



DESIGNATION ORDER

USDA Forest Service, Eastern Region
Chequamegon-Nicolet National Forest
Medford-Park Falls Ranger District
Price and Vilas Counties, Wisconsin

Tucker Lake Hemlocks - Update

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 Tucker Lake Hemlocks Research Natural Area. It shall be comprised of 674 acres (273 hectares) of land in Price and Vilas Counties, in the state of Wisconsin, on the Medford-Park Falls 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

Date

SIGNATURE PAGE

for

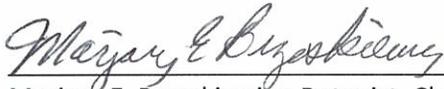
RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Tucker Lake Hemlocks Research Natural Area - Update

Chequamegon-Nicolet National Forest

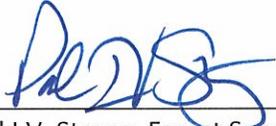
Price & Vilas Counties, Wisconsin

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 10/3/14
Robert Hennes, District Ranger, Medford-Park Falls District

Recommended by:  Date 2/18/15
Paul I.V. Strong, Forest Supervisor, Chequamegon-Nicolet National Forest

Concurrence of:  Date 3-23-2015
Michael T. Rains, Station Director, Northern Research Station



TITLE PAGE

United States
Department of
Agriculture

Forest
Service

March 2014



Establishment Record for Tucker Lake Hemlocks-*Update* Research Natural Area

**Chequamegon-Nicolet National Forest,
Medford-Park Falls District,
Price & Vilas Counties, Wisconsin**



Cover photo: Hemlock/hardwood forest in Tucker Lake Hemlocks RNA Update. Photo by Linda Parker, Ecologist, CNNF circa 2000

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

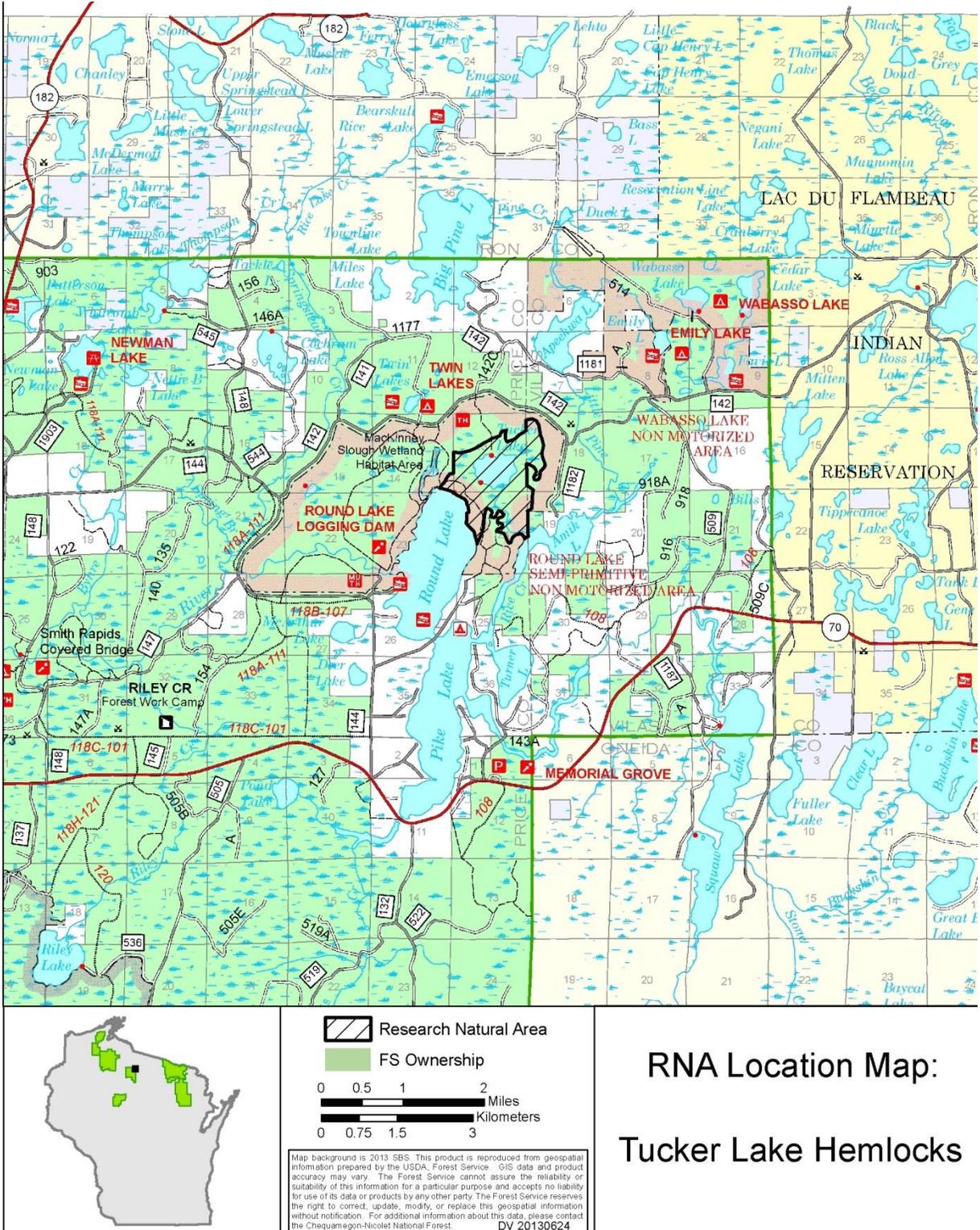
| | |
|---|----|
| 1. IDENTIFICATION SECTION | 5 |
| Location Map | 5 |
| Boundary Map (inner line is original RNA boundary) | 6 |
| Landscape Overview Tucker Lake Hemlocks RNA Update | 7 |
| Legal Description | 8 |
| 2. ADMINISTRATIVE SECTION..... | 9 |
| 3. BODY OF ESTABLISHMENT RECORD..... | 10 |
| a. Introduction..... | 10 |
| b. Justification Section..... | 11 |
| (1) Justification Statement | 11 |
| (2) Principal Distinguishing Features | 12 |
| (3) Objectives..... | 13 |
| c. Land Management Planning..... | 13 |
| d. Management Prescription | 14 |
| e. Use or Control of Fire or Grazing..... | 14 |
| f. Appendices..... | 15 |
| 4. Appendix 1 Ecological Evaluation..... | 15 |
| a. Physical Site Description and Climatic Conditions..... | 15 |
| (1) Location | 15 |
| (2) Size in acres/hectares..... | 15 |
| (3) Elevation range..... | 15 |
| (4) Access to the site..... | 15 |
| (5) Climatic data | 16 |
| b. Ecological Description | 16 |
| (1) Eco-region (to the lowest level of detail currently available)..... | 16 |
| (2) Plant community types | 16 |
| (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) | 25 |
| (4) Watershed values | 26 |
| (5) Recreation use | 27 |

| | |
|---|----|
| (6) Wildlife..... | 27 |
| (7) Transportation/road system..... | 28 |
| d. Historical Information | 28 |
| (1) Research/education use and interest: history of establishment..... | 28 |
| (2) Cultural/heritage..... | 29 |
| (3) Disturbance history | 30 |
| (4) Occurrence of exotic species..... | 31 |
| e. Other Information..... | 31 |
| (1) permanent research plots and/or photo points..... | 31 |
| (2) Bibliography | 31 |
| (3) Potential research topics..... | 32 |
| f. Evaluation of Specific Management Recommendations on the RNA..... | 32 |
| (1) Potential or existing conflicts; principal management issues..... | 32 |
| (2) Special management area if the Research Natural Area is within one..... | 33 |
| g. Photographs | 33 |
| Appendix 2 Bibliography..... | 34 |
| Appendix 3 Forest Management Area Direction | 38 |
| Appendix 4 Wisconsin Natural Heritage Working List – Rank definitions | 41 |
| Appendix 5 Contributors..... | 43 |
| Appendix 6 Legal Description | 44 |

