SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Horseshoe Bay Research Natural Area

Hiawatha National Forest

Mackinac County, Michigan

The undersigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified in accordance with FSM 4063.21, Mapping and Recordation and FSM 4063.41 5e(3) in arriving at this recommendation.

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Recommended by Carol J. Jorgensen Date 12-17-96
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Title Page

Establishment Record for Horseshoe Bay Research Natural Area within Hiawatha National Forest Mackinac County, Michigan

INTRODUCTION

Horseshoe Bay Research Natural Area (RNA) is located adjacent to the northwestern shore of Lake Huron north of the Mackinac Straits in Michigan's Upper Peninsula (Figure 1). The RNA consists of two units (north and south) located 7 miles (11 km) and 12 miles (19 km) north of St. Ignace, Michigan. The RNA lies within the St. Ignace Lake Plain Subsection and Niagara South, Brevoort Dune/Wetland Complex, and St. Martin Bay wetland Landtype Associations (Albert 1988). The RNA encompasses 2065 acres (836 ha) and features examples of the following community types: cobble beach, wooded dunes, northern fens, interdunal wetlands, rich conifer swamps, and hardwood-conifer swamps (Albert 1988). Notable are extensive areas of shallow pools underlain by marl and occurring on both current and former shorelines of Lake Huron. In addition, a number of rare plant and animal species may be supported within the RNA. The area has also been identified by The Nature Conservancy as one of the Conservancy's Last Great Places.

The main objectives of RNA designation are to preserve and protect the ecologically significant community types present, as well as provide undisturbed habitat conditions for rare plants and wildlife species.

The north unit is owned entirely by the United States and administered by the USDA Forest Service (Figure 2a). The southern boundary of the north unit is the 1/4-mile interim Wild and Scenic River boundary for the Carp River. The south unit is contained within the Horseshoe Bay Wilderness (Figure 2b). Three private inholdings are located within the RNA and represent approximately 85 acres. These private lands would not be included in the RNA designation, nor would lands be subject to RNA management.

Historical Background

The United States Government Land Office surveyed the area in 1845. The area was described as a cedar swamp with marly pools. Several cabins or residences once stood on the shoreline and the Mackinac Trail passes near the edge of the area. This route was the overland link between the Straits area and Sault Ste. Marie during the 1800s.

A 1987 field survey by the Forest Service noted the cedar swamp area of the south unit had been logged in the late 1800's. Some areas in the south unit are very wet, with marly pools or surface marl and thus have not been extensively logged (Albert 1988). Approximately 80 acres were strip cut immediately adjacent to the RNA boundary of the south unit (in T41N R3W Section 6) prior to Wilderness designation. In the north unit, the aspen stand (8 acres) located in T42N R3W Section 17 (see Figure 3a) was clearcut in 1989.

Fire is not a typical or common form of natural disturbance within this area but occasional small natural fires probably occurred. The most important natural disturbance regime is the lake level fluctuations of Lake Huron.

In 1991 the Horseshoe Bay Wilderness was established by Congress. The management plan allows for camping and campfires. For the most part the interior of both units is not inviting to recreationists as it has thick vegetation, blowdowns and wet areas. Nevertheless, some recreation use occurs, including deer and waterfowl hunting, hiking (primarily restricted to the trail from the Foley Creek Campground), and walking along the shoreline. Local Tribes also utilize the area for hunting and fishing.

LAND MANAGEMENT PLANNING

The 1710-acre (692-ha) south unit lies within the boundaries of the Horseshoe Bay Wilderness and was named as a candidate RNA in the *Hiawatha National Forest Land and Resource Management Plan* (Forest Plan), which was approved in 1986. Prior to RNA designation, the area was managed under Forest Plan Management Area 5.1 (wilderness objectives) standards and guidelines. RNA designation modified standards and guidelines to provide more specific management direction included as Management Area 5.1.1 in the Forest Plan. Designation also changed the southern boundary of the south unit to incorporate the riparian corridor of the unnamed creek near the original boundary.

The north unit (355 acres/144 ha) was not identified as a candidate RNA in the Forest Plan. Prior to RNA designation, it was managed under Management Area 6.4, objectives of which include: "to produce habitat for wildlife species such as bobcat, pine marten and black bear which require seclusion; to produce habitat for waterfowl and wetland species; to create specific desired habitat through vegetative manipulation; to provide semiprimitive motorized areas; and to produce a mixture of forest products while encouraging long-lived trees in a natural setting". An amendment to the Forest Plan changes this Management Area to 8.1.1 to better reflect the RNA objectives.

The southern boundary of the north unit is the 1/4-mile interim Wild and Scenic River corridor of the Carp River. When the river management plan is developed and finalized, the corridor boundary may be changed. Because the Wild and Scenic River designation and subsequent management plan direction supercedes RNA management, this boundary change may result in a change to the RNA boundary. Any changes would be evaluated for incorporation into an amended RNA Establishment Record at a later date.

OBJECTIVES

General objectives for RNAs include:

1) To preserve and maintain genetic diversity of rare or threatened and endangered species.

2) To serve as reference areas for the study of succession.

3) To provide limited on-site and extension educational activities.

4) To serve as a baseline area for measuring long-term ecological changes.

5) To serve as a control area for comparison to areas undergoing manipulation for management and research.

In addition, specific objectives of the Horseshoe Bay RNA include:

1) To maintain the integrity and diversity of high quality examples of natural communities, including northern fen, rich conifer swamp, hardwood-conifer swamp, cobble beach, interdunal wetland, and Great Lakes marsh, for research, study, observation, monitoring and those educational activities that maintain unmodified conditions.

2) To protect other rare elements such as inland marly pools and old lake beds and ridges which occur in the RNA.

3) To monitor long-term effects on forest structure and biodiversity of past resource management techniques and practices that have occurred within small portions of the RNA.

JUSTIFICATION

The Great Lakes ecosystem is a large-scale, freshwater system which is unique regionally, continentally, and globally. At the regional scale, the area's geologic history and lake-influenced climate interact to produce specific landtype associations, communities, and species habitat. The RNA shoreline included within the Northern Lake Huron Biosphere Reserve has regional significance in that it provides habitat for endemic, rare species and is relatively intact and unmodified at a landscape scale. The RNA has national significance in that it is considered one of The Nature Conservancy's Last Great Places. Within a landscape context, the RNA provides a large-scale, undeveloped, and relatively unmodified habitat for rare species and unique features, as well as an opportunity for baseline data collection and research by allowing natural disturbance to be the primary agent of change.

This RNA contains excellent examples of marly pools, Great Lakes marsh and high quality shoreline plant communities (Albert 1988). This area is one of the few places where marly pools, which generally occur only in close proximity to the shoreline, are also found up to three-quarters of a mile inland. Several examples of rare flora and fauna that are adapted to the Great Lakes shoreline ecosystem are known to occur (Table 1). A number of other rare species also have suitable habitat within the RNA. In addition, preliminary research results show the importance of Great Lakes riparian areas as staging or feeding areas for spring and fall migration of migrating neotropical migrant songbirds, which are rare or declining globally (David Ewert, personal communication).

Table 1. Federal and State listed rare species observed in Horseshoe Bay RNA

Species	Common name	Status
Carex scirpoidea	bulrush sedge	State threatened
Empetrum nigrum	black crowberry	State threatened
Erigeron hyssopifolius	hyssop-leaved fleabane	State threatened
Pinguicula vulgaris	butterwort	State special concern
Solidago houghtonii	Houghton's goldenrod	Fed. & State threatened
Thalictrum venulosum	veiny meadow-rue	State threatened
Haliaeetus leucocephalus	bald eagle	Fed & State threatened
Pandion haliaetus	osprey	State threatened

PRINCIPAL DISTINGUISHING FEATURES

Horseshoe Bay RNA includes coastal features (sand dunes, ridges and swales, and embayments) overlying limestone bedrock. Soils in the swales, swamps, and other low-lying areas are a sandy muck with some clay. The vegetation is highly diverse due to the complex hydrology and mineral-rich calcareous soil. Communities found in the RNA include northern fen, rich conifer swamp, hardwood-conifer swamp, cobble beach, interdunal wetland, and Great Lakes marsh. Marly pools are an outstanding feature of the RNA and contribute to the diversity of the RNA's flora and fauna. Due to the undeveloped and relatively undisturbed conditions prevalent in the area, a number of rare plant and animal species are present or have potential habitat within the RNA.

