

DESIGNATION ORDER

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

Echo Lake

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 Echo Lake Research Natural Area. It shall be comprised of 478 acres (193 hectares) of land in Forest and Vilas Counties, 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

10/22/14

Date

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Echo Lake

Research Natural Area

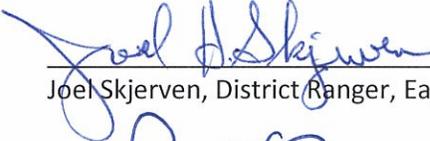
Chequamegon-Nicolet National Forest

Forest and Vilas Counties, 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:  Date 09/29/2014
Marjory E. Brzeskiewicz, Botanist, Chequamegon-Nicolet National Forest

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

Recommended by:  Date 10/15/14
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Recommended by:  Date 10/17/14
Paul I.V. Strong, Forest Supervisor, Chequamegon-Nicolet National Forest

Concurrence of:  Date 10.28.2014
Michael T. Rains, Station Director, Northern Research Station



United States
Department of
Agriculture

Forest
Service

March 2014

TITLE PAGE

Establishment Record for **Echo Lake** Research Natural Area



**Chequamegon-Nicolet National Forest,
Eagle River-Florence District,
Forest and Vilas Counties, Wisconsin**



Cover photo: A forested hill reflected in the waters of Echo Lake and the bog mat that surrounds the lake [photo: Mari Dallapiazza, 2012]

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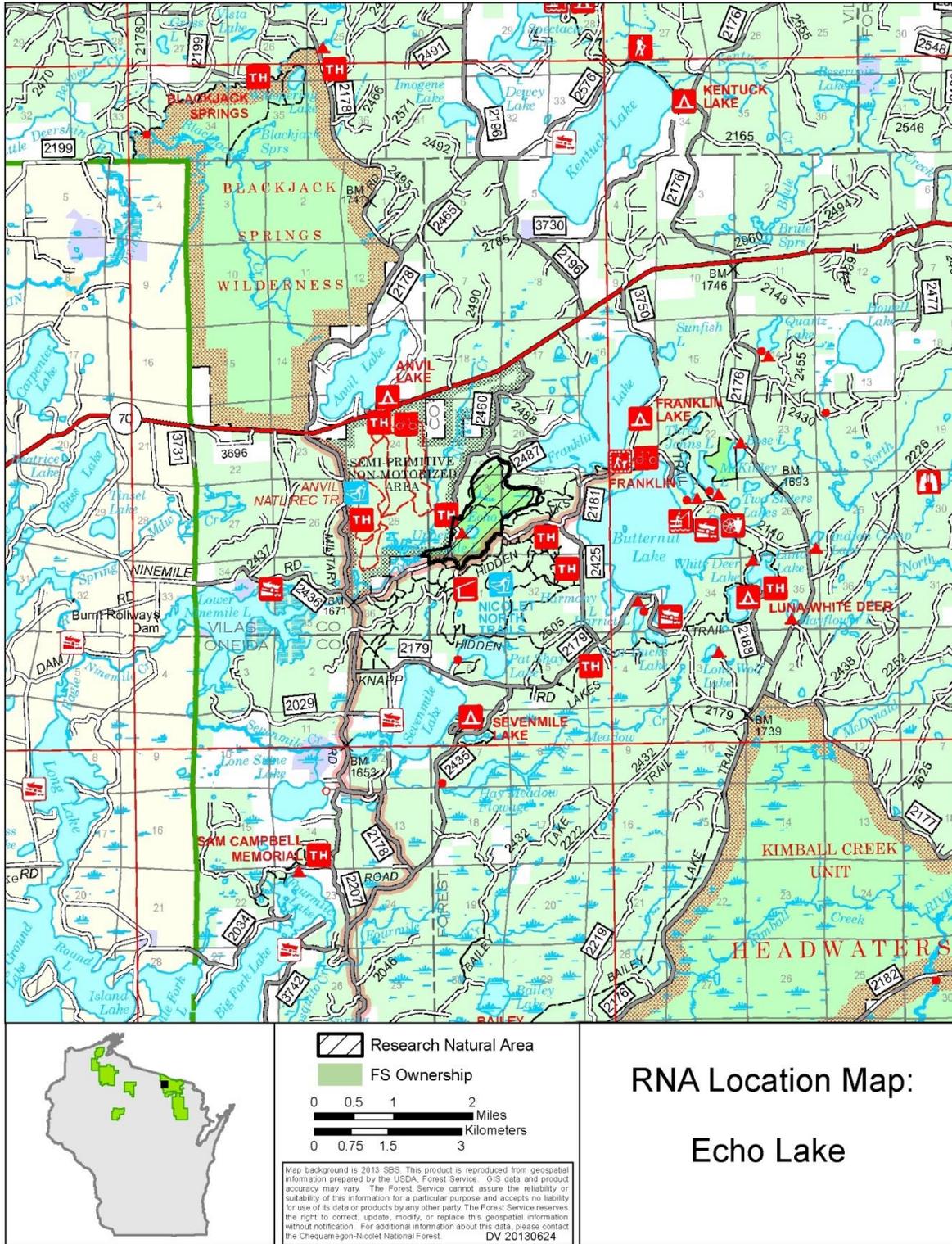
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Note: The Alpha/Numeric ordering in this document follows that within Forest Service Manual direction (FSM 4063) for Establishment Records.

1. IDENTIFICATION SECTION

LOCATION MAP



BOUNDARY MAP

RNA Boundary Map: Echo Lake

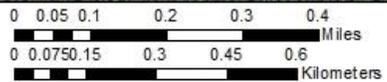


LANDSCAPE OVERVIEW ECHO LAKE RNA



 RNA Boundary

ESRI Basemap World Imagery
MB 2013



LEGAL DESCRIPTION

Echo Lake RNA is located on the Eagle River – Florence Ranger District of the Chequamegon – Nicolet National Forest in Forest and Vilas Counties, State of Wisconsin.

Sections 19, 20, 29, 30, 31, Township 40 North, Range 12 East, and Section 25, Township 40 North, Range 11 East. The boundary is delineated as follows:

Beginning at the Southwest corner of Section 30, T 40 N, R 12 E,

Thence west along the South line of Section 25, T 40 N, R 11 E, approximately 495 feet to the East edge of Upper Ninemile Lake,

Thence northeasterly along the shore of said lake, 458 feet,

Thence N 83° E, 1072 feet,

Thence N 56° E, approximately 500 feet to a point on the West ROW of Forest Road #2460,

Thence N 10° E (not following road), approximately 1835 feet to the intersection of the West ROW of FR #2460 and an unnamed stream,

Thence Northeasterly along the unnamed stream, 2133.0 feet,

Thence N 10° W, approximately 1000 feet to the North trail,

Thence Northeasterly along the North trail, approximately 2500 feet to the West ROW of Forest Road #2487A,

Thence Southeasterly along the West ROW of Forest Road #2487A approximately 3500 feet, to the Nicolet North trail,

Thence Southwesterly along the Nicolet North trail, approximately 3000 feet to the East line of Section 30,

Thence South along the East line of Section 30, approximately 800 feet to the North ROW of Forest Road #2181,

Thence along the North ROW of Forest Road #2181, approximately 6000 feet to the West line of Section 31,

Thence north along the West line of Section 31, approximately 450 feet to the Point of Beginning.