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

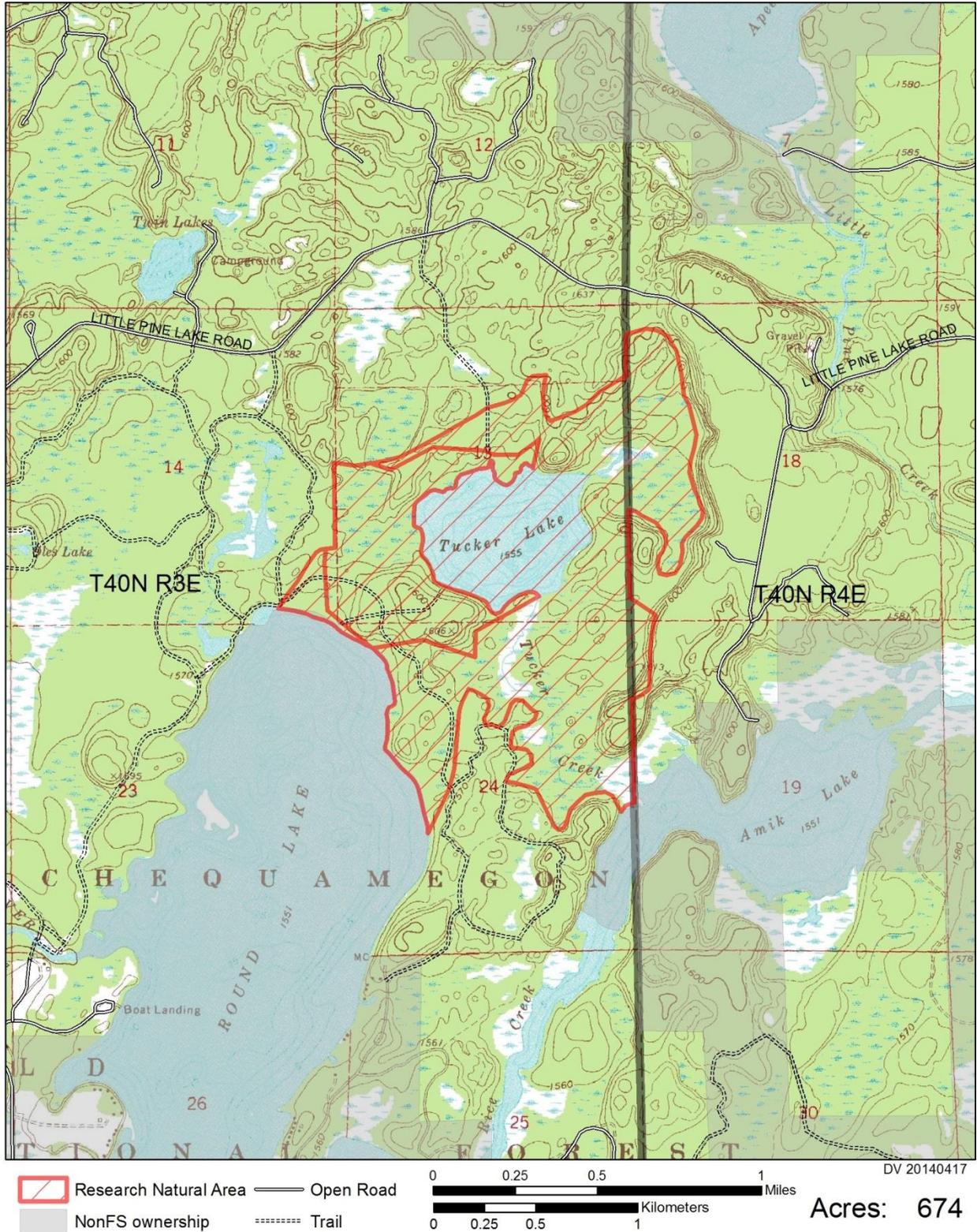
1. IDENTIFICATION SECTION

LOCATION MAP



Boundary Map (inner line is original RNA boundary)

RNA Boundary Map: Tucker Lake Hemlocks

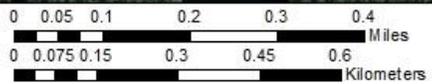


LANDSCAPE OVERVIEW TUCKER LAKE HEMLOCKS RNA UPDATE



 RNA Boundary

ESRI Basemap World Imagery
MB 2013



LEGAL DESCRIPTION

The legal description of Tucker Lake RNA update that assimilates the original RNA boundary is attached as Appendix 6. GIS data of the perimeter boundary are on file at the Chequamegon-Nicolet National Forest Supervisor's office. The original boundary is nested within the updated boundary (see *Boundary Map*).

2. ADMINISTRATIVE SECTION

This Establishment Record has been prepared pursuant to Forest Service Manual direction (FSM 4063). Establishment of the Tucker Lake Hemlocks RNA Update is documented with a signature page and a Designation Order both of which are separate documents 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, Medford-Park Falls 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, 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:

RNA Coordinator
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

The Station Director will determine archiving methods for the RNA in order to facilitate the exchange and transfer of information among Research Stations, scientists and Forest resource managers.

3. BODY OF ESTABLISHMENT RECORD

a. Introduction

Tucker Lake Hemlocks RNA is located on the Chequamegon-Nicolet National Forest (CNNF), Price and Vilas Counties on the Medford-Park Falls Ranger District. The RNA is located entirely on National Forest Service Land and is approximately 20 miles (14 km) east of Park Falls, Wisconsin (Identification Section: *Location Map* and *Boundary Map*).

The original Tucker Lake Hemlocks Research Natural Area (RNA) was designated in 1991. This new Establishment Record includes the original approximately 158-acre (64 ha) tract plus the 516 acre (209 ha) update. The original boundary is nested within the updated boundary (interior line on *Boundary Map*). Tucker Lake Hemlocks RNA now contains a total area of 674 acres (273 hectares). From here on, this record will generally refer to the entire RNA except where noted. Information on the original RNA can be obtained from the CNNF RNA coordinator. Also see Herman 1990 in the *Bibliography*.



Figure 1. An autumn day in a mesic hardwood forest of Tucker Lake Hemlocks RNA showing *Dryopteris intermedia*, an evergreen fern. Photo by Linda Parker

Located within the *Round Lake Semi-Primitive Non-Motorized Area*, the original Tucker Lake Hemlocks RNA features a high quality old-growth eastern hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*) forest plus northern wet conifer forest and late seral-stage forest maturing to hardwoods. The original RNA also protects a large spring run on Tucker Lake's west shore.

The updated RNA boundary now protects the entire shore of Tucker Lake plus Tucker Creek from the lake south

to Amik Lake (see Identification Section - *Boundary Map*). Lands that buffer these riparian areas include a large shrub/sedge wetland and two large stands of late seral-stage aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*) forest maturing to northern mesic hardwood forest. Additional lands added include sugar maple (*Acer saccharum*) forest and a large stand of paper birch. Both have inclusions of mature eastern hemlock and white pine (*Pinus strobus*) as well as excellent regeneration of both.

Historical Background - American Indian tribes have lived on the lands that make up the CNNF for thousands of years with a long and complex history. They hunted, fished, gathered food, and

obtained forest products for shelter, moved plants from other areas, and sometimes used fire to manipulate the land. Many of these practices continue today under reserved treaty rights (treaties of 1837 & 1842) with eleven Ojibwe tribes. The current Lac du Flambeau Ojibwe Reservation lies about three miles (5 km) to the northeast of this RNA. 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 1865 that state: “*This township has a large amount of most excellent Pine timber in it. Otherwise it is almost worthless so far as farming is concerned. Band of Chippewa Indians has his county seat between two lakes in southern part of section 6.*” (BCPL 2004). Note that Section 6 is not within the RNA but this historical reference reiterates the presence of indigenous peoples described above.

Northern Wisconsin was extensively logged in the late 1800s, virtually clear cutting much of the area. Catastrophic wildfires followed, burning the logging slash across the region. The land containing the RNA became National Forest in the 1930s. CNNF records show no timber harvests occurring within the RNA since it became National Forest and CNNF stand data indicates the year of origin for most stands as around 1930. The old-growth hemlock stand between the lakes has had some trees cut but the oldest hemlocks have been aged at 350 years (Tyrrell 1991). A Wisconsin land inventory, vegetation cover map from 1938 for this stand shows moderately well-stocked conifer and hardwoods that averaged 6-12 inches (15-30 cm) DBH (UWDC 2011). See Section d - *Historical Information* for more detail on establishment of this RNA.

Uses - Current land use includes research and monitoring in the RNA, a hiking/cross-country ski trail on the west side, a canoe portage trail from Round Lake to Tucker Lake, fishing, and dispersed camping on Tucker Lake (Krause 1998). [See Recreation Section c.(5) for more detail]. The surrounding land use includes recreational management in a semi-primitive non-motorized recreational setting that provides habitat for non-game species while allowing for the management of timber (USDA Forest Service 2004a). Refer to Appendix 1: *Ecological Evaluation* d. (1) *Research/education use* for an explanation of co-designation as a Wisconsin State Natural Area.

Ownership & Administration -Tucker Lake Hemlocks 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 Medford-Park Falls Ranger District, CNNF, provides day-to-day protection and maintenance of the area. The state of Wisconsin owns the title to all natural lake beds and has direct authority over navigable waters through the public trust doctrine (Kent & Dudiak 2001). The Department of Natural Resources is charged with management of the fishery resources in Wisconsin.

Tucker Lake Hemlocks RNA does not occur within any congressionally designated areas. It is within a CNNF-designated Semi-primitive Non-motorized area.

b. Justification Section

(1) JUSTIFICATION STATEMENT

Remnant communities of old-growth forest, particularly upland types, are very rare in northern Wisconsin. Those with relatively little past human-caused disturbance merit preservation (Epstein 1986). The RNA update will include additional old growth hemlock / hardwood mixed stands with super-canopy white pine (*Pinus strobus*). The updated boundary includes additional wetlands and

uplands that now completely surround the 107-acre (43 ha) Tucker Lake (Krause 1998). Also included in the updated boundary is a stand of pole-sized, mesic hardwoods with a strong yellow birch (*Betula alleghaniensis*) component and localized areas of eastern hemlock (*Tsuga canadensis*) regeneration. This area offers research opportunities that are unavailable in managed forests or on developed lakes. It provides habitat for organisms that are intolerant of disturbance and/or require old-growth habitat for survival.



Figure 2. Super-canopy white pines tower over a mixed hardwood and conifer second-growth forest in early spring within the updated boundary on the east side of Tucker Lake Hemlocks RNA. Photo by M Brzeskiewicz 2012.

(2) PRINCIPAL DISTINGUISHING FEATURES

The main features associated with this site include a large old growth hemlock / hardwood stand between two lakes. The oldest trees within the site are over 350 years old, among the oldest living trees in northern Wisconsin (Tyrell 1991). It includes the intact shore and wetlands surrounding the undeveloped 107-acre (43 ha) Tucker Lake (Krause 1998). Super-canopy white pines within the RNA provided nesting sites for an historic osprey (*Pandion haliaetus*) territory. Bald eagles (*Haliaeetus leucocephalus*) still nest within the RNA. Old-growth features such as canopy gaps, standing dead trees, and coarse woody debris are apparent (Figures 4 & 5). Remaining upland stands surrounding the lake are forested with late seral-stage aspen and birch forest succeeding to mesic hardwood forest. These stands contain pockets of large white pine, red pine (*Pinus resinosa*)

and eastern hemlock as well as excellent regeneration of all three species. Regeneration of these conifer types are of management concern on the CNNF.

