Environmental Assessment
March 2012

National Park Service
U.S. Department of the Interior

Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie

Indiana Dunes
National Lakeshore

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1. PURPOSE AND NEED

1.0 INTRODUCTION

The National Park Service has begun the process of planning the restoration of a portion of the Cowles Bog Wetland Complex at Indiana Dunes National Lakeshore (the national lakeshore or park) on the southern tip of Lake Michigan (Figure 1). The national lakeshore was officially created in 1966, but resulted from a movement that began in 1899. In 1966 the Federal Government authorized legislation setting aside 8,330 acres of land and water creating the national lakeshore. Subsequently, Save the Dunes Council, National Park Service, and others continued to seek expansion of the boundaries of preservation. Four subsequent expansion bills for the park (1976, 1980, 1986, and 1992) have increased the size of the park to currently more than 15,000 acres.

This Environmental Assessment (EA) is for a proposed wetland restoration located at the southeast portion of the Cowles Bog Wetland Complex (CBWC). This area was historically a lake plain wet-mesic

prairie. Significant alteration has occurred at the site over the last century. Site alteration was initiated in the late 1800's, with the greatest impacts resulting from construction of the adjacent industrial complex in the 1960's. Hydrology of the area was modified with a series of ditches created to drain the wetlands for potential development. Once drained, the area was gradually taken over by trees, with a resulting change in flora and fauna.

The EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 CFR Parts 1500-1508; National Park Service Director's Order #12 and Handbook, *Conservation Planning, Environmental Impact Analysis, and Decision-making;* and Section 106 of the National Historic Preservation Act of 1966 as amended, and implementing regulations, 36 CFR Part 800.

1.1 PURPOSE AND NEED

The national lakeshore conducted investigations of CBWC from 2002 through 2004. These investigations demonstrated that CBWC could be restored. The Cowles Bog Restoration Project is important because it would bring new life back to the wetlands. Native species of plant life can be re-introduced to the area, bringing with them the return of extirpated insects and animals that used to call this area home.

The purpose of the proposed action is to restore approximately 25 acres of CBWC to its former lake plain wet-mesic prairie conditions and provide waterfowl habitat in an adjacent open water body.

Lake plain wet-mesic prairie is a species-rich, lowland prairie community that occurs on moist, level, seasonally inundated glacial lake plains of the Great Lakes. Seasonal flooding, cyclic changes in Great Lakes water levels, and fire historically maintained the species composition and community structure of lake plain wet-mesic prairies. Lake plain wet-mesic prairie occurs on several glacial features of the lake plain, including level, sandy outwash, sandy lake plains, and deposits of dune sand on silt or clay glacial lake plains (Michigan State University Extension, 2008).

The action alternatives addressed in this EA will include restoring wetland hydrology, minor grading to fill in ditches, removal of the majority of the tree canopy and understory, and planting native plants now absent from the area to restore the site to its former historic lake plain wet-mesic prairie condition.

Indiana Dunes National Lakeshore wants to restore CBWC to increase native plant and animal diversity, provide a rest stop for migratory birds near Lake Michigan's southern tip, protect rare species of plants, create a high quality plant and animal habitat, protect the beaches and improve Lake Michigan's water quality by reducing and controlling runoff, enhance educational opportunities for students and the public, and most importantly, to leave a natural resource legacy for future generations.

Henry Chandler Cowles
Courtesy of National Park Service

Originally, three key individuals helped make Indiana Dunes National Lakeshore a reality: Henry Cowles, a botanist from the University of Chicago; Paul H. Douglas, Senator for the State of Illinois; and Dorothy R. Buell, an Ogden Dunes resident and English teacher. Henry Cowles published an article entitled "Ecological Relations of the Vegetation on Sand Dunes of Lake Michigan" in the Botanical Gazette in 1899 that established Cowles as the "father of plant ecology" in North America, and brought international attention to the intricate ecosystems existing on and between the dunes.

National significance of CBWC (the western 205 acres of Great Marsh - Lake Michigan's largest interdunal wetland) was established prior to its placement into the National Park System. The CBWC, comprised of bog, fen, forested swamp, sedge-meadow, wet-prairie and marsh, includes the only remaining coniferous swamp associated with southern Lake Michigan, the only native population of white cedar in Indiana, and the only raised fen in Indiana without adjacent higher topographical features. In 1965, the portion of CBWC purchased by Save the Dunes Council in 1953 with the

legal land title of Cowles Bog was designated a National Natural Landmark.

Prior to land transformation driven by commercial development, the tree community of the Lake Border Moraine adjacent and south of CBWC transitioned to lake plain wet-mesic prairie. It is likely that over 50 acres of lake plain wet-mesic prairie was a component of historic CBWC. In the early twentieth century, CBWC's lake plain wet-mesic prairie was drained and used for agriculture and development of a transportation corridor (Route 12; South Shore Railroad). Following cessation of cultivation, the soils no longer experiencing wetland hydrology were colonized by non-native trees and shrubs and native trees that readily establish through wind dispersed seed. In the 1960's industrial development obliterated all remaining historic lake plain wet-mesic prairie associated with CBWC except for approximately 25 acres (proposed restoration location) located on the southeastern portion of CBWC.

In response to the extreme industrial actions adjacent to a national park, in 1977, Congress of the United States added language to the enabling legislation of Indiana Dunes National Lakeshore "to study and report concerning the following objectives: … (b) Preservation and restoration of the watersheds of Cowles Bog and its associated wetlands;" This authorization was, in part, to provide data to defend against any harm to the national lakeshore resulting from increased industrial development.

Stone Marker Dedicating Cowles Bog
Courtesy of National Park Service

Today, lake plain wet-mesic prairie is globally imperiled. The National Park Service intends to make available a presentation of lake plain wet-mesic prairie to the public. The 25 acres associated with CBWC was selected based on its unique historic records documented by Henry Cowles, the 1830 government land survey of the Northwest Territory which records the site as having marsh and prairie characteristics and presence of soils that developed under a prairie influence. The above evidence supports the supposition that the site was historically a lake plain wet-mesic prairie. The National Park Service has determined that reestablishing hydrology to the site and removing non-historic vegetation will restore this portion of CBWC to its natural state and will provide the public with a glimpse of a rare habitat.

1.2 DESCRIPTION OF INDIANA DUNES NATIONAL LAKESHORE

The park is located in northwest Indiana along the south shore of Lake Michigan between Gary and Michigan City, Indiana, approximately 50 miles southeast of Chicago. The park is loosely bounded by Lake Michigan to the north and US 20 to the south (Figures 2a and 2b). The park is separated into an East Unit and a West Unit, with several small noncontiguous satellite areas. A variety of residential, commercial, and industrial developments abut the park boundaries, including several small communities that are completely surrounded by national lakeshore land (National Park Service, 1997).

Indiana Dunes National Lakeshore was established by the U.S. Congress as a unit of the National Park Service on November 5, 1966, in order to "preserve for the educational, inspirational, and recreational use of the public certain portions of the Indiana Dunes and other areas of scenic, scientific, and historic interest and recreational value in the State of Indiana." The enabling legislation further states that the "lakeshore shall be permanently preserved in its present state, and no development or plan for the convenience of visitors shall be undertaken therein which would be incompatible with the preservation of the unique flora and fauna or the physiographic conditions now prevailing."

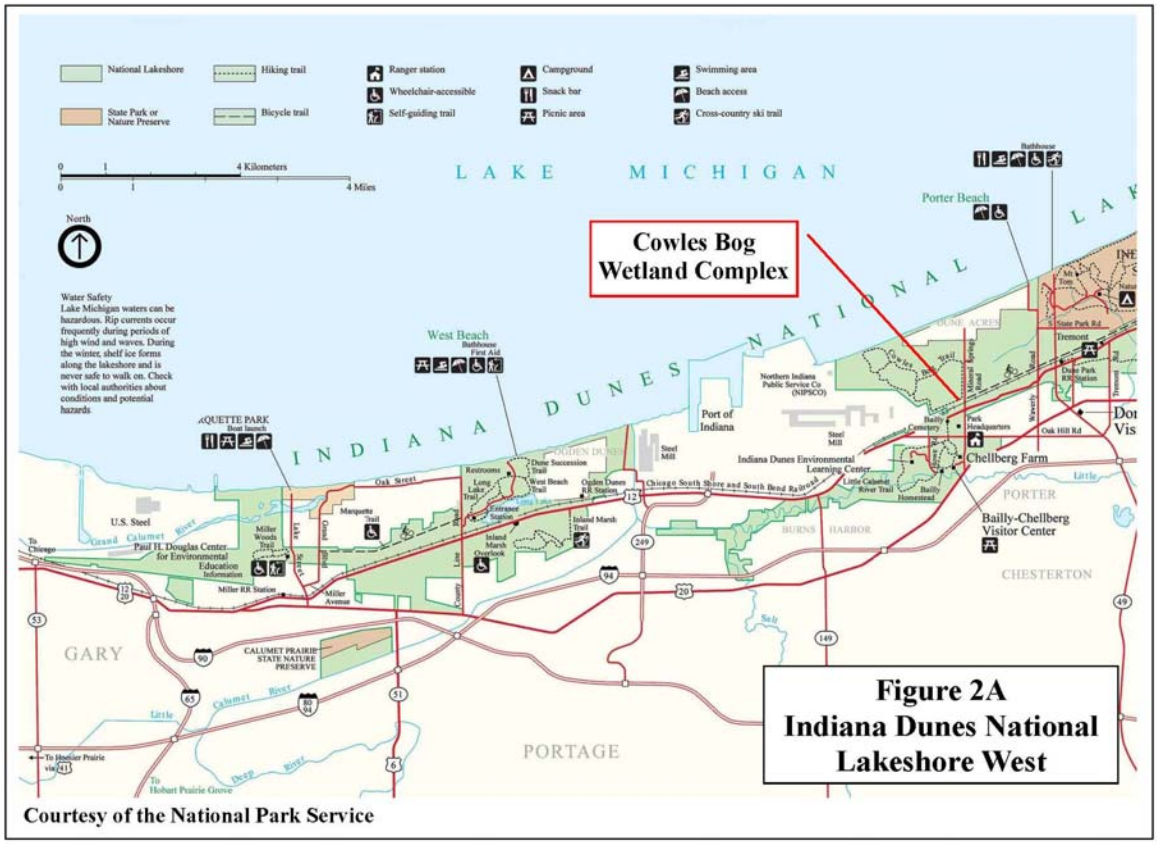


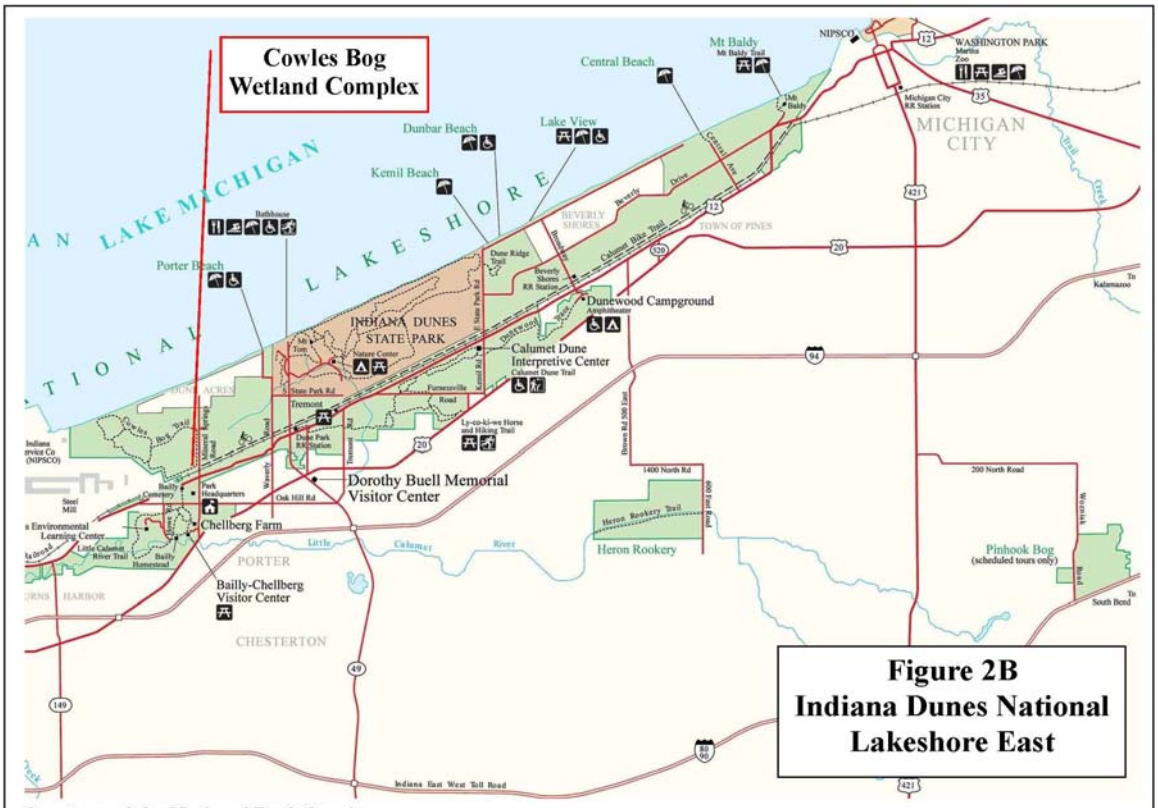
Figure 2A
Indiana Dunes National Lakeshore West

Courtesy of the National Park Service

Today, the national lakeshore totals 15,067 acres with nearly two million visitors each year. The park offers many amenities such as hiking, biking, and horseback riding trails; camping; beach access; visitor center; picnic tables and shelters; and interpretive programs. In addition, the park is home to four National Natural Landmarks and one National Historical Landmark. The park is comprised of dunes, oak savannas, swamps, bogs, marshes, prairies, rivers, and forests supporting a great diversity of plant and animal species. Over 1,135 native plant species are distributed throughout the park and more than 350 bird species have been observed within the park (National Park Service, 2007).

1.3 DESCRIPTION OF COWLES BOG WETLAND COMPLEX

Great Marsh is an interdunal peat base wetland in a dune-beach complex less than one mile from Lake Michigan. The wetland sits between two large dune systems. The southern perimeter is delineated by the Calumet Dunes, formed approximately 9,000 years ago. The Tolleston Dunes and recent dunes, formed approximately 4,000 years ago, delineate Great Marsh's northern perimeter. Great Marsh is the largest interdunal wetland associated with Lake Michigan. The Cowles-Bog Wetland Complex represents 205 acres of the western terminus of Great Marsh.



Courtesy of the National Park Service

From the perspective of biological significance, CBWC's abiotic signature reveals a unique composition of bog, fen, swamp forest, sedge-meadow, wet-mesic prairie, shallow-marsh, and a floating mat all intertwined in a relatively small area. Historically, this richness of wetland types provided habitat for a unique assemblage of biota. Wilhelm (1990) identified 41 special floristic elements, of which 15 were state listed species. At the fen of CBWC, one finds the only native stand of eastern white cedar (Thuja occidentalis) in Indiana. In the 1970's, the federal endangered butterfly, Mitchell's satyr (Neonympha mitchellii mitchellii), was observed (Texas Instruments Incorporated; Ecological Services 1976). Other documented fauna include seven species of state listed and/or park rare reptiles and amphibians (Resetar 1985, Brodman, Cortwright, and Resetar, 2002). These species are spotted turtle (Clemmys guttata), four-toed salamander (Hemidactylium scutatum), northern leopard frog (Rana pipiens), western chorus frog (Pseudacris triseriata), blue-spotted salamander (Ambystoma laterale), and massasauga rattlesnake (Sistrurus catenatus catenatus).

The occurrence of dense cattail throughout much of the Bog Complex has resulted in declines of or prevented total use of CBWC by once commonly observed waterfowl and other species such as sedge wren (Cistothorus platensis), marsh hawk (Circus cyaneus), American bittern (Botaurus lentiginosus), sora (Porzana carolina), Virginia rail (Rallus limicola) and least bittern (Ixobrychus exilis) (Apfelbaum et al. 1983).

1.4 DESCRIPTION OF THE PROJECT AREA

The proposed action is located in the southeast corner of CBWC and comprises approximately 25 acres (Figure 3). It is bounded on the east by Mineral Springs Road, the National Park Service's Cowles Bog Trail and the Northern Indiana Public Service Company (NIPSCO) access road on the south and southwest, and the remainder of the Cowles Bog Wetland Complex to the north and northwest. An open water body is west and adjacent to the trail on the southwest.

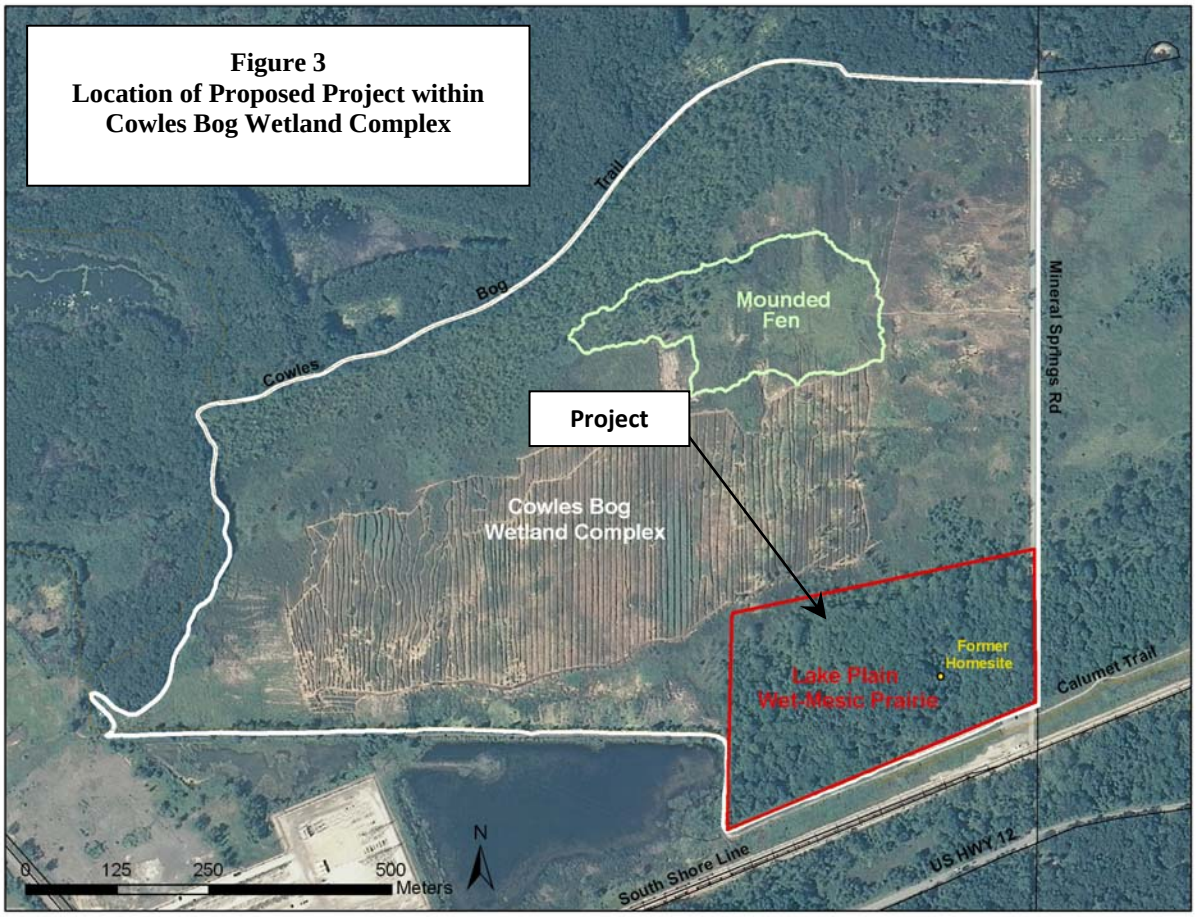


Figure 3
Location of Proposed Project within Cowles Bog Wetland Complex

Figure courtesy of National Park Service

The National Park Service through Indiana Dunes National Lakeshore has collected and continues to collect inventory data. Three primary functioning ditches (east-to-west; south–to-north; west-to-east) and approximately 29 smaller ditches which convey water to the east-to-west and west-to-east ditches are present on the site. In total there are 3,650 linear feet and 9,210 linear feet of primary and secondary ditches, respectively (Figure 4). Water from an adjacent open water body (west of the site) flows into the south–to-north ditch.