RNA contains approximately 478 acres.

/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 Echo Lake RNA is documented with a signature page and a Designation Order which is a separate document accompanying this Record (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 specimens 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

Echo Lake RNA contains exceptional examples of plant communities including northern mesic forest, northern wet-mesic forest, northern wet forest, and boggy seepage lake. Several old-growth eastern hemlock (*Tsuga canadensis*) hardwood forests ring the undisturbed wetland and lake. These forests are some of the most structurally and compositionally intact communities on the Chequamegon-Nicolet National Forest (CNNF). Several rare species are present within the RNA. The 478-acre (193 hectares) Echo Lake Research Natural Area (RNA) is located approximately 13 miles (21 km) east of Eagle River, Wisconsin (Identification Section - *Location Map*).



Figure 1. A fallen tree in Echo Lake RNA contributes to the development of old growth structure in this mixed deciduous/conifer forest. [Photo: Steve Janke 2012]

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

Forests in much of northern Wisconsin were extensively logged in the late 1800s followed by catastrophic wildfires that burned the logging slash. However, this site escaped widespread clearcutting and fire. Of interest are the original land survey notes of William E. Daughtry who surveyed the Township in 1859: "*The surface of this Township is gently rolling on dry land which is well adapted to farming purposes. The swamps are of considerable extent – all of which are unfit for cultivation.*" (BCPL 2004). The area containing the RNA became National Forest in the 1930s. Many of these trees are still standing. Timber harvests since the 1930s have been mostly small acreages of selection cuts and uneven age management leaving the canopy fairly intact (Epstein 1989). Logging has also occurred in at least one northern white cedar (*Thuja occidentalis*) stand in the 1970s (Fields & Janke 1996).

Uses Current recreational use of the RNA is light and includes non-motorized use along hiking trails that wind through the site. An improved road bisects the southwest corner of the site which receives light vehicle traffic to resorts and lake homes.

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

Congressionally Designated Areas Echo Lake 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

Establishment of Echo Lake RNA protects several rather spectacular eastern hemlock hardwood stands that are among the oldest and least disturbed on the Chequamegon-Nicolet National Forest (Fields and Janke 1996). The site contains some of the most structurally and compositionally intact communities on the CNNF. Blocks of old-growth *hemlock/hardwood* forest on the CNNF are relatively uncommon today and are important to birds, bats and other organisms that require mature trees. Echo Lake RNA also contains a northern wet-mesic forest dominated by large northern white cedar with a diverse ground flora supporting several orchids and rare plants.

(2) PRINCIPAL DISTINGUISHING FEATURES

The principal features of Echo Lake RNA are a soft-water seepage lake with a surrounding bog mat, and several stands of mature *hemlock/hardwood* forest situated on rolling moraine. These forests are among the oldest and least disturbed on the Nicolet side of the CNNF. The hardwood forests are dominated by large, over one hundred-year-old eastern hemlock with yellow birch (*Betula alleghaniensis*), and sugar maple (*Acer saccharum*).

Associated trees include basswood (*Tilia americana*), white pine (*Pinus strobus*), and white spruce (*Picea glauca*). The understory is open with few shrubs (Fig 2) and contains small canopy gaps filled with sugar maple saplings (Fields and Janke 1996). The groundlayer is dense in some areas



Figure 2. Older hemlock, maple, yellow birch forest showing minimal ground flora due to dense shade. The oldest trees date back to at least the mid-1800s according to CNNF stand records. [Photo: S. Janke 2012]

and supports American ginseng (*Panax quinquefolius*) which is a species of viability concern on the CNNF. Characteristic species include jack-in-the-pulpit (*Arisaema triphyllum*), shining club-moss (*Huperzia lucidulum*), intermediate wood fern (*Dryopteris intermedia*), three-leaved goldthread (*Coptis trifolia*), and blue cohosh (*Caulophyllum thalictroides*). The RNA supports numerous forest interior bird species (Table 5).

The RNA also contains a mosaic of wetland types which includes northern wet forest dominated by black spruce (*Picea mariana*) and tamarack (*Larix laricina*), white cedar swamp, alder thicket, and open bog (Fields and Janke 1996). The black spruce and tamarack dominate in the wetter areas to the south and east giving way to white cedar in the northern part of the stands. Although some cedar cutting has occurred in the past, regeneration is excellent in places and much has already outgrown the ungulate browse level. The gray jay (*Perisoreus canadensis*), an uncommon bird species, is present here.

Aquatic features include Echo Lake, and a branch of Ninemile Creek, which flows into Upper Ninemile Lake. The open bog surrounding Echo Lake contains an excellent representation of ericaceous species including Labrador tea (*Ledum groenlandicum*), velvet-leaf blueberry (*Vaccinium myrtilloides*), bog laurel (*Kalmia polifolia*) and leather-leaf (*Chamaedaphne calyculata*). Ninemile Creek is a narrow soft-water stream inhabited by brook trout (*Salvelinus fontinalis*).

(3) OBJECTIVES

Echo Lake 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.

Echo Lake RNA is one of thirty areas on the Forest that will be managed to meet the education and research objectives of the national RNA program (FSM 4063.02). It fits into a larger network of RNAs across the region and nation. The specific objectives of this RNA are to preserve the special characteristics of the forest, wetland, and aquatic communities that typify the area. 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.

c. LAND MANAGEMENT PLANNING

The 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). Echo Lake RNA is part of a national network of 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). It is embedded within 2004 CNNF Forest Plan Management Area 2B: Northern hardwood interior forest / restoration emphasis (alternative management area, larger diameter trees, longer rotations etc.).

d. MANAGEMENT PRESCRIPTION

The management prescription for the Echo Lake RNA is embodied in the management area direction and guidance presented in the 2004 Forest Plan.

The CNNF has not developed an individual site management plan for Echo lake 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.