Martineau Creek and an unnamed stream flow through the south unit. The Carp River (a designated Wild and Scenic River) lies adjacent to the southern boundary of the north unit. An unnamed intermittent stream flows through the central area of the north unit. A high water table is a prominant feature of the RNA and ponds and standing water areas are common.

Remote and relatively undeveloped shoreline habitat, which is rare around the Great Lakes, is a principal distinguishing feature of this RNA.

LOCATION

The Horseshoe Bay RNA is on the St. Ignace District of the Hiawatha National Forest in Mackinac County, Michigan.

Latitude and Longitude

The centrum of the north unit of Horseshoe Bay RNA is at 46 degrees 2' N latitude and 84 degrees 41' W longitude. The centrum of the south unit is at 45 degrees 58' N latitude and 84 degrees 42' 30" W longitude.

Legal Description

See Appendix 2 for Boundary Certification.

North Unit: All that certain tract or parcel of land lying in parts of Sections 9, 16 & 17, T42N-R03W, Michigan Meridian, Mackinac County, Michigan more particularly described as: BEGINNING at the Quarter corner common to Sections 9 & 10; thence Westerly and along the east and west quarter line of said Section 9 to a point where said east & west quarter line intersects a line fifty (50) feet distant from and parallel to the centerline of Forest Road (FR) 3900 as it exists on this date (November 26, 1996); thence Southwesterly and along said line, which is parallel to and fifty (50) feet distant from the centerline of FR 3900, through Sections 9, 16, and 17 to a point where said line intersects a line one quarter mile (1320') distant from said northerly high water mark, through Sections 17 & 16 to a point on the shore of Lake Huron; thence Northeasterly along said shoreline and through said Section 16 to the line common to Sections 16 & 9; thence Northeasterly and continuing along said shoreline through said Section 9 to the line common to Sections 9 & 10; thence northerly and along line common to Sections 9 & 10 to the Quarter corner common to said Sections 9 & 10 and the PLACE OF BEGINNING, containing 355 acres, more or less.

South Unit: All that certain tract or parcel of land lying in Parts of Sections 31 & 32, T42N-R03W, Sections 4, 5, 6, 7, 8, & 18, T41N-R03W and Sections 12 & 13, T41N-R04W, Michigan Meridian, Mackinac County, Michigan more particularly described as: BEGINNING at the corner common to Sections 32 & 33, T42N-R03W and Sections 4 & 5, T41N-R03W; thence Easterly and along the line common to said Section 33, T42N-R03W and Section 4, T41N-R03W to the shore of Lake Huron; thence Southeasterly, Southerly and Westerly along said shoreline through said Section 4 to the line common to Sections 4 & 5, T41N-R03W; thence Westerly and Southerly continuing along said shoreline through said Section 5 to the line common to Sections 5 & 8, T41N-R03W; thence Southeasterly and Westerly continuing along said shoreline through said Section 8 to the line common to Sections 8 & 7, T41N-R03W; thence Northwesterly and Southwesterly continuing along said shoreline through said Section 7 to the line common to Sections 7 & 18, T41N-R03W; thence Southwesterly continuing along said shoreline through said Section 18 to the line common to

Section 18, T41N-R03W and Section 13, T41N-R04W; thence Southwesterly continuing along said shoreline through said Section 13 to the intersection of said shoreline and the East and West Quarter line of said Section 13; thence Westerly and along said East and West Quarter line to the Center Quarter corner of said Section 13; thence Northerly and along the North and South Quarter line of said Section 13 to the Quarter corner common to Sections 12 & 13, T41N-R04W; thence Easterly and along the line common to said Sections 12 & 13 to the East Sixteenth corner common to said Sections 12 & 13; thence Northeasterly through said Section 12 to the North Sixteenth corner common to Section 12, T41N-R04W and Section 7, T41N-R03W; thence Northeasterly through said Section 7 to a point on the line common to Sections 6 & 7, T41N-R03W which lies 500 feet Easterly of the Section corner common to Sections 1 & 12, T41N-R04W and Sections 6 & 7, T41N-R03W; thence Northeasterly through said Section 6 to a point which lies 150 feet South of the line common to Section 6, T41N-R03W and Section 31, T42N-R03W and 3450 feet East of the corner common to T41 & 42N - R03 & 04W; thence Westerly 150 feet south of and parallel to said line common to Section 6, T41N-R03W and Section 31, T42N-R03W a distance of 350 feet; thence North 45 degrees West through Section 6, T41N-R03W and Section 31, T42N-R03W to a point which intersects a line 100 feet distant from and parallel to the centerline of County Road 320, commonly known as the "Ackland Road", as it exists on this date (November 26, 1996); thence Northeasterly, parallel to and 100 feet distant from the centerline of said County Road 320, through said Section 31 to the centerline of Forest Road (FR) 3168, as it exists on this date (November 26, 1996); thence Southeasterly and along said centerline of FR 3168 through Sections 31 & 32, T42N-R03W and Sections 4 & 5, T41N-R03W and the PLACE OF BEGINNING, EXCEPTING however therefrom the following parcels: The Southeast Quarter of the Southeast Quarter (SE1/4 SE1/4) and the Southeast Quarter of the Soutwest Quarter (SE1/4 SW1/4) of Section 31, T42N-R03W, Government Lot 5 of Section 5 and the Entire Section 8, T41N-R03W, containing 1710 acres, more or less.

Acreage

North Unit:	355 acres (144 ha)
South Unit:	1710 acres (692 ha)
Total Area:	2065 acres (836 ha)

Elevation

Elevation ranges from a low of 585 ft (177m) to a high of 600 feet (182m) above sea level.

Access

The north unit can be reached via US Hwy 75, turning east at the intersection with County Highway (CH) 134 and then south at the intersection with Forest Road 3900. Follow Forest Road 3900 to the end of the road. The RNA lies to the east of Forest Road 3900 after the first 1.5 miles (2.4 km) south of CH 134. (see Figures 1, 2a).

An alternative to reaching the north unit is to boat or canoe via the Carp River. A boat access is located at the end of the Carp River Road (from Gorman Road) just east of US Hwy 75. Turn north from the boat access to the mouth of the Carp River and turn west upstream. Disembark at any point in the first mile and enter the south end of the RNA through the woods.

The south unit may be reached by driving north from St. Ignace on US Highway 75 to H63. Drive north on H63 for approximately 6 miles (9.5 km) to Ackland Road. This road is blocked off and signed as a foot trail. There is no road marker. Park at the end of Ackland Road and walk along the foot trail approximately 1.5 miles (2.4 km) into the north central area of the RNA(see Figures 1, 2b).

An alternative access is from the north. Drive from St. Ignace north on US Highway 75 to H63. Take H63 1.5 miles (2.4 km) north to Gorman Road and turn east, follow Gorman Rd. for 0.8 miles (1.3 km) to County Road 320, and turn right (south). This is a seasonal road which usually requires 4-wheel drive or high clearance vehicles. Drive to the gates blocking the road. There are two foot paths. Heading south is the north end of Ackland Road. The path to the east is Forest Road 3167. Both of these go to the RNA boundary.

Seasonal roads in both units are likely to be unplowed in the winter and difficult to navigate during the spring season due to standing water, mud or road breakup.

AREA BY COVER TYPES

Table 2 lists Society of American Foresters (SAF) Forest Cover Types occuring within the RNA. (Also see Figure 3a and Figure 3b). Potential natural vegetation types are listed in Table 3 following Kuchler cover types. (Also see Figure 4a and Figure 4b).

Table 2. Society of American Foresters (SAF) Cover Types for Horseshoe Bay RNA.

	SAF Cover Types		
	Total *acres (ha)*	North Unit *acres (ha)*	South Unit *acres (ha)*
16 Aspen	8 (3)	8 (3)	
21 E. White Pine	16 (6)		16 (6)
25 Sugar maple/beech/y. birch	30 (12)		30 (12)
36 Spruce/fir/p. birch	118 (48)	20 (8)	98 (40)
37 N. White cedar	1509 (611)	180 (73)	1329 (538)
38 Tamarack	26 (11)		26 (11)
39 Bl. ash/elm/red maple	53 (22)		53 (21)
Wetland/Ponds	268 (108)	147 (60)	121 (49)
Beach	37 (15)		37 (15)
Total	2065 (836)	355 (144)	1710 (692)

Table 3. Kuchler vegetational cover types for Horseshoe Bay RNA.

