DESIGNATION ORDER

USDA Forest Service, Eastern Region
Chequamegon-Nicolet National Forest
Eagle River-Florence Ranger District
Forest County, Wisconsin

Rat Lake Swamp-Popple River Headwaters

RESEARCH NATURAL AREA

Designation Order

By virtue of the authority vested in me by the Secretary of Agriculture in accordance with 7 CFR 2.42, 36 CFR 251.23, and 36 CFR Part 219, I hereby establish the Rat Lake Swamp-Popple River Headwaters Research Natural Area. It shall be comprised of 1,568 acres (635 hectares) of land in Forest County, in the state of Wisconsin, on the Eagle River-Florence District of the Chequamegon-Nicolet National Forest, as described in the section of the Establishment Record entitled "Location" [and in the Land and Resource Management Plan for the Chequamegon-Nicolet National Forest map]

Approved by:

Kathleen Atkinson
Regional Forester

5/11/15
Date

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Rat Lake Swamp - Popple River Headwaters

Research Natural Area

Chequamegon-Nicolet National Forest

Forest County, Wisconsin

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, Establishment Record Content, in arriving at this recommendation.

Prepared by: Marjory E. Brzeskiewicz Date: 01/12/2015
Marjory E. Brzeskiewicz, Botanist, Chequamegon-Nicolet National Forest

Draft by: /s/ Dawn Heinbaugh Date: 2005
Dawn Heinbaugh, WI DNR

Recommended by: _____ Date 2/18/15
Joel Skjerven, District Ranger, Eagle River-Florence District

Recommended by: _____ Date 3/17/15
Paul I.V. Strong, Forest Supervisor, Chequamegon-Nicolet National Forest

Concurrence of: Michael T. Rains Date 3/16/15
Michael T. Rains, Station Director, Northern Research Station

TITLE PAGE

United States Department of Agriculture

Forest Service

November 2014

Establishment Record for *Rat Lake Swamp - Popple River Headwaters* Research Natural Area

Chequamegon-Nicolet National Forest, Eagle River-Florence District, Forest County, Wisconsin

Cover photo: Rat Lake (background in photo) and Rat creek are among several surface waters in the vast swamp dominated by conifers and ericad shrubs within Rat Lake Swamp - Popple River Headwaters RNA . (Photo: Mari Dallapiazza 2012)

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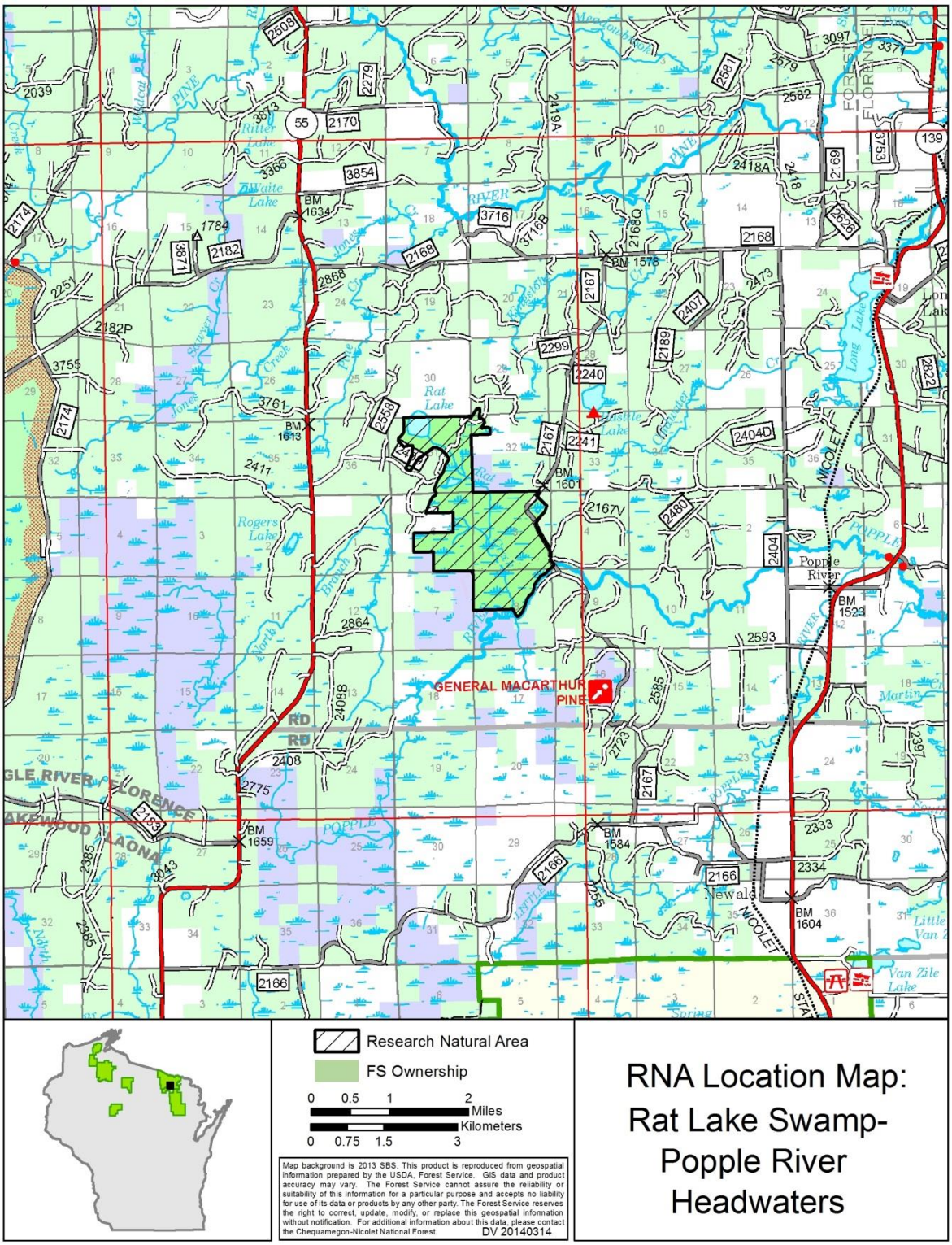
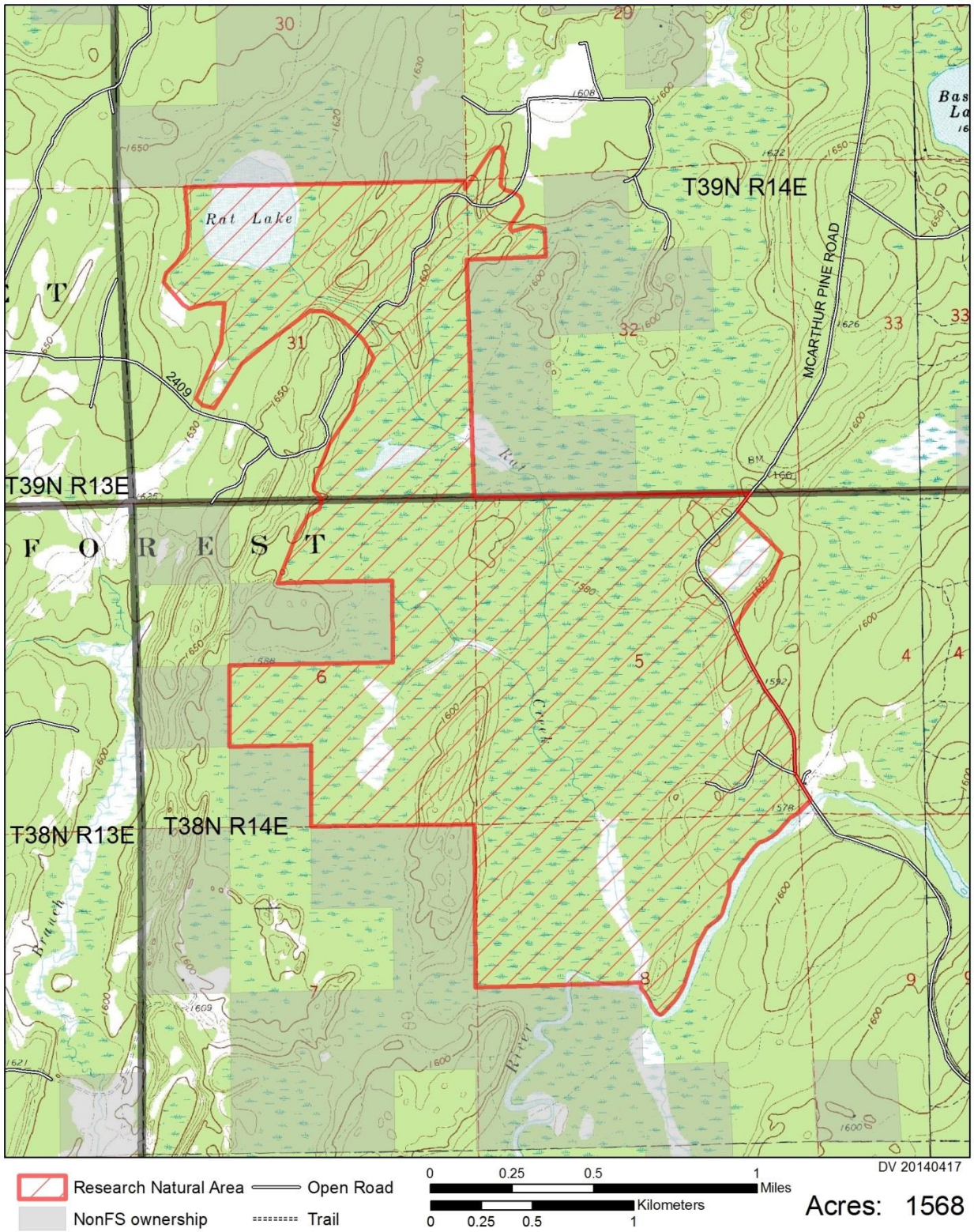
1. IDENTIFICATION SECTION

