

4.21 MA 21 – Boardman Plains Management Area

Summary of Use and Management

Vegetation management in the Boardman Plains management area (MA) (Figure 4.1) will provide forest products; maintain or enhance wildlife habitat; protect areas of unique character including the Boardman River (a designated natural river) and the Sand Lakes Quiet area (a designated high conservation value area), threatened, endangered and special concern species; and provide for forest-based recreational uses. Timber management objectives for this 10-year planning period include improving the age-class structure of aspen; increasing regeneration of oak; working toward balancing the red pine age-class structure; continuing emphasis on managing the northern hardwood resource for stand quality, age, and species diversity; wildlife values; and continued production of wood products. Wildlife habitat management objectives include perpetuating early-successional communities for species adapted to young forests for hunting and other wildlife-related recreation opportunity. Expected trends within this 10-year planning period are: increased recreational pressure, especially on the Muncie Lakes pathway, North Country and other established trails; increased oil and gas development; an increased wildland/urban interface; a need to restore oak/pine barrens communities; invasive plant control; and the conversion of poor oaks sites to mixed pine/oak sites.

Introduction

This management area is located just east of Traverse City, Michigan in Grand Traverse and Kalkaska Counties and contains 71,296 acres of state forest (Figure 4.21.1). The primary attributes which identify the Boardman Plains management area include:

- The glacial outwash plain landform (96% of the management area).
- A history of large fires which resulted in the cover types of oak, red pine, jack pine with pockets of aspen and upland hardwoods.
- Proximity of this management area to Traverse City, Kalkaska and other population areas and contribution of forest resources to the social and economic values to the area.
- Location within the Grayling Outwash Plain sub-region of the northern Lower Peninsula.
- Location of the approximately 3,000 acre Sand Lakes Quiet Area in the management area, which is a dedicated management area and high conservation value area.
- Location of the Boardman River and its tributaries in the management area, which is a designated natural river.
- Location of portions of the North Country Trail, Vasa cross country ski trail and single track bike trail, Muncie Lakes Pathway, Michigan Coast-to-Coast Cycle Trail, snowmobile trails and Shore-to-Shore Horse Trail in the management area.
- Location of two northern fen environmental reference areas (Root Lake and Sand Lake) and two oak pine barren ecological reference areas (North and South Carpenter Creek) in the management area.
- Numerous active and abandoned oil or gas wells associated with the Niagaran and Antrim Shale formations and future oil/gas storage facilities which may be located here.
- Survey presence of the following threatened, endangered or special concern species: Kirtland's warbler, Hill's thistle, bald eagle, wood turtle, red-shouldered hawk and osprey.

The current predominant cover types and acreages in the management area are shown in Table 4.21.1.

Boardman Plains

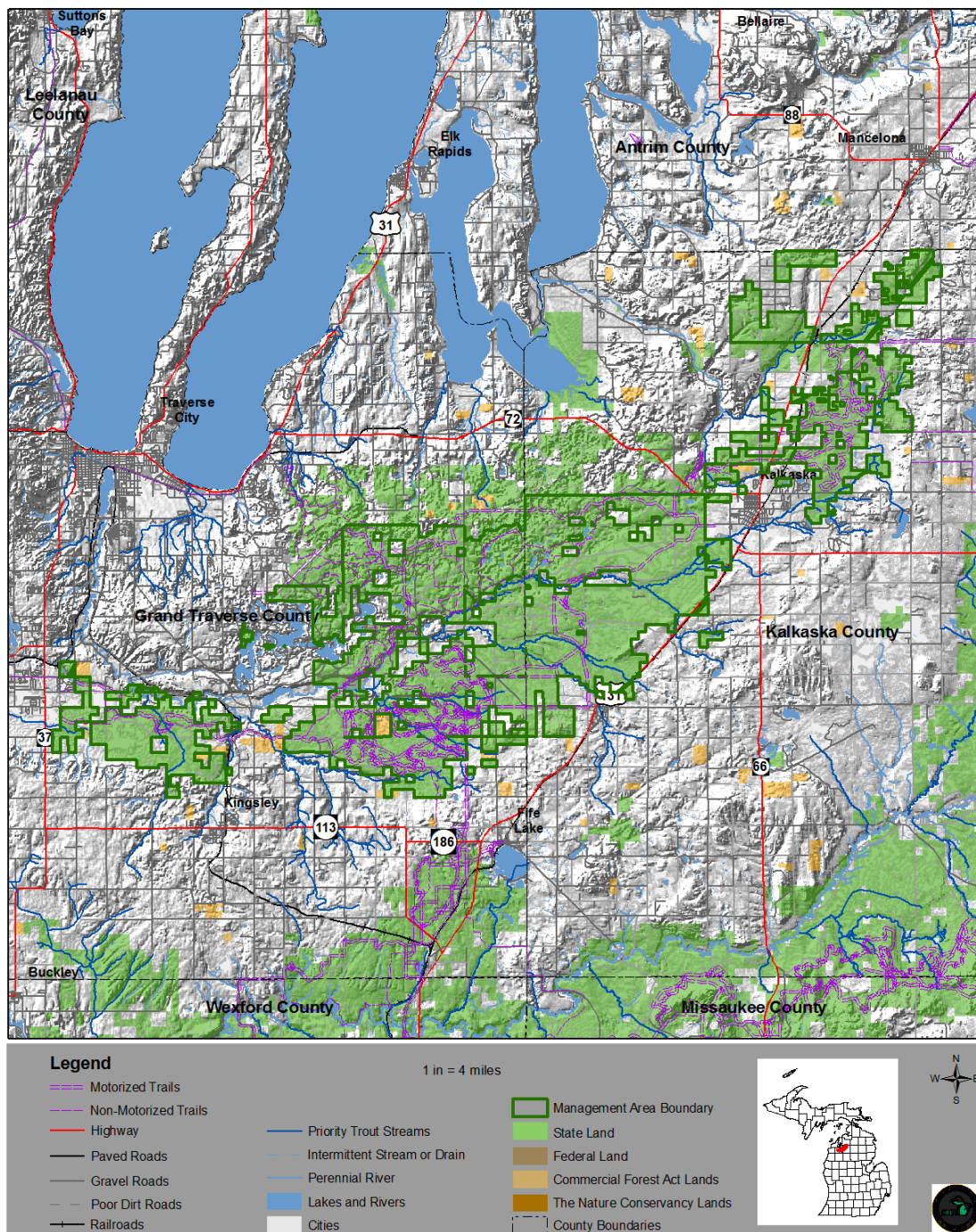


Figure 4.21.1. A map of the Boardman Plains management area (dark green boundary) in relation to surrounding state forest and other lands in Grand Traverse and Kalkaska counties, Michigan.