Description	Total acres (ha)	North Unit acres (ha)	South Unit acres (ha)
84 Great Lakes Spruce-Fir Forest	144 (58)	20 (8)	124 (50)
85 Conifer Bog	1509 (611)	180 (73)	1329(538)
86 Great Lakes Pine Forest	24 (10)	8 (3)	16 (6)
93 Beech-maple	83 (33)		83 (34)
Wetland/Pond	268 (109)	147 (60)	121 (49)
Beach	37 (15)		37 (15)
	2065 (836)	355 (144)	1710 (692)

PHYSICAL AND CLIMATIC CONDITIONS

Physical

The Horseshoe Bay RNA is level to nearly level. Its coastal features include sand dunes, ridge and swale complexes, embayments, and cobble beach overlaying shallow limestone bedrock. Soils are primarily sandy muck with some clay. The vegetation is highly diverse due to the complex hydrology and rich calcareous soils. Shallow marly pools are an outstanding feature of the RNA and contribute to the diversity of flora and fauna.

Climate

Climate in the RNA area is strongly influenced by the Great Lakes. This influence results in lower summer temperatures and milder winters, with longer growing seasons than other areas at similar latitude. In the ice-free season, the climate is maritime and becomes polar-continental during maximum ice building season. The growing season is 130-140 days (Albert 1988). Temperatures range from a mean maximum temperature of 78 degrees F (26 degrees C) in July to a mean minimum temperature of 7 degrees F (-14 degrees C) in February. Annual number of degree heating days is 8,350 and annual number of degree cooling days is 223. The average annual snowfall for the area is 78 inches (198.12 cm) and average annual rainfall is 29.9 inches (759.5 mm). Data is from 1961 - 1990. (NOAA 1992).

The nearest National Oceanographic and Atmospheric Agency (NOAA) weather station is #1492 - Cheboygan, Michigan. Cheboygan station is at latitude 45 degrees 39 minutes north and longitude 84 degrees 28 minutes west, elevation 590 ft. (179 m). Cheboygan lies at an approximate azimuth of 158 degrees from the approximate center of the RNA. Straight line distance is approximately 24 miles (38.6 km) from the approximate center of the RNA. Both the RNA and the weather station at Cheboygan are at the narrow west end of Lake Huron with land separating them from Lake Michigan. Cross Village (NOAA weather station # 1896) is approximately the same distance from the RNA but is influenced differently by Lake Michigan and is at a higher elevation, and was therefore not used.

Landscape Ecology

Within the ecological hierarchy compiled by McNab and Avers (1994), the RNA is part of the Northern Great Lakes section. The subsection is the St. Ignace Lake Plain (Albert et al. 1988). Three landtype associations (LTAs) are included in the RNA: Niagara South LTA, Brevoort Dune/Wetland Complex LTA, and St. Martin Bay wetland LTA. Niagara South LTA has thin till soils over limestone bedrock; coniferous forest wetlands are predominant with interspersed uplands. Brevoort Dune/Wetland Complex LTA consists of ancient sand

dunes and wetlands occurring in a roughly parallel pattern. St. Martin Bay Wetland LTA is shallow wet till over limestone bedrock.

DESCRIPTION OF VALUES

Flora

The following general plant communities (defined by Michigan Natural Features Inventory) are found within the RNA (Albert 1988): A number of Federal and State of Michigan listed rare plant species are known to occur within the RNA and are shown in Table 4. Given the lack of an intensive floristic inventory of the RNA, additional rare species may also occur. (Species names are cited from one or more of the following: Voss 1972, Voss 1985, Gleason and Cronquist 1991).

Northern Fen

The community is characterized by sedges (*Carex* spp.) and spike rushes (*Eleocharis* spp.). *Parnassia glauca* (grass of Parnassus), *Gentiana procura* (fringed gentian) and *Potentilla fruticosa* (shrubby cinquefoil) are common. Scattered *Thuja occidentalis* (northern white cedar) is typically present.

Eleocharis rostellata (spike rush) forms a carpet on marly pools. The limey mud also supports *Pinguicula vulgaris* and colonies of three state-threatened species: *Empetrum nigrum* (black crowberry); *Erigeron hyssopifolius* (hyssop-leaved fleabane); and *Carex scirpoidea* (bulrush sedge). Table 4 lists plants occurring in northern fens of the RNA.

Table 4. Plant species of northern fen communities in Horseshoe Bay RNA.

Trees

Larix laricina
Picea mariana
Pinus strobus
Thuja occidentalis

Shrubs

Andromeda glaucophylla
Aronia melanocarpa
Chamaedaphne calyculata
Cornus canadensis
Cornus stolonifera
Empetrum nigrum
Epigea repens
Gaultheria procumbens
Gaultheria hispidula
Gaylussacia baccata
Juniperus horizontalis
Kalmia polifolia
Ledum groenlandicum
Linnaea borealis
Myrica gale
Potentilla fruticosa
Rhamnus alnifolia
Rubus pubescens
Salix candida
Salix pedicellaris
Vaccinium macrocarpon
Vaccinium myrtilloides
Vaccinium oxycoccos

Forbs

Asclepias incarnata
Aster lowrieanus
Aster ptarmicoides
Calopogon tuberosus
Campanula aparinoides
Comandra umbellata
Cypripedium calceolus
Drosera rotundifolia
Erigeron hyssopifolius
Galium trifidum
Gentiana procera
Geocaulon lividum
Hypericum virginicum
Iris versicolor
Lilium philadelphicum
Lobelia kalmii
Lycopus americanus

Lysimachia terrestris
Maianthimum canadense
Menyanthes trifoliata
Mitchella repens
Parnassia glauca
Petasites palmatus
Pinguicula vulgaris
Potentilla palustris
Primula mistassinica
Prunella vulgaris
Sarracenia purpurea
Senecio pauperculus
Solidago houghtonii
Solidago uliginosa
Spiranthes romanzoffiana
Tofieldia glutinosa
Trientalis borealis
Triglochin maritimum
Triglochin palustre
Utricularia cornuta
Utricularia intermedia
Valeriana uliginosa
Zigadenus glaucus

Grass & Grasslike Plants

Andropogon scoparius
Calamagrostis spp.
Carex buxbaumii
Carex capillaris
Carex flava
Carex gynocrates
Carex lasiocarpa
Carex leptalea
Carex limosa
Carex scirpoidea
Carex ciridula
Cladium mariscoides
Dulichium arundinaceum
Eleocharis elliptica
Eleocharis rostellata
Eleocharis acicularis
Juncus balticus
Muhlenbergia glomerata
Phragmites australis
Rhynchospora alba
Scirpus cespitosus
Scirpus hudsonianus

Ferns & Fern Allies

Equisetum arvense
Osmunda regalis
Selaginella selaginoides

Bryophytes

Polytricum juniperinum var. *alpinum*
Sphagnum capillifolium
Sphagnum fuscum
Sphagnum magellanicum

Interdunal Wetland
The plant species of this community type are similar to those of northern fens, particularly in the RNA where the substrate is calcareous.

Rich Conifer Swamp
This community type is dominated by *Thuja occidentalis* (northern white cedar), much of which is stunted due to the high water table. As ground elevation rises, northern white cedar attains a larger size. Plant communities such as open, rich conifer swamp occur on most of the marly lake beds. The accumulation of organic matter has formed muck soils over the underlying marl. Many undergrowth species are the same as found in the northern fen type. Table 5 lists representative plant species of this community type.

Table 5. Plant species of rich conifer swamps in Horseshoe Bay RNA.

Trees

Abies balsamea
Acer rubrum
Betula papyrifera

Larix laricina
Picea glauca
Picea mariana
Pinus strobus
Populus tremuloides
Thuja occidentalis

Shrubs

Alnus rugosa
Arctostaphylos uva-ursi
Chamaedaphne calyculata
Cornus canadensis
Cornus rugosa
Dievilla lonicera
Gaultheria hispidula
Gaultheria procumbens
Juniperus communis
Juniperus horizontalis
Kalmia polifolia
Ledum groenlandicum
Linnaea borealis
Lonicera villosa
Nemopanthus mucronatus
Rhamnus alnifolia
Ribes triste
Rubus pubescens
Shepherdia canadensis
Vaccinium angustifolium
Vaccinium myrtilloides

Forbs

Aralia nudicaulis
Aster macrophyllus
Clintonia borealis
Coptis trifolia
Cypripedium acaule
Cypripedium reginae
Listera convallarioides
Maianthemum candensis
Mitella nuda
Oxalis montana
Petasites palmatus
Potentilla palustris
Scutellaria galericulata
Smilacina trifolia
Trientalis borealis

Grass & Grasslike Plants

Carex disperma
Carex leptalea
Carex pedunculata
Carex trisperma

Ferns & Fern Allies

Dryopteris cristata
Lycopodium annotinum
Onoclea sensibilis
Osmunda cinnamonea
Osmunda regalis

Hardwood-Conifer Swamp

This predominantly forested community with a grass and sedge groundcover makes up most of the north unit of the RNA. The trees present include: *Abies balsamea* (balsam fir); *Picea glauca* (white spruce); *Populus tremuloides* (trembling aspen) and *Populus balsamea* (balsam poplar) in wet interdunal swales. *Pinus resinosa* (red pine) and *Populus grandidentata* (bigtoothed aspen) dominate on the beach ridges.

