DESIGNATION ORDER

USDA Forest Service, Eastern Region
Chequamegon-Nicolet National Forest
Medford/Park Falls Ranger District
Taylor County, Wisconsin

MONDEAUX HARDWOODS

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 Mondeaux Hardwoods Research Natural Area. It shall be comprised of 721 acres (292 hectares) of land in Taylor County, 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

5/11/15
Date

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Mondeaux Hardwoods

Research Natural Area

Chequamegon-Nicolet National Forest

Taylor County, Wisconsin

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

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

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

Recommended by: Bob Hennes Date 2/20/2015
Robert Hennes, District Ranger, Medford-Park Falls District

Recommended by: Date 2/19/15
Paul I.V. Strong, Forest Supervisor, Chequamegon-Nicolet National Forest

Concurrence of: Michael T Rains Date 3.23.2015
Michael T. Rains, Station Director, Northern Research Station

TITLE PAGE

Establishment Record for *Mondeaux Hardwoods* Research Natural Area

United States Department of Agriculture

Forest Service

November 2014

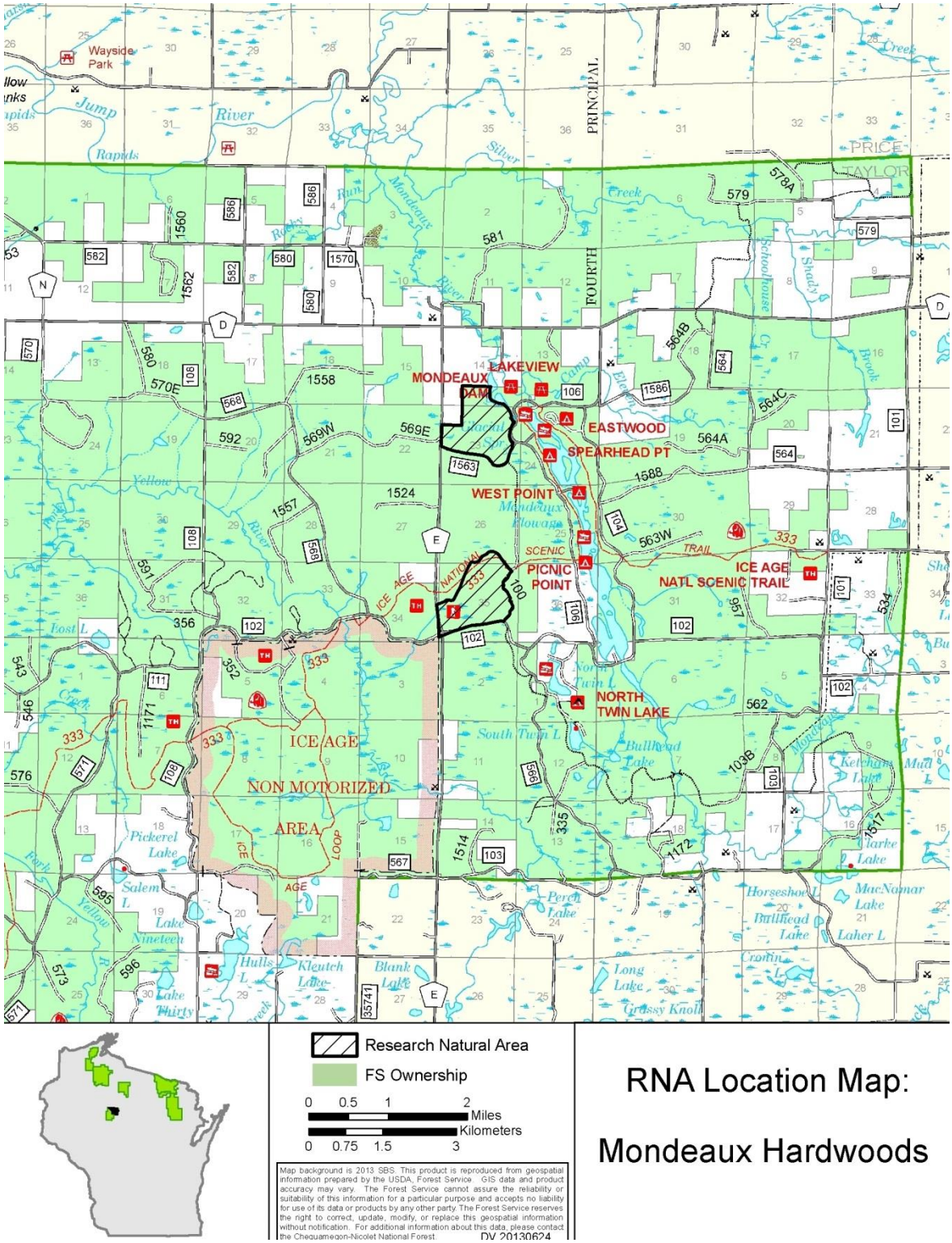
Chequamegon-Nicolet National Forest, Medford-Park Falls District, Taylor County, Wisconsin

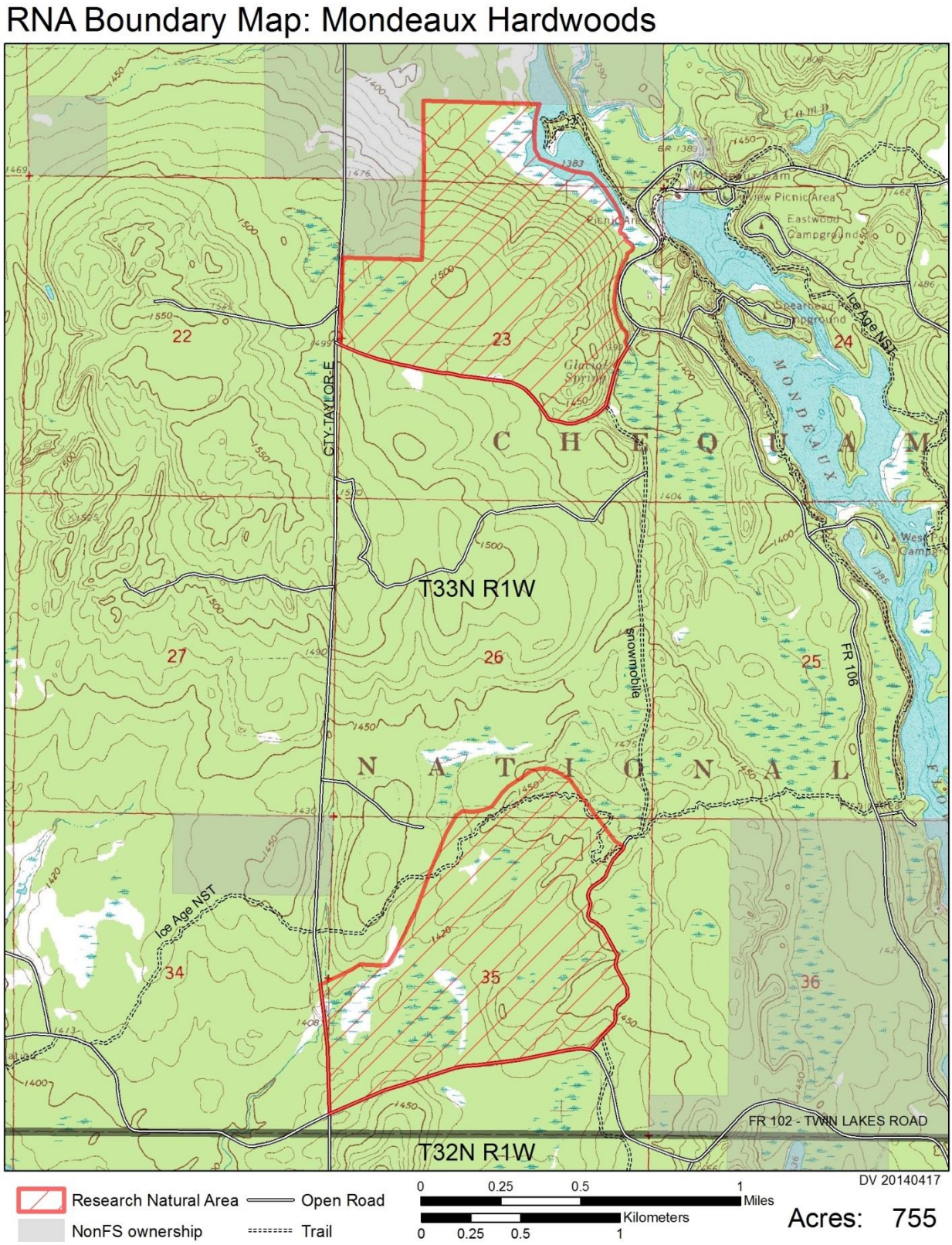
Cover photo: A hilltop view of Mondeaux Hardwoods RNA showing a large block of hardwood forest in the distance. (CNNF photo 2001)