Quantitative vegetation evaluation was conducted for shrubs and forb/graminoids and a complete census of all trees with a Diameter at Breast Height (dbh) greater than or equal to 10cm was completed. The recent development of the tree community is reflected by 81 percent of trees having a dbh less then 40cm. The tree canopy is dominated by red maple (*Acer rubrum*), black cherry (*Prunus serotina*) and white sassafras (*Sassafras albidum*). The shrub community is dominated by spice bush (*Lindernia benzoin*) and multiflora rose (*Rosa multiflora*) and the herbaceous community by fowl manna grass (*Glyceria striata*)

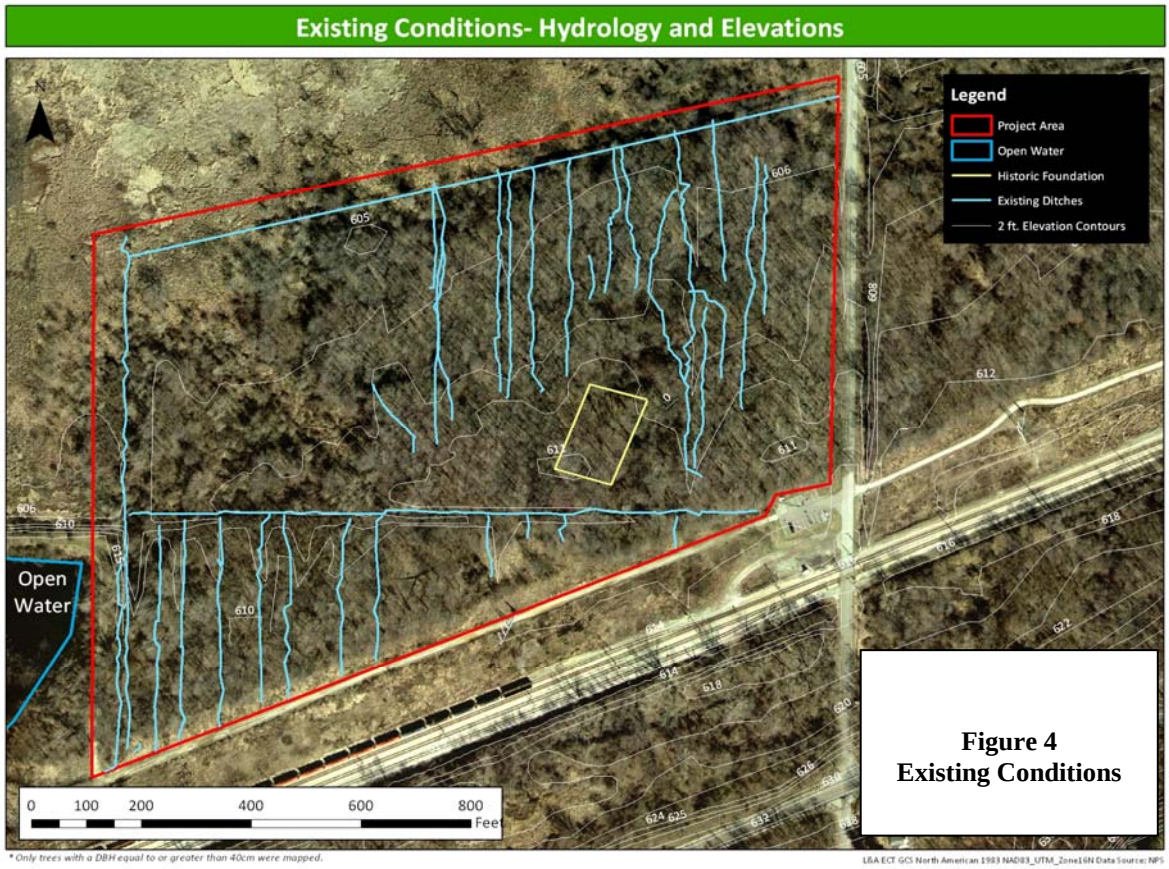


Figure 4
Existing Conditions

and seedlings of spice bush. Overall the herbaceous community is extremely sparse as indicated by total average plant cover of only 12.3 percent per meter square.

Groundwater at the project site is monitored weekly by the national lakeshore at 16 well locations. Groundwater level is highest in spring and lowest in summer months. As one transitions south to north, depth to groundwater declines. Soil classification conducted by the national lakeshore detected a complex of eight soil types. The soil types indicated a complex of microenvironments that supported a dominance of prairie with a few scattered trees.

Location of Historic Homesite
Courtesy of National Park Service

The Midwest Archeological Center (MWAC) conducted a site investigation and determined that the footprint of an early twentieth century homestead on the site should not be disturbed. The archeological site (12PR390) was documented by Forest Frost in 1993 (Frost 2001) as part of a park-wide inventory. Frost wrote that the site contains the remains of at least two structures, one with a 2 x 6 meter brick foundation and the second with a 7 x 7 meter earthen berm. Shovel tests resulted in documentation of household items such as a perfume bottle, mustard jar, and several pieces of metal. Frost states that based on household items and hard fired bricks the structures were constructed and occupied sometime between 1890 and 1910. Frost reported a row of trees on the west comprised of black locust (*Robinia pseudoacacia*) and black oak (*Quercus velutina*). It was suggested

by Frost that the row of trees was associated with a fence line.

The project will be planned to avoid the historic resource and the National Park Service will do additional studies.

1.5 PLANNING CONTEXT

Relationship to Other Projects and Plans

The 1997 General Management Plan (National Park Service 1997) defines the management philosophy and goals for the park for making decisions and solving problems for the next 20 years. The General Management Plan refers to the proposed restoration as being in the Little Calumet River Corridor. The plan calls out improving access and trails, none of which are associated with the site proposed for restoration. The Cowles Bog Trail was already established in 1997.

The Resource Management Plan for the park was revised in 1999, and reflects the guidance outlined in the national lakeshore's Statement for Management and General Management Plan. This plan will help achieve resource management and fire protection goals as defined in the General Management Plan and the Resource Management Plan. Resource management objectives identified in the Resource Management Plan attributed to the Statement for Management (National Park Service 1999) are:

- Natural resources, processes, and conditions are identified, inventoried, monitored, and protected for future generations to enjoy. Impairments or extirpation of these resources processes, or conditions are reversed by restoration, rehabilitation, mitigation or reintroduction as appropriate to national lakeshore's mission.
- Cultural resources, processes, and conditions are identified, inventoried, monitored, and protected for future generations to enjoy.
- Research in the natural sciences continues in the tradition of Dr. Henry Cowles such that the management needs of the national lakeshore and nearby National Park Service areas are addressed and natural resources management and research are advanced on a nationally significant scale.
- Restoration of expired reservation of use tracts will require…restoration of as near a natural plant regime as possible.

The park also has developed a Fire Management Plan (National Park Service 2007) outlining actions that will suppress undesirable fires, effectively control prescribed fires, protect and manage resources with wildland fire, protect firefighters and the public, and protect park property. The proposed restoration site is situated within the East Unit in an area classified as FMU 1 - Prescribed Fire/Suppression. This area covers most of the lakeshore and will be managed with the policy that all wildland fires will be suppressed, but will also enable the lakeshore to utilize prescribed fire as a management tool in identified areas.

The park has a Long Range Interpretive Plan (National Park Service 2011). CBWC is identified as part of the mid-term (4-6 years) interpretive wayside exhibit plan/trail system that will address species diversity, succession, and restoration. The proposed restoration project will fit within this mid-term interpretive goal. Park significance statements describing the distinctiveness of the combined resources of a park are also included in the Long Range Interpretive Plan.

The following significance statement describes the importance of the proposed restoration to the national lakeshore: "*Indiana Dunes National Lakeshore is the natural laboratory from which Dr. Henry Cowles described his theory of ecological succession. It offers opportunities for scientific research due to the*

outstanding plant diversity (over 1,100 native species) and complexity of its natural systems. For more than 100 years, Indiana Dunes has been a center of academic and scientific study of ecology."

Ongoing projects identified by the National Park Service are listed in Table 1. None of these ongoing projects will be hindered or affected by the proposed action alternatives.

Table 1 Current Projects

Project Title	Project Type	NEPA Type
Rehabilitation of East State Park Road, Realignment of Mt. Baldy Entrance, and Misc. Improvements	Rights-of-Way	EA
Deer Management Plan/Environmental Impact Statement	Resource Management Plan/Site Plan	EIS
Development of Portage Lakefront Park	Capital Improvement	EA
Good Fellow Club Youth Camp Historic Structures Report/Environmental Assessment	Other	EA
Beverly Shores Wetland Trail	Capital Improvement	CE
Shoreline Restoration and Management Plan	Resource Management Plan	EIS

1.6 SCOPING

Scoping is the effort to involve agencies and the public in determining the issues to be addressed in the environmental evaluation. Among other tasks, scoping determines important issues and eliminates issues that are ultimately unimportant; allocates assignments among the interdisciplinary team members and other participating agencies; identifies related projects and associated documents; identifies permits, surveys, or consultations required by other agencies; and creates a schedule that allows adequate time to prepare and distribute the environmental document for public review and comment before a final decision is made.

To fully consider the impacts and evaluate the selected alternatives, the National Park Service initiated a public scoping process. The purpose of the scoping phase was to solicit input on issues that should be considered in the development of alternatives, as well as what topics should be addressed in the EA. This phase included two meetings, an Agency Coordination Meeting and a Public Input Meeting, both held on Wednesday, July 20, 2011.

1.7 ISSUES

The two scoping meetings indicated the following topics were of importance to the stakeholders and the general public:

- Study Area - There is a need to resolve the extent of impacts anticipated on the NIPSCO property for connection to the water body, use and restoration of the access road, and extent of disturbance proposed on their property.
- Hydrology and Drainage - The EA should explain the conceptual plan for providing hydrology to the site. It should explain how surface flow patterns may change and the resulting impacts, or lack

thereof, to the remainder of the Cowles Bog Wetland Complex. It should also explain why the project is not expected to have any flooding impacts to Mineral Springs Road or residential areas.

- Project Description - The project description in the EA should explain and illustrate the trees that are intended to remain, to provide a clear picture that the entire site is not being cleared.
- Historic Homesite - The EA should explain the proposed avoidance of the site and what changes are allowed and not allowed as part of the project (i.e. seeding is okay, but earth moving is not).
- Threatened and Endangered Species -The EA should explain the basis for concluding that the project will not impact threatened and endangered species, through coordination with USFWS.
- Impacts During Construction

1.8 IMPACT TOPICS

Impact topics are the resources of concern that could be affected by the range of alternatives. Specific impact topics were developed to ensure that alternatives were compared on the basis of the most relevant topics.

Impact topics were identified based on legislative requirements, topics specified in *Director's Order 12 and Handbook* (National Park Service 2001), park-specific resource information, as well as input from agencies and the public during scoping.

1.8.1 Impact Topics Retained

Each of these impact topics would be impacted by one or more of the alternatives evaluated in this environmental assessment.

Geology and Soils

According to National Park Service's *Management Policies 2006* (National Park Service 2006), the National Park Service actively seeks to understand and preserve the soil resources of parks, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Soils are a large part of defining the lake plain wet-mesic wetland. Soils will be retained as an impact topic to allow for evaluation of these impacts.

Vegetation

The National Environmental Policy Act of 1969 (42 USC 4321 *et seq*.) calls for an examination of the impacts on all components of affected ecosystems. According to *Management Policies 2006* (National Park Service 2006), the National Park Service strives to maintain all components and processes of naturally evolving park unit ecosystems, including the natural abundance, diversity, and ecological integrity of plants. Vegetation is also a large part of defining a lake plain wet-mesic wetland; therefore, vegetation will be retained as an impact topic.

Green Heron
Courtesy of National Park Service

Wildlife

The Lakeshore supports a variety of wildlife. The National Park Service Organic Act, which directs parks to conserve wildlife for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the Lakeshore's natural ecosystem. Removal of vegetation and the construction of an alternative could affect the Lakeshore's wildlife; therefore, this impact topic will be addressed further. Due to the potential impacts, wildlife will be further evaluated as an impact topic.

Rare, Threatened, or Endangered Species
Rare, threatened, or endangered species are known to exist near the site. The 1973 Endangered Species Act, as amended, requires an examination of impacts to all federally listed threatened or endangered species. National Park Service policy 4.4.2.3 requires examination of the impacts to state listed rare, threatened and endangered species and federal candidate species. The 1973 Endangered Species Act and National Park Service policy are inclusive of protecting and restoring critical habitat for federal, state and locally listed species. Based on coordination with the U.S. Fish and Wildlife Service and the Indiana Department of Natural Resources, there are known occurrences of threatened or endangered species in the Cowles Bog Wetland Complex, however, no documented state or federal listed species have been observed at the 25 acre subject site.

Wilhelm (1990) identified 41 special floristic elements, of which, 15 of them were state listed species. In the 1970's, the federal endangered butterfly, Mitchell's satyr (Neonympha mitchellii mitchellii), was observed (Texas Instruments Incorporated; Ecological Services 1976). Other documented fauna include seven species of state listed and/or park rare reptiles and amphibians (Resetar 1985, Brodman, Cortwright, and Resetar, 2002).

These species occur largely in the northern 1/3 of CBWC associated with fen and swamp units. The National Park Service has conducted extensive surveys of the 25 acre subject site and has found no state or federal listed plant species. In addition, extensive surveys for the eastern massasauga rattlesnake identified no individuals on the 25 acre subject site. Likewise, occurrence of state or federal listed amphibians have not been documented on the 25 acre subject site, and at present the site does not exhibit favorable habitat for state and federal listed species., National Park Service policy 4.4.2.3 directs the National Park Service to "undertake active management programs to inventory, monitor, restore, and maintain listed species' habitats;". The restored site would provide habitat for federal, state, and locally listed species documented in the above studies.

Water Quality
Management Policies 2006 (National Park Service 2006) *require* protection of water quality consistent with the Clean Water Act. Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge of dredged or fill material or excavation in U.S. waters. Water quality at the Lakeshore is managed in accordance with Clean Water Act, Indiana Department of Environmental Management (IDEM) 401 Water Quality Certification, Executive Order 12088, and *Management Policies 2006* (National Park Service 2006). Due to potential impacts, water quality will be further evaluated as an impact topic.

Wetlands
Executive Order 11990, *Protection of Wetlands*, requires federal agencies to avoid, where possible, adversely impacting wetlands. The goal of National Park Service wetlands management is to strive to achieve a no net loss of wetlands, as defined by both acreage and function. Proposed actions that have the potential to adversely impact wetlands must be addressed in a statement of findings. The proposed project site contains designated wetlands as described in Executive Order 11990, the Clean Water Act Section 404, IDEM 401 water quality certification, or by National Park Service Director's Order No. 77-1 (2002). Due to potential impacts, wetlands will be further evaluated as an impact topic.

Cultural Resources
The National Historic Preservation Act, as amended (16 USC 470 *et seq*.); the National Environmental Policy Act (42 USC 4321 *et seq*.); and the National Park Service's Director's Order #28, *Cultural Resource Management Guideline* (National Park Service 1997a), *Management Policies 2006* (National Park Service 2006), and Director's Order #12, *Conservation Planning, Environmental Impact Analysis, and Decision Making* (National Park Service 2001), require the consideration of potential impacts on

archeological resources, Indian trust resources, historic structures, cultural landscapes, museum collections, and ethnographic resources listed in or eligible for listing in the National Register of Historic Places.

Trees by Historic Homesite
Courtesy of National Park Service

The Midwest Archeological Center conducted a site investigation and determined that the footprint of an early twentieth century homestead on the site should not be disturbed. Because of this determination, it is important that coordination be accomplished with the Indiana State Historic Preservation Office (SHPO). The project will be planned to avoid the historic resource and the National Park Service will do additional studies. Because of the presence of known historic resources, cultural resources will be retained as an impact topic.

1.8.2 Impact Topics Dismissed

The alternatives being evaluated in this environmental assessment will not impact the following topics.

Socioeconomics
Council on Environmental Quality regulations for implementing the National Environmental Policy Act (NEPA), 40 CFR 1500, requires economic analyses of federal actions that would affect local or regional economies. Socioeconomic values consist of local and regional businesses and residents, and local and regional economy. The local and regional economies of this area are strongly influenced by heavy industry and tourism. Should the proposed actions be implemented, short-term economic benefits for project-related expenditures and employment would include economic gains for some local businesses and individuals. Socioeconomic resources are not directly related to the project, and none of the alternatives impact these resources. Therefore this resource is dismissed as an impact topic.

Visitor Use and Experience
The site is currently open to visitor use during normal park hours. Once restoration of the wetland takes place at the site, visitor use is expected to increase. Although the action alternatives may improve visitor use and experience, the increase would not be considered appreciable and therefore there is no impact to this resource. This resource is not retained as an impact topic.

Park Facilities and Operations
New facilities within the park would need to be maintained and operated. No additional roadway, access or parking is required for any of the alternatives. While there may be an increase in management of this specific project area, it is not significant in the overall park management of facilities and operations. Therefore park facilities and operations is dismissed as an impact topic.

Natural, Depletable, or Energy Resource Requirements and Conservation Potential
As directed by *Management Policies 2006* (National Park Service 2006), the National Park Service strives to minimize the short and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques. None of the alternatives would require energy for day-

to-day operations and the action alternatives will not require materials for construction. This impact topic will therefore be dismissed as an impact topic.

Natural Soundscapes

National Park Service Director's Order #47 *Soundscape Preservation and Noise Management* (National Park Service 2000) and *Management Policies 2006* (National Park Service 2006) direct National Park Service managers to protect, maintain, or restore natural soundscapes unaffected by inappropriate or excessive noise. Under this directive, noise is defined as appropriate or inappropriate relative to the purpose of the park, the level of visitor services available, and to activities pursued by visitors.

Neither the No Action Alternative nor any of the action alternatives addressed in this analysis would introduce long-term inappropriate noise levels to the park. The temporary noise produced during construction or removal/revegetation and restoration activities would result in negligible, short-term, localized adverse impacts. Therefore, natural soundscapes was dismissed as an impact topic.

Night Sky/Lightscapes

The National Park Service Night Sky Initiative and *Management Policies 2006* (National Park Service 2006) direct the park service to "preserve to the greatest extent possible, the natural lightscapes of the parks, which are natural resources and values that exist in the absence of human-cause light." The National Park Service is currently developing the Night Sky Initiative to formulate a policy to protect views of the stars and planets in our national parks.

No additional lighting will be required by any of the alternatives evaluated. Action alternatives will remove some trees thus increasing the visibility of the night sky. For these reasons, night sky was dismissed as an impact topic for further consideration.

Floodplains

The entire site lies outside the 100-year and 500-year floodplain. Therefore, implementation of the proposed action alternatives would not adversely affect the natural values and functions of the floodplain or increase flood risks. Therefore, floodplains were dismissed as an impact topic for further consideration.

Prime and Unique Agricultural Lands

Prime farmland, as defined by the Council on Environmental Quality 1980 memorandum, has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. These designations are established by the Natural Resource Conservation Service following soil and resource analyses. No lands within the project site have been defined as prime or unique agricultural lands. This impact topic was dismissed from further analysis.

Land Use

The project area is located within the boundaries of the Lakeshore. The area is a wooded undeveloped site, identified as park use by the National Park Service in the General Management Plan (National Park Service 1997). The overall use and purpose of the site is consistent with planning documents and adjacent land use; therefore, land use was dismissed as an impact topic.

Environmental Justice

Presidential Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)*, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Environmental justice is the…"fair treatment and meaningful

involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations and policies" (Miller, Jr., G. Tyler, 2003). Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

The goal of 'fair treatment' is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts. The general vicinity of the Lakeshore contains both minority and low-income populations; however, environmental justice was dismissed as an impact topic for the following reasons:

- The Lakeshore staff and planning team solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of the preferred alternative would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse effects on any minority or low-income population.
- The impacts associated with implementation of the preferred alternative would not disproportionately affect any minority or low-income population or community.
- Implementation of the preferred alternative would not result in any identified effects that would be specific to any minority or low-income community.
- The Lakeshore staff and planning team do not anticipate any impacts on the socioeconomic environment to appreciably alter the physical and social structure of the nearby communities.

Air Quality

Section 118 of the 1963 Clean Air Act (42 U.S.C. 7401 *et seq*.) requires a national park unit to meet all federal, state, and local air pollution standards. The Lakeshore is a Class II air quality area under the Clean Air Act, as amended. A Class II designation indicates the maximum allowable increase in concentrations of pollutants over baseline concentrations of sulfur dioxide and particulate matter as specified in Section 163 of the Clean Air Act. Further, the Clean Air Act provides that the federal land manager has an affirmative responsibility to protect air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

Construction activities, including equipment operation and the hauling of material, could result in temporarily increased vehicle exhaust and emissions, as well as inhalable particulate matter. Construction dust associated with exposed soils would be controlled, if necessary, with the application of water or other approved dust palliatives. In addition, any hydrocarbons, nitrogen dioxide (NO2), sulfur dioxide (SO2) emissions, as well as airborne particulates created by fugitive dust plumes, would be rapidly dissipated because the location of the park and prevailing winds allows for good air circulation. Overall, there could be a local, short-term, negligible degradation of local air quality during construction activities; however, no measurable effects outside of the immediate construction site would be anticipated. Any construction-related adverse effects to air quality would be temporary, lasting only as long as construction. Therefore, air quality was dismissed as an impact topic.

2. ALTERNATIVES CONSIDERED

2.0 INTRODUCTION

A range of alternatives to provide a lake plain wet-mesic prairie were developed and evaluated throughout the development of this environmental assessment. These alternatives are described below in Section 2.2. Several alternatives were considered and dismissed because they did not meet the project's purpose and need as described in Chapter 1. These eliminated alternatives are discussed in Section 2.4. A discussion of the environmentally preferred alternative is provided in Section 2.5.

Although the option of maintaining the existing conditions (No Action) would not meet the needs of the project, this option provides the baseline against which the other alternatives are analyzed.

2.1 DEVELOPMENT OF ALTERNATIVES

In developing alternatives to meet the Purpose and Need, goals and objectives, as described in Chapter 1, the National Park Service considered several factors: (1) the presence of an historic site; (2) hydrology; (3) desired plant species; and (4) the extent of the tree canopy. Each of these issues is common to all action alternatives and is discussed below.

2.1.1 Historic Home Site

Bricks (Foundation?) by Historic Homesite
Courtesy of National Park Service

Within the southeast portion of the project site, park staff identified the remnants of a home site. The area has been overgrown with trees that are much younger than the age of the home site and spice bush. A 7 x 7 meter earthen berm remains visible from the surface; however, the only evidence of the 2 x 6 meter brick foundation reported by Forest Frost (2001) is scattered bricks. Shovel tests resulted in documentation of household items such as a perfume bottle, mustard jar, and several pieces of metal. Based on household items and hard fired bricks, the structures were constructed and occupied sometime between 1890 and 1910. Uprooted and dead trees from the time of home site occupation are present. National Park Service's Midwest Archaeology Center visited the site and concluded that the foundation should be avoided by the project rather than surveyed to determine its eligibility for the National Register of Historic Places (NRHP). Therefore, each alternative considered for the proposed project was developed to avoid physical impacts to the foundation and surrounding soil. For more information, please see Chapter 3.

2.1.2 Hydrology

The project site is drained by a series of ditches flowing south to north, east to west, and west to east (Figure 4). An open body of water is located just west of the site. A strip of this property beneath the electric lines is owned by the Northeast Indiana Public Service Company (NIPSCO). The other portions of the open water body are owned by the National Park Service. The pond was created in the early 1970's by the construction of an earthen berm through Great Marsh. At the time of its creation, the berm delineated the northern perimeter of NIPSCO's property. A culvert is located on the eastern end of the pond to carry water under the access road and into the south to north ditch along the west perimeter of the

project site. This culvert is currently blocked by a beaver dam, resulting in water flowing over the access roadway which is also a portion of the Cowles Bog trail, during rain events and pooling in the tire ruts.

The proposed project would negate movement of groundwater through the ditch system, restore the connection to the adjacent open water body by naturalizing the ditch that conveys water east from the pond and replacing the existing culvert with new culverts, and construct a groundwater replenishment zone that would receive surface water flow from the open water body.

