Shingleton Rich Conifer Swamp ERA Plan

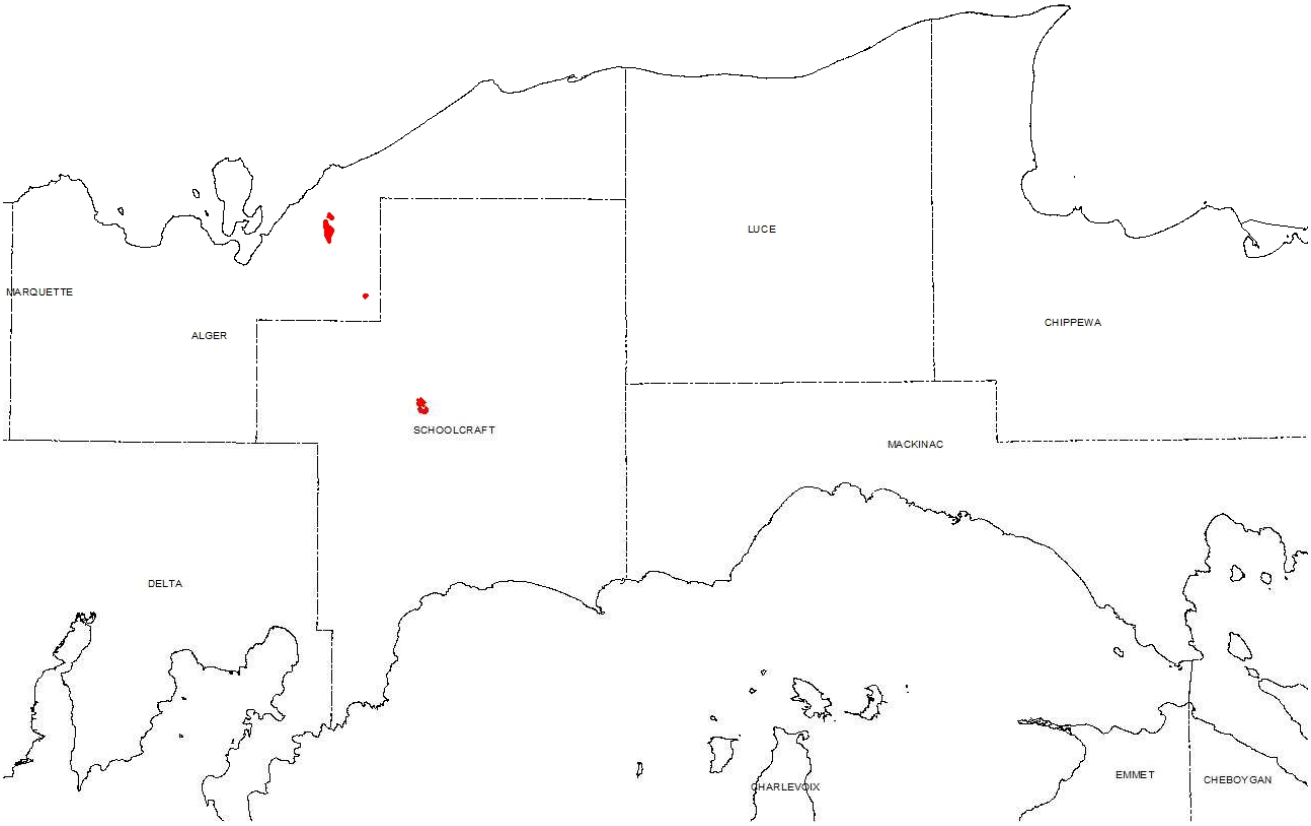

Figure 1. Shingleton Rich Conifer Swamp ERA plan locator map.

Administrative Information:

- The Shingleton Rich Conifer Swamp (RCS) ERA Plan contains five ERAs; four Rich Conifer Swamp ERAs, and a small Mesic Northern Forest (MNF) ERA that is embedded within one of the RCS ERAs.

- These ERA's are located on State Forest land in the Shingleton FMU, in Alger and Schoolcraft Counties, in compartments 023, 024, 176, 177, 178, 189 and 191.

- The Mosquito River Swamp RCS ERA and part of the Noble Lake RCS ERA are within the Pictured Rocks Buffer Management Area (MA). The Noble Lake MNF, the Shingletown Cedar RCS, and the majority of the Noble Lake RCS ERAs are within the Cusino Complex MA. The Cedar Island RSC is within the Seney Manistique Swamp MA.

- Alger County, Munising Township, T47N R17W sections 7, 8, 17, 18, 19, 20, and 30; T46N R17W section 23. Schoolcraft County, Hiawatha Township, T44N R16N, sections 10, 11, 14, and 15.

- Primary plan author: Kristen Matson, Forest Resources Division (FRD) Inventory and Planning Specialist; Contributors and reviewers include Sherry MacKinnon, Wildlife Division (WLD) Wildlife Ecologist; Keith Kintigh, Forest Certification and Conservation Specialist; Cody Norton, WLD Wildlife Biologist; Bob Burnham, FRD Unit Manager; Jason Lindquist, FRD Forest Technician; and Mario Molin, Adam Petrelius, and Tori Irving, FRD Foresters.

- Ownership around the ERAs is generally State of Michigan, with some commercial ownership at the south end of the Noble Lake RCS, and private ownership within the Cedar Island RCS.

- There are no existing infrastructure/facilities within these ERAs. Trail roads are near the edges of the ERAs in the Noble Lake area, and through the center of Shingletown Cedar ERA. Old grown over logging roads can be found within portions of some of the ERAs.