CONTENTS

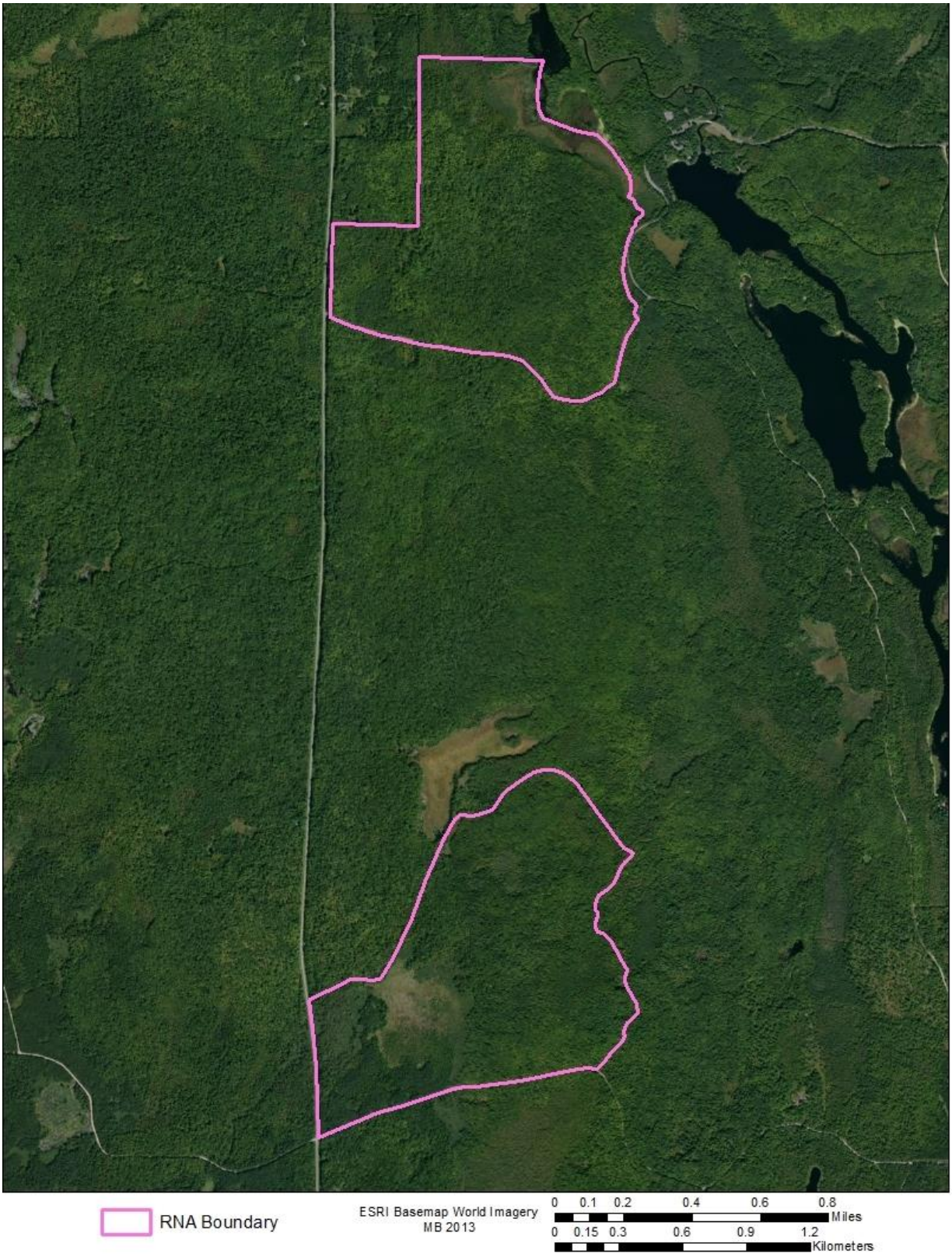
1. IDENTIFICATION SECTION

Location Map




RNA Boundary Map: Mondeaux Hardwoods
CTY-TAYLOR-E
T33N R1W
T32N R1W
FR 102 - TWIN LAKES ROAD
FR 106
Snowmobile
Ice Age NST
Eastwood Campground
Spearhead Campground
Picnic Area
22
23
24
25
26
27
34
35
36
C H E Q U A M
N A T I O N A L
M O N D E A U X
Research Natural Area
NonFS ownership
Open Road
Trail
0 0.25 0.5 1 Miles
0 0.25 0.5 1 Kilometers
DV 20140417
Acres: 755

LANDSCAPE OVERVIEW MONDEAUX HARDWOODS RNA



LEGAL DESCRIPTION

Mondeaux Hardwoods RNA is located on the Medford-Park Falls Ranger District of the Chequamegon-Nicolet National Forest in Taylor County, Wisconsin. It consists of two parcels, a *North Parcel* and a *South Parcel*.

The *North Parcel* is located in Sections 14 and 23, Township 33 North, Range 1 West. The boundary is delineated as follows:

Commencing at the Southwest corner of Section 23, thence north along the west line of Section 23, approximately 2530 feet to the intersection of the North ROW of Forest Road #1563, this being the **Point of Beginning**.

Thence North along the West line of Section 23, approximately 1438 feet to the North 1/16 corner of Sections 22 and 23,

Thence East along the North 1/16 line of Section 23, approximately 1320 feet to the Northwest 1/16 corner of Section 23,

Thence North along the West 1/16 line of Section 23, approximately 1320 feet to the West 1/16 corner of Sections 14 and 23,

Thence north along the West 1/16 line of Section 14, approximately 1320 feet to the Southwest 1/16 corner of Section 14,

Thence east along the South 1/16 line of Section 14, approximately 1925 feet to the center of an unnamed stream,

Thence southwesterly along the center line of the unnamed stream approximately 5115 feet to the North ROW of Forest Road #1563,

Thence westerly along the North ROW of Forest Road #1563, approximately 5860 feet to the **Point of Beginning**.

[The *North Parcel* of Mondeaux Hardwoods RNA contains approximately 372 acres (150 ha)]

The *South Parcel* is located in Sections 26, 34 and 35, Township 33 North, Range 1 West. The boundary is delineated as follows:

Commencing at the Southwest corner of Section 35, thence N 01◦ E approximately 325 feet to the intersection of the North ROW of Forest Road #102 and the East ROW of Taylor County Highway "E", this being the **Point of Beginning**.

Thence Northerly along the East ROW of County "E" 2140,

Thence Northeasterly (#5-#32) to the West Right of Way of Forest Road #100,

Thence Southwesterly along West Right of Way of Forest Road #100 approximately 4075 feet to the North Right of Way of Forest Road #102,

Thence Westerly along the north ROW of Forest Road #102 approximately 4450 feet to the **Point of Beginning**.

[The South Parcel of contains approximately 383 acres (155 ha)]

Total size of the Mondeaux Hardwoods Research Natural Area is approximately 755 acres (305 ha)

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

2. ADMINISTRATIVE SECTION

This Establishment Record has been prepared pursuant to Forest Service Manual direction (FSM 4063). Establishment of the Mondeaux Hardwoods RNA is documented with a signature page and a Designation Order which is a separate document accompanying this document (FSM 4063.41.2) (USDA Forest Service 2004c).

The Station Director of the Northern Research Station (NRS) in consultation with the Chequamegon-Nicolet Forest (CNNF) Supervisor, 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 NRS Director, Northern Research Station, who will coordinate a review of the application. The Director or NRS RNA Designate will approve research proposals, and prior to the initiation of any projects, will coordinate the project or activity with the RNA Coordinator and 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 CNNF or approved by the Station Director.

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

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

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

3. BODY OF ESTABLISHMENT RECORD

A. INTRODUCTION

The Mondeaux Hardwoods Research Natural Area (RNA) is located on the Chequamegon-Nicolet National Forest (CNNF), Taylor County, approximately 20 miles north of Medford, Wisconsin (see Identification Section: *Location Map, Boundary Map).* The 755 acre (305 ha) RNA, composed of two land parcels, the North parcel (307 acres; 150 ha) and the South parcel (383 acres; 155 ha) is located entirely on National Forest Service Land on the Medford-Park Falls Ranger District.

Mondeaux Hardwoods is situated on rough terminal glacial moraine. The morainal topography supports an extensive mesic forest with super-canopy white pine (*Pinus strobus*). The community mosaic is diverse with dry-mesic white pine forest, northern white cedar (*Thuja occidentalis*) swamp, hardwood swamp, black spruce-tamarack (*Picea mariana-Larix laricina*), and alder thicket (*Alnus incana*). Much of the surrounding landscape is national forest land and the majority of the RNA boundary is a CNNF Special Management Area.

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

As Europeans began to settle the area the condition of the land was recorded in the General Land Survey notes from the 1858 by surveyor Alexander S. Martin for T33N R1W:

> *"This township contains a few Tamarack and Cedar swamps of small extent, none of them fit for cultivation. The surface is rolling, soil first and second rate. Timber chiefly Hemlock, Birch, Maple, Pine, Tamarack, and Cedar. There is a large windfall fans (sic) across the northwest corner, bears in south-west and north-east direction. Timber decayed and grown to second growth Poplar. There are several creeks in the township among which is the Yellow River, runs in a north-westerly course across the stream, flows in a gentle current, not good for forming motive power for mills. There is another stream [Mondeaux River] of considerable extent enters the Township near the southeast corner and runs in a gentle current northwesterly; it is deep narrow stream, banks low and principally lined with Alders*." (BCPL 2004)

Northern Wisconsin was extensively logged in the late 1800s, and much of the forested area was clearcut. However, Mondeaux Hardwoods RNA apparently escaped widespread clearcutting. Vegetation cover maps from 1938 indicate that the average diameter of upland forest trees within the RNA was 12-18 inches dbh (30-45cm) (UWDC 2011). Small acreages were clearcut and may have been used for farming or cattle grazing. The area containing the RNA became National Forest in the 1930s. Selection harvests within the site since then occurred in the mid-1900s, late 1970s and early 1980s. The most recent management occurred on approximately 240 acres in the 1980s and was mainly selection thinning of hardwoods and shelterwood cuts (CNNF Database 2013).

Uses - Recreational use includes hunting, hiking, bird watching, camping, and snowmobiling (on the adjacent trail that is part of the eastern boundary). A portion of the National Ice Age Scenic trail

winds through the southern parcel of the RNA. A natural artesian spring along Forest Road 1563 in Section 23 (see "Glacial Spring" on Boundary map) was developed and is a popular source of drinking water for campers and area residents. Old logging roads and skid trails are found within the site; some have eroded and formed new drainage-ways (Fields 1997). See Section f (1) for discussion of this topic and other potential management needs.

