown in the regeneration prescription class. There are 728 acres with a partial harvest pending and these acres are included in their current age class. Figure 4.20.4 includes the projected number of acres converted to the cover type as a result of treatments that remove an overstory and planting of red pine. These acres are included in the regeneration prescription class.

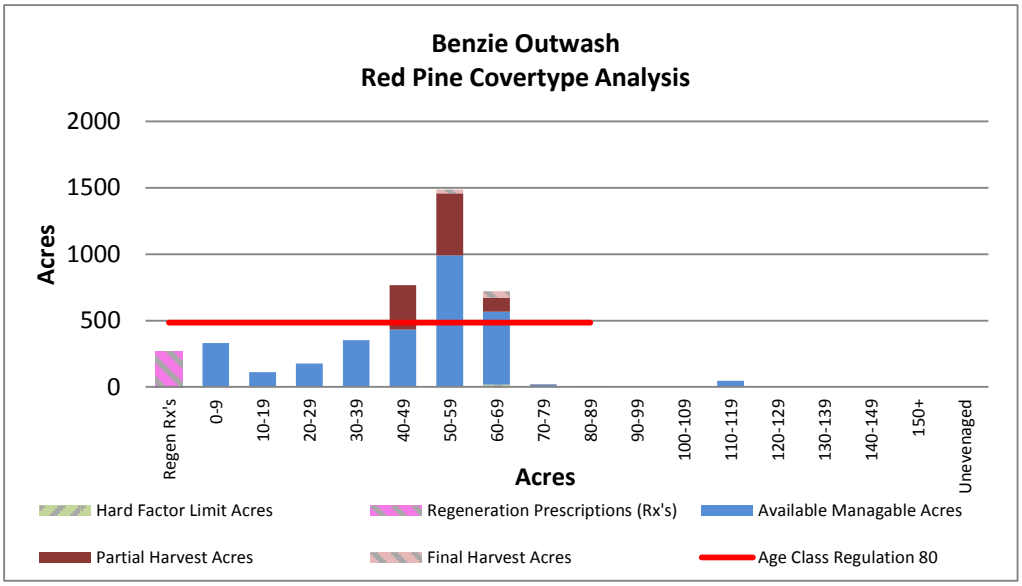

Figure 4.20.4. Age-class distribution for red pine in the Benzie Outwash management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- Red pine stands will be maintained and managed through thinning until stand replacement harvests at economic maturity, with acres balanced between 0 and 89 years of age to provide for a sustainable harvest, wildlife habitat and recreational opportunities.

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and balancing age-class distribution;
- Conduct partial harvests on a projected 1,937 acres on the younger age classes to improve the quality and size class; and
- Conduct regeneration harvests on a projected 930 acres in the older age classes to help balance the age-class distribution.

Long-Term Management Objectives

- Continue work towards balancing the age-class distribution between the ages of 0 and 89 years through final harvests and replanting;
- Seek opportunities to move red pine to suitable sites which may include managing red pine in mixed stands with oak or other species;
- On quality northern hardwood sites or sites where advanced northern hardwood species are present, consider whether to allow these sites to convert to northern hardwood; and
- A desired future harvest level is projected at 467 acres for final harvest and 2,196 acres for partial harvest per 10-year period.

4.20.1.4 Forest Cover Type Management – Lowland Open/Semi-Open Lands

Current Condition

Lowland open/semi-open lands (lowland shrub, marsh, treed bog and bog) communities in this management area are valued ecologically as sources of habitat for numerous species of wildlife. Lowland open/semi-open lands acres total 1,012 or 2% of the management area (Table 4.20.1).

Desired Future Condition

- Lowland open/semi-open lands sites will be maintained at or above current levels to provide wildlife habitat.

10-Year Management Objectives

- Management in lowland open/semi-open lands will be minimal. What little maintenance that will be done will be to maintain the hydrology and open characteristics.

Long-Term Management Objectives

- Continue management to maintain upland open/semi-open lands at or above current levels;
- Continue to protect stands from illegal off-road vehicle use; and
- Where feasible and necessary, use control methods on invasive non-native species.

4.20.1.5 Forest Cover Type Management – Upland Open/Semi-Open Lands

Current Condition

Upland open/semi-open lands in the management area valued ecologically as sources of habitat for numerous species of wildlife and recreationally for hunting, wildlife viewing and camping. These open lands acres total 3,333 acres (8%) of the management area. This category is a combination of the following non-forested land cover types: herbaceous open land, upland shrub and low-density trees. These non-forested areas are a result of natural processes of fire, frost or other disturbances which create openings in the forest canopy along with past management practices to maintain these areas.