To negate movement of groundwater through the ditch system, ten clay plugs will be placed at strategic locations in primary ditches and 16 clay plugs will be placed in secondary ditches at strategic locations. Reparative soil similar to soil present on the site, sandy loam, will be place in portions of primary and secondary ditches. To naturalize the ditch conveying water east from the open water body, the width of the ditch will be increased with a gradual slope of 20 feet of width to 1 foot of height to the point of intersection with higher land. This action will remove the ditch environment and provide for sheet flow of water through vegetation to the point of the culvert. Two 18 inch poly-corrugated culverts will be placed under the road using standard engineering practices. The culverts will be placed at an elevation that will maintain the ordinary water level of the open water body, with overflow into a spillway that conveys water into a groundwater replenishment zone along the southern perimeter of the project site (Figure 5).

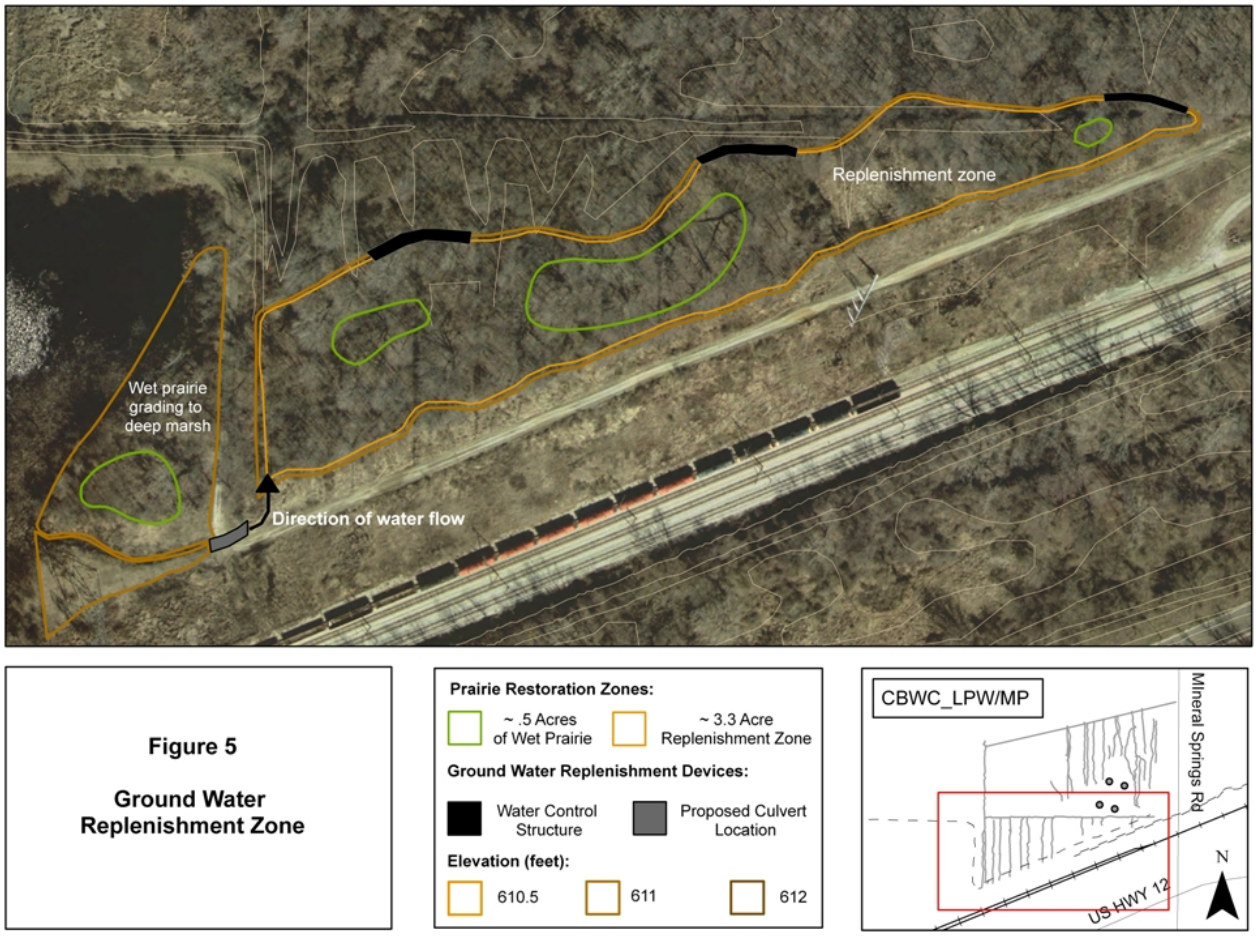


Figure courtesy of National Park Service

Construction of the groundwater replenishment zone will require shallow excavation to a depth of five to six inches. The groundwater replenishment zone is necessary due to impacts to near surface groundwater flow from the Lake Boarder moraine resulting from railroad construction. The groundwater replenishment zone will be comprised of approximately three acres of sedge meadow and 0.5 acres of wet prairie

In addition, the proposed project would involve enhancing waterfowl habitat in the adjacent open water body through placement of sandy loam soil in the open water body. Placement of the soil will lower the surface water depth, facilitate establishment of emergent vegetation, and provide habitat for waterfowl.

Restoration of wet-mesic prairie hydrology will required movement of approximately 6,418 cubic yards (173,293 cubic feet) of soil and placement of 835 cubic yards (35,708 cubic feet) of reparative soil in ditches.

Excavation and soil movement will be conducted using small earth moving equipment such as backhoes and bob cats. Soils excavated in construction of the ground water replenishment zone and naturalizing the ditch associated with the open water body will be used as wetland reparative soil in the ditch system and open water body. All actions taken to repair wetland hydrology will incorporate appropriate erosion and siltation controls.

The above actions would fulfill National Park Service Policies, Requirements, Standards for wetland protection (#77-1 2011): 2.1 The NPS adopts a goal of "no net loss of wetlands." In addition, the NPS will strive to achieve a longer-term goal of net gain of wetlands Servicewide., 2.7 Where natural wetland characteristics or functions have been degraded or lost due to previous or ongoing human activities, the NPS will, to the extent appropriate and practicable, restore them to pre-disturbed conditions., and 2.8 Where appropriate and practicable, the NPS will not simply protect, but will seek to enhance natural wetland values by using them for educational, recreational, scientific, and similar purposes that do not disrupt natural wetland functions.

Park staff considered the option of constructing a pool-and-riffle meandering stream through the project site, in lieu of the groundwater replenishment zones (Figure 6). However, the topography of the site does not lend itself to this strategy. Construction of a meandering stream would involve substantial changes to elevations throughout the site in order to generate flow in the correct direction. In addition, this option would not create the prairie conditions identified in the purpose and need.

2.1.3 Plant Species

As described in Section 1.3, the project site is currently dominated by a recently developed grouping of trees, with 81% of the trees having a diameter at breast height of less than 40cm. The tree canopy is dominated by red maple (*Acer rubrum*), black cherry (*Prunus serotina*), white sassafras (*Sassafras albidum*), and black locust (*Robinia pseudoacacia*). These four species represent 86.5 percent of trees present on the site. The shrub community is dominated by spice bush (*Lindernia benzoin*) and multiflora rose (*Rosa multiflora*) and the sparse herbaceous community by fowl manna grass (*Glyceria striata*) and seedlings of spice bush.

Dense Spicebush in Project Area
Courtesy of National Park Service

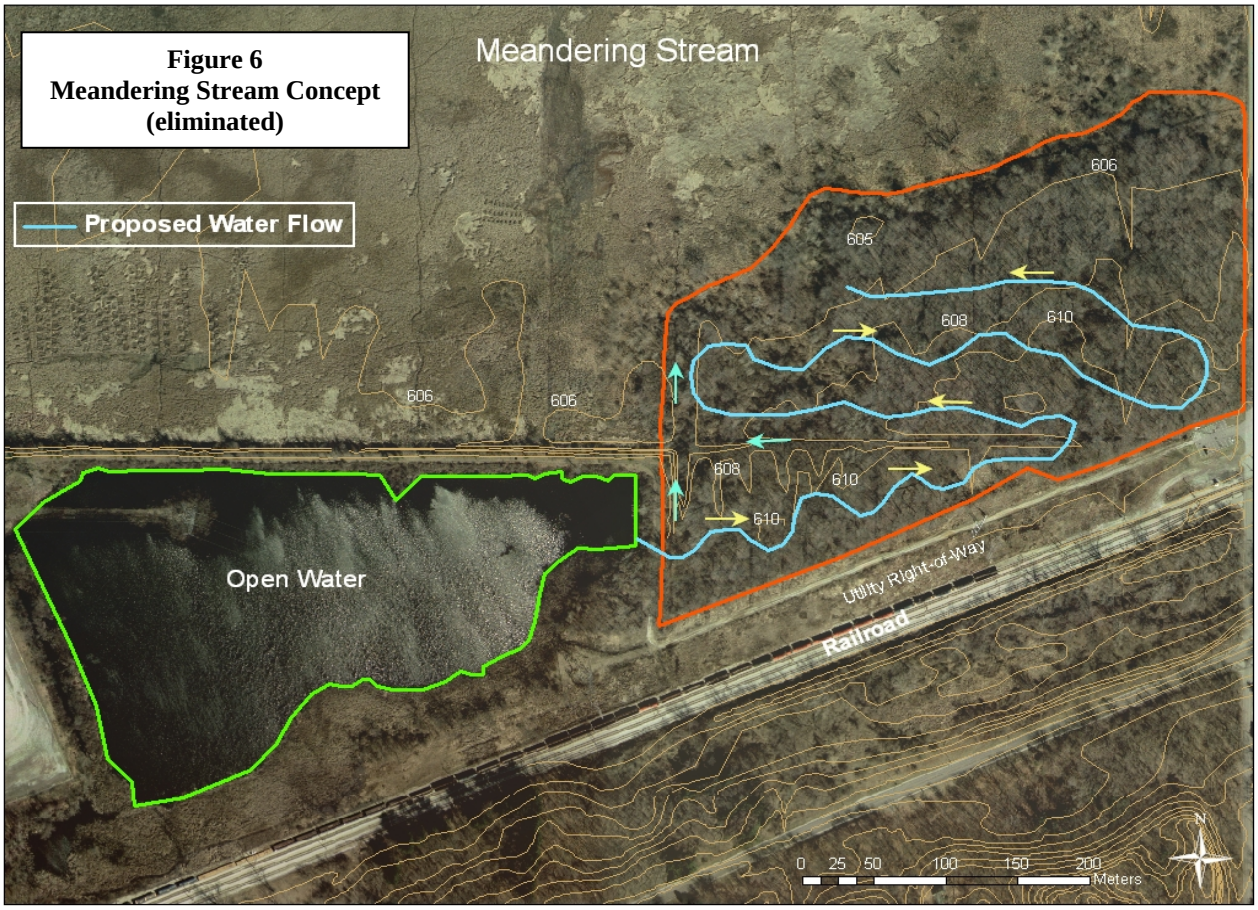


Figure courtesy of National Park Service

Based upon the goals of the project, the majority of these species would need to be removed and replaced with species that are appropriate for a lake plain wet-mesic prairie. The Michigan State University Extension maintains a website with information on the characteristics of wet-mesic prairies (Michigan State University Extension, 2008). The website lists the following vegetation information:

"Dominant grasses are typically big bluestem and Indian grass, with blue joint, cordgrass, and sedges (*C. bebbii*, *C. stricta*, *etc*.) often subdominant or common, especially in areas transitional to wet prairie. Other characteristic species include thimbleweed (*Anemone virginiana*), New England aster (*Aster novae-angliae*), common horsetail (*Equisetum arvense*), rattlesnake-master (*Eryngium yuccifolium*), grass-leaved goldenrod (*Euthamia graminifolia*), wild strawberry (*Fragaria virginiana*), northern bedstraw (*Galium boreale*), bottle gentian (*Gentiana andrewsii*), Virginia mountain mint (*Pycnanthemum virginianum*), yellow coneflower (*Ratibida pinnata*), black-eyed Susan (*Rudbeckia hirta*), prairie dock (*Silphium terebinthinaceum*), purple meadow rue (*Thalictrum dasycarpum*), and Culver's root (*Veronicastrum virginicum*). Sites associated with prairie fen harbor calciphiles such as purple gerardia (*Agalinis purpurea*), fringed gentian (*Gentianopsis crinita*), Kalm's lobelia (*Lobelia kalmii*), grass-of-Parnassus (*Parnassia glauca*), and shrubby cinquefoil (*Potentilla fruticosa*). Common shrubs include silky dogwood (*Cornus amomum*), gray dogwood (*C. foemina*), red-osier dogwood (*C. stolonifera*), ninebark (*Physocarpus opulifolius*), and willows (*Salix spp*.); these may be dense due to fire suppression and/or hydrologic alteration. Diversity varies, in part depending on duration of seasonal inundation and time since last fire."

The specific planting plan for the proposed site will be developed through consultation with local natural resource groups experienced in restoration actions. These groups include, among others, the Indiana Department of Natural Resources, The Nature Conservancy, and the United States Geological Survey. In accordance will National Park Service Policy 4.41.2, seed sources will be derived from similar habitats in adjacent or local areas. The desired vegetation will be establishment through hand planting of propagated native species and hand dispersal of native seed.

2.1.4 Extent of Tree Canopy

National Park Service staff collected species data on each tree over 10 cm dbh (diameter at breast height, approximately 4.5 feet). Location data was collected for every tree over 40cm dbh. Based upon the collected information, the project site contains 139 trees per acre, providing an almost continuous tree canopy. Based upon the objectives of the project, a reduction in the tree canopy and removal of the spicebush understory is required to support development of a lake plain wet-mesic prairie. In developing alternatives related to the tree canopy, several key issues were considered.

- The proposed tree cover should be thinned to be consistent with historical conditions, based upon the 1830's land survey and the edaphic analogy study.
- Trees associated with the historic home site should not be disturbed in order to have no impacts on the site.
- Some trees should be maintained adjacent to Mineral Springs Road in order to provide a visual buffer.

Tree and shrub removal on the western one-third of the site and in remaining natural wetland will be removed using methods routinely employed by the National Park Service in actions to enhance and restore natural conditions to park land. In these areas shrubs will be cut followed by herbicide applications to the stump. Large trees will girdled a shallow cut around the entire circumference followed by herbicide applied to the cut. These trees will be retained for use by woodpeckers. Small trees will be felled, bucked, and piled. These piles will eventually be removed through implementation of prescribed burns designed to maintain the wet-mesic prairie.

In the eastern two-thirds of the site, above ground and below ground portions of shrubs will be removed through use of small equipment. Removal of shrub roots will benefit the restoration through aeration of the compacted soils and exposure of propagules of relic species stored in the seedbank. These propagules, if present, will assist in provision of a historic landscape viewed and experienced by Native Americans and late 19th century Europeans. A historic landscape present prior to aggressive actions by Americans, stimulated by the 1850 federal Swamp Act, to totally remove a landscape type from America. Trees will be removed using forestry grade equipment. Use of this equipment will facilitate removal of trees with minimal ground disturbance. Trees will be cut followed by placement in tree chippers designed for large dbh trees or removed from the site by the Contractor. In short, all woody material will be removed from the site by the contractor in the form of chips or larger woody material. Three work locations for tree processing located on the southern and eastern portions of the unit will be identified.

Land clearing for tree removal will take place between October 1 and April 1. Tree removal during this time period was requested through consultation by the U.S. Fish and Wildlife Service to avoid potential impacts to federally listed Indiana Bat and will result in least ground disturbance. Tree and shrub removal will incorporate appropriate erosion and siltation controls. If necessary, ruts or other resulting uneven ground surfaces will be removed either through hand raking or if extensive through of a small ground leveling machine such as a Harley rake.

2.2 DESCRIPTION OF ALTERNATIVES

Based upon these Purpose and Need, objectives and goals, several alternatives were developed for consideration, described below.

2.2.1 Alternative 1: No Action

The existing site is approximately 25 acres located at the southeastern corner of Cowles Bog Wetland Complex (CBWC). (Refer to Section 1.4 for more details on the existing site conditions). The No Action alternative (Figure 7) would maintain the existing conditions. It would involve no hydrological changes, no earthmoving, no tree removal and no planting. The unnatural flow of water through the constructed ditch system into CBWC would continue. Tree growth would continue, with the tree canopy expanding to fill the site, along with an understory of spice bush. The site would remain a species poor system with provision of limited ecosystem services. See Figure 7 for an aerial photograph of the existing conditions, including the location and species for trees over 40cm dbh. The No Action Alternative would not meet the project goals of establishing a lake plain wet-mesic prairie with diverse species and wildlife.

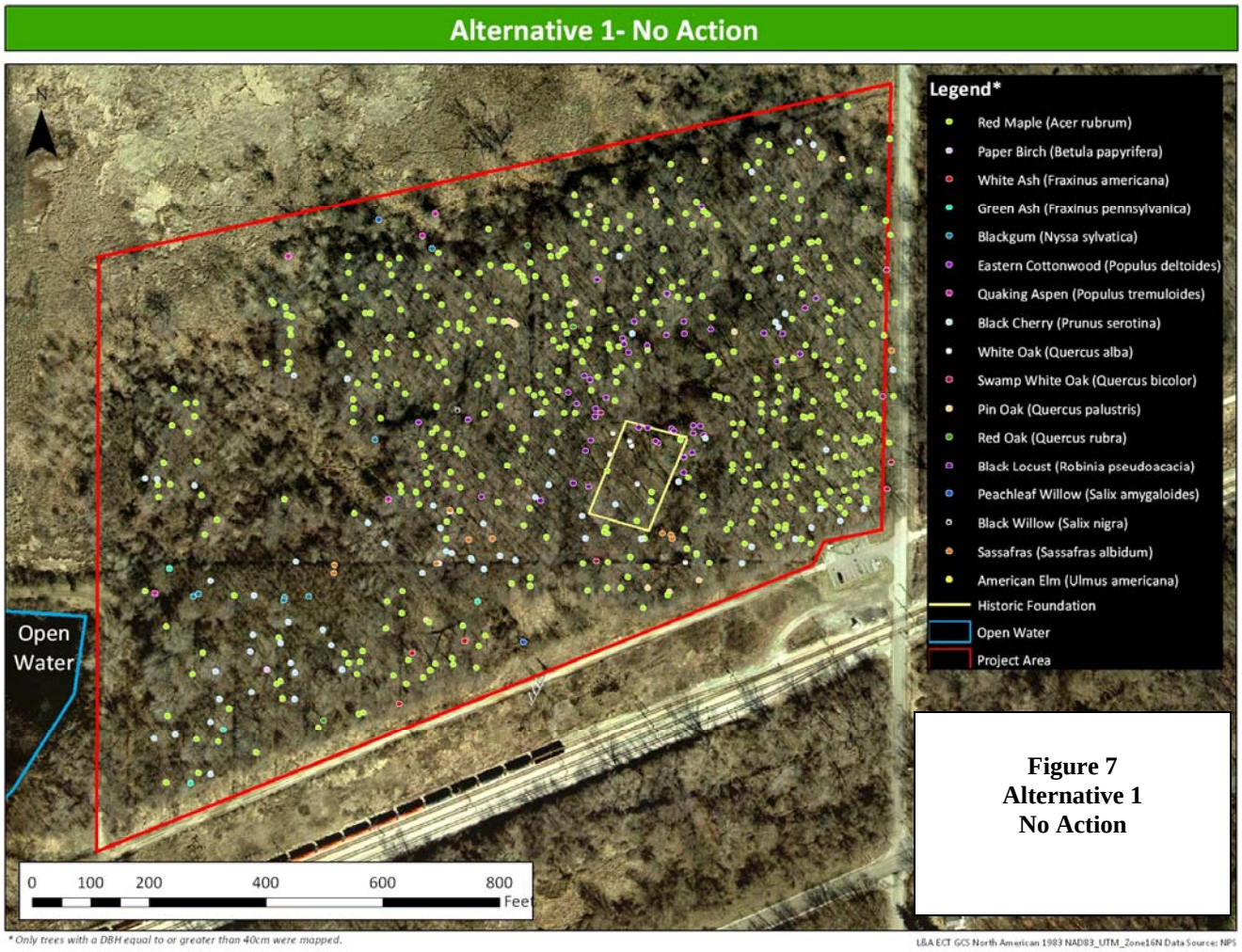


Figure 7
Alternative 1
No Action

2.2.2 Alternative 2 (Preferred Alternative): Retention of Selected Trees

Alternative 2 would involve a substantial reduction in the tree cover and removal of the shrub understory. Approximately 100 trees would remain, chosen specifically based upon species and location to be consistent with the project goals. Trees within and surrounding the historic home site would be undisturbed however, non-native black locust trees would be girdled. A number of trees would be

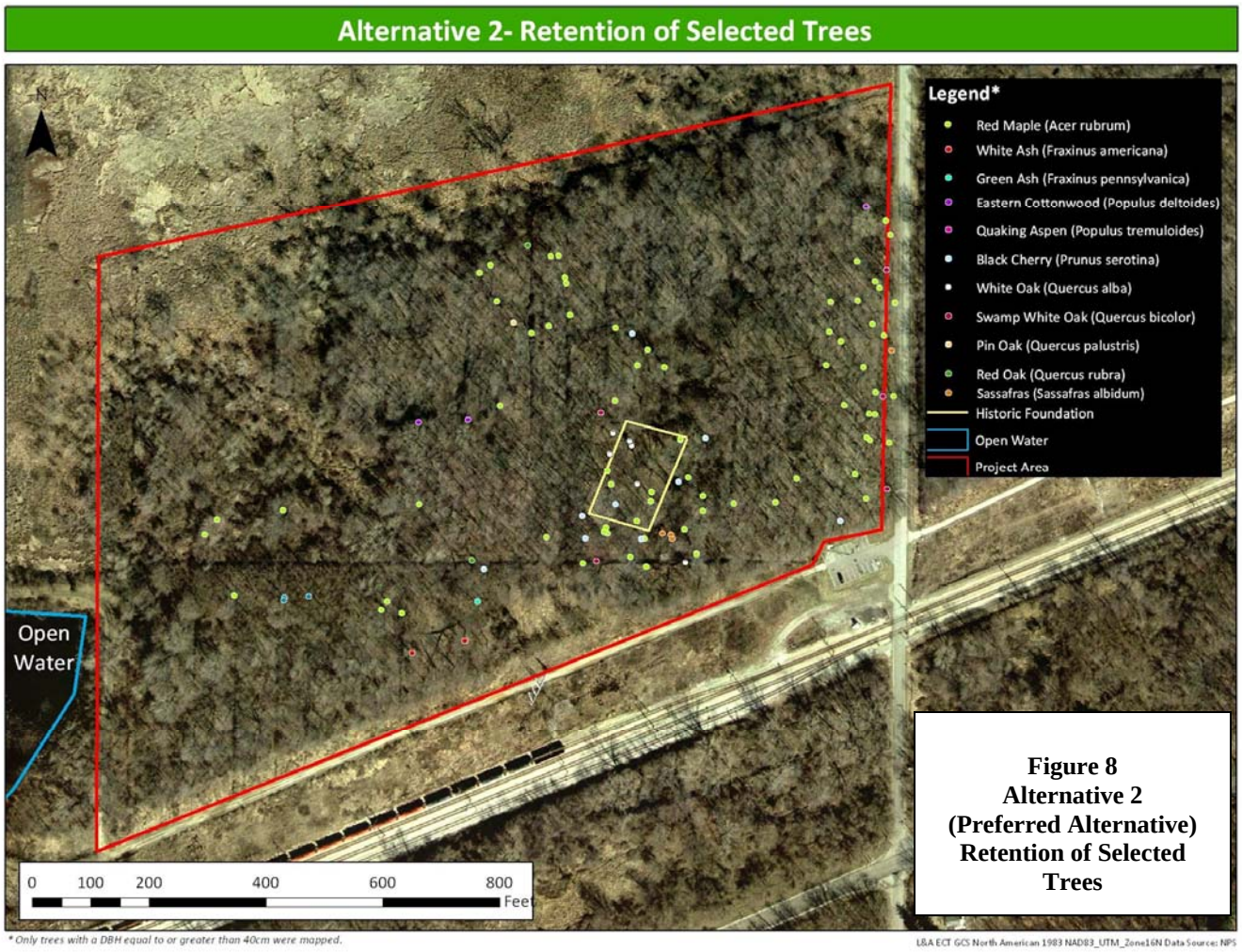


Figure 8
Alternative 2
(Preferred Alternative)
Retention of Selected Trees

maintained adjacent to Mineral Springs Road, including the "witness" trees from the 1830's land survey, to provide a buffer to the roadway. See Figure 8 for the location and species of trees proposed for preservation under Alternative 2. In addition to those trees shown on the exhibit, specific trees (including pin oak, black gum, and tree 47B) will be maintained for the ecological and habitat value based upon comments from the U.S. Fish and Wildlife Service (USFWS).