Ownership & Administration - Mondeaux Hardwoods RNA is owned outright by the USDA Forest Service. Administration and protection of the RNA is the responsibility of the Forest Supervisor of the Chequamegon-Nicolet National Forest, or designate. The Medford-Park Falls Ranger District, CNNF, provides day-to-day protection and maintenance of the area. Mondeaux Hardwoods RNA does not occur within any other administratively or congressionally designated areas. Refer to Appendix 1: *Ecological Evaluation* d. (1) *Research/education use* for an explanation of co-designation as a Wisconsin State Natural Area.

B. JUSTIFICATION SECTION

(1) JUSTIFICATION STATEMENT

Mondeaux Hardwoods RNA includes a wide diversity of plant communities and landforms and supports rare plants and birds. High quality stands of hemlock-hardwood forest enclose an area of northern hardwoods on well-drained ground moraine (Fields 1997). Many of the major landforms associated with the Chippewa Lobe of the last glacial period are found within the RNA, including extensive areas of till plain, meltwater stream sediments, end moraine, and kettle depressions. It is part of a much larger unfragmented block of northern hardwoods. The CNNF *County E Special Management Area (SMA)* [2200 acres (890 ha)] combined with the two parcels of the RNA (755 acres) totals almost 3,000 acres (1200 ha) that will be protected from manipulative management (Fig. 2).

Figure 1. Mature hardwood trees have large crowns that form a continuous canopy over much of the site and produce brilliant fall color in late September. (Photo: Linda Parker)

The site contains 150 year old eastern hemlock (*Tsuga canadensis*) and white pine (CNNF Data 2013). The hardwood stands are of large size and have minimal recent man-made disturbance. Very few, if any, comparably-sized roadless blocks of hardwood forest remain on the Medford-Park Falls District. In conjunction with the adjacent County E SMA, this is the best opportunity to protect a block of this size. Overall, the RNA's size, lack of recent disturbance, diverse plant communities, and unfragmented nature more than compensate for the relatively young age of much of its forest (stand ages range from 30 to 150 years). Rare plants occurring here

include the state-threatened bog bluegrass (*Poa paludigena*). The RNA contains habitat for northern goshawk (*Accipiter gentilis*) and red-shouldered hawk (*Buteo lineatus*).

(2) PRINCIPAL DISTINGUISHING FEATURES

This morainal topography west of the Mondeaux River supports an extensive mesic eastern hemlock-hardwood forest with trees in some areas exceeding 20-inch (50 cm) in diameter. A white pine super-canopy occurs in some stands with trees reaching 30-inch in diameter and approximately 150 years old. Situated on gently rolling, poorly-drained ground moraine are drainage-ways forested with large to medium swamp hardwoods situated within a matrix of good quality mesic hardwoods (Epstein 1993; Fields 1997). Other plant communities include northern wet-mesic forest, northern wet forest, alder thicket, northern sedge meadow, ephemeral pond, springs and spring runs, emergent and submerged aquatic plant communities. The globally vulnerable and state-threatened bog bluegrass is found in the fragile wetland communities associated with spring runs. The RNA also supports several locally uncommon plant species on the southern edge of their range [see section (3)(G) *Rare, threatened, endangered, or sensitive species*]. Rare animals include the state-threatened red-shouldered hawk (*Buteo lineatus*) and uncommon northern goshawk (*Accipiter gentilis*).

(3) OBJECTIVES

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

The Mondeaux Hardwoods RNA is one of thirty areas on the CNNF that will be managed to meet the research and education objectives of the national RNA program. Additional objectives of this RNA are to preserve a large contiguous block of northern hardwood forest. The complex of ecosystems is large enough to buffer against environmental disturbances. This RNA is situated near an ecological floristic/climatic tension zone where eastern deciduous forest meets mixed hardwood forest. It will provide species diversity while serving as a reference area for long-term ecological changes likely to be detected here.

C. LAND MANAGEMENT PLANNING

The effects of RNA establishment were analyzed and disclosed in the Final Environmental Impact Statement (USDA Forest Service 2004b pg 3-110) and 2004 CNNF Forest Plan Record of Decision (USDA Forest Service 2004c pg 9).

Mondeaux Hardwoods 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 Forest have been assigned to a management prescription (8E) that is consistent with RNA objectives (USDA Forest Service 2004c pg 9).

Management Area 8E is characterized by ecologically significant natural features and representative ecosystems. It includes a broad array of community types occurring on the range of landforms and soil types that occur on the Chequamegon-Nicolet National Forest. Plant communities are generally of an older age class and contain all or most species characteristic of that community in the region (Appendix 3 - *Forest Management Area Direction* and USDA Forest Service 2004a pg 3-50).

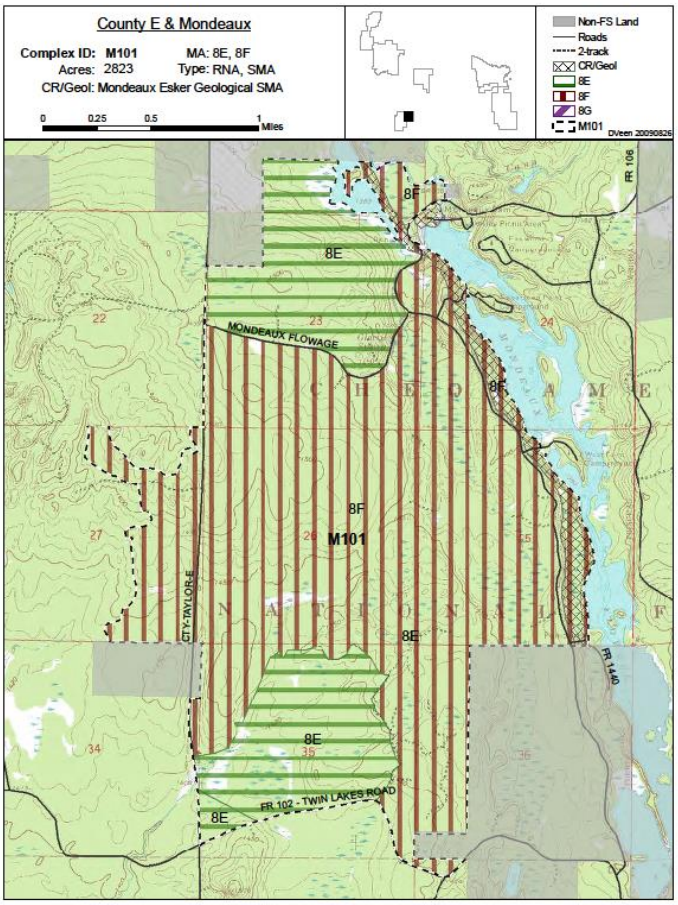


Figure 2. Map showing how Mondeaux Hardwoods RNA (horizontal lines, 8E on map), County E Forest Special Management Area (brown vertical lines, 8F), and Mondeaux Esker Geological Special area (cross-hatching, 8G) are connected into a large ecological reserve area in the CNNF Land and Resource Management Plan. Gray areas are non-CNNF land. (D. Veen 2009)

D. MANAGEMENT PRESCRIPTION

The management prescription for Mondeaux Hardwoods RNA is embodied in the management area direction and guidance presented in the 2004 CNNF Forest Plan.

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

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

Specific site management needs may include maintenance of the recreational hiking trail, or address potential mineral testing. Refer to Appendix 1, section f.(1) *Potential or existing conflicts* to reference unique management issues that should be addressed for this RNA.

E. USE OR CONTROL OF FIRE AND GRAZING

Fire is not generally used as a management tool in these mesic forest and wetland community types. Occasional wildfires can occur in dry years, but they are most often small in size - usually less than one acre (0.4 ha), limited by lack of fuel, and easily suppressed. Spring fires that occasionally occur in wetlands can be as large as 100 acres. There have been no wildfires within the RNA in recent years. Wildfires will be controlled if necessary, with as little disturbance as possible. Under an agreement with the CNNF, wildfire on federal land in Taylor County is managed by the Wisconsin Department of Natural Resources.

Fire Management Guidelines in the 2004 CNNF Forest Plan are listed in Appendix 3- *Forest Management Area Direction*. Fire is allowed if needed for specific objectives and would be designed in the Mondeaux Hardwoods RNA site plan however, fire has not been identified as a management need.

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

4. APPENDIX 1 ECOLOGICAL EVALUATION

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

A. PHYSICAL SITE DESCRIPTION AND CLIMATIC CONDITIONS

(1) LOCATION

Mondeaux Hardwoods RNA is located on the Medford-Park Falls Ranger District of the Chequamegon-Nicolet National Forest, Taylor County, in the state of Wisconsin about 20 miles (32 km) northwest of Medford WI. It consists of two parcels of land separated by approximately 1.3 miles (0.5 km). The RNA's Mercator coordinates are 45º 19' N latitude and 90º 27' W longitude.

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

(2) SIZE IN ACRES/HECTARES

The RNA is comprised of approximately 755 acres (306 hectares). The north parcel is approximately 372 acres (150 ha) and the south parcel is approximately 383 acres (155 ha).

(3) ELEVATION RANGE

Elevations range from 1,380 feet (421 m) to 1,550 feet (472 m) above sea level. The north and south parcels are in two different river basins separated by a slightly higher ridge that is not part of the RNA. As a comparison, the highest elevation in Wisconsin is 20 miles to the northeast at Timm's Hill in Price County [1,951 feet (595 m) above sea level]. See the Boundary Map in the Identification Section for a perspective of the area's contour.