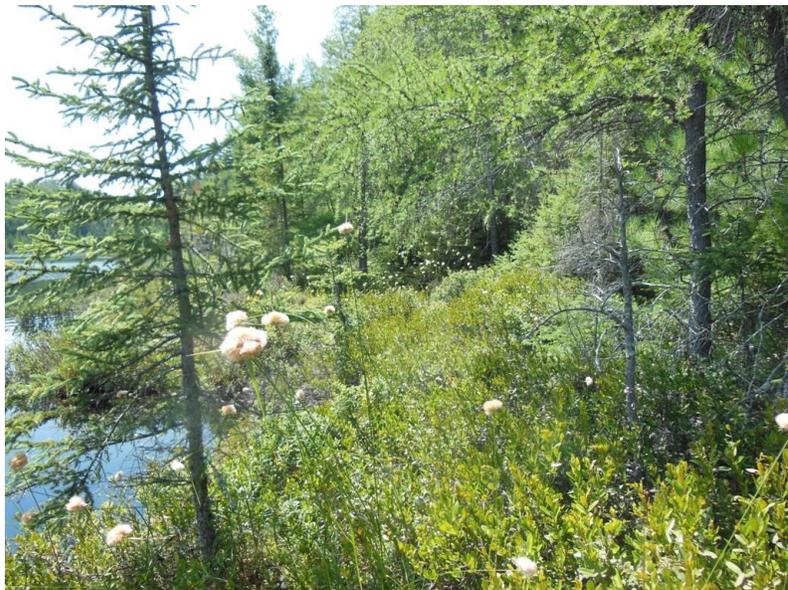


Figure 3. The shore of Echo Lake is dominated by bog ericads and black spruce/tamarack forest. [Photo: M. Dallapiazza]

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 mesic forest community types. Fire is allowed if needed for specific objectives however, fire has not been identified as a management need.

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. There are areas of dry-mesic conifer community that (Figure 5) that could carry fire if there was an ignition source. 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.

f. APPENDICES

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

Echo Lake RNA is located approximately 13 miles (21 km) east of Eagle River, Wisconsin on the Eagle River-Florence Ranger District of the CNNF. The site is situated entirely on National Forest Service land in T40N-R11E, Section 25; T40N-R12E, Sections 19, 20, 29 30, 31. The RNA's Mercator coordinates are 45° 54' N latitude and 89° 02' W longitude (map datum WGS 84).

See Establishment Record Identification Section for *Location Map* and *Boundary Map*.

(2) SIZE IN ACRES/HECTARES

Echo Lake Research Natural Area is 478-acre (193 hectares).

(3) ELEVATION RANGE

Elevations range from 1,680 feet (512 m) to 1,750 feet (533 m) above sea level. It lies on the eastern edge of the Northern Highlands Ecological Landscape of northern central Wisconsin. This area is known for its pitted outwash plains and kettle lakes mixed with extensive forests and large peatlands.

(4) ACCESS TO THE SITE

From the intersection of State Highways 70 and 32 in Eagle River drive east on 70 about 12 miles (19 km), then south on FR 2460 2.6 miles (4.2 km) to a parking area on the west side of the road (Identification Section: *Location Map* and *Boundary Map*). Hiking trails lead east into the site (dashed line on *Location Map*).

(5) CLIMATIC DATA

The weather station nearest to the Echo Lake RNA is Eagle River (station no. 472314, latitude 45° 55' N, longitude 89° 15' W). The station is about 13 mi (21 km) to the west of the RNA and experiences the same weather and climate. This station recorded temperature data since 1970 and precipitation data since 1940 (Midwestern Regional Climate Center 2003).

Table 1. Temperature records (1970-2000) and precipitation records (1940-2000) for Eagle River, Vilas County, WI

Temperature	°F	°C
Mean annual	40.0	4.4
Mean April through September	57.0	13.9
Mean October through March	23.0	-5.0
Average daily maximum	51.0	10.6
Average daily minimum	30.0	-1.1
Record high	97.0	36.0
Record low	-36.0	-37.8
Precipitation	in	mm
Mean annual rainfall	29.6	752.0
Mean April through September	3.4	85.0
Mean October through March	1.6	40.0
Mean annual snowfall	52.7	1339.0

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)

Echo Lake RNA is located in the Laurentian Mixed Forest Province, Section 212X Northern Highland, Subsection 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 (LTA) Xc04 Nicolet Hills.

(2) PLANT COMMUNITY TYPES

Echo Lake RNA contains a mosaic of plant community types, from open bog to northern mesic forest, that support a diversity of species including one rare plant.

Most of the northern mesic forest is dominated by large hemlock (*See Table 4 for scientific names*) [to 45" dbh (114 cm)] with yellow birch, and sugar maple. Other species include basswood, eastern white pine, and white spruce (Epstein 1981). The understory is open with few shrubs and local small canopy gaps filled with sugar maple saplings (Fields and Janke 1996). Shrubs present include beaked hazelnut, leatherwood, American fly-honeysuckle, and velvet-leaf blueberry. Abundant herbaceous species include drooping woodland sedge, hairy wood rush, *Actaea* spp., jack-in-the-pulpit, shining club-moss, three-leaved gold-thread, and hairy sweet cicely. Rare species include American ginseng. Coarse woody debris and large snags are common giving a pronounced old growth feel to the site. The mature forest features provide nesting habitat for numerous neotropical migrant birds.

Black spruce and tamarack dominate the canopy of the northern wet forest. Red maple also occurs in places. This area of Echo Lake is a mosaic of wetland types including conifer swamp, white cedar swamp, alder thicket, and semi-open bog (Fields and Janke 1996). Ericads are well-represented here (Figure 4) and include Labrador tea, early low blueberry, leather-leaf, cranberry, bog rosemary, and bog laurel. Abundant herbaceous plants include moccasin flower, threeleaf false lily of the valley, pitcher plant, marsh marigold, and naked miterwort.



Figure 4. Sphagnum bog mat flora near Echo Lake showing cranberry, and bog rosemary. [Photo: M. Dallapiazza 2012]

Echo Lake is a 13-acre (5 ha) soft-water seepage lake (Steuck and Andrews 1977) with a muck bottom and very clear water. This 12 foot (3 meter) deep lake is surrounded mostly by hardwood and conifer forest with about fifteen percent of the shoreline being a bog mat of sphagnum, sedges, and ericads. Few aquatic plants grow in the littoral zone. Ninemile Creek is a soft-water stream inhabited by brook trout (*Salvelinus fontinalis*).

Other communities present include dry-mesic forest of red pine, and white pine (Fig 5), northern sedge meadow, open bog surrounding Echo Lake, and alder thicket. The plant community listed in Table 3 and Figure 6 as jack pine (*Pinus banksiana*) in the eastern corner needs further inventory.