Near the Lake Huron shore, the swamp becomes more open and the plant community includes *Larix laricina* (tamarack), with an undergrowth of grasses and sedges (Table 6).

Table 6. Plant species of hardwood-conifer swamps in Horseshoe Bay RNA.

Trees

Abies balsamea
Acer rubrum
Betula papyrifera
Fraxinus nigra
Larix laricina
Picea glauca
Picea mariana
Pinus strobus
Populus balsamea
Populus tremuloides
Thuja occidentalis

Shrubs

Alnus rugosa
Cornus canadensis
Epigea repens
Ilex verticillata
Linnaea borealis
Myrica gale
Salix pedicellaris
Spiraea alba
Vaccinium angustifolium

Forbs

Aster junciformis
Aster macrophyllus
Aster umbellatus
Clematis virginiana
Coptis trifolia
Drosera rotundifolia
Lemna minor
Lysimachia terrestris
Lysimachia thyrsiflora
Ranunculus scleratus
Senecio aureus
Solidago rugosa
Typha latifolia

Grass & Grasslike Plants

Calamagrostis canadensis
Carex disperma
Carex intumescens
Carex oligosperma
Carex trisperma
Glyceria striata
Juncus effusus

Ferns & Fern Allies

Lycopodium annotinum
Onoclea sensibilis

Bryophytes

Polytrichum juniperinum var. *alpinum*
Sphagnum fuscum

Cobble Beach

The species composition of this community type is similar to that of the northern fen. *Carex scirpoidea* (bulrush sedge) is often associated with this community type although no plants were found in this community type in this RNA. *Pinguicula vulgaris* (butterwort) is common in the wet pools of the cobble beach. Typical species of this ecosystem are listed in Table 7.

Table 7. Plant species of open cobble beaches in Horseshoe Bay RNA.

Trees

Thuja occidentalis

Shrubs

Alnus rugosa
Arctostaphylos uva-ursi
Potentilla fruticosa

Forbs

Agalinis purpurea
Eupatorium perfoliatum
Gentiana procera
Habenaria hyperborea
Lobelia kalmii
Parnassia glauca
Pinguicula vulgaris
Potamogeton gramineus
Sagittaria spp.
Sarracenia purpurea
Solidago houghtonii
Solidago ohioensis
Tofieldia glutinosa
Triglochin maritimum
Triglochin palustre

Grass & Grasslike Plants

Calamagrostis canadensis
Carex aquatilis
Cladium mariscoides
Eleocharis acicularis
Eleocharis tenuis
Juncus arcticus
Juncus canadensis
Juncus pelocarpus

Phragmites australis
Rhychospora alba
Scirpus validus

Great Lakes Marsh
This community type occurs along the coastline of the north unit. Wet Meadow and Emergent Marsh subtypes are both present. Marshy areas are dynamic, with community types shifting in response to erosion, deposition and changes in water level. Species present in this community include *Eleocharis smallii* (Small's spikerush); *Calamagrostis canadensis* (bluejoint grass); *Carex stricta* (tussock sedge); and *Carex aquatilis* (water sedge).

The bryophyte (moss and liverwort) flora has been studied at Summerby Swamp by Howard Crum (Univ. of Michigan, Table 8). Summerby Swamp is located two miles (3 km) west of the south unit and features many of the same physiographic and vegetation characteristics of Horseshoe Bay RNA (Weitzman 1983).

Table 8. Bryophytes known from Summerby Swamp and likely to occur at Horseshoe Bay RNA.

Anastrophyllum hellerianum
Aneura pinguis
Aulacomnium palustre
Blepharospoma trichophyllum
Bryum pseudotriquetrum
Calliergon giganteum
Calliergonella cuspidata
Calypogeia integristipula
Campylium chrysophyllum
Campylium stellatum
Catescopium nigritum
Caphalozia lunulifolia
Ceratodon purpureus
Cheiloscyphus fragilis
Chiloscyphus pallescens
Cinclidium stygium
Dicranum bonjeani
Dicranum flagellare
Dicranum fuscescens
Dicranum montanum
Dicranum polysetum
Dicranum scoparium
Distichium capillaceum
Distichium inclinatum
Drepanocladus aduncus
Drepanocladus revolvens var. *intermedius*
Fissidens osmundioides
Geocalyx graveolens
Gymnostomum recurvirostrum
Hylocomnium splendens
Jamesoniella autumnalis
Jungermannia leiantha
Kurzia setacea
Lepidozia reptans
Lophozia gilmanii
Mnium pseudopunctatum
Moerckia hibernica
Mylia anomalum
Myurella julaecea
Nowellia curvifolia
Odontoschisma denudatum
Oncophorous wahlenbergii
Pellia megaspora
Plagiochila porelloides
Polytrichum strictum
Pressia quadrata
Ptilidium pulcherrimum
Radula complanata
Riccaria latifrons
Scapania nemorea
Sphagnum capillifolium
Sphagnum fuscum
Sphagnum recurvum
Sphagnum russowii
Sphagnum warnstorfii
Thuidium recognitum
Tomenthypnum nitens
Tortella fragilis
Tortella tortuosa
Trichocolea tomentella

Fauna

Horseshoe Bay RNA has not had a detailed faunal inventory. Table 9 lists possible mammals based on habitat utilization and distribution described by Baker (1983). Sightings of bald eagle (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*) have been documented within the RNA (Albert 1988).

Table 9. Potential mammal fauna of Horseshoe Bay RNA.

Mammals

Sorex arcticus	Arctic Shrew
Sorex cinereus	Masked Shrew
Sorex fumeus	Smoky Shrew
Sorex hoyi	Pygmy Shrew
Sorex palustris	Water Shrew
Blarina brevicauda	Short-tailed Shrew
Condylura cristata	Star-nosed Mole
Lepus americanus	Snowshoe Hare
Eutamias minimus	Least Chipmunk
Tamiasciurus hudsonicus	Red Squirrel
Glaucomys sabrinus	Northern Flying Squirrel
Peromyscus maniculatus	Deer Mouse
Clethrionomys gapperi	Southern Red-backed Vole
Microtus pennsylvanicus	Meadow Vole
Ondatra zibethicus	Muskrat
Synaptomys cooperi	Southern Bog Lemming
Erethizon dorsatum	Porcupine
Canis latrans	Coyote
Canis lupus	Gray Wolf
Ursus americanus	Black Bear
Martes americana	Marten
Mustela erminea	Ermine
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Lutra canadensis	River Otter
Felis lynx	Lynx
Felis rufus	Bobcat
Odocoileus virginianus	White-tailed Deer
Alces alces	Moose

Suitable habitat for several threatened, endangered and sensitive (TES) species occurs within the RNA, including habitat for piping plover, several species of tern, bald eagle, and osprey. Preliminary research results from the Lake Huron shoreline demonstrates the importance of Great Lakes riparian areas to migrating neotropical migratory birds (David Ewert, personal communication). Within the RNA, surveys are needed to better determine the presence or absence of rare animal species. Table 10 identifies rare birds which may occupy the RNA.

Table 10. Rare bird species which may occur in Horseshoe Bay RNA.

Species	Common Name	Status
Haliaeetus leucocephalus	bald eagle	Fed. Threatened

Pandion haliaetus	osprey	State Threatened
Charadrius melodus	piping plover	Fed. Endangered
Sterna hirundo	common tern	State Threatened
Chlidonias niger	black tern	State Species of Concern
Sterna caspia	Caspian tern	State Threatened
Sterna forsteri	Forster's tern	State Species of Concern
Ixobrychus exilis	least bittern	State Threatened
Nycticorax nycticorax	black-crowned night heron	State Species of Concern

Geology

The quaternary geology of the RNA is lacustrine sands and thin till over bedrock (Farrand and Bell 1982). The bedrock geology of the RNA is Pointe aux Chenes Shale and St. Ignace Dolomite, which typically lie less than 50 feet (15 m) below the surface for the majority of the area (Dorr and Eschman 1970).

