



DESIGNATION ORDER

USDA Forest Service, Eastern Region
Chequamegon-Nicolet National Forest
Lakewood-Laona Ranger District
Oconto County, Wisconsin

Waupee Lake Swamp 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 Waupee Lake Swamp Research Natural Area. It shall be comprised of 355 acres (136 hectares) of land in Oconto County, in the state of Wisconsin, on the Lakewood-Laona 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

Waupee Lake Swamp Research Natural Area

Chequamegon-Nicolet National Forest

Oconto 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 01/28/2015
Marjory E. Brzeskiewicz, Botanist, Chequamegon-Nicolet National Forest

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

Recommended by: Jeff Seefeldt Date 2/18/15
Jeff Seefeldt, District Ranger, Lakewood-Laona District

Recommended by: Paul I.V. Strong 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

January 2015



Establishment Record for Waupee Lake Swamp Research Natural Area

**Chequamegon-Nicolet National Forest,
Lakewood-Laona District,
Oconto County, Wisconsin**



Cover photo: Northern White Cedar swamp with sphagnum ground cover. Photo by Steve Janke

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

CONTENTS

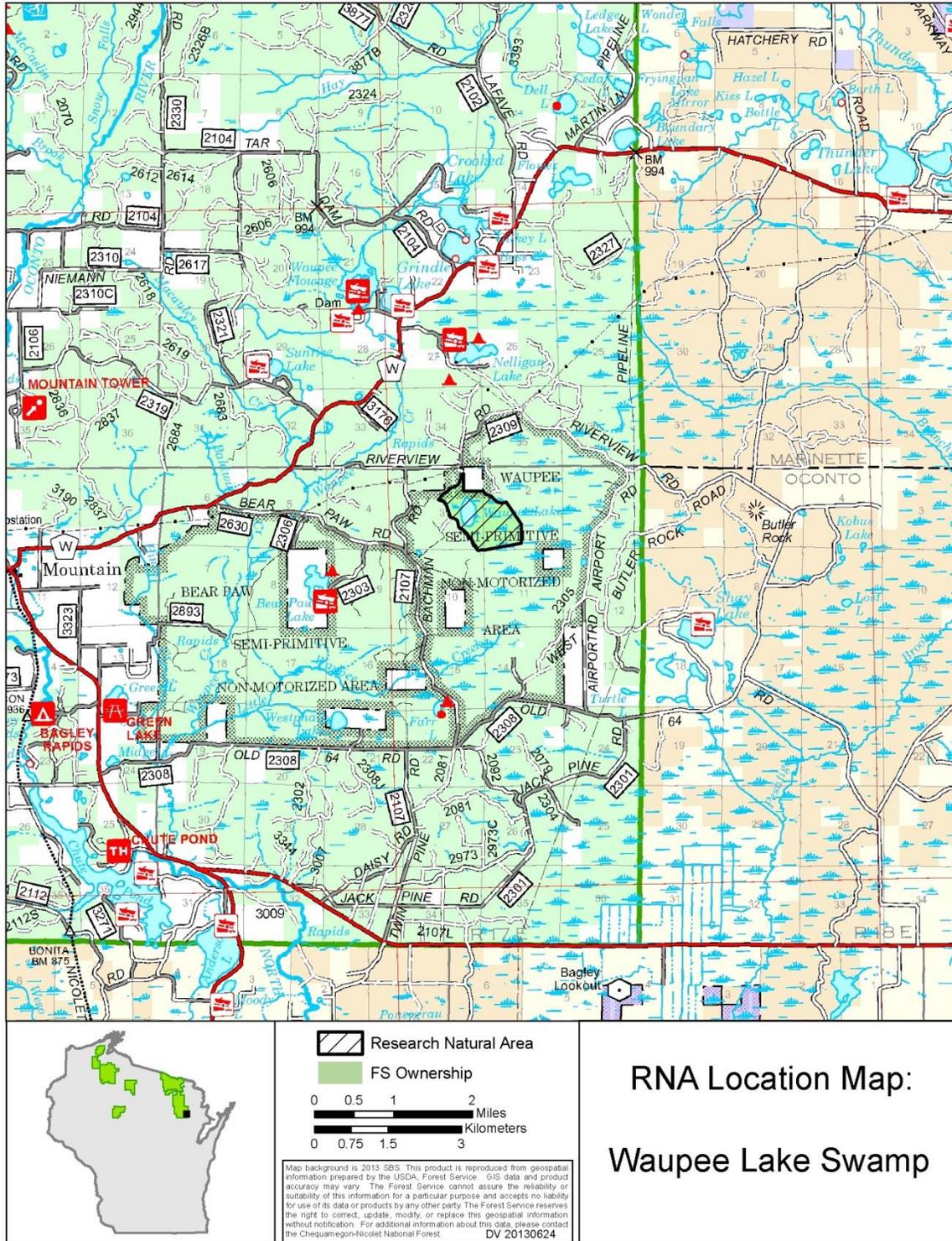
1. IDENTIFICATION SECTION	5
Location Map	5
Boundary Map.....	6
Landscape Overview Waupee Lake Swamp RNA.....	7
Legal Description.....	8
2. ADMINISTRATIVE SECTION.....	9
3. BODY OF ESTABLISHMENT RECORD.....	10
a. Introduction.....	10
b. Justification Section	11
(1) Justification Statement.....	11
(2) Principal Distinguishing Features	12
(3) Objectives.....	12
c. Land Management Planning.....	13
d. Management Prescription.....	13
e. Use or Control of Fire and Grazing.....	15
Appendices.....	16
4. Appendix 1 Ecological Evaluation.....	16
a. Physical Site Description and Climatic Conditions.....	16
(1) Location.....	16
(2) Size in acres/hectares.....	16
(3) Elevation range.....	16
(4) Access to the site.....	16
(5) Climatic data.....	17
b. Ecological Description	17
(1) Eco-region (to the lowest level of detail currently available).....	17
(2) Plant community types	17
(3) Description of the values of the Research Natural Area.....	20
c. Resource Information.....	25
(1) Minerals.....	25
(2) Grazing.....	25
(3) Plants (including timber and special forest products)	26
(4) Watershed values.....	27
(5) Recreation use	27

(6) Wildlife.....	27
(7) Transportation/road system.....	27
d. Historical Information	27
(1) Research/education use and interest: history of establishment.....	29
(2) Cultural/heritage.....	29
(3) Disturbance history	30
(4) Occurrence of exotic species.....	30
e. Other Information.....	31
(1) Any permanent research plots and/or photo points.....	31
(2) Bibliography	31
(3) Potential research topics.....	31
f. Evaluation of Specific Management Recommendations on the Research Natural Area.....	31
(1) Potential or existing conflicts; principal management issues.....	31
(2) Special management area if the Research Natural Area is within one.....	32
g. Photographs	32
Appendix 2 Bibliography.....	33
Appendix 3 Forest Management Area Direction	37
Appendix 4 Wisconsin Natural Heritage Working List – Rank Definitions.....	40
Appendix 5 Contributors.....	42

Note: The Alpha/Numeric ordering in this document follows that within Forest Service Manual direction (FSM 4063) for Establishment Records.

1. IDENTIFICATION SECTION

Location Map

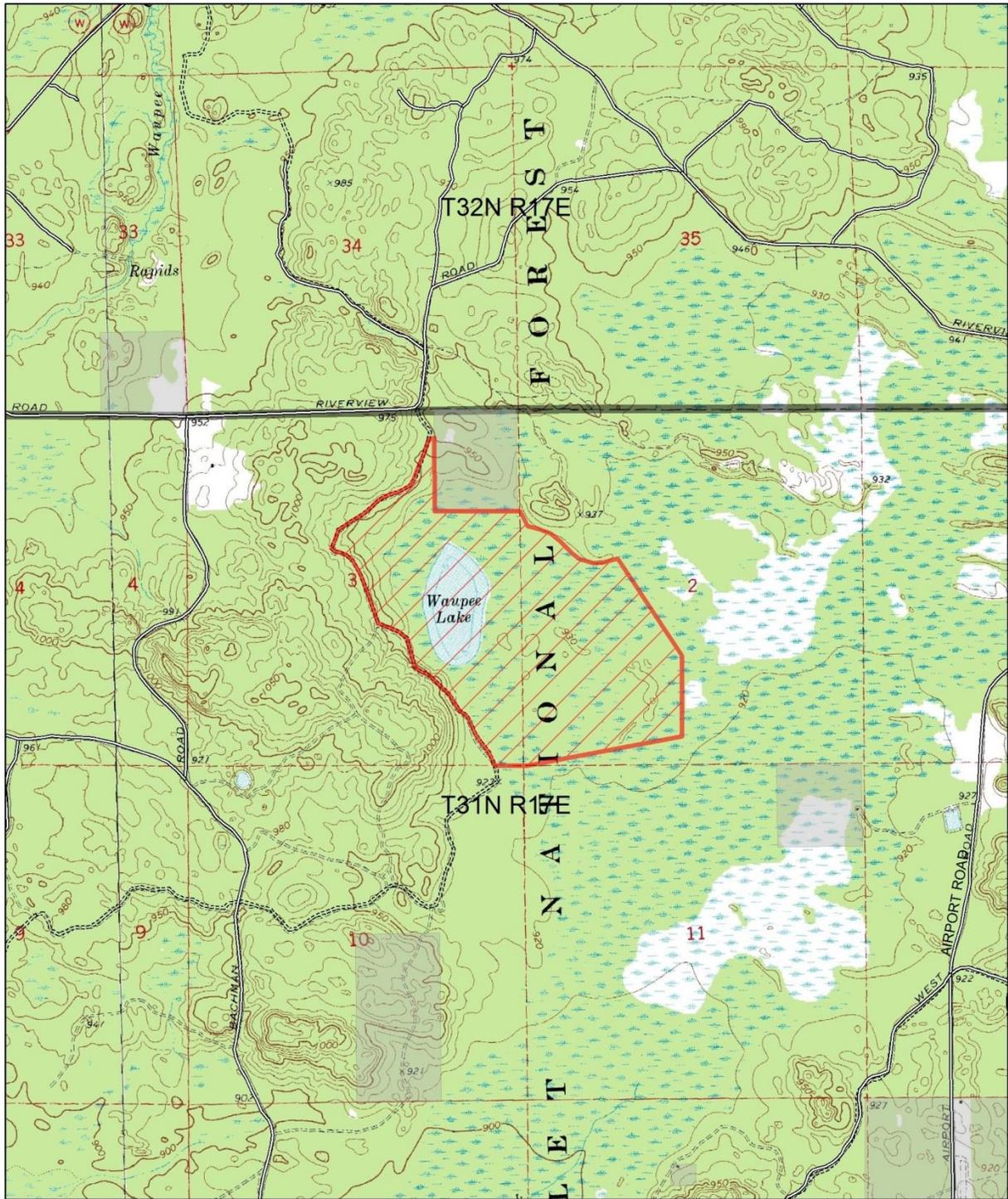


RNA Location Map:

Waupee Lake Swamp

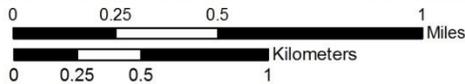
BOUNDARY MAP

RNA Boundary Map: Waupee Lake Swamp



DV 20140417

- Research Natural Area
- NonFS ownership
- Open Road
- Trail



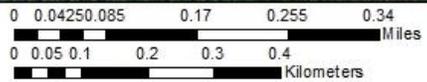
Acres: 335

LANDSCAPE OVERVIEW WAUPEE LAKE SWAMP RNA



 RNA Boundary

ESRI Basemap World Imagery
MB 2013



LEGAL DESCRIPTION

Waupee Lake Swamp RNA is located on the Lakewood-Laona Ranger District of Chequamegon-Nicolet National Forest in Oconto County, Wisconsin T 31 N, R 17 E, Sections 2 and 3. The boundary is delineated as follows:

Beginning at the Southeast Corner of Section 03,

Thence west along the south line of Section 03, 518.3 feet to the intersection of FR 94135,

Thence Northwesterly along the north ROW of FR 941350, 2919.4 feet to the intersection of FR 94144,

Thence northwesterly along the east ROW of FR 94144, 3902.3 feet to the intersection of FR 941461,

Thence northeasterly along the south ROW of FR 941461, 75.1 feet,

Thence N 74° E, approximately 20 feet to the East 1/16 line of Section 03,

Thence south along the East 1/16 line approximately 1145 feet to the North 1/16 line of Section 03,

Thence East along the North 1/16 line approximately 1300 feet to the North 1/16 corner of sections 2 and 3,

Thence East along the North 1/16 line of Section 02, 35.8 feet,

Thence southeasterly along the following courses:

Direction	Distance (feet)
S 28 E	259.3
S 72 E	178.4
S 71 E	188.4
S 50 E	230.7
S 45 E	218.8
S 51 E	159.4
S 74 E	217.7
N 87 E	155.0
N 75 E	240.0

Thence S 33° E 1808.4 feet

Thence South 1260.7 feet

Thence S 79° W 2536.5 feet to the Point of Beginning.

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

2. ADMINISTRATIVE SECTION

This Establishment Record has been prepared pursuant to Forest Service Manual direction (FSM 4063). Establishment of the Waupee Lake Swamp 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, Lakewood-Laona 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 St. South
Park Falls, WI 54552

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

3. BODY OF ESTABLISHMENT RECORD

A. INTRODUCTION

Waupee Lake Swamp Research Natural Area (RNA) is located Oconto County in northeastern Wisconsin on the Lakewood-Laona Ranger District of the Chequamegon-Nicolet National Forest (CNNF). The RNA is located entirely on National Forest Service Land and is approximately 6 miles (10 km) east of Mountain, Wisconsin (Identification Section- *Location Map and Boundary Map*).

The 335-acre (136 hectares) RNA features the 34-acre (14 ha) Waupee Lake, a shallow seepage lake surrounded by swamp conifer forest plus thickets of alder and black ash (Epstein 1981). The north and west edges of the lake are bordered by a muskeg-like forest of stunted tamarack and black spruce. A diverse community of sedges, ericads, orchids, and insectivorous plants is also present. Plant communities include northern wet and wet-mesic forest, open bog, northern sedge meadow, and emergent aquatics (Hoffman 1999). The RNA supports three rare plants and six rare bird species (Table 6). Recreational use of the area is low due to difficult access but includes fishing and waterfowl hunting on Waupee Lake and deer hunting in the uplands.



Figure 1. The north side of Waupee Lake shoreline showing swamp conifer forest with a predominantly graminoid ground flora. Photo by Steve Janke, 2011

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. See Section 4 d.(2) Cultural/Heritage for further discussion of Native American history on the site.

Of historical interest are the General Land Survey notes from 1853: “Nearly one half of this township is swamp and the balance is almost worthless. The soil is sand 3rd rate surface in places broken and rocky. There is scarcely any valuable timber in the township” (Board of Commissioners 2004). Waupee was the name of a Menominee Indian chief who had a village a few miles west of New Post, Wisconsin when the town was organized in 1859 (Wisconsin History 2012).

Northern Wisconsin was extensively logged in the late 1800s, clearcutting much of the land. Catastrophic wildfires burned the logging slash across the region. A 1942 Vegetation Cover map that includes the RNA (Figure 8) indicates that the *average* diameter of the upland forest trees was 0 to 3 inches dbh (<8cm) and predominantly of aspen (*Populus tremuloides*) and birch (*Betula papyrifera*) (UWDC 2011). This would indicate that prior to becoming federally owned in the 1930s, the uplands were clearcut and repopulated by early successional species. Most of the cedar swamps in the region have a history of cutting, and within the RNA a small portion of a cedar swamp was strip cut in the early 1970s (Janke 1998). In addition, clearcutting in the late 1970’s created some 5-15 acre (2-6 ha) seral stage patches of aspen and paper birch on the western edge of the RNA.

The site’s significant natural values were first documented in 1981 by Wisconsin Department of Natural Resources (DNR) biologists conducting an inventory of natural areas in Oconto County (Epstein 1986). In 1982 biologists from the DNR surveyed the Waupee Lake wetlands as part of a survey of rare plants on the Chequamegon and Nicolet National Forests (Judziewicz in Epstein 1986). The area was included in the 1986 Nicolet Forest Plan as a candidate research natural area. See Section 4 d (1) for *History of Establishment*.

Waupee Lake Swamp RNA is owned outright by the USDA Forest Service. The RNA does not occur within any other administratively or congressionally designated areas, such as a Wilderness Area or National Recreation Area. 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

Waupee Lake Swamp RNA includes extensive areas of northern white cedar (*Thuja occidentalis*) swamp and red maple-black ash (*Acer rubrum-Fraxinus nigra*) hardwood swamp. High quality examples of both of these community types are considered a priority for protection. The RNA is part of a much larger Waupee Lake Swamp Special Management Area (Figure 4) and is the largest intact forested wetland within the ecological subsection. In addition, the extensive wetlands surrounding the lake support an unusually high concentration of regionally rare or uncommon plant species (Epstein 1986). Waupee Lake is an undeveloped, hardwater seepage lake surrounded

by bog and swamp. These lake types are uncommon to rare in Wisconsin and Waupee Lake is an excellent representative on the forest (Nicolet National Forest 1994).

(2) PRINCIPAL DISTINGUISHING FEATURES

Waupee Lake Swamp RNA is an arm of an extensive wetland to the south and east of the CNNF known as the Peshtigo Brook Swamp (Janke 1998). This wetland complex is within the basin of glacial Lake Oconto and is underlain by a nearly level bed of sand. Relief is provided by wind and water-worked sand dunes and occasional rock outcrops. Most of the area is wet conifer swamp dominated by northern white cedar, balsam fir (*Abies balsamea*), and black ash (Figure 2). Also common is black ash swamp grading to alder (*Alnus incana ssp rugosa*) thicket and stands dominated by northern white cedar and black spruce (*Picea mariana*). Surrounding the wetlands are upland islands of pine (*Pinus spp*) and oak (*Quercus spp*). Contained within the RNA are the headwaters for Little Waupee Creek, which flows southwest into the North Branch of the Oconto River.



Figure 2. Northern white cedar swamp and other wetland forest and shrub plant communities cover two-thirds of the Waupee Lake Swamp RNA. Photo by Steve Janke, 2011

Waupee Lake has no development and has a high concentration of rare plants in the conifer swamps surrounding it. The large CNNF Waupee Lake Swamp Special Management Area (2,575 acres/1042 hectares) lies to the immediate east of the RNA (Figure 4).

(3) OBJECTIVES

Waupee Lake Swamp 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.

The Waupee Lake Swamp 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 preserve the special characteristics of the upland, wetland and aquatic communities and populations of uncommon and rare plant species. It will serve as a reference area for the study of succession as well as a control area for comparing results from manipulative research and resource management techniques executed elsewhere. It will maintain genetic diversity in a complex of lowland and upland habitats where researchers can measure ecological changes. Here succession will occur naturally following community-changing events such as wind throw and beaver flooding. The RNA also provides habitat for numerous animals, including two bird species of concern on the Chequamegon-Nicolet National Forest (see Section 4B(3)(G) *Rare Species*). Research and educational use of the RNA will be encouraged.