Figure 5. A hill of dryer soil rising above the surrounding landscape supports a dry-mesic red and white pine community. [Photo: M. Dallapiazza 2012]

Table 2. Natural vegetation community types within Echo Lake RNA 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 wet-mesic forest	TMC	hemlock, yellow birch	Tsuga canadensis - (Betula alleghaniensis) Forest C EGL002598
Northern wet-mesic forest	N/A	white cedar, tamarack	Thuja occidentalis - Larix laricina / Sphagnum spp. C EGL005225
Northern mesic forest	ATM, ATD	hemlock, sugar maple, yellow birch	Tsuga canadensis - Acer saccharum - Betula alleghaniensis Forest C EGL005044
Northern mesic forest	ATM	sugar maple, white ash, basswood	Acer saccharum - Tilia americana / Ostrya virginiana / Lonicera canadensis Forest C EGL002458
Northern mesic forest	ATM	white pine, red pine, quaking aspen	Pinus strobus - (Pinus resinosa) - Quercus rubra Forest C EGL002480
Northern mesic forest	ATM/ATD	quaking aspen (succeeding to mixed hardwood forest)	Populus tremuloides - Betula papyrifera / Acer saccharum - Mixed Hardwoods Forest C EGL002468
Northern wet forest	N/A	black spruce , tamarack, white cedar	Thuja occidentalis - Larix laricina / Sphagnum spp. Forest C EGL005225
Northern dry-mesic forest	AQV	red pine, white pine	Pinus strobus - (Pinus resinosa) - Quercus rubra Forest C EGL002480
Shrub Carr	N/A	willow/red-osier dogwood/meadow sweet	Salix sericea Shrubland C EGL006305
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/tussock sedge)	Calamagrostis canadensis - Eupatorium maculatum Herbaceous Vegetation C EGL005174
Stream: fast, cold, soft (unnamed tributary of Ninemile Creek)	N/A	needs survey	not determined
Lake soft, seepage (Echo)	N/A	needs survey	not determined

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

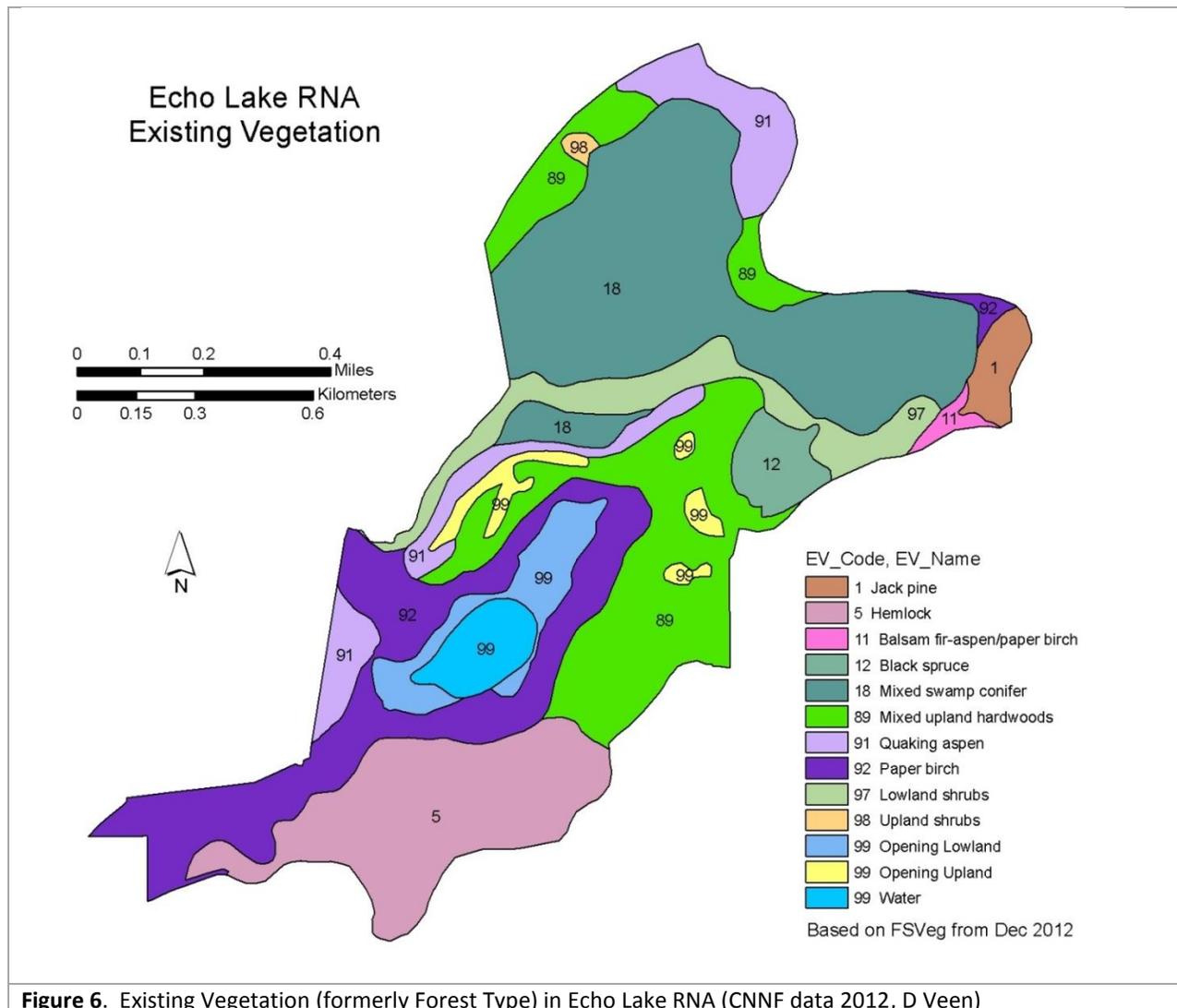


Figure 6. Existing Vegetation (formerly Forest Type) in Echo Lake RNA (CNNF data 2012, D Veen)

Table 3. Existing Vegetation (EV) by acres and hectares in Echo Lake RNA; codes used in Figure 6

EV Code	Existing Vegetation (as dominant tree type)	Acres	Hectares
1	Jack pine	7.5	3.1
5	Hemlock	63.7	25.8
11	Balsam fir-aspens/paper birch	2.6	1.0
12	Black spruce	11.1	4.5
18	Mixed swamp conifer	127.0	51.5
89	Mixed upland hardwoods	87.8	35.5
91	Quaking aspen	35.6	14.5
92	Paper birch	74.2	30.0
97	Lowland shrubs	28.0	11.3
98	Upland shrubs	1.2	0.5
99	Opening Upland	9.0	3.6
99	Opening Lowland	18.2	7.4
99	Water	12.0	4.9
Grand Total		477.9	193.6

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

(A) FLORA LIST

The flora list below is a compilation of the forest and wetland bog types and was created from the site evaluation and field surveys by Steve Janke and Douglas Fields in 1996.

