

Angler's Bay Shoreland and Associated Oak Savanna Stewardship Plan

Dickinson County



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SITE LOCATION: Angler's Bay on the NE side of Big Spirit Lake, Spirit Lake TWP, Dickinson County

LEGAL LOCATION: SE ¼, Section 14, T100N, R36W.

TOTAL ACRES OF PLAN: +/- 22.4 acres including approximately 4,900' of shoreline

DNR and Partners' Goals & Objectives

1. **FIRST PRIORITY:** Remove encroaching riparian trees to provide needed sunlight to bulrush and near-shore native aquatic and terrestrial plant beds. Where needed and possible, reestablish the near-shore aquatic and terrestrial plants.
2. **SECOND PRIORITY:** Restore the oak savanna/open woodlot community (~40 to 60% canopy coverage) where possible by eliminating invasive trees and setting back succession. Retain all bur oak and some basswood and hackberry. Where needed and possible, plant native bur oak, black walnut, red oak, bitternut hickory, basswood and hackberry. Where needed, reestablish high diversity native grass and forbs.
3. **THIRD PRIORITY:** Remove all green ash trees before Emerald Ash Borer reaches the area and while these trees have some market value. Where needed as a wind buffer to protect retained and planted trees, temporarily leave relatively few green ash trees.

Resource Concerns: Rare, Threatened & Endangered Species

Historically, large shoreline areas of Iowa's natural lakes were inhabited with a high diversity of emergent, submergent, and floating leaf plant species. Static water levels, residential shoreline development (including directly removing plants to facilitate viewing, boating and boat docking), shoreline succession from native herbaceous to invasive woody plants, and other factors eliminated these plant beds from nearly all of Iowa's lakes (Phillips 2006). A study by Phillips (2006) revealed that while degraded, the Angler's Bay portion of Big Spirit Lake was still the largest (~40 acres) and most diverse (28 species) aquatic plant community of all large (>1,000 acres) natural lakes in Iowa. This, and other factors led local public and private conservationists to pursue permanent protection of this unique and critical habitat, with the Angler's Bay property eventually being purchased by Iowa Natural Heritage Foundation (INHF) in 2006 and turned over to the Iowa DNR for management soon after. Management recommendations to preserve and enhance the bulrush and other aquatic plant beds on nearly 5,000' of Angler's Bay shoreline emphasized the need to reverse shoreline succession by removing trees that were shading out and therefore, causing zones of shallow water areas void of aquatic plants (Phillips 2006).

Recent discussion among local conservationists and partners led to the additional goal of converting the adjacent, narrow upland area from a degraded green ash- and invasive buckthorn-dominated woodland (Schwartz 2014) to its historical condition of an oak savanna/open woodland (MacBride 1900). Oak savanna ecosystems consist of native fire-tolerant tree species (mostly bur oak in this area) interspersed throughout a prairie landscape dominated by native grass and forbs. While once common in the upper Midwest and elsewhere, oak savannah is now one of our most imperiled ecosystems and where healthy, provides critical habitat for a myriad of mammal, avian, reptile, amphibian and insect species. Review of the Threatened and Endangered Animal database revealed no threatened or endangered species within the project site. The federally threatened Northern long-eared bat (*Myotis septentrionalis*) is a potential inhabitant of the forested portions of the project area. Requirements are now in place regarding timber harvest in areas that potentially have nursery trees for this species. For complete requirements, see Appendix A. A July 2020 site inspection by DNR Ecologist John Pearson revealed no State or Federal threatened, endangered, or special concern plant species. Pearson found the woodland vegetation to be dominated by buckthorn in the understory and a variety of common disturbance-tolerant species such as white snakeroot, black snakeroot, and garlic mustard. Prior to implementation, the forest management activities described in this plan will be reviewed internally to determine potential impacts to both state and federal threatened or endangered plant and animal species.

Historic Stand Description

Schwartz (2014) suspects that the lower Storden soils had trees and prairie grass at the time of settlement but fire was not common due to higher moisture content due to proximity to water and higher humidity. After settlement, when natural fire was reduced or eliminated, native grasses were replaced by trees through succession. In the upland Storden areas, Bur oak, with two trees dating to the time of settlement or earlier, are present. Older Bur oaks have significant

storm damage while younger trees were not damaged by wind and have good crown form. Younger trees should live another 200 years if not eliminated by Bur Oak Blight, Oak Wilt, or high-water levels which will displace soil oxygen (Schwartz 2014). MacBride (1899) describes “trees being on the east side of Okoboji and wrapping nearly continuously around Big Spirit Lake with especially large woodlots on the east and northeast sides of Big Spirit Lake.” MacBride (1899) further describes the wooded areas to consist mostly of bur oak with fewer numbers of black walnut, red oak, hackberry, hawthorne, white ash, American elm wild cherry, and others, and states that cottonwood, boxelder, chokecherry, hard maple and others were probably present.

