

## II. GRNA NATURAL RESOURCES MANAGEMENT PLAN

**Purpose:** The GRNA Natural Resources Management Plan was developed to provide recommendations to GRNA, Inc. and Antrim County for the long term management, monitoring and maintaining of the natural resources located within GRNA boundaries. It is based on sound science and best practices for managing natural resources.

**Philosophy:** Resource management decisions must:

- Be based on a broad range of scientific information
- Sustain natural features, biological diversity and ecological integrity
- Consider the impact on future generations
- Be consistent with the mission of GRNA, Inc.

**Goals:** The GRNA Natural Resources Management Plan has four overarching goals.

- Preserve the biological diversity and ecological integrity of the natural resources in GRNA
- Monitor changes in the GRNA ecosystem
- Provide actions for the special management of threatened, endangered or rare species, as well as species of concern or species particularly important in GRNA
- Conduct and/or facilitate collaborative research to better understand the dynamics and structure of natural communities, the effectiveness of resource management, and the role of human history in GRNA

**Management Tools:** Successful resource management of GRNA requires that the following documents and systems be developed and a timeline established:

### **Data**

- 1) An up-to-date Natural Features Inventory of GRNA
- 2) An up-to-date Monitoring Database for GRNA
- 3) Biodiversity Assessment Tool for evaluating the biodiversity of each management area in GRNA
- 4) Viability Assessment Tool for evaluating of the viability of each special population of threatened, endangered, and/or rare species, as well as species of concern or species that are of particular importance in GRNA

### **Plans**

- 1) Natural Resource Management Plan covering all management areas in GRNA
- 2) Species Protection Plan for managing each selected population of threatened, endangered, and/or rare species, as well as species of concern or species that are particularly important in GRNA
- 3) Volunteer Training Plan for training and increasing the number of volunteers and students involved in monitoring the ecosystems in GRNA
- 4) Scientific Research Plan for conducting general and specific scientific research in GRNA
- 5) Historic Research Plan for conducting historic and archaeological research in GRNA

### ***Policy Handbook***

- 1) Management policies
- 2) Scientific research policies
- 3) Historical research policies for protecting important historical and anthropological sites and guiding historical and anthropological research
- 4) Template for a Memorandum of Understanding (MOU) with appropriate research partner organizations, such as public agencies, college and university departments

### ***Protocol Handbook***

- 1) Protocols for monitoring the biodiversity of each management area in GRNA
- 2) Protocols for inventorying the special populations of indicator, threatened, endangered, and/or rare species, as well as species of concern or species that are of particular importance in GRNA
- 3) Protocols for updating the Natural Features Inventory and the Monitoring Database

### ***Reports***

- 1) An annual Natural Resources Report including:
  - An evaluation of the effectiveness of the GRNA Natural Resources Management Plan
  - The condition of natural features, natural communities and indicator species
  - Information on the changes in GRNA
  - Progress made toward the conservation of monitored species for each natural community
  - Progress made toward eliminating populations of invasive species
- 2) An annual Monitoring Report including results of annual monitoring activities:
  - Wintering Bird Survey
  - Spring Nesting Bird Survey
  - Frog and Toad Survey
  - Stream Survey
  - Macro-invertebrate Survey

## **MANAGEMENT AREAS**

Four management areas were defined to simplify natural resource management within GRNA. These areas are based on descriptions of native plant communities in Michigan. (MNFI, 2010)

### **Uplands**

**Estimated acreage: 350.67 acres**

#### **Management Area 1- Upland Forest**

Estimated Acreage: 281.57 acres

Management Area 1A- Hardwood Forest

Estimated acreage: 268.73 acres

Management Area 1B- Pine Forest

Estimated acreage: 12.84 acres

#### **Management Area 2- Dry Meadow**

Estimated acreage: 69.10 acres

### **Wetlands**

**Estimated acreage: 1015.85 acres**

#### **Management Area 3- Forested Wetlands**

Estimated acreage: 798.52 acres

Management Area 3A- Cedar Swamp Forest

Estimated acreage: 662.44 acres

Management Area 3B- Shrub Thicket

Estimated acreage: 136.08 acres

#### **Management Area 4- Non-forested Wetlands**

Estimated acreage: 217.33 acres

## Management Area 1 Upland Forest

281.57 acres

Map Symbol: #1

### **Description:**

The Upland Forest is a mosaic of four forest types: hardwood forests, mixed forests, aspen forests and pine plantations. It comprises approximately 21% of the Grass River Natural Area. The hardwood forests are dominated by sugar maple. The mixed forests consist primarily of hemlock, white pine, balsam fir, beech and sugar maple. The aspen forests have several species of aspen, and the pine plantations contain red and white pines.

The Upland Forest contains a rich diversity of more than twenty species of coniferous (12.84 acres) and deciduous (268.73 acres) trees, as well as more than fourteen shrubs species.

### **Location:**

The Upland Forest is located primarily on the south side of Grass River between the Alden Highway on the south and the cedar swamp forest to the north on land that in ancient times was Lake Algonquin and Lake Nipissing. It is approximately 600 feet above sea level. Topographically, this area is nearly level to gently sloping (0-4 percent) (USDA, 1978).

The hardwood and mixed forests cover the upland areas in the following locations:

- West of the entrance road, and north and south of the Rail Trail in the center of GRNA
- East of the entrance road, including a portion of Scrabble Creek
- East of Finch Creek
- Northwest and northeast of the inflow of Grass River

The pine plantations are found in two locations:

- South shore of Grass River, west of the entrance road and north of the barn
- Northwest side of Grass River between South Shore Drive and Baginski Drive and west of the cedar swamp forest

### **Current Condition:**

The Upland Forest historically supported a climax community of white pine and hemlock. It has been fragmented by human development and is still recovering from the grazing and clear cutting of the late 1800s and early 1900s, as indicated by the stumps and nurse logs along the Woodland Wildfire Trail. There is no old growth in GRNA. (Squiers, 1983)

The sub-canopy trees, shrubs and herb species have been reduced significantly by over-browsing of white-tail deer.

### Hardwood and Mixed Forests

These forests have a variety of deciduous species such as sugar maple, red maple, beech, wild cherry, hop- hornbeam and ash. Most of the ash trees in GRNA have been killed by the emerald-ash borer, an invasive species; it is uncertain whether younger seedlings will survive this infestation. White pine, balsam fir and hemlock are emerging in some areas of the forest. Most of the trees are 10-25 years old.

### Aspen Forests

Aspen forests are found on the sandy upland soils and flood plains. Bigtooth aspen dominate on moister soils and quaking aspen dominate on drier soils. Balsam poplar and quaking aspen are dominant species. Aspen is short-lived and grows rapidly, especially for the first 30 years. It reproduces easily from seed or sucker shoots and quickly reforests on disturbed sites where it helps to build the soil and provides shade to protect seedlings of slower growing, longer lived tree species.

Aspen forests in GRNA have viable populations of the dominant canopy tree species: bigtooth aspen, quaking aspen and red maple, but much of the aspen forest has reached its biological maturity (50 to 80 years) and shows signs of decline. The aspen forests are likely to succeed to longer-lived species such as white pine, red maple and balsam fir over the next 100 years unless man interferes with this natural process.