Location Map

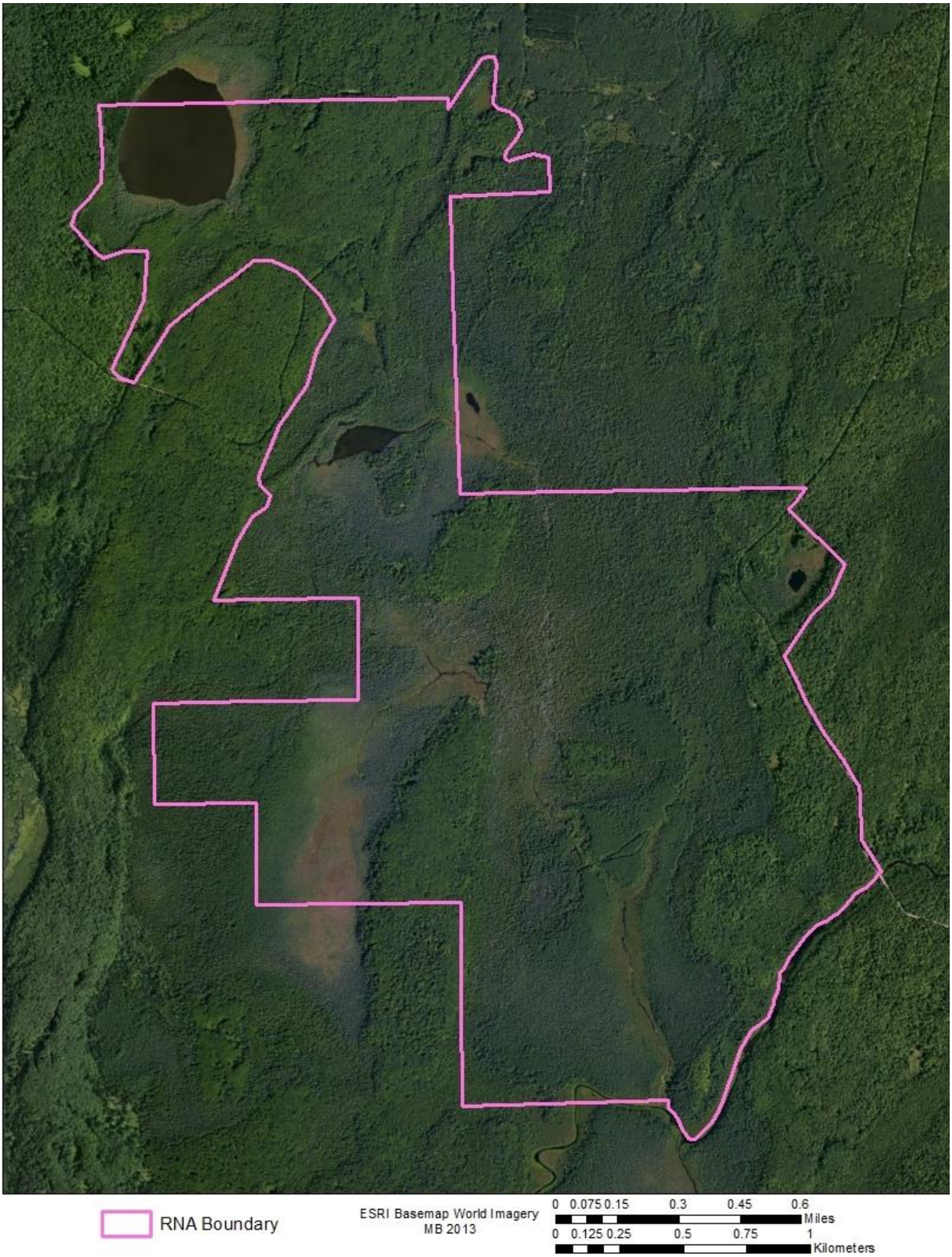


BOUNDARY MAP

RNA Boundary Map: Rat Lake Swamp-Popple River Headwaters



LANDSCAPE OVERVIEW: RAT LAKE SWAMP - POPPLE RIVER HEADWATERS RNA



LEGAL DESCRIPTION

The legal description of Rat Lake Swamp - Popple River Headwaters RNA is attached as Appendix 6. Geographic Information Systems (GIS) data of the perimeter boundary are on file at the Chequamegon-Nicolet National Forest Supervisor's office.

2. ADMINISTRATIVE SECTION

This Establishment Record has been prepared pursuant to Forest Service Manual direction (FSM 4063). Establishment of the Rat Lake Swamp - Popple River Headwaters RNA is documented with a signature page to follow and a Designation Order which is a separate document accompanying this document (FSM 4063.41.2) (USDA Forest Service 2004c).

The Station Director of the Northern Research Station (NRS) in consultation with the Chequamegon-Nicolet Forest (CNNF) Supervisor, Eagle River-Florence District Ranger, and NRS RNA Coordinator(s) will approve and coordinate research conducted in the RNA.

Requests to conduct research are referred to the Station Director, Northern Research Station, who will coordinate a review of the application. The Director or NRS RNA Designate will approve research proposals, and prior to the initiation of any projects, will coordinate the project or activity with the District Ranger. Any plant, animal, vegetation, or soil specimen(s) collected in the course of research conducted in the RNA are to be housed at a location designated by the Forest or approved by the Station Director.

Hard copies of research data files will be maintained in the following offices:

Chequamegon-Nicolet National Forest
1170 4th Avenue South
Park Falls, WI 54552

Station Director
c/o Station RNA Field Representative
Northern Research Station
5985 Highway K
Rhinelander, WI 54501

3. BODY OF ESTABLISHMENT RECORD

a. INTRODUCTION

The Rat Lake Swamp-Popple River Headwaters Research Natural Area (RNA) is located on the Chequamegon-Nicolet National Forest, Forest County on the Eagle River-Florence Ranger District. The 1,568-acre (635 hectares) RNA is located entirely on National Forest Service Land and is approximately 7 miles (11km) southwest of Long Lake, Wisconsin (Identification Section -*Location and Boundary Maps*).

The most important features of Rat Lake Swamp - Popple River Headwaters RNA include extensive areas of open wetland, northern wet forest, transitional wet-mesic forest, most of the shoreline of Rat Lake, Rat Creek, a portion of the Popple River, springs and spring ponds, and several rare plants and animals (Hoffman 1999). The site has very few roads and provides unbroken blocks of interior forest.

Historical Background - American Indian tribes have lived on the lands that make up the CNNF for thousands of years with a long and complex history. They hunted, fished, gathered food, and obtained forest products for shelter, moved plants from other areas, and sometimes used fire to manipulate the land. Many of these practices continue today under reserved treaty rights (treaties of 1837 & 1842) with eleven Ojibwe tribes. The current Sokaogon Ojibwe reservation lies approximately 30 miles (48 km) to the south of the RNA. See Section 4 d.(2) Cultural/Heritage for further explanation of Native American treaty history.

Massive timber harvests in the mid-1800s in northern Wisconsin were followed by large-scale wildfire that was carried by the logging slash. The township (38N-R14E) was surveyed by J. L. Nowlin in 1865 (BCPL 2004). Nowlin's field notes are of interest: "*The Timber in this township is about 2nd rate Hemlock, Sugar, and Birch. Land level and Swampy. Soil 2nd and 3rd rate. No large streams but few lakes. No settlers no roads. Swamps and marshes are irreclaimable.*"

The area containing the RNA became National Forest in the 1930s. Current CNNF data lists the year of origin of many timber stands as pre-1930s. Since then, some upland forests in the site have had timber harvests in the mid-1900s but many have not been cut since the 1890s. Inventories of the site include Forest Service compartment exams (1977), a Natural Heritage Evaluation by CNNF biologist S. Janke (1996) and a survey by DNR ecologist E. Epstein (1989).

Uses -Current land use includes canoeing, hiking, hunting, and fishing. No timber has been cut in the site since before the 1970s.

Ownership & Administration - Rat Lake Swamp - Popple River Headwaters RNA is owned outright by the USDA Forest Service. Administration and protection of the RNA is the responsibility of the Forest Supervisor of the Chequamegon-Nicolet National Forest, or designate. The Eagle River-Florence Ranger District, Chequamegon-Nicolet National Forest, provides protection and maintenance of the area.

Congressionally Designated Areas - Rat Lake Swamp - Popple River Headwaters RNA does not occur within any other administratively or congressionally designated areas. Refer to Appendix 1: *Ecological Evaluation* d. (1) *Research/education use* for an explanation of co-designation as a Wisconsin State Natural Area.

b. JUSTIFICATION SECTION

(1) JUSTIFICATION STATEMENT

The forested wetlands of Rat Lake Swamp-Popple River Headwaters RNA are characteristic of the Land Type Associations (LTA) *Iron River/Argonne Drumlins* and *Argonne Outwash Plains*. The extensive wetland-dominated complex is nearly roadless with access only on the periphery, which provides good interior forest habitat for a number of rare plants and animals, including the state endangered little goblin moonwort (*Botrychium mormo*) (Figure 8).

The RNA includes the upper reaches of the Popple River and designation provides a protected link to an important landscape and river corridor. While the wetlands and wet forest are the dominant plant communities, a small portion of the total RNA is high quality mesic hardwood forest with large, old trees. The eastern hemlock (*Tsuga canadensis*) stands along MacArthur Pine Road are especially significant relative to the surrounding younger hemlock/hardwoods in this part of the state.

(2) PRINCIPAL DISTINGUISHING FEATURES

The principal distinguishing feature of this large site is an extensive wetland complex providing interior forest habitat (Janke 1996). The southern portion borders a section of the Popple River flowing through conifer swamp as well as uplands. The north end contains Rat Lake, a muck-bottomed hard-water seepage lake with a well-developed bog mat on its north and east sides (Epstein 1989).

At the center of the RNA, Rat Creek flows through a mosaic of extensive black spruce-tamarack *(Picea mariana- Larix laricina*) and northern white cedar (*Thuja occidentalis*) swamp. Embedded in these wetlands are drumlinoid hills topped with mature hardwood stands.

Figure 1. A vast wetland of open and semi-open conifer swamp extends the entire length of the Rat Lake Swamp-Popple River Headwaters RNA (photo Mari Dallapiazza 2012)

In the northern portion of the RNA north of a sizable spring pond, a long, narrow glacial esker visible on the *Landscape Overview* (Identification Section) runs northeast/southwest through the site.

At the eastern edge of the site is a high quality bog pond surrounded by an old-growth eastern hemlock and hardwood forest containing a large component of super-canopy white pine (*Pinus strobus*). The RNA supports numerous orchid species, and rare birds and plants (see Section b. (3) *Values*).

(3) OBJECTIVES

Rat Lake Swamp - Popple River Headwaters RNA was recommended for RNA designation in the 2004 Chequamegon and Nicolet National Forest Land and Resource Management Plan (hereinafter referred to as "2004 CNNF Forest Plan") and is incorporated by reference per the page citations that occur in this Establishment Record (USDA Forest Service 2004a pg 3-50). Objectives in the 2004 CNNF Forest Plan state that "RNAs and candidate RNAs (MA8E) and Special Management Areas (MA8F), as well as Old Growth and Natural Features Complexes (MA8G) serve in the role of minimum management requirements, because they cumulatively function as important contributors for sustainable ecosystem management including the provision of a long-term increase in security of species viability and diversity" (USDA Forest Service, 2004c p. 10). These include plant communities that are part of a larger network of ecosystems represented across the region and nation.

Rat Lake Swamp - Popple River Headwaters RNA is one of thirty areas on the CNNF that will be managed to meet the research and educational objectives of the national RNA program. The specific objectives of this RNA are to protect a large wetland complex and surrounding upland forest for genetic diversity and to protect against serious environmental disruptions. It can be used as a reference area for studying of succession or measuring environmental changes. Here succession will occur naturally following community-changing events such as wind throw and beaver flooding.

c. LAND MANAGEMENT PLANNING

The alternative effects on RNA establishment were analyzed and disclosed in the Final Environmental Impact Statement (USDA Forest Service 2004b pg 3-110) and Record of Decision (USDA Forest Service 2004c pg 9). Rat Lake Swamp - Popple River Headwaters RNA is part of a national network of ecological areas designated in perpetuity for research and education, and to provide important components of biological diversity for the CNNF.

The RNAs and candidate RNAs on the CNNF have been assigned to a management prescription (8E) that is consistent with RNA objectives (USDA Forest Service 2004c pg 9). Management Area 8E is characterized by ecologically significant natural features and representative ecosystems. It includes a broad array of community types occurring on the range of landforms and soil types that occur on the Chequamegon-Nicolet National Forest. Plant communities are generally of an older age class and contain all or most species characteristic of that community in the region (Appendix 3 - *Forest Management Area Direction* and USDA Forest Service 2004a pg 3-50).

D. MANAGEMENT PRESCRIPTION

The management prescription for Rat Lake Swamp - Popple River Headwaters RNA is embodied in the management area direction and guidance presented in the 2004 CNNF Forest Plan.

The CNNF has not developed an individual site management plan for this RNA. When developed, such a plan will provide more specific detail of management needs and ensure that the objectives for which the RNA was created are met. In general, the management objectives are to allow natural processes to drive the structure and function of the ecosystems. Any site plans will be coordinated with the state as this is also a State Natural Area and as such has compatible management goals.

The CNNF non-native invasive plant strategy (USDA Forest Service 2009) will detect, manage and prevent invasive plants as RNAs are high priority for monitoring and controlling invasives.

Refer to Appendix 1, section f.(1) *Potential or existing conflicts* to reference unique management issues that should be addressed for this RNA.

e. USE OR CONTROL OF FIRE AND GRAZING

Fire is not generally used as a management tool in wetland and mesic forest community types which comprise much of the RNA. Fire is allowed within RNAs if needed for specific objectives, however, fire has not been identified as a management need.

Occasional wildfires do occur in upland mesic forest in dry years, but they are most often small in size - usually less than one acre (0.4 ha), limited by lack of fuel, and easily suppressed. Spring fires that occasionally occur in wetlands can be as large as 100 acres. Wildfire suppression within the RNA would employ those methods that cause the least disturbance.