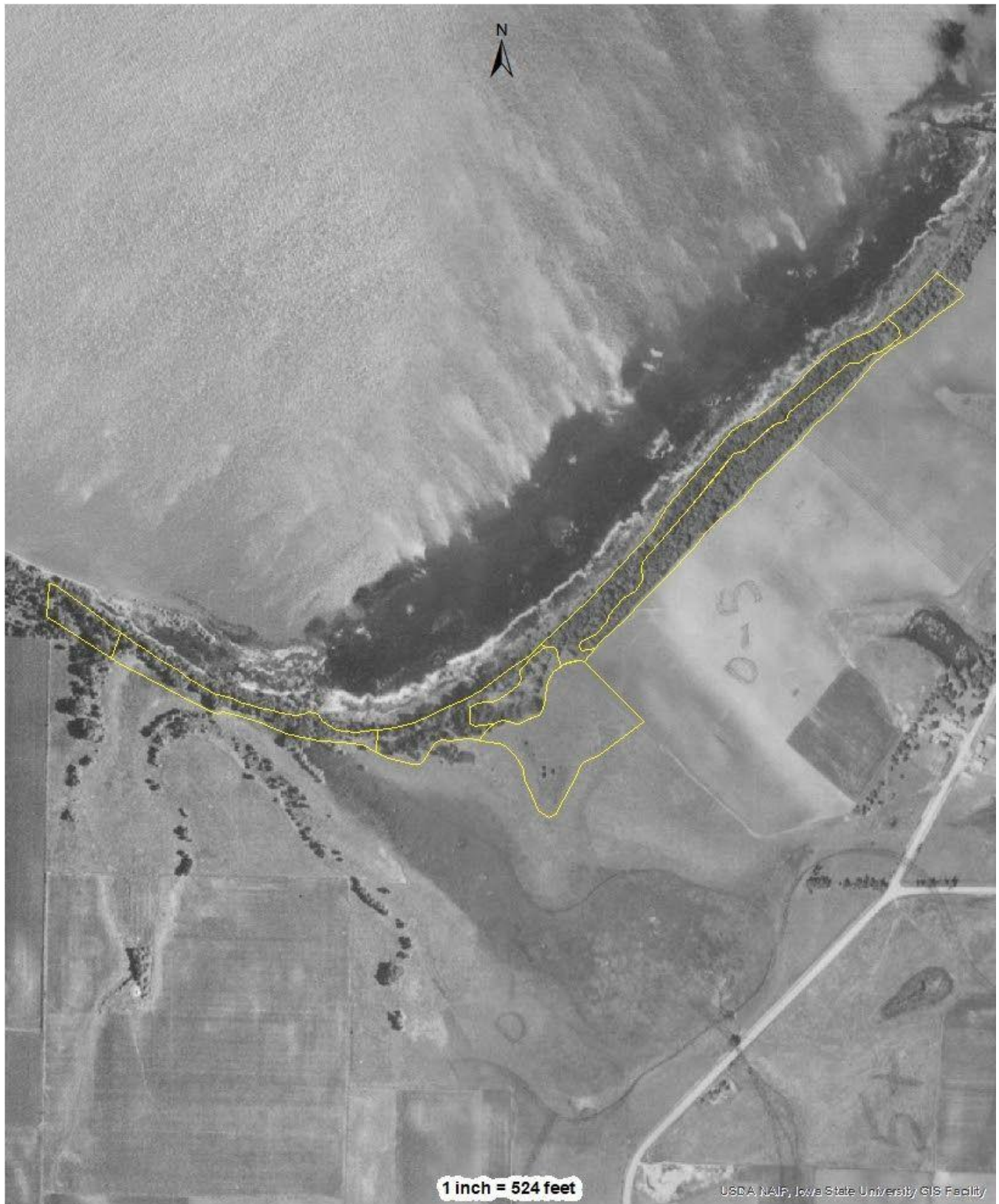
Soil Types

- Omsrud-Storden (loam) The parent material is fine-loamy till. It is well drained and moderately eroded with a neutral to moderately alkaline pH.
- Nicollet (clay loam) The parent material is fine-loamy till. It is somewhat poorly drained with a neutral to moderately acid pH.
- Clarion (loam) The parent material is fine-loamy till. It is well drained with a slightly acid to neutral pH.
- Okabena (silty clay loam) The parent material is Lacustrine sediments over glacial till. It is somewhat poorly drained with a slightly acid to neutral pH.
- Augusta Lake-Estherville (sandy loam) the parent material is loamy and sandy sediments over glacial till and loamy sediment over sand and gravel. It is well drained to somewhat excessively drained. The pH is slightly acid to moderately acid.

Soils Map



1930's Land Use Map



2018 Land Use Map



Project Stand Map



Tree Species Map



Stands Overall Description

The stands are split up by the three valued tree species shown above; bur oak, basswood and hackberry. Stand 1 has all three species. Stand 2 only has hackberries. The Stands with a 3 do not have any of these tree species. Stands with a 4 have only bur oak trees.

Stand 1: 4.6 acres

Overstory Species: The trees are mostly green ash but there are also hackberries, basswoods, bur oaks and a few elms. A previous DNR-Forestry inventory (Schwartz 2014) estimated green ash to compose about 95% of the trees in Stands 1 and 2. The southwest two thirds of Stand 1 contain the majority of the bur oaks.

Midstory Species: Green ash is the most abundant, but there is also boxelder, American elm, white mulberry, bur oak, basswood, hackberry, and tall buckthorn in areas. Black willow and quaking aspen can be found along the lake.

Understory Species: The understory consists of choke cherry, garlic mustard, buckthorn, white mulberry, gooseberry, and Virginia creeper.

Diameter at Breast Height (DBH): The tree diameters range from 2-31 inches. The average diameter is 16 inches.

Objective: Restore to an oak savanna/open woodlot