Soils

Soils of the south unit from the southern boundary north to Martineau Creek consist mainly of Markey and Carbondale mucks and Roscommon mucky sand (Davis and Frey 1984). These soils are poorly drained organic soils of varying depth overlying a sandy substrate. There are well-drained inclusions on the knobs and ridges associated with lakeshore features. Marl complexes occur both south and north of Martineau Creek. Grosse Point (at the northeast end of the south unit) contains poorly drained Angelica loam and Satago Variant loam. Angelica loam is a layer of thin muck over a loam and clay loam subsoil. The Satago Variant loam is loam over clay loam and silt loam. Shale fragments are common.

The north unit contains Markey and Carbondale mucks, the Eastport-Roscommon complex, Solona loam, Deford mucky loamy fine sand, and Ingalls fine sand. Most of these soils are poortly drained with some well-drained inclusions on the ridges. Eastport soils feature several inches of muck over sand. Solona loam is loam over sandy loams and sandy clay loams. Deford mucky loamy fine sand is muck over loamy fine sand and fine sand. Ingalls fine sand is loamy sand over sand and very fine sand silt and clay.

Within both units of the RNA, ponded water and deep organic accumulations occur as less than 5-acre (2 ha) units, and were considered inclusions in soil surveys. The micro-relief, soil deposition patterns, the presence of several different parent materials, and the influence of the Great Lakes (water level fluctuations) have created a complex and unusual arrangement of ecosystems within the RNA.

More detailed soils information is available in the Soil Resource Inventory for the Sault Ste. Marie and St. Ignace Ranger Districts (Davis and Frey 1984).

Lands

The land within the north unit of the RNA is owned entirely by the United States and managed by the USDA Forest Service. The south unit (1795 acres total) contains 3 private inholdings totalling 85 acres, therefore the acreage designated as a RNA in the south unit is 1710 acres. The State of Michigan reserves the mineral, coal, oil and gas rights, right of ingress and egress across any lands along any water course, all aboriginal antiquities and the right to explore and excavate for same on the majority of the land in this RNA. (See Figures 5a, 5b).

Heritage Resources

The north half of the upper unit in was surveyed in 1985 with no findings. No other archaeological surveys have taken place within the RNA. Archival sources (maps) indicate several recreational cabins or residences once stood along the Lake Huron shore. The Mackinac Trail follows County Road H-63 near the western boundary of the south unit. This route was an overland link between the Straits of Mackinac and Sault Ste. Marie during the 1800s. An old map indicates a possible "Indian Trail" just north of the Carp River. The shoreline setting and proximity to the Straits of Mackinac indicate a high potential for both prehistoric and historic sites. The key factor determining where sites are present would be the presence of well-drained landforms. Even though the archaeological potential of most of the area is very low because of wet conditions, any areas high enough for upland vegetation or with several inches of well-drained soil would have high potential.

Other

The southern boundary of the north unit lies adjacent to the interim Wild and Scenic River corridor. This Carp River segment is designated as "recreational", which means it is easily and readily accessed and development may exist along its shoreline. Current Forest Plan standards and guidelines guide the management within this corridor pending completion of the river management plan for the Carp River.

IMPACTS AND POSSIBLE CONFLICTS

Mineral Resources

There are no known minerals of commercial value in the RNA. The mineral rights in the RNA are owned by the United States and the State of Michigan. The State of Michigan holds the rights to 40 acres of subsurface minerals in the north unit (Figure 5a) and the majority of subsurface minerals in the south unit (Figure 5b). The likelihood that the State will exercise its right to the minerals is low based on their actions in similar areas.

Grazing

Grazing is not allowed under revised standards and guidelines for the RNA.

Timber

Stands in the south unit, having already been contained within the Horseshoe Bay Wilderness, were classified as unsuited for timber production when the Wilderness was designated. With RNA designation, the north unit will now be entirely classified as unsuited for timber production, However, although standards and guidelines in the north unit previously allowed timber harvest, the high water table and sensitive communities were never conducive to accessing the area for harvest.

Watershed Values

Species present in the RNA are adapted to a fluctuating water table. There are multiple marly pools, vernal pools and Martineau Creek within the RNA. Designation as a RNA will have no impact on the animal and plant species present.
The RNA is within the Lake Huron, Carp River, and Martineau Creek watersheds.

Recreation Values

Human use of the RNA is very low. Reported use for the entire Horseshoe Bay Wilderness is approximately 500 visitors annually. Visitation is concentrated around the Horseshoe Bay Trail terminus and along the Lake Huron shoreline. Use within the RNA is at its highest during the whitetail deer hunting seasons. Hunting may be important in maintaining a balance between vegetation and deer populations.

The Horseshoe Bay Trail from Foley Creek Campground crosses the south end of the south unit of the RNA. This trail receives light to moderate use during the campground operating season (May-September). Other portions of the RNA are very wet and difficult to traverse.

Visitor controls are minimal and occur mostly in the form of hunter patrols during the two weeks of whitetail deer gun-hunting season. Visitor education is provided at this time and during visits to the District Office where visitors can gather information about the Wilderness and "leave no trace" practices.

Although the Carp River itself is not included within the north unit of the RNA, activities associated with the river occur immediately adjacent to the RNA. The immediate lakeshore area and river banks along the mouth of the Carp River are heavily used during the spring smelt dipping season. The southern river bank receives the most use and has been hardened to accommodate this use. The northern river bank is also used as indicated by user-created pathways and other impacts.

Wildlife and Plant Values

The RNA supports a variety of TES species and has strong potential to provide habitat for additional species whose occurrence within the RNA has not yet been documented. RNA designation will maintain the habitat that supports these populations.

The deer population in this region is currently higher than it would have been during pre-European settlement times. If high deer populations are maintained or if populations increase, deer browsing could impact rare plant species. Several of the plant species known to occur within the RNA area which may be affected by heavy deer browsing include: bulrush sedge (*Carex scirpoidea*), hyssop-leaved fleabane (*Erigeron hyssopifolius*), and Houghton's goldenrod (*Solidago houghtonii*).

Additionally, the invasion of non-native plant species could prove to be a threat to native plant communities in these areas.

One of the important features of this area is seclusion habitat provided for wildlife. Current recreation use in both units is low. However, some potential exists for wildlife impacts to occur if human disturbance were to become significant. Despite State law, illegal off-road vehicle use presently occurs along the shoreline and beach areas. An increase in this type of activity could alter natural systems and impact potential research conditions.

Special Management Area Values

The south unit of the RNA lies within the Horseshoe Bay Wilderness. The north unit lies immediately adjacent to the Carp River, a designated Wild and Scenic River. RNA standards and guidelines have been designed to not conflict with the current Wilderness and Wild and Scenic River designations.

Transportation Plans

There are no trail or road transportation plans for this area. No new trails are proposed for the RNA. Standards and guidelines do not allow the use of motorized vehicles, saddle and draft animals, and bicycles within the RNA. One of the private landholders has indicated interest in securing roaded access to his property, but a decision has yet to be made on that proposal.

MANAGEMENT PRESCRIPTION

The management objective of the RNA is to maintain and protect the ecologically significant community types and the site's special plant and animal species. RNA establishment will allow natural vegetation succession to occur unmodified by human activities. Forest-wide standards and guidelines are provided within the Forest Plan. The Purpose, Desired Future Condition, Management Prescription, and Standards and Guidelines specific to the RNA are found in management areas 5.1.1 and 8.1.1 of the Forest Plan (and included here in Appendix 1).

ADMINISTRATION RECORDS AND PROTECTION

Administration and protection of the Horseshoe Bay RNA is the responsibility of the Forest Supervisor of the Hiawatha National Forest, or designate. Day-to-day protection and on-the-ground maintenance of the area is provided by the St. Ignace Ranger District, Hiawatha National Forest. Research proposals within the RNA must be sent to the Regional RNA Coordinator, 1992 Folwell Ave., St. Paul, MN, 55108 for review. The Station Director of the North Central Forest Experiment Station is responsible for approving studies or research conducted in the north unit of the RNA. Research proposals in the south unit (within the Wilderness) must be approved by the Regional Forester. A special use permit must also be obtained from the St. Ignace District Ranger. All plant and animal specimens collected in the course of research conducted in the RNA will be deposited at the Hiawatha Forest Supervisor's Office in Escanaba, Michigan, and at the University of Michigan Herbarium in Ann Arbor (plants only), or as agreed upon and appropriate. Copies of all data, reports, and publications resulting from research in the RNA will be provided to the Station Director, Regional Forester, and Forest Supervisor.