Table 4.21.1. Current cover types, acreages, projected harvests and projected acreages at the end of this ten-year planning period for the Boardman Plains 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	17%	11,984	666	11,318	2,539		11,984	1,886	
Oak	14%	10,062	2,984	7078	1,474	2,235	10,062	787	2,235
Red Pine	13%	9,438	276	9162	829	3,570	9,438	833	3,685
Northern Hardwood	10%	7,242	180	7062	300	3,270	7,242		2,862
Jack Pine	8%	5,722	223	5499	745		5,722	786	
Natural Mixed Pines	5%	3,349	228	3121		880	3,349	284	880
Mixed Upland Deciduous	5%	3,248	532	2716	1,094	625	3,248	388	1,045
Upland Mixed Forest	4%	2,977	468	2509	627	628	2,977	279	628
White Pine	4%	2,884	8	2876	535	1,100	2,884	262	1,100
Upland Open/Semi-Open Lands	6%	4,614		4614			4,614		
Lowland Open/Semi-Open Lands	3%	2,016		2016			2,016		
Misc Other (Water, Local, Urban)	1%	878		878			878		
Others	10%	6,882	4,366	2516	631	420	6,882	289	420
Total		71,296	9,933	61,363	8,774	12,728	71,296	5,794	12,855

4.21.1 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 and some of the minor cover types 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. While most stands have a variety of trees species and other vegetation, cover types are classified by the species with the dominant canopy coverage. In unmanaged portions of the state forest the natural processes of succession and disturbances will create forest areas that will provide ecological benefits such as habitat, carbon sequestration, oxygen production, improvement of water quality, reduced water runoff, aesthetic qualities and a host of other benefits.

4.21.1.1 Forest Cover Type Management - Aspen

Current Condition

Aspen acres total 11,984 or 17% of the management area (Table 4.21.1). Aspen is distributed throughout the management area including the moraine ridges, moraines and till areas on habitat class PARVHa, PARVVb, and AFO sites (see Appendix E). The age-classes of aspen are fairly well-balanced with a slight trough in the 0-9 and 10-19 year-old age classes (Figure 4.21.2). Data show that 666 acres of aspen have met harvest criteria, but have site conditions that preclude harvest (hard factor limited acres).

There are 1,184 acres of stands that have a regeneration harvest pending and these acres are included in the regeneration prescription class. Aspen is generally managed on a 50-year rotation in this management area to produce pulpwood and occasional sawlogs. The exceptions to this management are priority areas for ruffed grouse habitat (a featured species for this management area) where the emphasis may be placed on shorter rotations which provides more acres in the younger age classes. In some areas, aspen may be of merchantable size at less than 50 years and this may provide an opportunity to harvest stands “early” to restart additional acres which may help to balance the age-class distributions.

Desired Future Condition

- Aspen will be located on suitable sites with acres balanced within the 0-59 year-old age classes; and
- Aspen acres will be maintained on currently operable sites to provide early successional habitat for species viability which will provide recreational opportunities, while also providing a sustainable level of wood fiber.

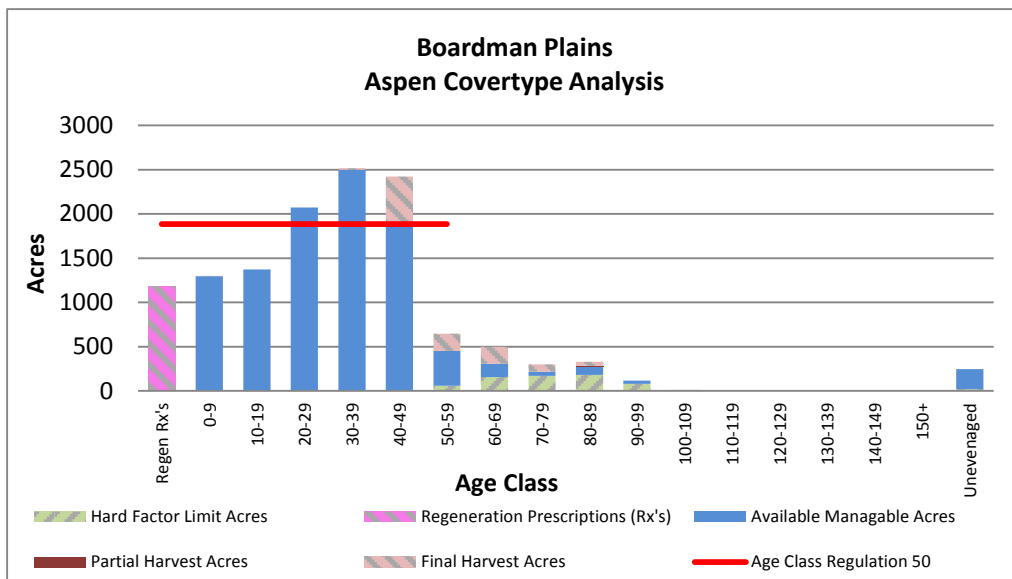


Figure 4.21.2. Age-class distribution for aspen in the Boardman Plains management area (2012 Department of Natural Resources inventory data).

10-Year Management Objectives

- Conduct stand regeneration harvests on a projected desired future harvest level of 2,539 acres. This level is above the age class regulation level; and
- Where necessary and feasible, consider harvesting stands from other age classes and below the rotation age to expedite the balancing of age-class distributions.

Long-Term Management Objectives

- A desired future harvest level for final harvest is projected at 1,886 acres per 10-year period to balance the aspen age-class distribution.

4.21.1.2 Forest Cover Type Management – Oak

Current Condition

Oak acres total 10,062 or 14% of the management area (Table 4.21.1). The age-class distribution is dominated by stands between the ages of 70-100+ years old (Figure 4.21.3). Oak is located on habitat class PArVVb, AFO and AFOCa sites. Data show that 2,984 acres of oak have met harvest criteria, but have site conditions that preclude harvest (hard factor limited acres). There are 556 acres of stands that have a regeneration harvest pending and these acres are shown in the regeneration prescription class (restart harvest acres). Data show 420 acres with a partial harvest pending and these acres are shown in their current age class.

The graph includes the projected number of acres converted to the cover type as a result of treatments that remove an overstory species resulting in release of oak. These acres are included in the regeneration prescription class.