This alternative would be consistent with the project goals and would reduce the tree canopy to allow for development of desired species, would be consistent with historical conditions, and would provide a buffer to Mineral Springs Road.

2.2.3 Alternative 3: Retention of Trees by Historic Foundation

Alternative 3 (Figure 9) would involve removal of all of the trees, other than those associated with the historic home site. See Figure 9 for the location and species of trees associated with the home site. This option would reduce the tree canopy to allow for development of desired species, but would not be consistent with historical conditions nor provide a buffer to Mineral Springs Road.

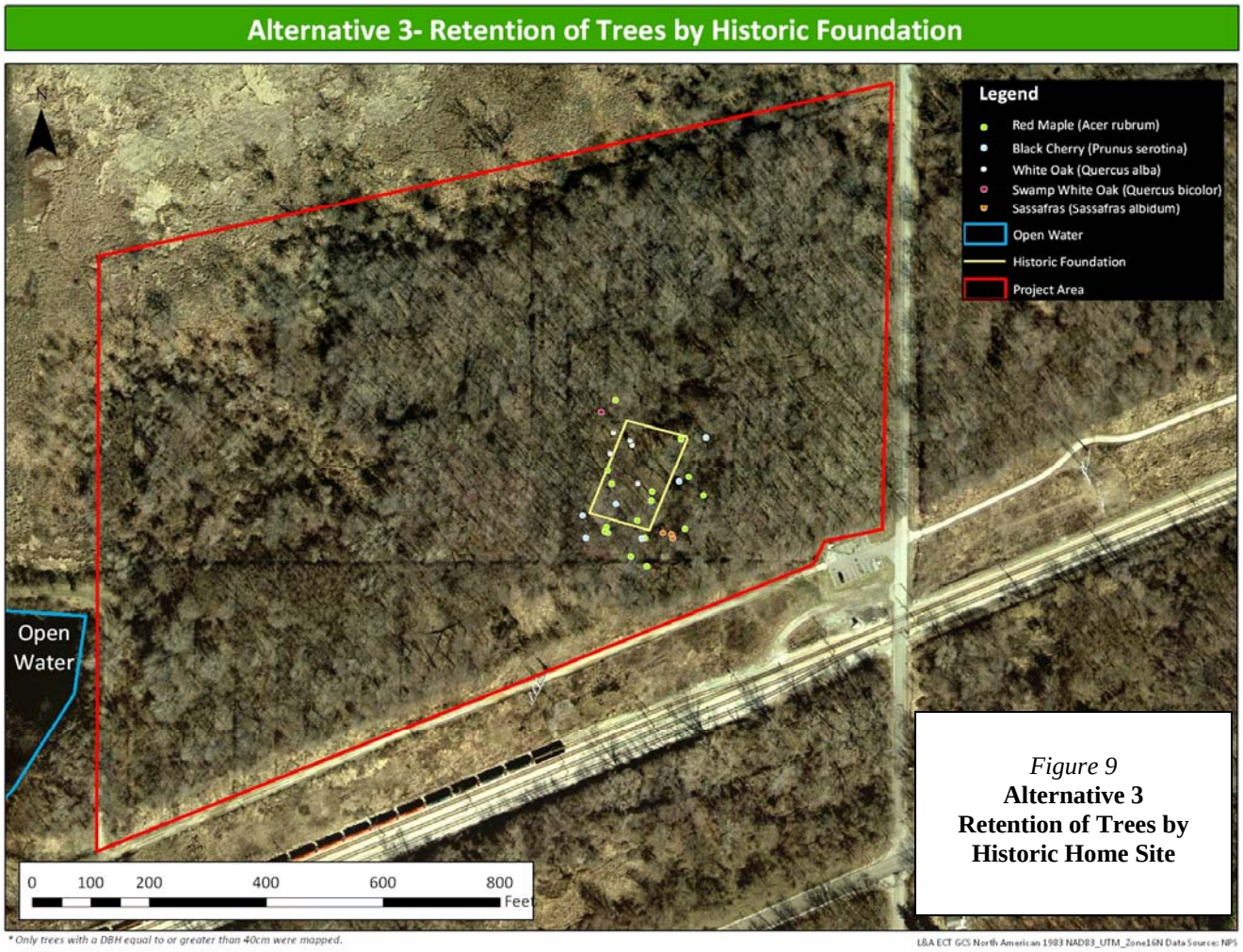


Figure 9
Alternative 3
Retention of Trees by Historic Home Site

2.3 ALTERNATIVES CONSIDERED AND DISMISSED

In addition to the three alternatives discussed above, the National Park Service also considered two additional options for the tree canopy: (1) maintaining all trees greater than 40cm dbh and (2) maintaining all trees greater than 70cm dbh.

Both of these options would not reduce the tree canopy enough to support desired species and would not provide a buffer to Mineral Springs Road. Therefore, neither of these options would meet the project's Purpose and Need.

2.4 IDENTIFICATION OF ENVIRONMENTALLY PREFERABLE ALTERNATIVE

As stated in Section 2.7D of Director's Order #12 and Handbook (National Park Service 2001), the environmentally preferred alternative is the alternative that would promote the national environmental policy expressed in the National Environmental Policy Act.

The Council on Environmental Quality (CEQ) provides additional direction in its guidance *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations* (1981). The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources.

Continuing the current conditions under Alternative 1, the National Park Service would not be providing a lake plain wet-mesic prairie for the American public as desired by the restoration plan for CBWC. Alternative 1 would retain the current degraded condition of the site and allow for continuation of water flow through ditches directly into CBWC. Alternative 1 would result in the appearance of the least damage to the biological and physical environment; however, this alternative would retain the continuation of environmental degradation. It would not enhance natural resources, improve ecosystem services, or provide a unique view-shed for park visitors because no site restoration would occur. Alternative 1 does not meet the purpose and need for the project (Section 1.1).

Alternative 2 would have a short term adverse impact to vegetation and wildlife, while avoiding adverse impacts to rare, threatened or endangered species and cultural resources. Alternative 2 would also provide beneficial impacts to wetlands, socioeconomics, and visitor use and experience. Alternative 2 would meet the purpose and need of the project as outlined in Section 1.1.

Alternative 3 would have greater impacts to biological and physical resources than other alternatives considered due to the extent of trees to be removed. Alternative 3 would provide beneficial impacts to wetlands, socioeconomics, and visitor use and experience, while adversely impacting vegetation and wildlife. Alternative 3 would avoid impacts to rare, threatened, or endangered species and cultural resources. Alternative 3 partially meets the purpose and need for the project (Section 1.1).

Alternative 2 meets the park's need to restore a lake plain wet-mesic prairie on the site and is the action alternative that best protects, preserves, and enhances historic, cultural, and natural resources. Alternative 2 provides the best balance between impacts to natural resources and benefits to the environment, public and visitors. Therefore, Alternative 2 is the environmentally preferred alternative.

2.5 COMPARISON OF ALTERNATIVES

Table 2 compares each alternative with respect to accomplishing the purpose or fulfilling the need identified in the purpose and need section.

Table 2: Comparison of Alternatives – Purpose and Need

Purpose and Need, Objectives and Goals	**Alternative 1 No Action**	**Alternative 2 Retention of Selected Trees**	**Alternative 3 Retention of Trees at Historic Home Site**
Hydrology	Would not restore wetland hydrology	Would restore wetland hydrology	Would restore wetland hydrology
Species	Would not allow for development of desired species	Would allow for development of desired species	Would allow for development of desired species

Table 2: Comparison of Alternatives – Purpose and Need

Purpose and Need, Objectives and Goals	Alternative 1 No Action	Alternative 2 Retention of Selected Trees	Alternative 3 Retention of Trees at Historic Home Site
Tree Canopy/ Consistency with Historical Conditions	Hydrology and tree cover not consistent with the 1830s land survey or edaphic analogy study	Hydrology and tree cover consistent with 1830s land survey and edaphic analogy study	Hydrology consistent with historical conditions, but removes too many trees to be consistent with 1830s land survey or edaphic analogy study
Buffer to Mineral Springs Road	Would maintain trees along roadway	Would maintain some trees along roadway	Would not maintain trees along roadway
Educational Value	Site is not readily accessible for visitors due to dense spice bush understory. Does not reflect a unique habitat.	Would make site accessible for visitors and allow for development of a unique habitat type.	Would make site accessible for visitors and allow for development of a unique habitat type.

2.6 SUMMARY OF IMPACTS

Table 3 provides a summary of impact severity for each impact topic retained for Alternatives 1, 2 and 3. See Section 3 for details.

Table 3: Comparison of Alternatives – Environmental Issues

Environmental Issues	Alternative 1 No Action	Alternative 2 Retention of Selected Trees	Alternative 3 Retention of Trees at Historic Home Site
Geology and Soils	Moderate Negative Long Term	Minor Negative Short Term Minor Negative Long Term	Moderate Negative Short Term Beneficial Long Term
Vegetation	Negligible Impact, however, invasive and non-native species will continue to grow.	Moderate Negative Short Term Beneficial Long Term	Moderate Negative Short Term Beneficial Long Term
Wildlife	Negligible Short Term Negligible Long Term	Minor Negative Short Term Beneficial Long Term	Negligible Short Term Beneficial Long Term
Threatened and Endangered Species	Negligible Short Term Negligible Long Term	Minor Negative Short Term Beneficial Long Term	Minor Negative Short Term Beneficial Long Term
Water Quality	Negligible Short Term Negligible Long Term	Minor Negative Short Term Beneficial Long Term	Minor Negative Short Term Beneficial Long Term
Wetlands	Negligible Short Term Negligible Long Term	Minor Negative Short Term Beneficial Long Term Wetlands will be	Minor Negative Short Term Beneficial Long Term Long Term

Table 3: Comparison of Alternatives – Environmental Issues

Environmental Issues	**Alternative 1** **No Action**	**Alternative 2** **Retention of Selected Trees**	**Alternative 3** **Retention of Trees at Historic Home Site**
		altered but not adversely impacted	Wetlands will be altered but not adversely impacted
Cultural Resources	Negligible Short Term Negligible Long Term	Negligible Short Term Negligible Long Term	Negligible Short Term Negligible Long Term
Socioeconomics	Negligible Short Term Negligible Long Term	Negligible Short Term Negligible Long Term	Negligible Short Term Negligible Long Term
Visitor Use and Experience	Negligible Short Term Negligible Long Term	Negligible Short Term Negligible Long Term	Negligible Short Term Negligible Long Term
Park Facilities and Operations	Negligible Short Term Negligible Long Term	Negligible Short Term Minor Negative Short Term	Negligible Short Term Minor Negative Short Term

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.0 INTRODUCTION

A determination of the probable consequences (or impacts) of each alternative on park resources was made in accordance with the National Environmental Policy Act. The effects to historic resources are considered in accordance with the National Historic Preservation Act. The analysis for each impact topic includes a description of the resource being affected, identification of impacts of the various actions comprising the alternative, characterization of the impacts, an assessment of cumulative impacts, and a conclusion.

3.0.1 Regulations and Policies

The regulations and policies associated with park management – the General Management Plan Indiana Dunes National Lakeshore (National Park Service 1997) and the Long Range Interpretive Plan (National Park Service 2011) – are incorporated by reference to eliminate repetitive information. Regulations and policies relevant to the impact topics are discussed in Section 1.

3.0.2 Methodology

For each impact topic, the analysis includes an evaluation of effects as a result of implementing each alternative discussed in Section 2. The impact analyses were based on professional judgment using information provided by park staff, relevant references and technical literature citations, and subject matter experts. Evaluation of alternatives takes into account whether the impacts would be negligible, minor, moderate, or major. These thresholds are defined for each resource.

Context is the affected environment within which an impact is analyzed, such as local, park wide, or regional. Context is defined for each impact topic. The duration of an impact is evaluated based on its short-term or long-term nature of alternative-associated changes to existing conditions. Type of impact refers to the beneficial or adverse consequences of implementing a given alternative. More exact interpretations of intensity, duration, context, and type of impact are given for each impact topic examined. Impacts analyses include implementation of mitigation measures taken to protect resources. Examples of these measures are outlined in Section 2.3 “Mitigation Measures” in the description of the alternatives.

3.1 CUMULATIVE IMPACTS

The Council on Environmental Quality’s (CEQ 1978) regulations for implementing the National Environmental Policy Act and National Park Service Director’s Order #12 Conservation Planning, Environmental Impact Analysis, and Decision Making (2001), require assessment of cumulative effects in the decision-making process for federal projects. Cumulative effects are considered for the No Action and proposed action alternatives.

Cumulative effects were determined by combining the effects of each alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing, or reasonably foreseeable future actions at the Cowles Bog Wetland Complex.

3.1.1 Past Degradation Actions

In the 150 years of occupation of the Calumet region by those of European heritage, landscape change of this unique ecosystem has been equivalent to landscape alterations generally realized after thousands of years of passive geologic forces. Surprisingly, CBWC exhibited strong ecosystem resilience to these anthropogenic stressors until total annihilation of the western adjacent dune-wetland ecosystem in the

1960's. Critical twentieth century negative events influencing CBWC's successional trajectory are as follows:

1. Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), which is located at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach Complex.

2. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC.

3. Numerous ditches were constructed throughout the lakeplain wet-mesic prairie of CBWC (1920's); extending from the Lake Border Moraine to sedge meadow of CBWC.

4. Vegetable farming, home construction and residential living took place on the lakeplain wet-mesic prairie of Cowles Bog Wetland Complex.

5. Intradunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intradunal wetlands to jurisdictional ditches.

6. A Native American trail along the northern edge of CBWC was expanded and used to gain access to the golf course (late 1920's).

7. White pine and herbaceous plants were harvested from forested areas of CBWC, cattle were pastured, and graminoids were harvested for hay (early 1900's to 1950's); pasturing likely terminated in the 1930's but logging of white pine was reported as late as the 1950's.

8. The dune-wetland ecosystem to the west of CBWC was annihilated (1961 NIPSCO plant completed; 1965 Bethlehem Steel plant completed).

9. A sand dike was constructed through Great Marsh defining the property boundary between Indiana Dunes National Lakeshore (north and east of the sand dike) and NIPSCO (south and west of the sand dike and inclusive of it; north to south dike was constructed by 1961, and the west to east dike by 1973).

10. Beaver fleeing from destruction of the western dune-wetland ecosystem take up residence at Mineral Springs Road (early 1960's).

11. Immediately south of the sand berm, wetland excavation and prevention of the northerly flow of surface water resulted in an expansive area of open water (1974).

12. Land immediately west of CBWC was used for placement of fly ash and other materials; fly ash ponds were constructed and utilized throughout the 1970's.

Events 1 through 4 altered critical hydrology supporting the lake plain wet-mesic prairie of CBWC resulting in its obliteration (except for a small strip maintained by NIPSCO). Following cessation of vegetable farming, the lake plain wet-mesic prairie was colonized by woody vegetation. Change analysis using aerial photographs from the 1930's to present document a rapid colonization of trees starting in the 1950's The present day degraded state of this wetland prairie type is epitomized by the presence of remnant footprints of a home site, woody vegetation, and a functioning ditch system.

Events 5 through 7 are responsible for accelerated succession, thrusting the conifer dominated forested swamp into a red maple dominated swamp. White pine was lumbered from CBWC and adjacent dunes and sold for profit (Newman and Doyle 1995). Greater canopy cover resulting from a dominance of red maple would not have been supportive of orchids and other forbs occurring in the conifer understory. Removal of attractive wild flowers from the swamp for personal and commercial use (Pepoon 1927) contributed to declines in populations of these forbs. Golf course and road construction would have provided access to the adjacent forested swamp, facilitating removal of these species.

Wetland drainage resulting from construction of jurisdictional ditches (Event 2), while drying the wetland sufficiently to allow for haying and grazing of its graminoid resources was not sufficient to cause a shift from wetland vegetation to upland vegetation. Aerial photography and oral history provides evidence that wetland vegetation was not completely replaced by upland vegetation. However, even partial draining of muck/peat soils can result in their compression and subsidence (Snyder 2004; Ewing and Vepraskas 2006; National Engineering Handbook-Section 16). Subsidence of soils in the central portion of CBWC was substantiated by Verry and Boelter (1978) who reported a layer of aggregate organic materials one-quarter to one-half meter below the soil surface.

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). Events 5, 8, 9, 10, and 11, in concert with soil subsidence, resulted in water depths that exceeded water depth tolerances of the existing forb-grass-sedge wetland plant assemblage, but provided water depths favorable for cattail growth. Narrow leaf cattail and hybrid cattail responded aggressively; rapidly colonizing denuded areas throughout the central portion of CBWC. In higher zones, conditions were favorable for colonization of shrubs and trees such as silky dogwood (*Cornus obliqua*), red maple (*Acer rubrum)*, and trembling aspen (*Populus tremuloides*).

3.1.2 Current Restoration Actions

The National Park Service is currently implementing actions to restore Cowles Bog's plant assemblages to reflect plant groupings observed by scientists and educators who used Cowles Bog as a living laboratory in the early nineteenth century. Industrial stressors which shoved Cowles Bog's vegetation into a negative trajectory have largely been negated; however, these stressors resulted in a pitiable desert of non-native cattail and obliterated prairie located on the southern margin of the wetland. Restoration actions designed to replace non-native cattail with early nineteenth century vegetation assemblages are taking place on approximately 130 acres. The 25-acre area associated with this project is part of the next phase in the overall restoration of CBWC.

3.1.3 Future Restoration Actions

Inventory and restoration design actions conducted 2002 through 2004 identified two restoration pathways. Restoration actions would depend on the funding stream and funding amount. Given a dedicated funding stream of $100,000 per year, restoration of the CBWC would require 12 to 15 years. Less funding or interrupted funding would result in a higher restoration cost and a longer time period. Funding from the National Park Service and the Great Lakes Restoration Initiative, partnerships with the town of Dune Acres, The Nature Conservancy, and Shirley Heinze Land Trust which allowed for funding from the Indiana Lake Michigan Coastal Program along with in-the-field contribution by numerous volunteers, has facilitated aggressive restoration actions initiated in 2008. Dedicated funding to allow for

complete restoration of the 130 acres of current active restoration and the subject 25 acres is anticipated through 2014. Restoration actions will be initiated on the remaining 50 acres following location of a funding source.

3.2 IMPACT TOPICS RETAINED

3.2.1 Geology and Soils

Affected Environment

The geologic formation of the pre-settlement landscape of southern Lake Michigan was driven by glacial activity. The last great ice sheet experienced by Northwest Indiana was the Wisconsin glacier. Events associated with this ice sheet are responsible for present day natural landforms of Northwest Indiana extending from the Valparaiso Moraine north to Lake Michigan. The Valparaiso Moraine, which extends from Northwest Indiana through Palos Hills, Illinois to Wisconsin, was formed during a static phase of the Wisconsin glacier. Following this static phase, the Wisconsin glacier moved north resulting in the formation of Lake Chicago. This event occurred approximately 14,000 years ago.

Within the approximate 14,000-year time span between Lake Chicago and present day Lake Michigan, geologists recognize twelve major phases representing expansions or contractions of the Lake (Chrzastowski and Thompson 1994). The varieties of land forms found in Northwest Indiana reflect this glacial activity. Among these landforms are the Lake Border Moraine, Glenwood dune ridge, Calumet Dune ridge, Tolleston Dune ridge, and recent dunes. The Great Marsh formed approximately 4,500 years ago during the second Nipissing phase. The Calumet dune ridge and Lake Border Moraine are present on the southern edge of Great Marsh, and the Tolleston Dunes and recently formed dunes are present on the northern edge of Great Marsh.

Detailed information pertaining to the glacier activities associated with the Wisconsin glacier is provided by Hansel et al. (1985), Bluckley (1974), Bartlein and Webb (1982), Thompson and Baedke (1997), and Futyma (1988).