Most of the conifer swamps and bogs surrounding Tucker Lake have been inundated by beaver activity; however, a small stand of cedar is still intact at the head of a large spring run on the lake's west shore. Tucker Lake also supports significant waterfowl use, including common loon (*Gavia immer*) and large flocks of ringneck ducks (*Aythya collaris*) during migration. Mammals including mink (*Mustela vison*), least weasel (*Mustela nivalis*), northern river otter (*Lontra canadensis*), Gray wolf (*Canis lupus*), and beaver (*Castor canadensis*) have been noted during field surveys. The wetlands and rocky beach bordering both Round and Tucker lakes support a large population of leopard frogs (*Rana pipiens*) and spotted sandpipers (*Actitis macularia*). See Section b. (3)(b) for a list of fauna within the RNA.

(3) OBJECTIVES

An expansion of the Tucker Lake Hemlocks RNA was recommended 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.

Tucker Lake Hemlocks 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:

1. Preserve representative areas typical of northern mesic hardwood forest that includes some of the oldest conifer trees in northern Wisconsin.
2. Serve as reference areas for the study of succession as the plant communities experience small and large scale natural disturbance through wind events or rare small wildfires.
3. Preserve and maintain genetic diversity.
4. Serve as baseline areas for measuring long-term ecological changes and to monitor effects of resource management techniques and practices used elsewhere.

c. Land Management Planning

The effects on expanding Tucker Lake Hemlocks RNA 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). The RNA is part of a national network of ecological areas designated in perpetuity for research and education, and to provide important components of biological diversity for the CNNF.

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

d. Management Prescription

The management prescription for Tucker Lake Hemlocks RNA is embodied in the management area direction and guidance presented in the 2004 CNNF Forest Plan (Appendix 3 and USDA Forest Service 2004a pg 3-50).

The CNNF has not developed an individual site management plan for Tucker Lake Hemlocks 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 Ojibwe Tribes and the state as this is also a Tribal RNA and 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. Research Natural Areas are high priority for monitoring and controlling invasives.

Refer to Appendix 1, section 4 f (1) *Potential or existing conflicts* to reference unique management issues that should be addressed for this RNA.

e. Use or Control of Fire or Grazing

Fire is not generally used as a management tool in these mesic and 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 2004 CNNF Forest Plan standard.

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 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 RNA program, and provides information to researchers seeking research sites or projects. More specific information can be obtained from the CNNF RNA Coordinator.

a. Physical Site Description and Climatic Conditions

(1) LOCATION

Tucker Lake Hemlocks RNA is located on the Medford-Park Falls Ranger District of the Chequamegon-Nicolet National Forest, Price and Vilas Counties, in the state of Wisconsin. No other National Forest System lands are involved. It is completely bounded by National Forest land.

The RNA's Mercator coordinates are 45° 56' N latitude and 90° 03' W longitude; Pike Lake quadrangle USGS map. See Establishment Record Identification Section for *Boundary Certification*, *Location Map* and *Boundary Map*.

(2) SIZE IN ACRES/HECTARES

The RNA is expanding by 516 acres (209 ha) with this update. The original approximately 158 acre (64 ha) RNA was designated in 1991. In addition to expanding the size, slight boundary modifications were made on the eastern boundary of the original RNA using Global Information Systems (GIS) technology not available in 1991. The total RNA size is now 674 acres (273 hectares).

(3) ELEVATION RANGE

Elevations range from 1,550 feet (472 m) to 1,610 feet (491 m) above sea level.

(4) ACCESS TO THE SITE

From Park Falls, drive east on State Highway 182 for 13 miles (21 km) to Forest Road 144 (Shady Knoll Road). Turn east (right) on FR 144 5.2 miles (8.3 km), then east (left) on FR 142 (Twin Lakes Road) 3.2 miles (5.1 km) on the right to a small parking area with a gate marked as a hiking trail. Walk south 1 mile (1.6 km) to the north shore of Round Lake, then follow the trail east about 0.25 mile (0.4 km) which leads to the old-growth hemlock stand. Access is also available via canoe or boat on Round Lake by following the portage trail between Round and Tucker Lakes. To access the

east side of the RNA (east of Tucker lake) walk approximately one quarter mile (0.4 km) on a woods roads off FR 142 and FR 1182 (See Identification Section maps).

(5) CLIMATIC DATA

The weather station nearest to Tucker Lake Hemlocks RNA is Park Falls DNR Headquarters (Station no. 476398, latitude 45° 55' N, longitude 90° 26' W). The station is about 20 mi (32 km) northwest of the RNA and experiences the same weather. This station has recorded temperature and precipitation data since 1910 (Midwestern Regional Climate Center 2003).

Table 1 Climate data from station no. 476398 1910 to 2003 (Midwestern Regional Climate Center 2003)

| Temperature | °F | °C |
|--|-------|-------|
| Mean annual | 41.0 | 5.0 |
| Mean April through September | 58.0 | 14.0 |
| Mean October through March | 24.0 | -4.0 |
| Mean daily maximum | 51.0 | 11.0 |
| Mean daily minimum | 31.0 | -0.5 |
| Record high | 106.0 | 41.0 |
| Record low | -45.0 | -43.0 |
| Precipitation | in | cm |
| Mean annual rainfall | 32.0 | 81.3 |
| Mean monthly - April through September | 4.0 | 9.4 |
| Mean monthly - October through March | 2.0 | 4.3 |
| Mean annual snowfall | 41.0 | 104.6 |

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).

Tucker Lake Hemlocks RNA is located in the Laurentian Mixed Forest Province (212), Northern Highland Section (212X). The site is located in the Subsection Northern Highlands Pitted Outwash (212Xb), of the Ecological Units of the Eastern United States (Keys et al. 1995; Cleland et al. 2007). It includes Land Type Association (LTA) Northern Highland Outwash Plains (Xb01).

(2) PLANT COMMUNITY TYPES

The most significant plant community type is old-growth eastern hemlock - yellow birch forest. This mesic forest type is dominated by eastern hemlock (*see Table 4 for plant scientific names*),

yellow birch, and sugar maple (Epstein 1986). Many canopy trees of all dominant species exceed 20 inches (50 cm) DBH which is large for northern Wisconsin. Scattered, much larger individual trees are present; the largest measured was a yellow birch at just under 40" (76 cm) in 1986. The oldest hemlock trees aged by Tyrrell (1991) were 350 years old but diameter was not correlated with age. Reproduction within the old-growth stand is primarily by sugar maple, but hemlock is reproducing well in several mesic forest stands (Figure 3). Canopy associates include basswood, red maple, white ash, balsam fir, and white pine.



Figure 3. Eastern hemlock is reproducing successfully in the understory of mesic hardwood forest of Tucker Lake RNA. Photo by Linda Parker 2005

The shrub layer of the eastern hemlock-yellow birch forest is generally sparse, except where canopy gaps allow sunlight to penetrate to the forest floor. Characteristic shrub species are mountain maple, beaked hazelnut, American fly honeysuckle, and red elderberry. A few, heavily browsed Canada yew (a CNNF species of concern) are present. The ground layer is characterized by species such as shining club moss, mountain wood sorrel, small enchanter's nightshade, and intermediate wood fern (Figure 1).

Aquatic communities within the RNA include the entire shoreline of Tucker Lake and approximately 4,000 feet (1,200 m) of shoreline on Round Lake. Aquatic vegetation includes several pondweeds, bladderwort, common elodea, and water-lily. There is also a short spring run west of Tucker Lake. Wetland communities include shrub carr and sedge meadow.

Table 2. Natural vegetation community types within Tucker 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 mesic forest | ATM | hemlock, yellow birch, sugar maple (white pine) | Tsuga canadensis - Acer saccharum - Betula alleghaniensis Forest C EGL005044 |
| Northern wet-mesic forest | ATD | Eastern Hemlock, yellow birch | Tsuga canadensis - Betula alleghaniensis Saturated Forest C EGL005003 |
| Northern wet-mesic forest | N/A | northern white cedar | Thuja occidentalis / Sphagnum Forest C EGL006007 |
| Northern wet forest | N/A | black spruce, tamarack | Picea mariana-(Larix laricina)/Ledum groenlandicum/Sphagnum spp Forest C EGL005271 |
| Shrub carr | N/A | Speckled Alder | Alnus incana Swamp Shrubland C EGL002381 |
| Sedge meadow | N/A | Bluejoint Grass or Tussock Sedge dominated | Calamagrostis canadensis - Eupatorium maculatum Herbaceous Vegetation C EGL005174 or Carex stricta - Carex spp. Herbaceous Vegetation C EGL002258 |
| Spring, spring run | N/A | Not documented | Not documented |
| Lake (Tucker and Round) | N/A | white water lily, bullhead lily - emergent pondweed, coontail - submergent | Nymphaea odorata - Nuphar (microphylla, variegata) Herbaceous Vegetation C EGL002562 & Potamogeton spp. - Ceratophyllum spp. - Elodea spp. Permanently Flooded Herbaceous Vegetation C EGL004725 |

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



Figure 4. Old-growth features present include canopy gaps with sugar maple saplings now reaching the canopy. Photo by M. Brzeskiewicz 2013



Figure 5. This tree likely fell more than fifty years ago and provides numerous ecosystem services as a nurse log. Photo by M. Brzeskiewicz 2013