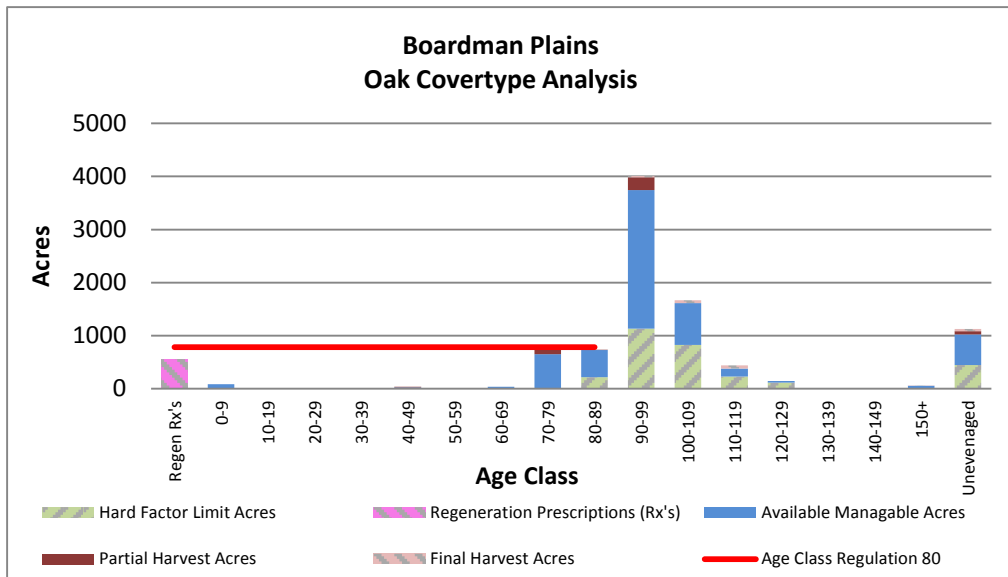


Figure 4.21.3. Age-class distribution for oak in the Boardman Plains management area (2012 Department of Natural Resources inventory data).

Oak is desirable as it provides valuable habitat for many wildlife species, including ruffed grouse, white-tailed deer, black bear and wild turkey, which are featured species in this management area. Oak also provides valuable timber products.

Conditions that existed around the turn of the last century that created the extensive oak stands (large clearcuts that minimized frost pockets, intense fires that minimized competition and a smaller deer population) cannot be replicated. Therefore, the oak resource in this management area is extremely skewed towards the older age classes due to a minimal amount of regeneration for the last 70 years (Figure 4.21.3). The oak in the 90+ age classes is approaching the end of the normal lifespan on outwash plains and is becoming increasingly susceptible to insects and diseases such as oak wilt and oak decline. Older oak also does not sprout as vigorously from stump sprouts.

Due to the advanced age of the oak and the challenges to regenerating oak, management should concentrate on maintaining oak in mixed stands. The current understory of white pine and red maple below oak will be released through partial oak harvests. Where oak is in the understory, such as under jack pine or other pine types, treatments to reduce the pine overstory will release oak. Considerations should also be given to planting pine in oak stands, which can help to shelter young oak from late spring freezes. Oak can be a component of other cover types, but will require management techniques to ensure regeneration.

Desired Future Condition

- Oak will be represented by mixed cover types and as a component in stands throughout the management area through management to provide for timber products, wildlife habitat and recreational opportunities; and
- Some oak sites will be mixed with white pine or red maple.

10-Year Management Objectives

- Conduct final harvests on a projected 1,474 acres;
- Conduct partial harvests on a projected 2,235 acres;
- Consider competition control through methods such as prescribed burning or herbicide use to improve the chances for successful natural regeneration;
- Maintain or expand oak as a component in stands throughout the management area through retention and management to promote natural regeneration in other cover types;
- Consider opportunities to re-establish and maintain oak/pine barrens on poorer quality sites (primarily low-end PARVVb and PVCd). This will provide habitat for species, including wild turkey (a featured species in this management area), that prefer openings; and
- Where site conditions allow, consider introduction of red pine in young oak stands to shelter oak from late spring freezes.

Long-Term Management Objectives

- Continue work towards maintaining oak on the landscape in mixed stands and as a component in other cover types through final harvests at a projected desired future harvest level of 787 acres and 2,235 acres for partial harvests per 10-year period;
- Continue management for mixed oak/pine stands through partial harvests to release understory species into the overstory or planting pine in young oak stands; and
- Future management decisions will need to take into consideration the impact of oak wilt and oak decline as the cumulative impacts will likely increase over time.

4.21.1.3 Forest Cover Type Management – Red Pine

Current Condition

Red pine acres total 9,438 or 13% of the management area (Table 4.21.1) on high-quality moraines on habitat class PArVBB and AFO sites. Red pine timber is a high-value forest commodity which drives continued management of the red pine resource.

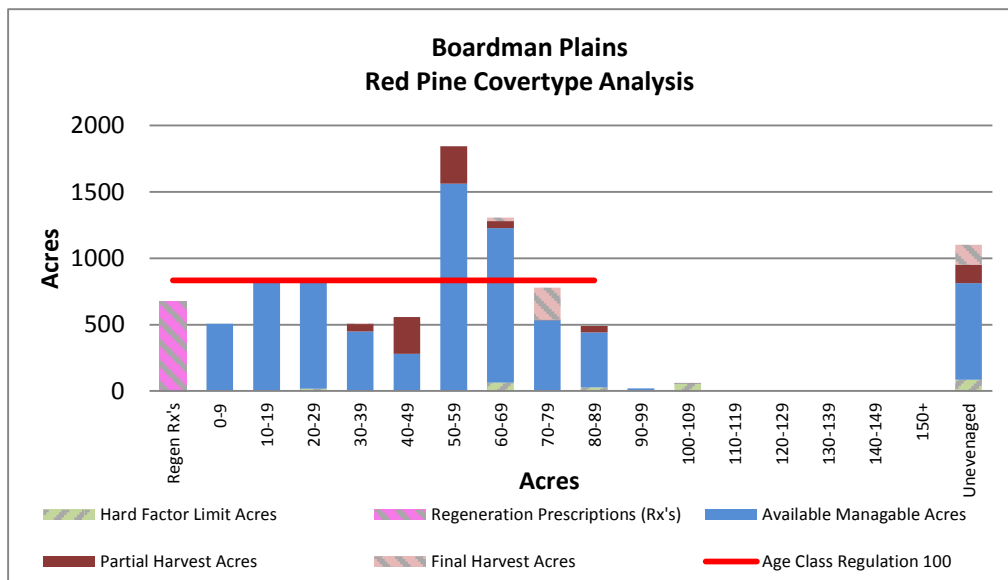


Figure 4.21.4. Age-class distribution for red pine in the Boardman Plains management area (2012 Department of Natural Resources inventory data).