C. LAND MANAGEMENT PLANNING

The effects of 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). Waupee Lake Swamp 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).



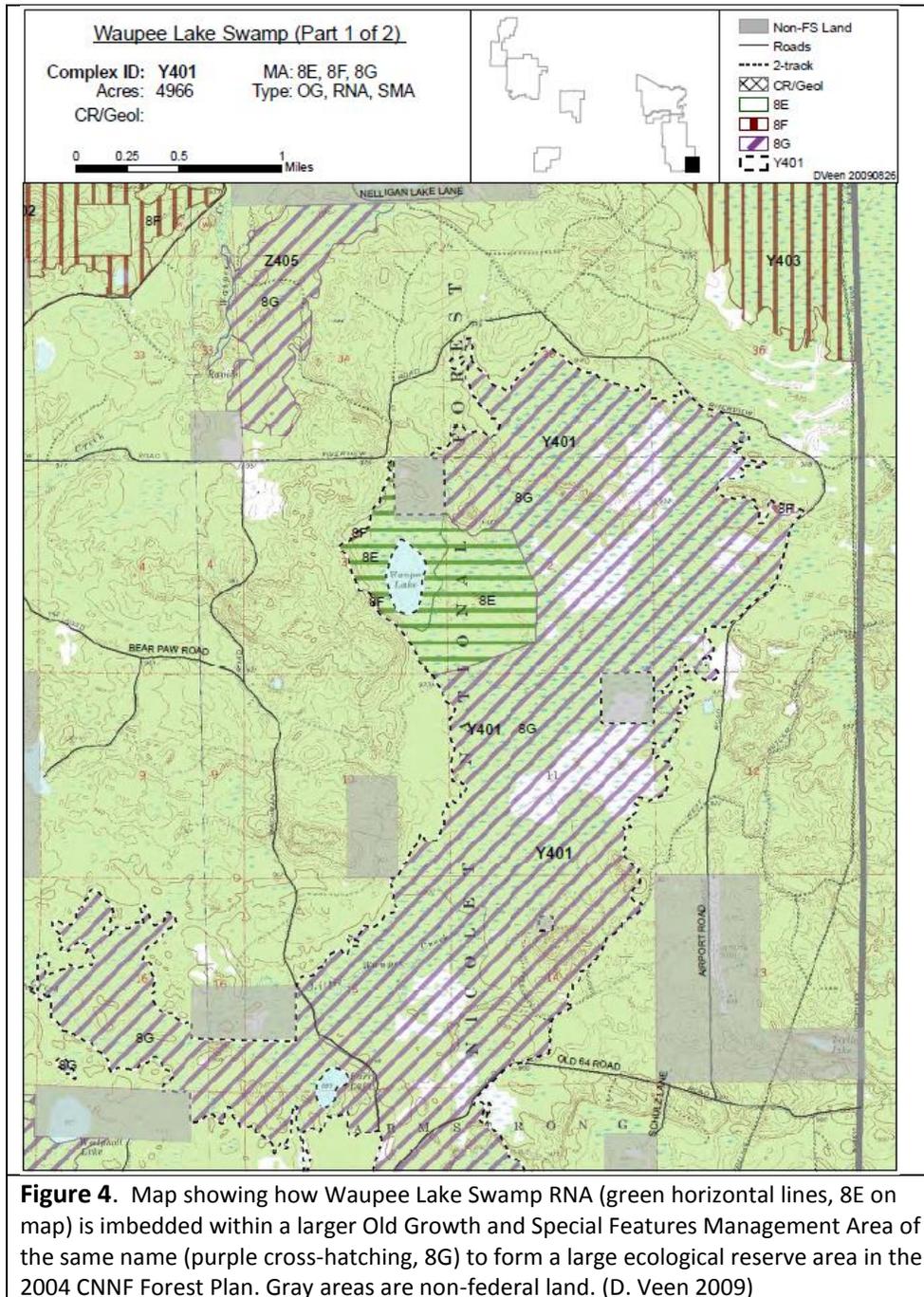
Figure 3. Land Management Planning for Waupee Lake Swamp RNA will largely involve protecting habitat for all native species including the tuberous grasspink orchid (*Calopogon tuberosus*). Photo by Steve Janke, 2011

D. MANAGEMENT PRESCRIPTION

The management prescription for Waupee Lake Swamp 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 Waupee Lake Swamp 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. 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 these wetland community types. Fire is allowed if needed for specific objectives, however, fire has not been identified as a management need.

According to CNNF fire management records, occasional wildfires do occur 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 (40 ha). 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 the 2004 CNNF Forest Plan.

APPENDICES

4. APPENDIX 1 ECOLOGICAL EVALUATION

The following ecological evaluation is included as an appendix to the establishment record and tiers to the Final Environmental Impact Statement for the Chequamegon-Nicolet National Forest Land and Resource Management Plan ("2004 CNNF Forest Plan")(USDA Forest Service 2004a) and to the 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 can be obtained from the Forest RNA Coordinator.

A. PHYSICAL SITE DESCRIPTION AND CLIMATIC CONDITIONS

(1) LOCATION

Waupee Lake Swamp RNA is located on the Lakewood-Laona Ranger District of the Chequamegon-Nicolet National Forest, Oconto County, in the state of Wisconsin. See Establishment Record Identification Section for *Boundary Certification, Location Map* and *Boundary Map*.

(2) SIZE IN ACRES/HECTARES

The RNA is comprised of 335 acres (136 hectares). The RNA's Mercator coordinates are 45° 10' N latitude and 88° 20' W longitude.

(3) ELEVATION RANGE

The area is generally level. Elevations range from 920 feet (280 m) to 950 feet (289 m) above sea level. The RNA and surrounding area is situated on a sandy, glacial lake bed.

(4) ACCESS TO THE SITE

Access is by County Road W (Riverview Road), and by foot on an unimproved road. From Mountain, WI go east on County Hwy W 4.5 miles (7.2 km), then east on Riverview Road (FR 2107) 2.4 miles (3.8 km) to a point where the road turns north. Walk south on an unimproved road (this road is not open to motorized travel) and continue south for about 0.5 mile (0.8 km). Waupee Lake Swamp RNA lies a short distance to the east (Identification Section - *Location Map*).

(5) CLIMATIC DATA

The weather station nearest to Waupee Lake Swamp RNA is Lakewood 3 NE (station no. 474523, latitude 45° 19' N, longitude 88° 30' W). The station is about 15 mi (24 km) to the northwest of the RNA and has similar weather and climate. This station has recorded temperature and precipitation data since 1968 (Midwestern Regional Climate Center 2003).

Table 1. Climate Records for station Lakewood 3 NE No.474523, Oconto County, Wisconsin from the years 1968 to 2000

Temperature	°F	°C
Mean annual	42.0	5.6
Mean monthly April through September	58.0	14.4
Mean monthly October through March	25.0	-3.9
Average daily maximum	53.0	11.7
Average daily minimum	30.0	-1.1
Record high	100.0	37.8
Record low	-43.0	-41.6
Precipitation	in	mm
Mean annual rainfall	33.1	841.0
Mean monthly - April through September	3.6	91.4
Mean monthly - October through March	1.9	48.3
Mean annual snowfall	64.7	1643.0

B. ECOLOGICAL DESCRIPTION

Nomenclature for flora follows the USDA PLANTS database (USDA, NRCS 2012); nomenclature for birds follows AOU Checklist (Pyle 2014); 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).

Waupee Lake Swamp RNA is located in the Laurentian Mixed Forest Province (212), Northern Great Lakes Section (212T), Subsection Athelstane Sandy Outwash and Moraines (212Tc), of the Ecological Units of the Eastern United States (Cleland et al. 2007). It includes Land Type Association[s] (LTA[s]) Waupee Knolls (Tc04) and Butler Plains (Tc03).

(2) PLANT COMMUNITY TYPES

Two-thirds of the area of Waupee Lake Swamp RNA is wetland plant community types.

Most of the forested swamp (vegetation type 18 in Figure 5) surrounding Waupee Lake is dominated by northern white cedar (Figure 2). Associated trees include tamarack (*see Table 4 for scientific names*), black spruce, balsam fir, black ash, red maple, paper birch, yellow birch, and eastern hemlock. A few scattered super-canopy white pine and red pine are present. Characteristic

ground flora includes bunchberry, creeping snowberry, three-leaved goldthread, Labrador-tea, and cinnamon fern (Epstein 1986). Overall, the swamps of this area have moderate plant species richness except around Waupee Lake, which apparently benefits from calcareous groundwater inputs giving it an unusually high number of unique plant species (Janke 1998).

Emergent and floating-leaved vegetation is present along the lake margins and across portions of its surface. Species include softstem bulrush, cattail, and American white waterlily (Epstein 1986).

Surrounding the lake are open wetlands dominated by sedges, bulrushes, bluejoint grass and other grasses, with scattered trees (Figure 1). Associate species include eastern marsh fern, marsh cinquefoil, blueflag iris, and poison sumac.

The surrounding upland forests support sugar maple, quaking aspen, balsam fir, and eastern hemlock. East of the lake and swamp are slightly higher areas dominated by eastern hemlock and eastern white pine.