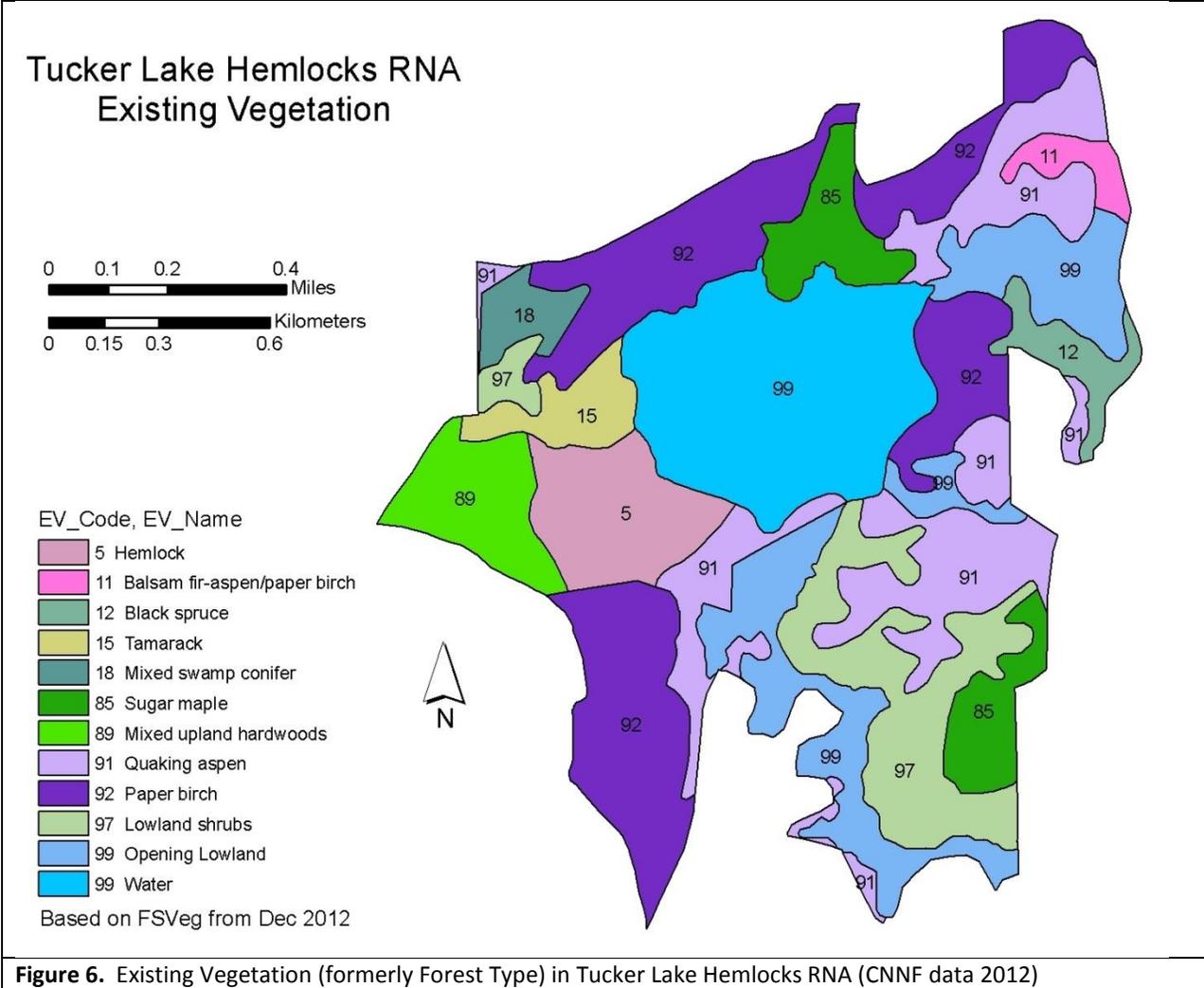


Figure 6. Existing Vegetation (formerly Forest Type) in Tucker Lake Hemlocks RNA (CNNF data 2012)

Table 3. Existing Vegetation (as dominant tree cover) and area within Tucker Lake Hemlocks RNA and key to Figure 6

| EV Code | Existing Vegetation (EV) | Acres | Hectares |
|--------------------|------------------------------|--------------|--------------|
| 5 | Hemlock | 38.5 | 15.6 |
| 11 | Balsam fir-aspen/paper birch | 8.8 | 3.5 |
| 12 | Black spruce | 14.1 | 5.7 |
| 15 | Tamarack | 17.2 | 7.0 |
| 18 | Mixed swamp conifer | 11.5 | 4.7 |
| 85 | Sugar maple | 40.3 | 16.2 |
| 89 | Mixed upland hardwoods | 30.2 | 12.2 |
| 91 | Quaking aspen | 105.4 | 42.5 |
| 92 | Paper birch | 147.8 | 59.9 |
| 97 | Lowland shrubs | 67.9 | 27.5 |
| 99 | Opening Lowland | 85.2 | 34.5 |
| 99 | Water | 106.8 | 43.2 |
| Grand Total | | 673.7 | 272.5 |

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

The CNNF has not completed a comprehensive flora of the expanded portions of the RNA. The table below is based on information from a one-acre CNNF monitoring plot within eastern hemlock/hardwood forest and informal surveys in the 1990s. More survey work will yield additional species in other plant communities.

(A) FLORA LIST

Table 4. Flora of Tucker Lake Hemlocks RNA (from surveys 1998 - 2008)

| Scientific name | Common Name | Scientific name | Common Name |
|-----------------------------------|------------------------------|---|--------------------------|
| <i>Abies balsamea</i> | balsam fir | <i>Larix laricina</i> | tamarack |
| <i>Acer rubrum</i> | red maple | <i>Lonicera canadensis</i> | American fly honeysuckle |
| <i>Acer saccharum</i> | sugar maple | <i>Luzula acuminata</i> | hairy wood rush |
| <i>Acer spicatum</i> | mountain maple | <i>Lycopodium annotinum</i> | bristly club-moss |
| <i>Actaea pachypoda</i> | white baneberry | <i>Lycopodium clavatum</i> | running club-moss |
| <i>Actaea rubra</i> | red baneberry | <i>Lycopodium dendroideum</i> | northern tree club-moss |
| <i>Adiantum pedatum</i> | maidenhair fern | <i>Maianthemum canadense</i> | wild lily-of-the-valley |
| <i>Alnus incana</i> | gray alder | <i>Matteuccia struthiopteris</i> | ostrich fern |
| <i>Amelanchier arborea</i> | downy serviceberry | <i>Mitchella repens</i> | partridgeberry |
| <i>Anemone canadensis</i> | Canada anemone | <i>Nuphar variegata</i> | bullhead lily |
| <i>Anemone quinquefolia</i> | woods anemone | <i>Nymphaea odorata</i> | American white waterlily |
| <i>Aralia nudicaulis</i> | wild sarsaparilla | <i>Onoclea sensibilis</i> | sensitive fern |
| <i>Arisaema triphyllum</i> | jack-in-the-pulpit | <i>Oryzopsis asperifolia</i> | roughleaf ricegrass |
| <i>Aster macrophyllus</i> | big-leaf aster | <i>Osmunda cinnamomea</i> | cinnamon fern |
| <i>Athyrium filix-femina</i> | lady fern | <i>Osmunda claytonii</i> | interrupted fern |
| <i>Betula alleghaniensis</i> | yellow birch | <i>Ostrya virginiana</i> | ironwood |
| <i>Betula papyrifera</i> | paper birch | <i>Oxalis montana</i> | mountain wood sorrel |
| <i>Brachyelytrum erectum</i> | northern shorthusk | <i>Phegopteris connectilis</i> | northern beech fern |
| <i>Brasenia schreberi</i> | watershield | <i>Picea glauca</i> | white spruce |
| <i>Calamagrostis canadensis</i> | bluejoint grass | <i>Picea mariana</i> | black spruce |
| <i>Caltha palustris</i> | marsh marigold | <i>Pinus resinosa</i> | red pine |
| <i>Carex arcata</i> | drooping woodland sedge | <i>Pinus strobus</i> | white pine |
| <i>Carex deweyana</i> | Dewey sedge | <i>Polygonatum biflorum</i> | greater Solomon's-seal |
| <i>Carex intumescens</i> | greater bladder sedge | <i>Polygonatum pubescens</i> | hairy Solomon's-seal |
| <i>Carex pedunculata</i> | long-stalked sedge | <i>Populus grandidentata</i> | big-tooth aspen |
| <i>Caulophyllum thalictroides</i> | blue cohosh | <i>Populus tremuloides</i> | trembling aspen |
| <i>Circaea alpina</i> | Dwarf enchanter's nightshade | <i>Prunus serotina</i> | black cherry |
| <i>Clintonia borealis</i> | bluebead lily | <i>Prunus virginiana</i> | choke cherry |
| <i>Coptis trifolia</i> | goldthread | <i>Pteridium aquilinum</i> | bracken fern |
| <i>Cornus alternifolia</i> | alternate-leaved dogwood | <i>Pyrola elliptica</i> | elliptic shinleaf |
| <i>Cornus canadensis</i> | bunchberry | <i>Pyrola secunda</i> | sidebells |
| <i>Corylus americana</i> | American hazelnut | <i>Quercus rubra</i> | red oak |
| <i>Corylus cornuta</i> | beaked hazelnut | <i>Ranunculus abortivus</i> | little-leaf buttercup |
| <i>Diphasiastrum digitatum</i> | northern running pine | <i>Rubus alleghaniensis</i> | blackberry |
| <i>Dirca palustris</i> | leatherwood | <i>Rubus idaeus</i> | red raspberry |
| <i>Dryopteris intermedia</i> | fancy wood fern | <i>Rubus pubescens</i> | dwarf red blackberry |
| <i>Elymus hystrix</i> | eastern bottlebrush grass | <i>Sambucus racemosa</i> | red elderberry |
| <i>Elymus virginicus</i> | Virginia wild rye | <i>Streptopus lanceolatus v. longipes</i> | rosy twisted stalk |
| <i>Fragaria virginiana</i> | strawberry | <i>Taraxacum officinale</i> | common dandelion |

| Scientific name | Common Name | Scientific name | Common Name |
|-------------------------------------|------------------------|------------------------------|-------------------------|
| <i>Fraxinus americana</i> | white ash | <i>Taxus canadensis</i> | Canada yew |
| <i>Fraxinus nigra</i> | black ash | <i>Thalictrum dioicum</i> | early meadow rue |
| <i>Galium triflorum</i> | sweet-scented bedstraw | <i>Thuja occidentalis</i> | northern white cedar |
| <i>Gaultheria procumbens</i> | wintergreen | <i>Tilia americana</i> | basswood |
| <i>Gymnocarpium dryopteris</i> | oak fern | <i>Trientalis borealis</i> | starflower |
| <i>Hepatica nobilis var. obtusa</i> | roundlobe hepatica | <i>Trillium grandiflorum</i> | large-flowered trillium |
| <i>Hieracium aurantiacum</i> | orange hawkweed | <i>Tsuga canadensis</i> | eastern hemlock |
| <i>Huperzia lucidula</i> | shining club-moss | <i>Ulmus americana</i> | American elm |
| <i>Impatiens capensis</i> | jewelweed | <i>Utricularia spp</i> | bladderwort |
| <i>Iris versicolor</i> | blueflag iris | <i>Lythrum salicaria</i> | purple loosestrife |
| <i>Juncus tenuis</i> | path rush | <i>Plantago major</i> | large-leaved plantain |
| | | <i>Polemonium reptans</i> | Jacob's ladder |



Figure 7. The largest eastern hemlock trees present are approximately 350 years old with diameters ranging from 18 to 24 inches DBH (45-61 cm). These large trees provide habitat for many organisms including this curious red squirrel. Photo by M. Brzeskiewicz 2013.