Table 4. Flora of Echo Lake RNA (surveys by S. Janke and D. Fields 1996)

Echo Lake RNA Vascular Plant List (1996)	
Scientific Name*	Common Name
<i>Abies balsamea</i>	balsam fir
<i>Acer rubrum</i>	red maple
<i>Acer saccharum</i>	sugar maple
<i>Actaea spp</i>	baneberry
<i>Adiantum pedatum</i>	maidenhair fern
<i>Alliaria petiolata</i>	garlic mustard
<i>Alnus rugosa</i>	speckled alder
<i>Andromeda polifolia v. glaucophylla</i>	bog rosemary
<i>Anemone quinquefolia</i>	woods anemone
<i>Aralia nudicaulis</i>	wild sarsaparilla
<i>Aralia racemosa</i>	American spikenard
<i>Arisaema triphyllum</i>	jack-in-the-pulpit
<i>Aster macrophyllus</i>	big-leaved aster
<i>Athyrium filix-femina</i>	lady fern
<i>Betula alleghaniensis</i>	yellow birch
<i>Betula papyrifera</i>	paper birch
<i>Betula pumila</i>	bog birch
<i>Botrychium virginianum</i>	rattlesnake fern
<i>Carex arctata</i>	sedge
<i>Carex pedunculata</i>	peduncled sedge
<i>Carex pensylvanica</i>	Pennsylvania sedge
<i>Caulophyllum thalictroides</i>	blue cohosh
<i>Chamaedaphne calyculata</i>	leatherleaf
<i>Clintonia borealis</i>	blue-bead lily
<i>Coptis trifolia</i>	gold-thread
<i>Cornus canadensis</i>	bunchberry
<i>Corylus cornuta</i>	beaked hazelnut
<i>Cypripedium acaule</i>	moccasin flower
<i>Dicentra spp</i>	non-flowering spp
<i>Dirca palustris</i>	leatherwood
<i>Dryopteris. intermedia</i>	Intermediate wood fern
<i>Dryopteris carthusiana</i>	spinulose wood fern
<i>Equisetum arvense</i>	field horsetail
<i>Equisetum sylvaticum</i>	woods horsetail
<i>Galium labradoricum</i>	northern bog bedstraw

Echo Lake RNA Vascular Plant List (1996)	
Scientific Name*	Common Name
<i>Galium triflorum</i>	bed-straw
<i>Galium sp</i>	a bedstraw
<i>Gaultheria hispidula</i>	creeping snowberry
<i>Goodyera repens</i>	rattlesnake plantain
<i>Gymnocarpium dryopteris</i>	common oak fern
<i>Kalmia polifolia</i>	bog laurel
<i>Hepatica americana</i>	round-lobed hepatica
<i>Huperzia lucidula</i>	shining club-moss
<i>Larix laricina</i>	tamarack
<i>Ledum groenlandicum</i>	Labrador tea
<i>Linnaea borealis</i>	twinflower
<i>Lonicera canadensis</i>	American fly honeysuckle
<i>Lycopodium lagopus</i>	one-cone club-moss
<i>Lycopodium clavatum</i>	running clubmoss
<i>Luzula acuminata</i>	evergreen wood-rush
<i>Maianthemum canadensis</i>	Canada mayflower
<i>Mitchella repens</i>	partridge-berry
<i>Mitella nuda</i>	naked mitrewort
<i>Monotropa uniflora</i>	indian-pipe
<i>Osmorhiza claytonii</i>	sweet cicely
<i>Osmunda claytoniana</i>	Interrupted fern
<i>Oxalis montana</i>	mountain wood sorrel
<i>Panax quinquefolius</i>	American ginseng
<i>Populus tremuloides</i>	quaking aspen
<i>Picea glauca</i>	white spruce
<i>Picea mariana</i>	black spruce
<i>Pinus banksiana</i>	jack pine
<i>Pinus resinosa</i>	red pine
<i>Pinus strobus</i>	White pine
<i>Platanthera obtusata</i>	blunt-lobed orchid
<i>Pteridium aquilinum</i>	bracken fern
<i>Ribes sp</i>	unknown current
<i>Rhynchospora alba</i>	white beaksedge
<i>Rubus pubescens</i>	dewberry
<i>Scheuchzeria palustris</i>	podgrass
<i>Smilacina trifolia</i>	threeleaf false lily-of-

Echo Lake RNA Vascular Plant List (1996)	
Scientific Name*	Common Name
	the-valley
<i>Sorbus americana</i>	American mountain ash
<i>Sorbus acuparia</i>	European mountain ash
<i>Taxus canadensis</i>	Canada yew
<i>Thuja occidentalis</i>	northern white cedar
<i>Tilia americana</i>	basswood
<i>Trientalis borealis</i>	American starflower
<i>Trillium cernuum</i>	nodding trillium

Echo Lake RNA Vascular Plant List (1996)	
Scientific Name*	Common Name
<i>Tsuga canadensis</i>	eastern hemlock
<i>Urtica dioica</i>	stinging nettle
<i>Vaccinium angustifolium</i>	lowbush blueberry
<i>Vaccinium myrtilloides</i>	velvet-leaf blueberry
<i>Vaccinium oxycoccus</i>	cranberry
<i>Viola sp</i>	unknown violet

*(USDA PLANTS 2012)

(B) FAUNA LIST

Echo Lake RNA has not had a detailed faunal inventory. The Nicolet Breeding Bird Survey Points 609 and 610 are located within the RNA (Table 5) and have been surveyed biannually since 1988 (Nicolet BBS 2004).

Table 5 Birds of Echo Lake RNA (from Breeding Bird Survey 2004 and site surveys by Fields/Janke 1996)

Echo Lake RNA Bird List			
Common Name*	Scientific Name*	Common Name*	Scientific Name*
Mallard	<i>Anas platyrhynchos</i>	Golden-crowned kinglet	<i>Regulus satrapa</i>
American black duck	<i>Anas rubripes</i>	Hermit thrush	<i>Catharus guttatus</i>
Blue-wing teal	<i>Anas discors</i>	Wood thrush	<i>Hylocichla mustelina</i>
Common loon	<i>Gavia immer</i>	Veery	<i>Catharus fuscescens</i>
Wood ducks	<i>Aix sponsa</i>	American robin	<i>Turdus migratorius</i>
Merganser	<i>Mergus merganser</i>	Brown creeper	<i>Certhia americana</i>
Coot	<i>Fulica americana</i>	Winter wren	<i>Troglodytes troglodytes</i>
Trumpeter swan	<i>Cygnus buccinator</i>	Black-throated blue warbler	<i>Dendroica caerulescens</i>
Broad-winged hawk	<i>Buteo platypterus</i>	Yellow-rumped warbler	<i>Dendroica coronata</i>
Barred owl	<i>Strix varia</i>	Blackburnian warbler	<i>Dendroica fusca</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	Chestnut-sided warbler	<i>Dendroica pensylvanica</i>
Pileated woodpecker	<i>Cryocopus pileatus</i>	Black-throated green warbler	<i>Dendroica virens</i>
Alder flycatcher	<i>Empidonax alnorum</i>	Common yellowthroat	<i>Geothlypis trichas</i>
Least flycatcher	<i>E. minimus</i>	Black and white warbler	<i>Mniotilta varia</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>	Northern parula	<i>Parula americana</i>
Eastern wood pewee	<i>Contopus virens</i>	Ovenbird	<i>Seiurus aurocapillus</i>
Red-eyed vireo	<i>V. olivaceus</i>	Nashville warbler	<i>Vermivora ruficapilla</i>
Blue-headed vireo	<i>Vireo solitarius</i>	Scarlet tanager	<i>Piranga olivacea</i>
Blue jay	<i>Cyanocitta cristata</i>	Song sparrow	<i>Melospiza melodia</i>
Black-capped chickadee	<i>Parus atricapillus</i>	White-throated sparrow	<i>Zonotrichia albicollis</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>	Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Gray jay	<i>Perisoreus canadensis</i>

*Names According to AOU Checklist -1983 (not in phylogenetic order)

(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 bedrock of Echo Lake RNA is igneous, metamorphic, and volcanic rock (WI DNR 2003). The bedrock is greater than 100 feet from the land surface. Geomorphologic processes were glacial meltwater deposition with a surface of collapsed outwash plain.