Table 2. Natural vegetation community types within Waupee Lake Swamp RNA using systems using common classification systems for Wisconsin (Curtis 1959 and Kotar et al. 2002) and NGDC (2012)

Community Type (Curtis 1959)	Habitat Types (Kotar et al. 2002)	Dominant Species	NVCS Associations *(NGDC 2012)
Northern dry-mesic forest	AQVib	red oak, sugar maple, white pine	Pinus strobus - (Pinus resinosa) - Quercus rubra Forest C EGL002480
Northern mesic forest	TMC	eastern hemlock, yellow birch, white pine	Tsuga canadensis - (Betula alleghaniensis) EGL002598
Northern wet-mesic forest	N/A	Northern white cedar, black spruce, balsam fir	Thuja occidentalis - (Larix laricina) Seepage Forest C EGL002455
Northern wet-mesic forest	N/A	Black ash, white cedar, balsam fir	Acer rubrum - Fraxinus spp. - Betula papyrifera / Cornus canadensis Forest C EGL002071
Northern wet forest	N/A	black spruce, tamarack	Picea mariana-(Larix laricina)/ Ledum groenlandicum/Sphagnum spp Forest C EGL005271
Open bog	N/A	leatherleaf, Labrador tea, bog laurel	Chamaedaphne calyculata - Ledum groenlandicum - Kalmia polifolia Bog Dwarf-shrubland C EGL005278
Northern sedge meadow	N/A	Blue-joint grass	Calamagrostis canadensis - Eupatorium maculatum Herbaceous Vegetation C EGL005174
Lake- shallow, hard, seepage (Waupee)	N/A	White water lily, bullhead lily - emergent	Nymphaea odorata - Nuphar (microphylla, variegata) Herbaceous Vegetation C EGL002562

* These National Vegetation Classification System associations are initial approximations - further review needed.

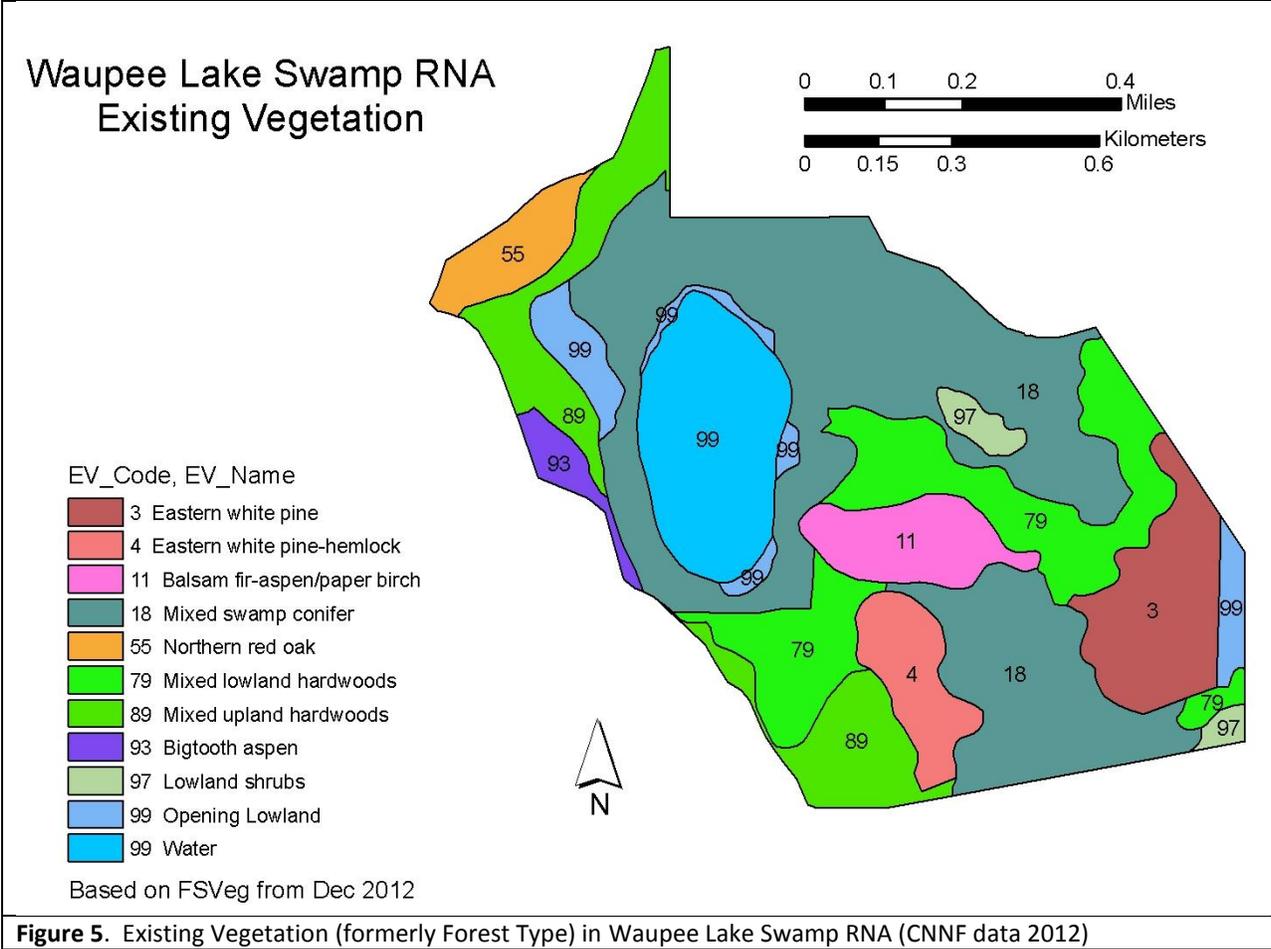


Table 3. USDA FS cover types in Waupee Lake Swamp RNA and key to Figure 5

EV Code	Existing Vegetation (EV)	Acres	Hectares
3	Eastern white pine	24.4	9.9
4	Eastern white pine-hemlock	13.0	5.3
11	Balsam fir-aspen/paper birch	15.1	6.1
18	Mixed swamp conifer	130.6	52.9
55	Northern red oak	10.2	4.1
79	Mixed lowland hardwoods	48.9	19.7
89	Mixed upland hardwoods	35.8	14.5
93	Bigtooth aspen	4.8	1.9
97	Lowland shrubs	4.8	1.9
99	Opening Lowland	13.9	5.7
	Water	33.8	13.7
Grand Total		335.3	135.7

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

(A) FLORA LIST

The flora list in Table 4 was compiled from several field visits between 1981 and 2003 by both state and CNNF ecologists.

Table 4. Flora of Waupee Lake Swamp RNA (USDA NRCS PLANTS 2012)

Waupee Lake Swamp RNA Vascular Plant List *		Waupee Lake Swamp RNA Vascular Plant List *	
Scientific name	Common Name	Scientific name	Common Name
<i>Abies balsamea</i>	balsam fir	<i>Coptis trifolia</i>	threeleaf goldthread
<i>Acer rubrum</i>	red maple	<i>Corallorhiza trifida</i>	yellow coralroot
<i>Acer saccharum</i>	sugar maple	<i>Cornus canadensis</i>	bunchberry
<i>Acer spicatum</i>	mountain maple	<i>Cornus rugosa</i>	roundleaf dogwood
<i>Alnus incana</i>	gray alder	<i>Cornus sericea</i>	red osier dogwood
<i>Amelanchier arborea</i>	downy serviceberry	<i>Corylus cornuta</i>	beaked hazelnut
<i>Amerorchis rotundifolia</i>	roundleaf orchid	<i>Cypripedium acaule</i>	pink lady's slipper
<i>Amorpha fruticosa</i>	false indigo	<i>Cypripedium arietinum</i>	ram's-head lady's slipper
<i>Amphicarpaea bracteata</i>	hog peanut	<i>Cypripedium parviflorum</i> <i>v. pubescens</i>	greater yellow lady's slipper
<i>Andromeda glaucophylla</i>	bog rosemary	<i>Cypripedium reginae</i>	showy lady's slipper
<i>Anemone quinquefolia</i>	woods anemone	<i>Drosera rotundifolia</i>	roundleaf sundew
<i>Aralia nudicaulis</i>	wild sarsaparilla	<i>Dryopteris cristata</i>	crested wood fern
<i>Asclepias exaltata</i>	poke milkweed	<i>Equisetum fluviatile</i>	water horsetail
<i>Asclepias incarnata</i>	swamp milkweed	<i>Equisetum scirpioides</i>	dwarf scouring rush
<i>Aster macrophyllus</i>	bigleaf aster	<i>Equisetum sylvaticum</i>	woodland horsetail
<i>Athyrium filix-femina</i>	lady fern	<i>Fagus grandifolia</i>	American beech
<i>Betula alleghaniensis</i>	yellow birch	<i>Fragaria virginiana</i>	strawberry
<i>Betula papyrifera</i>	paper birch	<i>Fraxinus nigra</i>	black ash
<i>Botrychium virginianum</i>	rattlesnake fern	<i>Gaultheria hispidula</i>	creeping snowberry
<i>Calamagrostis canadensis</i>	bluejoint grass	<i>Gaultheria procumbens</i>	wintergreen
<i>Calopogon tuberosus</i>	tuberous grasspink	<i>Gaylussacia baccata</i>	black huckleberry
<i>Caltha palustris</i>	marsh marigold	<i>Geum rivale</i>	purple avens
<i>Campanula aparinoides</i>	marsh bellflower	<i>Gymnocarpium dryopteris</i>	oak fern
<i>Cardamine pratensis</i>	cuckoo flower	<i>Hamamelis virginiana</i>	American witch-hazel
<i>Carex comosa</i>	longhair sedge	<i>Huperzia lucidula</i>	shining club-moss
<i>Carex disperma</i>	softleaf sedge	<i>Ilex verticillata</i>	common winterberry
<i>Carex gracillima</i>	graceful sedge	<i>Impatiens capensis</i>	jewelweed
<i>Carex gynocrates</i>	northern bog sedge	<i>Iris versicolor</i>	harlequin blueflag
<i>Carex intumescens</i>	greater bladder sedge	<i>Juglans cinerea</i>	butternut
<i>Carex lacustris</i>	common lake sedge	<i>Kalmia polifolia</i>	bog laurel
<i>Carex limosa</i>	mud sedge	<i>Larix laricina</i>	tamarack
<i>Carex pensylvanica</i>	Pennsylvania sedge	<i>Ledum groenlandicum</i>	Labrador tea
<i>Carex prairea</i>	prairie sedge	<i>Listera cordata</i>	heartleaf twayblade
<i>Carex stricta</i>	tussock sedge	<i>Lonicera canadensis</i>	American fly honeysuckle
<i>Carex trisperma</i>	threeseeded sedge	<i>Lonicera reticulata</i>	grape honeysuckle
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Lycopodium annotinum</i>	stiff clubmoss
<i>Circaea alpina</i>	dwarf enchanter's nightshade	<i>Lycopodium clavatum</i>	running clubmoss
<i>Clintonia borealis</i>	bluebead lily		