Desired Future Condition

- The amount of upland open/semi-open lands will be at or above the current level to provide habitat for species which use openings.

10-Year Management Objectives

- Consider management to maintain upland open/semi-open lands.

Long-Term Management Objectives

- Continue management to maintain upland open/semi-open lands at or above current levels;
- Continue to protect stands from illegal off-road vehicle use: and
- Where feasible and necessary, use control methods on invasive non-native species.

4.19.1.6 Forest Cover Type Management – Other Types

Current Condition

Individual cover types which may cover less than 5% of the management area include: lowland deciduous, 1,399 acres (3% of the management area), mixed upland deciduous, 1,302 acres (3%), white pine, 1,272 acres (3%), oak, 1,001 acres (2%), lowland aspen/balsam poplar, 777 acres (2%) and natural mixed pines, 699 acres (2%). Other forested and non-forested cover types total 3,072 acres (7%) and is spread throughout the management area. All of the timbered and non-timbered communities have important ecological values and are important habitat for numerous wildlife species.

Desired Future Condition

- These cover types will contribute to the compositional diversity of the landscape in addition to providing wood products, wildlife habitat and recreational opportunities.

10-Year Management Objectives

- Seek opportunities to harvest, where appropriate, the scattered acreages of upland and lowland minor types where access and operability will not adversely impact sensitive areas;
- Conduct final (regeneration) harvests on a projected 46 acres of lowland deciduous.
- Consider methods to ensure adequate regeneration of lowland conifers;

- Additional opportunities to increase harvest prescriptions in lowland forest types will be assessed, both in and outside (due to forest health issues) of normal years of entry;
- Conduct final harvests on a projected 629 acres of mixed upland deciduous, 291 acres of white pine, 190 acres of oak, 64 acres of lowland aspen/balsam poplar, 192 acres of natural mixed pines, 156 acres of upland mixed forest, 210 acres of upland spruce/fir and 27 acres of planted mixed pines; and
- Conduct partial harvests on a projected 467 acres of mixed upland deciduous, 376 acres of white pine, 210 acres of oak, 294 acres of natural mixed pines, 191 acres of upland mixed forest and 62 acres of planted mixed pines.

Long-Term Management Objectives

- Continue efforts to regenerate lowland types where feasible; and
- A desired future harvest level for final harvest is projected at 46 acres for lowland deciduous and 13 acres for lowland conifers per 10-year period.

4.20.2 Featured Wildlife Species

Each of the featured species outlined below includes recommended practices with regard to forest and/or wetland management.

The following have been identified as featured species for this management area during this 10-year planning period:

- American marten
- American woodcock (Grass Lake Flooding State Wildlife Management Area)
- Black bear
- Black-throated blue warbler
- Golden-winged warbler
- Mallard (Grass Lake Flooding State Wildlife Management Area)
- Pileated woodpecker
- Red-shouldered hawk
- Ruffed grouse
- Wild turkey
- White-tailed deer
- Wood duck (Grass Lake Flooding State Wildlife Management Area)
- Wood thrush

The primary focus of wildlife habitat management in the Benzie Outwash management area will be to address the habitat requirements identified for the listed featured species. Based on the selected featured species, some of the most significant wildlife management issues in the management area are the maintenance of young forest; extensive mature forest; large open grassland complexes and marsh/grassland complexes; the retention of large, over-mature trees and snags; and the maintenance and expansion of hard mast, understory shrub and mesic conifer components.

This management area will include one or more northern Lower 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 Grouse Enhanced Management System area boundary may be managed on a shortened rotation with multiple age classes and smaller stand sizes to enhance hunting opportunities for ruffed grouse, woodcock, deer, turkey and hare. The remainder of the management area (outside the boundary) will be managed based on the direction in the management area write up.

A more detailed overview of featured species is included in Section 3.

American Marten

The goal for American marten in the northern Lower Peninsula is to increase available habitat. American marten needs mature mixed forest stands or old conifer-dominated stands, with dead and down material for maintaining a stable and sufficient supply of small mammals as prey. American marten are rarely found outside the forest canopy. This species depends upon live-tree dens, snags and coarse woody debris for loafing (resting) and denning sites. State forest management should address the maintenance and improvement of extensive and mature forest tracts, corridors, dead wood and conifer components in priority landscapes.
Wildlife Habitat Specifications:

- Identify, maintain, develop or restore large forested tracts and forested corridors.
- In even-aged management systems, within-stand retention should focus on large diameter (>15 inches in diameter at breast-height) trees, known cavity trees and/or mesic conifers to maintain/increase denning and loafing sites.
- Where possible, increase both standing-dead and downed-dead wood by:
  - Applying at least the minimum level of within-stand retention to all stands in management area;
  - Writing harvest specifications to leave slash at the stump or to minimize the removal of slash; and
  - Limiting or prohibiting firewood permits at marten-occupied sites.