### Pine Plantations

There are two pine plantations in GRNA. Each is less than 5 acres and together they contain the only red pine found within the natural area. The pine plantations are well stocked and have good quality trees. (Antrim County Forester, 2011) One area was planted in 1965 and contains a mixture of red pine and Eastern white pine ranging from 6 to 10 inches in diameter. Density is 150BA. The other area was planted in 1958 and also contains a mixture of red pine and Eastern white pine. Trees are primarily 10 to 18 inches in diameter. Density is 235BA. (Forest Resource Services, 2001)

### **Biodiversity:**

Flora When the first ecological inventory was conducted in 1983, the plants identified at GRNA were compared with a list of plants characteristic of the aspen-maple forest developed by the U.S. Forest Service. The report concluded that the biodiversity within this forest had significantly declined due to human activity. (Squiers, 1983)

Fauna A wide variety of animals has been identified in GRNA: 49 species of mammals, 65 species of birds, 35 species of fish, as well as 33 species of reptiles and amphibians. The initial inventory provided an alphabetical list of 182 animal species, but did not identify the species in each plant community, since many animal species may utilize a variety of habitats. Lack of herbs and shrubs has caused a significant decline in bird species. (Squiers, 1983)

Since this initial inventory, there has been no comprehensive assessment of the biodiversity of the flora and fauna in GRNA.

### **Threats:**

Natural fire, over-browsing by white-tail deer, insect epidemics such as emerald ash borer, hypoxylon aspen canker, and pine bark beetle (MNF, 2010)

Man-made fire suppression, clear cutting for development of public access and educational facilities, impacts of thousands of visitors and vehicles (Squiers, 1983) and invasive species

### **Soils:**

The primary soil beneath the Upland Forest is Au Gres-Finch Complex (AuA), which is sandy and very permeable. The surface layer (1-2" deep) is organic material and black sand, the subsurface layer (5-26" deep) is gray sand and the underlying material (60" deep) is loose sand. (USDA, 1978)

**History:**

Pre-Settlement Era Late Woodland Native Americans used this area. Cultural sites will be managed according to established guidelines.

Settlement Era The Upland Forest in GRNA has been fragmented by many development activities over the settlement years.

The railroad with its 200-foot right-of-way was constructed in 1892. A store and comfort station to serve passengers were built near the natural area. Comfort Road is named after this station.

Modern Era Like the surrounding area, the Upland Forest was clear cut in the early 1900s. The corduroy roads across Finch Creek are evidence of this logging activity. Widespread logging and slash fires eliminated pine and hemlock seeds, killed advanced regeneration, and incinerated residual seed in the duff. When seedlings became available through the USDA Soil Conservation Service, property owners planted barren areas with red pine and Eastern white pine during the 1950s and 1960s.

Land was cleared for the former Dewey farm between the Alden Highway and the railroad right-of-way, crops planted, and livestock grazed. DeLange put in a two-track road and constructed a cabin. This area was used as a dairy farm and hunting retreat until the property was acquired by Antrim County. There are three old structures remaining from this time: the DeLange cabin, a small pavilion and the Dewey barn. GRNA, Inc. has used the cabin as an interpretive center, the pavilion, as a shelter for small groups and the barn, for special events.

In the 1980s the GRNA parking lot, pit toilets and the Cabin Trail were constructed.

During the early 1990s, GRNA, Inc. constructed five upland trails in Management Area #1: Chippewa, Nipissing, and Algonquin (west of the entrance road); and Woodland and Wildfire (east of the entrance road). A portion of a sixth trail called Glacial Plain was renamed the Rail Trail. Trails are maintained year round for walking and cross country skiing.

In 1997, the lack of new aspen regeneration was identified as a concern. Three areas (a total of 12 acres) were selected to be clear cut to address this concern. By 2010, these areas were well stocked with 12-20 foot aspen.

During the late 1990s, beavers came up an unnamed stream and blocked a culvert under the Rail Trail. After consulting with the MDNR, Compass Fencing was hired to install beaver bafflers. They did not successfully stop beaver activity, so two fenced enclosures were installed on either side of the railroad grade. The westernmost fence is short to allow waterfowl to use the water there. The fences also served as deer enclosures to allow cedar to regenerate.

In 2011 the new Grass River Center was constructed. The center provides restrooms, a book store, a meeting room with interpretive displays, a classroom with a science laboratory, and an outdoor pavilion with fireplace.

## FOREST RESOURCES

### **Plant Communities:**

Within GRNA, the Upland Forest consists of one plant community, the Dry-Mesic Northern Forest, which typically has three successional stages. All three are present in GRNA:

- 1) Bigtooth aspen, quaking aspen, balsam poplar
- 2) Red maple, paper birch, yellow birch, black cherry, hop-hornbeam
- 3) White pine, eastern hemlock, balsam fir, white spruce

The Upland Forest requires 150+ years to reach the climax stage referred to as old growth.

### **Plants commonly found in Upland Forests:**

See Appendix for scientific names. (Squiers, 1983)

Trees bigtooth aspen, quaking aspen, balsam poplar, white pine, red pine, eastern hemlock, balsam fir, red maple, sugar maple, silver maple, white birch, yellow birch, black cherry, pin cherry, basswood, hop-hornbeam, black ash and white ash, American beech

Shrubs striped maple, serviceberry, grey dogwood, bush honeysuckle, maple-leaf viburnum

Herbs wild columbine, wild sarsaparilla, big-leaved aster, striped wintergreen, trailing arbutus, bunchberry, Canada mayflower, partridgeberry, fringed polygala, star flower, bracken fern, spinulosa wood fern, ground pine

Protected Species Pine drops, a state threatened plant, has been observed in GRNA.

### **Forest Management:**

Minimal forest management activities have occurred within this management area. The aspen forests were managed by Antrim County beginning in 1995; the pine plantations, not until 2004.

Because aspen is one of the most significant tree species for wildlife within GRNA, management activities have been undertaken in three sub-areas. (Forest Resource Services, 2001)

The area located west of Finch Creek and contains 131.2 acres of 80 year old aspen. Trees average 13 inches in diameter with about 125 trees per acre. Primary species include bigtooth aspen, quaking aspen and red maple with a small component of balsam fir, black cherry and eastern white pine. As of 2011, the aspen is mature and in fair health. Limb dieback in the tops of the crowns and heart rot in some of the core samples indicate the stand is in decline. The area is converting to red maple naturally and contains 1,500- 2,000 red maple saplings per acre. (Site Index-80, Density- 110BA)

The second area was created in 1997 when an aspen regeneration project occurred. An 11.95 acre parcel of forest (three 2 to 5-acre sites) was clear cut to simulate natural processes with the intent of regenerating new aspen seedlings. As of 2011, the aspen were 8-10 feet tall. The clear-cut farthest to the west has shown an increase in red-osier dogwood. (Site Index-80, Density- N/A)

The third area consists of 64.5 acres (similar in composition to the first sub-area) and is located east of Finch Creek. It is dominated by mature, but declining, aspen and red maple that appear to be in fair health, although there are some signs of branch die-back. The understory includes a natural progression of red maple, balsam fir, eastern white pine and eastern hemlock. (Site Index-80, Density- 110BA)

There are several management alternatives typically used to manage an aspen forest:

- 1) Selectively remove mature aspen on higher quality upland sites to favor longer-lived shade tolerant species such as beech, sugar maple, basswood and ironwood
- 2) Clear-cut this management area to produce even-aged aspen
- 3) Implement selected thinning and allow aspen to reach pole-size before harvesting
- 4) Allow the area to follow natural succession and become an old growth Dry- Mesic Northern Forest

There are several management alternatives typically used to manage a pine plantation:

- 1) Conduct a prescribed burn to allow for understory species to increase biodiversity
- 2) Clear-cut the area to allow for natural succession to increase biodiversity
- 3) Continue selective thinning to increase biodiversity, as well as to increase net yields and financial returns

**Overall Management Goal for the Upland Forest/Desired Future Condition:**

*To maintain and/or encourage increased biodiversity of native plants and animals*

**Forest Management Recommendations:**

The following forest management recommendations will provide for a variety of aspen age classes and a diversity of forest successional stages necessary to increase the biodiversity of flora and fauna in Management Area 1.