There is currently no grazing on the Chequamegon-Nicolet National Forest, nor is grazing allowed in RNAs per 2004 CNNF Forest Plan standard.

Figure 2. A mature stand of northern white cedar and eastern hemlock within Rat Lake Swamp - Popple River Headwaters RNA. [Photo: Steve Janke 1996]

4. APPENDIX 1 ECOLOGICAL EVALUATION

The following ecological evaluation is included as an appendix to the establishment record and tiers to the 2004 CNNF Forest Plan (USDA Forest Service 2004a) and to the Final Environmental Impact Statement (USDA Forest Service 2004b). This evaluation provides the initial baseline information for the Research Natural Area, serves as a source of data for reports on the Research Natural Area program, and provides information to researchers seeking research sites or projects. More specific information on research sites can be obtained from the Forest RNA Coordinator.

A. PHYSICAL SITE DESCRIPTION AND CLIMATIC CONDITIONS

(1) LOCATION

Rat Lake Swamp-Popple River Headwaters RNA is located on the Eagle River-Florence Ranger District of the Chequamegon-Nicolet National Forest, Forest County, in the state of Wisconsin. The RNA's Mercator coordinates are 45º 48' N latitude and 88º 46' W longitude (map datum WGS 84). See Establishment Record Identification Section for *Boundary Certification*, *Location Map* and *Boundary Map*.

(2) SIZE IN ACRES/HECTARES

The RNA is comprised of 1,568 acres (645 hectares).

(3) ELEVATION RANGE

Elevations range from 1,570 feet (479 m) to 1,660 feet (488 m) above sea level. For comparison, the highest elevation in Wisconsin is 1,952 feet (595 m).

(4) ACCESS TO THE SITE

From the intersection of Highway 139 and Settlement Road in Long Lake, drive northwest on Settlement Road 0.2 miles (0.3 km), then north and west on Forest Road (FR) 2168 (Long Lake Rd) 3.7 mile (6 km), then south on FR 2167 (MacArthur Pine Rd) 3.2 miles (5.2 km) into the site. To reach the western portion, continue west on FR 2168 another 3.75 miles (6 km), then south on Highway 55 2.7 miles (4 km), then northeast on FR 2558 0.5 miles (0.8 km), then east on FR 2409 0.7 mile (1 km) to the western boundary (see Location Section maps).

(5) CLIMATIC DATA

The weather station nearest to the Rat Lake Swamp-Popple River Headwaters RNA is Laona 6 SW (station no. 474582 latitude 45 º 31' N, longitude 88º 45' W) (Midwestern Regional Climate Center 2003). The station is about 22 mi (35 km) south of the RNA and experiences the same weather and climate conditions. This station recorded temperature and precipitation data since 1927.

Table 1. Climate Data for Rat Lake Swamp - Popple River Headwaters RNA from 1948 to 2000

Temperature	°F	°C
Mean annual	39.4	4.1
Mean April through September	46.7	8.2
Mean October through March	23.2	-4.9
Average daily maximum	49.5	9.7
Average daily minimum	29.3	-1.5
Record high	100.0	37.8
Record low	-39.0	-39.4
Precipitation	**in**	**mm**
Mean annual rainfall	31.7	805.0
Mean monthly - April through September	2.9	72.6
Mean monthly - October through March	1.8	45.2
Mean annual snowfall	73.5	1867.0

b. ECOLOGICAL DESCRIPTION

Nomenclature for flora follows the USDA PLANTS database (USDA, NRCS. 2012); nomenclature for birds follows AOU Checklist (1983); nomenclature for vertebrates follows Watermolen & Murrell (2001). In Wisconsin, commonly used references for describing ecosystems include Forest Habitat Types (Kotar 2002) and Natural Communities (Curtis 1959).

(1) ECO-REGION (TO THE LOWEST LEVEL OF DETAIL CURRENTLY AVAILABLE).

Rat Lake Swamp-Popple River Headwaters RNA is located in the Laurentian Mixed Forest Province, Northern Highland Section, Subsection Xc Brule and Paint Rivers Drumlinized Ground Moraine of the Ecological Units of the Eastern United States (Cleland et al. 2007). It includes Land Type Associations (LTAs) Xc01 Iron River/Argonne Drumlins and Xc02 Argonne Outwash Plains. LTA Xc02 comprises most of the RNA and especially the centermost area. The northwest and southeast corners are included in LTA Xc01.

(2) PLANT COMMUNITY TYPES

Rat Lake Swamp - Popple River Headwaters RNA is characterized by a predominantly wet area of outwash plain in the center of the complex and drumlinized uplands in the northwest corner and eastern edge (Janke 1996). A series of black spruce and tamarack, mixed conifer, and northern white cedar swamps is drained south and east by Rat Creek into the Popple River. North of the

river, the uplands are generally well-drained and most stands are dominated by pole-sized sugar maple (*See Section b.(3)(A), Table 4 for scientific names*) hardwoods. Throughout the site, drumlin tops and other well-drained uplands are dominated by sugar maple while eastern hemlock and northern white cedar dominate the foot of drumlins as well as poorly drained areas.

Rat Lake (cover photo) is an excellent example of a glacial kettle bog situated in pitted outwash of the Popple River headwaters. The sedge-sphagnum-ericad mat is well-developed and botanically rich (Epstein 1989). Flora includes numerous ericaceous species, orchids, sedges, and insectivorous plants.

Figure 3. Uplands within the RNA support pockets of large-diameter old growth white pine and hemlock. [Photo Linda Parker, 2011]

Surrounding the wetland swamps are pockets of old-growth hemlock and sugar maple forest containing a large component of supercanopy white pine (Figure 3). Trees range from 10 to 24+ inches (25-60 cm) DBH and the oldest trees are well over one hundred years old. The ground flora is well-developed, particularly on the drumlin tops, and includes lycopods (*Lycopodium and Huperzia* spp), wild sarsaparilla, rosy twisted-stalk, northern beech fern, yellow bluebead lily, and mountain wood-sorrel. Richer soils support wild ginger, bloodroot, blue cohosh, and three species of the genus *Botrychium*. The shrub layer is poorly developed, with *Lonicera canadensis* the most common. South of Rat Lake, a narrow esker winds through the site. Portions of this landform are dominated by sugar maple; others by hemlock and white cedar. Very large stumps are still present among the remaining old-growth trees.

Most notable are the numerous rare plants, including the state-endangered little goblin moonwort and viable populations of orchid species present within the RNA. Two populations of swamp pink and boreal bog orchid are known to exist on the private land along the north shore of Rat Lake. The uncommon American ginseng has been located just outside the RNA's boundary and suitable habitat exists within the RNA.

Table 2. Natural vegetation community types within Rat Lake Swamp - Popple River Headwaters RNA using common classification systems for Wisconsin (Curtis 1959 and Kotar et al. 2002) and NGDC (2013)

Community Type (Curtis 1959)	**Habitat Types** (Kotar et al. 2002)	**Dominant Species**	**NVCS Associations** (NGDC 2012)*
Northern mesic forest	ATM/TMC	eastern hemlock, sugar maple, yellow birch	Tsuga canadensis - Acer saccharum - Betula alleghaniensis Forest CEGL005044
Northern mesic forest	ATD/AViO	sugar maple, basswood	Acer saccharum - Betula alleghaniensis - (Tilia americana) Forest CEGL002457
Northern mesic forest	TMC	eastern hemlock, northern white cedar	Tsuga canadensis - (Betula alleghaniensis) Forest CEGL002598 or CEGL005003
Northern wet-mesic forest	N/A	black ash, red maple	CEGL002071 Acer rubrum - Fraxinus spp. - Betula papyrifera / Cornus canadensis Forest
Northern wet-mesic forest	N/A	white cedar, balsam fir	CEGL006007 Thuja occidentalis / Sphagnum
Northern wet-mesic forest	TMC - wet	hemlock, white cedar	CEGL005003 Tsuga canadensis - Betula alleghaniensis Saturated Forest
Northern wet forest	N/A	black spruce, tamarack	CEGL005271 Picea mariana - (Larix laricina) / Ledum groenlandicum / Sphagnum spp. Forest
Alder thicket	N/A	speckled alder	CEGL002381 Alnus incana Swamp Shrubland
Open bog	N/A	leatherleaf, Labrador tea, bog laurel	CEGL005278 Chamaedaphne calyculata - Ledum groenlandicum - Kalmia polifolia Bog Dwarf-shrubland
Northern sedge meadow	N/A	Carex spp	G112 Eastern North American Wet Meadow Group
Lake shallow, hard-water, seepage bog lake - Rat Lake	N/A	not surveyed	not delineated
Stream- slow, hard, cold - Rat Creek	N/A	not surveyed	not delineated
River- slow, medium hard-water , cold -Popple River	N/A	not surveyed	not delineated

* These National Vegetation Classification System associations are initial approximations.

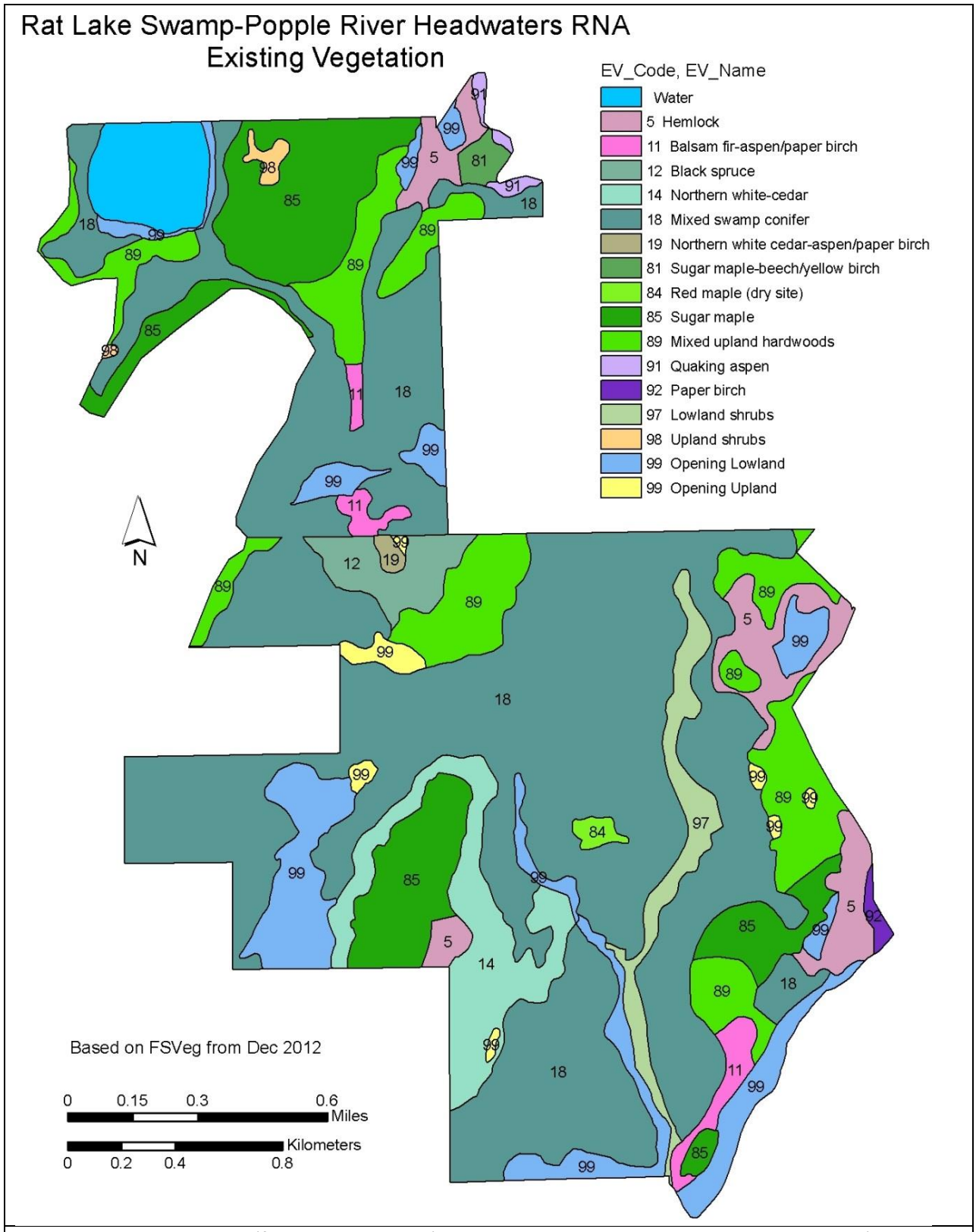


Figure 4. Existing Vegetation (formerly Forest Type) in Rat Lake Swamp - Popple River Headwaters RNA (CNNF data 2012)