Evaluation of 23 soil samples indicated that the soil series present was not Maumee as reported by the National Resource Soil Conservation soil survey of 1971, but a complex of eight soil series (Figure 12). All soil samples had an A-Horizon longer than ten inches and lacked an E-horizon. Soils that develop under a forested influence exhibit an A-horizon that is much less than prairie soils and an E-horizon following the A-horizon. The soil complex consist of more alkaline soil formed in sandy sediment with more clay silt present due to the hydric nature of the soil units (NRCS soil survey Porter County 1981). The soil series complex suggests that prior to anthropogenic disturbance the plant community was a mosaic of wet and mesic prairie with the presence of a few scattered trees (Figures 10a and b).

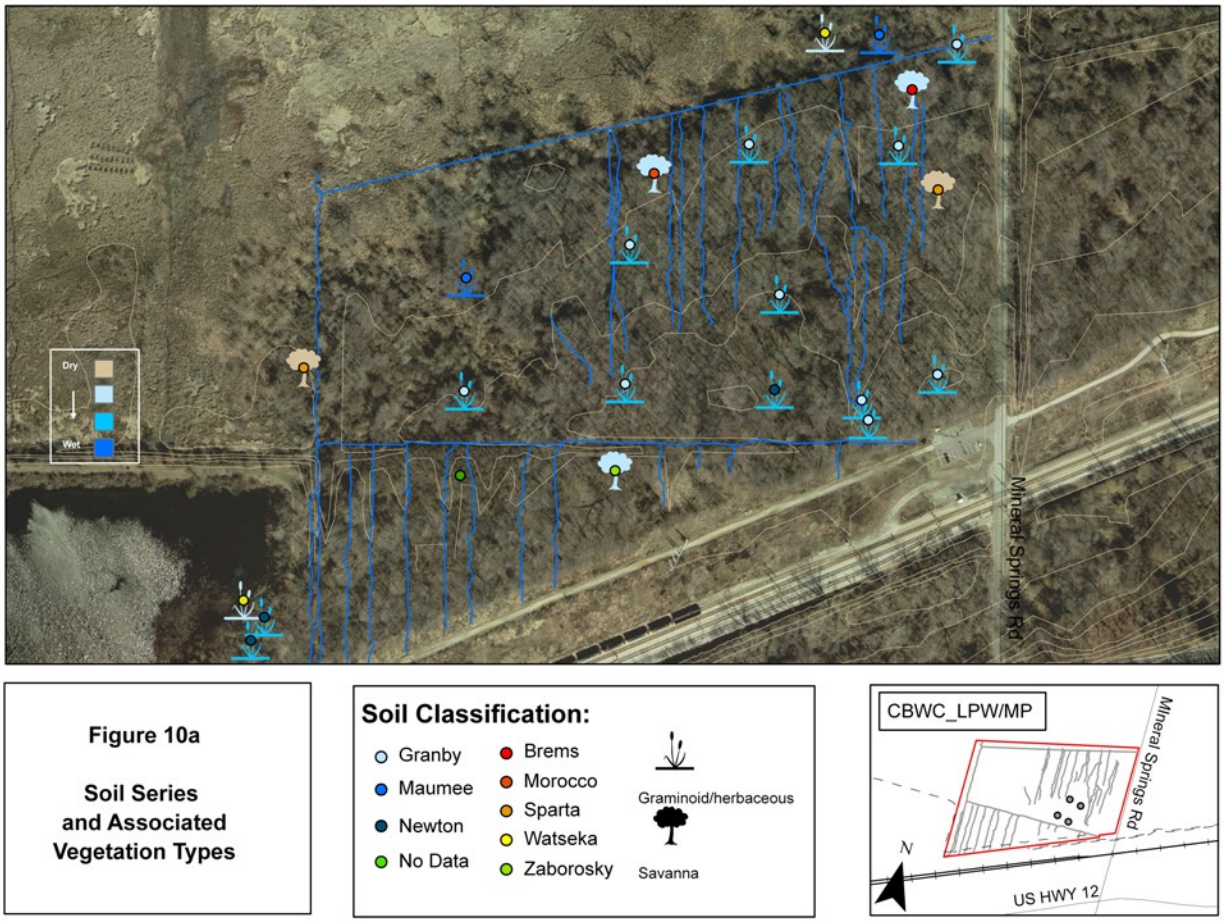


Figure courtesy of National Park Service

Earthworms which are not native to the upper Midwest are present in soils of the project site. Exotic earthworms have negative impacts to plants, mycorrhizal fungi and alter the soil profile, and soil nutrients.

Topography on the site is flat with very little grade change. The site has an elevation of approximately 611 on the southern perimeter declining to approximately 606 on the northern perimeter. Steep slopes are not present; given site width of 850 feet, elevations decline by 1 foot every 170 linear feet.

Intensity

- Negligible: Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight.
- Minor: The effects to soils would be detectable. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation was needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.
- Moderate: The effect on soil productivity or fertility would be readily apparent and would result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

- Major: The effect on soil productivity or fertility would be readily apparent and would substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

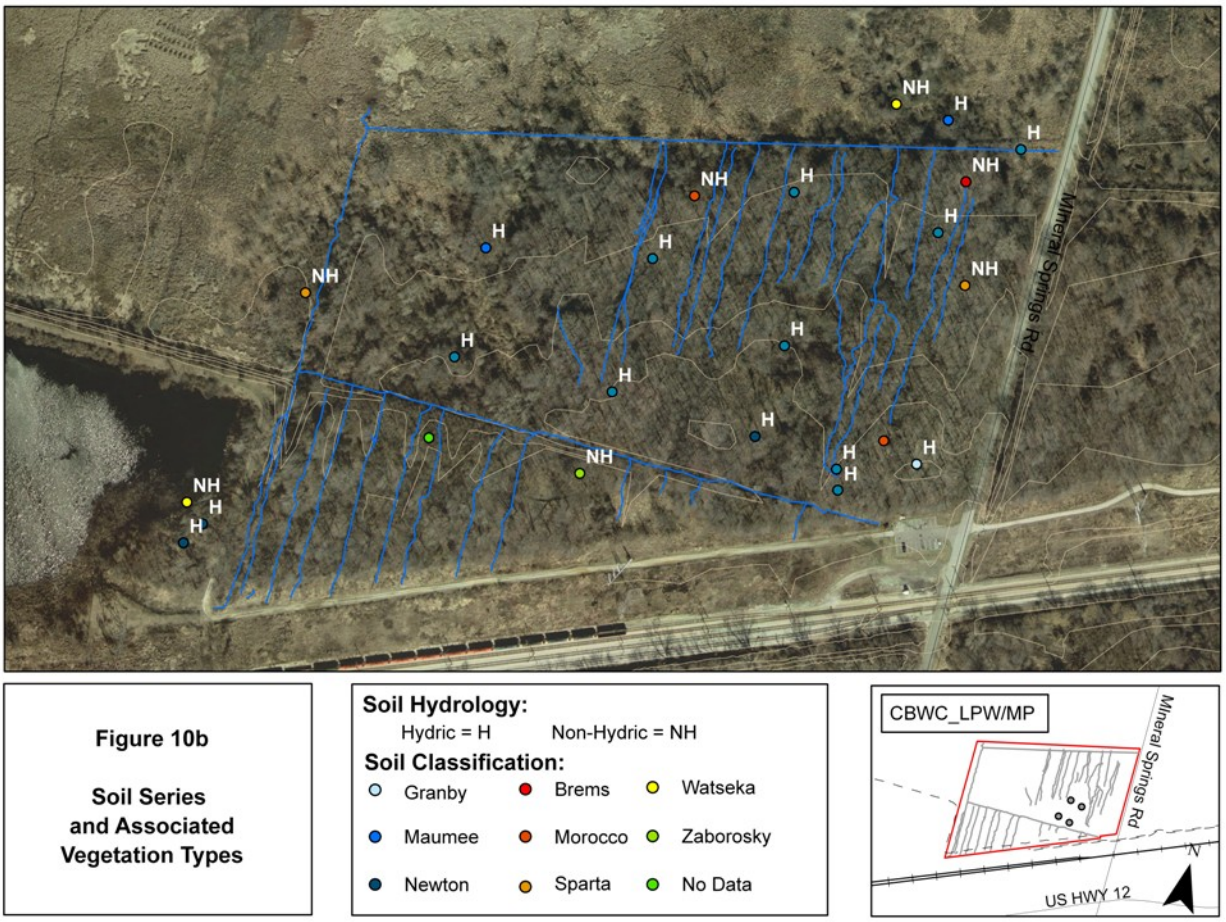


Figure courtesy of National Park Service

Duration

• Short-term: Recovers in less than 3 years.
• Long-term: Takes more than 3 years to recover.

Impacts of Alternative 1 (No Action)

Under Alternative 1, the site would continue under the current management plan. No maintenance would occur and no significant improvements to the site would be implemented. The No Action Alternative does not include construction or other activities that would alter the site as it exists today. The geology and soils would continue to be negatively altered by earthworm activity.

Cumulative Effects

Past actions that would have contributed to cumulative impacts to soil include construction of Mineral Springs Road, the railroad bed adjacent to the site, the creation of ditches through the site, the creation of the berm, vegetable farming, home construction, human occupation and construction of the power lines by NIPSCO. Combined, these actions would have a minor adverse impact to the geology and soils

because of the alterations that occurred to the site in the past. There would be no actions in the future taken to restore the site.

Conclusions

The No Action Alternative would not directly impact soils or geology because no significant improvements, construction, or other activities would occur that would alter the site. However, no actions would be taken to remove exotic earthworms. Therefore soils would continue to be negatively impacted through their modification by exotic earthworms. This would result in long-term negative effects on soils and geology. The No Action Alternative combined with the cumulative actions would have a moderate adverse impact. Soils and geology would be negatively altered as a result of the No Action Alternative.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative

Under Alternative 2, over 100 trees would be retained and understory vegetation would be removed. Large machinery would be utilized to remove the vegetation and temporary disturbance to the soil where the work is to be conducted is anticipated. Tree roots would not be removed; however, above and below ground portions of the shrub layer would be removed. The goal with the total removal of shrubs is to stimulate the seed bank that was historically located at the site and aerate the compacted soils. The seed bank and supplemental plantings (in accordance with wet-mesic habitat) would be the principal source in vegetation re-establishment. Post-tree and understory monitoring is anticipated in order to eradicate unwanted species in the restoration area. Soil erosion and sedimentation control methods would be employed as necessary to stabilize soils and prevent sediment movement through ditches.

Cumulative Effects

Past actions that would have contributed to cumulative impacts to soil include construction of Mineral Springs Road, the railroad bed adjacent to the site, the creation of ditches through the site, vegetable farming, home construction, human occupation, and creation of the berm and power lines by NIPSCO. These actions combined would have a minor adverse impact to the geology and soils because of the alterations that occurred to the site in the past and few actions in the future would be taken to restore the site.

Conclusions

This alternative would impact soils as a result of tree and understory removal, including the use of construction equipment. Implementation of Alternative 2 would result in minor adverse short-term effects but long-term positive effects due to aeration of the soils. This alternative, in combination with cumulative actions, would result in minor adverse short-term effects and minor long-term positive effects. Soils and geology would be improved as a result of Alternative 2.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation

Under Alternative 3, over 25 trees would be retained and understory vegetation would be removed. Large machinery would be utilized to remove the vegetation and temporary disturbance to the soil where the work is to be conducted is anticipated. Tree roots would not be removed; however, above and below ground portions of the shrub layer would be removed. The goal with the total removal of the shrubs is to stimulate the seed bank that was historically located at the site and to aerate the compacted soils. The seed bank and supplemental plantings (in accordance with wet-mesic habitat) would be the principal source in vegetation re-establishment. Post-tree and understory monitoring is anticipated in order to eradicate unwanted species in the restoration area. Soil erosion and sedimentation control methods would be employed as necessary to stabilize soils and prevent sediment movement through ditches.. Tree and understory removal under this alternative would result in impacts to a larger area than under Alternative 2.

Cumulative Effects

Past actions that would have contributed to cumulative impacts to soil include construction of Mineral Springs Road, the railroad bed adjacent to the site, the creation of ditches through the site, vegetable farming, home construction, human occupation, and creation of the berm and power lines by NIPSCO. These actions combined would have a minor adverse impact to the geology and soils because of the alterations that occurred to the site in the past and few actions in the future would be taken to restore the site.

Conclusions

This alternative would impact soils as a result of tree and understory removal, including the use of construction equipment. Implementation of Alternative 3 would result in moderate adverse short-term effects. This alternative, in combination with cumulative actions, would result in moderate adverse short-term effects but long-term moderate positive effects due to aeration of the soils. Soils and geology would be improved as a result of Alternative 3.

3.2.2 Vegetation

Affected Environment

The woody and shrub vegetation are comprised of recent recruits that do not reflect a plant assemblage recognized by ecologists. The quantitative survey confirmed that the tree canopy is dominated by red maple. There were 2,191 red maple trees, generating 45.3 percent cover/10 m^2. Other common trees were black cherry (*Prunus serotina*, 798 individuals) and the non-native black locust (*Robinia pseudoacacia*, 247 individuals). The reason for recent documentation of weedy invasiveness of red maple trees is not known. Speculations include that it is a response to increase levels of carbon dioxide, soil alterations due to earthworm activity, and hybridization among red maple cultivars.

The shrub layer was dominated by spicebush. Spicebush provided 52.7 percent cover/5 m^2 (84.2 percent of total shrub cover). The herbaceous layer was very sparse exhibiting only 12.3 percent cover/m^2. The dominant species were small spicebush individuals and fowl manna grass (*Glyceria striata*). In the three years following the quantitative vegetation survey, there has been a notable increase in cover of spicebush and a decline in cover of native herbaceous species. The absence of a well-established herbaceous layer is reflected in species observed; of 58 species only 29 (50 percent) of them were herbaceous. Most herbaceous species were present at the zone of transition from woody vegetation to herbaceous wetland vegetation.

Intensity

- Negligible: No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be on a small scale, and no species of special concern would be affected.
- Minor: The alternative would temporarily affect some individual native plants and would also affect a relatively minor portion of that species' population. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, could be required and would be effective.
- Moderate: The alternative would affect some individual native plants and would also affect a sizeable segment of the species' population and over a relatively large area. Mitigation to offset adverse effects could be extensive, but would likely be successful. Some species of special concern could also be affected.
- Major: The alternative would have a considerable long-term effect on native plant populations, including species of special concern, and affect a relatively large area in and out of the park. Mitigation measures to offset the adverse effects would be required, extensive, and success of the mitigation measures would not be guaranteed.

Duration

• Short-term: Following treatment, recovery would take less than one year.
• Long-term: Following treatment, recovery would take longer than one year.

Impacts of Alternative 1 (No Action)

Under the No Action Alternative, the site would continue under the current management plan. No significant changes or improvements would occur to the site. Although a lack of action can affect native plant communities, the No Action Alternative would have negligible beneficial impacts on the site's vegetation.

Cumulative Effects

Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908) and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch, and Samuelson Ditch (1880 – 1920) were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of CBWC (1920's), extending from the Lake Border Moraine to the sedge meadow of CBWC. Vegetable farming, home construction, and human occupation occurred on the site through the mid-1950's, .

Conclusions

The No Action Alternative would not directly impact vegetation because no alterations would occur to the site. Since the current vegetation found at the site is the main issue with the restoration efforts, this action would not meet the purpose or need of this project.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative

Under Alternative 2, over 100 trees would be retained and understory vegetation would be removed. Large machinery would be utilized to remove the vegetation and temporary disturbance to the soil where the work is to be conducted is anticipated. Tree roots would not be removed; however, above and below ground portions of the shrub layer would be removed. The goal with total removal of the shrubs is to stimulate the seed bank that was historically located at the site and to aerate the compacted soils. The seed bank and supplemental plantings (in accordance with wet-mesic habitat) would be the principal source of vegetation re-establishment. Post-tree and understory monitoring is anticipated in order to eradicate unwanted species in the restoration area. Soil erosion and sedimentation control methods would be employed as necessary to stabilize soils and prevent sediment movement through ditches.

Cumulative Effects

Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of CBWC (1920's), extending from the Lake Border Moraine to the sedge meadow of CBWC. The lake plain wet-mesic prairie of CBWC was utilized for vegetable farming and residential purposes.

Conclusions

This alternative, in combination with cumulative actions, would meet the purpose and need of the project but would result in moderate adverse short-term effects. In the long-term, plant species richness would exceed 125 species and given seed dispersal to adjacent areas Alternative 2 would result in long-term beneficial impacts to vegetation.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation

Under Alternative 3, over 25 trees would be retained and understory vegetation would be removed. Large machinery would be utilized to remove the vegetation and temporary disturbance to the soil where the work is to be conducted is anticipated. Tree roots would not be removed; however, above and below ground portions of the shrub layer would be removed. The goal with total removal of the shrubs is to stimulate the seed bank that was historically located at the site and to aerate the compacted soils. The seed bank and supplemental plantings (in accordance with wet-mesic habitat) would be the principal source of vegetation re-establishment. Post-tree and understory monitoring is anticipated in order to eradicate unwanted species in the restoration area. Soil erosion and sedimentation control methods would be employed as necessary to stabilize soils and prevent sediment movement through ditches. Tree and understory removal would result in impacts to a larger area than under Alternative 2.

Cumulative Effects

Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of CBWC (1920's), extending from the Lake Border Moraine to the sedge meadow of CBWC. The lake plain wet-mesic prairie of Great Marsh was utilized for vegetable farming and residential purposes.

Conclusions

This alternative, in combination with cumulative actions, would meet the purpose and need of the project and would result in moderate adverse short-term effects. In the long-term, plant species richness would exceed 125 species and given seed dispersal to adjacent areas Alternative 2 would result in long-term beneficial impacts to vegetation. However, this option would not be consistent with historical conditions nor provide a buffer to Mineral Springs Road.

3.2.3 Wildlife

Affected Environment

The national lakeshore is home to not only a diverse population of plants, but also a diverse wildlife population. This biological diversity is one of the most significant features and a primary reason for establishment of Indiana Dunes National Lakeshore. Because the national lakeshore is located in several ecological transition zones, the diversity is many times greater than that of most areas of similar size. Remnant species from past climatic changes have survived in sheltered habitats. The moderating effect of Lake Michigan, along with the great variety of habitats within a small area, explains much of the plant and animal diversity.

Within the national lakeshore, surveys have documented 37 species of mammals, 352 species of birds, 18 species of amphibians, and 27 species of reptiles. The largest herbivore is the white-tailed deer and the largest predator is the coyote. The national lakeshore also provides habitat for a great blue heron rookery. An inventory of invertebrates has not been completed, but the national lakeshore has about 100 different species of butterflies and moths.

Grassland birds have experienced widespread declines throughout the Midwest and other areas of continental United States (Herkert 1995). The population decline of grassland birds has been steeper and more consistent than declines in other bird species (Knopf 1994). Grassland habitat has exceeded loss of forest habitat throughout the Midwestern United States (Iverson 1988). At the project site, tree diversity is minimal and tree canopy cover is high; site conditions that are associated with a decline in forest dwelling bird species (Gil-Tena et. al. 2007; James and Wamer 1982).

Intensity

- Negligible: Wildlife and their habitats would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to wildlife populations.
- Minor: Effect on wildlife or habitats would be measurable or perceptible, but localized within a small area. While the mortality of individual animals might occur, the viability of wildlife populations would not be affected and the community, if left alone, would recover.
- Moderate: A change in wildlife populations or habitats would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity, or quality of population. Mitigation measures would be necessary to offset adverse effects, and would likely be successful.
- Major: Effects on wildlife populations or habitats would be readily apparent, and would substantially change wildlife populations over a large area in and out of the national park. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured.

Duration

• Short-term: Effects lasting less than 2 years.
• Long-term: Effects lasting longer than 2 years.

Impacts of Alternative 1 (No Action)

Under the No Action Alternative, the site would continue under the current management plan. No significant changes or improvements would occur to the site. The No Action Alternative would have negligible beneficial impacts on the site's wildlife.

Cumulative effects

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). Events 5, 8, 9, 10, and 11 in concert with soil subsidence, resulted in the obliteration of habitat for many sensitive plant and animal species.

Conclusions

Under the No Action Alternative, no actions would occur to the site. The No Action Alternative would result in negligible beneficial impacts to wildlife. The No Action Alternative, combined with the cumulative actions, would result in a negligible adverse long-term impact on wildlife.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative

Today, lake plain wet-mesic prairie is globally imperiled. The National Park Service intends to restore a portion of CBWC to lake plain wet-mesic prairie and allow the public to access the restored wetland. The presence of pre-European wet-mesic prairie present on the 25 acre project site were selected based on soil classification and the 1830 government land survey of the Northwest Territory. The soil series complex developed under a prairie influence and the 1830 government land survey describe the site as having marsh characteristics consistent with wet-mesic prairie habitat. The National Park Service has determined that the site, with restored hydrology and removal of vegetation established following site disturbance

will re-establish a degraded portion of CBWC back to its natural state and will provide the public with a glimpse of a rare habitat.

Cumulative Effects

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). Events 5, 8, 9, 10, and 11 in concert with soil subsidence, resulted in the obliteration of habitat for many sensitive plant and animal species.

Conclusions

Alternative 2 would result in minor short-term adverse impacts to wildlife from tree and understory removal activities and use of construction equipment. This alternative, in combination with the cumulative actions, would result in negligible adverse short-term impacts on wildlife. Retention of some trees, girdling of approximately ten percent of trees and establishment of a species rich plant community would provide habitat for a variety of bird species, amphibians and invertebrates. A direct benefit would be provided to grassland birds, woodpeckers and cavity dwelling birds and mammals. Alternative 2 would have some long term beneficial impact to wildlife.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation

Today, lake plain wet-mesic prairie is globally imperiled. The National Park Service intends to restore a portion of Cowles Bog to lake plain wet-mesic prairie and allow the public to access the restored wetland. The 25 acres associated with CBWC were selected based on soil classification and the 1830 government land survey of the Northwest Territory. The soil series complex developed under a prairie influence and the 1830 government land survey describe the site as having marsh characteristics consistent with wet-mesic prairie habitat. The National Park Service has determined that the site, with restored hydrology and removal of vegetation established following site disturbance will re-establish a degraded portion of CBWC back to its natural state and will provide the public with a glimpse of a rare habitat.

Cumulative Effects

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). Events 5, 8, 9, 10, and 11 in concert with soil subsidence, resulted in the obliteration of habitat for many sensitive plant and animal species.

Conclusions

Implementation of Alternative 3 in combination with cumulative actions would result in negligible adverse short-term effects. Establishment of a species rich plant community would provide habitat for a variety of bird species, amphibians, and invertebrates. However, removing all trees would eliminate habitat for certain bird species. Alternative 3 would have a long term beneficial impact to wildlife but with fewer benefiting animals than realized under Alternative 2.