Data show that 276 acres of red pine have met harvest criteria, but have site conditions that preclude harvest (hard factor limited acres). Data show that 679 acres have a regeneration harvest pending and these acres are included in the regeneration prescription class.

There are 867 acres with a partial harvest pending and these acres are included in their current age-class. The graph includes the projected number of acres converted to the cover type as a result of treatments that remove an overstory species resulting in release of red pine or final harvests and then planting red pine. These acres are included in the 0-9 year-old age class.

Due to the active era of red pine planting during the 1950s and 1960s there are spikes of acres above the rotation regulation in the 50-59 and 60-69 year-old age classes and less than the age-class regulation level in the 0-9, 30-39 and 40-49 year age classes. Most operable acres are currently being thinned to increase the volume and value for future harvests.

Desired Future Condition

- Red pine of either natural origin or in planted stands will be located on suitable sites with acres balanced between 0 and 109 years of age to provide a sustainable harvest of forest products.

10-Year Management Objectives

- Follow the Red Pine Management Guidelines, which recommends growing red pine on suitable sites and managing toward a balanced age-class distribution;
- Consider site suitability when deciding where to plant red pine;
- Conduct partial harvests (thinning) on a projected 3,570 acres, concentrating on stands of better-quality red pine that have the potential for a higher product value in larger size classes; and
- Conduct final harvests on a projected 829 acres of red pine beginning with the oldest age-classes and with a concentration on stands with less potential for a higher product value.

Long-Term Management Objective

- In identified special conservation areas, especially those with natural red pine on dry-mesic sites, consider management of red pine to a biological rotation of 200+ years;
- Continue management of red pine through partial harvests of the younger age classes at a projected desired future harvest level of 833 acres per 10-year period and final harvests at a projected desired future harvest level of 3,685 acres per 10-year period; and
- Where necessary and feasible, future planning may need to consider harvesting additional acres to expedite the balancing of age-class distributions.

4.21.1.4 Forest Cover Type Management – Northern Hardwoods

Current Condition

Northern hardwoods total 7,242 acres or 10% of the management area (Table 4.21.1) on habitat class PArVVb, AFO and AFOCa sites. Since northern hardwood stands have trees of varying ages and stand density, basal area is a more appropriate measure of stand condition. It should be noted that red oak is a frequent and valuable component of northern hardwood stands in this management area and has good growth potential. Data show that 180 acres of northern hardwoods (Figure 4.21.5) have met harvest criteria, but have site conditions that preclude harvest (hard factor limited acres). Data show 1,799 acres with a partial harvest pending and these acres are included in their current age class.

Northern hardwoods in the management area may vary from higher quality sites capable of producing quality hardwood sawlogs to poor quality sites that contain a mix of less valuable timber species. Poorer sites are estimated by field staff to be approximately 30% of the overall treatable acres and the form and quality of the trees may result in lower quality products due to multiple stems or poorer quality stems that are not capable of producing quality sawlogs. This will dictate whether stands are treated through selective or partial harvests to produce quality sawlogs or through final harvests to improve the future stem quality. Final harvests may occasionally release aspen which may out-compete the hardwoods resulting in a conversion to aspen.

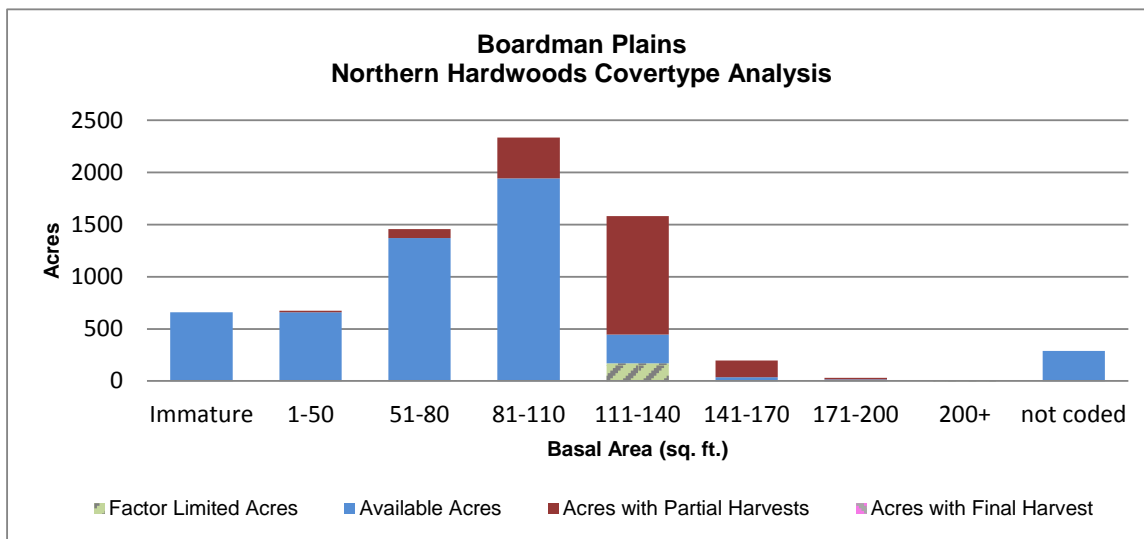


Figure 4.21.5. Basal area distribution for northern hardwoods in the Boardman Plains management area (2012 Department of Natural Resources inventory data).

The ash and American beech components of northern hardwoods are susceptible to emerald ash borer and beech bark disease and as such, it may be desirable to salvage these species to capture the timber value. This salvage may result in lower than normal residual basal area in some northern hardwood stands.

Desired Future Condition

- Northern hardwoods will be located on suitable sites and will produce a sustainable yield of forest products along with wildlife habitat which will provide 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. These stand conditions will be of benefit to numerous wildlife species including pileated woodpecker, a featured species for this management area.