(B) FAUNA LIST

Lake shores and surrounding wetlands support significant waterfowl use during migration. The exposed rocky beach and wetlands bordering Tucker Lake have a large population of leopard frogs (*see Table 5 for scientific names*) and spotted sandpipers. Bald eagles have been nesting within the RNA for decades and the lake has a diverse fish population. The lake was last stocked with walleye in 1999 (WI DNR 2013a). Wisconsin has title to the natural lakes of the state and is charged with management of the fishery resources (Kent & Dudiak 2001).

Table 5. Fauna observed in Tucker Lake RNA (1972; 1998)

| Tucker Lake Hemlocks Fauna List | |
|---------------------------------|---------------------------------|
| Common Name | Scientific Name |
| BIRDS | |
| common loon | <i>Gavia immer</i> |
| great blue heron | <i>Ardea herodias</i> |
| mallard | <i>Anas platyrhynchos</i> |
| wood duck | <i>Aix sponsa</i> |
| ringneck duck | <i>Aythya collaris</i> |
| osprey | <i>Pandion haliaetus</i> |
| bald eagle | <i>Haliaeetus leucocephalus</i> |
| ruffed grouse | <i>Bonasa umbellus</i> |
| woodcock | <i>Philohela minor</i> |
| belted kingfisher | <i>Ceryle alcyon</i> |
| spotted sandpiper | <i>Actitis macularia</i> |
| northern flicker | <i>Colaptes auratus</i> |
| pileated woodpecker | <i>Dryocopus pileatus</i> |
| yellow-bellied sapsucker | <i>Sphyrapicus varius</i> |
| eastern wood pewee | <i>Contopus virens</i> |
| olive-sided flycatcher | <i>Contopus borealis</i> |
| brown creeper | <i>Certhia americana</i> |
| winter wren | <i>Troglodytes troglodytes</i> |
| hermit thrush | <i>Catharus guttatus</i> |
| veery | <i>Catharus fuscescens</i> |
| red-eyed vireo | <i>Vireo olivaceus</i> |
| northern parula | <i>Parula americana</i> |
| yellow-rumped warbler | <i>Dendroica coronata</i> |
| black-throated green warbler | <i>Dendroica virens</i> |
| blackburnian warbler | <i>Dendroica fusca</i> |
| ovenbird | <i>Seiurus aurocapillus</i> |
| scarlet tanager | <i>Piranga olivacea</i> |
| MAMMALS | |
| black bear | <i>Ursus americanus</i> |

| Tucker Lake Hemlocks Fauna List | |
|---------------------------------|--------------------------------|
| Common Name | Scientific Name |
| common raccoon | <i>Procyon lotor</i> |
| red squirrel | <i>Tamiasciurus hudsonicus</i> |
| eastern chipmunk | <i>Tamias striatus</i> |
| beaver | <i>Castor canadensis</i> |
| porcupine | <i>Erethizon dorsatum</i> |
| muskrat | <i>Ondatra zibethicus</i> |
| white-tailed deer | <i>Odocoileus virginianus</i> |
| gray wolf | <i>Canis lupus</i> |
| mink | <i>Mustela vison</i> |
| least weasel | <i>Mustela nivalis</i> |
| northern river otter | <i>Lontra canadensis</i> |
| FISH | |
| walleye | <i>Stizostedion vitreum</i> |
| largemouth bass | <i>Micropterus salmoides</i> |
| muskellunge | <i>Esox masquinongy</i> |
| northern pike | <i>Esox lucius</i> |
| yellow perch | <i>Perca flavescens</i> |
| bluegill | <i>Lepomis macrochirus</i> |
| black crappie | <i>Pomoxis nigromaculatus</i> |
| pumpkinseed | <i>Leopomis gibbosus</i> |
| rock bass | <i>Ambloplites rupestris</i> |
| black bullhead | <i>Ictalurus melas</i> |
| white sucker | <i>Catostomus commersoni</i> |
| bluntnose minnow | <i>Pimephales notatus</i> |
| golden shiner | <i>Notemigonus crysoleucas</i> |
| iowa darter | <i>Etheostoma exile</i> |
| HERPTILES | |
| leopard frog | <i>Rana pipiens</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). Precambrian granite bedrock, a part of the Canadian Shield, underlies this area.

Bedrock of the Land Type Association (LTA)(Northern Highland Outwash Plains) includes igneous, metamorphic, and volcanic rock and the majority of the LTA has bedrock within 5 feet of the land surface. Topography is rolling. The dominant geomorphologic process was till deposition (WI DNR 2003).

(D) SOILS

Soils are sandy loam, fine sandy loam, and to a lesser extent, loam or silt loam surfaces over sand and gravel. There is a moisture gradient from west to east and the RNA contains a strip of dry sand/gravel outwash plain on the northeastern boundary.

The majority of the soil falls into the Padus series. The Padus series consists of very deep well-drained soils, which are moderately deep to stratified sandy outwash. These soils formed mostly in loamy alluvium and are underlain by stratified sandy outwash on glacial lake plains, outwash plains, stream terraces, and moraines. Permeability is moderate or moderately rapid in the loamy mantle and rapid or very rapid in the sandy outwash. Slopes range from 0 to 45 percent. Most areas are forested. Nutrient status is medium to medium-poor (USDA NRCS 2003).

(E) TOPOGRAPHY

The characteristic landform pattern of the Northern Highland Outwash Plains LTA is rolling drumlin and inter-drumlin outwash plains and swamps (WI DNR 2003). Terrain of the RNA is undulating to hilly to rolling to steep topography (see Identification Section - *Boundary Map* showing 10-foot contour lines) with well-drained sandy loams and loamy sand soils. The moisture regime is mesic to dry mesic.

(F) AQUATIC/RIPARIAN

Tucker Lake Hemlocks RNA is located within the Upper South Fork of the Flambeau River watershed classified as an Outstanding Resource Water in 1993 (WIDNR 2013a). The updated boundary of the RNA now encompasses the entire shore of Tucker Lake and will help protect the riparian communities (Figure 8). Tucker Lake is a large, undeveloped drainage lake with medium soft, slightly alkaline, clear water. It has a maximum depth of 32' (13m) with a bottom primarily of gravel and



Figure 8. A view of the south end of Tucker Lake. The outlet, Tucker Creek, is to the left of the taller trees in the center of the picture. Photo by M. Brzeskiewicz 2013.

muck (Sommerfeldt 1990). Designation of the update will also protect Tucker Creek and thus the water quality of lakes downstream within the watershed. The RNA updated boundary now includes approximately 0.75 miles (1.2 km) of high quality natural shoreline on Round Lake (see Identification Section- *Landscape Overview*). The state of Wisconsin maintains authority over the natural lakes of the state and the DNR is charged with management of fishery resources (Kent & Dudiak 2001).

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

Several ecological surveys of the uplands over the past twenty years have not revealed any rare or uncommon plants other than Canada yew. The old-growth forest with its large trees likely provides habitat for several bat species but no bat surveys have been done. Several bat species are now listed as threatened in Wisconsin due to the imminent threat of white nose syndrome and the RNA may provide good quality habitat.

Table 6. Threatened, endangered, and unique species in Tucker Lake Hemlocks RNA, State status and Natural Heritage rank

| Common Name | Scientific Name | State Status; State Heritage Rank ¹ |
|-------------|---------------------------------|--|
| Timber wolf | <i>Canis lupus</i> | SC/P, S4 |
| Bald eagle | <i>Haliaeetus leucocephalus</i> | SC/P; S4B,S4N |
| Osprey | <i>Pandion haliaetus</i> | SC/M; S4B |
| Canada yew | <i>Taxus canadensis</i> | CNNF species of concern |

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

(H) LIST OF RARE ELEMENTS AND RARE PLANT COMMUNITIES

Eastern hemlock is reproducing well here, a rarity compared to other areas of northern Wisconsin. The RNA protects a small stand of northern white cedar another species of concern due to low reproduction in this part of its range.

Table 7. Rare or unique elements and plant communities within Tucker Lake Hemlocks RNA with global and state rank (WI DNR 2012).

| Element/Community Name | Global Rank | State Rank ¹ |
|------------------------------|-------------|-------------------------|
| Northern Wet-mesic Forest | G3? | S3S4 |
| Black spruce swamp | G5 | S3? |
| Tamarack (poor) swamp | G4 | S3 |
| Northern sedge meadow | G4 | S3 |
| Lake-deep, soft, drainage | GNR | S1 |
| Eastern hemlock regeneration | none | none |

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

c. Resource Information

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

(1) MINERALS

The mineral estate [674 acres (273 hectares)] within Tucker Lake Hemlocks RNA is federally owned. Federal-owned minerals are open to hardrock prospecting within the Research Natural Area and the Forest Service must allow access to the mineral estate which is administered by Bureau of Land Management. There is potential for hardrock prospecting activity within RNA based on geology and recent hardrock prospecting permit activity nearby. 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 Tucker Lake Hemlocks RNA.