3.2.4 Rare, Threatened, or Endangered Species

Affected Environment

Rare, threatened, or endangered species are known to exist on and near the site. The 1973 Endangered Species Act, as amended, requires an examination of impacts to all federally listed threatened or endangered species. National Park Service policy requires examination of the impacts to state listed threatened and endangered species and federal candidate species. Based on coordination with the U.S. Fish and Wildlife Service and the Indiana Department of Natural Resources, there are known occurrences of threatened or endangered species on the site. Wilhelm (1990) identified 41 special floristic elements, of which 15 were state listed species. In the 1970's, the federally listed endangered butterfly, Mitchell's satyr (*Neonympha mitchellii mitchellii*), was observed (Texas Instruments Incorporated; Ecological Services 1976). Other documented fauna include seven species of state listed and/or park rare reptiles and amphibians (Resetar 1985, 1994). These species are spotted turtle (*Clemmys guttata*), four-toed salamander (*Hemidactylium scutatum*), northern leopard frog (*Rana pipiens*), western chorus frog (*Pseudacris triseriata*), blue-spotted salamander (*Ambystoma laterale*), and massasauga rattlesnake (*Sistrurus catenatus catenatus*).

Impacts of Alternative 1 (No Action)

Under the No Action Alternative, the site would continue under the current management plan. No significant changes or improvements would occur to the site. The No Action Alternative would have negligible beneficial impacts on the site's rare, threatened, or endangered species.

Intensity

- Negligible: Rare, threatened, or endangered species would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to these species.
- Minor: Effect on rare, threatened, or endangered species or habitats would be measurable or perceptible, but localized within a small area. While the mortality of individual species might occur, the viability of populations would not be affected and the community, if left alone, would recover.
- Moderate: A change in populations or habitats would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity, or quality of population. Mitigation measures would be necessary to offset adverse effects, and would likely be successful.
- Major: Effects on populations or habitats would be readily apparent, and would substantially change populations over a large area in and out of the national park. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured.

Duration

• Short-term: Effects lasting less than 2 years.
• Long-term: Effects lasting longer than 2 years.

Cumulative Effects

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland

(CBWC). Events 5, 8, 9, 10, and 11 in concert with soil subsidence, resulted in the obliteration of habitat for many sensitive plant and animal species.

Conclusions

Under the No Action Alternative, no actions would occur to the site. The No Action Alternative would result in negligible beneficial impacts to rare, threatened, or endangered species. The No Action Alternative, combined with the cumulative actions, would result in a negligible adverse long-term impact on rare, threatened, or endangered species. Rare, threatened, or endangered species would not be affected as a result of Alternative 1.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative

Management Policies 2006 (National Park Service 2006) states that the National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible. The National Park Service is required to survey for, protect, and strive to recover all federally listed species and to maintain listed species' habitats. The purpose of this project is to restore an approximately 25 acre portion of CBWC to its former lake plain wet-mesic prairie conditions. It is anticipated that no rare, threatened, or endangered species or their habitat will be impacted as part of the common tree (red maple, black cherry, and black locust) and understory (spicebush) removal. Additionally, it is anticipated that the restoration of the lake plain wet-mesic prairie will bring back a rare habitat and associated species to the area.

Cumulative Effects

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). Events 5, 8, 9, 10, and 11 in concert with soil subsidence, resulted in the obliteration of habitat for many sensitive plant and animal species.

Conclusions

Alternative 2 would result in minor short-term adverse impacts to rare, threatened, or endangered species (if present) from tree and understory removal activities and use of construction equipment. Per request of U.S. Fish and Wildlife trees would be removed between Oct and March. Shrubs could be removed at any time. This alternative, in combination with the cumulative actions, would result in negligible adverse short-term impacts on rare, threatened, or endangered species. Massasauga rattlesnake and Mitchell's satyr butterfly habitat would result from the restoration actions. Populations of five state listed plant species would be established in the prairie plant community. Habitat for spotted turtle, four-toed salamander, northern leopard frog, western chorus frog, and blue-spotted salamander would be provided (personal communication with Dr. Ralph Grundrel USGS wildlife ecologist), therefore, this alternative would have a beneficial impact on rare, threatened, or endangered species.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation

The National Park Service *Management Policies 2006* (National Park Service 2006) states that the National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible. The National Park Service is required to survey for, protect, and strive to recover all federally listed species and to maintain listed species' habitats. The purpose of this project is to restore approximately 25 acres of CBWC to its former lake plain wet-mesic prairie conditions. It is anticipated that no rare, threatened, or endangered

species will be impacted as part of the common tree and understory removal. Additionally, it is anticipated that the restoration of the lake plain wet-mesic prairie will bring back a rare habitat and associated species to the area.

Cumulative Effects

The annihilation of the western dune-wetland ecosystem (Event 8) in conjunction with construction of the sand berm (Event 9) prevented water flow to the west. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road (Event 10). These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC (Event 5). Conversion of wetland to open water south of the sand berm (Event 11) resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). Events 5, 8, 9, 10, and 11 in concert with soil subsidence, resulted in the obliteration of habitat for many sensitive plant and animal species.

Conclusions

Alternative 3 would result in minor short-term adverse impacts to rare, threatened, or endangered species from tree and understory removal activities and use of construction equipment. This alternative, in combination with the cumulative actions, would result in negligible adverse short-term impacts on rare, threatened, or endangered species. Massasauga rattlesnake and Mitchell's satyr butterfly habitat would result from the restoration actions. Populations of five state listed plant species would be established in the prairie plant community. Habitat for spotted turtle, four-toed salamander, northern leopard frog, western chorus frog, and blue-spotted salamander would be provided (personal communication with Dr. Ralph Grundrel USGS wildlife ecologist). Therefore, this alternative would have a beneficial impact on rare, threatened, or endangered species.

3.2.5 Water Quality

Affected Environment

Inspection of adjacent land west and south of the open water body failed to locate culverts or landscape features that would convey surface water into the open water body from the south or west. Therefore, one must assume that water level in the open water body is driven by precipitation and groundwater from the Lake Border Moraine. Surface water from the open water body is conveyed east to the disturbed prairie unit of CBWC (Figure 11) through a connecting ditch. This ditch connects to two ditches on the west edge of the disturbed prairie unit. The ditches in the disturbed prairie unit convey surface water from the open water body into the east shrub unit of CBWC.

Surface water from the Lake Border Moraine is captured by a ditch system south of South Shore Railroad. The surface water is directed to a culvert that lies beneath South Shore Railroad and Mineral Springs Road. This culvert surfaces on the east side of Mineral Springs Road. Therefore, surface water from the Lake Border Moraine is directed to a portion of Great Marsh east of Mineral Springs Road.

The watershed of CBWC is largely defined by maximum dune elevation of adjacent dunes on the western and northern boundary of CBWC and on the western, northern and eastern boundary of the wetland contiguous to CBWC. This contiguous wetland to the north of CBWC is parkland which belongs to the town of Dune Acres. Political boundaries aside, this wetland is ecologically and hydrologically part of Great marsh and should be considered part of CBWC.

High dunes on the perimeter of CBWC comprise of 38.2 hectares and the adjacent contiguous wetland totals 15.5 hectares. This relatively small watershed is reflected by a minimum increase in water levels following rain events.

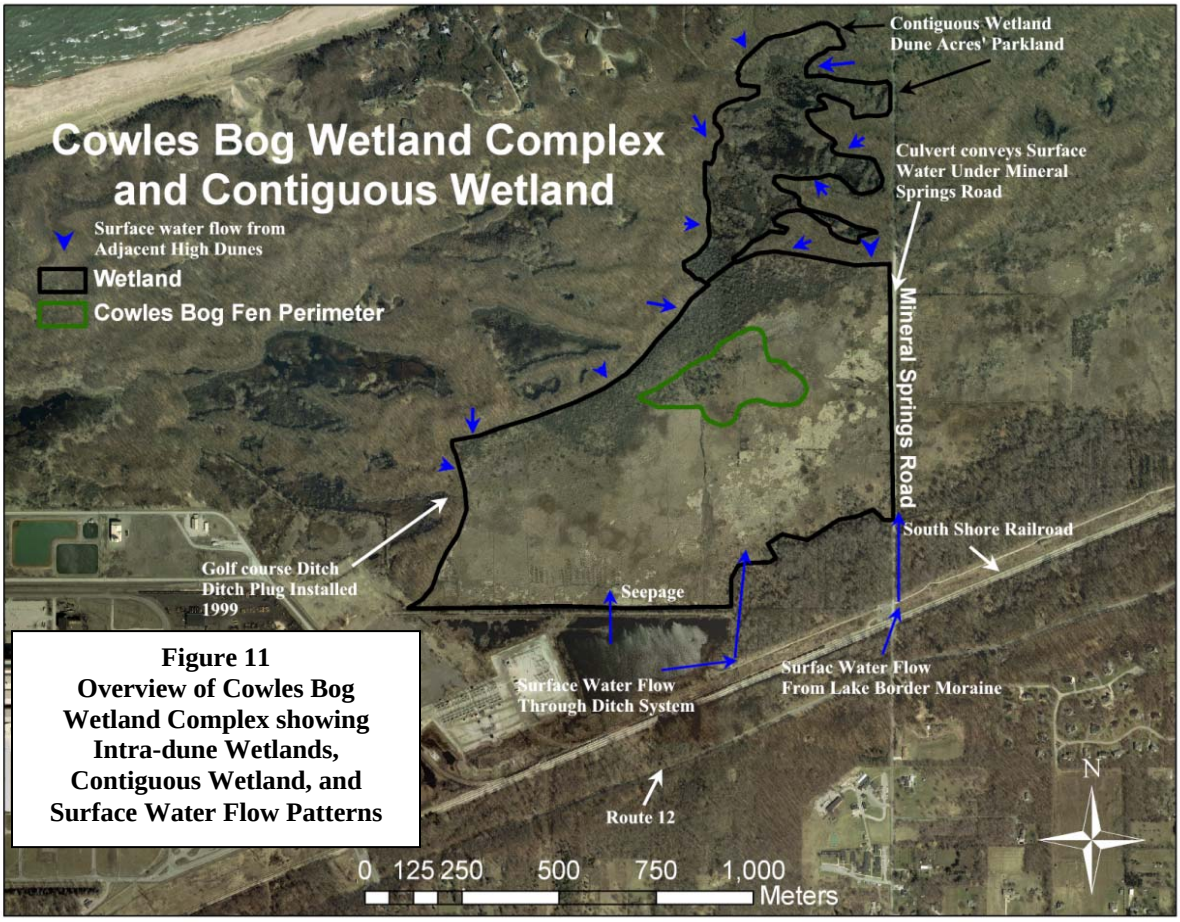


Figure 11
Overview of Cowles Bog Wetland Complex showing Intra-dune Wetlands, Contiguous Wetland, and Surface Water Flow Patterns

Figure courtesy of National Park Service

Three primary ditches are present in the Unit (Figure 12). Ditch-A has a length of 1,083 feet and average width and depth (based on 14 measurements) of 9.0 feet and 1.5 feet, respectively. Ditch-B is a double ditch. Ditch-B1 has a length of 952 feet and Ditch-B2 has a length of 417 feet. Based on eight measurements, Ditch-B1 has an average width of 7.5 feet and a depth of 1.4 feet. Ditch-B2 has an average width of 8.3 feet and depth of 1.3 feet. Ditch-C has a length of 1,198 feet and based on 14 measurements an average width and depth of 8.5 feet and 1.5 feet, respectively.

There are 18 secondary ditches comprising 6,338 linear feet associated with Ditch-A. Of these 18 ditches, There are eight ditches comprising 3,260 linear feet that have a direct connection to Ditch-A or are directly connected to a ditch with a direct connection to Ditch-A. The other ten ditches are fragmented pieces or flow into Ditch-A under high flow rates only. These ditches comprise 3,078 linear feet. There are 11 secondary ditches south of Ditch-C representing 2,872 linear feet. Eight of these ditches comprising 2,087 feet have a direct connection to Ditch-C. The other three ditches representing 787 feet only flow into Ditch-C under high flow events. Secondary ditches vary in width and are shallow with a depth ranging from three to five inches. Secondary ditches with a direct connection to primary ditches typically exhibit a width ranging from three to six feet. Other secondary ditches may have a wider width due to ditch overflow resulting in erosive expansion of the original ditch width.

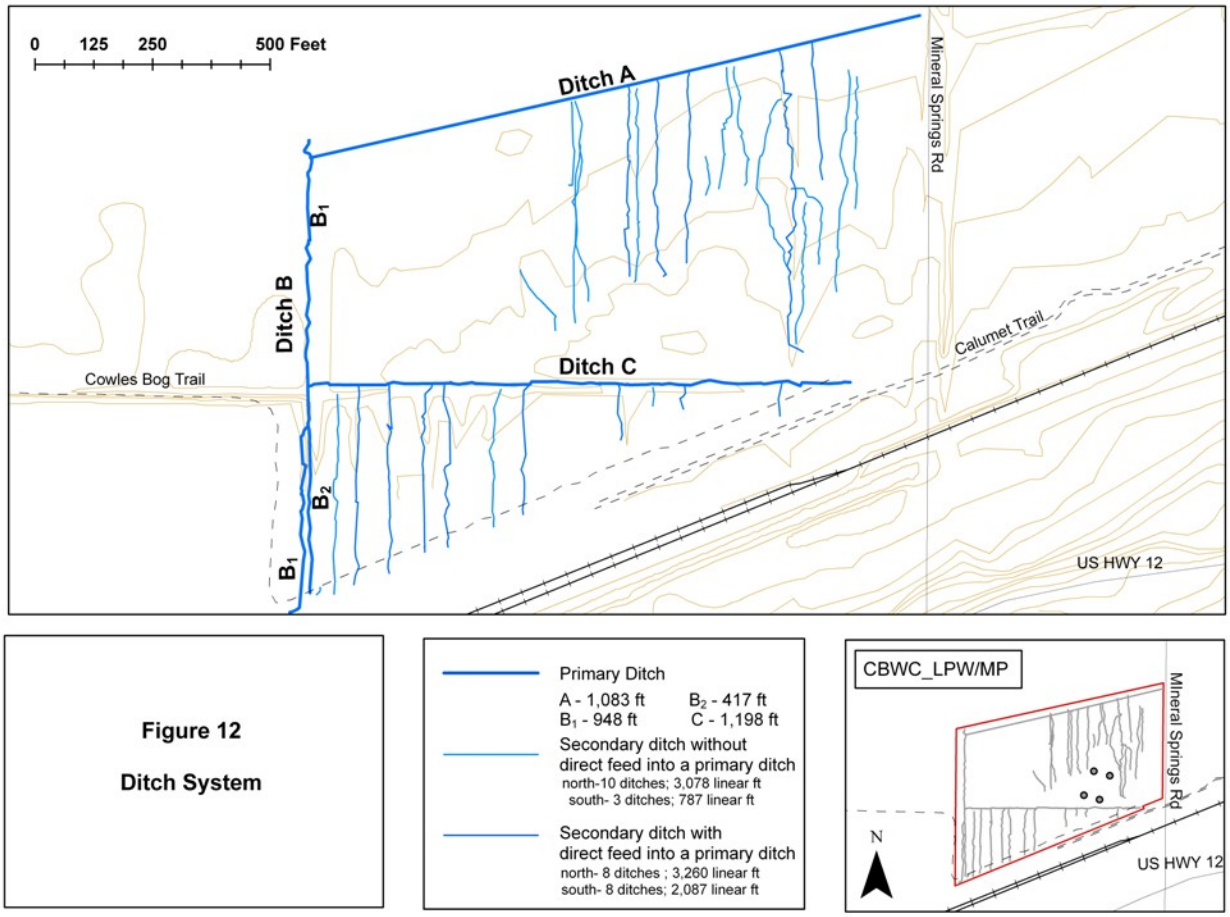


Figure courtesy of National Park Service

Intensity

- Negligible: Surface water quality would not be affected, or changes would be either non-detectable or if detected, would have effects that would be considered slight and localized.
- Minor: Changes in surface water quality would be measurable, although the changes would be small and the effects would be localized. No mitigation measures associated with water quality would be necessary.
- Moderate: Changes in surface water quality would be measurable, but would be relatively local. Mitigation measures associated with water quality would be necessary and the measures would likely succeed.
- Major: Changes in surface water quality would be readily measurable, would have substantial consequences, and would be noticed on a regional scale. Mitigation measures would be necessary and their success would not be guaranteed.

Duration

• Short-term: Following construction, recovery would take less than one year.
• Long-term: Following construction, recovery would take longer than one year.

Impacts of Alternative 1 (No Action)

Under the No Action Alternative, the site would continue under the current management plan. No significant changes or improvements would occur to the site. The No Action Alternative would have negligible beneficial impacts on the site's water quality.

Cumulative Effects

The hydrology in the area has been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous other ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intradunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road. These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC and contamination of the wetland. Conversion of wetland to open water south of the sand berm resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC).

Conclusions

Under the No Action Alternative, no actions would occur to the site. The No Action Alternative would result in negligible beneficial impacts to water quality. The No Action Alternative, combined with the cumulative actions, would result in a negligible adverse long-term impact on water quality. Water quality would not be improved from its altered state as a result of Alternative 1.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative

A summary of reparative actions on existing ditches is provided in Table 4. Reparative actions will be taken on 3,650 linear feet and 4,080 linear feet on primary and secondary ditches, respectively. Twenty-six clay plugs using 381 cubic feet of clay will be installed and 22,557 cubic feet of reparative soil will be placed in the ditches. In total, 35,706 square feet of ditch area will be repaired. In the process of creating wetland habitat in the open water body and a groundwater replenishment zone, 173,293 cubic feet of soil will be moved.

Table 4: Ditch Reparative Actions -Clay Plugs, Volume of Soil, Wetland Area Repaired					
Primary Ditches	**Ditch Length**	**Clay Plugs**		**Reparative Soil**	**Wetland Area Repaired**
	Feet	#	Cubic feet	Cubic feet	Square feet
A	1,083	2	70	1,104	880
B-1	952	2	52	4,604	5,004
B-2	417	2	49	2,684	3,346
C	1,198	4	153	9,265	10,236
Secondary Ditches					
North	3,280	10	36	3,900	13,040
South	800	6	21	1,000	3,200
Total	**7,726**	**26**	**381**	**22,557**	**35,706**

Cumulative Effects

The hydrology in the area has been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908) and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intradunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road. These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC and contamination of the wetland. Conversion of wetland to open water south of the sand berm resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC).

Conclusions

The use of construction equipment to remove the trees and understory and create the water recharge area would result in minor adverse short-term effects to water quality. Potential effects would be minimized by Best Management Practices (BMP's) and control of stormwater runoff during the removal of the vegetation prior to the re-installation of the desired vegetation. Alternative 2, combined with the cumulative actions, would result in minor adverse short-term effects. Movement of water in a northerly direction through groundwater flow rather than ditch flow should have some long-term beneficial impact to water quality.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation

A summary of reparative actions is provided in Table 4. Reparative actions will be taken on 3,650 linear feet and 4,080 linear feet on primary and secondary ditches, respectively. Twenty-six clay plugs using 381 cubic feet of clay will be installed and 22,557 cubic feet of reparative soil will be placed in the ditches. In total, 35,706 square feet of ditch area will be repaired. In the process of creating wetland habitat in the open water body and a groundwater replenishment zone, 173,293 cubic feet of soil will be moved.

Cumulative Effects

The hydrology in the area has been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intradunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road. These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC and contamination of the wetland. Conversion of wetland to open water south of the sand berm resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC).

Conclusions

The use of construction equipment to remove the trees and understory and create the water recharge area would result in minor adverse short-term effects to water quality. Potential effects would be minimized by Best Management Practices (BMP's) and control of stormwater runoff during the removal of the vegetation prior to the re-installation of the desired vegetation. Alternative 3, combined with the cumulative actions, would result in minor adverse short-term effects. Movement of water in a northerly direction through groundwater flow rather than ditch flow should have long-term beneficial impact to water quality.

3.2.6 Wetlands

Affected Environment

This project intends to enhance 7.6 acres of existing wetland and restore 17.4 acres of non-functioning wetland to a wetland-upland complex comprised of wet-mesic prairie in which wet prairie would be the major land form. In addition, 1 to 1.5 acres of existing wetland which is inundated with water depths that prevent establishment of emergent wetland vegetation will be restored.

Intensity

- Negligible: Wetlands would be neither directly impacted by the fill of ditches nor indirectly impacted by changes in drainage patterns, surface water quality, or subsurface hydrology.
- Minor: The activity would require permit coordination through the U.S. Army Corps of Engineers (ACOE) and indirect impacts from changes in drainage patterns, surface water quality, or subsurface hydrology would be detectable, although short-term.
- Moderate: The activity would require permit coordination through the ACOE and Indiana Department of Environmental Management (IDNR). It should be noted that mitigation may be required. Indirect impacts from changes in drainage patterns, surface water quality, or subsurface hydrology would be detectable, and considered long-term.
- Major: Wetland fill would occur in any size of wetlands of exceptional quality and/or any other wetlands requiring permit coordination through the ACOE and IDNR. It should be noted that mitigation may be required. Indirect impacts from changes in drainage patterns, surface water quality, or subsurface hydrology would be detectable, and considered long-term.

Duration

• Short-term: Occurs only during construction.
• Long-term: Effects extend beyond construction.

Impacts of Alternative 1 (No Action)

Under Alternative 1, the site would continue under the current management plan. No new activities would occur and only minimal maintenance would be performed. The existing wetlands would not be impacted, resulting in negligible impacts to wetlands. No additional wetland acreage would result from restoration of hydrology.

Cumulative Effects

The hydrology in the area has been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908) and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intra-dunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road. These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC and contamination of the wetland. Conversion of wetland to open water south of the sand berm resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). The cumulative effect of these past and future actions results in minor effects on wetlands.

Conclusions

Implementation of Alternative 1, the No Action Alternative, would not impact wetlands, resulting in negligible short term impacts to wetlands. Wetlands would not be harmed as a result of this alternative nor would additional wetland acres be realized.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative

Under Alternative 2, the site would have the current trees and understory removed and the drainage ditches on-site would be plugged to prevent the water from leaving the site so quickly. Along the western side of the site, the culvert between the open water pond and the project area would be restored and a groundwater replenishment zone would be constructed on the project area for the purpose of restoring wet-mesic prairie hydrology (see Figure 13).