(4) ACCESS TO THE SITE

From Medford, WI go west on State Hwy 64 about 5 miles (8 km), then north on County Highway E (Mondeaux Drive) 13 miles (20 km), turn east on Forest Road 1563 (Park Road) which is the southern boundary of the northern parcel of the site. The southern parcel is accessed by County Highway E and Forest Road 102 (Mondeaux Ave) (See Identification Section: *Location Map* and *Boundary Map*).

(5) CLIMATIC DATA

The weather station nearest to the Mondeaux Hardwoods RNA is Jump River 1 ESE (station no. 474080, latitude 45° 22' N, longitude 90° 46' W). The station is about 15 miles (24 km) to the east of the RNA and experiences similar weather. This station has temperature data from 1962-2000 and precipitation data from 1948-2000 (Midwestern Regional Climate Center 2003). Mean annual summer temperature is 58° F (14°C) while the mean winter temperature is 24°F (-4 °C).

Table 1. Climate Data for Jump River 1 ESE, Taylor County Wisconsin for the years 1962 to 2000

Temperature	°F	°C
Mean annual	41	5
Mean April through September	58	14
Mean October through March	24	-4
Average daily maximum	52	11
Average daily minimum	30	-1
Record high	100	38
Record low	-47	-44
Precipitation	**in**	**mm**
Mean annual rainfall	33	838
Mean monthly - April through September	4	99
Mean monthly - October through March	2	41
Mean annual snowfall	57	1,445

B. ECOLOGICAL DESCRIPTION

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

Mondeaux Hardwoods RNA is located in the Laurentian Mixed Forest Province, 212 Northern Highland Section, Subsection Xd Central/Northwest Wisconsin Loess Plains and Xe Perkinstown End Moraine of the Ecological Units of the Eastern United States (Cleland et al. 2007). It includes Land Type Associations (LTAs) Xd05 Jump River Ground Moraine and Xe05 Perkinstown Moraine.

(2) PLANT COMMUNITY TYPES

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).

Mondeaux Hardwoods RNA is a large site that includes a wide variety of plant communities (Epstein 1993; Fields 1997). This is an extensive mesic forest composed of eastern hemlock, yellow birch, sugar maple, red maple, and basswood (*See Appendix 6 for plant scientific names*). In mature stands, trees exceeding 20 inches (50 cm) in diameter at breast height (dbh) are common. A white

pine super-canopy occurs in some stands with trees greater than 30-inches dbh (76 cm). These eastern hemlock and white pine stands are some of the oldest and largest on the Medford land base of the District. The sapling and shrub stratum is generally sparse where the canopy is closed and thicker under young forest (Figure 3). Some eastern hemlock reproduction occurs throughout the area. Characteristic ground flora species include toothed wood fern, wild lily-of-the-valley, wild sarsaparilla, roughleaf rice grass, and wood anemone.

Figure 3. A younger forest dominated by sugar maple (*Acer saccharum*) showing dense understory and a rich and diverse ground flora. (CNNF photo circa 2001)

Northern hardwood forest is located on gently rolling, moderately well-drained ground moraine while areas that are poorly-drained are dominated by wet and wet-mesic forest types. Those stands with a prominent eastern hemlock component are generally of an older age class (Fields 1997) on the order of 150 years.

Sugar maple is dominant in the uplands with associated species including yellow birch, red maple, and bitternut hickory. *Ostrya virginiana* and *Carpinus caroliniana* are common in the understory. The ground flora includes rich site indicator species such as Virginia water-leaf, sweet cicely, maidenhair fern, and bloodroot.

Small pockets of wet-mesic forest occur in the southern parcel (Fields 1997). The typical species composition is a mix of black ash, northern white cedar, red maple, yellow birch, and in some places, balsam fir. Canopy gaps are common and the high nutrient conditions favor dense understories. Shrub and small trees include alder, mountain maple, red-osier dogwood, and *Lonicera canadensis*. Ground flora is diverse with cinnamon fern, spinulose woodfern, and bryophytes. Large yellow lady's-slipper is found throughout the area. Where eastern hemlock is

present common species include three-leaved goldthread, mountain wood-sorrel, bunchberry, and blue-bead lily.

Northern wet forest of tamarack in association with black spruce occurs in widely scattered locations, often at the heads of drainages. Red maple, paper birch, and white pine are frequent associates. The herbaceous ground layer consists mainly of sphagnum, ericads, and cinnamon fern, one-sided shinleaf, and Canada mayflower. Other less common species such as moccasin flower, bog buckbean, and pitcher plant occur locally.

Table 2. Natural vegetation community types within Mondeaux Hardwoods 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, TMC	eastern hemlock, sugar maple, yellow birch, red maple	Tsuga canadensis/Betula alleghaniensis Forest CEGL002598
Northern mesic forest	AH, ATM	sugar maple, basswood, yellow birch, white ash	Acer saccharum - Betula alleghaniensis - (Tilia americana) Forest (CEGL002457) Acer saccharum - Tilia americana / Ostrya virginiana / Lonicera canadensis Forest (CEGL002458)
Northern mesic forest	ATM/AVVib	paper birch, red maple balsam fir (likely succeeding to sugar maple, basswood, yellow birch)	Populus tremuloides - Betula papyrifera - (Acer rubrum, Populus grandidentata) Forest (CEGL002467)
Northern wet-mesic forest	N/A	black ash, northern white cedar, red maple, yellow birch	Fraxinus nigra - Mixed Hardwoods - Conifers / Cornus sericea / Carex spp. Forest (CEGL002105)
Northern wet forest	N/A	tamarack, black spruce	Picea mariana - (Larix laricina) / Ledum groenlandicum / Sphagnum spp. Forest (CEGL005271)
Northern hardwood swamp	N/A	black ash, red maple	Acer rubrum - Fraxinus spp. - Betula papyrifera /Cornus canadensis Forest(CEGL002071)
Alder thicket	N/A	Alnus incana	Alnus incana Swamp Shrubland (CEGL002381)
Northern sedge meadow	N/A	Carex stricta	Carex stricta - Carex spp. Herbaceous Vegetation CEGL002258
ephemeral ponds	N/A	Carex spp.	not determined

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

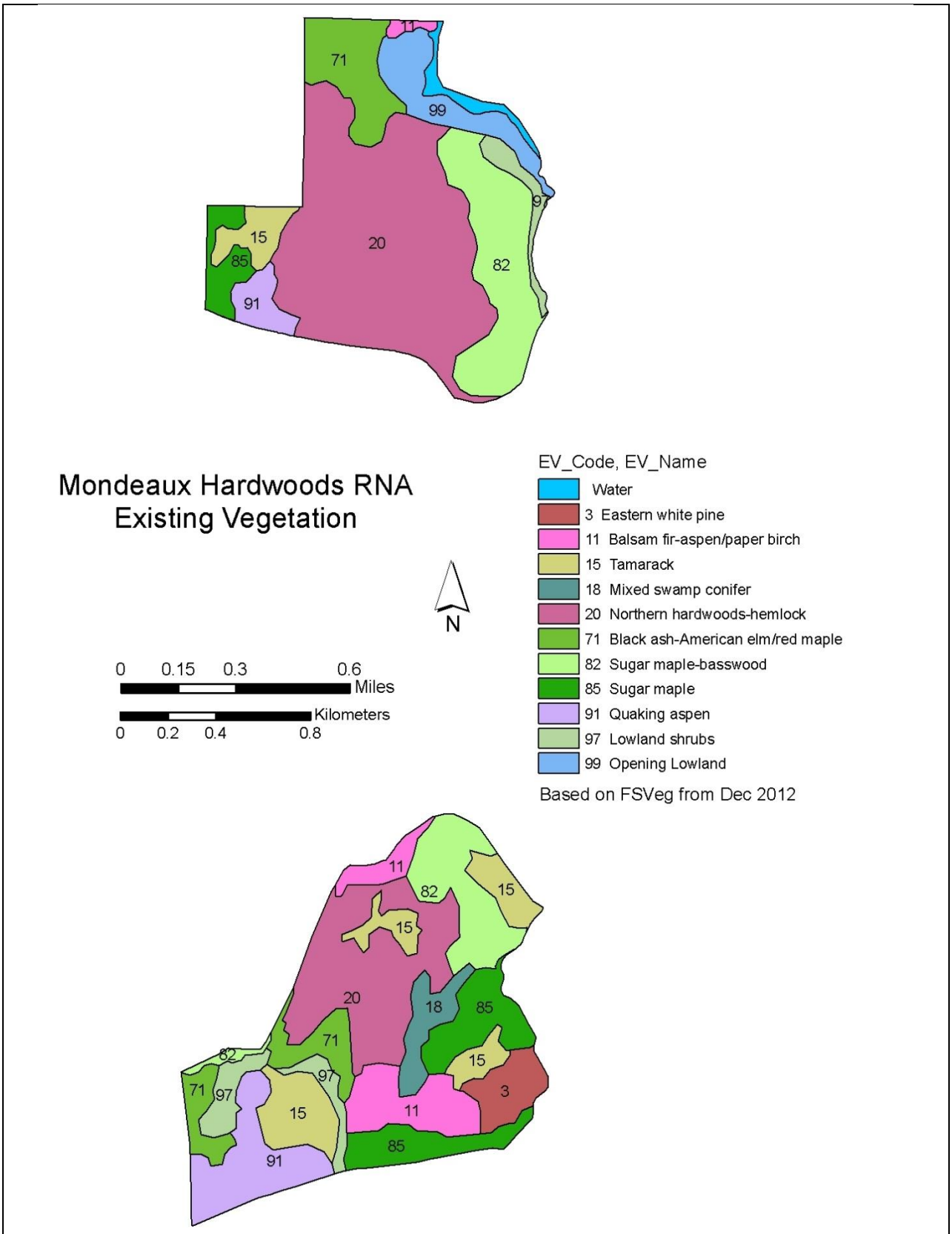


Figure 4. Existing Vegetation (formerly Forest Service Forest Type) in Mondeaux Hardwoods RNA (CNNF data 2012)

Table 3. Existing Vegetation (dominant tree cover) by area in Mondeaux Hardwoods RNA and key to Figure 4.