- 1.1 Prohibit timber harvesting along stream corridors.
- 1.2 Manage 50% of the Upland Forest for natural succession.
- 1.3 Manage 25% of the Upland Forest for sustainable forestry.
- 1.4 Manage 25% of the Upland Forest for replicating old growth characteristics.
- 1.5 Manage invasive species.

**WILDLIFE RESOURCES**

**Habitat:**

The aspen component within Management Area #1 is significant for wildlife habitat. Aspen is one of the most important tree species for enhancing wildlife diversity, and for some wildlife, aspen is more important than all other species combined. It provides a high protein food base (nectar, catkins, buds, fruits and seeds), has a relatively fast growth rate and has the widespread distribution of any tree species in North America. Declining aspen forests offer excellent wildlife habitats for cavity nesting birds and small mammals. They also offer migratory habitats for many song birds.

**Animals commonly found in the Upland Forest:**

See Appendix for scientific names. (Squiers, 1983)

Mammals white-tail deer, black bear, eastern cottontail rabbit, raccoon, eastern gray squirrel, red squirrel, northern flying squirrel, opossum, bobcat, red fox, coyote, porcupine, striped skunk, 13-lined ground squirrel, eastern chipmunk, masked shrew

Birds ruffed grouse, great-horned owl, common flicker, pileated woodpecker, hairy woodpecker, downy woodpecker, wood thrush, Baltimore oriole, song sparrow, ovenbird, and neo-tropical migrants



Reptiles eastern garter snake, ring-necked snake, brown snake, red-bellied snake, hog-nosed snake, blue racer snake, milk snake, smooth green snake

Amphibians wood turtle, eastern box turtle, skink, eastern American toad, Fowler's toad, western chorus frog, northern spring peeper, gray tree frog, northern leopard frog

Protected species bald eagle, osprey, northern flying squirrel, red bat, hoary bat, silver-haired bat, big brown bat, woodland jumping mouse, gray fox, least weasel, long-tail weasel, short-tail weasel, keen myotis, badger, eastern massasauga rattlesnake The bald eagle (Comfort Road) and osprey (Alden Highway) nest just outside the boundaries of GRNA, but they use the Upland Forest for food and perching.

Invasive species House sparrow, European starling

**Wildlife Management:**

No management activities have been undertaken for specific species in the Upland Forest.

**Wildlife Management Recommendations:**

- 1.6 Implement best management practices to provide habitat for key wildlife species
- 1.7 Identify ways to increase populations of protected animal species.
- 1.8 Reduce the negative impacts of white-tail deer population to allow forest regeneration and to increase biodiversity.
- 1.9 Manage non-native wildlife species.

**WATER RESOURCES**

**Description:**

Portions of Finch Creek and Scrabble Creek flow through the center of the Upland Forest in GRNA. Finch Creek is 6.5 miles long, but only the last 0.5 miles flows through the natural area. For half of this distance, it flows through the Upland Forest. Scrabble Creek is 1.0 miles long and 0.5 miles flows through the Upland Forest where it meets Finch Creek along the Woodland Wildfire Trail. Its course and flow have been significantly altered by the adjacent property owner. Both creeks are meandering streams with steep banks as they enter GRNA, but their shores are more level as they flow through the natural area.

Although Finch Creek is designated as a trout stream by the Michigan DNR, there is a lack of spawning gravel and adequate cover for adult fish. In addition, the sandy bottom is poor habitat for aquatic insects, although a preliminary sampling identified diverse invertebrate fauna. (Squiers, 1983)

Riparian areas provide wildlife with corridors for dispersal. For example, the river otter live in Grass River, but their young disperse up Finch Creek and across uplands to establish new territories on other streams in the Chain of Lakes Watershed. Riparian areas also provide water and food sources for many wildlife species.

**Water Resources Management:**

No management activities have been undertaken for the water resources within the Upland Forest.

**Water Resources Management Recommendations:**

Management of these water and aquatic resources is described in Management Area 3- Forested Wetlands.

## Management Area 2 Dry Meadow

69.1 acres

Map Symbol: #2

### **Description:**

The Dry Meadow consists of four small, open areas in the Upland Forest. It covers approximately 5% of GRNA. They are the only open upland areas within the natural area. The Dry Meadow has a mixture of native and non-native grasses, herbs and shrubs. Many invasive species have become established here.

### **Location:**

The Dry Meadow's four open areas are located at GRNA's higher elevations:

- Southwest of the Rail Trail and south of the former Speet homestead
- South along the Alden Highway and the entrance road and including the former W. Dewey farmstead
- West of M-88 across from the Bellaire Golf Course and including the former Kierstead farmstead
- East of Cottage Drive next to a pine plantation

The Dry Meadow is situated on the former lake bottom and beaches of ancient Lake Algonquin approximately 600 feet above sea level. Topographically, this area is nearly level to gently sloping (0-4 percent). (USDA, 1978)

### **Current Condition:**

The Dry Meadow areas have been subject to considerable disturbance and intensive human activities such as railroads, roads, home sites, lawns and farming activities. On areas of nutrient poor, sandy upland soils, regeneration after disturbance is slow. Trees are lacking and shrubs are adapted to extreme conditions of wind and strong sunlight. (Squires, 1983) Non-native species such as spotted knapweed, chicory, Queen Anne's lace, ox-eye daisy, autumn olive and staghorn sumac have invaded the Dry Meadow.

### **Biodiversity:**

Flora When the first ecological inventory was conducted in 1983, the plants identified at GRNA did not include a separate list of plants found in the Dry Meadow.

Fauna A wide variety of animals has been identified in GRNA: 49 species of mammals, 65 species of birds, 35 species of fish, as well as 33 species of reptiles and amphibians. The initial inventory provided an alphabetical list of 182 animal species, but did not identify the species in each plant community, since many animal species may utilize a variety of habitats.

Since the initial inventory, there has been no comprehensive assessment of the biodiversity of flora and fauna in GRNA.

### **Threats:**

Natural invasive species

Man-made roads, lawns, structures (Squires, 1983)

**Soils:**

Soil beneath the Dry Meadow is Kalkaska Montcalm Complex (KmB), a coarse sandy soil found on 0-6 percent slopes. The surface layer (1-3" deep) is black sand and gray loamy sand, the subsurface layer (6-46" deep) is gray sand and sandy loam and the underlying material (26" deep) is friable sand. (USDA, 1978)

**History:**

Settlement Era This area historically supported a Dry- Mesic Northern Forest dominated by pine/pine and hardwoods. In the late 1800s, a 100 foot wide strip was cleared for the railroad right-of-way.

Modern Era Then, in the early 1900s, the forest was clear cut. Widespread logging and slash fires eliminated potential pine and hemlock seed trees, killed advanced regeneration and incinerated residual seed in the duff.