American Woodcock

The goal for American woodcock in the northern Lower Peninsula is to maintain or increase available habitat. American woodcock use young aspen stands having stem densities ranging from 6,000-20,000 stems/acre for feeding, nesting and brood-rearing. State forest management should address the maintenance of adequate early successional habitat to provide feeding, nesting and brood-rearing habitat and opportunity for hunting.

Wildlife Habitat Specifications:

- Maintain the aspen cover type and the aspen component in mixed stands within the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this American woodcock habitat specification.
- Move to balance the age-class distribution of aspen and continue management to regenerate oak to maintain young forests across the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this American woodcock habitat specification.
- Identify commercial and non-commercial treatment opportunities in aspen and alder stands associated with non-high priority trout stream riparian zones or forested wetlands.

Black Bear

The goal for black bear in the northern Lower Peninsula is to maintain or improve habitat. Black bears have large home ranges and require large contiguous tracts of diverse forests with a mixture of cover types. They tend to use forested riparian corridors in their movements (which can be extensive). Hard mast is critical in the fall for bears to achieve adequate weight gains before denning. State forest management for the species should focus on improving existing habitat by minimizing forest fragmentation and maintaining oak to offset potential population declines due to changes in land-use.

Wildlife Habitat Specifications:

- Identify, maintain, develop or restore forested corridors that connect larger forested tracts, paying particular attention to riparian zones.
  - Implementation of riparian guidance (best management practices) will be sufficient to meet the black bear habitat specifications related to preventing fragmentation and maintaining corridors.
- Conduct silvicultural practices that maintain or increase oak-dominated stands and the oak component of mixed stands.
  - Implementation of the 10-year management direction for oak will be sufficient to meet black bear habitat specifications.

Black-throated Blue Warbler

The goal for black-throated blue warbler in the northern Lower Peninsula is to maintain available habitat. Black-throated blue warbler is an area-sensitive species (e.g., densities increase exponentially with increasing patch size) mainly occurring in mesic deciduous forest tracts >50 years in age and >250 acres in size, with a dense understory layer for nesting and foraging. State forest management for the species should focus on maintaining mature, large (>50 years old and >250 acres) mesic deciduous forest tracts with a dense understory layer for nesting and foraging.

Wildlife Habitat Specifications:

- Identify, maintain, develop or restore mesic-deciduous tracts >50 years old and >250 acres in size;
- Maximize forest interior (of northern hardwood stands) within the management area by increasing the portion of forest over 250 acres, minimizing edges (concentrating openings, oil and gas development, roads and pipelines along the forest or stand edge) and providing canopy gaps through single tree and group selection harvest practices; and
- Conduct silvicultural practices to maintain or promote a well-developed shrub understory.

Golden-winged Warbler

The goal for golden-winged warbler in the northern Lower Peninsula is to maintain or increase available habitat. Golden-winged warbler nest in a variety of shrubby and early-successional forest sites including moist woodlands, willow and alder thickets and young forests of sapling aspen and fire cherry. Habitat tracts of 25-125 acres can support several pairs and are preferred over both smaller and larger areas. State forest management should focus on the maintenance of young aspen (0-10 years old) in association with lowland shrub and grasslands in priority landscapes.

Wildlife Habitat Specifications:

- Identify commercial and non-commercial treatment opportunities in aspen and alder adjacent to or within lowland shrub and grassland. Treatment areas 25-125 acres are preferred.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this golden-winged warbler habitat specification.
- Within management area, maintain 20% of aspen associated with lowland shrub and grasslands in the 0-10 year age class.

Mallard

Mallards prefer complexes of grassland and shallow seasonal or semi-permanent marshes in association with permanent hemi-marshes for pair bonding, nesting and brood rearing. Mallard pair-bonding wetlands are typically 0.25 to 20 acres in size and brood rearing wetlands are typically 1.2 to 30 acres in size. Optimal hemi-marsh sites are >2.5 acres with open water portions having extensive portions less than three feet deep and 4:1 area of adjacent grasslands to hemi-marsh. Mallards nest on upland sites, normally within about 200 yards from water.