(D) SOILS

A large area of the central and southern portion of Echo Lake RNA includes the Stambaugh soil series. This series is found surrounding Echo Lake to the north, west, and south. Other soils include Carbondale, Greenwood, Pence, and Padus series (USDA-NRCS 2003).

The Stambaugh series consists of deep, moderately well-drained soils formed in silty sediments on outwash plains and stream terraces. These soils are undulating to rolling with slopes of 1-25%. Typical pedon texture is silt loam.

Within the immediate vicinity of Echo Lake is the Greenwood Series. These soils are very deep, very poorly drained soils formed in organic deposits more than 51 inches deep. Slopes range from 0-2% and the texture of a typical pedon is mucky peat commonly derived from sphagnum moss (fibric material), undecomposed sphagnum moss, or from both herbaceous plants and sphagnum moss. Greenwood soils are generally found in small morainal depressions to larger areas commonly on outwash or lake plains. The pH ranges from 3.5-4.5. Vegetation consists of bogs and wet forest with black spruce and tamarack.

In the northeast portion of Echo Lake RNA is a low-lying area containing soils of the Carbondale series. These are very deep, very poorly drained soils formed in organic deposits on ground moraines, outwash plains and lake plains. Slopes range from 0-2%. The texture of a typical pedon is muck commonly derived from herbaceous plants but some pedons may contain a moderate amount of woody material. PH ranges from 5.1-7.0 in water. Most areas contain forest of northern white cedar, balsam fir, black spruce, and paper birch.

To the south and east of Echo Lake are soils of the Pence series. These are well-drained soils formed in loamy deposits and the underlying stratified sandy and gravelly outwash on stream terraces, outwash plains, eskers, and kames. Slopes range from 0-45% and the texture of a typical pedon is sandy loam. Soil pH ranges from slightly to strongly acid. Forest vegetation is mixed coniferous and deciduous forest.

The northwest section of the RNA contains soils of the Padus series. These are deep, well-drained and moderately well-drained soils formed in loamy deposits and in the underlying sand or sand and gravelly outwash on outwash plains, stream terraces, eskers, kames, and moraines. Slopes range from 0-45%. The texture of a typical pedon is fine sandy loam. Most areas are forested.

(E) TOPOGRAPHY

The topography of this area of northern Wisconsin is undulating to rolling with slopes of one to twenty-five percent. Geomorphologic processes that formed the hills, lakes, and bogs were glacial melt-water deposition with a surface of collapsed outwash plain. Elevations vary by only about 70 feet (20 km) (see Identification Section - Boundary Map showing ten-foot contour intervals).

The northern portion of the RNA is within Nicolet Hills LTA. Characteristic landform pattern is hilly collapsed outwash plain with lakes common. The southernmost portion has a characteristic landform pattern of nearly level pitted and unpitted outwash plain with bogs and lakes common (Wisconsin Department of Natural Resources 2003).

(F) AQUATIC/RIPARIAN

Aquatic features include Echo Lake, and a tributary of Ninemile Creek, which flows into Upper Ninemile Lake impoundment. The RNA will help protect the water quality of these resources and the plant and animal communities this water supports.



Figure 7. Un-named tributary of Ninemile Creek in northern Echo Lake RNA.
[Photo: S. Janke 1996]

Echo Lake is a 13-acre (5 ha) soft-water seepage lake with a maximum depth of 12 feet (3 m). The water is slightly acidic and very clear with a Secchi disk value of 12 feet (3 m) (Steuck and Andrews 1977). The shoreline is predominantly upland of mixed upland hardwoods and conifer with the remainder wetland bog mat of sphagnum, sedges, and ericads. There is no development along the 0.57 mile (0.9 km) lakeshore but there is an unimproved carry-in boat access.

A small tributary of Ninemile Creek flows from a conifer swamp in a southwesterly direction through the northern part of the RNA (Figure 7). It is a soft-water stream with slightly alkaline, light brown-stained water and is likely inhabited by brook trout (*Salvelinus fontinalis*). The stream bank is predominantly sedge mat or alder but a portion is shaded by boreal-like forest.

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

Table 6. Rare, Uncommon, and species of concern in Echo Lake RNA, State status and global and state rank

Common Name	Scientific Name	State Status, Global and State Rank*
Animals		
Trumpeter swan	<i>Cygnus buccinator</i>	SC/M, G4 S4B
Common loon	<i>Gavia immer</i>	SC/M, G5 S3S4B (uncommon)
Veery	<i>Catharus fuscescens</i>	SC/M, G5 S3S4B (uncommon)
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	SC/M, G5 S3S4B (uncommon)
Gray jay	<i>Perisoreus canadensis</i>	SC/M, G5 S3B (uncommon)
Plants		
American ginseng	<i>Panax quinquefolius</i>	SC, G3G4, S4, CNNF Regional Forester sensitive
Canada yew	<i>Taxus canadensis</i>	SC, G5,S4, CNNF Management indicator species

* see Appendix 4: Wisconsin Natural Heritage Working List Rank Definitions 2012

(H) LIST OF RARE ELEMENTS AND RARE PLANT COMMUNITIES

None of the plant communities are listed as rare by the Wisconsin Natural Heritage Inventory (WI DNR, 2012) but their rankings are noted below. Assemblages of high quality plant communities that include wetlands and uplands are of conservation concern. Much of the private lakeshore land in northern Wisconsin is developed including boggy shore lakes. The RNA status ensures Echo Lake will remain wild.



Figure 8. The RNA protects the brushy swamp edge habitat of the Nashville warbler whose nest was found here. [Photo: Steve Janke, 2012]



Figure 9. Northern Leopard frogs (*Rana pipiens*) find quality habitat on the bog mat surrounding Echo Lake. [Photo: M. Dallapiazza, 2012]

Table 7. Rare elements and plant communities present in Echo Lake RNA with G-Rank below 5 or State uncertain

Element/Community Name	Global Rank*	State Rank
Northern Dry-mesic forest	G4	S3
Northern mesic forest	G4	S4
Northern wet-mesic forest	G3?	S3S4

Northern wet forest	G4	S4
Northern Sedge Meadow	G4	S3
Stream: fast, soft, cold	GNR	SU

* see Appendix 4: *Wisconsin Natural Heritage Working List Rank Definitions 2012*

c. RESOURCE INFORMATION

This section discusses resources that occur in the RNA framed *within the context of potentially conflicting uses*. Echo Lake RNA is owned outright by the United States government and is administered by the USDA Forest Service, Chequamegon-Nicolet National Forest. It is bounded entirely by Forest Service land.