Table 3. Existing Vegetation (as dominant tree cover) and area in Rat Lake Swamp - Popple River Headwaters RNA and key to Figure 4 (CNNF data 2012)

EV CODE	Existing Vegetation (EV)	Acres	Hectares
5	Hemlock	66.8	27.1
11	Balsam fir-aspen/paper birch	20.6	8.3
12	Black spruce	27.2	11
14	Northern white-cedar	76	30.8
18	Mixed swamp conifer	805.2	326
19	Northern white cedar-aspen/paper birch	2.8	1.1
81	Sugar maple-beech/yellow birch	6.4	2.6
84	Red maple (dry site)	4.1	1.7
85	Sugar maple	165.8	67.1
89	Mixed upland hardwoods	164.2	66.4
91	Quaking aspen	4.8	1.9
92	Paper birch	3.3	1.3
97	Lowland shrubs	38.3	15.5
98	Upland shrubs	4.4	1.8
99	Opening Lowland	125.3	50.7
99 yellow	Opening Upland	12.5	5.2
blank blue	Water	40.1	16.2
Grand Total		1567.8	634.7

(3) DESCRIPTION OF THE VALUES OF THE RESEARCH NATURAL AREA.

Numerous rare plants and animals are protected in this RNA, including several state-listed species. The botanically-rich forested wetlands, the wild creek and river, and old-growth upland forest offer an exceptional opportunity for ecological research.

(A) FLORA LIST

Table 4. Flora of Rat Lake Swamp - Popple River Headwaters RNA (names: USDA PLANTS 2012) from Janke 1996

Rat Lake Swamp - Popple River Headwaters Vascular Plant List	
Scientific name	Common name
Abies balsamea	balsam fir
Acer rubrum	red maple
Acer saccharum	sugar maple
Agrostis gigantea	redtop
Alnus incana	speckled alder
Andromeda glaucophylla	bog rosemary
Anemone quinquefolia	wood anemone
Aralia nudicaulis	wild sarsaparilla
Arethusa bulbosa	swamp pink

Rat Lake Swamp - Popple River Headwaters Vascular Plant List	
Scientific name	Common name
Arisaema triphyllum	jack-in-the-pulpit
Asarum canadense	wild ginger
Athyrium filix-femina	lady fern
Betula alleghaniensis	yellow birch
Betula papyrifera	paper birch
Botrychium virginianum	rattlesnake fern
Botrychium matricariifolium	daisy-leaved grapefern
Botrychium mormo	little goblin moonwort

Rat Lake Swamp - Popple River Headwaters Vascular Plant List	
Scientific name	Common name
Calla palustris	wild calla
Caltha palustris	marsh marigold
Carex brunnescens	sedge
Carex chordorrhiza	cord-root sedge
Carex crinita	fringed sedge
Carex disperma	two-seeded sedge
Carex intumescens	swollen sedge
Carex lasiocarpa	wooly-fruit sedge
Carex oligosperma	few-seeded sedge
Carex pauciflora	few-flowered sedge
Carex rostrata	beaked sedge
Carex tenuiflora	sparse-flowered sedge
Carex trisperma	three-seeded sedge
Caulophyllum thalictroides	blue cohosh
Chamaedaphne calyculata	leatherleaf
Chrysosplenium americanum	golden saxifrage
Cirsium palustre	European swamp thistle
Clintonia borealis	yellow blue-bead lily
Coptis trifolia	goldthread
Cornus canadensis	bunchberry
Cornus stolonifera	red-osier dogwood
Cypripedium acaule	pink lady's-slipper
Cypripedium reginae	showy lady's-slipper
Drosera rotundifolia	round-leaved sundew
Dryopteris carthusiana	spinulose wood fern
Equisetum sylvaticum	woodland horsetail
Eriophorum alpinum	alpine cotton-grass
Eriophorum vaginatum	tussock cotton-grass
Fraxinus nigra	black ash
Galium trifidum	small bedstraw
Galium triflorum	sweet-scented bedstraw
Gaultheria hispidula	creeping snowberry
Glyceria canadensis	rattlesnake grass
Glyceria striata	fowl manna grass
Goodyera repens	rattlesnake plantain
Gymnocarpium dryopteris	oak fern
Ilex mucronata	mountain holly
Iris versicolor	wild blue flag
Kalmia polifolia	bog laurel
Larix laricina	tamarack
Ledum groenlandicum	labrador tea
Linnea borealis	twinflower
Liparis loeselii	fen orchid
Listera cordata	heart-leaf twayblade
Lonicera canadensis	American fly honeysuckle

Rat Lake Swamp - Popple River Headwaters Vascular Plant List	
Scientific name	Common name
Lycopodium annotinum	stiff clubmoss
Lycopodium clavatum	running clubmoss
Lysimachia terrestris	swamp candles
Lysimachia thyrsiflora	swamp loosestrife
Maianthemum canadense	Canada mayflower
Menyanthes trifoliata	bog buckbean
Mitella nuda	naked miterwort
Moneses uniflora	one-flowered pyrola
Monotropa uniflora	indian pipe
Osmunda cinnamomea	cinnamon fern
Osmunda regalis	royal fern
Oxalis montana	mountain wood-sorrel
Panax quinquefolius	ginseng
Picea glauca	white spruce
Picea mariana	black spruce
Pinus resinosa	red pine
Pinus strobus	white pine
Platanthera clavellata	small green wood orchid
Platanthera dilatata	boreal bog orchid
Platanthera hyperborea	northern green orchid
Pogonia ophioglossoides	rose pogonia
Populus tremuloides	trembling aspen
Potentilla palustris	marsh cinquefoil
Pryola secunda	one-sided pyrola
Pteridium aquilinum	bracken fern
Rhynchospora alba	white beak-rush
Ribes cynosbati	eastern prickly gooseberry
Ribes hudsonianum	black current
Rubus pubescens	dwarf red raspberry
Rubus strigosus	wild red raspberry
Sagittaria latifolia	common arrowhead
Salix pedicellaris	bog willow
Sanguinaria canadensis	bloodroot
Sarracenia purpurea	pitcher plant
Scheuchzeria palustris	arrow-grass
Scirpus cyperinus	wool-grass
Scutellaria galericulata	marsh skullcap
Sium suave	water-parsnip
Smilacina trifolia	false solomon's seal
Spirea tomentosa	steeplebush
Stellaria longifolia	chickweed
Streptopus lanceolatus v. longipes	twistedstalk
Thelypteris phegopteris	beech fern
Thuja occidentalis	northern white cedar
Trichophorum alpinum	alpine cotton-grass
Trientalis borealis	American starflower
Tsuga canadensis	eastern hemlock

Rat Lake Swamp - Popple River Headwaters Vascular Plant List	
Scientific name	Common name
Typha latifolia	broad-leaf cat-tail
Utricularia intermedia	flat-leaved bladderwort
Vaccinium angustifolium	early low blueberry
Vaccinium macrocarpon	cranberry

Rat Lake Swamp - Popple River Headwaters Vascular Plant List	
Scientific name	Common name
Vaccinium myrtilloides	velvet-leaf blueberry
Vaccinium oxycoccus	small cranberry

(B) FAUNA LIST

There has been no comprehensive inventory of fauna within the RNA. Fish of the Popple River include brook trout (*Salvelinus fontinalis*), fifteen species of forage fish, and black bullhead (*Ameiurus melas*) (Steuck and Andrews 1976). Waterfowl observed by CNNF ecologists using the lake and surrounding wetlands include mallard (see Table 5 for scientific names), American black duck, and common merganser.

Nicolet Breeding Bird Survey sites number 802, 559, 560, and 546 are located within the RNA (Nicolet BBS 2004). These sites have been biannually surveyed since 1988 to document breeding birds. A high number of birds associated with boreal habitats are found here. Information on this on-going survey can be obtained from the CNNF RNA coordinator.

Table 5. Avi-Fauna of Rat Lake Swamp - Popple River Headwaters RNA (Nicolet Breeding Bird Survey 2004; Janke 1996

Rat Lake Swamp - Popple River Headwaters Bird List	
Common Name	Scientific Name
Ruffed grouse	*Bonasa umbellus*
Pileated woodpecker	*Dryocopus pileatus*
Least flycatcher	*Empidonax minimus*
Winter wren	*Troglodytes troglodytes*
Hermit thrush	*Catharus guttatus*
Wood thrush	*Hylocichla mustelina*
Veery	*Catharus fuscescens*
Northern parula	*Parula americana*
Chestnut-sided warbler	*Dendroica pensylvanica*
Mourning warbler	*Oporornis philadelphia*
Scarlet tanager	*Piranga olivacea*
Rose-breasted grosbeak	*Pheucticus ludovicianus*

Rat Lake Swamp - Popple River Headwaters Bird List	
Common Name	Scientific Name
White-throated sparrow	*Zonotrichia albicollis*
Mallard	*Anas platyrhynchos*
American black duck	*Anas rubripes*
Common merganser	*Mergus merganser*
Osprey	*Pandion haliaetus*
Yellow-bellied flycatcher	*Empidonax flaviventris*
Gray jay	*Perisoreus canadensis*
Boreal chickadee	*Poecile hudsonica*
Philadelphia vireo	*Vireo philadelphicus*
Black-throated blue warbler	*Dendroica caerulescens*
Connecticut warbler	*Oporornis agilis*
Nashville warbler	*Vermivora ruficapilla*

(C) GEOLOGY

The geology of northern Wisconsin was shaped by long periods of cooling climate and expansion of glaciers; the last expansion is known as the Wisconsin Glaciation. This glacial advance began about 26,000 years ago when the Laurentide Ice Sheet spread across the continent. As this glacier retreated, till deposition and glacial melt-water formed an irregular landscape of hills pocked with depressions that later became lakes and wetlands (WGNHS 2011).

Bedrock of the RNA includes igneous, metamorphic, and volcanic rock (WI DNR 2003). Bedrock is between 50 and 5 feet of the land surface. Geomorphologic processes include till deposition and glacial meltwater deposition. Several prominent glacial eskers rise 50 feet (15 m) or more above the surrounding level wetlands (Figure 5).

(D) SOILS

The soils of Rat Lake Swamp-Popple River Headwaters RNA are heterogeneous and include the Padus, Carbondale, Goodman, Greenwood, and Stambaugh series (USDA NRCS 2003).

The majority of lowlands contain Carbondale mucks. These are very poorly drained soils formed in organic deposits in depressions on till plains, outwash plains and lake plains. The center of the RNA is comprised of Greenwood mucks. Vegetation is predominantly sphagnum, cedar, and alder.

The Goodman series consists of well-drained soils formed in eolian deposits and in the underlying sandy loam or loamy sand glacial till. The surface is silt loam.

Padus soils are moderately well-drained in loamy deposits over sand and gravel on outwash plains and stream terraces.

Stambaugh soils consist of well-drained soils formed in silty sediments moderately deep over gravelly sand on outwash plains and terraces. Common vegetation is primarily second growth sugar maple, yellow birch, American basswood, eastern hemlock, and eastern white pine.