10-Year Management Objectives

- Conduct partial harvests on a projected 2,544 acres of northern hardwood with a basal area of 111 square feet per acre or greater;
- Conduct final harvests on a projected 300 acres of poorer quality northern hardwood;
- Where necessary (especially for ash and beech salvage) and feasible, consider harvesting stands from lower basal area stands to expedite the balancing of basal area distributions;
- Where present, retain healthy oak for mast production and white pine and hemlock for within stand diversity and thermal cover for wildlife;
- Continue to conduct salvage harvests of beech and ash affected by beech bark disease and emerald ash borer using the appropriate management guidelines; and
- Consider the need to delay further selection harvesting due to resultant lower than normal residual basal area in post-salvage harvest stands.

Long-Term Management Objectives

- Management of northern hardwoods will continue with individual tree selection harvests (partial harvests) at a projected desired future harvest level of 2,862 acres per 10-year period. This will help to develop an uneven-aged stand structure;
- Consider the need to delay further selection harvesting due to resultant lower-than-normal residual basal area in post-salvage harvest stands;
- Consider the need to continue final harvests on poor or low quality sites to improve future timber quality; and
- It is acceptable that a small number of lower quality hardwood acres may convert to aspen due to harvest activities.

4.21.1.5 Forest Cover Type Management – Jack Pine

Current Condition

Jack pine acres total 5,722 or 8% of the management area (Table 4.21.1) on habitat class PArVHa sites. Age classes are well distributed in the 0-69 age-classes, with a slight spike in the 0-9 year-old age class (Figure 4.21.6). Data shows that 223 acres of jack pine have met harvest criteria, but, have site conditions that preclude harvest (hard factor limited acres). There are 431 acres of stands that have a regeneration harvest pending and these acres are included in the 0-9 year-old age class. Data show that 139 acres have a regeneration harvest pending and these acres are included in the regeneration prescription class. Some jack pine-dominated stands may provide incidental habitat for the Kirtland's warbler through natural jack pine reproduction.

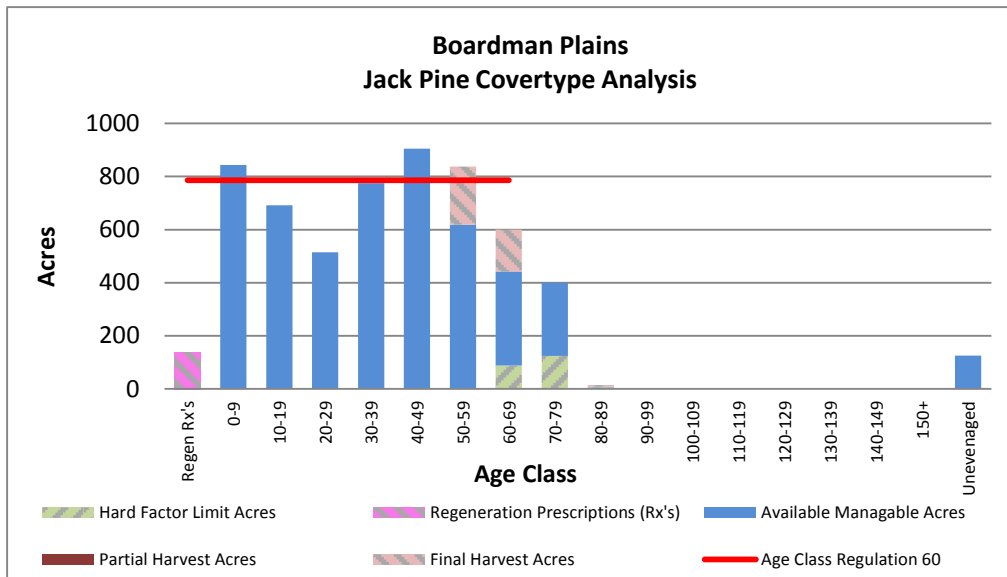


Figure 4.21.6. Age-class distribution for jack pine in the Boardman Plains management area (2012 Department of Natural Resources inventory data).

However, jack pine areas in this management area are not part of essential habitat for Kirtland’s warbler. Jack pine is managed for timber products with the objective of balancing the age-class distribution and managing jack pine on suitable sites. Jack pine budworm outbreaks may result in increased mortality in older age classes and work continues to reduce the number of acres in the older age classes.

Desired Future Condition

- Jack pine will have balanced age classes between 0 and 69 years of age to provide a sustainable timber production and wildlife habitat which will provide recreational opportunities.

10-Year Management Objectives

- Conduct final harvests on a projected 745 acres concentrating on stands older than 60 years to reduce the risk of jack pine budworm in older age classes.

Long-Term Management Objectives

- Continue to manage jack pine for a balanced age-class distribution at a projected desired future harvest level of 786 acres per 10-year period to produce a sustainable timber supply and wildlife habitat which will provide recreational opportunities;
- Where necessary and feasible, future planning may need to consider harvesting additional acres above the rotation regulation level from younger age classes to expedite the balancing of age-class distributions;
- Some jack pine dominated stands have a component of red pine that is much better quality and form than the jack pine. These stands may be converted to a mixed stand with a red pine component (through planting) and natural oak/red maple/aspens; and
- Some deteriorating jack pine stands have a considerable oak understory which may be promoted as managerially desirable.

4.21.1.6 Forest Cover Type Management – White Pine

Current Condition

White pine acres total 2,884 or 4% of the management area (Table 4.21.1). Age classes are well distributed in the 0-69 age-classes, with a slight spike in the 0-9 year-old age class (Figure 4.21.6). Data shows that 8 acres of white pine have met harvest criteria, but, have site conditions that preclude harvest (hard factor limited acres).

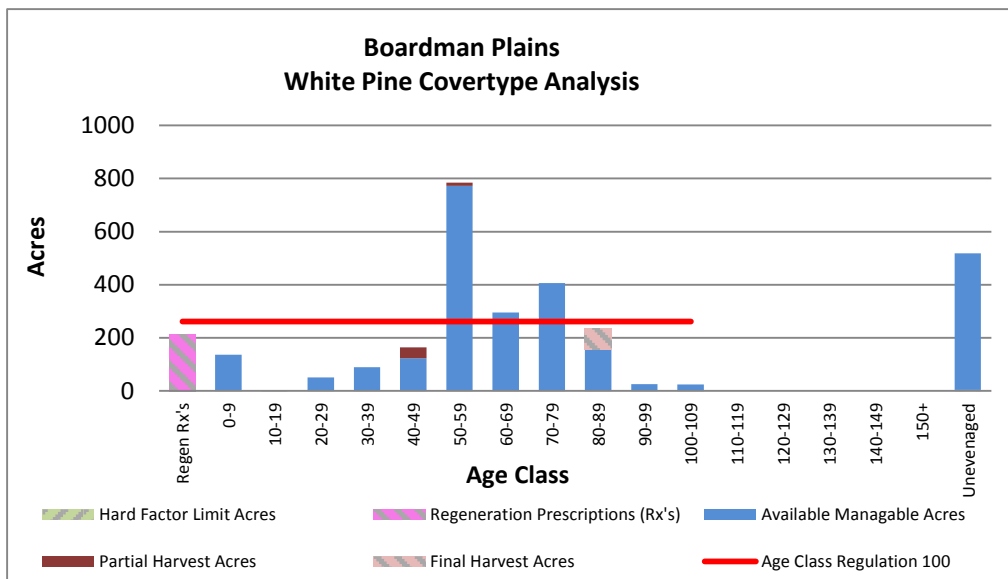


Figure 4.21.7. Age-class distribution for white pine in the Boardman Plains management area (2012 Department of Natural Resources inventory data).