Recommendation: Where bur oaks are of sufficient density to achieve an oak savanna/open woodlot-like ecosystem (i.e. ~40-60% canopy coverage), remove all other understory, midstory, and overstory herbaceous and woody species. Where oaks are not of sufficient density to achieve the desired canopy cover, leave quality hackberrys and basswood standing and plant additional bur oak, black walnut, red oak, and bitternut hickory, with bur oak being the dominant species. Oak varieties which are resistant to oak blight and/or wilt should be considered for all stands in this project where bur oaks are recommended. Where poor quality oaks, hackberry, and basswood negatively affect the growth of nearby quality trees of those species, remove those poor-quality trees. In areas where excessive tree removal may result in wind damage to retained and planted trees, consider leaving trees of other species temporarily (5-10 years) standing to buffer the permanently retained trees. Once problem weeds and brush are controlled, re-establish high quality native grasses and forbs to provide an historic understory that will benefit savanna-dependent wildlife species and provide the fuel needed to control invasive weed and brush species through prescribed fire.

Stand 2: 5.7 acres

Overstory Species: Green ash is the major overstory tree. There are also hackberry and scattered cottonwoods. Boxelder and elm overstory increase to the south. The northern portion contains very large hackberries.

Midstory Species: The midstory is composed primarily of box elder and to a lesser degree, hackberry and elm.

Understory Species: The understory is composed of various gooseberry species, garlic mustard, chokecherry, buckthorn, Virginia creeper, and stinging nettle.

DBH: The tree diameters range from 12-26 inch.

Objective: Restore to an oak savanna/open woodlot

Recommendation: Retain the few existing bur oak and hackberry and once site conditions are appropriate, plant bur oak, black walnut, and hackberry, with bur oak being the dominant species. Where needed, temporarily keep some green ash and other species to act as a wind buffer for retained and planted species. Remove these trees when no longer needed. Once problematic brush and weed species are under control, reintroduce a high diversity of native grasses and forbs to understory.

Stand 3: 5 acres

Overstory Species: This stand is composed of 99% green ash.

Understory Species: The understory consists of grass, sedge, buckthorn, garlic mustard, and some elm seedlings (less than 1 inch in diameter).

DBH: The majority of the stand has a range from 2-11 inch green ash trees. The average diameter is 5.6 inches.