After the forests were cleared, two of the areas were used for agricultural fields and cattle grazing. After the farms were abandoned in the 1950s, the fields became dry meadows. Non-native shrubs such as autumn olive were planted for wildlife in a program sponsored by the US Department of Agriculture. In the 1990s, a short Bluebird Trail was constructed south from the Rail Trail. Nest boxes have been installed, but they have not been maintained or monitored.

### PLANT RESOURCES

**Plant Communities:**

GRNA's Dry Meadow areas consist of openings in one plant community, the Dry-Mesic Northern Forest. Today, they support a mixture of grasses and wildflowers with brambles of blackberries and raspberries. Alder, sumac and willow shrubs grow along the forest edge. Saplings of aspen, maple and white pine occasionally take hold.

**Plants commonly found in the Dry Meadow:**

See Appendix for Scientific names. (Squires, 1983)

Trees aspen, maple, white pine

Shrubs common blackberry, non-natives- autumn olive and staghorn sumac

Herbs reindeer moss , clovers , hoary alyssum, hawkweeds, golden ragwort, early goldenrod, gray goldenrod, yellow goat's beard, tall wormwood, yarrow, field pussytoes, red sorrel, vetch, St. John's-wort, and a variety of grasses

Protected species lady slippers and other field orchids are occasionally present. (Squires, 1983)

Invasive species spotted knapweed, chicory, Queen Anne's lace, ox-eye daisy, autumn olive and staghorn sumac

**Dry Meadow Management:**

No management activities have occurred within Management Area 2. There are several management alternatives typically used to manage the Dry Meadow:

- 1) Mow or conduct a prescribed burn to maintain dry meadow
- 2) Allow for natural succession to increase biodiversity.
- 3) Plant native species to increase biodiversity.

**Overall Management Goal for the Dry Meadow/Desired Future Condition:**

*To maintain and/or encourage increased biodiversity of native plants and animals*

**Dry Meadow Management Recommendations:**

- 2.1 Maintain two areas totaling 39 acres as open Dry Meadow.
- 2.2 Manage invasive species.

**WILDLIFE RESOURCES**

**Habitat:**

The Dry Meadow can provide significant wildlife habitat for a variety of wildlife species otherwise are not likely to occur. Encroaching hardwoods in the adjacent under-story adds to this area’s ability to attract wildlife. Early stages of red pine growth in the adjacent pine plantations also provide excellent shelter and escape cover for many wildlife species. Conifer trees provide valuable winter habitat, and they are especially valuable when they are contiguous with hardwood forests.

**Animals commonly found in Dry Meadows:**

See Appendix for scientific names. (Squires,1983)

Mammals cottontail rabbit, white-tailed deer, meadow vole, black bear, snowshoe hare, gray fox, red fox, white-footed mouse, raccoon, coyote, bobcat

Birds killdeer, northern harrier, eastern kingbird, eastern bluebird, white-crowned sparrow, field sparrow, eastern meadowlark, bobolink, snowy owl

Reptiles eastern garter snake, hog-nosed snake, blue racer, smooth green snake

Amphibians eastern box turtle, skink (McDuffie, 2012)

Protected species migratory birds

Invasive species House sparrow, European starling

**Wildlife Management:**

The only wildlife management activity was the establishment of a bluebird trail in the open area south of the Rail Trail. The grass was not mowed, and the nest boxes were not sited correctly or monitored regularly. Consequently, the bluebird trail was unsuccessful.

**Wildlife Management Recommendations:**

- 2.3 Implement best management practices to provide habitat for key wildlife species.
- 2.4 Identify ways to increase populations of protected animal species.

## WATER RESOURCES

No water resources are located within Management Area 2.

## Management Area 3 Forested Wetlands

798.52 acres

Map Symbol: #3

### **Description:**

Most of the forested wetland in GRNA is cedar swamp forest with smaller areas of northern shrub thicket. Forested wetlands comprise approximately 58% of GRNA. The area contains a wide variety of trees, shrubs, sedges, rushes, reeds, cattails and flowering herbs. It is approximately 600 feet above sea level and almost completely level in slope.

The cedar swamp forest is a groundwater-influenced, mineral rich, forested wetland dominated by northern white-cedar that occurs on organic soils. Cedar dominated stands have replacement intervals of 1500 years. In GRNA, this forest type (662.44 acres) is closely associated with nearby lakes and the tributary streams that pass through and drain the natural area. It contains a wide variety of plants not found in adjoining upland areas. Typically, cedar swamp forests are dominated by lowland conifer species such as white cedar, tamarack, balsam fir, hemlock, and black spruce. The amount of sunlight reaching the forest floor often regulates the types of plants found there. Where limited sunlight reaches the forest floor, mosses, ferns and specialized plants dominate. Where disturbances have occurred in the forest canopy, shrubs such as alder, dogwood, and willow have become established and persist for many years.

The northern shrub thicket (136.08 acres in GRNA) is a widespread community type that has increased in acreage from its historical extent as a result of logging of swamp forests, alteration of hydrologic regimes, and fire suppression. Thickets are dominated by alders and contribute significantly to the overall biodiversity by providing habitat to a wide variety of plant and animal species including several rare species. In Michigan, however, northern shrub thickets have replaced many rare and declining wetland communities such as rich conifer swamp and northern fen.

### **Location:**

The forested wetlands are situated along the shores of Intermediate River, Lake Bellaire, Grass River, and Clam Lake as follows:

- Intermediate River, lower reach- west shore
- Lake Bellaire- north shore, west of the mouth of Intermediate River
- Lake Bellaire- south shore, west of the entrance to Grass River
- Grass River- northeast shore, and along most of the river
- Grass River- along the west shore of the 'old channel' and west of the island
- Shanty Creek, Finch Creek and Cold Creek- along both shores of their respective routes through GRNA.

### **Current Condition:**

High water tables, a high deer population, beavers, human disturbances, storms, insects and disease have all played a role within this forest and will continue to shape the forest composition in the future. Emerald ash borer is having an impact. Black ash has been declining over the past 5 years. Black spruce seems to be in decline as well. The loss of these species in some areas may affect the water dynamics of the unit.

White cedar is a strong component in much of this forest. Existing stands of cedar appear healthy and may actually benefit from the loss of some of the associated species such as black ash. There is a lack of regenerating (new) white cedar seedling and saplings due to over-browsing by deer. Balsam fir has several age classes. Speckled alder, red maple, willow and black ash exist where blow-downs have opened up the canopy.

Overall the forested wetland is in good condition in 2012. (Antrim County forester)

**Biodiversity:**

When the first ecological inventory was conducted in 1983, the plants identified in GRNA were compared with a list of plants characteristic of forested wetlands developed by the U.S. Forest Service. The report concluded that the biodiversity within GRNA had significantly declined due to human activity. (Squiers, 1983)

The initial inventory provided an alphabetical list of 182 animal species: 49 species of mammals, 65 species of birds, 35 species of fish, as well as 33 species of reptiles and amphibians., but did not identify their location by plant community, since many animal species may utilize a variety of habitats.

Since this initial inventory, there has been no comprehensive assessment of the biodiversity of the flora and fauna in GRNA.