Desired Future Condition

- White pine will have balanced age classes between 0 and 109 years of age to provide a sustainable timber production and wildlife habitat which will provide recreational opportunities.

10-Year Management Objectives

- Conduct final harvests on a projected 535 acres concentrating on older stands; and
- Conduct partial harvests on a projected 1,100 acres.

Long-Term Management Objectives

- Continue to manage white pine for a balanced age-class distribution at a projected desired future final harvest level of 262 acres and partial harvest of 1,100 acres over 10 years to produce a sustainable timber supply and wildlife habitat which will provide recreational opportunities; and
- Where necessary and feasible, future planning may need to consider harvesting additional acres above the rotation regulation level from younger age classes to expedite the balancing of age-class distributions.

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

Current Condition

Upland open/semi-open acres total 4,614 acres or 5% of the management area (Table 4.21.1). This category is a combination of the following non-forested land cover types: herbaceous open land, upland shrub, low-density trees and bare/sparsely vegetated. These non-forested areas are a result of natural fire, frost or other disturbances which created openings in the forest canopy and intentional opening maintenance through prescribed fire or removal of trees that have encroached in openings. These communities are valued ecologically as sources of open land habitat for numerous species of wildlife including wild turkey, a featured species for this management area.

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

- Where feasible and necessary, conduct management to maintain upland open/semi-open lands;
- Conduct management activities that favor mast-producing shrubs (such as blueberry, junberry, cherry, and hawthorn) for black bear, turkey and ruffed grouse; and
- Manage for warm season bunch grasses, row crops and drill planted forages were possible for wild turkey brood rearing habitat.

Long-Term Management Objectives

- Continue management to maintain upland open/semi-open lands at or above current levels;
- Where feasible and necessary, use control methods on invasive non-native species; and
- Consider opportunities to manage historic barrens/savannah areas through use of prescribed fire and timber harvests.

4.21.1.8 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 acres total 2,016 acres or 3% of the management area (Table 4.21.1).

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.

4.21.1.9 Forest Cover Type Management – Other Types

Current Condition

Individual cover types which may cover less than 5% of the management area include: natural mixed pines, 3,339 acres (5% of the management area), mixed upland deciduous 3,248 acres (5%) and upland mixed forest, 2,977 acres (4%) (see Table 4.21.1). Also included but not shown in Table 4.21.1 are even smaller acreages of other cover types including non-forested types, 6,882 acres (10%), lowland conifer, 1,570 acres (2%), planted mixed pines, 1,282 acres (2%), lowland deciduous, 1,201 acres (2%), lowland mixed forest, 482 acres (1%), lowland aspen/balsam poplar, 363 acres (1%) and other scattered acres of upland conifers, upland spruce/fir, tamarack, hemlock, lowland spruce/fir and paper birch. All of these timbered and non-timbered cover types have important ecological values and are important habitat for numerous species. Some of these types are managed through partial or final harvests to provide forest products.

Desired Future Condition

- These cover types will be maintained on suitable sites and contribute to the compositional species diversity of the landscape while providing forest products and habitat for wildlife.

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 harvests on a projected 35 acres of lowland conifer and 40 acres of lowland deciduous stands. Additional opportunities to increase harvest prescriptions in lowland forest types will be assessed, both in and outside (due to forest health issue) of normal years of entry;
- Consider methods to ensure adequate regeneration of lowland types;
- Conduct final harvests on a projected 1,094 acres of mixed upland deciduous, 627 acres of upland mixed forest, 431 acres of planted mixed pines, 28 acres of lowland aspen/balsam poplar 38 acres of upland conifers and 59 acres of upland spruce/fir; and
- Conduct partial harvests on a projected 880 acres of natural mixed pines, 625 acres of mixed upland deciduous, 368 acres of planted mixed pines, 47 acres of upland conifers and 628 acres of upland mixed forest.

Long-Term Management Objectives

- Continue management to regenerate lowland types; and
- Continue management of lowland types at a projected desired harvest level of 35 acres of lowland conifer and 40 acres of lowland deciduous stands per 10-year period to provide a sustainable yield of forest products and wildlife habitat.

4.21.2 Featured Wildlife Species

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

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

- Black bear
- Pileated woodpecker
- Ruffed grouse
- Wild turkey
- White-tailed deer

The primary focus of wildlife habitat management in the Boardman Plains 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 and large open grassland complexes, the retention of large, over-mature trees and snags and the maintenance and expansion of hard mast and mesic conifer components.

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

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.

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 than 12 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 in diameter at breast height.
 - 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.

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 junberry, 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.

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:

- Annual 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.

4.21.3 Rare Species and Special Resource Area Management

All forest operations must be reviewed for potential conflicts between rare species and proposed forest operations following the guidance in DNR's *Approach to the Protection of Rare Species on State Forest Lands* (IC4172). This is especially important when listed species are present or past surveys have indicated a possibility of their presence.

Past surveys have noted and confirmed seven listed species and four natural communities of note occurring in the management area as listed in Table 4.21.2. Any established management guidelines will be followed. Further surveys for special species and natural communities will be carried out as a matter of course during the inventory process and opportunistically for special more focused surveys.

The Boardman 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 4.21.7. Another high conservation value area is the Sand Lake Quiet Area, a 2775 acre area set aside as a non-motorized recreation area (Figure 4.21.7).