(E) TOPOGRAPHY

Much of the site is level swamp at approximately 1,570 feet (478 m) above sea level. See Identification Section: *Boundary Map* showing 10-foot contour intervals. The uplands are undulating pitted and unpitted outwash plain between drumlin ridges with some areas of drumlinized uplands. These glacial deposits rise steeply in places and several prominent glacial eskers occur (Figure 5). These eskers occur in the northern portion of the RNA north of the spring pond. Their sinuous form is recognizable in the *Landscape Overview* satellite photo in the Identification Section.

Figure 5. An esker slope within the RNA supports large-diameter hemlock and white pine (Photo: Steve Janke 1996)

(F) AQUATIC/RIPARIAN

This RNA protects an important headwater area of the Popple River. A tributary to the Pine River, the Popple River is a designated State Wild River and a Class IIA and III trout stream (WI DNR 2013a). The Popple River is also designated a candidate Scenic River (MA 8D) in the 2004 CNNF Forest Plan. Rat Lake in the northwest corner of the RNA is a shallow, 47-acre bog lake with wetlands surrounding most of its shoreline. Rat Creek is a slow-moving shallow creek that drains from Rat Lake south about three miles (5 km) into the Popple River on the southern boundary of

the RNA (WI DNR 2013a). Several spring ponds occur in this extensive wetland community. A small, high quality bog pond is included within on the east side of FR 2167.

(G) RARE, THREATENED, ENDANGERED, OR SENSITIVE SPECIES

Table 6. Threatened, endangered, and unique species in Rat Lake Swamp - Popple River Headwaters RNA; the State status, the Natural Heritage Rank, Global Rank, and CNNF Regional Forester Sensitive Species status (if applicable)

Common Name	Scientific Name	State Status, Heritage Rank, GlobalRank[1] ; RFSS listing (if appl)
Animals		
Osprey	*Pandion haliaetus*	SC/M S4B G5
Yellow-bellied flycatcher	*Empidonax flaviventris*	SC/M S3S4B G5
Gray jay	*Perisoreus canadensis*	SC/M S3B G5
Boreal chickadee	*Poecile hudsonica*	SC/M S2S3B G5
Wood thrush	*Hylocichla mustelina*	SC/M S4B G5
Veery	*Catharus fuscescens*	SC/M S3S4B G5
Philadelphia vireo	*Vireo philadelphicus*	SC/M SUB G5
Black-throated blue warbler	*Dendroica caerulescens*	SC/M S3B G4
Connecticut warbler	*Oporornis agilis*	SC/M S2S3B G4 ; R9 Sensitive
Plants		
Little goblin moonwort	*Botrychium mormo*	END S1S2 G3 ; R9 Sensitive
Showy lady's-slipper	*Cypripedium reginae*	SC S4 G4
Sparse-flowered sedge	*Carex tenuiflora*	uncommon (formerly state listed)

[1] see Appendix 4: *Wisconsin Natural Heritage Working List – Rank Definitions*

(H) LIST OF RARE ELEMENTS AND RARE PLANT COMMUNITIES

Of the natural communities within the RNA (Table 2), the Wisconsin Natural Heritage Inventory ranks *northern sedge meadow* community as S3, rare or uncommon in Wisconsin and G4: globally uncommon but not rare. The rest of the natural communities within the RNA listed in Table 2 are ranked as S4 (apparently secure in Wisconsin) or higher or are currently "unrankable". Globally they are either G4 or "not ranked" (WI DNR 2012).

c. RESOURCE INFORMATION

This section discusses resources that occur in the RNA framed *within the context of potentially conflicting uses*. Rat Lake Swamp - Popple River Headwaters RNA is owned outright by the United States government and is administered by the USDA Forest Service, Chequamegon-Nicolet National Forest.

(1) MINERALS

Outstanding, and Federal-owned minerals are open to hardrock prospecting within the Research Natural Area (Table 7) and the Forest Service must allow access to the surface to the mineral owner. The state of the knowledge of the bedrock geology and where actual ore bodies may be

found (if they exist and are commercial) is not precise enough to assign relative probability of prospecting activity within the county (Knight pers comm 2013). Mineral ownership does not preclude use of the site for research but if prospecting took place disturbance to localized areas would occur.

To date there has been no bedrock core drilling activity on the Eagle River-Florence District. There are currently no active prospecting permits within the RNA.

Table 7. Mineral resource ownership within the Rat Lake Swamp - Popple River Headwaters RNA (CNNF Forest data)

Township-Range	Section	Acres*	Hectares	Mineral ownership	Comments
38N 14E	5	590 (all)	239	Outstanding	
	6, 8	all		Federally owned	
39N 14E	31	110	45	Outstanding	Balance of acres Federal owned
	32	all		Federally owned	

Definitions:

Outstanding: Third party (mineral rights were not owned by the surface land owner when the land was sold to the National Forest) mineral ownership rights are described in deed and State Law. Forest Service must allow access to the surface to the mineral owner.
Federally owned: Mineral estate is administered by Bureau of Land Management and are open for prospecting.
All: Means the total acreage within the RNA boundary in that section.
Balance: Means the remaining acreage minus the listed acres within the RNA boundary in that section.
***Acres**: This represents only a rough estimate of the number of acres within the proposed RNA boundary. Mineral ownership acreage is estimated because RNA boundaries are meander lines and mineral ownership is a legal description.

(2) GRAZING

There is no grazing on the Chequamegon-Nicolet National Forest. The 2004 CNNF Forest Plan includes a standard that prohibits grazing in Research Natural Areas (Appendix 3 -*Forest Management Area Direction*).

(3) PLANTS (INCLUDING TIMBER AND SPECIAL FOREST PRODUCTS)

Of the 1,347 acres (545 ha) listed in Table 3 that are forested, seventy three percent are of types that are not typically harvested on the CNNF due to regeneration problems and other concerns. The remaining twenty seven percent are of forest types that are managed for timber elsewhere. There are no outstanding timber rights on any of the tracts in the RNA, nor are there any special use permits outstanding.

The 2004 CNNF Forest Plan includes a guideline that prohibits gathering Special Forest Products for personal use or commercial sale within RNAs (USDA Forest Service 2004a pg 3-50). When the CNNF issues a permit to gather products such as club moss or firewood, the permittee is provided with a map of areas, including RNAs, which are off-limits to harvesting. The CNNF supplement to the Forest Handbook (FSH2409.18) states that "gathering small amounts of fruit, nuts, berries, and fungi (mushrooms) for personal use is allowed" in RNAs.

Rat Lake Swamp - Popple River Headwaters RNA at the time of establishment is not designated as an Ojibwe Tribal RNA (Tribal-USDA MOU) which would limit tribal gathering. The CNNF is

continuing to work with the Tribes to protect these unique features and to provide for the exercise of treaty-reserved hunting and gathering rights. See Section d.(2) -*Cultural/Heritage* for further discussion.

(4) WATERSHED VALUES

The large swamp protects a portion of the headwaters of the Popple River. The Popple River is a state designated Wild River and is eligible for federal listing as a Wild and Scenic River (USDA Forest Service 2004a). The wetlands throughout the site are of high quality and little-disturbed except for a few old logging roads that are heavily grown over.

Figure 6. Rat Creek winds through both wooded areas and open marsh as it drains south into the Popple River (Photo: Steve Janke 1996)

Flowing through the middle of the RNA is Rat Creek (Figure 6), a cold hard-water stream that drains from Rat Lake in the northern-most part of the RNA about three miles (5km) south through both forest and open marsh to the Popple River. The RNA protects this corridor.

(5) RECREATION USE

The Popple River on the southeast boundary of the RNA is designated as a Wild and Scenic River. The RNA protects the scenic and recreational values of the area for canoeists, kayakers, anglers, hikers, and other low impact recreational users. Hunting and fishing are popular in the area and are compatible with RNA designation. Operation of all-terrain vehicles is not allowed in the RNA but has occurred in the past and has caused some damage. The 2004 CNNF Forest Plan prohibits recreational use that threatens or interferes with the objectives or purposes for which the RNA was established. The District Ranger is responsible for monitoring and alleviating resource damage.

(6) WILDLIFE

Wildlife habitat is protected within this large tract allowing natural processes to occur without manipulation. Species valued for sport hunting and fishing will thrive in their native habitat. The CNNF is concerned about bat viability. According to CNNF bat expert Brian Heeringa, seven species of bats inhabit northern Wisconsin and all (even cave-dwellers) rely at one time or another on a matrix of older forests and water such as Rat Lake Swamp - Popple River Headwaters RNA provides. Large trees in older forests with open understory are more often selected, and bats

especially rely on deep tree cavities, loose bark, and lightning strike crevices for roosts. Because of the ephemeral nature of such structures, natural successional changes are provided by RNAs over time. This RNA has had no specific surveys for bats so it is not known if bats occur here but they are known to occur in this part of the state. Wisconsin pro-actively listed three bat species in 2010 as threatened due to the invasive fungus that causes death from *white nose syndrome* (WI DNR 2013b). These same three bats were listed as Regional Forester Sensitive species for the CNNF: little brown myotis (*Myotis lucifugus*), northern long-eared myotis (*Myotis septentrionalis*), and tri-colored bat (*Perimyotis subflavus*).

(7) TRANSPORTATION/ROAD SYSTEM

Forest Road 2167 (McArthur Pine Road) passes through a small portion of the RNA on the eastern edge and crosses the Popple River. Another improved road (Forest Road 2409) south of Rat Lake is open to highway legal vehicles (USDA Forest Service 2012) and allows access to private lands. There are no plans to close either of these system roads. Old logging roads and skidder trails used in the 1930s are heavily grown over and should not be a management concern. No new roads or trails are planned. The current rule guiding motorized access is contained in the Travel Management Project Decision Notice via a Motorized Vehicle Use Map (MVUM) for 2012 (USDA Forest Service 2012) which shows roads available for motorized use. There is a short portion of a road depicted on the MVUM in Section 5 as 2167J and is an open system road that dead ends within a swamp in the RNA.

d. HISTORICAL INFORMATION

(1) RESEARCH/EDUCATION USE AND INTEREST: HISTORY OF ESTABLISHMENT

Research/Education Use:

There are four sites of the long-term Nicolet Breeding Bird Survey (Howe and Roberts 2005) within the RNA (#802, 559, 560, and 546). The Wisconsin Department of Natural Resources gathered baseline data on the RNA for a peatlands study related to climate change (Anderson et al 2006).

History of establishment:

The CNNF began a forest-wide ecological inventory to identify high quality ecological features in the early 1990s (Parker 1999). Rat Lake Swamp - Popple River Headwaters was one of the highest ranking sites based on its ecological values. It was assigned a high conservation priority and deferred from management activity. About the same time, the Eastern Region and Northern Research Station undertook a gap analysis of high-quality examples of alliances (ecological communities) within each subsection (Tyrrell et al 2000). This site filled a cell in that gap analysis.

The Natural Heritage Inventory Section of the Bureau of Endangered Resources (Wisconsin DNR) worked closely with Forest ecologists in evaluating this site, making numerous field visits and assisting with ecological inventory and evaluation. They completed a *Site Evaluation* and recommended this area for protection (Hoffman 1999). CNNF Plant Ecologist Steven Janke completed a thorough ecological evaluation of the site in 1996 and discovered or verified the rare species listed in Table 6 (Janke 1996).

The Wisconsin Department of Natural Resources was also interested in achieving ecosystem representation within the State Natural Area Network (WI DNR 2011). They signed a Memorandum of Understanding (MOU) in 2008 with the CNNF to co-designate all current and future RNAs and CNNF Special Management Areas (SMAs) as State Natural Areas. This designation does not restrict the goals of research and education for the site.

The Rat Lake Swamp - Popple River Headwaters site was identified as a Candidate RNA in the Draft CNNF Forest Plan and analyzed in the Environmental Impact Statement. It was recommended for designation as a Research Natural Area in the Land and Resource Management Plan Record of Decision (USDA Forest Service 2004c).

A 2008 region-wide analysis was conducted in conjunction with the Northern Research Station to evaluate all candidate RNAs in the Eastern Region. Based on this analysis, the Eastern Regional Office recommended Rat Lake Swamp - Popple River Headwaters for establishment.