**Threats:** invasive species, over browsing by deer, logging, fluctuating water levels

**Soils:**

Soils of the forested wetlands are primarily Tawas Muck lowland soils, the most common soil in the GRNA. The area is nearly level and very poorly drained. It is subject to frequent flooding and has a surface layer of black muck (8-16" deep), a subsurface layer of brown muck (16-28") and underlying material of gray sandy loam (60"). (USDA, 1978)

The soils of the cedar swamp forest are primarily composed of saturated, coarse woody peat and may vary significantly in depth of organic matter. Organic soils are typically neutral to moderately alkaline but may be very strongly acid near the surface where sphagnum mosses dominate the ground layer. The structure and species composition of cedar swamp forests are strongly influenced by the constant flow of mineral-rich, cold groundwater through the organic soils (MNFI, 2007).

The soils of northern shrub thicket are wet to moist, nutrient-rich, well-decomposed peat, or occasionally mineral, soil. The pH ranges widely from alkaline to acidic with medium acidity the most prevalent condition. The soils are characterized by high nutrient levels due to the nitrogen-fixing ability of alder. Northern shrub thickets are non-stagnant wetlands with high levels of dissolved oxygen and soil nitrogen. Soils range from poorly drained to well drained, with most sites remaining saturated throughout the growing season. The thicket is typically flooded in spring (MNFI, 2007).

**History:**

Pre-Settlement Era A Late Woodland Native American village was located in this management area. Cultural sites will be managed according to established guidelines.



Settlement Era Water transportation was a very important factor in settling Antrim County and Grass River provided an important route into the Upper Chain of Lakes in the Elk River Watershed during the 1800s.

During the later 1800s, the channel at the entrance to Grass River from Lake Bellaire was changed from the west to the east, which created an island. The new channel enabled steamers to transport people to Lake Bellaire and the Upper Chain of Lakes; it was dredged to make it deeper and wider, so that logs could be floated to mills in Alden on Torch Lake. The original channel partitioned the forested wetlands in this part of GRNA from the non-forested wetlands that distinguish the island habitat.

Modern Era Cedar was logged extensively during the winters of the early 1900s. Remains of the corduroy roads created through the swamp to reach the cedar can still be seen in Finch Creek along the Sedge Meadow Trail. Now, old stumps are being used as “nursery” logs, and they can be seen along the wetland trails as evidence that the cedar swamp forest is regenerating.

In the 1980s, boardwalks were constructed through the forested wetlands. Two viewing platforms were constructed: one on the east shore of Grass River and another on the western bridge over Finch Creek. Several benches were installed along the trails.

## **PLANT RESOURCES**

### **Plant Communities:**

GRNA’s forested wetlands is dominated by the cedar swamp forest, also known as the rich conifer swamp. (MNFI, 2007) There is an over-story of trees, an understory of young trees and/or shrubs, and an herbaceous layer. The water table is near or slightly below the surface, except in the spring or in localized depressions.

The cedar swamp forest is dominated by northern white-cedar, a relatively short tree (66 feet) which often forms a dense, low canopy, that can prevent other tree species from establishing. Balsam fir, tamarack and black spruce are other common tree species.

The northern shrub thicket is dominated by speckled alder, various willows and larch. It can become established following severe disturbance of swamp forests or through shrub establishment in open wetlands such as northern wet meadow. Flooding, fire, disease, and windthrow can result in sufficient mortality of the swamp forest overstory to allow for the complete opening of the forest canopy and the expansion of alder through establishment of seedlings or stump sprouting. Following canopy release, alder can form dense, impenetrable thickets that retard or prevent tree establishment. Prolonged periods without fire, an absence of beaver flooding, or the lowering of the water table allows for shrub encroachment into open, non-forested wetlands. (MNFI, 2007)

### **Plants commonly found in this management area:**

See Appendix for scientific names. (Squiers, 1983)

Trees northern white cedar, balsam fir, black spruce, larch (tamarack), black ash and some quaking aspen

Shrubs speckled alder, Labrador tea, swamp laurel, red-osier dogwood, bog rosemary, leatherleaf, alderleaf buckthorn, poison sumac, willow, winterberry and high bush cranberry

Herbs swamp aster, marsh marigold, marsh bellflower, joe-pye-weed , common boneset, rough bedstraw, jewelweed, wild blue flag, northern bugleweed, wild mint, monkey- flower, common skullcap, mad-dog skullcap, golden ragwort, Canada goldenrod, late goldenrod, rough goldenrod, skunk cabbage and purple meadow rue

Ferns and fern allies common horsetail, sensitive fern, cinnamon fern, royal fern and marsh fern

Protected species pitcher plant has been observed in GRNA

Invasive species glossy buckthorn, multi-flora rose, purple loosestrife, narrow-leaved cat-tail, hybrid cat-tail, and reed canary grass

### **Forested Wetlands Management:**

To date, this area has been managed only to provide human access. There has been monitoring of invasive species, particularly where the forested wetlands abut Grass River or one of the lakes.

Where shrub encroachment threatens to convert less common open wetlands to shrub-dominated systems, actions can be taken. Where sites in which northern shrub thicket is succeeding to swamp forest, allowing succession to proceed unhindered will result in increased acreage of less common swamp communities. (MNFI, 2007)

Populations of protected species such as the northern pitcher plant have been impacted by encroaching shrub thicket. Management strategies for protected plants will have to be evaluated and steps taken to insure they continue to thrive in GRNA.

Small “habitat” cuts in some areas where trees are just dropped and left on site will form a shin-tangle to protect cedar regeneration from deer. Locations of this management strategy will be determined.

### **Overall Management Goals for the Forested Wetlands/Desired Future Condition:**

*To maintain and/or encourage increased biodiversity of native plants and animals.*

*To maintain and/or encourage a strong white cedar component.*

### **Forested Wetlands Management Recommendations:**

- 3.1 Prohibit timber harvesting along stream corridors and lake shores.
- 3.2 Maintain and protect water levels.
- 3.3 Maintain populations of protected plant species.
- 3.4 Control invasive species.

## WILDLIFE RESOURCES

### **Habitat:**

Because windthrow is very common, portions of the cedar swamp forest often appear as a dense tangle of fallen, leaning, and misshapen northern white-cedar. The complex structure is further enhanced by the root hummocks of northern white-cedar, which are often elevated above adjacent saturated or flooded organic soil. Species diversity is greater within this area with species such as yellow birch, hemlock, red maple, and balsam fir occurring with more frequency.

The forested wetlands separate the upland forest from the non-forested wetlands and form a transition zone. This zone is significant to wildlife, especially cavity nesting birds and small mammals. Larger diameter trees and cavity trees, snags and deadfalls are significant habitats. The zone also serves as corridor area for wildlife dispersal. The river otter disperse to other streams upland from Grass River and the bobcat use the forested wetlands for wintering habitat. The MDNR has designated this zone a deer wintering yard, which constitutes 5-10% of the area used by white-tail deer. Deer density in Antrim County is estimated at 35/square mile.

In cedar swamp forests, winter is more moderate than in nearby open wet meadows or upland forest. Less snow accumulates, biting winds are greatly reduced, and night time temperatures often remain higher. Wildlife can find shelter, and plenty to eat in these swamps. The presence and abundance of snags and dead and downed woody material is often found in greater abundance and is a key component of these forest systems.

Four features are especially influential in maintaining wintering areas for wildlife:

- species composition of the over-story
- crown size and form
- canopy closure
- patchiness of the stand

Species composition influences snow interception; over-story crowns should be connected or wide with white cedar and spruce being of higher value. Canopy closure should be 70 to 90 percent to reduce snow depth and duration. Patchiness of the stand affects snow distribution, melt rate and browse production. (MNFI, 2007)

Vernal ponds or pools are important habitats, especially for frogs and other amphibians.