(1) MINERALS

The mineral estate [478-acre (193 hectares)] within the RNA contains both federally owned and outstanding mineral ownership (Table 8). Outstanding, and Federal-owned minerals are open to hardrock prospecting within the Research Natural Area and the Forest Service must allow access to the surface to the mineral owner or the mineral estate which is administered by Bureau of Land Management. There is some potential for hardrock prospecting activity within the RNA based on geology and recent hardrock prospecting permit activity in the county. 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 RNA (Knight pers comm 2013). Mineral ownership does not preclude use of the site for research but if prospecting took place disturbance to localized areas could occur. There are currently no active prospecting permits within the RNA as of 2013.

Table 8. Mineral resource ownership within Echo Lake RNA (CNNF data)

Township-Range	Section	Acres*	Hectares	Mineral Ownership	Comments
40N 12E	19	40	16	Outstanding	Balance of acres Federal owned
	30	120	49	Outstanding	Balance of acres Federal owned
	31	150(all)	61	Outstanding	Balance of acres Federal owned
	29	all	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 Forest land and Resource Management Plan has a standard that prohibits grazing in Research Natural Areas (Appendix 3 - *Forest Management Area Direction*).

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

The total forested acreage in the RNA is 409 (166 hectares) fifty percent of which is lowland forest, a type not harvested on the CNNF. There are no outstanding timber rights on any of the tracts in the RNA, nor are there any special use permits outstanding. Designation will help protect the rare plants and sensitive species that are present in this site.

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.

Echo Lake 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.



Figure 10. White beaksedge growing on the boggy shore of Echo Lake. [Photo: M. Dallapiazza, 2012]



Figure 11. Flower of the pitcher plant growing in a bog among Labrador tea. [Photo: S. Janke 2012]

(4) WATERSHED VALUES

Aquatic features protected by the RNA include Echo Lake, and a branch of Ninemile Creek, which flows into Upper Ninemile Lake to the west. No roads lead to the lake and it is surrounded by

floating bog mat (Figure 3). There may be some canoe use accessed by an unimproved boat landing. The creek is likewise limited to walk-in access; it is narrow and not navigable by canoe.

Echo Lake and Ninemile Creek are within the Eagle River watershed within the Upper Wisconsin water management unit and drains into the Mississippi River (WI DNR 2013a)

(5) RECREATION USE

Visitation is concentrated around the recreational non-motorized trails that run through part of the site. This trail use adversely affects the RNA through the spread of garlic mustard, a non-native invasive species. Long-term rerouting of the trail should be considered to protect plant and animal communities, help maintain site integrity and help prevent the spread of exotic species into the RNA. The area is open for hunting and trapping in the appropriate season.

(6) WILDLIFE

Designation as a RNA will maintain mature forests that provide habitat to rare birds such as the yellow-bellied flycatcher and protected bat species. This site is embedded within an area recognized by the Wisconsin Bird Conservation Initiative as an *Important Bird Area* which by definition provides essential habitat to one or more species of breeding or non-breeding birds (Steele 2007). The identification of a site as an IBA carries no legal status or regulatory requirements.

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 Echo Lake 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 but they are known to occur in this region. Wisconsin pro-actively listed three bat species in 2010 as threatened due to the invasive fungus that causes death from *white nose syndrome*. 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

The current rule guiding motorized access is contained in the Travel Management Project Decision Notice via a Motorized Vehicle Use Map for 2012 (USDA Forest Service 2012). This map shows roads available for motorized use. Forest road 2460 crosses the RNA on the west side near Upper Nine Mile Lake for about 2 tenths of a mile (0.3 kilometers). This black-top surfaced road then becomes the western boundary of the site for another half mile. Forest road 2181 (Butternut Lake Road) is the southern boundary of the site and is also paved. Both roads are travelled fairly extensively, especially in summer, to access homes and recreation areas around the Franklin-Butternut Lakes area of Forest County.

The 2004 CNNF Forest Plan and the Forest Service Manual prohibit construction of new roads and trails within RNAs as well as the use of horses, bicycles, and motorized vehicles (US Forest Service 2004a pg 3-53).

d. HISTORICAL INFORMATION

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

Research/Education use:

The Nicolet Breeding Bird Survey Points 609 and 610 are located within Echo Lake RNA. This RNA has also been bi-annually surveyed for breeding birds from 1986 to present as part of the Nicolet Breeding Bird Survey (Nicolet BBS 2004). Results have contributed to at least 11 Master's theses, 2 Ph.D. theses, and more than 15 scientific publications.

The Wisconsin Department of Natural Resources initiated a four year peatland study utilizing this site in 2008 (Anderson 2007).

History of establishment:

The CNNF began a forest-wide ecological inventory to identify high quality ecological features in the early 1990s (Parker 1999). Echo Lake 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* (unique 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 Echo Lake for protection.

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.

Echo Lake was identified as a Candidate RNA in the Draft 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 Echo Lake for establishment.

(2) CULTURAL/HERITAGE

USDA Forest Service Heritage information indicates there are no known cultural sites recorded in Echo Lake RNA (USDA Forest Service 2003). See *Introduction* regarding Native American traditional uses of lands for hunting and gathering in territory ceded to the U.S.

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 Echo Lake RNA has not been adopted as an Ojibwe Tribal RNA which would require that tribal members follow the gathering regulation in the 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. 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

Although historical logging (late 1800s and early 1900s) did occur within this RNA, the hemlock hardwood stands were never cut. A state vegetation cover map from the 1930s shows the average tree diameters within the hemlock-hardwood forests of the RNA as 12-18 inches (30-45cm) dbh at that time (UWDC 2011). After the land became National Forest some cutting occurred within a few hardwood areas of the RNA in the 1950s. Both the historic and more recent cuttings were light and the canopy was not significantly opened (Epstein 1989). Logging has also occurred in at least one cedar stand in the 1970s (Fields & Janke 1996).

(4) OCCURRENCE OF EXOTIC SPECIES

The non-native invasive species garlic mustard (*Alliaria petiolata*) was found along a trail and invading one excellent hardwood stand in the mid 1990’s. There are two modes of spread: an advancing front and satellite population expansion possibly facilitated by small animals. Unlike other plants that invade disturbed habitats, garlic mustard readily spreads into high quality forests (WI DNR 2011). Control measures were initiated in 1996 using hand-pulling and in 2005 with targeted spraying of herbicide in early spring. Satellite populations continue to pop up throughout the area, likely transported by birds and people. 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. Research Natural Areas are high priority locations to monitor and implement control.