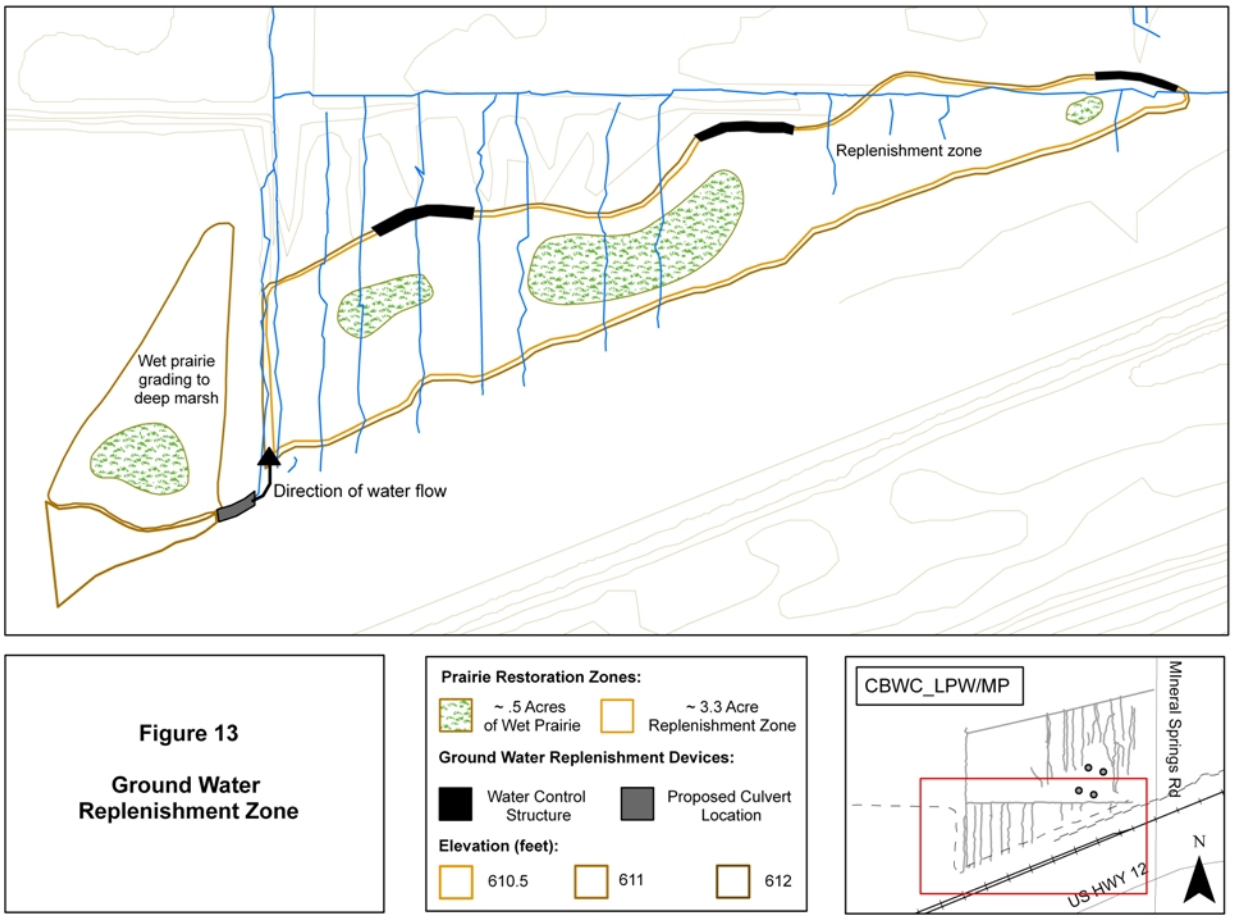


Figure courtesy of National Park Service

Cumulative Effects

The hydrology in the area has been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intradunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road. These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC and contamination of the wetland. Conversion of wetland to open water south of the sand berm resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). The cumulative effect of these past and future actions would result in minor effects on wetlands.

Conclusions

Implementation of Alternative 2 would effectively convert the site from a degraded upland/wetland complex to a lake plain wet-mesic prairie. Today, lake plain wet-mesic prairie is globally imperiled. The National Park Service intends to restore a portion of Cowles Bog to lake plain wet-mesic prairie and allow access to the public. The 25 acres associated with CBWC were selected based on unique historic records documented by Henry Cowles and the 1830 government land survey of the Northwest Territory, which record the site as having marsh characteristics consistent with lake plain wet-mesic prairie habitat. The National Park Service has determined that the site, with restored hydrology and removal of non-historic vegetation, will re-establish a degraded portion of CBWC back to its natural state and will provide the public with a glimpse of a rare habitat. Alternative 2 would restore alter the current wetlands to a different and more appropriate type of wetland to the area; this restoration combined with the cumulative actions would result in moderate long term positive impacts to wetlands.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation

Under Alternative 3, the site would have the current trees and understory removed and the two drainage ditches on-site would be plugged to prevent water from leaving the site so quickly. Along the western side of the site, the culvert between the open water pond and the project area would be restored or replaced and water retention areas would be constructed on the project area to hold water that will be utilized for the resurgence of the lake plain wet-mesic prairie (see Figure 12).

Cumulative Effects

The hydrology in the area has been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intra-dunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. Beaver built a dam at the culvert conveying water east under Mineral Springs Road causing water to flow over Mineral Springs Road. These events resulted in a confined wetland with a normal water level based on the elevation of Mineral Springs Road. Water from fly ash operations entered Golf Course ditch resulting in unnatural conveyance of surface water into CBWC and contamination of the wetland. Conversion of wetland to open water south of the sand berm resulted in a positive hydrostatic head maintaining stable water levels in the confined wetland (CBWC). The cumulative effect of these past and future actions would result in minor effects on wetlands.

Conclusions

Implementation of Alternative 3 would effectively convert the site from a degraded upland/wetland complex to a lake plain wet-mesic prairie. Today, lake plain wet-mesic prairie is globally imperiled. The National Park Service intends to make restore a portion of Cowles Bog to lake plain wet-mesic prairie and allow access to the public. The 25 acres associated with CBWC were selected based on unique historic records documented by Henry Cowles and the 1830 government land survey of the Northwest Territory, which record the site as having marsh characteristics consistent with a lake plain wet-mesic prairie habitat. The National Park Service has determined that the site, with restored hydrology and removal of non-historic vegetation, will re-establish a degraded portion of CBWC back to its natural state and will provide the public with a glimpse of a rare habitat. Alternative 3 would alter the current wetlands to a different and more appropriate type of wetland to the area; this alteration, combined with the cumulative actions, would result in moderate; long term impacts to wetlands.

3.2.7 Cultural Resources

Affected Environment

The National Historic Preservation Act, as amended (16 USC 470 *et seq*.), the National Environmental Policy Act (42 USC 4321 *et seq*.), and the National Park Service's Director's Order #28 [*Cultural Resource Management Guideline* (National Park Service 1997a), *Management Policies 2006* (National Park Service 2006), and Director's Order #12, *Conservation Planning, Environmental Impact Analysis, and Decision Making* (National Park Service 2001)], require the consideration of potential impacts on archeological resources, Indian trust resources, historic structures, cultural landscapes, museum collections, and ethnographic resources listed in or eligible for listing in the National Register of Historic Places (NHRP).

With the establishment of the National Lakeshore in 1966 the National Park Service acquired properties associated with a once large and active Swedish community established in the nineteenth century in the area around the Little Calumet River. A context study, entitled Swedish Baileytown: A Nineteenth Century Rural Enclave, was prepared in 2001 to provide a historic context as well as a framework to evaluate several of the Swedish properties for the National Register of Historic Places. The archeological site (12PR390), as noted below, was home to one of the Swedish community members.

Earthen Berm by Historic Homesite
Courtesy of National Park Service

The Midwest Archeological Center (MWAC) conducted a site investigation and determined that the footprint of an early twentieth century homestead on the site should not be disturbed. The archeological site (12PR390) was documented by Forest Frost in 1993 (Frost 2001) as part of a park-wide inventory. Frost wrote that the site contains the remains of at least two structures, one with a 2 x 6 meter brick foundation and the second with a 7 x 7 meter earthen berm. Shovel tests resulted in documentation of household items such as a perfume bottle, mustard jar, and several pieces of metal. Frost states that based on household items and hard fired bricks the structures were constructed and occupied sometime between 1890 and 1910. Frost reported a row of trees on the west comprised of black locust (*Robinia pseudoacacia*) and black oak (*Quercus velutina*). It was suggested by Frost that the row of trees was associated with a fence line.

Porter County Platt maps of 1876 and 1895 do not show a structure present at the site. The 1906 and 1921 Porter County Platt maps show a structure at the present day footprint on land owned by P.W. Peterson in 1906 and by Freund et. al. in 1921. Henry Studebaker, a long time resident of Dune Acres, communicated that the house was constructed by his grandmother's brother Peter Peterson and that it was destroyed by fire in the early decades of the 20th century (Henry Studebaker was born in the town of Dune Acres in 1927).

A tree census conducted in 2009-2010 failed to locate black oak trees but several large white oak trees are present. Two of the white oaks were positioned next to each other. There is present a cluster of black locust trees. Six of the black locust trees have a trunk diameter ranging from 40 to 50 cm and may have been present at the time of home occupation. However, the average life span of a black locust tree ranges

only from 75 years to 100 years. A linear positioning of black locust trees was not observed. There were many fallen trees and trees that no longer exhibited healthy growth.

Ground disturbance at the site will not be necessary to achieve wetland restoration for all action alternatives. The site is located at a ground elevation of 611 with a decline of six feet to the north within approximately 1,000 linear feet. Submergence of the site would result in five to six feet of water on Mineral Springs Road. Due to its location and insufficient water source submergence of the site is unattainable.

All action alternatives plan to avoid the historic resource and the National Park Service will do additional studies. Coordination of cultural resources with the Indiana State Historic Preservation Office is underway.

Dead Tree by Historic Homesite
Courtesy of National Park Service

Intensity

- Negligible: Cultural resources would not be affected by on-site vegetation removal and earthwork activities.
- Minor: The cultural resources found on the site would not be impacted, but an area within 50 feet of the site would be impacted by vegetation removal and earthwork activities.
- Moderate: Cultural resources would be impacted by on-site vegetation removal and earthwork activities; this activity would require phase II cultural resource activities and curation of artifacts collected.
- Major: Cultural resources would be degraded by on-site vegetation removal and earthwork activities; this activity would require phase II cultural resource activities and curation of artifacts collected.

Duration

• Short-term: Occurs only during construction.
• Long-term: Effects extend beyond construction.

Impacts of Alternative 1 (No Action)

Under Alternative 1, the site would continue under the current management plan. No new activities would occur and only minimal maintenance would be performed. The existing homestead would not be impacted, resulting in negligible impacts to cultural resources.

Cumulative Effects

The cultural resources have been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intra-dunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional

ditches. The cumulative effect of these past and future actions would result in minor effects on cultural resources.

Conclusions
Implementation of Alternative 1, the No Action Alternative, would not impact cultural resources, resulting in negligible impacts.

Impacts of Alternative 2: Retention of Selected Trees – Preferred Alternative
Under Alternative 2, the tree and understory vegetation would be removed except for the area within and 50 feet around the old homestead found on-site.

Cumulative Effects
The cultural resources present at the site have been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intra-dunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. The cumulative effect of these past and future actions would result in minor effects on cultural resources.

Conclusions
Implementation of Alternative 2 would not impact cultural resources. Additional cultural resource investigations are being planned by the National Park Service.

Impacts of Alternative 3: Removal of all Trees and Understory Vegetation
Under Alternative 3, the tree and understory vegetation would be removed except for the area within and 50 feet around the old homestead found on-site.

Cumulative Effects
The cultural resources have been altered by the following events: Transportation infrastructure was constructed, including the Buffalo and Mississippi Railroad (1830-1840), South Shore Line Railroad (1906-1908), and U.S. Route 12 (1920's), at the northern edge of the Lake Border Moraine and on a portion of the Calumet Dune Beach complex. Jurisdictional ditches, State Ditch and Samuelson Ditch (1880 – 1920), were constructed in CBWC. Numerous ditches were constructed throughout the lake plain wet-mesic prairie of Great Marsh (1920's), extending from the Lake Border Moraine to the sedge meadow of Great Marsh. The lake plain wet-mesic prairie of Great Marsh was utilized for commercial and residential purposes (1900-present). Intra-dunal wetlands, Cranberry Bog and Little Lake, were drained for golf course construction (late 1920's). Drainage of these wetlands required the construction of additional ditches through CBWC to convey water from these intra-dune wetlands to jurisdictional ditches. The cumulative effect of these past and future actions would result in minor effects on cultural resources.

Conclusions
Implementation of Alternative 3 would not impact cultural resources, resulting in negligible short term impacts. Consideration will be given to the retention or recordation of any cultural vegetation prior to

removal. Additional cultural resource investigations are being planned by the National Park Service prior to implementation of the project.

4. CONSULTATION/COORDINATION

Tribes/Agencies/Organizations/Individuals Contacted

Consultation and coordination conducted thus far regarding the proposed restoration of a portion of Cowles Bog Wetland Complex (CBWC) to lake plain wet-mesic prairie habitat includes coordination with the United States Army Corps of Engineers (USACE), National Park Service – Indiana Dunes (National Park Service –INDU), Indiana Department of Natural Resources – Division of Natural Preserves (IDNR–DNP), United States Fish & Wildlife Service (USFWS), United States Geological Survey (USGS), and Indiana Department of Environmental Management (IDEM). Representatives from all of the aforementioned agencies were present at the Agency Coordination Meeting on July 20, 2011 except for the IDEM 401 Coordinator and the Indiana Department of Natural Resources Threatened and Endangered Species Coordinator. Initial perspectives and recommendations from agencies (if known) are described below. Agencies will be provided a copy of the Environmental Assessment asked to respond with any information or concerns. Any comments from Agencies that responded to the request for information or concerns will be taken into account before the decision document is signed for this project.

Tribes

The Native American tribes listed below have demonstrated interest in the areas within the Lakeshore. Letters will be sent to these tribes and tribal contacts regarding the proposed project in March, 2012.

- Citizen Band Potawatomi Nation of Oklahoma
- Hannahville Indian Community of WI Potawatomi Indians of Michigan
- Prairie Band of Potawatomi Indians of Kansas
- Match-e-be-nash-she-wish Band of Potawatomi Indians
- Pokagon Band of Potawatomi Indians of Michigan
- Nattawaseppi Huron Band of Potawatomi Indians
- Forest County Potawatomi
- Miami Nation of Indians of Indiana (MNI)
- Miami Tribe of Oklahoma (MTO)

Any comments and National Park Service responses resulting from letters sent to the above tribal organizations will be taken into account before the decision document is signed for this project.

State Historic Preservation Office

The consultation between the National Park Service and SHPO was initiated in March 2012. Any comments and National Park Service responses resulting from consultation with SHPO will be taken into account before the decision document is signed for this project. As recommended by MWAC, during the restoration actions, the historic foundation within the project area and the majority of associated nearby trees will be avoided. It is recommended that a 50 foot buffer exist between earthwork activities and the historic foundation to avoid disturbance of the foundation and any associated artifacts. Instead of using machinery to remove unwanted trees near the historic foundation (including *Acer rubrum* and *Robinia pseudoacacia*), they will be girdled. These species must be removed to ensure the success of the proposed vegetation restoration as they tend to spread rapidly in clusters, and would contribute to vegetative cover not associated with species indicative of wet-mesic prairie habitat.

INDR–DNP representative, John Ervin, has recommended using small, rubber-tired bulldozers to scrape the surface and perform the proposed earth moving activities. This would also churn the underlying seed bank to help stimulate desired vegetation that existed before the area was highly forested by uncharacteristic species. The use of this machinery is not proposed on or near the historic foundations. Measures will be used to mark off the buffer zone to assist field crews in locating and avoiding the

historic foundation. The National Park Service is anticipating comment from the Indiana SHPO regarding the proposed activity and anticipated effects. Their input will be considered before the decision document is signed for this project.

U.S. Fish and Wildlife Service

Elizabeth McCloskey was present at the Agency Coordination Meeting on July 20, 2011. Ms. McCloskey suggested that although there are trees on the site that could be used by the Indiana bat for habitat, the tree cover was dense enough that there are not any flight corridors; therefore, removal of trees does not seem to greatly affect suitable Indiana bat habitat. Ms. McCloskey also noted that the trees should not be removed when the ground is wet so that amphibians that might be utilizing the site would not likely be impacted. A letter dated August 19, 2011 from Ms. McCloskey with comments is found in Appendix A. In the letter, she provides information that the project lies within the range of federally endangered, threatened, and candidate species. Specific information regarding each species is provided. In addition, it is suggested that cutting of trees be done between October 1 and April 1. The project plans on complying with this suggestion. The Environmental Assessment will be provided to USFWS as part of informal consultation under the Endangered Species Act. Based upon coordination to date, the National Park Service expects a finding of "may affect, but not likely to adversely affect" any threatened or endangered species or their habitat.

Indiana Department of Natural Resources

Formal coordination of threaten and endangered species has not been fully completed with IDNR.

Indiana Department of Environmental Management

Indiana Department of Environmental Management Formal coordination of the wetland permitting processes with IDEM has taken place. Since the project impacts total more than 0.1 acre and the project area involves water within the National Lakeshore which has been designated an Outstanding State Water Resource an individual (site-specific) 401 Water Quality Certification (401 WQC) will be required. Formal coordination of the wetland permitting processes will continue with IDEM following the finalization of the EA document.

United States Army Corps of Engineers

Formal ditch plugging/wetland permitting processes will commence with USACE following the finalization of this EA document. Paul Leffler, USACE representative, was present at the Agency Coordination Meeting on July 20, 2011. It was noted during the meeting that sedimentation is of primary concern; control structures and BMPs (best management practices) should be in place prior to work to prevent unintended sedimentation/fill of wetlands. Any fill to be placed in the wetland complex or in the ditches must be coordinated with USACE and IDEM, as any ground or surface water connection to waters of the United States will make these ditches/wetlands subject to USACE and IDEM regulation.

It was noted during the meeting that impacts to the wetland complex and project area must be kept under 1 acre to avoid requiring an individual permit. Formal consultations with USACE confirmed that the project would qualify for a Nationwide Permit 27: Aquatic Habitat Restoration and Enhancement Activities.

Public Involvement

An Agency Coordination Meeting followed by a Public Involvement meeting was held on July 20, 2011 at the Indiana Dunes National Lakeshore facility.

Agency Coordination Meeting

The intent of the Agency Coordination Meeting was to focus on park staff, federal agencies, state agencies, and the adjacent property owner. Invitations to the Agency Coordination Meeting were sent to the following agencies:

- USGS
- USACE
- IDEM – Office of Water Quality
- IDNR
- USFWS

The meeting was scheduled for 1:00 p.m. on Wednesday July 20, 2011, at the Park Headquarters, 1100 North Mineral Springs Road, Porter, Indiana 46350, with an optional field visit scheduled for 10:30 a.m. the same day. A summary of the meeting in presented in Appendix A

Public Involvement Meeting

A public input meeting was scheduled for the same day as the agency meeting. A press release was prepared to announce the meeting. The public meeting was held at 7:00 p.m., July 20, 2011, in the Park Meeting Room at Park Headquarters, 1100 North Mineral Springs Road, Porter, Indiana 46350. Twenty-seven people signed in on the attendance sheet. Presentations were made at the meeting which was followed by a question and answer session. A summary of the meeting in presented in Appendix A

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6. LIST OF PREPARERS

Contributors:

National Park Service

Chevance, Nick, Regional Environmental Coordinator, Midwest Regional Office, Omaha, NE

Mason, Dan, Botanist, Indiana Dunes National Lakeshore, Porter, IN

Preparers:

Lawhon & Associates, Inc.

Daniels, Susan, P.E., AICP, President, Westerville, OH

Lashley, Nichole, Senior Scientist, Project Manager, Dayton, OH

Powell, Thomas G., CPG, Vice President, Cleveland, OH

Thrush, Eliza, Junior Scientist, Westerville, OH

Wagner, Krista, Junior Scientist, Westerville, OH

APPENDIX A
AGENCY AND PUBLIC CORRESPONDENCE

Dan
Mason

United States Department of the Interior
Fish and Wildlife Service

Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

August 19, 2011

Mr. Constantine J. Dillon
Superintendent
Indiana Dunes National Lakeshore
1100 North Mineral Springs Road
Porter, Indiana 46304

Dear Mr. Dillon:

This responds to the letter dated July 22, 2011, requesting endangered species information from the U.S. Fish and Wildlife Service regarding the proposed Cowles Bog Wetland Complex restoration of 25 acres of wet-mesic prairie at a site currently covered with woodland. The site was drained and farmed by the 1930's but was abandoned in the 1950's, with trees, primarily red maple, moving in to the site between 1954 and 1971. The 25 acres are now populated by 3,400 trees and a dense shrub layer of spice bush. It is proposed to remove the majority of the trees, although several old oaks and maples will be left at a former upland homestead site and various other individual trees, such as pin oak and black gum, will remain scattered throughout the site. Hydrology will be restored as groundwater through plugging the numerous ditches. The site is located along Mineral Springs Road north of US 12 and south of the main Cowles Bog Wetland Complex, Porter County, Indiana.

The proposed project is within the range of the following Federally endangered, threatened, and candidate species:

Species	Habitat
Indiana bat (Myotis sodalis) Endangered	summer: forested areas typically associated with water resources; roost in trees with exfoliating bark
Karner blue butterfly (Lycaeides melissa samuelis) Endangered	pine barrens and oak savanna with sandy soils and containing wild lupine
Pitcher's (dune) thistle (Cirsium pitcheri) Threatened	Great Lakes shoreline – stabilized dunes and blowout areas

Eastern massasauga rattlesnake (Sistrurus catenatus catenatus) Candidate	wetlands and adjacent uplands

Porter County also includes 9.7 kilometers (32,000 feet) of designated critical habitat for the endangered piping plover (Charadrius melodus) along the Lake Michigan shoreline between the INDU/NIPSCO property line within the Dune Acres/Cowles Bog Unit and Kemil Road/East State Park Boundary Road at Beverly Shores. This critical habitat is north of the proposed project area and would not be affected by the project.