### **Animals commonly found in Forested Wetlands:**

See Appendix for scientific names. (Squiers, 1983)

Mammals muskrat, mink, river otter, raccoons, foxes, white-tailed deer, snowshoe hare, red squirrels, bobcat and bear

Birds red-winged blackbird, cedar waxwing, American crow, great-crested flycatcher, American goldfinch, evening grosbeak, blue jay, eastern kingbird, kingfisher, red-crested nuthatch, eastern phoebe, tree swallow, swamp sparrow, chestnut-sided warbler, great blue heron, green heron, northern marsh wren, great gray owl, northern parula warbler, black backed woodpecker, golden crowned kinglet, and wood warbler

Reptiles northern water snake, ribbon snake, garter snake, milk snake, massasauga rattlesnake

Amphibians musk turtle, mud turtle, Blanding's turtle, eastern box turtle, pickerel frog, green frog, northern spring peeper, western chorus frog, northern leopard frog, eastern American toad, Fowler's toad, gray tree frog, blue-spotted salamander, , eastern tiger salamander, red-backed salamander, four-toed salamander, newt (McDuffie, 2012) An unnamed tributary at the east end of Clam Lake is a breeding ground for the midland painted turtle.

Protected species bald eagle, osprey, Blanding's turtle, American bittern, black tern, northern marsh wren. The bald eagle (Comfort Road) and osprey (Alden Highway) nest just outside the boundaries of GRNA, but they use the east end of Clam Lake and south end of Lake Bellaire for feeding. The common loon, threatened in Michigan, use the water adjacent to the undeveloped shores of Lake Bellaire and Clam Lake as their primary habitat. Nesting platforms have improved nesting success since loons have many land predators living in the cedar swamp forest: raccoons, opossums, mink, otters and muskrats.

Invasive species feral dogs and cats

#### **Wildlife Management:**

In the late 1900s a beaver exclusion fence was installed in an unnamed, seasonal stream that flows into the east end of Clam Lake. The purpose of the fence was to prevent beavers from damming the culvert along the Rail Trail in the upland area of GRNA. Beavers travel from Clam Lake through Grass River and into Lake Bellaire. They have a large beaver lodge near the west end of Clam Lake near the Clam River Bridge.

No management has been undertaken for the white-tail deer living in Management Area 3, or in any other part of GRNA.

Management of swamp wildlife can be as simple as doing nothing or it can be very complex and involve the manipulation of wildlife habitat. Swamps that have a steady, stable flow of water year round function naturally. Usually they can be managed by protecting the water source and enhancing the adjacent uplands.

#### **Wildlife Management Recommendations:**

- 3.5 Provide adequate habitat for native wildlife species.
- 3.6 Implement best management practices for wildlife management.
- 3.7 Identify ways to increase populations of protected animal species.
- 3.8 Control invasive species.

## WATER RESOURCES

### **Description:**

There are six bodies of water that provide the hydrology to GRNA's forested wetlands: Intermediate River, Lake Bellaire, Grass River, Shanty Creek, Cold Creek, Finch Creek and Clam Lake. Their overall water quality is high. (TLA, 2010)

This wetland complex is affected by the quality and quantity of the water entering the systems as precipitation, surface flow from Lake Bellaire via Grass River, surface flow from the three tributaries and numerous smaller channels, overland flow from the forested wetlands and uplands and groundwater flow. This income is balanced by an outflow of surface water to Clam Lake via Grass River, seepage into the groundwater and loss through evaporation and transpiration. (Squiers, 1983)

**Lake Bellaire** is a moderately productive (mesotrophic) lake that is 90% developed along the shoreline. Most of the undeveloped parcels along the lakeshore are wetlands. There are thirteen tributaries, the two major streams being Grass Creek in the northwest and the Intermediate River in the northeast. Most of the near shore sediments are sand or gravelly sand which limits fish spawning. The surface area is about 3 square miles and the average depth is 42 feet. Its immediate watershed is 42 square miles. (Fuller, 2001)

**Grass River** is 2.5 miles long and its immediate watershed is 14 square miles. The river's annual flow is 268.3 cubic feet per second which makes it navigable by moderate-sized powerboats. It is classified as a warm water stream, because it is shallow (less than 10 feet) and the current is slow and non-turbulent. The river's elevation drops less than 6 inches over its course. (Fuller, 2001) There are three major tributaries: Shanty Creek, Cold Creek and Finch Creek.

There are 53 parcels on the shoreline and 40% have been protected within GRNA. On the west side of the river, of the 26 parcels, 13 have been protected; on the east side of the 27 parcels, 8 have been protected.

**Clam Lake** is a highly productive (eutrophic) lake that is 90% developed along the shoreline. Most of the undeveloped parcels are wetlands located at the east end within the Grass River Natural Area. About 70% of the shoreline has submergent vegetation and 10% has emergent vegetation. The only tributary is Grass River. (Fuller, 2001)

**Shanty Creek-** Shanty Creek flows into the Grass River, and according to USGS, has no tributaries. The stream originates 2.75 miles above its mouth in forested uplands on the Shanty Creek Resort property. The greatest elevation of the creek's headwaters is 738 feet, and the stream drops at a rate of about 53 feet per mile through GRNA property to Grass River. The stream water is reported to be normally clear and cold. (Fuller, 2001)

**Cold Creek-** Cold Creek discharges directly into Grass River. The stream originates 2.5 miles upstream of its mouth, at the base of forested moraines. The lower reach within GRNA flows into a large swamp. The greatest elevation of the stream is at 640 feet, and the stream drops at an average gradient of 19 feet per mile through GRNA. Estimated stream flow is 20 cubic feet per second. The water is unstained and clear. (Fuller, 2001) Cold Creek is known for having steady, low summer temperatures due to high levels of ground water input. The observed temperature range throughout the year is 38-60 F. Cold Creek is designated as a trout stream by the MDNR.

### **Finch Creek and Scrabble Creek-** (See Management Area 1, p. 12)

As mentioned above, riparian areas provide wildlife with corridors for dispersal as well as water and food sources.

#### **Aquatic Resources:**

See Appendix for scientific names. (Squiers, 1983)

Macroinvertebrates About 25 different macro-invertebrates have been found in Lake Bellaire. (Three Lakes Association, 2009)

Fisheries Lake Bellaire supports planted non-native brown trout and walleye. It has natural populations of lake herring, lake whitefish, yellow perch, smallmouth bass, northern pike, bluegill, black crappie, largemouth bass and bullhead. Since Lake Bellaire has few aquatic plants, the habitat is better suited to smallmouth bass, rather than largemouth bass. (MDNR, 2010 and Fuller, 2002) Also reported along the northwest shore of the island were Johnny and Iowa darters, banded killifish, largemouth bass, and bluntnose minnow. A total of 29 species has been collected from Lake Bellaire over the past fifty years. Some species reported in the 1930's have not been reported since. (Kelly, 1981)

Clam Lake has diverse vegetation and a good variety of species. Black crappie and northern pike are abundant. Brown bullhead, yellow bullhead, black bullhead, yellow perch, largemouth bass, bluegill, pumpkinseed sunfish, northern longear sunfish, Johnny darter, blackchin shiner, blacknose shiner, sand shiner, white crappie, longnose gar, bluntnose minnow, central mudminnow, brook silverside have been found here, also. (MDNR, 2010 and Fuller, 2002) In the past six decades over twenty-four fish species have been reported from Clam Lake. The Department of Conservation planted walleye and largemouth bass during the 1930's. (Kelly, 1981)

Invasive species brown trout, rainbow trout, rainbow smelt, zebra mussel, rusty crayfish

#### **Water Resources Management:**

There has been little water resources management within GRNA. Conventional tree harvesting can cause severe, perhaps irreparable, damage to water resources, so no cedar harvesting has occurred since the natural area was established. Bridge and boardwalk construction have been done with minimal disturbance to the shore and bottomlands, and erosion control fencing has limited nutrient inputs.