Wildlife Habitat Specifications:

- Maintain priority wetlands in hemi-marsh condition, with 50/50 open water to emergent marsh, for both breeding and non-breeding habitat.
  - Implementation of the wildlife management area master Plans for Dingman Marsh, French Farm Flooding, and O'Neil Lake state wildlife management areas and application of the beaver wildlife habitat specifications will be sufficient to meet this mallard habitat specification.
- Maintain stable water levels at managed floodings from April through August.

Pileated Woodpecker

The goal for pileated woodpecker in the northern Lower Peninsula is to maintain available habitat. Pileated woodpeckers prefer stands greater than 40 years old for foraging and greater than 70 years old for nesting and roosting and abundance is positively related to the density of trees greater than12 inches in diameter at breast height. State forest management should focus on the maintenance of a component of large diameter trees (>12 inches in diameter at breast height) at the landscape scale.

Wildlife Habitat Specifications:

- Maintain a component of large diameter trees greater than 12 inches DBH.
  - Implementation of Within-Stand Retention Guidance, factor-limited acres, uneven-aged management in the northern hardwoods type, special conservation areas with objectives for big tree management and continued mortality from insect and disease will be sufficient to meet the pileated woodpecker habitat specifications for large trees in this management area.

Red-shouldered Hawk

The goal for red-shouldered hawk in the northern Lower Peninsula is to maintain available habitat. Red-shouldered hawks nest in contiguous, mature, closed canopy, hardwood forests. Nesting habitat consists primarily of well-stocked pole or sawtimber stands (stocking densities 6 and 9) with a closed canopy (80-100%) and basal area of at least 98 square feet per acre. Nests are usually found in deciduous trees with a mean 23 inches in diameter at breast height. State forest management activities should focus on the maintenance of large blocks (>385 acres) of mesic northern forest with the appropriate level of large diameter trees in priority landscapes.

Wildlife Habitat Specifications:

- All suspected red-shouldered hawk nests are to be reported to local wildlife staff and confirmed nests documented in accordance with the DNR's *Approach to the Protection of Rare Species on State Forest Lands* (CI 4172) and included in Integrated Forest Monitoring, Assessment and Prescriptions Geographic Decision Support Environment when there is an expected operational impact. For red-shouldered hawk, 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.

Ruffed Grouse

The goal for grouse in the northern Lower Peninsula is maintain available habitat. Ruffed grouse prefer young (6-15 year-old), even-aged deciduous stands that typically support 8,000-10,000 woody stems/acre. Although ruffed grouse use many different forest types (aspen, birch, oak-hickory), aspen can support higher densities than those attained in other forest types. The juxtaposition of different age classes allows for different life history requirements to be met within a small area and promotes higher grouse densities. Ideal aspen stands will be of 40-160 acres under a 40-year rotation with staggered harvests of 25% every 10 years in 10-40 acre harvest units. Larger harvest units should have irregular boundaries and include one or two, 1-3-acre unharvested inclusions. State forest management should focus on maintaining and balancing the age-class distribution for aspen and oak cover types in priority landscapes.

Wildlife Habitat Specifications:

- Maintain the aspen cover type and the aspen component in mixed stands within the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this ruffed grouse habitat specification.
- Move to balance the age-class distribution of aspen and continue management to regenerate oak to maintain young forests across the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen, lowland deciduous and oak will be sufficient to meet this ruffed grouse habitat specification.
- Maintain the upland shrub cover type specifically juneberry, hawthorn, cherry and other mast producing shrub components.
  - Implementation of 10-year management direction for upland brush will be sufficient to meet this grouse habitat specification.
- 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.

Wild Turkey

The goal for turkey in the northern Lower Peninsula is maintain available habitat. In northern Lower Peninsula, snow depth is the primary limiting factor that restricts turkey population expansion as deep snow limits access to winter food. The availability of acorns can help mediate the impacts of deep snow. A secondary limiting factor throughout their range is good brood cover. Openings with grasses and forbs and little or no overstory trees are preferred. State forest management should focus on providing natural winter food, maintaining and regenerating oak and maintaining brood-rearing openings to improve brood-production and winter survival.

Wildlife Habitat Specifications:

- Maintain and increase the number of brood-rearing openings (forest openings, savannas, barrens, hayfields, etc.).
  - Implementation of 10-year management direction for upland open land will be sufficient to meet this turkey habitat specification.