Records for Horseshoe Bay RNA will be maintained in the following offices:

District Ranger
St. Ignace District
Hiawatha National Forest
1498 West US 2
St. Ignace, MI 49781

Station Director
North Central Forest Experiment Station
1992 Folwell Avenue
St. Paul, MN 55108

Forest Supervisor
Hiawatha National Forest
2727 North Lincoln Rd.
Escanaba, MI 49829

Regional Forester
Forest Service Eastern Region
310 West Wisconsin Ave, Suite 500
Milwaukee, WI 53203

Forest Orders issued for this RNA will be placed at the Site, at the St. Ignace District Office in St. Ignace, Michigan and at the Forest Supervisor's Office in Escanaba, Michigan.

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Appendix 1. Standards and Guidelines for Horseshoe Bay RNA.

Management Area 5.1.1 (South Unit)

Purpose

- To protect and perpetuate wilderness character and values including, but not limited to, opportunities for scientific study, education, solitude, physical and mental challenge and stimulation, and semiprimitive recreation experiences.

Desired Future Condition

Remote, undisturbed areas offer a secluded setting where natural processes function without human interference.

Access may be by foot as specifically allowed in accordance with the Michigan Wilderness Act of 1987.

Foot trails exist where needed to control use patterns. Dispersed recreational opportunities for hiking, hunting, snowshoeing and backpacking may be found in the area. Little evidence of human intrusion into the area is apparent.

Interaction between wilderness visitors will be minimal. Motorized or mechanized interior travel is not permitted.

Down, dead or diseased trees remain within the forest offering habitat for a wide variety of mammals and birds. Aquatic ecosystems function naturally without human interference.

A diversity of tree species, age, and size class is found in this naturally appearing forest.

Opportunities to experience solitude and self-reliance exist.

Management Prescription

Acres of National Forest System Land - 1710
Acres Suitable for Timber Production - None

Standards and Guidelines for Management Area 5.1.1

1600 Information Services

Disseminate public information and education materials related to the Wilderness and RNA to insure the resource will not be damaged by overuse or by activities compromising its wilderness character. Leave No Trace and Wilderness awareness training tools will be used to inform current and potential wilderness users about wilderness ethics and resource protection.

Use all reasonable means to manage visitor use before implementing restrictions.

Encourage visitors not desiring a wilderness experience or lacking outdoor recreation experience to use other areas of the Forest.

Educational use may be allowed as long as the use supports, promotes or does not degrade wilderness and RNA resource values, and does not disturb on-going research activities. Educational parties wishing to use the area must receive authorization in advance from the appropriate District Ranger.

Visits will be limited to groups of no more than 8 people with no more than one group active in the area at any given time.

1900 Planning

This area will be managed in accordance with the approved Wilderness Management Plan, Wilderness Implementation Schedule, and the RNA Establishment Record.

Managers planning activities in adjacent areas shall consult these guidelines. Consider size, location, and characteristics of this area so that activities on adjacent lands will not have an adverse effect on wilderness and RNA resource values.

Vegetation Management

Allow natural processes to determine the composition and distribution of plant species.

Permit vegetation management only when needed to protect wilderness and RNA resource values or to protect adjacent private property from adverse impacts.

Eliminate or control invasive and non-native species if they cause damage to wilderness and RNA resource values. Decisions regarding the need for action will be made by the Regional Forester.

All threatened, endangered, sensitive, or rare species shall be protected from activities occurring within the area, including research and educational activities.

2100 Environmental Management

A. Air Quality

Advise the Regional Forester of areas where redesignation to a Class I air-quality area is necessary to protect wilderness and RNA resource values.

B. Soil and Water

Erosion caused by human influences will be corrected using hand tools and native, indigenous plant species when natural processes are not sufficient to correct the problem.

2200 Range Management

Allow no grazing by domestic livestock.

2300 Recreation Management

A. Heritage Resources

Activities associated with inventory, evaluation, and protection will be done in a manner that does not adversely affect wilderness and RNA resource values. On-site interpretation will not be permitted.

B. Transportation

Motorized equipment and mechanized transport are not permitted except for emergency (life or death) situations, search and rescue, fire suppression, and access to private lands within the area.

Only wheeled vehicles (including motorized wheelchairs) suitable for indoor pedestrian use to assist persons with a mobility impairment or disability are permitted within the Wilderness.

C. Recreation Opportunities

Feature semi-primitive recreation opportunities.

Recreation uses are allowed when compatible with the protection of the wilderness and RNA resource values.

Site modification is permitted only as needed to protect wilderness and RNA resource values, environmental quality, or public health and safety.

Monitoring will be adopted to measure effects of recreation use on wilderness and RNA resource values. Limits of acceptable change standards will be established to evaluate the impact of recreation use on wilderness and RNA resource values. Steps will be taken to reduce use if these values are being threatened.

Domestic animals must be on a leash or otherwise confined except while being used for hunting.

Off-road vehicles, including saddle-pack and draft animals, and bicycles are not allowed.

Campfires and collecting of firewood for campfire use is not permitted.

Overnight use is allowed, but may be prohibited if such use threatens RNA and wilderness resource values.

D. Trails

Prohibit trails for motorized use.

Prohibit the construction of new trails unless necessary for the protection of wilderness and RNA resource values and/or to control human use patterns.

Consider relocation or elimination of existing trails if use threatens or interferes with wilderness and RNA resource values.

Maintain trails to wilderness foot travel standards. Reroute or rehabilitate existing trails as necessary to minimized human-caused impacts. When necessary, utilize native, untreated materials in trail reconstruction and maintenance projects.

E. Scenery Resources

The overall desired Visual Quality Objective (VQO) of the Wilderness and RNA is Preservation, which allows for ecological changes only. Since some management practices may be allowed, these practices must meet, at a minimum, a VQO of Retention.

F. Hunting and Trapping

Prohibit use of agricultural products for attracting wildlife.

2400 Timber Management

Silvicultural systems are not applicable to this management area.

Timber harvesting is not permitted.

Gathering of miscellaneous forest products for commercial and personal use is prohibited.

Hazard trees along designated travel routes may be felled but not removed.

2500 Watershed Management

Spring seeps, springs, and other water areas will be protected.

Control human-caused erosion with measures commensurate with soil characteristics, expected use, and to protect wilderness and RNA resource values.

When necessary, utilize native, untreated materials in erosion control projects.

Favor natural healing of disturbed areas.

2600 Wildlife, Fish, and Sensitive Plant Habitat Management

Fish and wildlife management activities will emphasize the protection of natural processes. An exception may be the reintroduction of species extirpated from this area. Decisions regarding the need for reintroduction will be made on a case-by-case basis by the Regional Forester and Station Director.

All threatened, endangered, sensitive, or rare species shall be protected from activities occurring ~~within~~ the area, including research and educational activities.

The State of Michigan and the U.S. Fish and Wildlife Service are responsible for managing threatened and endangered species and fish and wildlife populations working cooperatively with U.S. Forest Service wildlife biologists, and wilderness and RNA managers.

2700 Land Uses Management

No new utility corridors will be permitted within the boundaries of this area except those needed to serve the private lands located within the Wilderness boundary.

Approve road permits to private inholdings on a case-by-case basis. Gated access will be considered in all road permit cases to control unauthorized motorized use in the area. Regional Forester approval is required when road construction or reconstruction is needed.

Special Uses which do not require fixed improvements or modifications of natural conditions may be considered on a case-by-case basis.

Competitive events are not permitted.

2800 Minerals and Geology

Surface-disturbing exploration for Federal minerals is not permitted after December 31, 1983.

Sub-surface exploration and extraction for non-Federal minerals, oil or gas may be allowed only when environmental analysis demonstrates the wilderness and RNA resource values will not be adversely affected by such activities.

Acquisition of non-federal mineral rights will be pursued on a willing seller, willing buyer basis.

3400 Forest Pest Management

Protection of this area from introduced and endemic insects, diseases, plants and animals may be allowed, but only when necessary to protect unacceptable damage to wilderness and RNA resource values over the long term. Decisions regarding the need for action will be made by the Regional Forester after consultation with the Station Director.

4000 Research

Non-manipulative research and monitoring activities that are dependent on a wilderness environment are allowed. Activities such as clipping of vegetation, collection of flora and fauna, and use of increment borers may be allowed but will be reviewed for approval by the Regional Forester in consultation with the Station Director on a case-by-case basis.

Temporary research and monitoring devices may be installed and operated only when the desired information is essential and cannot be obtained from a location outside the wilderness and RNA, and the proposed device is the minimum tool necessary to accomplish the objective safely and successfully.