The Three Lakes Association has undertaken a comprehensive water quality survey of Grass River's major tributaries which will be completed in 2013. Road stream crossings, culverts, and erosion sites will be located with GPS coordinates and evaluated using standard methods. This information will be useful in determining remedial actions steps that GRNA, Inc, will have to take in the future.

The inflow to Grass River is affected by seasonal precipitation and by adjustments to the lake level of Intermediate Lake. In 1973, the 86<sup>th</sup> Judicial Circuit Court in Antrim County established lake levels at two locations in the Elk River Chain of Lakes Watershed, Intermediate River in Bellaire and Elk River in Elk Rapids. The levels are adjusted gradually over a two-week period at each seasonal changeover. The Antrim County Drain Commissioner is responsible for maintaining the levels.

The lake level for Intermediate Lake is measured at the Bellaire Dam Gauge located on the Intermediate River on spillway in Richardi Park in the Village of Bellaire. Lake level for the summer period (April 15-November 1) is 607.15 feet. Lake level for the winter period (November 1-April 15) is 606.54 feet.

The lake level for Elk Lake is measured at the Elk Rapids Dam Gauge located on the south wall of the headrace/forebay area just in front of the powerhouse in Elk Rapids. Lake level for the summer period is 590.9 feet; for the winter period, 590.2 feet.

**Water Resources Management Recommendations:**

- 3.9 Maintain high water quality.
- 3.10 Improve habitat for native aquatic species.
- 3.11 Maintain and protect water levels

## MANAGEMENT AREA 4 Non-Forested Wetlands

217.33 acres

Map Symbol: #4

### **Description:**

The Non-Forested Wetlands lie along the shores of Grass River and adjacent lakes. Non-Forested Wetlands comprise approximately 16% of GRNA. These wetlands consist of emergent marshes, northern wet meadows and northern fens. They contain a wide variety of sedges, rushes, reeds and cattails, as well as some flowering herbs and low shrubs.

### **Location:**

The Non-Forested Wetlands are situated in six locations adjacent to high quality waterbodies within the Grass River Natural Area:

- Lake Bellaire, along the north shore
- Lake Bellaire, along the east shore of the south arm
- Grass River, Upper Reach, along both shores of the old and new river channels and including an island with several shallow ponds
- Grass River, Middle Reach, along both shores of the river and including the deltas of Shanty Creek and Cold Creek
- Grass River, Lower Reach, along both shores of the river and including the deltas of Finch Creek and Grass River
- Clam Lake, along the south shore and the east end

### **Current Condition:**

The Non-Forested Wetlands historically have supported a variety of palustrine wetlands: northern wet meadow, northern fen, and emergent marsh. Dominated by grass-like plants, although most are not true grasses, these wetlands gave Grass River its name. Lake Bellaire was originally named Grass Lake and one of its northern tributaries is Grass Creek.

These wetlands have been significantly degraded by increasing boat traffic along the river, and development along the shore. Areas in the Upper Reach of Grass River have been eroded by boats running onto the shore or anchoring along the shore, and people playing in the water. Many come ashore to eliminate bodily wastes.

Invasive species have been brought by increasing boat traffic, but they have not severely impacted the Non-Forested Wetlands yet.

### **Biodiversity:**

GRNA's non-forested wetlands are generally less productive with less plant diversity than comparable communities at similar latitudes. This may be a result of the mixed plant communities within each area and low nutrient levels in this river system. (Allan, 1983) There is evidence of wetland succession in these areas between the water and the forested shore. As shrubs take over the non-forested wetlands, biodiversity decreases.

Rivers such as the Grass River tend to erode their banks to the outside of bends, where current is swiftest, loosening soil and silt which is then swept downstream and deposited to the inside of bends where current is slowest. As this process continues, pioneering species hold the soil in place, slowing the current, which in turn increases the deposition of silt and reduces erosion.



This process eliminates some species and establishes others. Eventually the silted marshes develop into wet meadows. The sedges form dense mats of roots and rhizomes, continuing the filling process through deposition of organic material, which are slow to decompose under water-logged conditions. As this organic material, or peat, builds up, the mat becomes further stabilized by the growth of shrubby plants. (Squires, 1983)

In the Upper Reach of Grass River is a 116-acre island. This island was created when a new navigational channel was constructed in the late 1800s. It lies between the present channel on the east and the old channel on the west. The old channel is no longer navigable and has been filled with sediment at the north end. There are three small, shallow ponds that appear to be spring fed, which support fish such as northern pike and largemouth bass. The vegetation of the area appears to be supported on a mat of dead organic materials 10-25 centimeters thick. This mat is floating on 1-4 meters of alkaline, marl soil that covers the substrate of the Grass River basin. The presence of the floating mat means that the water level remains constant year-round relative to the marsh surface. This may be one of the largest fens in Michigan. (Squires, 1983)

Flora When the first ecological inventory was conducted in 1983, the plants identified at GRNA were compared with a list of plants characteristic of emergent wetlands developed by the US Department of Agriculture. (Squires, 1983)

Fauna A wide variety of animals has been identified in GRNA: 49 species of mammals, 65 species of birds, 35 species of fish, as well as 33 species of reptiles and amphibians. The initial inventory provided an alphabetical list of 182 animal species, but did not identify the species in each plant community, since many animal species may utilize a variety of habitats. (Squires, 1983)

Since this initial inventory, there has been no comprehensive assessment of the biodiversity of the flora and fauna in GRNA.

**Threats:**

Natural frequent or seasonal flooding, beaver-induced flooding, seasonally fluctuating water tables, muskrat feeding can create openings that are colonized by submergent and floating vegetation, advancing shrubs and trees (MNFI, 2010)

Man-made invasive species, fluctuating water table (dam removal, bottled water diversion, natural gas fracking), erosion caused by wakes from increasing boat traffic, litter and pollution, sediment and nutrient loading from human activities along tributaries, global warming

**Soils:**

There is one primary soil found beneath the Non-Forested Wetlands, Tawas Muck, a post-Nipissing age soil that covers most of the low flood plain of the river and the island. This area is nearly level, very poorly drained, and subject to frequent flooding, Tawas Muck has a surface layer of black muck (8-16" deep), a subsurface layer of brown muck (16 to 28" deep) and underlying material of gray sandy loam (60" deep). Water movement is moderate in the muck layers and rapid in the underlying sand. The water table is at the surface or within 1 foot of the surface. (USDA, 1978)

**History:**

Pre-Settlement Era Late Woodland Native American village used this management area. Cultural sites will be managed according to established guidelines.

Settlement Era Water transportation was a very important factor in settling Antrim County and Grass River provided an important route into the Upper Chain of Lakes in the Elk River Watershed during the 1800s.