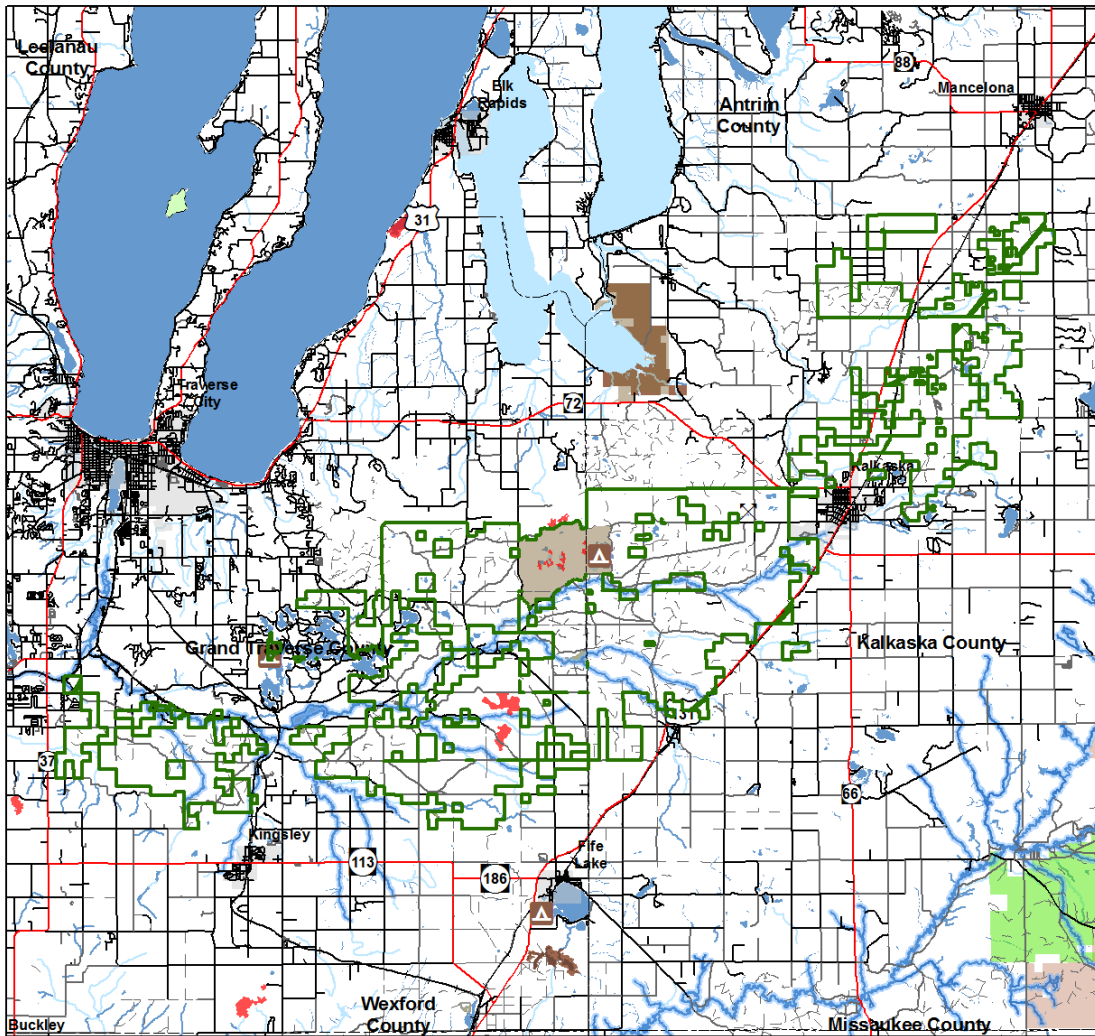
There are three ecological reference areas identified for the Boardman Plains management area as shown if Figure 4.21.7. Two ecological reference areas represent the northern fen natural community type and are 0.07 acres (only partially on state forest land) and 47.05 acres in size. The third ecological reference area represents the oak-pine barrens natural community type and is 306.63 acres. 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 4.21.2. Occurrence information for special concern, rare, threatened and endangered communities and species for the Boardman Plains management area.

Common Name	Scientific Name	Status	Status in Management Area	Climate Change Vulnerability Index (CCVI)	Confidence	Natural Community Association	Probable Cover Types	Successional Stage
Natural Communities								
Dry-mesic northern forest		S3/G4	Confirmed				White Pine	Late
Northern fen		S3/G3	Confirmed				Lowland open/semi-open	N/A
Oak-Pine barrens		S2/G3	Confirmed				Oak	Mid
Rich conifer swamp		S3/G4	Confirmed				Tamarack	Late
Birds								
Red-shouldered hawk	<i>Buteo lineatus</i>	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
Kirtland's warbler	<i>Dendroica kirtlandii</i>	LE/E/G1/S1	Confirmed	PS	Very High	Pine barrens	Jack Pine	Early
						Dry northern forest	Jack Pine, Red Pine	Early
Common loon	<i>Gavia immer</i>	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	<i>Haliaeetus leucocephalus</i>	SC/G5/S4	Confirmed	IL	Moderate	Bog	Lowland open/semi-open	N/A
						Hardwood-conifer swamp	Lowland Mixed	Mid
						Northern hardwood swamp	Black Ash	Late
						Poor conifer swamp	Tamarack	Late
						Dry northern forest	Jack Pine, Red Pine	Early
						Mesic northern forest	White Pine	Late
						Mesic northern Forest	Northern Hardwood	Late
Osprey	<i>Pandion haliaetus</i>	SC/G5/S2-3	Confirmed	PS	Low	Coastal fen	Lowland open/semi-open	N/A
						Northern hardwood swamp	Black Ash	Late
						Floodplain forest	Lowland Mixed	Mid
						Hardwood-conifer swamp	Lowland Mixed	Mid
Butterfly								
Dusted skipper	<i>Atrytonopsis hianna</i>	Sc/G4G5/S2S3	Confirmed	MV	Low	Dry sand prairie	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
Plant								
Hill's thistle	<i>Cirsium hillii</i>	SC/G3/S3	Confirmed			Alvar	Upland open/semi-open	N/A
						Oak-pine barrens	Oak	Mid
						Pine barrens	Jack Pine	Early
						Boreal forest	Upland open/semi-open	N/A
						Dry northern forest	Upland open/semi-open	N/A
						Dry sand prairie	Upland open/semi-open	N/A
						Dry-mesic northern forest	Upland open/semi-open	N/A
						Dry-mesic prairie	Upland open/semi-open	N/A
						Limestone bedrock glade	Upland open/semi-open	N/A
						Mesic prairie	Upland open/semi-open	N/A
						Mesic sand prairie	Upland open/semi-open	N/A
						Open dunes	Upland open/semi-open	N/A