Waupee Lake Swamp RNA Vascular Plant List *	
Scientific name	Common Name
<i>Lysimachia thyrsiflora</i>	tufted loosestrife
<i>Maianthemum canadense</i>	Canada mayflower
<i>Malaxis brachypoda</i>	white adder's-mouth orchid
<i>Menyanthes trifoliata</i>	buckbean
<i>Mitella nuda</i>	naked miterwort
<i>Monotropa hypopithys</i>	pinemap
<i>Nuphar variegata</i>	bullhead lily
<i>Nymphaea odorata</i>	American white waterlily
<i>Onoclea sensibilis</i>	sensitive fern
<i>Orthilia secunda</i>	sidebells shinleaf
<i>Osmunda cinnamomea</i>	cinnamon fern
<i>Osmunda regalis</i>	royal fern
<i>Ostrya virginiana</i>	ironwood (hophornbeam)
<i>Oxalis montana</i>	mountain wood sorrel
<i>Pedicularis lanceolata</i>	swamp betony
<i>Phragmites australis</i>	common reed
<i>Picea glauca</i>	white spruce
<i>Picea mariana</i>	black spruce
<i>Pinus resinosa</i>	red pine
<i>Pinus strobus</i>	eastern white pine
<i>Platanthera dilatata</i>	white bog orchid
<i>Platanthera hyperborea</i>	northern bog orchid
<i>Platanthera clavellata</i>	small green wood orchid
<i>Platanthera obtusata</i>	bluntleaf orchid
<i>Polygala paucifolia</i>	gaywings
<i>Potentilla palustris</i>	marsh cinquefoil
<i>Pteridium aquilinum</i>	bracken fern
<i>Quercus rubra</i>	red oak
<i>Rhamnus alnifolia</i>	alderleaf buckthorn
<i>Ribes lacustre</i>	prickly currant

Waupee Lake Swamp RNA Vascular Plant List *	
Scientific name	Common Name
<i>Rubus allegheniensis</i>	blackberry
<i>Rubus hispidus</i>	bristly dewberry
<i>Rubus idaeus</i>	red raspberry
<i>Rumex orbiculatus</i>	greater water dock
<i>Sambucus racemosa</i>	red elderberry
<i>Sarracenia purpurea</i>	purple pitcherplant
<i>Saxifraga pensylvanica</i>	swamp saxifrage
<i>Schoenoplectus tabernaemontani</i>	softstem bulrush
<i>Scutellaria galericulata</i>	marsh skullcap
<i>Maianthemum trifolia</i>	threeleaf false lily-of-the-valley
<i>Symplocarpus foetidus</i>	skunk cabbage
<i>Thelypteris palustris</i>	eastern marsh fern
<i>Thuja occidentalis</i>	northern white cedar
<i>Toxicodendron radicans</i>	poison ivy
<i>Toxicodendron vernix</i>	poison sumac
<i>Trientalis borealis</i>	starflower
<i>Triglochin maritima</i>	seaside arrowgrass
<i>Trillium cernuum</i>	nodding trillium
<i>Tsuga canadensis</i>	eastern hemlock
<i>Typha latifolia</i>	broadleaf cattail
<i>Utricularia minor</i>	lesser bladderwort
<i>Vaccinium angustifolium</i>	lowbush blueberry
<i>Vaccinium macrocarpon</i>	cranberry
<i>Vaccinium myrtilloides</i>	velvet-leaf blueberry
<i>Viola canadensis</i>	Canadian white violet
<i>Viola macloskeyi</i>	smooth white violet
<i>Woodsia ilvensis</i>	rusty woodsia fern

* Janke 1996; Hoffman 1999

(B) FAUNA LIST

Waupee Lake Swamp RNA has not had a detailed faunal inventory. Common mammals of the area include snowshoe hare (*Lepus americanus*), red squirrel (*Tamiasciurus hudsonicus*), white-tailed deer (*Odocoileus virginiana*), and black bear (*Ursus americanus*) (Epstein 1986). Waupee Lake is a shallow lake and does not support a significant fishery.

The bird list in Table 5 is a compilation of species that were recorded during the Nicolet Breeding Bird Survey since 1988 (Nicolet BBS 2004).

Table 5. Avi-Fauna of Waupee Lake Swamp RNA Names: AOU Checklist Pyle 1983

Waupee Lake Swamp RNA Bird List	
Common Name	Scientific Name
northern goshawk	<i>Accipiter gentilis</i>

Waupee Lake Swamp RNA Bird List	
Common Name	Scientific Name
red-shouldered hawk	<i>Buteo lineatus</i>
osprey	<i>Pandion haliaetus</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Turkey vulture	<i>Cathartes aura</i>
Mallard	<i>Anas platyrhynchos</i>
Wild turkey	<i>Meleagris gallopavo</i>
Northern flicker	<i>Colaptes auratus</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Downy woodpecker	<i>Picoides pubescens</i>
Eastern wood pewee	<i>Contopus virens</i>
Great-crested flycatcher	<i>Myiarchus crinitus</i>
Least flycatcher	<i>Empidonax minimus</i>
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>
Blue-headed vireo	<i>Vireo solitarius</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Common raven	<i>Corvus corax</i>
Blue jay	<i>Cyanocitta cristata</i>
Black-capped chickadee	<i>Poecile atricapillus</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>
Golden-crowned kinglet	<i>Regulus satrapa</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Wood thrush	<i>Hylocichla mustelina</i>
Swainson's thrush	<i>Catharus ustulatus</i>
Veery	<i>Catharus fuscescens</i>
Blackburnian warbler	<i>Setophaga fusca</i>
Black-throated green warbler	<i>Setophaga virens</i>
Mourning warbler	<i>Geothlypis philadelphia</i>
Black and white warbler	<i>Mniotilta varia</i>
Northern parula	<i>Setophaga americana</i>
Golden-winged warbler	<i>Vermivora chrysoptera</i>
Nashville warbler	<i>Orethlypis ruficapilla</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Canada warbler	<i>Cardellina canadensis</i>
Scarlet tanager	<i>Piranga olivacea</i>
Song sparrow	<i>Melospiza melodia</i>
American tree sparrow	<i>Spizella arborea</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
Purple finch	<i>Haemorhous purpureus</i>
Evening grosbeak	<i>Coccothraustes vespertinus</i>

(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).

The RNA is underlain by precambrian metamorphic rock and topography is mostly level with a gentle slope on the west side of Waupee Lake. Because the area was glaciated during the Pleistocene, there are no surface exposures of this rock within the RNA. The present surface material was deposited by the Green Bay lobe during the middle Woodfordian substage of the Wisconsin ice advance (Chadde 1997). Geomorphologic processes were glacial meltwater deposition (WI DNR 2003). Glacial sediment is less than 30 meters thick and landforms include ground moraine and outwash plains.

(D) SOILS

Soils are loamy sand over sand. Nutrient status is poor and moisture regime is dry to dry-mesic. Upland soils of the RNA are deep, moderately well-drained and formed in sandy loam aeolian material overlying loamy sand glacial till. The area is covered by 0.5 meter or more of wind-blown sand (USDA Forest Service 2003a). Wetland soils east of Waupee Lake are organic, very poorly drained, slightly acid to neutral and derived from woody and herbaceous plant material.

(E) TOPOGRAPHY

Characteristic landform is nearly level outwash plain and rolling collapsed outwash plains with remnant moraines. Elevation throughout the site varies by only thirty feet (10 m). The *Boundary Map* in the Identification Section shows 10-foot contour intervals.

(F) AQUATIC/RIPARIAN

The 34-acre (14 ha) Waupee Lake is a hard-water seepage lake with a maximum depth of 5 feet (1.5 m) with a muck bottom substrate (Carlson et al. 1977). The lake's shoreline is 90 percent coniferous wetland and the entire littoral zone is silt. Waterfowl make moderate use of the lake during migration. Emergent vegetation occupies sixty percent of the lake basin.

Waupee Lake has an intermittent outlet at the south end, which drains south through a large wetland area to Little Waupee Creek, a tributary of the North Branch Oconto River.

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

There are no federally endangered or threatened species within Waupee Lake Swamp RNA. Species currently or formerly tracked by Natural Heritage Inventory are listed in Table 6. Surveys for other taxon are needed.