- ERA boundaries are derived from the underling Natural Community EO boundary which are mapped using NatureServe standards. EO Boundaries are informed by vegetation and other site characteristics including soils, landform, and/or historic aerial imagery. As a result, it is not uncommon for EO/ERA boundaries to differ from forest inventory stand boundaries. If these difference result in potential conflicts with proposed forest activities, consult with the Forest Conservation and Certification Specialist.

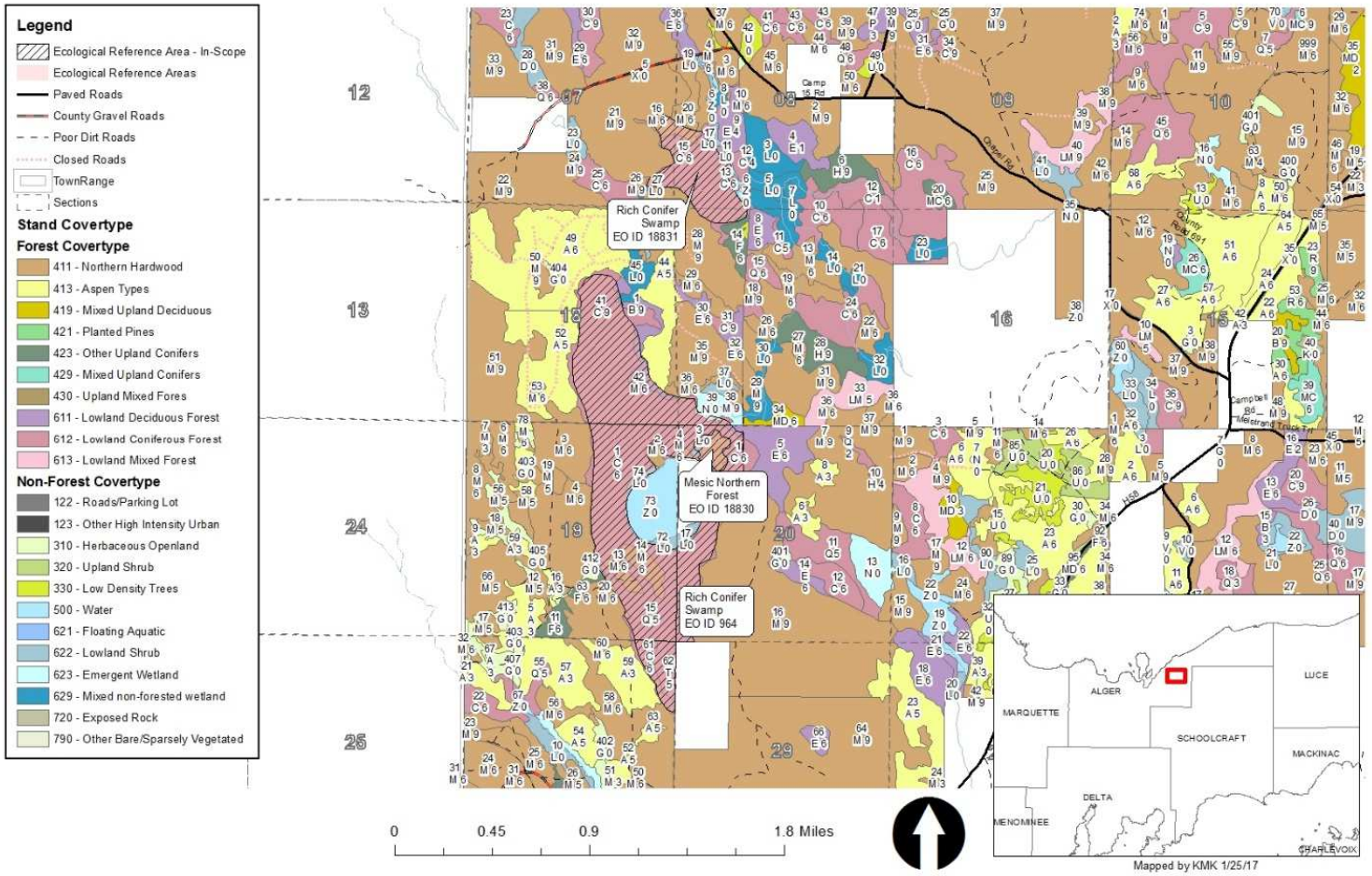

Figure 2. Noble Lake and Mosquito River Swamp ERA area map with EO ID labels.