(2) CULTURAL/HERITAGE

Cultural sites recorded in Rat Lake Swamp-Popple River Headwaters RNA include a prehistoric contact site (US Forest Service 2003b). Various Native American tribes have lived in Wisconsin over many millennia. The current Sokaogon Ojibwe reservation lies approximately 30 miles (48 km) to the south of the RNA.

While other Indian tribes currently live in Wisconsin Ojibwe tribes specifically retained the right to hunt, fish, and gather on lands that make up the CNNF through a series of session treaties. The Forest Service (and Eastern Region, Northern Research Station and USFS Law Enforcement) recognizes treaty rights through a "Memorandum of Understanding" with eleven sovereign and federally recognized tribes of Ojibwe Indians (Tribal-USDA MOU). Today, these treaty rights are being exercised by Ojibwe Indian tribes under rules promulgated and enforced by the tribes. One of these rules recognizes twelve existing RNAs on the CNNF as "Tribal Research Natural Areas" because it is important to protect the unique features that these areas provide. The rule prohibits gathering in Tribal RNAs except for tribally-permitted ceremonial use.

At the time of establishment Rat Lake Swamp - Popple River Headwaters RNA has not been adopted as an Ojibwe Tribal RNA; tribal members will follow the gathering regulation in the MOU here. The CNNF is continuing to work with the Ojibwe Tribes to protect these unique features and to provide for the exercise of treaty-reserved rights. Upon establishment, the Tribes will have an opportunity to also designate it as a Tribal RNA (Tribal-USDA MOU). The 2004 CNNF Forest Plan includes an objective (USDA Forest Service 2004c p. 1-7) that "nothing in this Forest Plan or its implementation (i.e. establishing the RNA) is intended to modify, abrogate, or otherwise adversely affect tribal reserved or treaty guaranteed rights applicable within the CNNF".

(3) DISTURBANCE HISTORY

Timber was harvested as recently as the mid-1900s throughout the RNA. There are pockets of old growth white pine and hemlock that date back to the late 1800s (CNNF stand data). All upland stands show various degrees of past management intensity dating back to the 1930s and 1940s. Some stands are pole size hardwoods with a relatively intact groundlayer and some stands are managed for big trees and have a dense layer of sugar maple saplings. Hemlock stands are less

disturbed and have good gradients to wetlands. Most of the upland stands along the Popple River have been heavily managed in the past.

Balsam fir stands have been greatly affected by spruce budworm. Other components of the natural disturbance regime include individual tree throw and infrequent larger scale blowdown, infrequent low-intensity fire, insect damage, and beaver flooding.

Old roads and logging skid trails are mostly grown over with brush and small trees (Janke 1996). Some damage from illegal use of all-terrain vehicles has occurred recently within the RNA and will be stopped.

(4) OCCURRENCE OF EXOTIC SPECIES

The CNNF has developed an invasive plant strategy (USDA Forest Service 2009) that utilizes adaptive pest management to discover, prioritize, and control non-native invasive plants wherever they occur. The following species occur within the RNA: European swamp thistle (*Cirsium palustre*), common St. Johns-wort (*Hypericum perforatum*), and reed canary-grass (*Phalaris arundinacea*). European swamp thistle is a high priority species and control work on the one patch was started in 2009 (Janke pers comm). Current information on occurrences or treatment methods is available from the RNA coordinator.

e. OTHER INFORMATION

(1) ANY PERMANENT RESEARCH PLOTS AND/OR PHOTO POINTS

There are four permanent birding points within the RNA that are marked with posts and the gps coordinates are recorded. Information on these can be obtained from the CNNF RNA coordinator.

The Station Director shall establish and maintain a system for archiving data and reports from the RNA in a manner that will facilitate the exchange and transfer of information among Stations and scientists. Research data files are maintained by the following office: Chequamegon-Nicolet National Forest, 1170 Fourth Avenue South, Park Falls WI 54552.

Plant collections will be housed at a herbarium located at the University of Wisconsin-Madison Herbarium or a place approved by the Station Director. All animal specimens collected in the course of research will be properly preserved and maintained within the Chequamegon-Nicolet National Forest Supervisor's office or a designated university.

(2) BIBLIOGRAPHY

A listing of citations used in this document, useful references, reports, and journal articles that resulted from study within this RNA are listed in Appendix 2 – *Bibliography.*

(3) POTENTIAL RESEARCH TOPICS

The area is suited for a range of ecological studies and much information is lacking in the CNNFs data about the site. Topics of study: wetland ecology, climate change, declining bird species

associated with boreal habitats, peatlands, rare plants, amphibians, bryophytes, and insects. A survey of bats has not been done and is desirable due to their declining numbers from "white-nose syndrome" that is spreading in North America.

The Northern Research Station along with the Chequamegon-Nicolet National Forest shall encourage the use of this RNA by scientists and educators. This site has been co-designated by the State of Wisconsin as a State Natural Area and as such appears on their web site (WI DNR 2012).

f. EVALUATION OF SPECIFIC MANAGEMENT RECOMMENDATIONS ON THE RESEARCH NATURAL AREA

(1) POTENTIAL OR EXISTING CONFLICTS; PRINCIPAL MANAGEMENT ISSUES

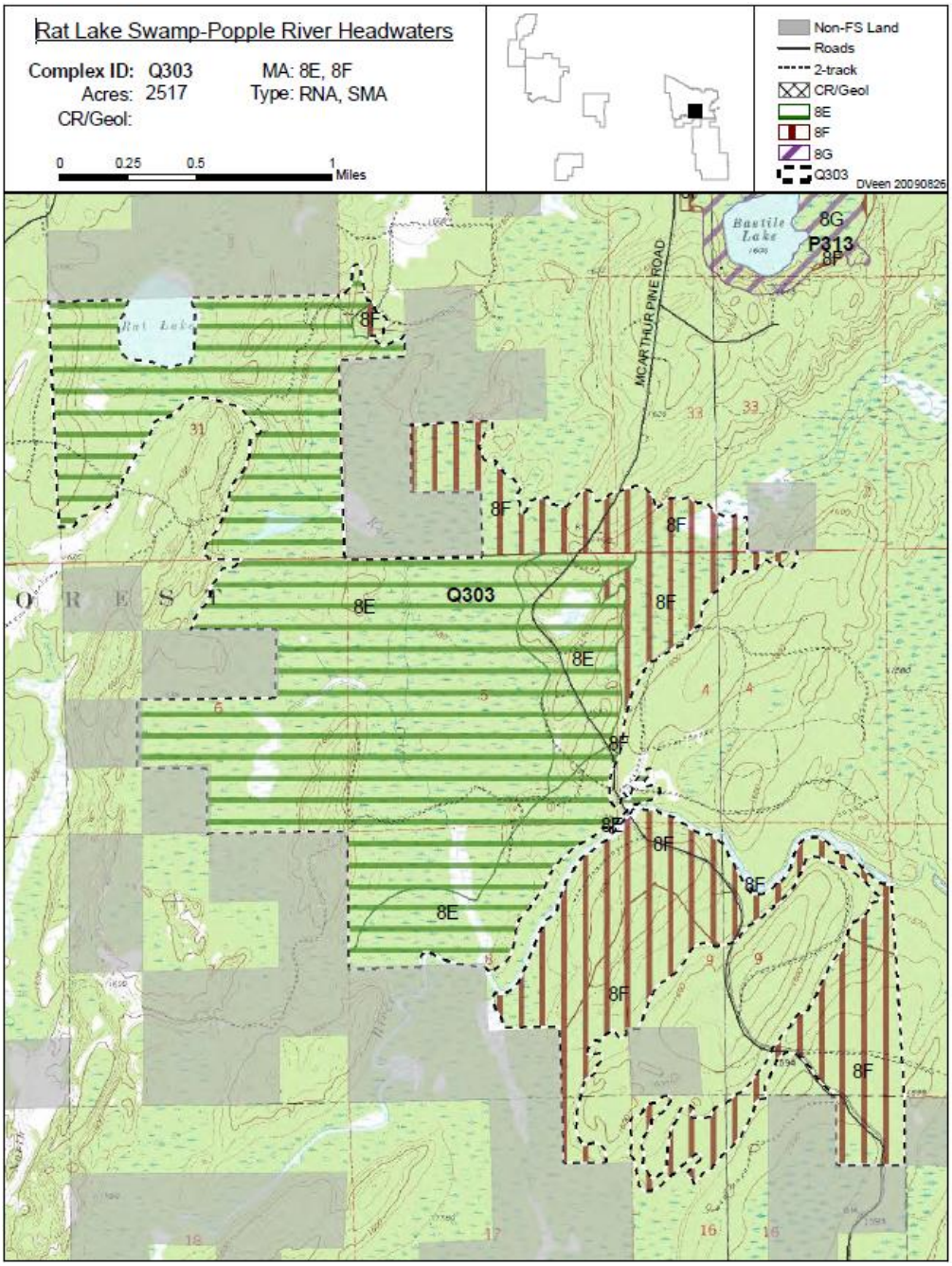
The district ranger will need to monitor and prevent illegal off road vehicle use. Non-native invasive plants should be controlled using the integrated pest management protocol found in the CNNF invasive plant strategy.

Federal lands surrounding Rat Lake Swamp-Popple River Headwaters RNA are designated for either *Uneven-aged Northern Hardwoods* 2A (a small portion on the east side) or *Uneven-aged Northern Hardwoods: Hardwood-Early Successional* 2C (west and northeast) in the 2004 CNNF Forest Plan. There may be conflicts between the management prescriptions of these two adjacent areas, which will need to be considered and addressed on an individual project basis. Buffer zones could be created that employ long rotations for timber harvest. The district ranger in consultation with the Forest Supervisor and RNA coordinator will work out conflicts.

The Popple River that forms the southeast boundary of the RNA is in CNNF Management Area 8D: *Eligible Wild/Scenic Rivers*. MA 8D is compatible with RNA designation. The Rat Lake Swamp Special Management Area (MA 8F) borders the RNA to the southeast and east (Figure 7) and enhances the protection of the RNA.

Two miles (3.2 km) of the western boundary and 1 mile (1.6 km) of the northeastern boundary is owned by the State of Wisconsin Board of Commissioners of Public Lands (BCPL) (the lavender colored blocks on the *Location Map* in the Identification Section). These are state-managed school trust lands.

Approximately two miles of privately-owned land borders the RNA (white blocks on the *Location Map*). Possible conflicting management is unknown for private lands bordering the site.


Rat Lake Swamp-Popple River Headwaters
Complex ID: Q303
Acres: 2517
CR/Geol:
MA: 8E, 8F
Type: RNA, SMA
0 0.25 0.5 1 Miles
Non-FS Land
Roads
2-track
CR/Geol
8E
8F
8G
Q303
DVeen 20090826
Bastile Lake
8G
P313
8F
MCARTHUR PINE ROAD
Rat Lake
8E
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g. PHOTOGRAPHS

All photographs used in this Establishment Record are the property of the Chequamegon-Nicolet National Forest but not copyrighted. Some older slides are with the site file housed in the Park Falls office of the Forest. An electronic file is part of this establishment record.

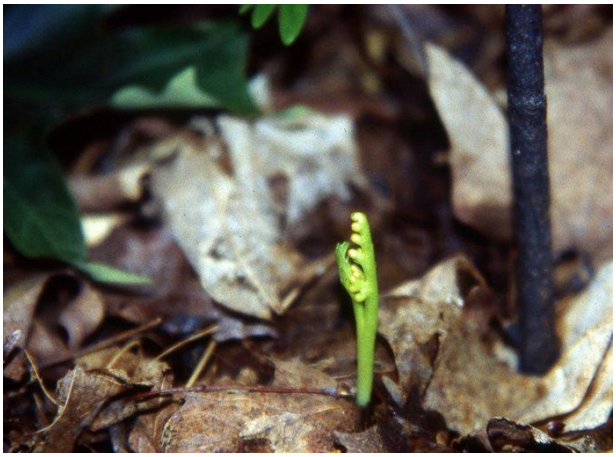

Figure 8. The state - threatened little goblin fern occurs in northern mesic forest dominated by sugar maple and basswood within the Rat Lake Swamp - Popple River Headwaters RNA (Photo: S. Janke, 1996)

Figure 9. Black Spruce/Tamarack swamp forest with a shrub layer of Labrador tea is the most common plant community within the RNA (Photo: M. Dallapiazza, 2012)

Figure 10. Open bog areas of the RNA are sphagnum peat-dominated and support bog rosemary, cranberry, and other ericad plants (Photo: M. Dallapiazza, 2012)

Figure 11. The shore of Rat Lake is predominantly conifer swamp dominated by black spruce (Photo: M. Dallapiazza, 2012)

APPENDIX 2 BIBLIOGRAPHY

Below is all literature cited in this establishment record including references useful for researchers, and journal articles or publications that have resulted from studies conducted on the site.