Access to this area by scientists external to the Forest Service may be authorized by the appropriate District Ranger through a Letter of Authorization, once the research is approved by the Regional Forester and Station Director. Use shall conform to conditions specified in approved study plans or cooperative agreements.

Research parties will be limited to 8 people with no more than 1 group in the area at any given time.

5100 Fire Management

Wildfires will be suppressed unless covered under an approved prescribed natural fire plan. Wildfire suppression tactics and prescribed fire holding lines will consider the potential damage to wilderness and RNA resource values, visual quality objectives, threatened and endangered species and heritage resource sites.

Human-ignited prescribed fires are not allowed in this area unless essential for the protection and maintenance of wilderness and RNA resource values or to meet other standards and guidelines.

Prescribed natural fire will be allowed only if necessary to protect and maintain wilderness and RNA resource values or to meet other standards and guides AND only after preplanned prescriptions have been developed and approved by the Regional Forester.

Develop a wilderness/RNA fire management plan addressing prevention, detection, suppression, and presuppression fuels management based on an analysis of the following:

- Protection of wilderness and RNA resource values.
- Probable fire locations.
- Expected fuel intensities.
- Potential net resource value changes.
- Risk to health, safety, and private developments.

Normal suppression will be accomplished using hand tools. Aerial fire suppression may be used if it is determined that less damage to the wilderness and RNA resource values than hand suppression would result. The use of mechanized equipment and vehicles must be approved by the Forest Supervisor in consultation with the Regional Forester and Station Director.

The need and desirability for post-fire community restoration will be determined by the Regional Forester in consultation with the Station Director.

5400 Landownership

A. Surface Ownership

On a willing seller, willing buyer basis, acquire private inholdings within the wilderness and adjacent to the RNA.

Owners of private lands within the designated wilderness (adjacent to the RNA) shall be assured the right of adequate access.

B. Subsurface Ownership

Acquire subsurface mineral rights through exchange with the State where feasible. Established federal claims on the State Dormant Minerals Act where the law can be applied to free leasable minerals. Acquire subsurface mineral rights in other cases on a willing seller, willing buyer basis.

7100 Engineering Operations

Landline marking if necessary, will use Property Line Marking Standards (FSM 7153.47) Class C (Subdued Visibility).

Marking of the RNA boundary will be done only when and where necessary to protect the area from non-conforming uses. The boundary will be accurately recorded and documented in the RNA Establishment Record.

7300 Buildings

No buildings or other similar structures will be constructed.

7400 Public Health and Pollution Control Facilities

These lands shall not be considered for landfills or waste disposal.

7700 Transportation System

No roads will be provided except those needed to permit access to private lands within the wilderness.

The standards used to construct access roads will be the minimum necessary to provide adequate access and protect wilderness and RNA resource values.

Maintenance on authorized roads will be conducted in a manner that will protect wilderness and RNA resource values.

Motorized equipment and mechanized transport are not permitted except for emergency (life or death) situations, search and rescue, fire suppression, and access to private lands within the wilderness area.

Management Area 8.1.1

Purpose

- To protect areas that contain unique biological, geological, or cultural features for their scientific, educational, and/or biological potential.

Desired Future Condition

A variety of vegetation exists. Terrain may include forested wetlands, inland pools, lakeshores, older forest stands, open wetlands, and other communities. Ecological processes such as natural succession proceed to the extent possible unaltered by human disturbance.

Travel routes are minimized. No roads exist and trails are only maintained to protect RNA features from human traffic.

The environment may be different from that of areas around it. Human activity may be controlled to protect the site. Recreation use is not encouraged, although activities such as hunting, fishing, trapping, and hiking may occur.

Management Prescription

Acres of National Forest System Land - 355 acres
Acres Suitable for Timber Production - None

Standards and Guidelines for Management Area 8.1.1

1600 Information Services

Disseminate public information and education materials related to the RNA to ensure the resource will not be damaged by overuse or by activities compromising its RNA character.

Use all reasonable means to manage visitor use before implementing restrictions.

Educational use may be allowed as long as the use supports, promotes or does not degrade the RNA values, and does not disturb on-going research activities. Educational parties wishing to use the area must receive authorization in advance from the appropriate District Ranger.

Appropriate educational use may be allowed. Visits will be limited to groups of no more than 8 people with no more than one group active in the area at any given time.

1900 Planning

The area will be managed in accordance with the RNA Establishment Record.

Managers planning activities in adjacent areas shall consult these guidelines. Consider size, location, and characteristics of this area so that activities on adjacent lands will not have an adverse effect on RNA values.

Vegetation Management

Allow natural process to determine the composition and distribution of plant species.

Permit vegetation management only to protect RNA values or to protect adjacent property from adverse impacts.

Eliminate or control invasive and nonnative species if they may cause damage to RNA resource values.

All threatened, endangered, sensitive, or rare species shall be protected from activities occurring within the area, including research and educational activities.

2100 Environmental Management

A. Air Quality

Advise the Regional Forester of areas where redesignation to a Class I air-quality area is necessary to protect National Forest System lands.

B. Soil and Water

Erosion caused by human influences will be corrected using hand tools and native, indigenous plant species when natural processes are not sufficient to correct the problem.

2200 Range Management

Allow no grazing by domestic livestock.

2300 Recreation Management

A. Heritage Resources

Activities associated with inventory, evaluation, and protection will be done in a manner that does not adversely affect RNA resource values. On-site interpretation will not be permitted.

B. Transportation

Motorized uses are not permitted except for emergency (life or death) situations, search and rescue, and fire suppression.

C. Recreation Opportunities

Recreation uses, while not encouraged, are allowed when compatible with the protection of RNA values.

Feature semiprimitive non-motorized recreation opportunities.

Site modification is permitted only as needed to protect RNA values , environmental quality, or public heath and safety.

Monitoring will be adopted to measure effects of recreation use on RNA values. Limits of acceptable change standards will be established to evaluate the impact of recreation use on RNA values. Steps will be taken to reduce use if these values are being threatened.

Domestic animals must be on a leash or otherwise confined except while being used for hunting.

Off-road vehicles, including saddle-pack and draft animals, and bicycles are not allowed.

Campfires and collecting of firewood for campfire use is not permitted.

Overnight use is allowed, but may be prohibited if such use threatens RNA values.

D. Trails

Prohibit trails for motorized use.

Prohibit the construction of new trails unless necessary for the protection of RNA values and/or to control human use patterns.

Consider relocation or elimination of existing trails if the use threatens or interferes with RNA values.

Maintain trails to foot travel standards. Reroute or rehabilitate existing trails as necessary to minimize human-caused impacts. When necessary, use hand tools and utilize native, untreated materials in trail reconstruction and maintenance projects.

E. Scenery Resources

The overall desired Visual Quality Objective (VQO) of the RNA is Preservation, which allows for ecological changes only. Since some management practices may be allowed, these practices must meet, at the minimum, a VQO of Retention.

F. Hunting and Trapping

Prohibit use of agricultural products for attracting wildlife.

2400 Timber Management

A. Silvicultural System

Silvicultural systems are not applicable to this management area.

B. Harvest Practice

Commercial timber harvest practices for removal of forest products are not applicable to this management area.

Hazard trees along designated travel routes may be felled but not removed.

C. Other Forest Products

Gathering of miscellaneous forest products (e.g. *Lycopodium* species, birch bark, cones, etc.) for commercial and personal use is prohibited.

2500 Watershed Management

Spring seeps, springs, and other water areas will be protected.

Control human-caused erosion with measures commensurate with soil characteristics, expected use, and with protection of RNA values.

When necessary, utilize native, untreated materials in erosion control projects.

Favor natural healing of disturbed areas.

2600 Wildlife, Fish, and Sensitive Plant Habitat Management

Fish and wildlife management activities will emphasize the protection of natural processes. An exception may be the reintroduction of species extirpated from this area. Decisions regarding the need for reintroduction will be made on a case by case basis by the Regional Forester and Station Director.

The U.S. Fish and Wildlife Service and State of Michigan have responsibility for managing wildlife and fish populations, including threatened, endangered, and sensitive species. Wildlife and fish management activities will be coordinated with area management objectives so as not to adversely impact RNA values.

All threatened, endangered, sensitive, or rare species shall be protected from activities occurring within the area, including research and educational activities.

2700 Land Uses Management

Special uses which do not require fixed improvements or modifications of natural conditions may be considered on a case by case basis. Competitive events are not permitted.

2800 Minerals and Geology

Surface-disturbing exploration for federal mineral is not permitted.