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

Boardman Plains

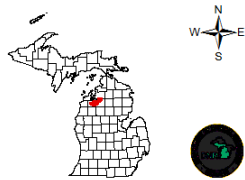


Legend

- Highway
- Paved Roads
- Gravel Roads
- - - Poor Dirt Roads
- Railroads
- Intermittent Stream or Drain
- Perennial River
- Lakes and Rivers
- Management Area Boundary
- Cities
- - - County Boundaries

- Ecological Reference Areas
- High Conservation Value Areas**
- Coastal Environmental Areas
- Critical Dunes
- Natural Rivers Vegetative Buffer
- Natural Rivers Zoning District
- Critical Coastal Habitat (Piping Plover)
- Kirtland Warbler Habitat
- Dedicated Management Areas
- Natural Areas Legally Dedicated

- Special Conservation Areas**
- Campgrounds
- Fishing Access Sites
- Boat Access Sites
- Mineral Resource Locations
- Wild & Scenic Rivers (USFS Lands)
- Visual Management Areas
- Contiguous Resource Areas
- Possible Type 1 and Type 2 Old Growth
- Potential Old Growth
- Non-Dedicated Natural Areas & National Natural Landmarks
- Springs, Wetlands, or Riparian Areas



- Cold Water Streams & Lakes
- Wildlife Management Areas
- Research, Development, and Military Lands
- Great Lakes Islands

Figure 4.21.7 A map of the Boardman Plains management area showing the special resource areas.

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.

4.21.4 Forest Health Management

Although forest health issues span the entire landscape, some specific threats are more important in this management area due to the species composition, site quality or other factors. Oak wilt and oak decline are both important forest health issues in this management area and management should be adapted as follows:

- Oak wilt is prevalent in this area. Epicenters need to be identified and treated. Timber sale restrictions which prevent wounding of oaks from April 15 to July 15 need to be enforced;
- Other management activities that can lead to damage of residual red oak trees (oil and gas development, recreational trail improvement, etc.) should be not be conducted during this high-risk period; and
- Oak decline is most prevalent on frost- prone, nutrient poor outwash plains. Old age and drought predispose areas to two-lined chestnut borer and *Armillaria* root rot. Shorter rotations will reduce the risk of decline.

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 the Table 4.21.3. 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, will be used to inform 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 4.21.3. Locations of invasive species mapped in and within a five-mile buffer of the management area (Midwest Invasive Species Information Network database).

Boardman Plains - FRD MA	Cases within FRD Areas	Cases within 5-Mile Buffer	Total number of cases	Total number of different Invasive Species
	1	10	11	2
Invasive Species within FRD Areas	Occurrences	Invasive Species within 5-Mile Buffer	Occurrences	
Phragmites (Common Reed) <i>Phragmites australis</i>	1	Japanese Knotweed <i>Fallopia japonica</i>	1	
-	-	Phragmites (Common Reed) <i>Phragmites australis</i>	9	

4.21. 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 4.21.1 and listed in Appendix F.

4.21.6 Fire Management

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 and grass/upland brush types. Wildfire risk and fuel loading is increased in young dense conifer plantations and mature jack pine affected by jack pine budworm.

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 will be applied in the management area:

- Consider opportunities to re-introduce fire in the oak/pine areas to encourage pine and oak regeneration and to discourage competition;
- Consider opportunities to incorporate fire as a tool to achieve silvicultural objectives and to restore or maintain managed openings and oak/pine barrens; and
- Recognize that increased urbanization in close proximity to the management area will present more wildland/urban interface challenges to wildfire suppression and prescribed fire implementation.

4.21.7 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 the Vasa single-track and Vasa ski trails. In accordance with the department's *Sustainable Soil and Water Quality Practices on Forest Land*, upon completion of harvesting, temporary spur and seasonal roads will be closed and stabilized.

The Boardman Plains management area located between Traverse City (the most populated city in the northern Lower Peninsula) and Kalkaska is heavily used by residents and visitors due to the abundance of outdoor recreational opportunities. Camping opportunities along with boating access sites can be found at Guernsey Lake and Scheck's Place campgrounds (Figure 4.20.7). There are two trail camps for equestrians at Scheck's Place Trail Camp and Rapid River Trail Camp which link to the Shore-to-Shore equestrian trail (Figure 4.20.1). The Forks access site located on the Boardman River provide access on this natural river. Off-road vehicle users have numerous opportunities to ride trails designed for all types of off-road vehicles from single track motorcycles to full size jeep-type vehicles (Figure 4.20.1). These trails include the Grand Traverse Cycle Trail, Grand Traverse to Leetsville Michigan Cycle Conservation Club Trail, Leetsville Trail and the Leetsville to Kalkaska Michigan Cycle Conservation Club Trail. Snowmobiling opportunities are numerous, winding through the forests in this management area (Figure 4.20.1). For those users that prefer a quiet hiking and skiing experience, the Sand Lakes Quiet Area trail system provides a unique 3,000-acre tract of state land void of engine noise (Figures 4.20.1 and 4.20.7). The popular Vasa cross country ski trail, which recently held the prestigious National Masters Championship race, (with participants from all over the country) can be found in this management area. A section of the North Country Trail, which is America's longest national scenic trail, transects this management area and additional hiking experiences include the Muncie Lakes Pathway and the Shore-to-Shore Trail.

The opportunity to participate in these recreational activities on the nearby state forest land is one of the reasons that the population in areas near the management area is expected to continue to increase. This will result in an increased demand for outdoor recreation opportunities. 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.

4.21.8 Oil, Gas and Mineral Development

Surface sediments consist of glacial outwash sand and gravel and postglacial alluvium and minor end moraine of coarse-textured till. The glacial drift thickness varies between 200 and 600 feet. Sand and gravel pits are located in this management area and there is potential for additional pits.

The Mississippian Coldwater and Sunbury Shales and Devonian Berea Sandstone, and Bedford, Ellsworth and Antrim Shales sub-crop below the glacial drift. The Antrim is quarried for cement products elsewhere in the state.

Most of these lands have been developed for oil and gas production from the Guelph (former Niagaran) reefs. Well spacing is currently 80 acres and most of the area of production is still under lease. The Collingwood Formation has potential in this management area and some lands have been leased for that exploration. Well spacing will probably be either 320-640 acres or possibly larger units. If exploration is successful for the Collingwood Formation, additional lands will be leased and drilling could expand, potentially using existing well pads and facilities.

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.