EV Code	Existing Vegetation (EV)	Acres	Hectares
3	Eastern white pine	18.0	7.3
11	Balsam fir-aspen/paper birch	41.6	16.8
15	Tamarack	64.7	26.1
18	Mixed swamp conifer	16.4	6.7
20	Northern hardwoods-hemlock	268.2	108.6
71	Black ash-American elm/red maple	60.9	24.7
82	Sugar maple-basswood	108.2	43.8
85	Sugar maple	62.3	25.1
91	Quaking aspen	50.5	20.5
97	Lowland shrubs	28.5	11.5
99	Opening Lowland	28.8	11.6
(blank)	Water	7.3	3.0
Grand Total		755.4	305.7

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

(A) FLORA LIST

A plant list is included as Appendix 6.

(B) FAUNA LIST

Table 4. Fauna observed in Mondeaux Hardwoods RNA (CNNF surveys in 1993, 1997)

Mondeaux Hardwoods Fauna List	
Common Name	**Scientific Name***
Birds (Epstein 1993)	
Ruffed grouse	*Bonasa umbellus*
Northern goshawk	*Accipiter gentilis*
Red-shouldered hawk	*Buteo lineatus*
Barred owl	*Strix varia*
Northern flicker	*Coaptes auratus*
Pileated woodpecker	*Cryocopus pileatus*
Downy woodpecker	*Picoides pubescends*
Hairy woodpecker	*Picoides villosus*
Red-eyed vireo	*Vireo olivaceous*
Common raven	*Corvus corax*
Black-capped chickadee	*Parus atricapillus*
Winter wren	*Troglodytes troglodytes*
Hermit thrush	*Catharus guttatus*
Blackburnian warbler	*Dendroica fusca*
Chestnut-sided warbler	*D. pensylvanica*
Black-throated green warbler	*D. virens*
Common yellowthroat	*Geothylpis trichas*
Ovenbird	*Seiurus aurocapillus*

Mondeaux Hardwoods Fauna List	
Common Name	**Scientific Name***
Northern waterthrush	*S. noveboracensis*
Scarlet tanager	*Piranga olivacea*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Indigo bunting	*Passerina cyanea*
Mammals (Fields 1997; Epstein 1993)	
white-tailed deer	*Odocoileus virginianus*
porcupine	*Erethizon dorsatum*
red squirrel	*Tamiasciurus hudsonicus*
muskrat	*Ondatra zibethicus*
beaver	*Castor canadensis*
black bear	*Ursus canadensis*

* AOU Checklist 1983; Watermolen & Murrell 2001

(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).

Landtype Associations (LTA) represented are Jump River Ground Moraine and Perkinstown Moraine. The bedrock of Jump River Ground Moraine LTA is carbonates, which are between 100 feet and 50 feet (30 - 15 m) of the land surface (WI DNR 2003). Bedrock of the Perkinstown Moraines LTA includes igneous, metamorphic, and volcanic rock.

Surface features on these LTAs are dominated by till plain with outwash terraces and hummocky moraine with plateau-like ice-walled lake plains. The ice-walled lake plain glacial features were formed as the glacier retreated. A wall of stagnant ice trapped the outwash sediments, creating a plateau of debris that was later covered with fine loess deposits. The soils that developed are rich in nutrients and support a diverse plant community.

(D) SOILS

The soils of Mondeaux Hardwoods RNA generally fall into the Pence and the Alcona-Bohemian-Sarona complex series (USDA NRCS 2003; USDA Forest Service 2003a). Information and soil maps can be obtained from the CNNF RNA coordinator.

Nearer the Mondeaux River to the east are sandy loam Pence soils on rolling hills that are well drained. The soils have a sandy loam, fine sandy loam, or loam surface over medium and coarse sands and thick gravel bands. The gravel bands contain no more than 10 percent silt and clay. These soils formed in the pitted outwash landform, which is characterized by rolling hills forming a horizontal plain, giving the appearance of depressional or “pitted” topography, rather than that of hills protruding from the surface. Major timber species on this soil type include red maple, red oak, red pine, and aspen. Other species often present are white pine, white birch, balsam fir, and white spruce.

Other soils within the RNA include Valderian end moraine till with sandy loam and loam over cobbly sandy loam. These soils are moderately well-drained on 10-30% slopes. Some well drained areas do exist. Surface textures can be sandy loam, fine sandy loam, loam, and occasionally silt loam. Subsurface textures are sandy loam or gravelly to cobbly sandy loam till. These soils occupy the shoulder and backslope positions of end moraine hills. Surface and subsurface cobbles and stones are common. The major timber species are sugar maple, basswood, and aspen. Common associates are paper birch, red maple, white ash, red oak, white spruce, and ironwood.

In low areas are peaty soils that occur in drainage-ways and depressions. Both are strongly acid, moderately decomposed organic soils. The water table is at the surface throughout the year and organic material largely derived from sphagnum mosses and herbaceous plants.

(E) TOPOGRAPHY

Numerous glacial features are contained within the site including ground moraine and end moraine with associated meltwater stream sediments, and kettle depressions (Fields 1997). Topography ranges from nearly level on ground moraine to hummocky and steep on end moraine. Drainage in the north parcel is to the Mondeaux River, which joins the Jump River a few miles north. The south parcel drains to the North Fork of the Yellow River. Both the Jump and Yellow River are tributaries of the Chippewa River that flows westerly to the Mississippi (WI DNR 2012).

Figure 5. A small spring run in Mondeaux Hardwoods RNA (CNNF photo 2006)

(F) AQUATIC/RIPARIAN

Unique features of this RNA are springs and spring runs. Groundwater flows to the surface forming small streams that feed marshes and conifer swamps (Figure 5). These springs create a fragile wetland community that supports the globally rare and state threatened bog bluegrass. One spring named *Glacial Springs* on the RNA boundary was tapped decades ago and is a source of water for recreationists in the area (Figure 7). The RNA protects a portion of the source water of the Mondeaux River and Yellow River to the east.

The state of Wisconsin maintains authority over the streams and natural lakes of the state and the DNR is charged with management of fishery resources (Kent & Dudiak 2001).

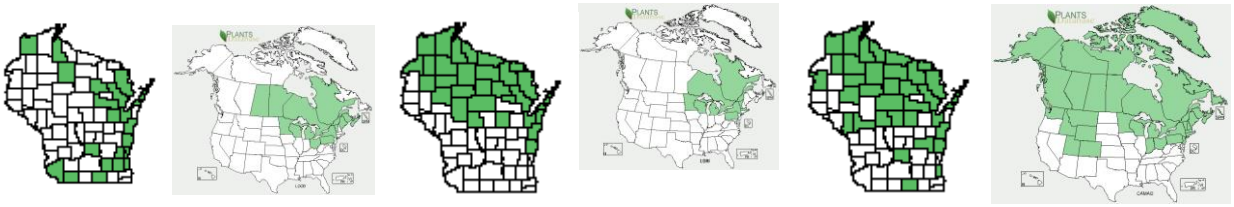
Several listed and uncommon plants and birds are found within Mondeaux Hardwoods RNA (Table 5). No comprehensive surveys have been done for lichens, invertebrates, or mammals. Bog bluegrass is only found in the northeastern United States and has a very narrow habitat preference in fragile spring-fed swamp wetland communities (NatureServe 2014). The abundance and condition of butternut are both in rapid decline due to butternut canker disease.

Several other plant species, while not rare, occur here on the southern edge of their range (Fig. 6). Notable among these are swamp fly honeysuckle, hairy honeysuckle and boreal bog sedge. A large matrix of plant communities such as within Mondeaux Hardwoods RNA may be vital in maintaining these more northern species as the climate warms.

Table 5. Threatened, endangered, and unique species in the RNA, Global rank, State status and State Heritage Rank

Common Name	Scientific Name	Global Rank, State Status, State Rank[1] (or unique status)
Plants		
bog bluegrass	*Poa paludigena*	G3, S3, THR
butternut	*Juglans cinerea*	G4, S3?, SC
pale sedge	*Carex pallescens*	uncommon formerly state listed
white adder's-mouth orchid	*Malaxis brachypoda*	uncommon[2]
round-leaved dogwood	*Cornus rugosa*	very localized in Taylor Co[2]
rough avens	*Geum laciniatum*	only known record for Taylor Co
lungwort (a lichen)	*Lobaria pulmonaria*	somewhat rare, prefers old forest
boreal bog sedge	*Carex magellanica subsp. irrigua*	southern edge of range
hairy honeysuckle	*Lonicera hirsuta*	southern edge of range
swamp fly honeysuckle	*Lonicera oblongifolia*	southern edge of range
Birds		
Northern goshawk	Accipiter gentilis	G5, SC/M, S2B,S2N
Red-shouldered hawk	Buteo lineatus	G5, THR, S3S4B,S1N

[1] See Appendix 4: Wisconsin Natural Heritage Working List – Rank Definitions
[2] Fields 1997



A. The range of swamp fly honeysuckle (*Lonicera oblongifolia*)

B. The southern range of hairy honeysuckle (*Lonicera hirsute*)

C. The range of boreal bog sedge (*Carex magellanica subsp. irrigua)*

Figure 6- A, B, C. Range maps of some "edge of range" plants of Mondeaux Hardwoods RNA in Wisconsin and North America (Maps: Wisplants 2013; USDA NRCS 2013)

(H) LIST OF RARE ELEMENTS AND RARE PLANT COMMUNITIES

Table 6. List of rare elements and communities in the RNA with Global and State ranks

Element/Community Name	Global Rank	State Rank[1]
springs and spring runs, hard water	*GNR*	S4
hardwood swamp	*G4*	S3
northern sedge meadow	*G4*	S3
ice-walled lake plain	*unique geologic feature no rank*[2]	

[1] see Appendix 4: Natural Heritage Working List-Rank Definitions
[2] see (3)(C) Geology

C. RESOURCE INFORMATION

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

(1) MINERALS

Reserved and Federal-owned minerals are open to hardrock prospecting within the Research Natural Area and the Forest Service must allow access to the surface to the mineral owner. There is potential for hardrock prospecting activity within the RNA based on geology and recent hardrock prospecting permit activity in the County. The state of the knowledge of the bedrock geology and where actual ore bodies may be found (if they exist and are commercial) is not precise enough to assign relative probability of prospecting activity within the RNA (Knight pers comm 2013). To date there has been no hardrock prospecting permit activity in the RNA.