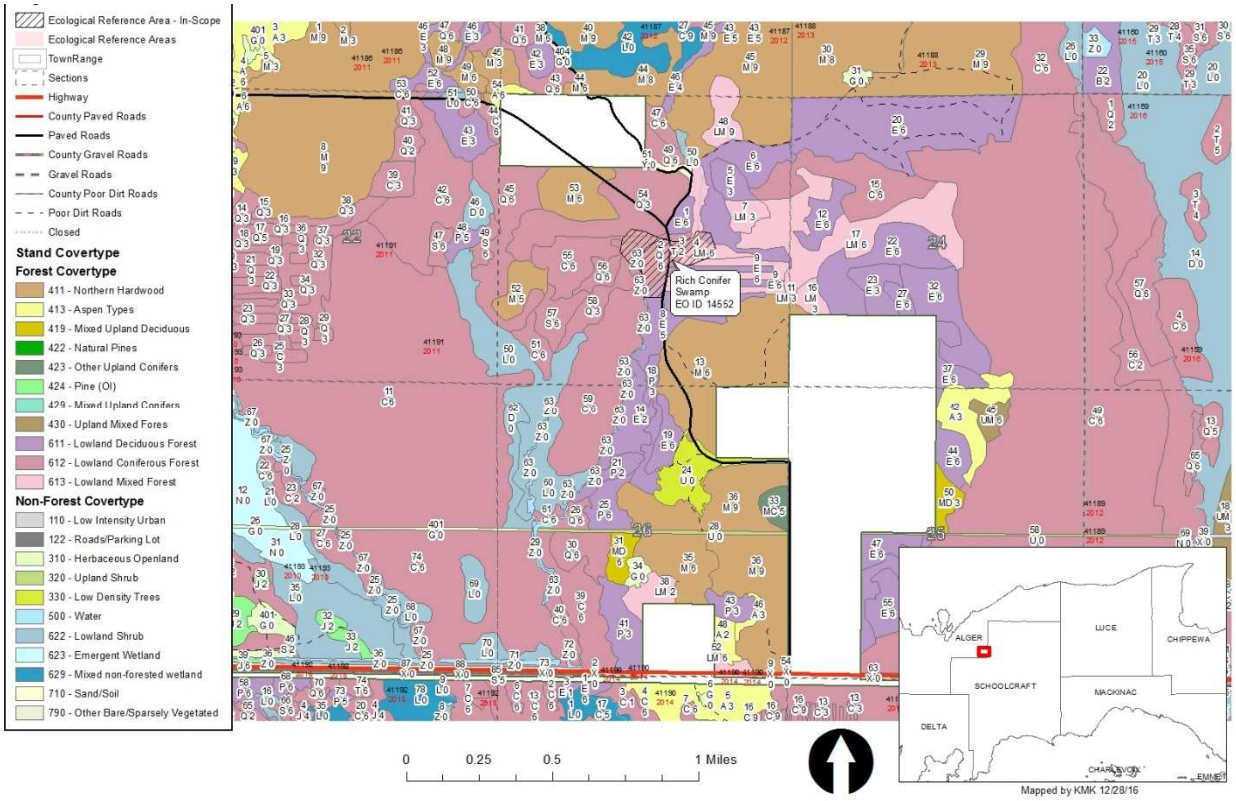

Figure 3. Shingletown RCS ERA map with EO ID label.

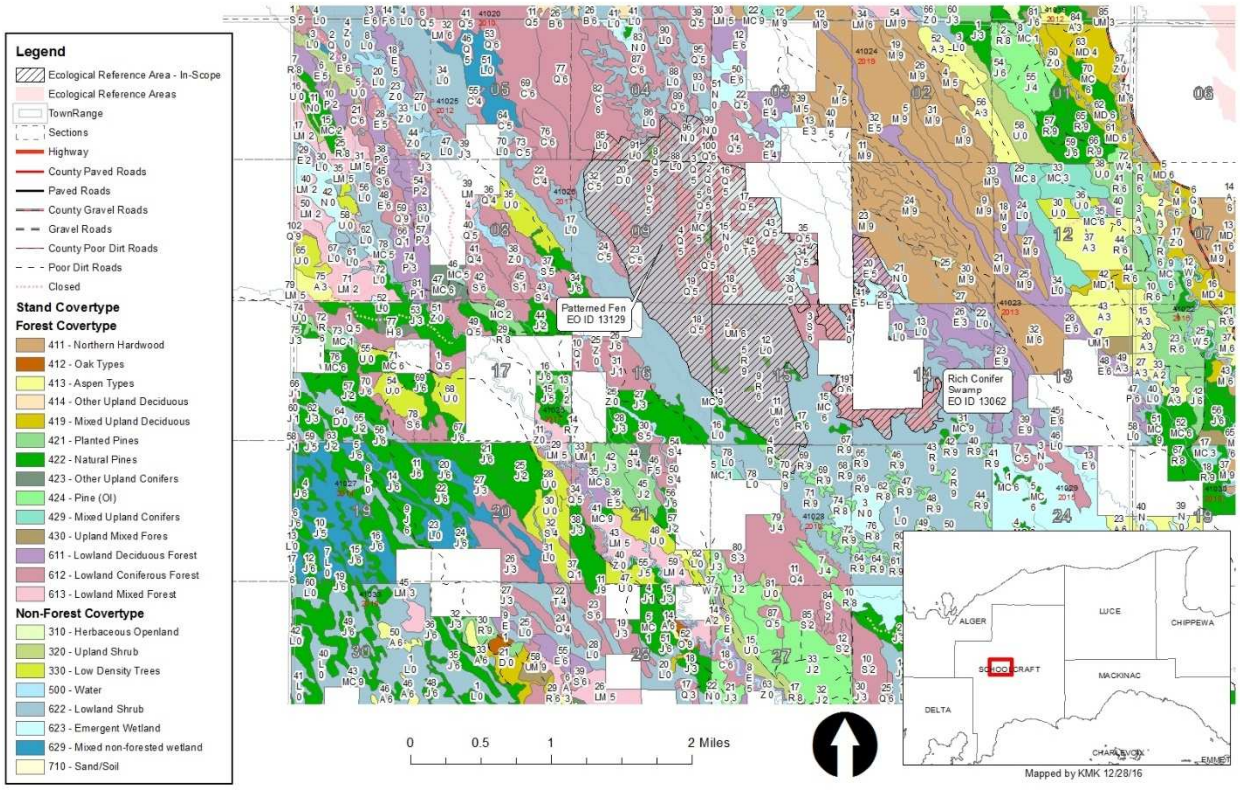

Figure 4. Cedar Island RCS ERA map with EO ID label. (Patterned fen ERA in different plan.)