Objective: Restore to open oak savanna where possible

Recommendation: Remove all the trees besides the 3 oaks indicated on the map to the north of the stand and a few green ash around the oaks as buffers to protect them. Where needed and possible, plant bur oak and hackberry in a density that approximates lowland open oak savanna (~20 to 40% canopy coverage). Where possible and at a time when it is appropriate to do so, reintroduce native grasses and forbs, realizing that control of Reed Canary Grass in this area may be difficult.

Stand 3A: 2.4 acres

Overstory Species: The most dominant overstory tree is cottonwood with a few black willow, silver maple and elm.

Midstory Species: The midstory has cottonwood, green ash, and silver maple.

Understory Species: The understory consists of buckthorn, and gooseberry. There is one young oak along the lake edge.

DBH: The tree diameter range is from 8-28 inches. The average tree diameter is 14.6 inches.

Objective: Manage as a predominantly open shoreland and grassland

Recommendation: Remove trees in areas that will not negatively affect shoreline stability. This sandy loam soil will support bur oak, and red oak. Consider planting these in areas where the trees have been cleared. The low elevations will most likely result in the understory of this area remaining predominantly in Reed Canary Grass.

Stand 4: 1.4 acres

Overstory Species: The overstory is open grown bur oaks with one cottonwood and a couple green ash trees. At present, it is oak savanna-like with portions trending towards open woodlot.

Midstory Species: Some areas have 4-9 inch American elms, green ash and hackberry.

Understory Species: The understory has gooseberry, buckthorn, and garlic mustard. To the west, there is tall buckthorn under the oaks.

DBH: The bur oak diameters range from 19-37 inches. The average is 25 inches.

Objective: Manage as an oak savanna/open woodlot

Recommendation: Remove all trees except existing bur oaks and some hackberry. Consider thinning oaks in some overstocked areas, which will allow for sunlight penetration to the ground and the subsequent germination of oak seedlings. Where needed and possible, plant in a savanna/open woodlot arrangement (40 to 60% canopy coverage), bur oak, black walnut, red oak, bitternut hickory, basswood, and hackberry, with bur oak being the dominant species. Where possible and at a time when it is appropriate to do so, reintroduce native grasses and forbs, realizing that control of Reed Canary Grass in this area may be difficult.

Stand 4A: 2.1 acres

Overstory Species: The overstory has cottonwood along the lake, bur oak and green ash.

Midstory Species: The midstory has black willow along the lake, elm, and green ash.

Understory Species: The understory has reed canary, smooth brome, smooth and Missouri goldenrod, common milkweed, false indigo bush, buckthorn, and wild gooseberry.

DBH: The tree diameter ranges from 13-54 inches. The average diameter is 25 inches.

Objective: Manage as a predominantly open shoreland and where possible, an oak savanna.

Recommendation: Retain all oaks. Remove all other brush and tree species, except for the very large cottonwoods that will be logistically very hard to remove due to ground/shoreline disturbance issues and the presence of a public sewer line in the area. Consider double-girdling these trees so that they die and cease to produce invasive seeds to nearby restored areas. Where site conditions allow, consider planting bur oak, red oak, and black walnut in a density that approximates the appearance and function of an open-canopy lowland oak savanna (~20 to 40% canopy coverage). Where site conditions allow, consider planting a high diversity native grass/forb mix, realizing that Reed Canary Grass will dominate some areas.

Stand 4B: 1.1 acres

Overstory Species: The overstory has green ash, cottonwood, silver maple and bur oak.

Midstory Species: The midstory has boxelder, elm, green ash, and buckthorn spread around with a DBH up to 4 inches.

Black willow can be found along the lake.

Understory Species: The understory consists of garlic mustard, false indigo bush, and jewel weed.

DBH: The tree diameters range from 18-41 inches. The average diameter is 26 inches. The average DBH is 26 inches.

Objective: Manage as a predominantly open shoreland and where possible, open oak savanna.

Recommendation: Remove all trees except existing bur oaks and perhaps a few trees that serve as wind buffers for those bur oaks. Leave the very large cottonwoods that will be logistically very hard to remove due to ground/shoreline disturbance issues and the presence of private housing in the area. Consider double-girdling these trees so that they die and cease to produce invasive seeds to nearby restored areas. Consider planting oaks in an oak savanna-like density. Consider planting bur oak, red oak, and black walnut where needed.