BIBLIOGRAPHIC REFERENCES:

American Ornithological Union. 1983. Check-list of North American birds, 6th edition.

BCPL: Board of Commissioners of Public Lands. 2004. Wisconsin Public Land Survey Records: Original Field Notes. http://bcpl.state.wi.us/asx/ Accessed October 12, 2004.

Cleland, D.T.; Freeouf, J.A.; Keys, J.E., Jr.; Nowacki, G.J.; Carpenter, C; McNab, W.H. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States [1:3,500,000] [CD-ROM]. Sloan, A.M., cartog. Gen. Tech. Report WO-76. Washington, DC: U.S. Department of Agriculture, Forest Service. Available online; http://fsgeodata.fs.fed.us/other_resources/ecosubregions.html

Curtis, J. T. 1959. Vegetation of Wisconsin. University of Wisconsin Press, Madison WI.

Epstein, E. 1989. Natural Heritage Inventory Site Survey Summary. On file in the Bureau of Endangered Resources, WDNR, Madison WI.

Heeringa, Brian, Wildlife Biological Technician and CNNF bat expert. Personal communication with Marjory Brzeskiewicz, December 2012.

Hoffman, R. 1999. Unpublished Project Evaluation on Rat Lake Swamp-Popple River Headwaters ecological complex.

Janke, S. 1996. Chequamegon-Nicolet National Forest Research Natural Area Evaluation Report: [Rat Lake Swamp-Popple River Headwaters]. Unpublished reports on file in Park Falls Chequamegon-Nicolet Office.

Knight, G. 2013. Chequamegon-Nicolet Forest Soil Scientist. Personal communication with Marjory Brzeskiewicz

Kotar, J., J. Kovach, T. Burger. 2002. A Guide to Forest Communities and Habitats of Northern Wisconsin (2nd edition). Madison: University of Wisconsin, Department of Forest Ecology and Management.

Midwestern Regional Climate Center. 2003. Historical Climate Data. Climate of the Midwest. http://mcc.sws.uiuc.edu/prod_serv/prodserv.htm. Accessed November 18, 2003.

NGDC. National Geographic Data Committee. 2012. National Vegetation Classification Standard (NVCS). Available online: http://usnvc.org/explore-classification/ Accessed 2012.

Nicolet BBS. 2004. Nicolet National Forest Breeding Bird Survey. Bird Records on file in Park Falls Headquarters. http://www.uwgb.edu/birds/nnf/index.htm

Parker, Linda. 1999. Landscape analysis and design on the Chequamegon-Nicolet national forest. Unpublished Forest Service report on file in Park Falls office.

Steuck, R. and L. M. Andrews. 1976. Surface water resources of Forest County; Lake and Stream Classification Project. Department of natural Resources Division of rexource Management, Madison, WI.

Tribal-USDA MOU. 2012 Memorandum of Understanding Regarding Tribal - USDA Forest Service Relations on National Forest Lands Within the Territories Ceded in Treaties of 1836, 1837, and 1842. Amended March 2012. Available online: http://www.fs.fed.us/spf/tribalrelations/documents/agreements/mou_amd2012wAppendixes.pdf and MOU Appendix A 1998 (amended from time to time): Off-reservation Gathering code, Tribal Wildernesses, Tribal Research Natural Areas, and Tribal Vehicle Permit Areas on National Forests.: http://www.baymills.org/resources/glifwic_wilderness_permits.pdf

Tyrrell, Lucy E., Faber-Langendoen, Don, and Snow, Kristin. 2000. Establishing a region-wide network of representative research natural areas (RNAs): an assessment for the eastern region's RNA framework. Unpublished Forest Service draft report on file in Park Falls office.

USDA Forest Service. 2003a. Chequamegon-Nicolet National Forest Soils (ELTP) Inventory Reports. On file in Park Falls Headquarters.

USDA Forest Service. 2003b. Chequamegon-Nicolet National Forest Heritage Site Points Shapefiles cd and database.

USDA Forest Service. 2004a. Chequamegon-Nicolet National Forests Land and Resource Management Plan. http://www.fs.usda.gov/main/cnnf/landmanagement/planning

USDA Forest Service. 2004b. Final Environmental Impact Statement to accompany the 2004 Land and Resource Management Plan. Available online at: http://www.fs.usda.gov/main/cnnf/landmanagement/planning

USDA Forest Service. 2004c. Record of Decision, 2004 Land and Resource Management Plan. http://www.fs.usda.gov/main/cnnf/landmanagement/planning (select ROD at this website)

USDA Forest Service. 2009. Chequamegon-Nicolet National Forest Invasive Plant Strategy and Desk Reference, unpublished. Available from CNNF Invasive Plant Program coordinator, Park Falls, WI.

USDA Forest Service. 2012. Motor Vehicle Use Map (MVUM) Decision Notice and Finding of No Significant Impact. Available online: http://www.fs.usda.gov/detail/cnnf

USDA NRCS. 2003. Official Soil Series Descriptions. http://ortho.ftw.nrcs.usda.gov/osd/osd.html Accessed 2003.

USDA, NRCS. 2012. The PLANTS Database (http://plants.usda.gov, 11 May 2012). National Plant Data Team, Greensboro, NC 27401-4901 USA.

Watermolen, D.J.; M.D. Murrell. 2001. Checklists of Wisconsin Vertebrates (out of print). Wisconsin Department of Natural Resources. Now available online: http://dnr.wi.gov/files/PDF/pubs/ss/ss0954.pdf

WGNHS: Wisconsin Geological and Natural History Survey. 2011. Wisconsin's Glacial Landscapes. An online publication updated December, 12, 2011. Accessed 1/13/2012: http://wisconsingeologicalsurvey.org/ice_age.htm

WI DNR. 2003. Wisconsin Department of Natural Resources, Ecological Landscapes of Wisconsin. CD compilation and Handbook, Madison, WI.

WI DNR. 2010. Wisconsin Department of Natural Resources, NR-40 Invasive Species Rule, Sept. 29, 2010. Available from the DNR website at: http://dnr.wi.gov Link to NR-40 list: http://dnr.wi.gov/topic/Invasives/documents/NR40ListsSep292010.pdf

WI DNR. 2011. State Natural Areas Program. Available online: http://dnr.wi.gov/topic/Lands/naturalareas/

WI DNR. 2012. Natural Heritage Inventory, Wisconsin Department of Natural Resources Bureau of Endangered Resources. Online: http://dnr.wi.gov/topic/nhi/

WI DNR. 2013a. Wisconsin Watersheds and Basins Website. http://dnr.wi.gov/topic/watersheds/ Accessed on January 13, 2013.

WI DNR. 2013b. Wisconsin Department of Natural Resources, Bat Program. http://dnr.wi.gov/topic/WildlifeHabitat/bats.html

PUBLICATIONS FROM STUDIES ON RNA:

Anderson, Craig, L. Ayers, T. Bergeson. 2006. Biodiversity in selected natural communities related to global climate change, annual summary for 2006 submitted to Wisconsin Focus on Energy Environmental Research Program. 20 pp.

Howe, R.W. and A.T. Wolf. 2003. A Checklist of Birds in the Chequamegon-Nicolet National Forest. USDA Forest Service Publication, Park Falls, WI.

Howe, R.W. and L.J. Roberts. 2005. Sixteen Years of Habitat-based Bird Monitoring in the Nicolet National Forest. Pages 963-973 in Ralph, C.J. and T.D. Rich, editors. 2005. Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference. 2002 March 20-24; Asilomar, California, Volume 2. Gen. Tech. Rep. PSW-GTR-191. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 643 p.

Nieme, Gerald J., R.W. Howe, G.R. Sturtevent, L.R. Parker, A.R. Grinde, N.P. Danz, M. Nelson, E.J. Zlonis, N.G. Walton, E.E. Giese, S.M. Lietz. In Review. Analysis of long term forest bird monitoring in National Forests of the Western Great Lakes Region. General Technical Report NRS-GTR-##. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.

Schulte, L.A., A.M. Pidgeon, and D.J. Mladenoff. 2005. One-hundred-fifty years of change in forest bird breeding habitat: Historical and current estimates of species distributions. Conservation Biology 19:144-156.

APPENDIX 3 FOREST MANAGEMENT AREA DIRECTION

The management prescription for the Rat Lake Swamp - Popple River Headwaters RNA is embodied in the management area (MA) direction and guidance presented in the Chequamegon-Nicolet National Forests 2004 Land and Resource Management Plan under Management Area 8E - Existing and Candidate Research Natural Areas (USDA Forest Service 2004b pg 3-50). A copy of that management prescription follows:

MA 8E Existing and Candidate Research Natural Areas (RNA)

Theme

In this document, the term RNA will refer to both Existing and Candidate Research Natural Areas. MA 8E is characterized by ecologically significant natural features, representative ecosystems, and/or unique areas managed as Candidate or Existing Research Natural Areas. A broad representation of Forest community types is included in this MA. In combination with other RNAs in the nation, they form a national network of ecological areas for research, monitoring, education, and maintenance of biological diversity.

Landscape Description

MAs 8E is characterized by nearly level to steep topography with slope gradients ranging from 0 to 30%. Glacial landforms include drumlin ground moraine, collapsed and uncollapsed outwash plains, washed moraines and eskers. The soils range from sandy to silty in the surface over loamy to sandy sediments. Soil moisture regimes range from dry to mesic and nutrient status ranges from poor to rich. A broad array of Forest Habitat Types and LTAs are represented in this MA.

Desired Future Condition

Landscape Composition and Structure

RNAs are chosen as high quality representatives of ecological communities found on the Forest. In general, they exhibit minimal evidence of past human disturbance, and contain all or most species characteristic of that community in the region. They may range in size from less than 100 acres to thousands of acres. They are generally well buffered from incompatible activities on nearby lands. RNAs are meant to include a representation of ecological types and vegetative cover across the Forest. However, composition results primarily from natural ecological processes rather than human-caused activities. As a result, late-successional upland types such as northern hardwoods, northern hardwood/hemlock, and mixed-conifers dominate the MA. A variety of wetland types may be present, from small isolated ponds and bogs to large (over 1000 acre) wetland complexes.

Site-Level Composition and Structure

Compositional diversity typically reflects late successional mature conditions. Dominant upland tree species are sugar maple, hemlock, yellow birch, basswood, and American beech. Lowland areas support tree species such as black spruce, northern-white cedar, and tamarack. Shade-intolerant species such as aspen, white birch, and jack pine are uncommon, limited to areas affected by natural disturbance such as windfall. Ground flora reflects the full diversity of native upland and lowland communities, and is generally unaffected by invading exotics. Structural diversity is complex, with features such as super-canopy trees, snags, den trees, downed woody debris, and canopy gaps commonly found.

Disturbance Regime

Natural ecological processes and natural disturbances shape the landscape-level and site-level vegetation composition. Components of the natural disturbance regime include individual tree throw and infrequent larger scale blowdown, infrequent low-intensity fire, insect damage, and beaver flooding. Timber harvesting does not occur.

Standards and Guidelines

Minerals

Standard:

• Prohibit the development of new sources of common variety minerals.