Table 7. Mineral resources within Mondeaux Hardwoods RNA (CNNF Forest data)

Township-Range	Section	Acres*	Hectares	Mineral ownership	Comments
33N 1W	35	160	65	Reserved	Balance in Sec 35 is Federally owned
	23	all	all	Federally owned	
	26	all	all	Federally owned	

Definitions of terms in table:

Reserved: The surface land owner owned the mineral rights and retained those mineral rights when they sold the surface land to the National Forest. These mineral rights are subject to Secretary of Agricultures Rules & Regulations and State laws based on date of land purchase. Forest Service must allow access to the surface to the mineral owner.
Federally owned: Mineral estate is administered by Bureau of Land Management and are open for prospecting.
All: Means the total acreage within the RNA boundary in that section.
Balance: Means the remaining acreage minus the listed acres within the RNA boundary in that section.
***Acres:** This represents only a rough estimate of the number of acres within the proposed RNA boundary. Mineral ownership acreage is estimated because RNA boundaries are meander lines and mineral ownership is a legal description.

(2) GRAZING

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

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

The total forested acreage in the RNA is 690 (279 ha). Eighty percent of this forested area is in types that are commonly harvested for timber elsewhere on the CNNF. According to the 2004 CNNF Forest Plan, eastern hemlock, a common component of the RNA, is reserved in all hardwood stands or is infrequently managed on the Medford landbase due to regeneration concerns (USDA Forest Service 2004a pg 2-8). In other situations, eastern hemlock is only harvested to benefit or maintain habitat for species of viability concern (USDA Forest Service 2004a pg 2-13). Lowland forest types (20% of the forested acreage) are not typically harvested on the CNNF (tamarack, mixed swamp conifer and black ash-American elm/red maple).

The last harvesting within the RNA was some single-tree cutting (north parcel) and shelterwood thinnings (south parcel) on about 240 acres in the late 1970s and 1980s. There are no outstanding timber rights on any of the tracts in the RNA, nor are there any special use permits outstanding. Botanists will be attracted to the area because of the rare and uncommon plants found here – some which are very localized (See Section (3)(G): *Rare, Threatened, Endangered or Sensitive Species*).

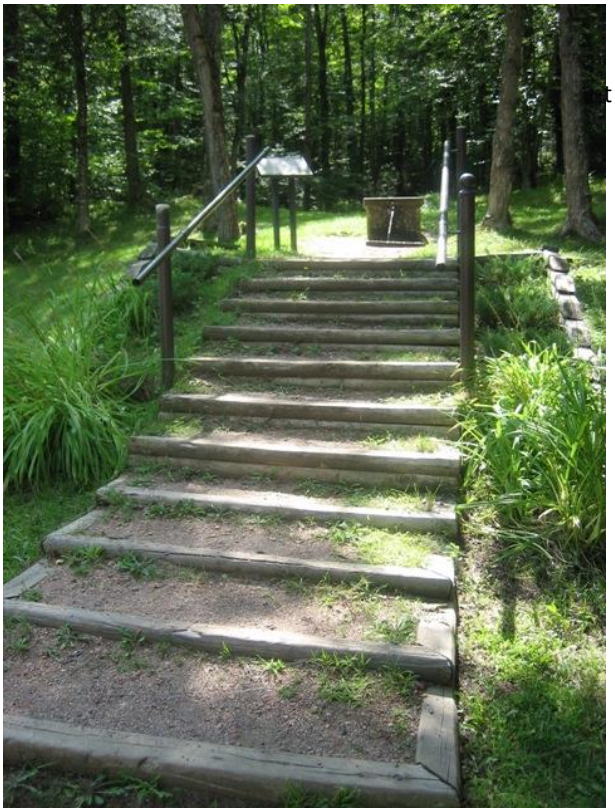
The 2004 CNNF Forest Plan has a guideline that prohibits gathering Special Forest Products for personal use or commercial sale within RNAs (USDA Forest Service 2004a pg 3-50). When the CNNF issues a permit to gather products such as club moss or firewood, the permittee is provided with a map of areas,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

Mondeaux Hardwoods RNA at the time of establishment is not designated as an Ojibwe Tribal RNA (Tribal-USDA MOU) which would limit tribal gathering. The CNNF is continuing to work with the Tribes to protect these unique features and to provide for the exercise of treaty-reserved hunting and gathering rights. See Section d.(2) -*Cultural/Heritage* for further discussion.

(4) WATERSHED VALUES

The Mondeaux Hardwoods RNA falls within two different river basins separated by higher lands that are designated as a CNNF Special Management Area (Figure 2). The north RNA parcel is in the Upper Chippewa River basin (Lower Jump River watershed). The southern parcel is within the Lower Chippewa River basin (Upper Yellow River watershed). Both eventually flow into the Mississippi River to the west (WI DNR 2012). The RNA will protect lands that contain pristine source waters for these two river systems. See (3)(F) *Aquatic/Riparian* values section above.

(5) RECREATION USE



Hikers and hunters utilize the extensive forested tract and the large eastern hemlock-hardwoods. Such use is compatible with RNA status and no conflict is anticipated. On the edge of the RNA there is a developed glacial spring that flows year-round with pure, clean water and is used by travelers and local residents (Figure 7). A portion of the National Ice Age scenic hiking trail passes through the northern edge of the southern parcel of the RNA (see *Location* and *Boundary* maps in *Identification Section*). A developed day-use site and three campgrounds outside of the RNA on the Mondeaux Flowage (impoundment) attract many visitors to the general area. No new motorized trails may be constructed or designated within the RNA. Existing old roads from past management are rapidly filling in with trees and will be left to mature to forest. These roads are likely still used by hunters on foot to access interior forest. Monitoring would discover if any erosion is still taking place and rehabilitation methods would be written into a site management plan.

Public use of all-terrain vehicles is popular on the CNNF and conflicts may arise if off-highway vehicles illegally ride cross-country or follow old road corridors. Closure barriers and signs must remain intact. As of 2014, a road on the east boundary of the southern RNA parcel is open to seasonal ATV use to benefit hunters. It does not connect to any ATV trail. The current Motor Vehicle Use Map (MVUM) contains the regulations on motorized use of corridors on the Forest (USDA Forest Service 2014).

(6) WILDLIFE

The RNA contains a large block of forest with tall trees for bird nesting. These are two attributes that are required by the state-threatened red-shouldered hawk and the special concern northern goshawk found here. Hunting is popular in Wisconsin and the area is used for the harvest of deer, bear, coyote, fox, and small game. Hunting is compatible with RNA objectives and, in the case of deer, may be highly desirable to reduce populations.

(7) TRANSPORTATION/ROAD SYSTEM

The current rule guiding motorized access on the CNNF is contained in the Travel Management Project Decision Notice and Motorized Vehicle Use Map for 2014 (USDA Forest Service 2014). This map shows roads available for motorized use. No new roads may be constructed in RNAs per forest standards and guidelines (Appendix 3: *Forest Management Area Direction*). County Highway E

bordering the RNA to the west is paved as is Park Road (FR 1563) that is the southern boundary of the north parcel. A snowmobile trail outside the RNA to the east does not allow all-terrain or street-legal vehicles.

Any existing native-surface collector roads left over from past management practices will be treated if necessary to restore hydrologic, geomorphic, and ecological processes and properties. The methods would be defined in the RNA site plan when such a plan is developed.

D. HISTORICAL INFORMATION

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

History of establishment:

The CNNF began a forest-wide ecological inventory to identify high quality ecological features in the early 1990s (Parker 1999). Mondeaux Hardwoods was one of the highest ranking sites based on its ecological values. It was assigned a high conservation priority and deferred from management activity. About the same time, the Eastern Region and Northern Research Station undertook a gap analysis of high-quality examples of alliances (ecological communities) within each subsection (Tyrrell et al 2000). This site filled at least one 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 Mondeaux Hardwoods for protection (Epstein 1993; Fields 1997).

The Wisconsin Department of Natural Resources was also interested in achieving ecosystem representation within the State Natural Area Network. They signed a Memorandum of Understanding in 2008 with the CNNF to co-designate all current and future RNAs and CNNF Special Management Areas (SMAs) as State Natural Areas. Mondeaux Hardwoods is listed as site #461 (WI DNR SNA 2013).

Mondeaux Hardwoods was identified as a Candidate RNA in the Draft Forest Plan and analyzed in the Environmental Impact Statement. It was recommended for designation as a Research Natural Area in the Land and Resource Management Plan Record of Decision (USDA Forest Service 2004c).

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

The site is monitored on a regular schedule by the Chequamegon-Nicolet. There is a Chequamegon Breeding Bird Survey site here that has been monitored annually since 1992. This monitoring program was designed to provide an accurate estimate of population change for forest bird species on the Chequamegon National Forest in addition to two national forests in Minnesota (Danz et al 2008). A number of publications and graduate student theses made use of this Breeding Bird Survey data. That list can be obtained by contacting the Forest RNA Coordinator.