- Through opening maintenance, planting and pruning, provide sources of winter food that are accessible above the snow (food plots, annual grains, fruit-bearing trees or shrubs).
  - Implementation of 10-year management direction for upland open land will be sufficient to meet this turkey habitat specification.
- Conduct silvicultural practices that conserve the oak component in forest stands and promote oak regeneration.
  - Implementation of 10-year management direction for oak will be sufficient to meet this turkey habitat specification.

White-tailed Deer

The goals for white-tailed deer habitat in the northern Lower Peninsula are to: 1) Maintain spring and summer forage and improve recreational access through openings management; 2) Maintain the overall proportion of potential woody browse such as aspen; 3) Maintain or increase the oak component in forest stands and promote oak regeneration; and 4) Maintain and promote functional shelter in wintering complexes.

Wildlife Habitat Specifications:

- Annually manage at least 3,000 acres of forest openings across the ecoregion to provide spring and summer forage, and recreational opportunities.
  - Implementation of 10-year management direction for upland open land and upland shrub will be sufficient to meet this deer habitat specification.
- Maintain the aspen cover type and the aspen component in mixed stands within the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen and lowland deciduous will be sufficient to meet this deer habitat specification.
- Move to balance the age-class distribution of aspen and continue management to regenerate oak to maintain young forests across the management area.
  - Implementation of 10-year management direction for aspen, lowland aspen, lowland deciduous and oak will be sufficient to meet this deer habitat specification.
- Conduct silvicultural practices that conserve the oak component in forest stands and promote oak regeneration.
  - Implementation of 10-year management direction for oak will be sufficient to meet this deer habitat specification.
- Manage cedar and hemlock with the main objectives of regeneration and providing future functional cover.
  - Implementation of 10-year management direction for cedar and lowland conifer will be sufficient to meet this deer habitat specification.
- Promote hemlock on appropriate sites using silviculture to increase within-stand hemlock components.

Wood Duck

The goal for wood duck in the northern Lower Peninsula is to maintain or increase available habitat. Wood duck are most limited by available nesting and brood rearing habitat. Wood duck nest in tree cavities near rivers, streams, swamps, beaver ponds and marshes. Nests require mature hardwood trees with 10 inches or larger in diameter at breast height. Brood-rearing habitat is composed of wetland areas such as forested wetlands, shrub-scrub wetlands and emergent marshes that maintain adequate water through the brood rearing period. Hemi-marshes with nearby shrub-scrub or forest are important, where marshes are typically within 100 yards of woody cover. Optimal breeding habitat includes 1.25 acres or larger hemi-marsh and/or swamp (forested and shrub-scrub wetlands) located within 1,100 yards of mature hardwood forest. State forest management should focus on the protection of forest wetlands and adjacent snags and the management of priority state wildlife management areas with suitable habitat.

Wildlife Habitat Specifications:

- Maintain priority wetlands in hemi-marsh condition, with 50/50 open water to emergent marsh, for both breeding and non-breeding habitat.
  - Implementation of the wildlife management area master plans for Dingman Marsh, French Farm Flooding and O'Neil Lake state wildlife management areas and application of the beaver wildlife habitat specifications will be sufficient to meet this wood duck habitat specification.
- Maintain stable water levels at managed floodings from April through August.

Wood Thrush

The goal for wood thrush in the northern Lower Peninsula is to maintain available habitat. Wood thrush occur primarily in upland, mesic deciduous and mixed forests with large trees, diverse tree communities, moderate undergrowth and a well-developed litter layer. Wood thrush is highly susceptible to nest predation and brood parasitism, which increases with forest fragmentation. State forest management for the species should focus on maintaining large (>250 acres) forest tracts, minimizing edge and promoting a dense understory layer for nesting and foraging.

Wildlife Habitat Specifications:

- Identify, maintain, develop or restore mesic-deciduous tracts >50 years old and >250 acres in size;
- Maximize forest interior (of northern hardwood stands) within the management area by increasing the portion of forest over 250 acres, minimizing edges (concentrating openings, oil and gas development, roads and pipelines along the forest or stand edge) and providing canopy gaps through single tree and group selection harvest practices; and
- Conduct silvicultural practices to maintain or promote a well-developed shrub 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 or past surveys have indicated a possibility of their presence.

Future development and recreational pressure associated with expected population growth in the vicinity of this management area will be the primary challenge to successful management for rare fish, wildlife and plants.

Past surveys have noted and confirmed eight listed species and one natural community 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 Betsie River and its tributaries have been identified as a natural river and along with its corridor are also designated as a high conservation value area as shown in Figure 4.20.5.