(2) GRAZING

There is no grazing on the CNNF. The 2004 CNNF Forest 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 414 (167 hectares). Of this 38 acres (15 ha) are identified as eastern hemlock, a type that is not managed on the CNNF due to regeneration concerns. Another 42 acres (17 ha) are lowland forest types which are also not currently managed. There are no outstanding timber rights on any of the tracts in the RNA. There is a small stand in the northeastern section where many balsam fir are dead and falling down (Figure 9) likely due to native spruce budworm (*Choristoneura fumiferana*) or native disease outbreaks that occur periodically.

The 2004 CNNF Forest Plan has a guideline that prohibits gathering



Figure 9. This photo was taken in early spring of a balsam fir/aspens stand east of Tucker Lake (EV code 11 on Figure 6). It shows significant numbers of dead balsam fir. Photo by M Brzeskiewicz April, 2012

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 that 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”.

The original Tucker Lake Hemlocks RNA has been designated as a Tribal RNA (Tribal-USDA MOU) which limits tribal gathering, but the expanded portion has not. 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 *Introduction*).

(4) WATERSHED VALUES

Tucker Lake Hemlocks RNA is located within the Upper South Fork of the Flambeau River watershed in the upper Chippewa Basin (WIDNR 2013a). The basin feeds into the Mississippi River. The South Fork Flambeau River was classified as an Outstanding Resource Water in 1993 (WI DNR 2013a).

The RNA surrounds the 107 acre (43 ha) Tucker Lake, a high-quality aquatic resource and classified as Outstanding/Exceptional Resource Water (WI DNR 2013a). The expansion of the RNA allows for protection of the entire shoreline of the lake. Because of the excellent fishery, the lake gets some pressure from anglers in all seasons but use is limited due to walk-in only access (Sommerfeldt 1990). Beaver have been trapped from the outlet stream on a regular basis for the past twenty years to mitigate flooding and to aid in the movement of walleye between Tucker Lake and the Pike/Round chain of lakes (Reinecke pers comm). The 2004 CNNF Forest Plan includes a guideline that states “wildlife and fish habitat manipulation will not be permitted unless it is consistent with RNA objectives and is needed to maintain the character or purpose of the area” (USDA Forest Service 2004a). The CNNF determined that periodic removal of beaver was needed to prevent flooding of old growth forest and shoreline erosion within the RNA.

The expanded RNA now includes 4,000 feet (1,200 m) of the northeast shoreline of Round Lake (Identification Section - *Boundary Map*). The Forest Service owns approximately two thirds of the lakeshore on the north portion of the lake. Round Lake has high values for its fishery and its scenic quality for the permanent and seasonal homes and resorts on the southern third of the lake.

(5) RECREATION USE



Figure 10. Sturdy steps have worked well to prevent erosion at the portage trail on Tucker Lake. Photo by M. Brzeskiewicz 2013.

Tucker Lake receives light recreation use while Round Lake is popular and receives moderate use compared to some heavily used northern Wisconsin lakes.

There is a canoe portage trail leading from Round Lake to Tucker Lake that is used occasionally throughout the year. A portion of this trail connects to a cross-country ski trail that is not groomed. Use of this trail is mainly by hikers, snowshoers, and anglers who walk in all seasons. Tucker Lake is a well-known panfish and northern pike fishery in winter; with tasty fillets the reward for snowshoeing over a mile in the cold. See Identification Section maps.

Dispersed camping in one area on Tucker Lake led to erosion and litter problems that have since been corrected (Figure 10). Camping is discouraged in RNAs and can be prohibited if necessary. The CNNF will reduce negative impacts associated with any user developed sites and continue to monitor such sites.

A 2004 CNNF Forest Plan standard prohibits recreational use that threatens or interferes with the objectives or purposes for which the RNA was established (USDA Forest Service 2004a). Horses, bicycles, and motorized vehicles are prohibited on

RNA trails. Tucker Lake Hemlocks RNA is imbedded within a CNNF Semi-primitive, non-motorized area so conflict with potential illegal motorized use will be minimal.

(6) WILDLIFE

Tucker Lake Hemlocks RNA supports a diverse array of non-game birds but ruffed grouse and woodcock occur on the tract as well. Several important game mammals including white-tailed deer and beaver inhabit the tract. Gray wolves are common in the area and may, along with deer hunters, be keeping deer numbers down allowing eastern hemlock to regenerate. The state protected osprey and bald eagle use the RNA for foraging. The RNA protects the active bald eagle nest and large trees required for nesting.

In the past, beaver dams on Tucker Creek (the outlet of Tucker Lake) have caused flooding that killed a portion of a swamp conifer stand on the west side of the lake. Beaver are a natural part of the ecosystems of northern Wisconsin but their populations exploded in the 1970s due to timber management for early successional forest and a drop in pelt prices. To protect the values of the RNA and aid the passage of fish the CNNF has had beaver trapped out of the creek on a regular basis since the 1990s (Reinecke pers comm). Note that the creek and lake are under state jurisdiction and are not technically included in the RNA. Perhaps since wolves began to repopulate the area in the 1980s they may play a role in controlling beaver populations.

Seven species of bats occur on the CNNF and all, even cave-dwellers, rely at one time or another on a matrix of older forests and water such as Tucker Lake Hemlocks RNA provides. This RNA has had no specific surveys for bats but they are known to occur in this general area (Heeringa, pers comm). 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, the successional changes within Tucker Lake Hemlocks RNA will provide these essential habitat characteristics over time.

Wisconsin pro-actively listed four cave bat species in 2010 as *threatened* due to the invasive fungus that causes death from *white nose syndrome*. They have also proactively listed the infecting fungus (*Geomyces destructans*) that as a *prohibited species* (WI DNR 2010). Three bat species were listed as Regional Forester Sensitive species for the CNNF in 2011 [Little Brown myotis (*Myotis lucifugus*), Northern long-eared myotis (*Myotis septentrionalis*), and Tri-color (*Perimyotis subflavus*)]. Bat surveys have not been done within the RNA as of 2013 (Heeringa pers comm).

(7) TRANSPORTATION/ROAD SYSTEM

There are no roads or trails open to motor vehicles within or adjacent to the RNA, and 2004 CNNF Forest Plan standards and guidelines prohibit their construction. The RNA is completely contained within a larger semi-primitive non-motorized area. The current rule guiding motorized access is contained in the Travel Management Project Decision Notice and Motorized Vehicle Use Map for 2012 (USDA Forest Service 2012).



Figure 11. An old road within the RNA is not maintained but is used as a hiking and cross-country ski trail and provides easy access for researchers. Photo by M. Brzeskiewicz 2013.

d. Historical Information

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

History of establishment:

The site was identified and its outstanding natural features first documented in 1972 by Wisconsin Department of Natural Resources (WDNR) biologists conducting an inventory of natural areas in Price and Vilas Counties, Wisconsin (Epstein 1986). Following that inventory, Tucker Lake Hemlocks was recommended for State Scientific Area status. The area was included in a larger *Round Lake Wilderness Study Area* and deferred from management since the early 1970s. In 1986

the area was included on a list of potential candidate RNAs prepared by CNNF personnel. The site was inspected in the summer of 1986 by WDNR Natural Heritage Program biologists to update existing information on the area's biota, assess the overall condition and quality of the area's natural features, and make recommendations for appropriate protective status and/or management actions. A 158-acre (64 ha) "Tucker Lake Hemlocks" was recommended and established as a Research Natural Area in 1991.

The CNNF began a forest-wide ecological inventory to identify high quality ecological features in the early 1990s (Parker 1999). The expanded area of Tucker Lake Hemlocks was one of the highest ranking sites based on its ecological values and would add valuable wetlands surrounding Tucker Lake as well as high quality upland communities. It was assigned a high conservation priority and continued to be deferred from management activity. About the same time, the Eastern Region and Northern Research Station undertook a gap analysis of high-quality examples of alliances (ecological communities) within each subsection (Tyrrell et al 2000). This site filled a cell in that gap analysis.

The Natural Heritage Inventory Section of the Bureau of Endangered Resources (Wisconsin DNR) worked closely with Forest ecologists in evaluating this site, making numerous field visits and assisting with ecological inventory and evaluation. They completed a *Site Evaluation* and recommended expanding Tucker Lake Hemlocks RNA (Hoffman 1999).

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 (MOU) in 2008 with the CNNF to co-designate all current and future RNAs and Forest Special Management Areas (SMAs) as State Natural Areas. The management goals of State Natural Areas for research and education are compatible with the CNNF's.

The update of Tucker Lake RNA 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 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 Tucker Lake for establishment.

Research Use

Several monitoring plots are established within the original portion of the RNA west of Tucker Lake. See Section e (1): *Permanent Research Plots and/or Photo Points* below. A Breeding Bird Atlas survey has been conducted annually by the CNNF Forest Ecologist since 1990.

(2) CULTURAL/HERITAGE

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

The current Lac du Flambeau Ojibwe Reservation lies about three miles (5 km) to the northeast of this RNA. While other Indian tribes currently live in Wisconsin, Ojibwe tribes specifically retained the right to hunt, fish, and gather on lands that make up the CNNF through a series of session treaties. The Forest Service (and Eastern Region, Northern Research Station and USFS Law

Enforcement) recognizes treaty rights through a “Memorandum of Understanding” with eleven sovereign and federally recognized tribes of Ojibwe Indians (Tribal-USDA MOU). Today, these treaty rights are being exercised by Ojibwe Indian tribes under rules promulgated and enforced by the tribes. One of these rules recognizes twelve existing RNAs (including Tucker Lake Hemlocks) 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 the expanded portion of Tucker Lake Hemlocks 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 the expanded portion 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

Other than the old growth forest on the hill between the lakes, a point on the north shore of Tucker Lake, and small, scattered inclusions, the entire site is comprised of second growth forest which was harvested in the early 1900s. Most of the harvested stands are now old aspen-birch forest on mesic sites indicating a history of intense post-logging fires in the early 1900s. Many are succeeding to sugar maple and yellow birch with hemlock inclusions or tending toward white pine and red oak on the drier sites.