Table 6. Threatened, Regional Forester Sensitive, and rare species in Waupee Lake Swamp RNA, State status and Natural Heritage rank and Regional Forester listing if applicable

Common Name	Scientific Name	Global Rank, State Status, Heritage Rank ¹
Plants		
roundleaf orchid	<i>Amerorchis rotundifolia</i>	G5 THR S1S2
ram's head lady's-slipper	<i>Cypripedium arietinum</i>	G3 THR S2
showy lady's-slipper	<i>Cypripedium reginae</i>	G4 S4 (no longer state-listed but data still collected 2014)
Birds		
northern goshawk	<i>Accipiter gentilis</i>	G5 SC/M S2B S2N (U.S. Species of Concern)
red-shouldered hawk	<i>Buteo lineatus</i>	G5 THR S3S4B, S1N
osprey	<i>Pandion haliaetus</i>	G5 SC/M S4B; Regional Forester Sensitive for CNNF
swainson's thrush	<i>Catharus ustulatus</i>	G5 SC/M S2B
golden-winged warbler	<i>Vermivora chrysoptera</i>	G4 SC/M S3S4B (not actively tracked but data still collected 2014) (U.S. Species of Concern)
yellow-billed cuckoo	<i>Coccyzus americanus</i>	G5 SC/M S3B (not actively tracked but data still collected 2014)
veery	<i>Catharus fuscescens</i>	G5 SC/M S3S4B (not actively tracked but data still collected 2014)
yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	G5 SC/M S3S4B (not actively tracked but data still collected 2014)

¹ see Appendix 4: *Wisconsin Natural Heritage Working List – Rank Definitions 2014*



Figure 6. Roundleaf orchid, (*Amerorchis rotundifolia*), a State Threatened species. Photo by Steve Janke 1998

(H) LIST OF RARE ELEMENTS AND RARE PLANT COMMUNITIES

Table 7. List of Rare Plant Communities within Waupee Lake Swamp RNA

Community Name	Global Rank	State Rank ¹
northern dry-mesic forest	G4	S3
northern wet forest	G4	S4
northern wet-mesic forest	G3?	S3S4
northern sedge meadow	G4	S3
lake - shallow, hard, seepage	GNR	SU

¹ see Appendix 4: *Natural Heritage Working List-Rank Definitions* (WI DNR 2014)

C. RESOURCE INFORMATION

This section discusses resources that occur in the RNA framed within the *context of potentially conflicting uses* - where future conflicts may arise. Waupee Lake Swamp RNA is owned by the United States government and is administered by the USDA Forest Service, Chequamegon-Nicolet National Forest.

Few resource conflicts are anticipated. National Forest lands surrounding Waupee Lake Swamp RNA to the west are assigned Management Area 4B- Conifer: natural pine-oak within a non-motorized designation with full vegetation management. While timber harvest does occur in MA 4B, landscape heterogeneity is low and a relatively continuous canopy is maintained until regeneration harvests are applied. The lands to the east are in Special Management Area (8F) (Figure 4) where only natural disturbance and small-scale management such as trail clearing occurs (USDA Forest Service 2004a pgs 3-17 & 3-53). There is a forty acre (16 ha) tract of private land adjacent to the RNA boundary on the north. See Section F (1) for further discussion of management issues.

(1) MINERALS

The mineral estate within the RNA is all federally owned and is administered by Bureau of Land Management. The lands are open for prospecting. There are currently no active prospecting permits within the RNA. The RNA has low potential for hardrock prospecting to occur based on geology and the lack of recent hardrock prospecting permit activity in Oconto County.

(2) GRAZING

Grazing is not allowed in RNAs per Forest Service Manual direction. No grazing occurs on the Chequamegon-Nicolet National Forest. The 2004 CNNF Forest Plan includes a standard that prohibits grazing in Research Natural Areas if a grazing permit were to be requested (Appendix 3 - *Forest Management Area Direction*).

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

Waupee Lake Swamp harbors several rare plants (Table 6) and designation as an RNA will help protect their habitat.

The total forested acreage in the RNA is 283 (114 hectares), one third of which is upland forest. Most of the upland forest types are on the western edge between the swamp and a woods road (Figure 5 and Table 3). These are forest vegetation types that would be managed elsewhere on the CNNF.

Seventy percent of the RNA is lowland swamp, marsh, or open bog with a few small islands of upland trees. Due to regeneration concerns, the CNNF does not harvest lowland black spruce, northern white cedar, or tamarack forest types.



Figure 7. Much of Waupee Lake Swamp RNA is conifer swamp forest such as this area northeast of Waupee Lake dominated by tamarack and black spruce. This is the habitat of the seaside arrowgrass (*Triglochin maritima*) a species not commonly encountered on the CNNF. Photo by Steve Janke 2011.

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.

Waupee Lake Swamp was designated as a Tribal RNA in 2004 (Tribal-USDA MOU). The tribes impose restrictions on gathering within Tribal RNAs. See Section d(2) -*Cultural/Heritage* for further discussion.

(4) WATERSHED VALUES

Waupee Lake Swamp RNA lies within the Lower North Branch Oconto River Watershed in the Green Bay Basin (WI DNR 2013). It is a portion of a vast wetland that extends over thousands of acres to the southeast. RNA designation will help protect and maintain the watershed quality. In addition, designation will help protect the wetland habitat that supports numerous rare plants and animals.

(5) RECREATION USE

The RNA falls within a designated non-motorized area (USDA Forest Service 2004a). Human use of the area is low in most of the swamps surrounding Waupee Lake. Most use is by hunters on foot. A checkup of the RNA in 2000 found evidence of legal ground-level deer hunting blinds constructed of deadfall branches.

The shallow lake contains only small forage fish so is not utilized by fisherman. A snowmobile trail extends along the north-south unimproved road on the west boundary of the RNA. The district plans to close this trail as part of the Lakewood Southeast vegetation project started in 2013.

(6) WILDLIFE

Waupee Lake Swamp RNA harbors several uncommon and rare birds (Table 6). RNA designation will help protect and maintain populations and habitats of the site’s rare fauna. The larger swamp, of which the RNA is a part, is an historic winter concentration area for white-tailed deer and deer use is expected into the future. Browsing is evident on understory shrubs and trees within the RNA. Waterfowl utilize Waupee Lake during fall migration. Consequently, the area is used most heavily by the public in fall during deer and duck hunting seasons.

(7) TRANSPORTATION/ROAD SYSTEM

The current rule guiding motorized access is contained in the Travel Management Project Decision Notice via a Motorized Vehicle Use Map for 2014 (MVUM 2014). This map shows roads available for motorized use. No new roads or trails are planned. Lands adjacent to the RNA on the west are within a designated non-motorized area (see *Location Map*) with full vegetation management. The snowmobile trail adjacent to the RNA will be closed with the *Lakewood Southwest* vegetation project initiated in 2013.

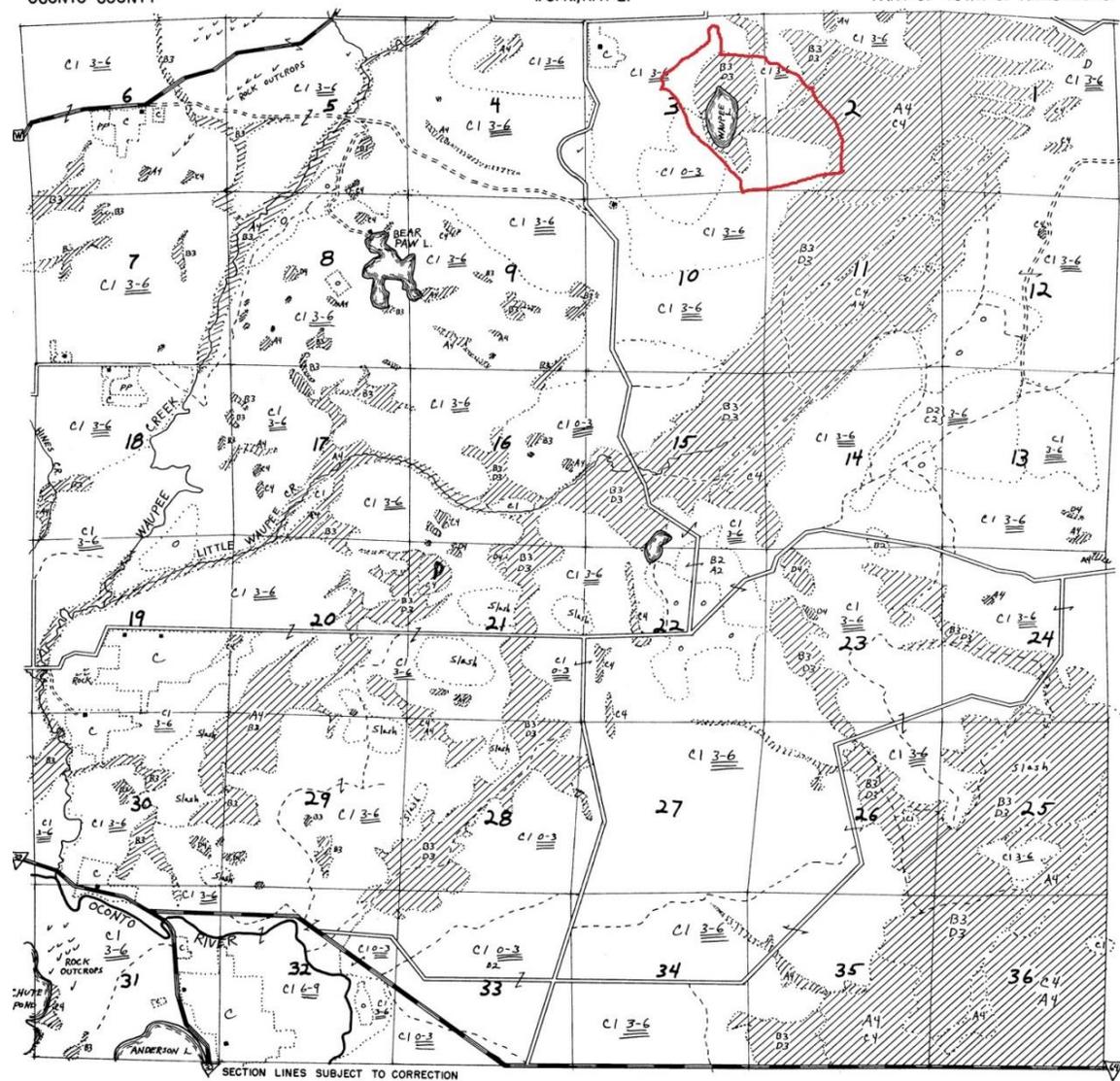
D. HISTORICAL INFORMATION

WISCONSIN LAND INVENTORY

LAND COVER MAP
T. 31 N., R. 17 E.