Acoustical data was gathered for identifying bat species starting in 2009. The WDNR is responsible for interpretation of this data but this has not been done as of 2014.

(2) CULTURAL/HERITAGE

Mondeaux Hardwoods RNA contains the site of a post-European contact American Indian camp (USDA Forest Service 2003b). Various American Indian tribes have lived in Wisconsin over many millennia.

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

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

(3) DISTURBANCE HISTORY

The mesic and wet-mesic forest in the RNA may never have been systematically clearcut as was the case for much of northern Wisconsin in the late 1800s. Vegetation cover maps from 1938 (Figure 8) indicate that the *average* diameter of the upland hardwood forest trees at that time was 12 to 18 inches dbh (30-45cm) (UWDC 2011). This means that there were probably large eastern hemlock and white pine here when the area became federally owned in the 1930s. Since then, the area was managed mostly by selection cut methods (removing individual trees). CNNF records only show some small patches typed as aspen along Forest Road 1563 that were likely clearcut in the 1950s. They are now succeeding back to hardwood forest (Figure 4). Old road corridors used for timber harvest are still present but growing in. Wind-throw of individual trees and larger patches are the most common natural disturbance in northern Wisconsin evidenced by tip and mound micro-topography within the RNA. Surveys in the 1990s do not indicate any substantial amount of recently downed trees.

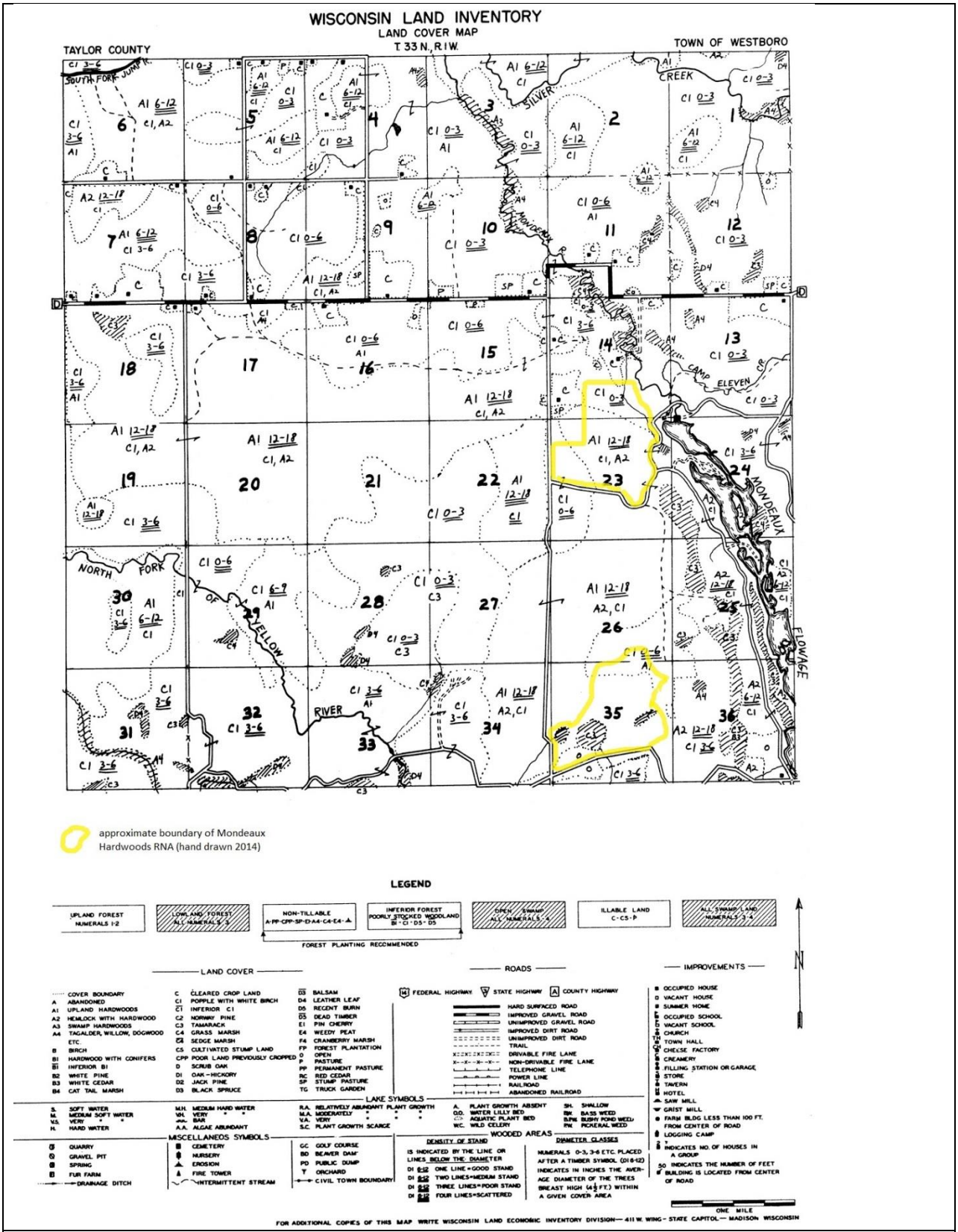


Figure 8. Map of vegetation cover from 1938 annotated in yellow with approximate boundary of Mondeaux Hardwoods RNA (UWDC 2011)

(4) OCCURRENCE OF EXOTIC SPECIES

The CNNF has developed an invasive plant strategy (USDA Forest Service 2009) that utilizes adaptive pest management to discover, prioritize, and control non-native invasive plants wherever they occur. RNAs are high priority for early detection and rapid response to invasions.

Spotted knapweed (*Centaurea biebersteinii*) occurs on the county Highway E boundary of the southern parcel and was treated with herbicide in 2010. Reed canarygrass (*Phalaris arundinacea*) occurs on FR 102 and has been mowed every year since 2008 to keep it from seeding. Both species grow only in full sun and would not invade the forested ecosystems. Regular monitoring will allow for early detection of invasive species.

E. OTHER INFORMATION

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

There is a Chequamegon Breeding Bird Survey site in the adjacent CNNF *County E Special Management Area* that has been monitored annually since 1992. This monitoring program was designed to provide an accurate estimate of population change for forest bird species on the Chequamegon National Forest (in addition to two national forests in Minnesota)(Danz et al 2008). Location information can be obtained from the CNNF RNA coordinator.

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

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

(2) BIBLIOGRAPHY

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

(3) POTENTIAL RESEARCH TOPICS

Due to its large size and position near Wisconsin's floristic/climatic tension zone, Mondeaux Hardwoods would be an ideal location to study the dynamics and spatial structure of plant communities as well as forest succession and adaptation to climate change. The large trees and nearby water provide habitat for bats. Acoustic bat transects adjacent to the RNA were begun in 2009 but the data has not been interpreted as of 2014. Other topics for research include goshawk

and red-shouldered hawks, the globally rare bog bluegrass and its associated spring-run wetland community, plants on the edge of their ecological range, and groundwater-influenced wetland ecology. The forested ice-walled lake plain end moraine glacial features in this area are unique because elsewhere in the state they have been highly modified for agricultural use.

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 2013).

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

(1) POTENTIAL OR EXISTING CONFLICTS; PRINCIPAL MANAGEMENT ISSUES

The principal management issue will be compatibility of surrounding forest management practices. Lands surrounding Mondeaux Hardwoods RNA are designated for Early Successional Aspen (1A) and Uneven-aged Northern Hardwoods: Interior Forest (2B) in the 2004 CNNF Forest Plan. A large Special Management Area (8F) where no timber harvest will occur connects the two parcels of this RNA (Figure 2).

Seventy-five percent of the boundary is Forest Special Management Area 8F (no timber harvest, no road or trail construction) so there should be no conflicting management issues here. The areas slated for early successional forest may be problematic. There is nothing in the 2004 CNNF Forest Plan however that says these areas will or are required to be managed with even-aged harvest techniques. Buffer zones could be created that employ long rotations for timber harvest. The district ranger in consultation with the Forest Supervisor and RNA coordinator will work out conflicts.

The northern boundary of the north parcel is adjacent to private lands some of which has been logged in the recent past.

Non-native invasive plants are a concern. The beaver-created marshes will be monitored for reed canarygrass as it occurs within a short distance of the southern parcel. Regular check-ups will allow for early detection of invasive species.

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

The Mondeaux Hardwoods RNA is does not include any lands designated by congress in any special management category.

G. PHOTOGRAPHS

All photographs used in this Establishment Record are the property of the Chequamegon-Nicolet National Forest but not copyrighted. Some older slides are with the site file housed in the Park Falls office of the Forest. There are no permanent photographic points within the RNA. An electronic file is part of this establishment record.