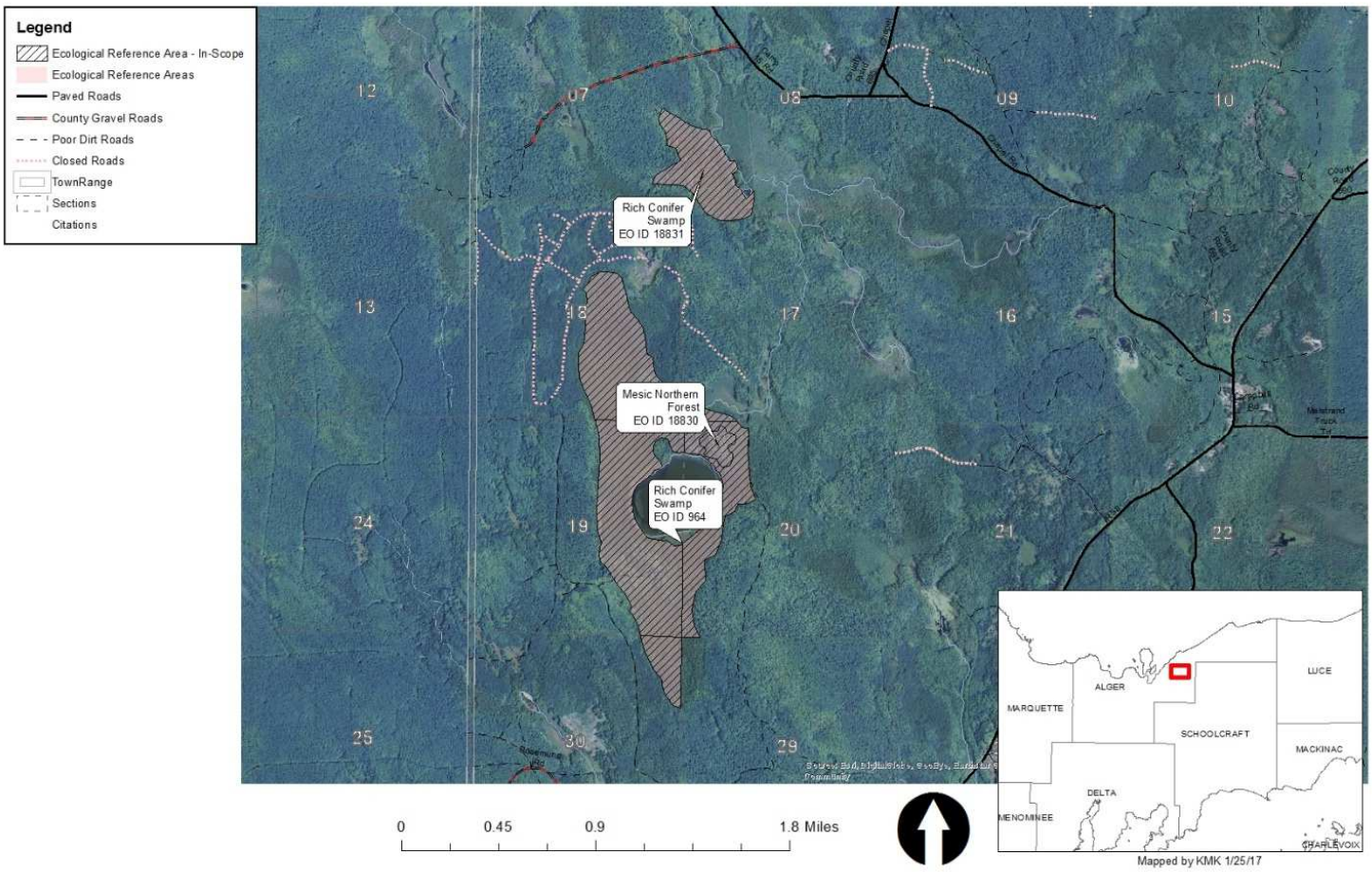

Figure 5. Noble Lake and Mosquito River Swamp ERA Imagery with EO ID labels.

Figure 6. Shingletown RCS ERA Imagery with EO ID label.