The CNNF does occasionally experience wildfires in mesic hardwood forest in dry years but fires are most often small in size. The RNA borders drier sandy outwash plain on the northeast corner that could experience a larger natural fire on the order of tens of acres. Blackened stumps of past fires are evident here (Figure 12). The soil is sandy and perched on glacial outwash plateau that supports a pine-oak forest community.

Historic beaver activity on Tucker Creek had raised the lake level significantly inundating the adjoining conifer swamps and bogs and some upland old growth forest, but beaver control and dam removal in the late 1980s has since eliminated this disturbance. Some shoreline erosion occurred during these high water levels (Hoffman 1999).



Figure 12. Scars of a small fire decades ago are still evident but generally wildfires are infrequent. Photo by M. Brzeskiewicz 2012

User developed campsites have impacted vegetation in small, localized areas along the shoreline of Tucker Lake [See section c.(5) *Recreation Use*]. These areas have been repaired and are being monitored. Camping will be prohibited if damage increases.

In recent years some wind-throw of a few large trees occurred in the northwestern section of the RNA near the Tucker Lake shoreline. These trees now provide habitat for small mammals, birds, salamanders, and invertebrates.

(4) OCCURRENCE OF EXOTIC SPECIES

Purple loosestrife (*Lythrum salicaria*) occurs on Round Lake which is the southwestern border of the RNA. Control efforts using biological control insects as well as digging by CNNF staff and the Pike and Round Lake Association members have kept it in check since 1997. Loosestrife is being monitored as part of invasive plant monitoring as well as through RNA check-ups. There is a scattering of non-native plants of minimal concern along the trails such as dandelion, orange hawkweed, and large-leaved plantain. 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. Monitoring for invasive species is the responsibility of the Park Falls-Medford Ranger District and the RNA coordinator.

e. Other Information

(1) PERMANENT RESEARCH PLOTS AND/OR PHOTO POINTS

- USFS Forest Service Inventory and Analysis (FIA) plot established in the 1970s.
- US Forest Service Northern Research Station, Old Growth Studies (Tyrrell 1991; Tyrrell et al 1993)
- Mitch Bergeson (WDNR 2001) Small mammals and amphibians of old growth forests
- Control site for permanent vegetation monitoring network: baseline vegetation monitoring plot in the hemlock forest southwest of Tucker Lake established by the CNNF in 1990.

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

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

(2) BIBLIOGRAPHY

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

(3) POTENTIAL RESEARCH TOPICS

The 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).

Potential research topics include beaver populations following the return of the timber wolf, or species such as balsam fir on the edge of their range with respect to climate change. It would be a good location to study succession of what is now older, seral-stage aspen and birch forest succeeding from past management to hemlock/hardwood forest as they could be compared to recently managed communities on the same landform nearby. A thorough inventory of small mammals, forest bats, birds, upland vegetation, and wetland vegetation is needed as well as lichens and invertebrates.

f. Evaluation of Specific Management Recommendations on the RNA

(1) POTENTIAL OR EXISTING CONFLICTS; PRINCIPAL MANAGEMENT ISSUES

Principle management issues include compatibility of timber management on lands surrounding the RNA, recreation impacts, the effects of a disease/insect outbreak that killed many balsam fir, and continuing monitoring for invasive species such as hemlock wooly adelgid (*Adelges tsugae*).

All of the land surrounding the RNA is in Management Area 1B - Early Successional Mixed Aspen-Conifer and Conifer overlain on a "6B - Semi-primitive non-motorized, moderate disturbance" designation (USDA Forest Service 2004a). Standards and guidelines for both Management Areas are applied and when they conflict, the more restrictive Standards or Guidelines prevail. Under 6B, clearcuts for creating early successional forest are limited to 10 acres (4 ha) and most long-lived northern hardwood and conifer large diameter trees are retained.

There is nothing in the 2004 CNMF Forest Plan that says 1B areas will or are required to be managed with any particular harvest techniques. Avoiding clear cut harvesting for aspen adjacent to the RNA will reduce ecological edge effect. Buffer zones could be created that employ long rotations for timber harvest. The district ranger in consultation with the Forest Supervisor and RNA coordinator will work out appropriate management. Past timber management to the east of the RNA reserved the very large white pine super canopy trees and there are some large red oak here ranging in diameter from 14 to 20 inches (35 - 50 cm). Surrounding land is owned by the National Forest so no conflict with management by other entities is possible.

The impacts of non-motorized recreation will continue as this area has an extensive history of use for hiking, fishing, and dispersed camping. The district has corrected erosion on Tucker Lake and improved the approach to the lake with wooden steps [see Section c(5)]. Signs and trail gates may be needed to keep out horseback riders and bicyclists (personally observed on trails in the past) as these activities are prohibited in RNAs.

Hemlock wooly adelgid, a non-native genotype from southern Japan, is an imminent management concern but has not yet infested hemlocks in Wisconsin (WI DNR 2013b). Hemlock wooly 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.

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

Tucker Lake Hemlocks RNA is not located within or adjacent to any congressionally designated area. It does contain the original 158 acre (64 ha) Tucker Lake Hemlocks RNA designated in 1991 by the Chief of the Forest Service.

g. Photographs

All photographs used in this Establishment Record are the property of the CNNF but not copyrighted. An electronic file is part of this establishment record.



Figure 13. Course woody debris within a patch of young forest on the west side of Tucker Lake. Photo by M. Brzeskiewicz, 2013



Figure 14. A large hemlock snag within the old-growth hemlock-hardwood forest where the oldest trees are over 350 years old. Photo by M. Brzeskiewicz, 2013

APPENDIX 2 BIBLIOGRAPHY

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

BIBLIOGRAPHIC REFERENCES:

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

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

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

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

Epstein, E. 1986. Establishment Record for the Tucker Lake Hemlocks Research Natural Area within the Chequamegon National Forest, Price County Wisconsin. (original RNA)

Heeringa, Brian. 2012. Wildlife Biology technician and Forest bat expert, Washburn Ranger District, CNNF. Personal Communication with Marjory Brzeskiewicz.

Hoffman, R. 1999. Unpublished project report on Tucker Lake Hemlocks.

Kent, P. G. and T. A. Dudiak. 2001. Wisconsin Water Law, A guide to water rights and regulations. University of Wisconsin-Extension. Copyright 2001 by the Board of Regents of the University of Wisconsin System.

Keys, J. Jr.; Carpenter, C.; Hooks, S.; Koenig, F. ; McNabb, W.H.; Russell, W. ; Smith, M.L. 1995. Ecological units of the eastern United States - first approximation [Map and booklet of map unit tables.] Atlanta, GA: U. S. Department of Agriculture, Forest Service. 83p.

Knight, Greg. 2013. Chequamegon-Nicolet National Forest soil scientist. Personal communication with Marjory Brzeskiewicz.

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

Krause, J. 1998. Chequamegon-Nicolet National Forest Natural Area Inventory: Tucker Lake Hemlocks. Unpublished reports on file in Park Falls Headquarters.

Midwestern Regional Climate Center. 2003. Historical Climate Data. Climate of the Midwest. http://mcc.sws.uiuc.edu/prod_serv/prodserv.htm Accessed 2005.

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

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

Reinecke, Sue. 2013. CNNF Forest Fish Biologist, personal communication with Marjory Brzeskiewicz.

Sommerfeldt, Thomas. 1990. *Draft* Fishery Survey Summary - Tucker Lake, Price County. Unpublished correspondence to William Smith WDNR, at Park Falls office CNNF.

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. 1991. Patterns of coarse woody debris in old-growth hemlock-hardwood forests of northern Wisconsin and Western Upper Michigan. A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Botany). University of Wisconsin - Madison.

Tyrrell, L. E.; G.J. Nowacki; T. R. Crow; D. S. Buckley; E. A. Nauertz; J. N. Niese; J. L. Rollinger; J. C. Zasada. 1997. Compiled information about old growth for selected forest type groups in the eastern United States, USDA Forest Service, North Central Forest Experiment Station General Technical Report, September 12, 1997.

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

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

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

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

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

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

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

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

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

USDA, NRCS. 2012. The PLANTS Database (<http://plants.usda.gov> 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/>

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

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

WI DNR. 1984. Wisconsin Department of Natural Resources Lake Survey Summary. Unpublished report on file in DNR's Bureau of Endangered Resources files.

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

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

WI DNR 2011. State Natural Areas Program. Available online: <http://dnr.wi.gov/topic/Lands/naturalareas/>
<http://dnr.wi.gov/topic/Lands/naturalareas/index.asp?SNA=296>

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

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

WI DNR 2013b Wisconsin Department of Natural Resources, Forest Health Topics, Hemlock wooly adelgid. Available online at: <http://dnr.wi.gov/topic/foresthealth/adelgid.html>

PUBLICATIONS FROM STUDIES ON RNA:

Bergeson, Mitchell T. 2001. Red-backed salamanders (*Plethodon cinereus*) in hardwood forests in northeastern Wisconsin and the upper peninsula of Michigan. A master of science (wildlife ecology) thesis, University of Wisconsin-Madison. 73 pp.

Clark, John D. 2010. Soil organic carbon content and quality in post-agricultural northern hardwood forests. PhD Dissertation. Publicly accessible Penn Dissertations. Paper 257.

Cook, James. Study on: *Change associated with the CNNF vegetation monitoring network, and comparisons of managed and unmanaged forests*. No publication as of 2013. Preliminary data available from CNNF RNA coordinator at Park Falls Office.

Herman, Ron. 1988. Establishment Record for Tucker Lake Hemlocks Research Natural Area within the Chequamegon National Forest, Price County, Wisconsin. 30 pp. Also available through this Northern Research Station website address: <http://www.nrs.fs.fed.us/rna/established/>

Tyrrell, L.E. 1991. Patterns of coarse wood debris in old-growth hemlock-hardwood forests of northern Wisconsin and western Upper Michigan. PhD Dissertation. University of Wisconsin, Madison, WI.