Hemlock woolly adelgid a non-native genotype from southern Japan has not yet infested hemlocks in Wisconsin as of 2010 (WI DNR 2013b). Hemlock woolly adelgid is classified a “prohibited species” in Wisconsin under Chapter NR40 and as such must be controlled by the landowner if/when it is encountered (WI DNR 2010).

e. OTHER INFORMATION

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

This RNA has been bi-annually surveyed for breeding birds from 1986 to present as part of the Nicolet Breeding Bird Survey. Survey points 609 and 610 are located within Echo Lake (Nicolet BBS 2004). Information on this project is housed at the CNNF Park Falls office.

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

Potential research topics include:

- use of old growth forest by bats and other organisms that require mature trees
- compositionally intact northern mesic forest
- wet-mesic forest dominated by large northern white cedar with a diverse ground flora supporting several orchids and rare plants
- acid bog lake
- rare plants including the economically important ginseng

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).

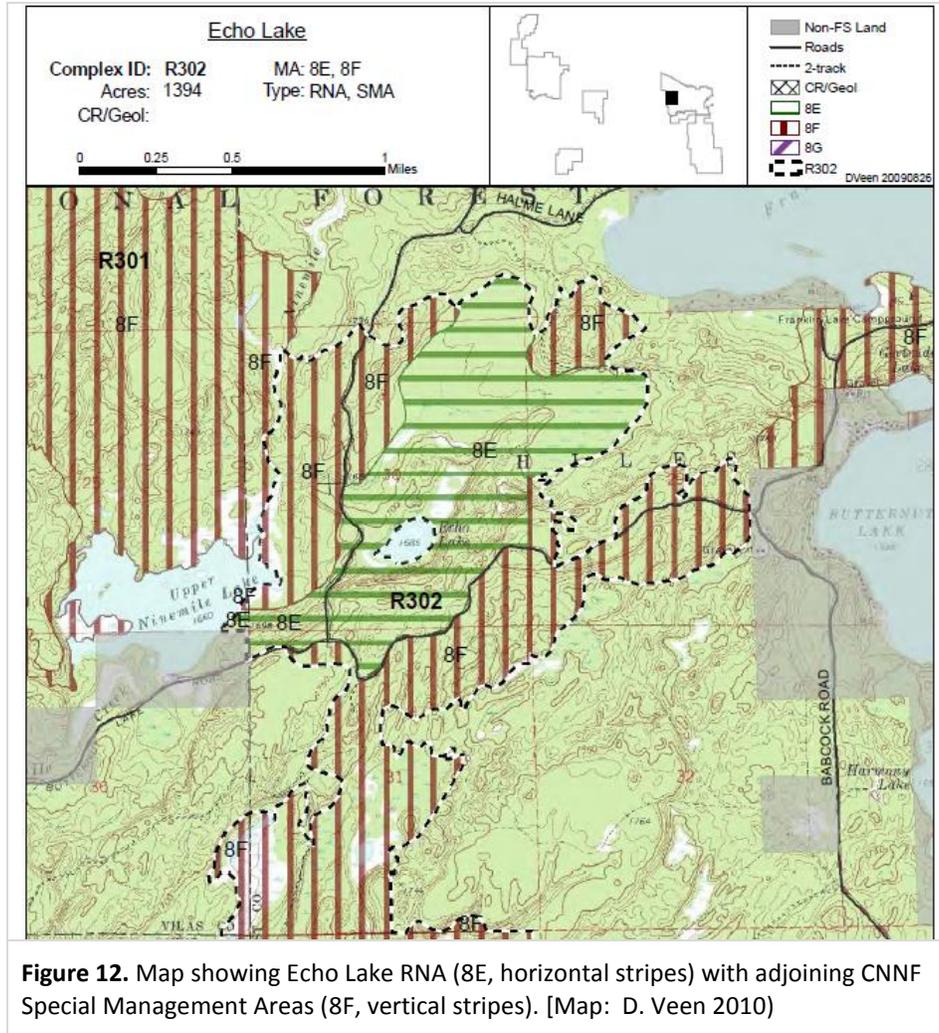
f. EVALUATION OF SPECIFIC MANAGEMENT RECOMMENDATIONS ON THE RESEARCH NATURAL AREA

(1) POTENTIAL OR EXISTING CONFLICTS; PRINCIPAL MANAGEMENT ISSUES

Of special concern is the prevention of the invasion of exotic species in the RNA. The invasive garlic mustard has been found along the trails and into the northern mesic forest of the RNA. The CNNF has been aggressive in its control since 1996 and was able to diminish the population significantly but the need for control will continue. Integrated pest control methods are permitted by the 2004 CNNF Forest Plan and will continue in order to ensure the long-term quality of the RNA. See Section d.(4) *Occurrence of Exotic Species* for details on methods.

The RNA is sandwiched between Franklin-Butternut Lakes Special Management Area (SMA) and Haymeadow Creek SMA (Figure 12). Commercial timber harvest does not occur within SMAs so

there will be no adjacent management conflict on these boundaries. The remainder of the land surrounding Echo Lake RNA is designated for Uneven-aged Northern Hardwoods: Interior Forest (2B) in the 2004 CNNF Forest Plan (pgs 3-30 and 3-8). The 2B type is described as an alternative management area with larger diameter trees and longer harvest rotations. Buffer zones could be created that leave a higher basal area adjacent to the RNA.



Hemlock woolly adelgid, a non-native genotype from southern Japan, is a long-term management concern. Hemlock adelgid has not yet infested hemlocks in Wisconsin as of 2010 (WI DNR 2013b). Hemlock woolly adelgid is classified a “prohibited species” in Wisconsin under Chapter NR40 and as such must be controlled by the landowner if/when it is encountered (WI DNR 2010).

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

Echo Lake RNA is not located within or adjacent to any congressionally designated area.

g. PHOTOGRAPHS

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



Figure 13. Eastern hemlock regeneration in a forest gap. [photo: M. Dallapiazza, 2012]



Figure 14. A stinkbug (family *pentatomidae*) on podgrass growing in the bog [Photo: M. Dallapiazza, 2012]

APPENDIX 2. BIBLIOGRAPHY

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

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APPENDIX 3 FOREST MANAGEMENT AREA DIRECTION

The management prescription for the Echo Lake 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.

The following section is copied from the CNNF 2004 Land and Resource Management Plan section on Management Area Standards and Guidelines (Pages 3-51 to 3-53).

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 June 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
WI Status: Protection category designated by the Wisconsin DNR. END = endangered; THR = threatened; SC = Special Concern.

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.

SGCN: Indicates that an element is a Species of Greatest Conservation Need from Wisconsin's [Wildlife Action Plan](http://dnr.wi.gov/org/land/er/WWAP/). <http://dnr.wi.gov/org/land/er/WWAP/>

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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