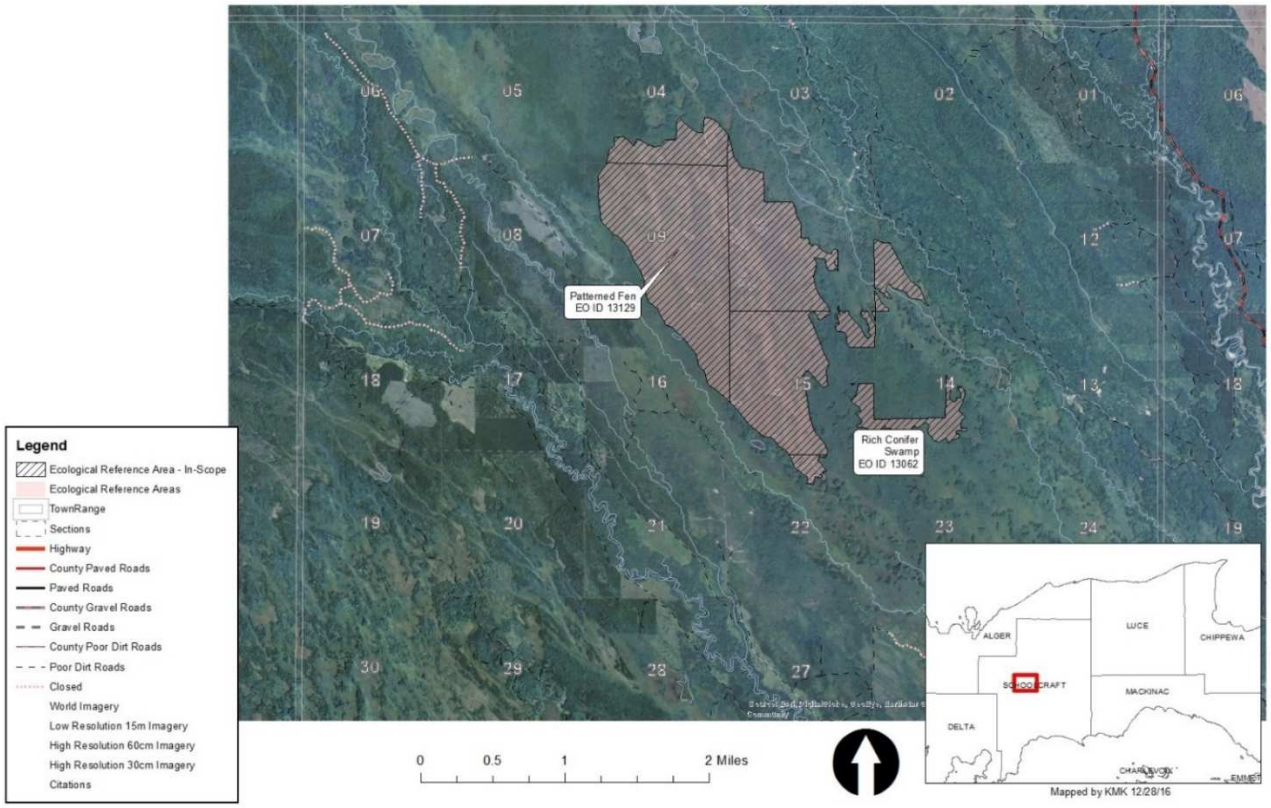

Figure 7. Cedar Island RCS ERA Imagery with EO ID label. (Patterned fen ERA in a different plan.)

Conservation Values

The five ERAs are found in two natural communities in this area:

- Rich Conifer Swamp communities:
    - EO_ID: 964, EORANK: B, LASTOBS: 2011-08-16 (Noble Lake)
    - EO_ID: 18831, EORANK: C, LASTOBS: 2011-08-16 (Mosquito River Swamp)
    - EO_ID: 13062, EORANK: AB, LASTOBS: 2007-07-11 (Cedar Island)
    - EO_ID: 14552, EORANK: CD, LASTOBS: 2005-08-17 (Shingletown Cedar)

- Mesic Northern Forest community:
    - EO_ID: 18830, EORANK: C, LASTOBS: 2011-08-16 (Noble Lake)

- These ERAs are all G4S3, apparently secure globally and vulnerable within the state.

Noble Lake RCS EO_ID 964: This EO is ranked B, good estimated viability. The ERA occurs on approximately 415 acres of state forest land. This rich conifer swamp occurs on an ice contact depression among end moraine of medium-textured till. Soils are saturated, acidic to circumneutral (pH 5.0-6.8), sapric to fibric peats over deep sands with a subsurface flow of mineral-rich, cold groundwater. Plant species diversity is high and is correlated with the diversity of microhabitats that results from windthrow mounds, hummock formation, vernal pool depressions, and frequent light gaps. The swamp is surrounded by managed upland forest.

Northern white-cedar is the predominant species in all vegetative layers, and appears to be reproducing well though deer browse is evident. Canopy cedar range in Diameter Breast Height (DBH) from 12-24". Portions of the occurrence consist of old-growth cedar, though logging in the northern portions has removed many large trees. Canopy associates include black spruce, tamarack, black ash, and yellow birch. The tall shrub layer is characterized by northern white-cedar (*Thuja occidentalis*), mountain maple (*Acer spicatum*), balsam fir (*Abies balsamea*), tag alder (*Alnus rugosa*) and elderberry (*Sambucus canadensis*). Labrador tea (*Ledum groenlandicum*) and swamp dewberry (*Rubus* hispidus) are prevalent in the low shrub layer. The ground cover is diverse with species such as false mayflower (*Smilacina trifolia*), bluebead lily (*Clintonia borealis*), goldthread (*Coptis trifolia*), wild sarsaparilla (*Aralia nudicaulis*), naked miterwort (*Mitella nuda*), small cranberry (*Vaccinium oxycoccos*) and wintergreen (*Gaultheria procumbens*).

This EO rank was reduced from AB to B in 2006 due to some past logging in the northern portion. Some logging has taken place in the northern half of the swamp, and more recently in the northern quarter. Old logging roads exist through the northern half. Hydrology in the area has likely been, and is currently, affected by compaction of the soil and the construction of roads associated with past and present logging activity.

Figure 8. Rich conifer swamp

Mosquito River Swamp RCS EO ID 18831: This EO is ranked C, fair estimated viability. This ERA is approximately 75 acres of state forest land. This rich conifer swamp occurs on an ice contact depression among end moraine of medium-textured till. The swamp occurs west of an old railroad grade that likely facilitated logging within the swamp and altered the overall hydrology of the wetland basin. Cut stumps occur throughout the swamp, however for the most part, the diameter of the cut stumps is equivalent to the size of the canopy trees. There are some localized portions of the swamp in which the cut stumps diameter is larger than the DBH of standing trees. The abundance of cut stumps decreases with increasing distance from the Mosquito River. The patchiness of the sphagnum carpet and the prevalence of paper birch in the canopy suggests that the swamp likely burned during the logging area fires. Canopy of mortality of tamarack may be due to flooding or insect attack (i.e., Larch sawfly). Deer browse was noted. This rich conifer swamp occurs just west of the Mosquito River and is within the Shingleton FMU in a large block of unfragmented state forest managed for timber production, wildlife, recreation, and biodiversity. Surrounding upland forest is primarily managed northern hardwoods. A high-quality rich conifer swamp and mesic northern forest occur to the

south associated with Noble Lake. Low road densities with scattered logging roads an old railroad grades.