During the later 1800s, the channel at the entrance to Grass River was changed from the west to the east, which created an island. This new channel enabled steamers to transport resorters to Lake Bellaire and the Upper Chain of Lakes. The river channel was dredged to make it deeper and wider, so that logs could be floated to mills in Alden on Torch Lake.

Modern Era In the 1980s, boardwalks were constructed through the forested wetlands and a short spur was constructed through the non-forested wetlands to the river. A viewing platform and boat dock were also constructed to provide public access from the river into the natural area.

In 1999-2000, the Village of Bellaire upgraded its waste water treatment plant on the northeast shore of Lake Bellaire, which reduced the nutrient load to the lake and subsequently to Grass River.

In 2010, new No Wake signs along the river were installed to slow down boats and reduce the erosion of the shore.

## PLANT RESOURCES

**Plant Communities:**

Within GRNA, the Non-Forested Wetlands consist of three plant communities: northern wet meadow, northern fen, emergent marsh. These plant communities are important for the biodiversity of the natural area. They are also important as biodiversity reserves in the State of Michigan, since the State has lost more than 50% of its wetlands.

**Plants commonly found in Non-Forested Wetlands:**

See Appendix for scientific names. (Squires, 1983)

Shrubs: occasionally Labrador tea, leather leaf, bog rosemary, sweet gale, shrubby cinquefoil and bog laurel, speckled alder, red-osier dogwood

Herbs:

Emergent Marsh- water plantain, sedges spike-rushes, white water lily, smartweeds, pickerel weed, bulrushes, bur-reeds, broad-leaved cattail, swamp milkweed

Northern Wet Meadow- blue-joint grass, boneset, water dock, Joe-pye weed, lake sedge, tussock sedge, marsh bellflower, bugleweed, swamp aster, tufted loosestrife, meadowsweet

Northern Fen- blue-joint grass, water dock, marsh bellflower, wild blue flag, water horsetail

Protected Species: False Solomon's Seal, Grass of Parnassus, roundleaf sundew, northern pitcher plant and Showy Lady's slipper, both protected species, have been observed in GRNA.

Invasive Species: Eurasian milfoil, purple loosestrife, yellow flag iris, phragmites, reed canary grass, common buckthorn, narrow-leaved cattail, variable- leaf pondweed

**Plant Management:**

Few management activities have occurred within this management area.

Invasive Species Management

Purple loosestrife was first identified in GRNA in 1993, on both sides of the lower reach (last ¼ mile) of Grass River and at the east end of Clam Lake. In 1994 the plants were huge with hundreds of stems. After a winter of research, GRNA, Inc. began control measures in 1995. The highest number of plants (200) was recorded in 1998. All of the plants were pulled out, but five new plants came up from each set of roots the next year, so individual plants were treated with glyphosphate (Round-Up). This stopped the increase in the number of plants and reduced the number of plants to about 20-40 per year. The plants are now wispy with single stems. (Randolph, 2009)

Hot spots have been mapped with GIS locations. Monitoring is conducted annually in August when the plants are flowering. Then the flower heads are cut, and the plants are treated with round-up. Sixteen years of treatment has limited the spread of purple loosestrife in GRNA.

In 2010, the phragmites stands growing along the river were identified as native species by the Antrim Conservation District.

Yellow flag iris and Eurasian milfoil have been identified in the Grass River Watershed, but have not been mapped or monitored in GRNA.

**Overall Management Goal for the Non-Forested Wetlands/Desired Future Condition:**

*To maintain and/or encourage increased biodiversity of native plants and animals*

**Plant Management Recommendations:**

- 4.1 Maintain populations of protected plant species.
- 4.2 Control invasive species.

**WILDLIFE RESOURCES**

**Habitat:**

The Non-Forested Wetlands form a large wetland complex between the open waters and forested wetlands. They receive water, nutrients and energy from adjoining water resources and return nutrients and energy back to the ecosystem.

Non-Forested Wetlands provide important food sources for insects and nesting habitat for wetland birds and other wetland wildlife species since wetland plants provide a food base of nectar, catkins, buds, fruits and seeds. They also provide spawning habitat for fish such as northern pike. Riparian areas provide wildlife with corridors for dispersal.

**Animals commonly found in Non-Forested Wetlands:**

See Appendix for scientific names. (Squires, 1983)

Mammals muskrat, mink, river otter, raccoons, foxes, white-tailed deer

Birds Red-winged blackbird, cedar waxwing, sandhill crane, American crow, great-crested flycatcher, American goldfinch, American bittern, black tern, evening grosbeak, blue jay, northern harrier, eastern kingbird, kingfisher, red-crested nuthatch, eastern phoebe, tree swallow, swamp sparrow, chestnut-sided warbler, American black duck, mallard duck, wood duck, Canada goose, great blue heron, green heron, common loon, marsh wren, tree swallow, bald eagle and osprey

Reptiles northern water snake, ribbon snake

Amphibians snapping turtle, midland painted turtle, spotted turtle, Blanding's turtle, soft-shell turtle, northern spring peeper, western chorus frog, bullfrog, green frog, northern leopard frog, mudpuppy, blue-spotted salamander, spotted salamander, eastern tiger salamander, red-backed salamander, four-toed salamander (McDuffie, 2012) An unnamed tributary at the east end of Clam Lake is a breeding ground for the midland painted turtle.

Protected species bald eagle, osprey, Blanding's turtle, American bittern, black tern, northern harrier, marsh wren, common loon

The bald eagle (Comfort Road) and osprey (Alden Highway) nest just outside the boundaries of GRNA and use the east end of Clam Lake and south end of Lake Bellaire for feeding.

Two pairs of threatened common loons live in the south arm of Lake Bellaire and the east end of Clam Lake. They have successfully reproduced every year for the past 30 years because of the protected wetlands in the natural area. A juvenile that was banded on Clam Lake in 1991 established a territory in the south arm of Lake Bellaire in 2002.

Invasive species mute swan

#### **Wildlife Management:**

Because many of the parcels within GRNA were purchased with funds from the Michigan Natural Resources Trust Fund, the area must be kept open for hunting, trapping and fishing.

Management activities for the threatened common loon have included installing artificial nesting islands and loon alert buoys which are permitted by the MDNR Law Enforcement Division. Monitoring nesting loons and their chicks is done every year by volunteers who serve as loon rangers and report annually to the Michigan LoonWatch Program sponsored by the Michigan Loon Preservation Association. Education and outreach activities to make boaters and property owners more aware of this threatened species have been coordinated by the Elk River Chain of Lakes Loon Network, a project of Michigan Audubon. The Loon Network also coordinates banding efforts with Common Coast Research, the Three Lakes Association and Friends of Clam Lake. Twelve loons in these two territories have been banded from 1991 to 2011.

In the late 1900s a beaver exclusion fence was installed in an unnamed stream that flows into the east end of Clam Lake. The purpose of the fence was to prevent beavers from damming culverts upstream. Beavers travel from Clam Lake through Grass River and into Lake Bellaire. They have a large beaver lodge near the Clam River Bridge and another on the North Arm of Lake Bellaire.

**Wildlife Management Recommendations:**

- 4.3 Provide adequate habitat for native wildlife species.
- 4.4 Implement best management practices for wildlife management.
- 4.5 Identify ways to increase populations of protected animal species.
- 4.6 Control invasive species.

**WATER RESOURCES**

(Same as Management Area 3)