Desired Future Conditions

The northern portion of the project site will be restored to its historical oak savanna/open woodland condition (~40 to 60% canopy coverage), as historic documentation and soils suggest this was the dominant landscape type prior to European settlement. Furthermore, this ecosystem type will allow adequate sunlight to penetrate to the soil, thereby allowing for the growth of native grasses and forbs, which are needed as a fuel type to allow managers to control invasive trees and brush with periodic prescribed fire. The shoreline area will be mostly open-canopy to allow sunlight to reach near-shore areas, thereby promoting the health of aquatic and terrestrial native plants. Upland areas will consist of existing bur oak, hackberry, and basswood, as well as planted bur oak, black walnut, red oak, and bitternut hickory. Bur oak will be the dominant species throughout the entire site and attempts will be made to acquire and plant bottomland bur oak, which may be more resistant to Bur Oak Blight. Some hackberry and basswood, and perhaps green ash will be left standing to buffer existing and planted priority trees from wind. Once the buffering effect of these trees is no longer needed, all green ash and some hackberry and basswood will be removed to promote the germination, growth, and health of priority species. The understory will ultimately consist of a high diversity of existing and restored prairie grass and flowers and will provide adequate site conditions for oak regeneration, which is nearly nonexistent now. The southern portion of the project, consisting mostly of moist soils (Schwartz 2014) will be restored to more of a lowland prairie and/or grassland with relatively fewer trees (~20 to 40% canopy coverage). Existing bur oak, hackberry, and basswood will be retained, and where soils and elevation allow, a full or partial mixture of bur oak, black walnut, red oak, bitternut hickory, hackberry, and basswood will be planted. As in the northern portion, some green ash, hackberry and basswood may be allowed to temporarily exist to protect desired species from wind. Where possible, native herbaceous prairie plants will be established, with the understanding that Reed Canary Grass will dominate most low-lying areas.



Fish & Wildlife

Hardstem bulrush and other aquatic plants in the nearshore area provide essential spawning and nursery areas for native fishes as well as important habitat for various aquatic insects and large zooplankton. Numerous species of amphibians, birds, and reptiles rely on this transitional habitat from aquatic to terrestrial environment to complete their life cycles. Several studies have shown the importance of this critical nearshore and shoreline habitat and the impacts of anthropogenic changes (Bryan 1992, Jennings 1999, and Scheuerell 2004).

Both emergent and submergent aquatic plants provide additional benefits to nearshore habitat and water quality by increasing nutrient uptake and by reducing erosion and sedimentation from wind and wave action. Aquatic plants buffer and dissipate wave energy reducing lakebed and shoreline erosion. Shorelines shaded by woody vegetation tend to be more vulnerable to sheet, rill, and gully erosion and more exposed to wave action. Existing hardstem bulrush beds should also protect nearshore shallow water areas; thereby allowing existing or reintroduced native aquatic and terrestrial plants to re-occupy shallow water areas.

Oak savannah, being a transitional ecosystem between prairie and woodlands, is attractive to many wildlife species that rely on these habitat types but to varying degrees; that is if a savanna is more prairie like, prairie wildlife species will benefit most. If the savannah is more forest-like, forest species thrive. Oak savannas provide habitat to our more well-known species like white-tailed deer, wild turkeys, eastern bluebirds, and red fox. They are also important for several Species of Greatest Conservation Need, including red-headed woodpeckers, Cope's gray treefrog, smooth greensnake, silvery blue butterfly, and the federally threatened northern long eared bat.

Past Management History

The project site and associated uplands were in private ownership until 2006 when an agreement was reached between the landowners and the INHF to protect the property in perpetuity through a fee title acquisition and subsequent transfer to the Iowa DNR for ownership and management. Prior to purchase by INHF, the wooded and lowland areas of the property (i.e. project site) were grazed and most likely logged by early settlers. The non-wooded areas of the tract were farmed; most recently in row crops. Since acquisition and transfer of the property to the Iowa DNR in 2006, the Iowa DNR has restored all wetlands (2008) and seeded all upland areas (2008 and 2009) to high diversity (120 species) prairie and has used prescribed fire four times to maintain prairie health. The final goal for the property is to implement the shoreland and oak savannah management described in this plan.

Forest Health & Invasive Species

The invasive species present on this site include buckthorn, garlic mustard, and white mulberry. Prior to large tree removal, DNR staff will use brush cutters during the fall of 2020 to begin eliminating problematic herbaceous and small woody invasive species. Following the removal of small trees/brush and large trees, problematic invasive species will take advantage of the increased light and reduced competition and expand aggressively. These species must be kept under control for several years to allow for the site to be successfully seeded to high diverse prairie and to allow for the eventual natural regeneration of bur oak. Management will consist of mowing where possible and effective and the spraying of approved herbicides according to label requirements, where needed.