Guidelines:

• Surface disturbing mineral activities and will be approved or disapproved on a case-by- case basis where minerals are federally owned. Whenever possible surface disturbance will be limited.

• When surface disturbing mineral exploration and development of reserved and outstanding mineral rights is proposed, consider reasonable alternatives that minimize impacts to RNA values.

• Acquisition of reserved and outstanding mineral rights will be considered on a willing seller / willing buyer basis.

• Existing common variety minerals developments may be utilized. Consider RNA values if full utilization requires vegetation disturbance.

Biological Diversity

Guideline:

• Use native plant species for restoration activities. Use non-native plant species only if they are needed to prevent irreversible resource damage.

Vegetation

Standard:

• Prohibit domestic livestock grazing.

Guidelines:

• Vegetation management is not permitted unless the desired vegetation type would be lost or degraded without treatment. Management practices will approximate the vegetation and processes that govern natural succession.

• Hazard trees may be cut but not removed.

Special Forest Products

Guideline:

• Prohibit the gathering of special forest products for personal use or commercial sale.

Wildlife and Fish

Guideline:

• Wildlife and fish habitat manipulation will not be permitted unless it's consistent with RNA objectives and is needed to maintain the character or purpose of the area.

Fire Management

Guidelines:

• Allow prescribed fire within a prescription designed to accomplish specific RNA objectives where it is part of the natural disturbance regime, where it is needed to maintain or restore ecosystems, and where it is called for in the establishment record.

• Minimize the disturbance of soil and water resources by designing fire suppression activities to fit each individual situation.

Insects and Disease

Guideline:

• Minimize the disturbance of soil and water resources. Minimize control actions against native insects and diseases, and native plant and animal pests. Allow limited control actions to protect adjacent resources or the features for which the research natural area was established.

Recreation

Standard:

• Prohibit recreational use that threatens or interferes with the objectives or purposes for which the RNA was established.

Guidelines:

• Do not install signs or construct trails or other improvements unless they contribute to RNA objectives or area protection.

• Prohibit the use of horses, bicycles, and motorized vehicles on RNA trails.

Heritage Resources

Guideline:

• Protect significant heritage resources by dispersing or limiting public use of RNAs.

Lands

Guideline:

• Clearly identify RNA boundaries, monument corners, and turning points.

Special Uses

Standard:

• Prohibit the establishment of new facilities and corridors for utility rights-of-way.

Guideline:

• Do not issue special use permits except as mandated by law or agreement. Exceptions may be made for research or educational activities. Phase out existing special use permits when feasible.

Facilities

Guideline:

• Do not construct buildings unless they are needed to meet RNA objectives. Existing structures may be maintained.

Transportation Systems

Guidelines:

• Do not construct new roads.

• Restore all decommissioned roads to some level of landscape restoration.

Research

Standard:

• Permit educational and research use as long as it will not result in unacceptable impacts to RNA values.

APPENDIX 4 WISCONSIN NATURAL HERITAGE WORKING LIST – RANK DEFINITIONS

The Wisconsin NHI Working List records which elements are tracked in the state. The working list is revised as species' populations change (increase or decrease) and as knowledge about their status and distribution in Wisconsin increase. The Working List presented here was revised in 2012. Definitions of ranks are provided below, along with definitions for other abbreviations used in the Working List.

US Status: Current federal protection status designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in Wisconsin. LE = listed endangered; LT = listed threatened; PE = proposed as endangered; NEP = nonessential experimental population; C = candidate for future listing; CH = critical habitat

State Status: Protection category designated by the Wisconsin DNR. END = Endangered; THR = Threatened; SC = Special Concern.

WDNR and federal regulations regarding Special Concern species range from full protection to no protection. The current categories and their respective level of protection are as follows: SC/P = fully protected; SC/N = no laws regulating use, possession, or harvesting; SC/H = take regulated by establishment of open closed seasons; SC/FL = federally protected as endangered or threatened, but not so designated by WDNR; SC/M = fully protected by federal and state laws under the Migratory Bird Act.

Special Concern species are those species about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered.

Global Element Ranks

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region), or because of other factor(s) making it vulnerable to extinction throughout its range; typically 21-100 occurrences.

G4 = Uncommon but not rare, (although it may be quite rare in parts of its range, especially at the periphery) and usually widespread. Typically >100 occurrences.

G5 = Common, widespread, and abundant (although it may be quite rare in parts of its range, especially at the periphery). Not vulnerable in most of its range.

GH = Known only from historical occurrence throughout its range, with the expectation that it may be rediscovered.

GNR = Not ranked. Replaced G? rank and some GU ranks

GU = Currently unrankable due to lack of data or substantially conflicting data on status or trends. Possibly in peril range-wide, but status is uncertain.

GX = Presumed to be extinct throughout its range (e.g. Passenger pigeon) with virtually no likelihood that it will be rediscovered.

Species with a questionable taxonomic assignment are given a "Q" after the global rank.

Subspecies and varieties are given subranks composed of the letter "T" plus a number or letter. The definition of the second character of the subrank parallels that of the full global rank. (Examples: a rare subspecies of a rare species is ranked G1T1; a rare subspecies of a common species is ranked G5T1.)

State Element Ranks

S1 = Critically imperiled in Wisconsin because of extreme rarity, typically 5 or fewer occurrences and/or very few (<1000) remaining individuals or acres, or due to some factor(s) making it especially vulnerable to extirpation from the state.

S2 = Imperiled in Wisconsin because of rarity, typically 6 to 20 occurrences and/or few (1000-3000) remaining individuals or acres, or due to some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in Wisconsin, typically 21-100 occurrences and/or 3000-10,000 individuals.

S4 = Apparently secure in Wisconsin, usually with >100 occurrences and >10,000 individuals.

S5 = Demonstrably secure in Wisconsin and essentially ineradicable under present conditions.

SNA = Accidental, non-native, reported, but unconfirmed, or falsely reported.

SH = Of historical occurrence in Wisconsin, perhaps having not been verified in the past 20 years, and suspected to be still extant. Naturally, an element would become SH without such a 20-year delay if the only known occurrence were destroyed or if it had been extensively and unsuccessfully looked for.

SNR = Not Ranked, a state rank has not yet been assessed.

SU = Currently unrankable. Possibly in peril in the state, but status is uncertain due to lack of information or substantially conflicting data on status or trends.

SX = Apparently extirpated from the state.

State Ranking of Long-Distance Migrant Animals

Ranking long distance aerial migrant animals presents special problems relating to the fact that their non-breeding status (rank) may be quite different from their breeding status, if any, in Wisconsin. In other words, the conservation needs of these taxa may vary between seasons. In order to present a less ambiguous picture of a migrant's status, it is necessary to specify whether the rank refers to the breeding (B) or non-breeding (N) status of the taxon in question. (e.g. S2B,S5N).
(http://dnr.wi.gov/org/land/er/wlist/06_2011_Working_List.pdf Last Revised: May 31, 2012

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APPENDIX 6 BOUNDARY DESCRIPTION

Rat Lake Swamp - Popple River Headwaters RNA

Located on the Eagle River- Florence Ranger District of the Chequamegon – Nicolet National Forest in Forest County in the State of Wisconsin. T 39 N R 14 E Section 31 and 32, T 38 N R 14 E Sections 4, 5, 6, 8, and 9. The boundary is delineated as follows:

Beginning at the Northwest Corner of Section 32, T 39 N, R 14 E,

Thence South along the west line of Section 32, 138.4 feet,

Thence Northeasterly the following courses:

Direction	Distance (ft)
N 34 E	763.1
N 63 E	86.2
N 90 E	90.0

Thence Southerly the following courses:

Direction	Distance (ft)
S 14 E	105.9
S 4 W	503.0
S 45 E	109.2
S 78 E	118.5
S 55 E	156.9
S 14 E	159.0
S 31 W	150.2
S 37 W	192.8
S 10 W	78.2

Thence Easterly the following courses:

Direction	Distance (ft)
S 45 E	54.7
N 72 E	162.8
N 77 E	171.5
S 76 E	205.8

to the West 1/16 line of Section 32,

Thence South along the West 1/16 line of Section 32 approximately 450 feet to the Northwest 1/16 corner of Section 32,

Thence west along the North 1/16 line of Section 32 approximately 1300 feet to the North 1/16 corner of Sections 31 and 32,

Thence South along west line of Section 32, approximately 1300 feet to the West ¼ corner of Section 32,

Thence South along the west line of Section 32, approximately 2640 feet to the Southwest corner of Section 32,

Thence East along the North line of Section 05, T 38 N, R 14 E approximately 2640 feet to the North ¼ corner of Section 5,

Thence east along the North line of Section 05, approximately 1845 feet to the west ROW of FR 2167,

Thence Southwesterly along the West ROW of FR 2167, 358.98 feet,

Thence Southeasterly the following courses:

Direction	Distance (ft)
S 46 E	31.6
S 46 E	964.0
S 22 W	444.2
S 44 W	391.2
S 34 W	605.8

to the west ROW of FR 2167,

Thence Southeasterly along the west ROW of FR 2167, approximately 3147 feet to the Popple River,

Thence southeasterly along the north bank of the Popple River approximately 4480 feet to Rat Creek,

Thence Northwesterly along Rat Creek to the North –South ¼ line of section 8,

Thence North along the North –South ¼ line, approximately 200 feet to the Center ¼ corner of Section 8,

Thence West along the East-West ¼ line approximately 2640 feet to the West ¼ corner of Section 8,

Thence North along the west line Section 8, approximately 2640 feet to the Northwest corner of Section 8, T 38 N, R 14 E,

Thence West along the South line of Section 06, approximately 2640 feet to the South ¼ corner of Section 6,

Thence north along the North-South ¼ line of Section 6, approximately 1320 feet to the Center south 1/16 corner of Section 6,

Thence west along the South 1/16 line of Section 6, approximately 1320 feet to the Southwest 1/16 corner of Section 6,

Thence north along the West 1/16 line of Section 6, approximately 1320 feet to the Center west 1/16 corner of Section 6,

Thence East along the East-West ¼ line of Section 6, approximately 2640 feet to the Center East 1/16 corner of Section 6,

Thence North along the East 1/16 line of Section 6, approximately 1320 feet to the Northeast 1/16 corner of Section 6,

Thence west along the North 1/16 line of Section 6, approximately 1320 feet to the Center North 1/16 corner of Section 6,

Thence west along the North 1/16 line of Section 6, 537.67 feet,

Thence Northeasterly the following courses:

Direction	Distance (ft)
N 22 E	820.3
N 31 E	374.9
N 57 E	214.1
N 16 E	160.7
N 42 W	191.2
N 7 W	103.7
N 22 E	692.4
N 35 E	656.4
N 14 E	464.7
N 30 E	461.0

Thence Northwesterly the following courses:

Direction	Distance (ft)
N 30 W	357.3
N 47 W	454.9
N 64 W	328.0
S 90 W	231.5

Thence Southwesterly the following courses:

Direction	Distance (ft)
S 52 W	293.3
S 54 W	542.7
S 51 W	548.2
S 32 W	849.2

Thence Northwesterly the following courses:

Direction	Distance (ft)
N 74 W	187.2
N 48 W	155.0

Thence Northerly the following courses:

Direction	Distance (ft)
N 25 E	978.1
N 4 E	657.8

Thence Southwesterly the following courses:

Direction	Distance (ft)
S 88 W	296.0
S 74 W	280.9

Thence Northerly the following courses:

Direction	Distance (ft)

N 58 W	121.4
N 41 W	474.2
N 14 E	158.9
N 45 E	218.4
N 36 E	303.4
N 4 E	335.4
N 4 W	503.0
N 6 W	152.1

to the North line of Section 31, T 39 N R 14 E,

Thence East along the North line of Section 31, 1878.34 feet to the North ¼ of Section 31(note, this line crosses Rat Lake),

Thence East along the North line of Section 31, approximately 2640 feet to the **Point of Beginning**.

_/s/ Randy Erickson_____ March 18, 2013__
Randy Erickson Date
Land Surveyor, Chequamegon-Nicolet National Forest