There are two ecological reference areas identified for the Benzie Moraines management area as shown if Figure 4.20.5. The two ecological reference areas represent the bog natural community type and are 26.05 acres and 36.97 acres in size. These ecological reference areas will be managed to enhance and protect their natural vegetative and associated wildlife communities as directed by an ecological reference area-specific management plan. These individual management plans will be developed over the life of this planning period.

Table 4.20.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Benzie Outwash management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Community								
Bog		S4/G3G5	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
						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
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
Eastern box turtle	*Terrapene carolina carolina*	SC/S2S3/G5T5	Confirmed	HV	Moderate	Northern hardwood swamp	Black Ash	Late
						Great Lakes marsh	Lowland open/semi-open	N/A
						Mesic northern forest	Northern Hardwood	Late
						Inundated shrub swamp	Lowland open/semi-open	N/A
						Northern shrub thicket	Upland open/semi-open	N/A
						Northern fen	Lowland open/semi-open	N/A
						Prairie fen	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Coastal fen	Lowland open/semi-open	N/A
Plant								
Ginseng	*Panax quinquefolius*	T/G3G4/S2S3	Confirmed			Floodplain forest	Lowland mixed	Mid
						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.

Management goals during this planning period:

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

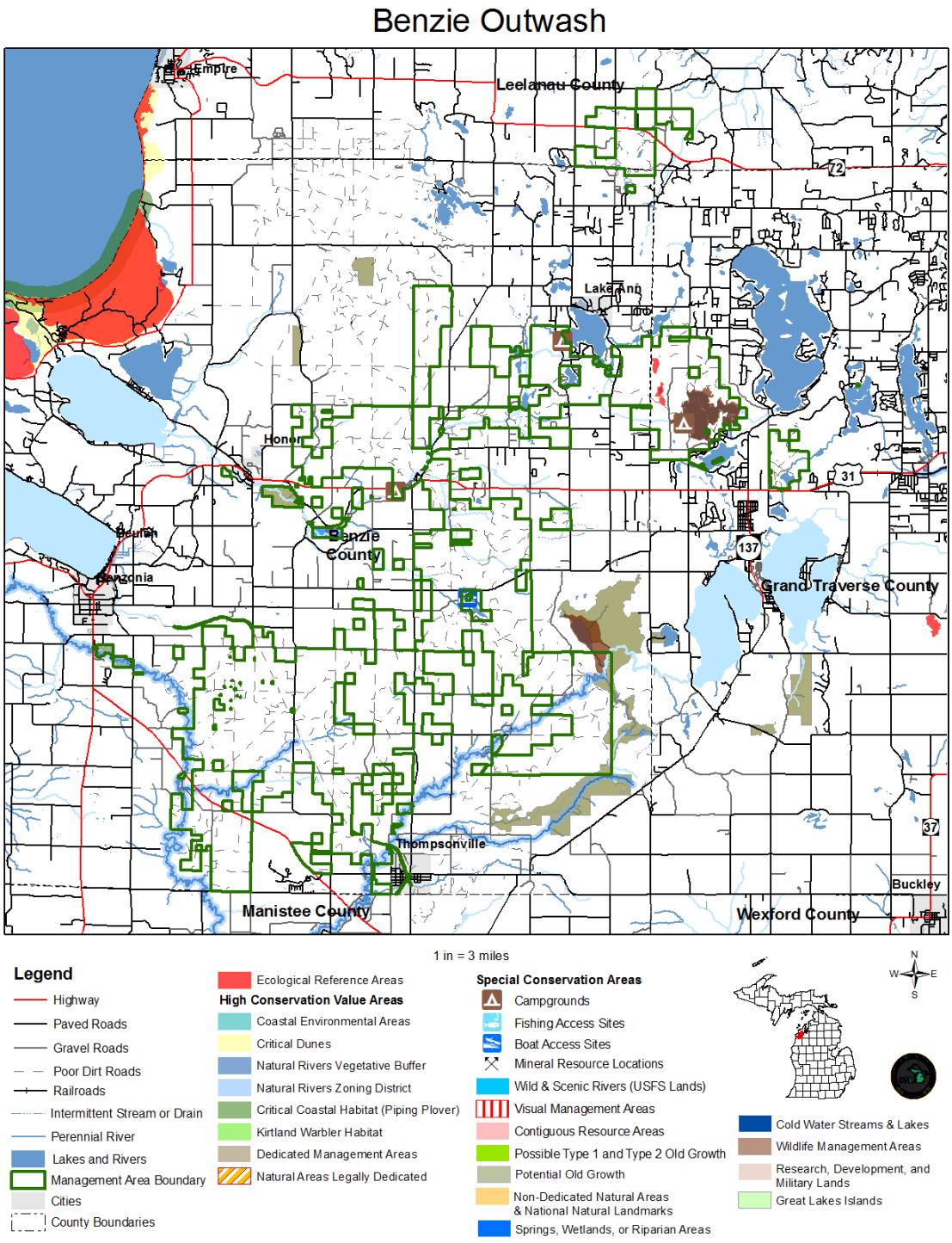

Figure 4.20.5. A map of the Benzie Outwash management area showing the special resource areas.