This rich conifer swamp is characterized by a discontinuous carpet of sphagnum moss, a species-rich herbaceous layer, a patch low shrub layer, and a patchy to dense coniferous canopy (65-90% canopy closure). The rich conifer swamp is floristically diverse. The canopy is dominated by cedar with canopy associates including paper birch, tamarack, white spruce, red maple and black ash, which range from 8 – 22" DBH. Cedar regeneration is common in the understory. Additional understory species include balsam fir, spruce and dogwood. Soils are saturated to inundated, alkaline (pH 7.5), deep sapric to hemic peats over deep, wet, alkaline (pH 7.5-7.8) sands with a subsurface flow of mineral-rich, cold groundwater. Plant species diversity is high and is correlated with the diversity of microhabitats that results from windthrow mounds, hummock formation, and frequent light gaps.

Cedar Island Rich Conifer Swamp EO ID 13062: This EO is ranked AB, excellent or good estimated viability. The ERA is approximately 164 acres of state forest land. This large block of northern white-cedar dominated rich conifer swamp occurs on a flat, poorly-drained lakeplain west of Hickey Creek, with the West Branch of Hickey Creek passing through the northern portion of the site. This uneven-aged system is characterized by diverse ecological zonation and numerous successional stages patterned by windthrow, beaver flooding, and fire. High species diversity (over 100 native species were noted during a single visit) is driven at the site scale by ecological zonation and at the microscale by sphagnum hummock and hollow microtopography. Anthropogenic disturbance is limited to selective turn-of -the-century logging. The predominant canopy cohort is 130+ years old with numerous younger patches occurring where flooding and/or windthrow have killed canopy trees. Well-developed sphagnum hummock and hollow microtopography occurs where the hydrology has stabilized. The circumneutral (pH 7.0) peats are of variable depth (50->100 cm) overlying wet sands. Fibric peats on sphagnum hummocks are slightly acidic and sands along low dune ridges are also acidic (pH 5.0). Sedge peats are prevalent in areas of standing water, where flooding has prevented the establishment of sphagnum peat.

The canopy is dominated by northern white-cedar (8-16" DBH) with canopy associates including tamarack (*Larix laricina*), black spruce (*Picea mariana*), black ash (*Fraxinus nigra*), red maple (*Acer rubrum*), and scattered white pine (*Pinus strobus*). Dune ridges extending into the swamp are dominated by white pine along with red pine (*Pinus resinosa*), northern white-cedar, big-toothed aspen (*Populus grandidentata*), and paper birch (*Betula papyrifera*). Areas of younger swamp along the margins where flooding is

more pervasive are characterized by an open canopy and are dominated by tamarack and black ash with a dense understory of tag alder and winterberry (*Ilex verticillata*). Tag alder and winterberry also occur in the understory of the cedar-dominated areas along with black ash, northern white-cedar, and balsam fir.

The low shrub layer is scattered with seedlings of canopy species, alder-leaved buckthorn (*Rhamnus alnifolia*), American fly honeysuckle (*Lonicera canadensis*), raspberries (*Rubus* spp.), blueberries (*Vaccinium* spp.), and gooseberries (*Ribes* spp.). Areas with stable hydrology are sphagnum-dominated with three-seeded sedge (*Carex trisperma*), royal fern (*Osmunda regalis*), starflower (*Trientalis borealis*), goldthread, bunchberry (*Cornus canadensis*), sensitive fern (*Onoclea sensibilis*), fowl manna grass (*Glyceria striata*), and marsh marigold (*Caltha palustris*) as prevalent ground cover species. Areas along the swamp margins and in the northern portion of the site that have standing water or have been recently flooded are characterized by an open canopy, a dense understory, and graminoid dominance in the ground cover with tussock sedge (*Carex stricta*) and lake sedge (*C. lacustris*) as dominants. Prevalent ground cover species in these flooded areas include common skullcap (*Scutellaria galericulata*), joe-pye-weed (*Eupatorium maculatum*), swamp candles (*Lysimachia terrestris*), swamp milkweed (*Asclepias incarnata*), marsh marigold, bluejoint grass (*Calamagrostis canadensis*), and royal fern.

Figures 8 and 9. This uneven-aged rich conifer swamp is characterized by diverse ecological zonation and numerous successional stages patterned by windthrow, beaver flooding, and fire. Photos by Joshua G. Cohen.

Shingletown Cedar Rich Conifer Swamp EO ID 14552: This EO is ranked CD, fair or poor estimated viability. This ERA is approximately 24 acres of state forest land. It was demoted to CD rank from BC in 2005. The sites on either side of Star Creek are the best representation. Star siding road also goes through the site, resulting in a portion of the site being not forested.

Cedar is the dominant tree in this stand, often very large in size, but in many locations not closing the canopy. Occasional large trees are paper birch, tamarack (along the road), white spruce, and balsam fir. The subcanopy consists of smaller cedar and black ash. Throughout most of the stand the lower layer is receiving sufficient light to be densely covered with ferns, mosses and herbs. There is a variation in the stand character with hummocks of larger trees (mostly along the creek), black ash bordering to the north and west, low areas with a denser herb floor (lots of poison ivy) and a marsh habitat right along the stream course (speckled alder, sensitive fern, joe-pye-weed and black ash). The stand on the east side of the road has smaller cedar, is much more dense and there is less variation (i.e. pure cedar) and a sparse ground floor.