OCONTO COUNTY

PART OF TOWN OF ARMSTRONG



SECTION LINES SUBJECT TO CORRECTION

LEGEND

UPLAND FOREST NUMERALS 1-2	LOWLAND FOREST ALL NUMERALS 3	NON-TILLABLE A-PP-CR-3P-E1-A-CR-E4-A	INFERIOR FOREST POORLY STOCKED WOODLAND B-1 D3-D5-D6	OPEN SWAMP ALL NUMERALS 5-6	TILLABLE LAND C-CS-P	ALL SWAMP LAND NUMERALS 5-6	
FOREST PLANTING RECOMMENDED							
LAND COVER							
A COVER BOUNDARY	C CLEARED CROP LAND	D3 BALSAM	ROADS				
A2 ABANDONED	C1 POPPLE WITH WHITE BIRCH	D4 LEATHER LEAF	FEDERAL HIGHWAY	STATE HIGHWAY	COUNTY HIGHWAY	IMPROVEMENTS	
A1 UPLAND HARDWOODS	C1 INFERIOR C1	D5 RECENT BURN	HARD SURFACED ROAD	IMPROVED GRAVEL ROAD	UNIMPROVED GRAVEL ROAD		
A2 HICKORY WITH HARDWOOD	C2 HORNBY PINE	D6 DEAD TIMBER	IMPROVED DIRT ROAD	UNIMPROVED DIRT ROAD	TRAIL		
A3 SWAMP HARDWOODS	C3 TAMARACK	E1 PIN CHERRY	DRIVABLE FIRE LANE	NON-DRIVABLE FIRE LANE	TELEPHONE LINE		
A4 FAGALDER, WILLOW, DOGWOOD ETC	C4 GRASS MARSH	E4 WEEDY PEAT	POWER LINE	RAILROAD	ABANDONED RAILROAD		
B BIRCH	C5 SEDGE MARSH	F4 CRANBERRY MARSH	WOODED AREAS				
B1 HARDWOOD WITH CONIFERS	C6 CULTIVATED STUMP LAND	FP FOREST PLANTATION	DENSITY OF STAND	DIAMETER CLASSES			
B2 INFERIOR B1	C7 POOR LAND PREVIOUSLY CROPPED	P PASTURE	IS INDICATED BY THE LINE OR	NUMERALS 0-3, 3-8 ETC. PLACED			
B3 WHITE PINE	D SOUR OAK	PERM. PASTURE	LINES BELOW THE DIAMETER	AFTER A TIMBER SYMBOL (D18 D2)			
B4 CAT TAIL MARSH	D1 MED. CEDAR	STUMP PASTURE	D1 IS ONE LINE-GOOD STAND	INDICATED IN INCHES THE AVERAGE			
	D2 JACK PINE	TG TRUCK GARDEN	D2 IS TWO LINES-MEDIUM STAND	DIAMETER OF THE TREES			
	D3 BLACK SPRUCE		D3 IS THREE LINES-POOR STAND	BREAST HIGH (4 1/2 FT) WITHIN			
			D4 IS FOUR LINES-SCATTERED	A GIVEN COVER AREA			
MISCELLANEOUS SYMBOLS							
QUARRY	CEMETERY	GC GOLF COURSE	OCCUPIED HOUSE VACANT HOUSE SUMMER HOME OCCUPIED SCHOOL VACANT SCHOOL CHURCH TOWN HALL CHEESE FACTORY CREAMERY FILLING STATION OR GARAGE STORE TAVERN HOTEL SAW MILL GRIST MILL FARM BLDG LESS THAN 100 FT FROM CENTER OF ROAD LOGGING CAMP INDICATES NO OF HOUSES IN A GROUP 30 INDICATES THE NUMBER OF FEET BUILDING IS LOCATED FROM CENTER OF ROAD				
HARDWOOD PIT	QUARRY	NURSERY					
SPRING	EMBANKMENT	BD BEAVER DAM					
FUR FARM	FIRE TOWER	PD PUBLIC DUMP					
DRAINAGE DITCH	INTERMITTENT STREAM	O ORCHARD					
		CIVIL TOWN BOUNDARY					

Figure 8. A vegetation cover map from 1942 with the approximate boundary of Waupee Lake Swamp
28 Establishment Record Waupee Lake Swamp RNA, Chequamegon-Nicolet National Forest, WI

RNA annotated in red. This map indicates the uplands contain aspen and paper birch trees less than 6 inches (15 cm) DBH that were cut prior to 1942; likely in the early 1900s (UWDC 2011)

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

Research/Education Use:

Waupee Lake Swamp RNA and surrounding area have been utilized by universities and researchers. Among them are The Wisconsin Society for Ornithology (Cutright et al 2006), Dr. Robert W. Howe (Howe et al -*several references*), and the Coffrin Institute for Biodiversity (University of Wisconsin-Green Bay). The RNA contains a survey point for the Nicolet Breeding Bird Survey that has gathered data continuously for twenty-six years (Nicolet BBS 2004). Bird Survey results have contributed to at least 11 Master's theses, 2 Ph.D. theses, and more than 15 scientific publications. A copy of this list is available from the CNNF RNA coordinator.

History of establishment:

The site's significant natural values were first documented in 1981 by Wisconsin Department of Natural Resources biologists conducting an inventory of natural areas in Oconto County. In 1982 biologists surveyed the wetlands adjacent to Waupee Lake as part of a rare plant survey for the (then) Nicolet National Forest. The area was included on a list of candidate research natural areas in the Nicolet National Forest Land and Resource Management Plan in 1986. An establishment record was drafted but never completed at that time.

The Chequamegon-Nicolet National Forest began a forest-wide ecological inventory to identify high quality ecological features in the early 1990s (Parker 1999). Waupee Lake Swamp was one of the highest ranking sites based on its ecological values. 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 Wisconsin Department of Natural Resources is also interested in achieving ecosystem representation within the State Natural Area Network. They signed a Memorandum of Understanding 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.

Waupee Lake Swamp was again identified as a Candidate RNA in the 2004 CNNF Draft Forest Plan and analyzed in the Environmental Impact Statement. It was recommended for designation as a Research Natural Area in the 2004 CNNF Forest 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 Waupee Lake Swamp for establishment.

(2) CULTURAL/HERITAGE

USDA Forest Service cultural resource information indicates there are no known cultural sites recorded in Waupee Lake RNA (USDA Forest Service 2003b).

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.

Waupee Lake Swamp RNA was adopted as an Ojibwe Tribal RNA in 2004 and requires that tribal members follow the gathering restrictions in the Memorandum of Understanding with the USDA Forest Service (Tribal-USDA MOU). 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. 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". Gathering of small amounts of nuts, roots, and fruits is allowed in RNAs. Other botanical products can be gathered by members for ceremonial use with special permission from tribal authorities.

(3) DISTURBANCE HISTORY

Most of the northern white cedar swamps have a history of cutting, and a small portion of a cedar swamp was strip cut in the early 1970s (Janke 1998). Clearcutting in the late 1970's created some 5-15 acre (2-6 ha) seral stage patches of aspen and paper birch on the western edge of the RNA. A cleared land line running north-south is present in the private land at the north end of Waupee Lake and appears to continue south beyond the property marker to the open bog area at the north end of the lake. This extended cleared line strikes the edge of a population of the state-threatened roundleaf orchid within the RNA. The age of the line is not known but the orchids appear unaffected.

CNNF lands to the west of the RNA are included in the *Lakewood Southeast* vegetation project begun in 2013. Timber harvesting will be through selection cutting and shelterwood methods. Information on specific prescriptions can be obtained from the Lakewood office of the CNNF.

(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 RNA was last checked for problems such as exotic species in 2000 and none were noted. RNAs on the CNNF are monitored on an infrequent basis but are high priority areas to control invasives if they are discovered.

E. OTHER INFORMATION

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

The site contains a survey point for the Nicolet Breeding Bird Survey that has gathered data continuously for twenty-six years (Nicolet BBS 2004).

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 and reports and journal articles that resulted from study within this RNA are listed in Appendix 2 – *Bibliography*.

(3) POTENTIAL RESEARCH TOPICS

This would be a good area to study ecological aspects of the flora and fauna of this large contiguous complex of wetland communities. Areas of focus include: northern white cedar regeneration, bats, insects, amphibians, reptiles, birds, rare plants, water chemistry, and wetland ecological adaptation to climate change.

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 2011).

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

(1) POTENTIAL OR EXISTING CONFLICTS; PRINCIPAL MANAGEMENT ISSUES

Waupee Lake Swamp RNA falls within a non-motorized designation with full vegetation management (see *Location Map*). National Forest lands surrounding the RNA to the west are assigned to Management Area 4B- *Conifer: natural pine-oak* in the 2004 CNNF Forest Plan. While timber harvest does occur in MA 4B, landscape heterogeneity is low and a relatively continuous

canopy is maintained until regeneration harvests are applied. The *Lakewood Southeast* vegetation management project begun in 2013 (USDA Forest Service 2013) utilizes shelterwood and selection-cut methods on the lands across a woods road to the west of the RNA. Specific management prescriptions must be obtained from the Lakewood district office of the CNNF.