Tyrrell, Lucy E., T. R. Crow. 1993. Analysis of structural characteristics of old-growth hemlock-hardwood forests along a temporal gradient. in John T. Curtis: Fifty years of Wisconsin plant ecology. James S. Fralish, Robert P. McIntosh, and Ori L. Loucks, editors. Wisconsin Academy of sciences, Arts, and Letters, Madison, Wisconsin. pp. 237-246.

Tyrrell, L.E., and T.R. Crow. 1994. Structural characteristics of old-growth hemlock-hardwood forests in relation to age. *Ecology* 75: 370-386.

Tyrrell, L.E., and T.R. Crow. 1994. Dynamics of dead wood in old-growth hemlock-hardwood forests of northern Wisconsin and northern Michigan. *Can. J. For. Res.* 24: 1672-1683

APPENDIX 3 FOREST MANAGEMENT AREA DIRECTION

The management prescription for the Tucker Lake Hemlocks 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 2012. Definitions of ranks are provided below, along with definitions for other abbreviations used in the Working List.

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

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

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

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

Global Element Ranks

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

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

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

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

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

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

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

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

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

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

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

State Element Ranks

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

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

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

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

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

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

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

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

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

SX = Apparently extirpated from the state.

State Ranking of Long-Distance Migrant Animals

Ranking long distance aerial migrant animals presents special problems relating to the fact that their non-breeding status (rank) may be quite different from their breeding status, if any, in Wisconsin. In other words, the conservation needs of these taxa may vary between seasons. In order to present a less ambiguous picture of a migrant's status, it is necessary to specify whether the rank refers to the breeding (B) or non-breeding (N) status of the taxon in question. (e.g. S2B,S5N).

(http://dnr.wi.gov/org/land/er/wlist/06_2011_Working_List.pdf Last Revised: May 31, 2012)

APPENDIX 5 CONTRIBUTORS

USDA Forest Service, Chequamegon-Nicolet National Forest

Linda Parker, Forest Ecologist, Park Falls Supervisor's Office
Ann Dassow, Ecologist, Medford-Park Falls Ranger District, Medford office
Deborah Veen, GIS Specialist, Rhinelander Supervisor's Office
Greg Knight, Forest Soil Scientist, Rhinelander Supervisor's Office
Sue Reinecke, Forest Fish Biologist, Park Falls Supervisor's Office
Kim Potaracke, Assistant Forest Archeologist, Rhinelander Supervisor's Office
Randy Erickson, Land Surveyor, Park Falls Supervisor's Office
David Campbell, Engineer - roads, Park Falls Supervisor's Office
Mark Theisen, Forest Silviculturist, retired

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 Team:

Sue Lietz, Forester, Northern Research Station
Linda Parker, Ecologist, Chequamegon-Nicolet National Forest
Greg Nowacki, Regional Ecologist, Forest Service Eastern Region
Diane Burbank, Green Mountain/Finger Lakes NF
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
Brittnee Shows, Wildlife Biologist Trainee, Forest Service Eastern Region

APPENDIX 6 LEGAL DESCRIPTION

Tucker Lake Hemlocks is located on the Medford-Park Falls Ranger District of Chequamegon – Nicolet National Forest in Price and Vilas Counties in the State of Wisconsin T 40 N, R 03 E, Section 13, 14, and 24 and T 40 N, R 04 E, Section 18, 19. The boundary is delineated as follows:

Commencing at the Southwest Corner of Section 18, thence south along the West line of Section 19, approximately 1,250 feet to the North ROW of FR 140141, said point approximately 40 feet north of the North 1/16 corner of Sections 19 and 24, and being the **Point of Beginning**.

Thence south along the west line of Section 19, approximately 1360 feet to the ¼ corner of Sections 19 and 24,

Thence continuing south along the west line of Section 19, 219.8 feet, Thence westerly the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| S 71 W | 22.1 |
| S 71 W | 133.4 |
| S 32 W | 112.9 |
| N 31 W | 129.4 |
| N 29 W | 168.9 |
| N 62 W | 125.9 |
| S 85 W | 170.7 |

| Direction | Distance (feet) |
|-----------|-----------------|
| S 79 W | 150.9 |
| S 48 W | 188.6 |
| S 43 W | 162.3 |
| S 15 W | 175.9 |
| S 24 W | 129.3 |
| S 72 W | 93.6 |
| N 53 W | 74.0 |

| Direction | Distance (feet) |
|-----------|-----------------|
| N 28 W | 284.5 |
| N 26 W | 393.8 |
| N 69 W | 103.1 |
| N 76 W | 251.2 |
| N 77 W | 136.5 |
| N 0 E | 36.5 |

to the East side of Trail #175,

Thence northeasterly along the east side of Trail #175, 70.5 feet,
Thence north and west the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| N 62 E | 88.5 |
| N 66 E | 185.5 |
| N 57 E | 149.8 |
| N 6 W | 133.9 |
| N 39 W | 105.2 |
| N 81 W | 135.0 |
| S 90 W | 110.9 |
| N 8 W | 111.9 |
| N 11 E | 158.2 |
| N 53 E | 111.0 |
| N 78 E | 143.6 |

| Direction | Distance (feet) |
|-----------|-----------------|
| N 49 E | 167.7 |
| N 21 E | 103.0 |
| N 54 W | 127.4 |
| N 45 W | 177.9 |
| N 86 W | 118.7 |
| S 45 W | 104.6 |
| S 18 W | 140.5 |
| S 22 W | 159.3 |
| S 52 W | 121.4 |
| S 90 W | 2.7 |

to the North side of Trail #175,

Thence Northwesterly along the north side of Trail #175, 178.2 feet, Thence southwesterly the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| N 72 W | 42.6 |
| N 9 W | 97.3 |
| N 27 E | 116.0 |
| N 17 E | 100.6 |
| N 11 W | 113.1 |
| N 56 W | 160.1 |
| N 62 W | 125.8 |

| Direction | Distance (feet) |
|-----------|-----------------|
| N 84 W | 74.3 |
| S 26 W | 238.2 |
| S 16 W | 138.1 |
| S 5 W | 170.8 |
| S 5 W | 764.9 |
| S 14 W | 328.5 |
| S 25 W | 790.3 |

Eastern Shore of Round Lake,

Thence northwesterly along the shore of Round Lake, 4950 feet, Thence northwesterly the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| N 31 E | 147.8 |
| N 33 E | 149.8 |
| N 37 E | 279.6 |
| N 31 E | 312.1 |
| N 35 E | 217.6 |
| N 55 E | 90.4 |
| N 82 E | 111.9 |
| N 84 E | 67.0 |
| N 84 E | 54.7 |

to west line of Section 13,

Thence north along the west line of Section 13, 1366.6 feet,

Thence northeasterly the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| S 82 E | 337.8 |
| N 80 E | 272.2 |
| N 82 E | 196.1 |
| N 76 E | 267.4 |
| N 63 E | 291.2 |
| N 62 E | 486.6 |
| N 58 E | 252.5 |
| N 61 E | 380.8 |
| N 57 E | 203.1 |
| N 74 E | 292.7 |
| N 70 E | 149.8 |

| Direction | Distance (feet) |
|-----------|-----------------|
| N 60 E | 145.8 |
| N 22 E | 119.7 |
| N 24 E | 129.1 |
| N 52 E | 121.4 |
| N 86 E | 118.6 |
| N 86 E | 96.5 |
| S 18 W | 93.6 |
| S 7 W | 186.3 |
| S 2 E | 259.1 |
| S 20 E | 149.7 |
| S 41 E | 78.7 |

| Direction | Distance (feet) |
|-----------|-----------------|
| N 73 E | 154.5 |
| N 69 E | 285.8 |
| N 57 E | 229.8 |
| N 46 E | 277.4 |
| N 57 E | 246.2 |
| N 58 E | 166.3 |
| N 58 E | 79.4 |

to east line of Section 13,

Thence north along east line of Section 13, 640.9 feet,

Thence easterly, southerly, and northwesterly the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| N 52 E | 44.04 |
| N 74 E | 296.22 |
| S 87 E | 126.02 |
| S 69 E | 142.93 |
| S 58 E | 139.46 |
| S 23 E | 112.86 |
| S 35 E | 143.62 |
| S 11 E | 398.99 |
| S 8 E | 335.95 |
| S 30 E | 162.30 |
| S 14 E | 495.20 |
| S 11 W | 195.87 |
| S 14 W | 244.11 |

| Direction | Distance (feet) |
|-----------|-----------------|
| S 4 W | 192.90 |
| S 17 E | 278.51 |
| S 23 E | 241.80 |
| S 14 E | 137.39 |
| S 8 W | 104.60 |
| S 34 W | 170.23 |
| S 46 W | 245.97 |
| S 27 W | 99.27 |
| S 3 E | 148.23 |
| S 10 W | 210.38 |
| S 33 W | 149.70 |
| S 75 W | 145.38 |
| N 75 W | 114.94 |

| Direction | Distance (feet) |
|-----------|-----------------|
| N 13 W | 129.13 |
| N 6 E | 141.23 |
| N 39 E | 105.14 |
| N 20 E | 173.26 |
| N 16 W | 131.03 |
| N 35 W | 217.62 |
| N 63 W | 281.25 |
| N 53 W | 110.88 |
| N 84 W | 109.89 |

to the East line of Section 13,

Thence south along east line of Section 13, 1404.3 feet,

Thence southerly the following courses:

| Direction | Distance (feet) |
|-----------|-----------------|
| S 56 E | 502.1 |
| S 15 W | 145.3 |
| S 8 W | 388.1 |
| S 0 W | 325.6 |
| S 2 W | 185.1 |
| S 2 W | 159.6 |

to the north ROW of FR 140141,

Thence southwesterly along the north ROW of FR 140141 approximately 325 feet to the **Point of Beginning**.

The area as described contains approximately 674 acres (273 hectares)

/s/ Randy Erickson

Randy Erickson

Land Surveyor, Chequamegon-Nicolet National Forest

March 18, 2013

Date