Noble Lake Mesic Northern Forest EO ID 18830: This EO is ranked C, fair estimated viability. This ERA is approximately 13 acres of state forest land, and is surrounded by the Noble Lake Rich Conifer Swamp ERA. Mesic northern forest occurs on ice-contact ridge within an ice contact depression surrounded by end moraine of medium-textured till. Beech bark disease noted on canopy beech. Recent onslaught of beech bark disease will drastically change the species composition, structure, and successional pathways. Canopy beech will soon die and create large light gaps that will be inundated by dense undergrowth of sprouting beech seedlings and saplings. No cut stumps observed. Mesic northern forest occurs along northeastern shore of Noble Lake surrounded by a high-quality rich conifer swamp within the Shingleton FMU in a large block of unfragmented state forest managed for timber production, wildlife, recreation and biodiversity. Surrounding upland forest is primarily managed northern hardwoods. In addition, a managed stand of northern hardwoods occurs as an island within the swamp southwest of Noble Lake. Low road densities with scattered logging roads and old railroad grades.

Small island of old-growth mesic northern forest occurring on ice-contact ridge within ice contact depression. A 24" D.B.H. sugar maple was cored and estimated to be over 225 years old. The uneven aged stand is characterized by pit and mound topography, large diameter old-growth trees, and moderate amounts of coarse woody debris. Species composition and vegetative structure have been influenced by gap phase dynamics. The soils are characterized as moderate to deep acidic (pH 4.5-5.0) organics over acidic (pH 4.5-5.0) sands.

Closed canopy dominated by sugar maple and beech with canopy associates including red maple, birch, hemlock, cedar and spruce. Hemlock and red maple are most prevalent along the margin of the upland island and the adjacent rich conifer slope. Most canopy trees are 20 – 28" diameter with some larger scattered maple and beech. The scattered subcanopy contains beech, maple, hemlock and spruce. The patchy understory is characterized by beech, maple, and balsam fir.

Figure 10. Mesic northern forest

Figure 11. Mesic northern forest

High Conservation Value (HCV) Attributes:

The Noble Lake landscape, in general, is largely an intact and functional landscape. It is part of a large landscape level forest with minimal road density and management activity. The two ERAs contain mixed ages of trees, and include large legacy trees that may be over 120 years old. Portions of the Noble Lake rich conifer swamp consists of old-growth cedar.

The Mosquito River Swamp ERA is within the Pictured Rocks Inland Buffer Zone contiguous resource area Special Conservation Area (SCA). It is also adjacent to the Mosquito River which is an SCA for cold water stream and high-priority trout stream.

There are known archaeological sites in the vicinity of all three of these ERAs. Old abandoned railroad grades from historical logging are found in this area.

The Shingletown ERA is within a large deer wintering complex SCA, and surrounds Star Creek, a cold water stream SCA.

The Cedar Island ERA is part of a large wetland complex, including high quality northern wet meadow and northern shrub thicket. A very large patterned fen ERA is close by (described in a different ERA plan). Small islands throughout the wetlands are listed as dry northern forest element occurrences. The West Branch Hickey Creek, which flows through part of this ERA, and nearby Hickey Creek are cold water stream SCAs. Cedar Island is a large block of naturally regenerated cedar swamp characterized by complex ecological zonation, structural heterogeneity and high native plant diversity (over 100 species noted). This site is noted for its size and lack of disturbance. The surrounding open wetlands should be protected since they contain a large population of sweet coltsfoot (*Petasites sagittatus*). Due to the large wetland complex surrounding the site, and the creeks flowing by, there are very few roads in this area.

Threats Assessment

Rich conifer swamp:

Logging within the EOs present the most imminent and damaging threat. Construction of new roads to facilitate logging of the northern hardwoods surrounding the EO also poses the threat of additional hydrologic alteration, and the introduction of non-native species. Overall overabundance of deer results in browse on northern white cedar, reduction in cedar regeneration, and stress to native plant populations through eating and trampling.

Invasive species that threaten the diversity and community structure of rich conifer swamp include glossy buckthorn (*Rhamnus frangula*), purple loosestrife (*Lythrum salicaria*), narrow-leaved cat-tail (*Typha angustifolia*), hybrid cat-tail (*Typha* x*glauca*), reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), and European marsh thistle (*Cirsium palustre*). Regular monitoring for these and other invasive species followed by prompt and sustained control efforts will help protect the ecological integrity of rich conifer swamp and adjacent natural communities.

Mesic Northern Forest:

Documented threats to mesic northern forest include fragmentation from roads, trails and nearby logging, loss of tree recruitment from deer browse, invasive plant species such as garlic mustard (*Alliaria petiolata*) and glossy buckthorn and pathogens such as beech bark disease (Cohen et al 2008).

General Management of ERAs

ERAs will generally not be managed for timber harvest. Management activities or prescriptions in Ecological Reference Areas are limited to low impact activities compatible with the defined attributes and values of the community type, except under the following circumstances:

i. Harvesting activities where necessary to restore or recreate conditions to meet the objectives of the ERA, or to mitigate conditions that interfere with achieving the ERA objectives. In this regard, forest management activities (including timber harvest) may be used to create and maintain conditions that emulate an intact, mature forest or other successional phases that may be under-represented in the landscape.

ii. Road building only where it is documented that it will contribute to minimizing the overall environmental impacts within the FMU and will not jeopardize the purpose for which the ERA was designated.

iii. Existing and new land use activities should be evaluated in the context of whether they detract from achieving the desired future conditions of the natural community for which the ERA was designated. The acceptability of land use activities within DNR administered ERAs will be evaluated using severity, scope, and irreversibility criteria, as established in DNR IC4199, Guidance for Land Use Activities within DNR Administered Ecological Reference Areas.