Closure of the forest road on the western border as planned in the *Lakewood Southeast* project will provide protection of sensitive plants and animals from possible illegal off-road vehicle use. Protection and maintenance of Waupee Lake Swamp RNA is the responsibility of the Lakewood-Laona Ranger District, Chequamegon-Nicolet National Forest.

The lands to the east of the RNA are assigned to Special Management Area (8F) (Figure 4) where only natural disturbance and small-scale management such as trail clearing occurs (USDA Forest Service 2002a pgs 3-17 & 3-53). There is no activity planned adjacent to the RNA.

There is private property adjacent to the RNA boundary on the north but there are no known issues at this time. The eastern and southern boundaries are protected by a Forest Special Management Area designation.

(2) SPECIAL MANAGEMENT AREA IF THE RESEARCH NATURAL AREA IS WITHIN ONE

The Waupee Lake Swamp RNA is does not include any lands designated by congress in any special management category.

G. PHOTOGRAPHS

All photographs used in this Establishment Record are the property of the Chequamegon-Nicolet National Forest but not copyrighted. Older slide photos were scanned in some cases and are with the site file housed in the Park Falls office of the CNNF. An electronic file is part of this establishment record.

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:

BCPL: Board of Commissioners of Public Lands. 2004. Wisconsin Public Land Survey Records: Original Field Notes. Available online <http://bcpl.state.wi.us/asx/> [Accessed October 2004]

Carlson, H; Andrews, L; Threinen, C. 1977. Surface Water Resources of Oconto County. Wisconsin Department of Natural Resources, Madison.

Chadde, S. 1997. Draft Establishment Record for Waupee Lake Research Natural Area. On file in Park Falls, WI.

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. 1981. Scientific and Natural Area Data Sheet. On file Wisconsin Dept. of Natural Resources, Bureau of Endangered Resources, Madison WI.

Epstein, E. 1986. Evaluation Report: Waupee Lake Candidate Research Natural Area. On file Wisconsin Dept of Natural Resources, Bureau of Endangered Resources, Madison WI.

Hoffman, R. 1999. Unpublished project report on Waupee Lake.

Janke, S. 1998. Chequamegon-Nicolet National Forest Research Natural Area Evaluation Report: Waupee Lake. Unpublished reports on file in Park Falls Headquarters.

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://mrcc.isws.illinois.edu/> Accessed 2005. [Accessed October 2003]

Natureserve. 2014. NatureServe Web Service. Arlington, VA. U.S.A. Available online <http://services.natureserve.org>. [Accessed Nov 2014]

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. Available online: <http://www.uwgb.edu/birds/nnf/index.htm>

Nicolet National Forest. 1994. Environmental Assessment: Waupee Lake Candidate Research Natural Area. On file Wisconsin Dept of Natural Resources, Bureau of Endangered Resources, Madison WI.

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

Pyle, P., and D. DeSante. 2014. List of North American birds and alpha codes according to American Ornithologists' Union taxonomy through the 55th AOU Supplement Available online: <http://www.birdpop.org/alphacodes.htm> [Downloaded Dec 2014]

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. Available online: <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: <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. 2013. Lakewood Southeast Vegetation Management Project. Available online: <http://www.fs.usda.gov/projects/cnnf/landmanagement/projects>

USDA Forest Service. 2014. Motor Vehicle Use Map (MVUM) Decision Notice and Finding of No Significant Impact. Available online: <http://www.fs.usda.gov/cnnf>

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

UWDC. 2011. University of Wisconsin Digital Collection: Ecology and Natural Resources Collection. 1933 map reference: *Wisconsin State Planning Board, WPA, Wisconsin land Economic Inventory Division*. Available through the University of Wisconsin, Board of Regents of the University of

Wisconsin System, online digital photos and maps: <http://uwdc.library.wisc.edu/> [Accessed Jan 2014]

Watermolen, D.J.; M.D. Murrell. 2001. Checklists of Wisconsin Vertebrates (out of print). Wisconsin Department of Natural Resources. 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. http://wisconsingeologicalsurvey.org/ice_age.htm [Accessed Jan 2012]

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

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

WI DNR 2014. Natural Heritage Inventory, Wisconsin Department of Natural Resources Bureau of Endangered Resources. Online: <http://dnr.wi.gov/topic/nhi/> [Accessed Jan 2015]

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

Wisconsin History. 2012. Online database of Wisconsin Place Names. <http://www.wisconsinhistory.org/dictionary/index.as> [Accessed June 2012]

PUBLICATIONS FROM STUDIES ON RNA:

Cutright, N., B. Harriman, and R. Howe. 2006. The Atlas of Wisconsin Breeding Birds. Wisconsin Society for Ornithology, Milwaukee, WI. 642 pages.

Davis, J.H., R.W. Howe, and G. Davis. 2000. A multi-scale spatial analysis method for point data. *Landscape Ecology* 15:99-114.

Donovan, T. M., D. A. Clark, R. W. Howe, and B. J. Danielson. 1996. Metapopulations, sources and sinks, and the conservation of neotropical migratory birds in the midwest. In: Thompson, Frank R. III, (ed.) Management of midwestern landscapes for the conservation of neotropical migratory birds. Proceedings of 1995 December 5, Detroit, Michigan. Gen. Tech. Rep. NC-187: 41-52.

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., A.T. Wolf, and T. Rinaldi. 1994. Monitoring birds in a regional landscape: lessons from the Nicolet National Forest Bird Survey. pp. 83-92 in Ralph, C.J., J.Sauer, and S. Droege (eds.) Monitoring Bird Populations by Point Counts. Gen. Tech. Rep. PSW-GTR-149, Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, CA.

Howe, R.W., G. J. Davis, and V. Mosca. 1991. The demographic significance of "sink" populations. *Biological Conservation* 57:239-255.

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.

Howe, R.W., G. Niemi, and J.R. Probst. 1996. Management of northern forest landscapes for the conservation of Neotropical migratory birds. pp. 144-167 **in** Thompson, F.R.(ed.), Managing Midwest Landscapes for the Conservation of Neotropical Migratory Birds. Gen. Tech. Rep. Northwest Forest Experiment Station, Columbia, MO.

Howe, R.W., G.J. Niemi, S.J. Lewis, and D.A. Welsh. 1997. A standard method for monitoring songbird populations in the Great Lakes Region. *Passenger Pigeon* 59(3):183-194.

Niemi, G.J., J. Hanowski, P. Helle, R. Howe, M. Mönkönen, L. Venier, and D. Welsh. 1998. Ecological sustainability of birds in boreal forests. *Conservation Ecology* [online] 2(2):17.

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.

Steele, Y. (ed.). 2007. Important Bird Areas of Wisconsin: Critical Sites for the Conservation and Management of Wisconsin's Birds. Wisconsin Bird Conservation Initiative. Wisconsin Department of Natural Resources, Madison, WI. 240 pages.

Wolf, A.T., R.W. Howe, and G.J. Davis. 1994. Detectability of forest birds from stationary points. pp. 21-25 **in** Ralph, C.J., J. Sauer, and S. Droege (eds.) *Monitoring Bird Populations by Point Counts*. Gen. Tech. Rep. PSW-GTR-149, Pacific Southwest Research Station, Forest Service, USDA, Albany, CA.

APPENDIX 3 FOREST MANAGEMENT AREA DIRECTION

The management prescription for the Waupee Lake Swamp 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 was revised in 2014. 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 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

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 with many occurrences.

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

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

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.

SU = Possibly in peril in the state, but status is uncertain. More information needed.

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/topic/NHI/documents/NHIWorkingList.pdf> Last Revised: June 2014)

APPENDIX 5 CONTRIBUTORS

USDA Forest Service, Chequamegon-Nicolet National Forest

Linda Parker, Forest Ecologist, Supervisor's Office
Steve Janke, Plant Ecologist, Lakewood District Office
Deborah Veen, GIS Specialist, Supervisor's Office
Greg Knight, Forest Soil Scientist, Supervisor's Office,
Kim Potaracke, Assistant Forest Archeologist, Supervisor's Office
Randy Erickson, Land Surveyor, Supervisor's Office
David Campbell, Engineer - roads, Supervisor's Office
Mark Theisen, Forest Silviculturist, Supervisor's Office
Mary Lucas, Fire and Fuels Planner, Supervisor's Office

Other Agencies, Groups, and Individuals Consulted:

Craig Anderson, NHI Program Botanist, WI Department of Natural Resources, Madison WI
Eric Epstein, NHI Program Community Ecologist, WI Department of Natural Resources, Madison
Randy Hoffman, Conservation Biologist, WI Department of Natural Resources, Madison WI
Thomas Meyer, Conservation Biologist, WI Department of Natural Resources, Madison WI
Eunice Padley, Forest Ecologist, WI Department of Natural Resources, Madison WI
Bill Smith, NHI Program Zoologist, WI Department of Natural Resources, Madison WI
Sue M. Lietz, Forester, USFS Northern Research Station, Rhinelander WI

Eastern Region RNA Review Committee 2012:

Sue Lietz, Forester, Northern Research Station
Linda Parker, Ecologist, Chequamegon-Nicolet National Forest
Doug Chaltry, Regional Planner, Forest Service Eastern Region
Christel Kern, Research Forester, Northern Research Station
Jennifer Pontius, Research Assistant Professor, University of Vermont Rubenstein School of
Environment and Natural Resources and Research Ecologist, USDA Forest Service
Northern Research Station