Surface-disturbing exploration for non-federal minerals will consider alternatives to minimize impacts to RNA values.

Sub-surface exploration and extraction for non-federal minerals, oil, or gas may be allowed only when environmental analysis demonstrates the RNA values will not be adversely affected by such activities.

Acquisition of non-federal mineral rights will be pursued on a willing seller/willing buyer basis.

3400 Forest Pest Management

Protection of the RNA from introduced and endemic insects, diseases, plants, and animals is allowed, but only when the values for which the RNA was established are severely threatened over the long term. Decisions regarding the need for action will be made by the Forest Supervisor in consultation with the Regional Forester and Station Director.

4000 Research

Non-manipulative research and monitoring activities are allowed. Activities such as clipping of vegetation, collection of flora and fauna, use of increment borers, flagging, permanent markers to relocate long-term plots, and tree tagging may be allowed but will be reviewed for approval by the Station Director on a case by case basis.

Research and monitoring devices may be installed and operated only when the desired information is essential and cannot be obtained from a location outside the RNA and the proposed device is the minimum tool necessary to accomplish the objective safely and successfully.

Access to this area by scientists external to the Forest Service may be authorized by the appropriate District Ranger through a Letter of Authorization, once the research is approved by the Station Director. Use shall conform to conditions specified in approved study plans or cooperative agreements.

Research parties will be limited to 8 people with no more than 1 group in the area at any given time.

5100 Fire Management

Wildfires will be suppressed. Wildfire suppression tactics will consider the potential damage to RNA and wilderness resource values, visual quality objectives, threatened and endangered species and heritage sites.

Human-ignited prescribed fires are not allowed in this area unless essential for the protection and maintenance of RNA values or to meet other standards and guidelines.

Prescribed natural fire will be allowed if necessary to protect and maintain RNA values or to meet other standards and guidelines AND only after preplanned prescriptions have been developed and approved by the Station Director.

Develop a RNA fire management plan addressing prevention, detection, suppression, and presuppression fuels management based on an analysis of the following:

- Protection of the RNA values.
- Probable fire locations.
- Expected fuel intensities.
- Potential net resource value changes.
- Risk to health, safety, and private developments.

Normal suppression will be accomplished using hand tools. Aerial fire suppression may be used if it is determined that less damage to the RNA values than hand suppression would result. The use of mechanized equipment and vehicles must be approved by the Forest Supervisor and Station Director.

The need and desirability for post-fire community restoration will be determined by the Station Director.

5400 Landownership

A. Surface Ownership

On a willing seller, willing buyer basis, acquire private inholdings adjacent to the RNA.

B. Subsurface Ownership

Acquire subsurface mineral rights through exchange with the State where feasible. Establish federal claims based on the State Dormant Minerals Act where the law can be applied to free leasable minerals. Acquire subsurface mineral rights in other cases on a willing seller, willing buyer basis.

7100 Engineering Operations

Landline marking, if necessary, will use Propserty Line Marking Standards (FSM 7153.47) Class C (Subdued Visibility).

7300 Buildings and Other Structures

No buildings or other similar structures will be constructed.

7400 Public Health and Pollution Control Facilities

These lands shall not be considered for landfills or waste disposal.

7700 Transportation System

No roads will be provided.

Motorized use is prohibited except for emergency situations (life or death), search and rescue, fire suppression, and access to private inholdings.

Appendix 2. Boundary Description for the Horseshoe Bay Research Natural Area

NORTH UNIT:

All that certain tract or parcel of land lying in Parts of Sections 9, 16 & 17, T42N-R03W, Michigan Meridian, Mackinac County, Michigan more particularly described as:
BEGINNING at the Quarter corner common to Sections 9 & 10; thence Westerly and along the east and west quarter line of said Section 9 to a point where said east & west quarter line intersects a line fifty (50) feet distant from and parallel to the centerline of Forest Road (FR) 3900 as it exists on this date; thence Southwesterly and along said line, which is parallel to and fifty (50) feet distant from the centerline of FR 3900, through Sections 9, 16 and 17 to a point where said line intersects a line one quarter mile (1320') distant from and Northerly of the Northern high water mark of the Carp River; thence Easterly, parallel to and one quarter mile (1320') distant from said northerly high water mark, through Sections 17 & 16 to a point on the shore of Lake Huron; thence Northeasterly along said shoreline and through said Section 16 to the line common to Sections 16 & 9; thence Northeasterly and continuing along said shoreline through said Section 9 to the line common to Sections 9 & 10; thence Northerly and along line common to Sections 9 & 10 to the Quarter corner common to said Sections 9 & 10 and the PLACE OF BEGINNING, containing 355 acres, more or less.

SOUTH UNIT:

All that certain tract or parcel of land lying in Parts of Sections 31 & 32, T42N-R03W, Sections 4, 5, 6, 7, 8 & 18, T41N-R03W and Sections 12 & 13, T41N-R04W, Michigan Meridian, Mackinac County, Michigan more particularly described as:
BEGINNING at the corner common to Sections 32 & 33, T42N-R03W and Sections 4 & 5, T41N-R03W; thence Easterly and along the line common to said Section 33, T42N-R03W and Section 4, T41N-R03W to the shore of Lake Huron; thence Southeasterly, Southerly and Westerly along said shoreline through said Section 4 to the line common to Sections 4 & 5, T41N-R03W; thence Westerly and Southerly continuing along said shoreline through said Section 5 to the line common to Sections 5 & 8, T41N-R03W; thence Southeasterly and Westerly continuing along said shoreline through said Section 8 to the line common to Sections 8 & 7, T41N-R03W; thence Northwesterly and Southwesterly continuing along said shoreline through said Section 7 to the line common to Sections 7 & 18, T41N-R03W; thence Southwesterly continuing along said shoreline through said Section 18 to the line common to Section 18, T41N-R03W and Section 13, T41N-R04W; thence Southwesterly continuing along said shoreline through said Section 13 to the intersection of said shoreline and the East and West Quarter line of said Section 13; thence Westerly and along said East and West Quarter line to the Center Quarter corner of said Section 13; thence Northerly and along the North and South Quarter line of said Section 13 to the Quarter corner common to Sections 12 & 13, T41N-R04W; thence Easterly and along the line common to said Sections 12 & 13 to the East Sixteenth corner common to said Sections 12 & 13; thence Northeasterly through said Section 12 to the North Sixteenth corner common to Section 12, T41N-R04W and Section 7, T41N-R03W; thence Northeasterly through said Section 7 to a point on the line common to Sections 6 & 7, T41N-R03W which lies 500 feet Easterly of the Section corner

common to Sections 1 & 12, T41N-R04W and Sections 6 & 7, T41N-R03W; thence Northeasterly through said Section 6 to a point which lies 150 feet South of the line common to Section 6, T41N-R03W and Section 31, T42N-R03W and 3450 feet East of the corner common to T41 & 42N - R03 & 04W; thence Westerly 150 feet south of and parallel to said line common to Section 6, T41N-R03W and Section 31, T42N-R03W a distance of 350 feet; thence North 45 degrees West through Section 6, T41N-R03W and Section 31, T42N-R03W to a point which intersects a line 100 feet distant from and parallel to the centerline of County Road 320, commonly known as the "Ackland Road", as it exists on this date; thence Northeasterly, parallel to and 100 feet distant from the centerline of said County Road 320, through said Section 31 to the centerline of Forest Road (FR) #3168, as it exists on this date; thence Southeasterly and along said centerline of FR #3168 through Sections 31 & 32, T42N-R03W to a point where said centerline intersects the line common to Section 32, T42N-R03W and Section 5, T41N-R03W; thence Easterly and along said line common to said Sections 32 & 5 to the corner common to Sections 32 & 33, T42N-R03W and Sections 4 & 5, T41N-R03W and the PLACE OF BEGINNING, EXCEPTING however therefrom the following parcels: The Southeast Quarter of the Southeast Quarter (SE1/4 SE1/4) and the Southeast Quarter of the Southwest Quarter (SE1/4 SW1/4) of Section 31, T42N-R03W, Government Lot 5 of Section 5 and the Entire Section 8, T41N-R03W, containing 1710 acres, more or less.

BOUNDARY CERTIFICATION

I, William F. Bowman, a licensed Land Surveyor in the State of Michigan hereby certify that the attached boundary description of the Horseshoe Bay Research Natural Area (North Unit and South Unit) was prepared by me from the records of the Hiawatha National Forest and that this description has been checked by me and is correct and consistent to the best of my knowledge and belief.

November 26, 1996

William F. Bowman

William F. Bowman, MI P.L.S.#28406