iv. Threats such as fire, natural or exotic pests or pathogens may warrant other management measures.

v. Harvesting and other management activities in presently accessible areas located within the peripheral boundary of an ERA that are NOT the natural community of focus and which may or may not be typed as a separate stand or forest type (e.g. an upland island of previously managed aspen within a bog complex) may be prescribed for treatments, contingent upon a determination of no anticipated direct or indirect adverse impact to the defined attributes and values of natural community for which the ERA was designated. The FRD Biodiversity Conservation Program leader shall be consulted regarding the determination of any direct or indirect adverse impact.

vi. Land management activities immediately adjacent to an ERA should consider any anticipated direct or indirect adverse impact to the defined attributes and values of natural community for which the ERA was designated. Management will be adaptive. ERAs will be monitored to determine if implemented management activities are moving the natural communities forward, or maintaining them at their desired future condition. The network of ERAs will be evaluated every five years for their contribution to the overall goal of biodiversity conservation. This review cycle will allow for the potential addition or subtraction of lands from an ERA, designation of new ERAs, or removal of the ERA planning designation.

Management Goals

- Allow natural ecological processes (windthrow, fire, and flooding) to occur.
- Manage for unfragmented forest/reduce fragmentation.
- Manage to reduce/control current invasive species and prevent new invasive species from becoming established.
- Reduce other threats (alteration of hydrology, ORV use, excessive deer browse, conflicting land uses, etc.).
- The ERA has representation of native plants, indicator species, and rare species.
- Restoration of and/or expansion of the mesic northern forest and rich conifer swamp ERAs where applicable.

Management Objectives

The following Management Objectives describe the measures necessary to ensure the maintenance and/or enhancement of the ERA site or sites. Objectives and associated management actions will be prioritized and implemented based upon available resources.

- Assess northern white cedar and hemlock regeneration during this planning period.
- Allow blowdown/windthrow and insect mortality to occur without salvage harvest.
- Assess EO quality every 10-20 years.
- Determine additional threats to the ERAs.
- Identify and prioritize critical areas within the ERA to treat for invasive species.
- Work with adaptation specialist to determine threats associated with climate change.
- Identify and eliminate illegal ORV access points.
- High diversity of native plants is desirable.
- Determine if there are impacts to hydrological system.

Management Actions

Suggested actions or series of actions that would help to achieve the above objectives.
M= Maintenance action, R= Restoration action)

- If current data/knowledge are not available regarding the management goals, actions may address needed assessments (i.e. surveys may be needed). (M, R)
- Identify vectors of invasive species and reduce their introduction to the site. (M, R)
- Remove invasive plants using appropriate control methods for that particular species (hand-pull, herbicide, prescribed fire). (M, R)
- Reintroduction of missing associated native plant species (both canopy and ground flora) using local genotypes (R); particularly mesic conifer species where they have been removed.
- Land acquisition to reduce fragmented ownership. (R)
- Where forest regeneration is found to be inadequate: (R)
    - In cedar and/or hemlock, determine if lack of regeneration is caused by deer herbivory and if so, consider reducing deer densities by reducing early-successional habitat in the surrounding landscape, consider limiting winter cutting intended to feed deer adjacent to the ERA and explore other potential solutions.
    - Minimize clearcuts adjacent to ERAs with existing significant deer browse pressure.
    - For restoration purposes in even aged stands, use big tree management to introduce a multi-storied canopy.
- Timber harvest adjacent to this wetland ERA may negatively impact site hydrology and wildlife habitat. Site hydrology may be impacted by decreasing evapotranspiration potential and increasing surface and sub-surface water flow which can negatively alter vegetation composition within the ERA. Additionally, many amphibians and reptiles are terrestrial hibernators, using upland areas adjacent to wetlands during winter months. These species may also use adjacent upland areas for feeding, seasonal movements to breeding areas, and dispersal of juveniles. Follow BMP Riparian Management Zone (RMZ) buffering guidelines as applicable. (M, R)

- Close illegal roads and trails. Consult with PRD Trails Specialist when roads and access points need to be closed. (M, R)
- Install culverts if necessary to restore natural hydrological flow. (R)
- Work with MNFI and other experts to update EO inventory. (M, R)
- Update plan with additional knowledge as it becomes available. (M)

Monitoring

Monitoring approaches and indicators appropriate for the natural community and in line with the objectives and management actions suggested, including appropriate frequency and timing considerations. (Unless otherwise specified, monitoring is expected to occur once every 10-year inventory cycle.)

Metric	Current Status	Desired Future Status	Assessment
Representative and rare species – species occurrences	Baseline EO Records; updated when EO's are updated	No decreases	TBD
Presence/Absence of trees >120 years old	Baseline inventory data taken every decade	Increasing in age	TBD
Forest Regeneration – regeneration by species	Baseline inventory data taken every decade	Regeneration falls within acceptable ranges by species	TBD
Populations of invasive species – number and scope of species	Severity unknown; treatments should be monitored appropriately; detection monitoring opportunistically or every five years' maximum	Eliminated/fewer occurrences	TBD
Illegal ORV activity – number of new instances and number of citations issued	Moderate; monitored via patrols, reports or opportunistically	Eliminated/fewer occurrences	TBD

Additional Resources:

MNFI Natural Community Abstracts: http://mnfi.anr.msu.edu/pub/abstracts.cfm#Communities

Michigan Department of Natural Resources Forest Certification Work Instruction 1.4: http://www.michigan.gov/documents/dnr/WI_1.4BiodMgt_320943_7.pdf