Archeological, Culture & Historic Sites

A Phase I Archeological Survey was completed in 2020 (Warren 2020) with no previously recorded archaeological sites found and no newly recorded sites located.

Additional Considerations

The shoreland area of Big Spirit Lake and associated uplands are a very high-value resource and every consideration will be made to ensure adequate procedures are established and followed to minimize adverse impacts to the land and water, including: only using heavy equipment during frozen soil conditions; only using approved chemicals according to label requirements; ceasing work immediately and reporting any archeological evidence. Citizens need to understand that this is a long-term project that may take up to a decade to get invasive species under control and native trees and prairie plants well-established, and many more years for slow-growing bur oak and other trees to grow to a size to contribute to a healthy and functioning oak savanna.

Fire Protection

None needed. On all stands, prescribed fire will be an integral part of managing and maintaining the prairie and savanna ecosystems. Oaks, and to some degree hickories, are tolerant of fire. Oaks are even considered fire dependent species, requiring the thinning effects of fire to allow enough sunlight to reach the ground for seedlings to grow. Fire return intervals for the upland sites will be on a 2-5 year rotation, depending on fuel conditions and fire objectives. Fire return intervals on the lowland areas will be 2 to 10 years, as fuel loading and conditions allow. The objective of the fire program on this Complex will be to maintain diverse and healthy herbaceous cover, as well as to promote oak regeneration while suppressing undesirable woody vegetation. Protection of select oak saplings and other planted species may be required to ensure sufficient recruitment. All prescribed fire will be conducted according to DNR Fire Policy.

Literature Cited

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Appendix A: Northern Long-Eared Bat (NLEB) Guidance for WSFR Wildlife Management Projects

Suitable summer habitat for NLEB consists of a wide variety of forested/woodland habitats and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥ 3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat. NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat. NLEBs typically occupy their summer habitat from mid-May through mid-August each year. The spring migration period likely runs from mid-March to mid-May each year and fall migration likely occurs between mid-August and mid-October.

Examples of unsuitable habitat:

- Individual trees that are greater than 1,000 feet from forested/wooded areas;
- Trees found in highly-developed urban areas;
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees;
- Living cedar trees encroaching into prairie ecosystems.

Step 1 - Evaluate if there are potential roost trees that will be impacted with a DBH of at least 3".

- If project will only require removal of trees or shrubs with a DBH of less than 3 inches, proceed to Step 2.
- If project will impact trees but does not include potential roosts, i.e., live trees and/or snags ≥ 3 inch DBH having exfoliating bark, cracks, and crevices or other cavities, proceed to Step 2.
- If project will require removal of trees with a DBH of at least 3 inches that exhibit cracks, crevices or peeling bark, proceed to Step 3. Isolated trees may be considered suitable habitat when they exhibit characteristics of a

suitable roost, and are within 1,000 feet of other forested/wooded habitat.

Step 2 - No further action is necessary. Management actions can proceed.

Step 3 - Conservation Measures for Tree Removals

You are "Not Likely to Adversely Affect" the NLEB if you conduct tree removal activities or woodland burns according to the following:

- Conduct woodland burns after September 30 and before April 1.
- Conduct tree removals after September 30 and before April 1

If your project is located outside of the Indiana Bat summer range, and you are not able to conduct it after September 30 and before April 1, the project is "Likely to Adversely Affect" the NLEB. **NOTE: If project falls within the Indiana Bat summer range, you must conduct tree removal activities between Sept 30 - April 1 and woodland burns outside of the maternity season (May 15-Aug 15).**

- If project will need to occur between April 1-May 15 or August 15-September 30, proceed to Step 4.

Step 4 - Solicit Additional Review

USFWS is required to track all activities that are "Likely to Adversely Affect" the NLEB, even if they are not prohibited take under the 4D rule. In order to meet their reporting requirement, you will need to:

- Prepare and submit a map and description of activity and timing to Monica.
- If project cannot be covered under existing acres approved in our grant's Section 7, the project will proceed to Step 5.

Step 5 - Additional FWS Review

- Information about the project will be submitted to USFWS by the DNR's Endangered Species Coordinator for an up to 30-day review and comment period using the Streamlined Consultation Form.