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 management area include emerald ash borer and beech bark disease and management should be adapted as follows:

- Full site use (e.g., stocking, desired species and low species diversity) on high-quality northern hardwood sites heavily impacted by beech bark disease and/or emerald ash borer is important;
- Consider planting red or white oaks, white or red pines, black cherry, white spruce, etc. as site conditions and quality allow; and
- Herbicides may be needed to control competing vegetation and/or to reduce density of ash and beech regeneration.

Invasive Species

Invasive species pose a major threat to forest resources. They impact timber production, wildlife habitat and recreational access. Locations of invasive species mapped in and within a five-mile buffer of the management area are summarized in Table 4.20.3 below. This information was compiled from the Midwest Invasive Species Information Network database, but it should not be considered complete. This information and other sources that show the extent and location of invasives should be used to inform of the potential for additional sightings that should be documented. Invasives that merit eradication efforts are those species that threaten sensitive sites due to their location or growth characteristics and have population levels that may be successfully controlled.

Table 4.20.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Benzie Outwash - FMD MA	Cases within FMD Areas	Cases within 5-Mile Buffer	Total number of cases	Total number of different Invasive Species
	2	13	15	3

Invasive Species within FMD Areas	Occurrences	Invasive Species within 5-Mile Buffer	Occurrences
Glossy Buckthorn *Rhamnus frangula*	2	Japanese Knotweed *Fallopia japonica*	1
-	-	Glossy Buckthorn *Rhamnus frangula*	11
-	-	Phragmites (Common Reed) *Phragmites australis*	1

4.20.5 Aquatic Resources

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

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

Forested stands adjacent to designated high priority trout streams will specifically be managed to discourage beaver use in accordance with both DNR Policy and Procedure 39.21-20 Beaver Management and IC 4011. Designated high priority trout streams for this management area are shown in Figure 4.20.1 and listed in Appendix F.

4.20.6 Fire Management

Northern hardwoods which have historically been a major component of this management area are rarely impacted by natural fire regimes. However, disturbance through fire has played an important role in the initial propagation and maintenance of oak and natural oak/pine types, small inclusions of aspen or grass/upland brush types.

The Michigan DNR has a prescribed fire program and maintains a well-trained staff to conduct prescribed burns for silviculture, habitat maintenance or habitat restoration. Each year, all burns prescribed on state forests, parks and wildlife game lands are evaluated and ranked, with funding allocated to the highest priority burns. The ability to fund prescribed burns is based on available funding, the total acres prescribed for burning and the prioritized ranking of individual burns. The demand for prescribed burning money frequently exceeds the amount of funding and some recommended burns may

not be funded for that fiscal year. Once funded, the ability to implement a burn is dependent on suitable prescribed burning weather, a suitable fuel (vegetation) condition, local staffing and other resources.
The following fire management concepts should be considered in the management area:

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

4.20.7 Public Access and Recreation

Access for management and/or recreation is generally very good throughout this management area as there is very little lowland and a well-developed road/trail system which includes snowmobile and other recreational trails. In accordance with the department's *Sustainable Soil and Water Quality Practices of Forest Land*, upon completion of harvesting, temporary spur and seasonal roads will be closed and stabilized.

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.

This management area is located within close proximity to Traverse City area, which is known for its affinity to promote and participate in an active outdoor lifestyle. Recreational opportunities in this management area vary greatly to accommodate the public's thirst for enjoying state lands. Rustic camping opportunities, along with boating access sites can be found at Lake Ann, Lake Dubonnet, Veteran's Memorial, Platte River and Grass Lake state forest campgrounds (Figure 4.20.5). Equestrian-based users can use Lake Dubonnet trail camp before journeying onward via the Shore-to-Shore Trail (Figure 4.20.1). Water sport enthusiasts can use numerous boating access sites that provide both inland lake and river access. Snowmobiling opportunities are numerous, winding through various forest cover types within the management area (Figure 4.20.1). For the non-motorized users, trails are numerous including the Lake Ann, Lost Lake and Platte Springs pathways (Figure 4.20.1). A portion of the heavily used Betsie Valley rail trail dissects this management area offering a unique opportunity to hike, bike and in the winter snowmobile through northern Michigan forests. Current and projected future recreation opportunities will continue to be an important component of this management area. Recreation facilities within this management area are shown below:

Campgrounds
- Lake Ann State Forest Campground
- Lake Dubonnet Trail Camp
- Lake Dubonnet State Forest Campground
- Veteran's Memorial State Forest Campground
- Platte River State Forest Campground
- Grass Lake State Forest Campground

Boating Access Sites (BSAs)
- Lake Ann BAS
- Lake Dubonnet BAS
- Veteran's Memorial BAS
- Platte River BAS
- Grass Lake BAS
- Turtle Lake BAS
- Ellis Lake BAS

Off-Road Vehicle Trails—N/A

Snowmobile Trails
- Various

Non-Motorized Trails

- Shore-To-Shore Trail
- Lake Ann Pathway
- Lost Lake Pathway
- Betsie Valley Trail
- Platte Springs Pathway
- Betsie River Trail

Although managing recreational opportunities is the primary responsibility of Parks and Recreation Division, timber management activities may impact the quality of recreational opportunities and management modifications will be considered to minimize these impacts.

Management modifications that may minimize possible recreational trail and other infrastructure impacts are agreed upon by recreation staff in Parks and Recreation Division and Forest Resources Division staff through the compartment review process. Public input received through meetings, including the compartment review process and other forums, will also be considered. Trail protection specifications can be applied through the vegetative management system in the design and administration of timber management activities. Guidance for within stand retention may also be used along trails to minimize impacts which may include modifications to management such as maintaining conifers to shade winter snow trails or retaining trees along single track off-road vehicle trails to maintain the integrity of narrow trails. Where modifications to management may not be compatible with timber management objectives, opportunities to educate the public on the department's timber management policies may be considered. Specifications and Guidance for management around trails may include, but is not limited to: vegetative management system Sections 5.2.39, 5.2.40 5.2.41 and 5.2.42, and the Department of Natural Resources Within Stand Retention Guidance.

4.20.8 Oil, Gas and Mineral Development

Surface sediments consist of an end moraine of coarse-textured till, coarse-textured till, glacial outwash sand and gravel and postglacial alluvium, and lacustrine (lake) sand and gravel. The glacial drift thickness varies between 400 and 800 feet. Sand and gravel pits are located in this management area and there is potential for additional pits.

The Devonian Ellsworth and Antrim Shales sub-crop below the glacial drift. The Antrim is quarried for cement products elsewhere in the state.

The southern part of Benzie County lands has been developed for gas from the Antrim Shale and oil and gas production from the Guelph (former Niagaran) reefs. Well spacing for both formations is currently 80 acres and most of the area of Antrim and Guelph production is still under lease. Some of the Grand Traverse County lands are leased, probably for the Antrim Shale. The Collingwood Formation does not appear to have potential in this management area.

Metallic mineral production is not supported by the geology given the depth to known metallic bearing formations.

Administration of oil and gas development on state forest land is provided by both the DNR and Department of Environmental Quality to ensure that minerals shall be developed in an orderly manner to optimize revenue consistent with other public interest and natural resource values.

Lease classification of state lands is guided by DNR Oil and Gas Lease Classification Procedure No. 27.23-15. Contained within each DNR Oil and Gas Lease Agreement are environmental terms which detail requirements for permits to drill issued by the Department of Environmental Quality, supervisor of wells pursuant to Part 615 of 1994 PA 451, as amended. No operations are to take place in a wetland (as defined in Part 303 of 1994 PA 451, as amended), habitat critical to the survival of an endangered species and designated under provisions of Part 365 of 1994 PA 451, as amended or a site designated by the secretary of state to be of historical or archeological significance, unless a plan to eliminate negative impacts to archeological or historical resources is agreed upon. Areas identified as having special wildlife, environmental, recreational significance and/or state surface require a development plan which will minimize negative impacts and will minimize surface waste while remaining consistent with the spacing requirements established by the supervisor of wells. All pipelines from the well site are required to follow existing well roads or utility corridors and all pipelines are to be buried below plow depth. Forest operations (including harvest and planting trees, prescribed fire and wildfire response) in the management area may require modification to accommodate the presence of pre-existing oil and gas pipelines located at or near the ground surface. Abandoned well sites should be incorporated back into state forest stands as either forest openings or re-forested areas, as determined by the vegetation plan contained in the lease agreement or as subsequently decided in compartment review.