APPENDIX 2 BIBLIOGRAPHY

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

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APPENDIX 3 FOREST MANAGEMENT AREA DIRECTION

The management prescription for the Mondeaux Hardwoods 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, eastern 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

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APPENDIX 6 FLORA LIST

Table 8. Appendix 6 Flora Observed in Mondeaux Hardwoods RNA (Douglas Fields 1997)

Scientific name	Common Name
Abies balsamea	balsam fir
Acer rubrum	red maple
Acer saccharum	sugar maple
Acer spicatum	mountain maple
Actaea pachypoda	white baneberry
Actaea rubra	red baneberry
Adiantum pedatum	maidenhair fern
Agrimonia gryposepala	tall hairy agrimony
Agrostis gigantea	redtop
Allium tricoccum	wild leek
Alnus rugosa	speckled alder
Andromeda glaucophylla	bog rosemary
Anemone quinquefolia	wood anemone
Apocynum androsaemifolium	spreading dogbane
Aquilegia canadensis	columbine
Arabis laevigata	smooth rockcress
Aralia nudicaulis	wild sarsaparilla
Aralia racemosa	spikenard
Arceuthobium pusillum	eastern dwarf mistletoe
Arisaema triphyllum	jack-in-the-pulpit
Asarum canadense	wild ginger
Asclepias incarnata	swamp milkweed
Aster lateriflorus	calico aster
Aster macrophyllus	big-leaf aster
Aster sagittifolius	common blue wood aster
Athyrium filix-femina	lady fern
Betula alleghaniensis	yellow birch
Betula papyrifera	paper birch
Bidens cernua	nodding beggartick
Botrychium virginianum	rattlesnake fern
Brachyelytrum erectum	northern shorthusk
Calamagrostis canadensis	bluejoint grass
Calla palustris	wild calla
Caltha palustris	marsh marigold
Cardamine pensylvanica	Pennsylvania bittercress
Carex albursina	white bear sedge
Carex blanda	sedge
Carex bromoides	brome-like sedge
Carex brunnescens	brownish sedge
Carex canescens	silvery sedge
Carex communis	fibrous-root sedge
Carex deweyana	Dewey sedge
Carex echinata	star sedge
Carex gracillima	graceful sedge
Carex gynandra	nodding sedge

Carex intumescens	greater bladder sedge
Carex lacustris	lake sedge
Carex leptalea	bristly-stalked sedge
Carex limosa	mud sedge
Carex magellanica subsp. irrigua	boreal bog sedge
Carex pallescens	pale sedge
Carex pedunculata	long-stalked sedge
Carex pensylvanica	Pennsylvania sedge
Carex projecta	necklace sedge
Carex pseudocyperus	cypress-like sedge
Carex rosea	rosy sedge
Carex stipata	awl-fruit sedge
Carex stricta	tussock sedge
Carpinus caroliniana	American hornbeam
Carya cordiformis	bitternut hickory
Caulophyllum thalictroides	blue cohosh
Centaurea biebersteinii	spotted knapweed
Chamaedaphne calyculata	leatherleaf
Chimaphila umbellata	pipsissewa
Chrysosplenium americanum	American golden saxifrage
Cicuta bulbifera	bulblet water hemlock
Cicuta maculata	spotted water hemlock
Cinna latifolia	drooping woodreed
Circaea alpina	Dwarf enchanter's nightshade
Cirsium muticum	swamp thistle
Claytonia virginiana	spring beauty
Clintonia borealis	bluebead lily
Coptis trifolia	goldthread
Corallorhiza maculata	summer coralroot
Corallorhiza trifida	yellow coralroot
Cornus alternifolia	alternate-leaved dogwood
Cornus canadensis	bunchberry
Cornus rugosa	round-leaf dogwood
Cornus sericea	red osier dogwood
Corylus americana	American hazelnut
Corylus cornuta	beaked hazelnut
Cypripedium acaule	moccasin flower
Cypripedium parviflorum var. pubescens	large yellow lady's-slipper
Dirca palustris	leatherwood
Dryopteris carthusiana	toothed wood fern
Dryopteris cristata	crested wood fern
Dryopteris intermedia	fancy wood fern
Elymus hystrix	eastern bottlebrush grass
Elymus virginicus	Virginia wild rye
Equisetum arvense	field horsetail
Equisetum sylvaticum	woodland horsetail
Eriophorum spissum	cottongrass
Eriophorum virginicum	tawny cottongrass
Erythronium americanum	trout lily
Eupatorium maculatum	spotted joe-pye wed

Festuca subverticillata	nodding fescue
Fragaria virginiana	strawberry
Fraxinus americana	white ash
Fraxinus nigra	black ash
Fraxinus pennsylvanica	green ash
Galium asprellum	rough bedstraw
Galium trifidum ssp. trifidum	three-petal bedstraw
Galium triflorum	sweet-scented bedstraw
Gaultheria hispidula	creeping snowberry
Gaultheria procumbens	wintergreen
Geum canadense	white avens
Geum laciniatum	rough avens
Geum rivale	purple avens
Glyceria canadensis	rattlesnake mannagrass
Glyceria striata	fowl mannagrass
Gymnocarpium dryopteris	oak fern
Hepatica nobilis var. acuta	sharp-lobed hepatica
Hepatica nobilis var. obtusa	roundlobe hepatica
Huperzia lucidula	shining club-moss
Hydrophyllum virginianum	Virginia waterleaf
Ilex mucronata	catberry
Impatiens capensis	jewelweed
Iris versicolor	blueflag iris
Juglans cinerea	butternut
Juncus effusus	common rush
Juncus tenuis	path rush
Kalmia polifolia	bog laurel
Lactuca sp.	wild lettuce
Laportea canadensis	Canadian wood nettle
Larix laricina	Tamarack
Ledum groenlandicum	Labrador tea
Lemna minor	small duckweed
Lilium michiganense	Michigan lily
Linnaea borealis	twin-flower
Lobaria pulmonaria	lungwort (a lichen)
Lonicera canadensis	American fly honeysuckle
Lonicera hirsuta	hairy honeysuckle
Lonicera oblongifolia	swamp fly honeysuckle
Luzula acuminata	hairy wood rush
Lycopodium annotinum	bristly club-moss
Lycopodium clavatum	running club-moss
Lycopodium dendroideum	northern tree club-moss
Lycopus uniflorus	northern bugleweed
Lysimachia ciliata	fringed loosestrife
Lysimachia thyrsiflora	tufted loosestrife
Maianthemum canadense	wild lily-of-the-valley
Maianthemum trifolium	threeleaf false lily of the valley
Malaxis brachypoda	white adders-mouth orchid
Matteuccia struthiopteris	ostrich fern
Menyanthes trifoliata	bog buckbean

Milium effusum	milletgrass
Mitchella repens	partridgeberry
Mitella diphylla	two-leaf miterwort
Mitella nuda	naked miterwort
Monotropa uniflora	Indian pipe
Onoclea sensibilis	sensitive fern
Oryzopsis asperifolia	roughleaf ricegrass
Osmorhiza claytonii	sweet cicely
Osmunda cinnamomea	cinnamon fern
Osmunda claytoniana	interrupted fern
Osmunda regalis	royal fern
Ostrya virginiana	ironwood (hophornbeam)
Oxalis montana	mountain wood sorrel
Packera aurea	golden ragwort
Panax trifolius	dwarf ginseng
Panicum latifolium	broadleaf rosette grass
Parthenocissus quinquefolia	Virginia creeper
Phalaris arundinacea	reed canarygrass
Phegopteris connectilis	northern beech fern
Picea glauca	white spruce
Picea mariana	black spruce
Pinus strobus	white pine
Platanthera hyperborea	northern bog orchid
Poa alsodes	bluegrass
Poa paludigena	bog bluegrass
Polygonatum pubescens	hairy Solomon's-seal
Polygonum arifolium	halberd-leaved tear-thumb
Polygonum cilinode	fringed black bindweed
Polygonum sagittatum	arrow-leaved tear-thumb
Populus grandidentata	big-tooth aspen
Populus tremuloides	trembling aspen
Potentilla palustris	marsh cinquefoil
Prenanthes alba	white rattlesnake-root
Prunus serotina	black cherry
Pteridium aquilinum	bracken fern
Pyrola elliptica	elliptic shinleaf
Pyrola secunda	sidebells
Quercus rubra	red oak
Ranunculus abortivus	little-leaf buttercup
Ranunculus hispidus	bristly buttercup
Ranunculus recurvatus	blisterwort
Ranunculus repens	creeping buttercup
Ribes americanum	black currant
Ribes cynosbati	prickly gooseberry
Ribes glandulosum	skunk currant
Ribes triste	swamp red currant
Rubus idaeus	red raspberry
Rubus pubescens	dwarf red blackberry
Rubus spp.	
Rumex orbiculatus	greater water dock

Sambucus racemosa v. racemosa	red elderberry
Sanguinaria canadensis	bloodroot
Sarracenia purpurea	pitcher plant
Saxifraga pensylvanica	swamp saxifrage
Schizachne purpurascens	false melic
Scirpus cyperinus	woolgrass
Smilacina racemosa	false Solomon's-seal
Smilax hispida	bristly greenbrier
Solidago flexicaulis	zigzag goldenrod
Solidago uliginosa	bog goldenrod
Spiraea alba	steeplebush
Spiraea tomentosa	hardhack
Streptopus lanceolatus v. longipes	rosy twisted stalk
Symphyotrichum puniceum	purple-stem aster
Symplocarpus foetidus	skunk cabbage
Taxus canadensis	Canada yew
Thalictrum dasycarpum	purple meadow-rue
Thalictrum dioicum	early meadow rue
Thelypteris palustris	eastern marsh fern
Thuja occidentalis	northern white cedar
Tilia americana	basswood
Toxicodendron radicans	poison ivy
Triadenum virginicum	Virgina marsh St. Johnswort
Trientalis borealis	starflower
Trillium cernuum	nodding trillium
Trillium grandiflorum	large-flowered trillium
Tsuga canadensis	eastern hemlock
Ulmus americana	American elm
Uvularia grandiflora	large-flowered bellwort
Uvularia sessilifolia	sessile bellwort
Vaccinium macrocarpon	cranberry
Vaccinium myrtilloides	velvet-leaf blueberry
Viburnum acerifolium	mapleleaf viburnum
Viburnum trilobum	American cranberry bush
Viola adunca	hooked-spur violet
Viola cucullata	marsh blue violet
Viola labradorica	alpine violet
Viola macloskeyi	smooth white violet
Viola pubescens v. pubescens	downy yellow violet
Viola pubescens v. scabriuscula	downy yellow violet
Viola renifolia	white violet
Zizania aquatica	wild rice