The eastern massasauga is found within suitable habitats at INDU east of the project study area and is not known to currently be present within the area which will be affected by the proposed project. However, restoration of the 25 acres to wet-mesic prairie may provide suitable habitat for this species.

Karner blue butterflies are present at INDU within several savanna complexes west of Burns Waterway and within Howes Prairie northeast of the proposed project site. There is no suitable habitat for this species within the Cowles Bog Wetland Complex.

Pitcher's thistle is present within dunes and blowouts landward of the beach within several units of INDU, but there is no suitable habitat for this species within the Cowles Bog Wetland Complex.

The Indiana bat has been found at the Heron Rookery Unit of INDU but so far not at any other sites within the Lakeshore. The existing woodland at the proposed project site may provide suitable summer nursery colony roosting and foraging habitat for this species. The U.S. Fish and Wildlife Service in Indiana considers Indiana bats to be present in suitable habitat unless mist net surveys indicate that they are unlikely to be present. However, we also have tree clearing restrictions to protect woodlands from being cut/cleared during the summer nursery season. These restrictions allow trees to be removed only between October 1 and April 1 when the bats would not be present. Considering the size of the project area woodland (25 acres) and the presence of numerous other woodlands containing suitable Indiana bat habitat within INDU and adjacent State-owned and private properties, we believe that in this case if the trees are cleared between October 1 and April 1, the Indiana bat would be adequately protected. However, if tree clearing is proposed between April 1 and October 1, a mist net survey would be necessary to determine whether or not this species is present.

These endangered species comments constitute informal consultation only. They do not fulfill the requirements of Section 7 of the Endangered Species Act of 1973, as amended.

Thank you for this opportunity to provide comments on this proposed project. If you have any questions, please contact Elizabeth McCloskey at (219) 983-9753 or elizabeth_mccloskey@fws.gov.

Sincerely yours,

Elizabeth S. McCloskey Acting

for Scott E. Pruitt
Supervisor

National Park Service
Indiana Dunes National Lakeshore

Cowles Bog Wetland Complex

Restoration of Lake Plain Wet-Mesic Prairie

Scoping Report

March 5, 2012

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Introduction

At Indiana Dunes National Lakeshore, National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore the area as a lake plain wet-mesic prairie, the wetland type that existed prior to disturbance by human activities over the last century. The project is located in the southeast portion of the Cowles Bog Wetland Complex, directly situated on the west side of Mineral Springs Road, north of the railroad tracks, at Indiana Dunes National Lakeshore (park).

The National Park Service is preparing an Environmental Assessment (EA) for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, National Park Service initiated a public scoping process. The purpose of the scoping phase was to solicit input on issues that should be considered in the development of alternatives, as well as what topics should be addressed in the EA. This phase included two meetings, an Agency Coordination Meeting and a Public Input Meeting, both held on Wednesday, July 20, 2011. This report documents the meetings and the resulting issues for consideration in the EA.

Agency Coordination Meeting

The intent of the Agency Coordination Meeting was to focus on park staff, federal agencies, state agencies, and the adjacent property owner. The meeting was scheduled for 1:00 p.m. on Wednesday July 20, 2011, at park headquarters, 1100 North Mineral Springs Road, Porter, Indiana 46350, with an optional field visit scheduled for 10:30 a.m. the same day. Prior to determining the date of the meeting, the proposed attendees were consulted by phone or e-mail regarding their availability, with the date and time chosen on that basis.

An invitation was prepared and transmitted on June 29, 2011, by e-mail and/or mail. A copy of the invitation is included in Appendix A. The invitation was sent to individuals representing the following agencies and organizations:

- Indiana Department of Environmental Management (IDEM)
- Indiana Department of Natural Resources (IDNR)
- National Park Service, Indiana Dunes National Lakeshore
- Northern Indiana Public Service Company (NIPSCO)
- U.S. Army Corps of Engineers, Regulatory Branch (USACE)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)

The field visit was conducted beginning at 10:30 a.m. The group gathered at Park Headquarters and proceeded to the site. Mr. Mason pointed out various features that would be discussed at the afternoon meeting.

The formal coordination meeting began at 1:00 p.m. in the Park Meeting Room at Park Headquarters.

Attendees included:

- Andrew Blackburn USACE
- Susan Daniels, Consultant, Lawhon & Associates
- Bob Daum, National Park Service
- John Ervin, IDNR-DNP
- Nichole Lashley, Consultant, Lawhon & Associates
- Paul Leffler, USACE
- Daniel Mason, Botanist, National Park Service
- Elizabeth McCloskey, USFWS
- Jeff Neumeier, NIPSCO
- Noel Pavlovic, USGS
- Dan Sullivan, NiSource
- Brenda Waters, National Park Service

Of those above, all attended the site visit except Daniels, Neumeier, Pavlovic, Sullivan and Waters. The invited IDEM representative, Marty Maupin, did not attend either the site visit or the formal meeting. (The sign-in sheet is included in Appendix B.)

An agenda and fact sheet were distributed to the group. Copies are included in Appendix B. The meeting began with self-introductions. Then, three presentations were given at the agency meeting, described below.

Presentations

The first presentation was given by Dr. Pavlovic, USGS, who provided information on the 1830 government land survey for the Northwest Territory. (See Appendix C.) As part of their efforts to lay out townships and ranges, the surveyors recorded "witness" trees, collected general information on the vegetation, and made notes regarding the land's suitability for agriculture. The land survey notes from the period corroborate other indicators, to be discussed later, that the project site exhibited marsh characteristics and was not wooded in 1830.

Following Dr. Pavlovic's presentation, Mr. Mason gave a presentation on the history of the Cowles Bog Wetland Complex. (See Appendix D.) He described the studies of Henry Cowles and other events illustrating the importance of the site to early ecologists and botanists. Mr. Mason then discussed what the area would have looked like in Henry Cowles' time, the late 1800's and early 1900's.

Mr. Mason then discussed the history of the overall effort to restore the Cowles Bog Wetland Complex. He discussed available data, funding, and current restoration efforts in other areas of the complex.

Mr. Mason then illustrated, using aerial photography, the man-made changes that occurred in the area and the resulting vegetation changes that have occurred over time. Mr. Mason showed historic aerial photography and stressed that ditches were created after the wetlands areas were deeded to the State of Indiana in 1850 and an aggressive program was initiated to drain the wetlands. Mr. Mason described the historic drainage pattern and how it was altered by ditching. Aerial photography over time shows the expansion of tree cover as a result of the changes in hydrology of the site. (See Exhibit in Appendix F.)

Mr. Mason also discussed a soil study that provided information on what plant communities were present when the soils were formed. He described how the diversity of soil types indicates mixed vegetation characteristics, none indicative of a dense forest. The indicated soil types were largely hydric soils that developed under wet prairie influence. The soil study results support the conclusion that the majority of the area was not forested until recently.

Next, Mr. Mason discussed the current tree species found on the site. All trees over 10 cm diameter-breast-height (dbh) were identified. The majority of dominant tree species are non-wetland species. The only dominant wetland tree species is red maple, which is also known to spread under non-wetland conditions. The calculated density is 139 trees per acre. The understory was found to be primarily spice bush, with very little herbaceous cover. This distribution of species and lack of herbaceous vegetation does not match the characteristics that would be expected of natural woodland that supports wildlife.

Mr. Mason concluded from the land survey records, the aerial photography, the soil study results, and the species data support that the proposed project area developed the majority of its tree cover only within the past 50 years.

The goal of the project is to restore the project site to conditions like those experienced by Henry Cowles and his students, with a similar viewshed and a natural landscape under natural processes, as part of overall plan to restore the Cowles Bog Wetland Complex. The proposed project is intended to provide educational value as well as ecological value.

Next, Mr. Mason gave a presentation on the existing conditions and the alternatives being considered. (See Appendix E.) Mr. Mason described the existing and proposed hydrology, the strategy for establishing desired plants, and the alternatives being considered with regards to reducing tree cover. (See Appendix E for details.)

Discussion

Following the presentations, Mr. Mason opened up the meeting for group discussion. Following is a summary of the discussion, grouped by topic.

Hydrology

Mr. Ervin, IDNR, emphasized the importance to have proper hydrology in place to suppress upland species. He asked about restoring the hydrology that was disturbed by the railroad embankment. Although it would be too costly to put connections under the railroad tracks, Mr. Ervin suggested planning for the possibility to accept that water in the future.

Spice bush

Mr. Ervin agreed with the desire to eliminate the spice bush. He suggested using small, rubber-tired bulldozers to scrap the surface, pulling the bush up as it is cut off (like a shaving razor) in order to churn the underlying seed bank. He suggested that the project should avoid killing the bush in place because the mass of plant material on the surface would interfere with ability to establish desired species. He suggested that the same dozers could be used to do the required earth moving, as well as scraping off the vegetation.

Sedimentation

Mr. Leffler, USACE, mentioned that a primary concern will be sedimentation and will require proper planning. Mr. Ervin noted that control structures could be installed to retain sediments during construction.

Elimination of Ditches

Mr. Leffler asked for clarification on the strategy to plug the existing ditches. Ms. McCloskey suggested that National Park Service consider pushing the spoil banks back into the ditches, rather than plugging them. She noted that most of the ditches are shallow. Mr. Ervin noted that leaving the spoil piles would allow an unwanted potential for recolonization. Mr. Daum agreed on the desire to wipe out the ditches entirely and avoid unwanted plants colonizing the area.

Permitting

Mr. Leffler suggested that National Park Service plan carefully to keep the fill amounts under one acre to avoid the need for an individual permit. Mr. Mason noted that there are several thousand linear feet of ditch. Several attendees questioned whether putting fill into a ditch that remains a wetland is actually an impact. Mr. Leffler agreed that this project will require thinking outside the box. He suggested investigating the Nationwide Permit for aquatic restoration as one option. Mr. Leffler offered to provide advice to Mr. Mason on how to approach the permitting process.

Historic Homesite

Dr. Pavlovic asked for clarification on the status of the historic homesite. Mr. Daum noted that National Park Service Midwest Archaeology Center in Nebraska visited the site to provide advice. They suggested avoiding the site rather than conducting a survey. Mr.

Daum agreed with this approach because it does not adversely affect the project. It is okay to seed the area, as long as there is no earthmoving or digging.

Control of Tree Cover

Mr. Leffler noted that some trees are proposed to remain as a buffer to Mineral Springs Road. He asked if there is any concern about these trees reseeding the site. Mr. Mason indicated that management strategies will be used as needed. If the hydrology is successful, it may not be much of an issue. There is also the potential to include the area as part of the prescribed burn program within the overall complex, if needed.

Water Level

Mr. Ervin asked if there is any consideration of what the extra water would do to the rest of the Cowles Bog Wetland Complex. Mr. Mason responded that the conditions will remain similar to existing. The water will go over the site instead of through the ditch system. Dr. Pavlovic asked about the seasonal variation in surface water level. Mr. Mason noted that it would be expected to be wetter in the spring and drier in the fall, a typical seasonal variation. Mr. Leffler asked if there is any chance that changing the water level will impact residential drinking water wells. Mr. Mason noted that wells in this area are dug very deep. Ms. McCloskey noted that the nearest home is over one mile away. Mr. Mason noted that there would be benefits from changes to the surface water drainage, such as better conditions for the trail and NIPSCO access road.

Restoration Sequence

Ms. McCloskey asked about the sequence of activities, tree cutting versus restoration of hydrology. She noted that tree cutting would be best when the ground is not wet. Mr. Mason agreed that the tree cutting should occur first and during the winter months, preferably. He noted that the schedule will be heavily dependent on permitting and on working out a property agreement with NIPSCO to gain access for the work.

NIPSCO Issues

Mr. Mason noted that tree trimmers for NIPSCO have stated that the preferred clear zone from the power line is at least 75-feet, but they cannot achieve the desired clearance without cutting trees on National Park Service property. Mr. Mason also stated that National Park Service would desire permission to do some planting and plant management on NIPSCO's adjacent property, the open area between the vehicle access corridor and the railroad. Mr. Ervin noted that there is a precedent for collaboration on management of vegetation. Mr. Sullivan agreed to look into details on the limits of their property, information on the preferred clear zone, and what kind of agreement would be needed to allow related improvements and/or vegetation management on NIPSCO property. He requested that Mr. Mason compile a bullet list of questions and requests for his use in contacting the appropriate parties at NiSource/NIPSCO.

Connection to Water Body

Lastly, Mr. Mason noted the need to cooperate with NIPSCO on the connection to the open water body – filling ditches, constructing a spillway and boardwalk in place of the existing

culvert. Ms. Waters noted that a spillway would be preferable because a culvert can be blocked by beavers. Mr. Mason indicated that a control elevation would be used to avoid dewatering the pond. The hydrostatic pressure is currently south to north. The water level in the pond should not be lowered, as it could reverse that pressure.

Study Area

Mr. Blackburn, USACE, noted that the study area for the project needs to be larger than just the project site, due to the involvement with the NIPSCO property and connection to the water body outside the site limits. Mr. Mason agreed.

Impacts to Animal Species

Ms. McCloskey indicated that she accepts the proposed idea of using a scraping method to remove the underbrush. She indicated that there are not very many animals there today, only a few birds. She noted the presence of a few trees that had characteristics that could provide roost habitat for Indiana bat, but the tree cover is so dense that there are no flight corridors. It is unlikely that bats are there and USFWS is unlikely to request bat surveys. Mr. Mason noted that they have surveyed the ditches and there is low potential for impacts to animals. The project should have small short-term impacts with a good potential for long-term benefits.

Selected Tree Species

In addition to those proposed, Mr. Ervin suggested saving the pin oaks and black gum as part of the selected trees. He suggested that there can be desirable herbaceous species associated with these trees. Mr. Ervin agreed to identify which trees he would like saved as part of the proposed project. Ms. McCloskey requested preservation of tree 47B due to its size and habitat potential.

Consensus on Proposed Alternative

The group consensus was that Alternative 2 Selected Trees should be the preferred alternative, modified to add the trees as suggested by Mr. Ervin and Ms. McCloskey.

Public Input Meeting

A public input meeting was scheduled for the same day as the agency meeting. A press release was prepared to announce the meeting. A copy of the notice is provided in Appendix G. Prior to the start of the public meeting, Mr. Mason provided interviews to the media in attendance. Media coverage of the event is included in Appendix I.

The public meeting was held at 7:00 p.m., July 20, 2011, in the Park Meeting Room at Park Headquarters, 1100 North Mineral Springs Road, Porter, Indiana 46350. Twenty-seven people signed in on the attendance sheet. (See Appendix G.) Mr. Mason, Ms. Daniels and Ms. Lashley attended the meeting for the project team. An agenda, fact sheet, and comment form were provided to each attendee.

For the Public Meeting, Mr. Mason gave the same presentations as given to the agency group covering the history of the Cowles Bog Wetland Complex and also the alternatives being considered.

The meeting was opened to questions from the group after each presentation. Following the first presentation regarding the history, several questions were asked. The questions and Mr. Mason's answers are summarized below.

Questions Following Presentation on History of Cowles Bog

Q: Are there records of fire through here?

A: There are no prescribed burns in this area.

Q: Whose land is this? Park or NIPSCO?

A: Restoration area belongs to National Park Service. NIPSCO owns adjacent area which may be incorporated into the project, depending on outcome of discussions with NIPSCO.

Q: In talks with NIPSCO, has thought been given to removing the dyke?

A: This was discussed with hydrologists from National Park Service, but eliminated from consideration. National Park Service wants to avoid a dramatic change. The current system is stable – it has adjusted to the berm being there. No one can be sure what would happen if it was removed. Don't want to reverse the hydrostatic pressure by lowering the water level in the pond. The current plan is to put in a control structure to get the overflow into the project site.

Q: NIPSCO was thought to be dumping fly ash and other things north of their site. What is story with that? Citizen noted that he has photos of NIPSCO dumping that he can provide, if desired.

A: The issue is under investigation and is not related to this project. A public meeting for that is scheduled with the EPA on July 28th.

Q: Were animal surveys done? Any birds?

A: National Park Service did a survey for amphibians and did not survey for birds.

Questions Following the Presentation on Alternatives

After the presentation on alternatives, several questions were asked and are summarized below.

Q: Concerned about flooding problems. Does the culvert under Mineral Springs Road drain the project site?

A: The water from the site drains south to north through the ditch system. This project would eliminate the ditches and retain or slow the flow of water, which may deter flooding.

Q: What is meant by the "buffer" to Mineral Springs Road?

A: It means leaving a few trees along the roadway to provide a visual buffer, maintain some shade, but thinned out enough to see through, along with removing the underbrush.

Q: What plants will come back?

A: A seed bank study has not been completed to know what would come back on its own. National Park Service expects to have to seed the area with desired species.

Q: Concern for creating a food plot for deer. What is the status of the EA for the deer? How does that tie into this project?

A: EA for the deer issue is separate and is in progress. The proposed project is not expected to be attractive to deer, as they generally do not prefer wetland plants.

Q: What species were observed in the 1830s? Any red maple? White pine?

A: The records indicate yellow oak, which we believe refers to swamp oak or white oak. There are no recorded red maple or white pine.

Q: What is the long term goal? If it is to create a premiere educational and research site for botanists and ecologists, have you considered involving academia?

A: National Park Service has developed a partnership with NERMI doing monitoring of restoration sites. Valparaiso University is monitoring water quality. In addition, the Dunes learning center brings 3 or 4 groups a week to the Cowles Bog Wetland Complex.

Q: Red maples are correlated with high numbers of earthworms. Changes in number of earthworms will tell you if you are successful at changing the water level.

A: Noted.

Q: The CO2 level for today and for the future should be considered in planning for vegetation.

A: Noted.

Q: Is the university involved? Perhaps a herpetologist?

A: Not at this time. There is the potential to restore some snake habitat through this project.

Q: Why did National Park Service hydrologist want you to keep the soil intact?

A: He meant the earth berm. They are supportive of the project, but do not recommend any dramatic changes in water levels.

Q: This is an opportunity to present something that has been lost to the area.

A: Noted.

Q: Will water table go up? Will the road flood?

A: Prairies are wet in spring and dry in fall. There is no expectation of water level affecting Mineral Springs Road. Recent concern over flooding near residences may be due to beaver activity east of Mineral Springs Road, which would not be impacted by this project.

Q: If about 3000 trees are going to be removed, what impact will the work have on traffic at Mineral Springs Road?

A: Access to and from the site is expected to use the access road on the south of the site and the parking area. There is no expectation that Mineral Springs Road north of the site will be impacted.

Q: Future park map shows trail along Mineral Springs Road. How is that impacted?

A: Mr. Mason stated that he was not aware of this proposal.

Q: What is the timeframe and how is it being funded?

A: National Park Service has allocated $200k over 3 years. Ms. Mason is hopeful that work will start this winter, but it will depend on permitting and approvals.

Q: How will the hydrology of the project site impact the quaking bog area?

A: This area does not have a hydrological connection to the quaking bog and will have no impact on it.

Q: What about removing the dyke?

A: As mentioned, we do not intend to remove the berm so as to avoid any dramatic changes to water level or patterns. The park does not own the berm or the property it sits on. There are no plans to remove it.

Q: How will trees and spice bush be removed?

A: Plans for how best to remove them are in discussion with agencies such as IDNR, U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers.

Q: With the disturbance, you remove the trees and the area floods. Invasive species may establish. It costs lots of time and money to maintain this. What will keep them from coming back?

A: The change in hydrology will deter some species. Plant management and prescribed burns may be used to control others, if necessary.

Q: Will removing lots of trees destroy the soil? Will you have to just start over?

A: Mr. Mason stated that National Park Service will be consulting IDNR and others on how best to do this.

Q: Any buildings planned?

A: None.

Q: What is the size of the project site?

A: The site is 25-26 acres.

Q: What is the total cost of the project?

A: Wetland restoration projects are difficult to quantify with certainty, unlike a house or a road. Systems change during the restoration process and the approach must adapt. There is the potential to spend $500k to get resilience.

Q: The website says $1.5 million.

A: That figure is for the whole Cowles Bog Wetland Complex.

Q: Aren't we picking an arbitrary time period for the restoration target?

A: True. We are choosing a period where we can connect the natural state with human experience, where we have records, where we can connect to our own past.

Q: It is not possible to get back to what we had 300-400 years ago. There are too many people and too much has changed. We need insects and birds. We need diversity.

A: Noted. The goal is ecosystems services for the enjoyment and education of people, too. That provides a monetary value to the restoration as well.

Q: What is the status of the cattail management project? Should they be gone before this project is started?

A: The process is still on-going and could take 12-15 years. It is not necessary for it to be finished before this starts. Cattails may need to be managed, but the target hydrology won't be what they prefer.

Q: The timing for which plants and what hydrology is using Cowles' era or earlier. There are records for that area from that time.

A: Noted.

Written Comments

As the meeting concluded, Ms. Daniels reminded the group that they could fill out a comment form and send it in to Mr. Mason to be included in the project record. Six written comments (letters, e-mails, and/or comment forms) were received following the meeting. Copies of these comments are on file in the administrative record.

Two individuals provided letters of support for the project, agreeing with the goals and the proposed alternatives to address those goals. One person questioned the decision to remove 3,000 trees due to their benefit to combat air pollution. One person suggested thinning the trees rather than clearing them. One individual asked for clarification of how access would be provided to and from the site before, during and after restoration and also expressed concern for west to east water flow, particularly to the culvert under Mineral Springs Road. There was one comment that specifically expressed opposition based upon

the topics mentioned above (access, flooding, loss of trees), but also stated additional concerns, including: attracting mosquitoes and poisonous reptiles within one mile of a residential area; attracting additional visitors to increase the pedestrians on Mineral Springs Road, potentially creating a hazard; and impacts to deer.

Conclusions from Scoping Process

The Preferred Alternative is expected to be Alternative 2, with the selected trees to be modified to include additional trees (pin oaks, black gum, and tree 47B) at the request of IDNR and USFWS. Following are the issues that should be addressed in the Environmental Assessment based upon concerns expressed by agencies and the public.

Study Area

There is a need to resolve the extent of impacts anticipated on the NIPSCO property for connection to the water body (spillway and boardwalk), use and restoration of the access road, and extent of disturbance proposed on their property.

Hydrology and Drainage

The EA should explain the conceptual plan for providing hydrology to the site. It should explain how surface flow patterns may change and the resulting impacts, or lack thereof, to the remainder of the Cowles Bog Wetland Complex. It should also explain why the project is not expected to have any flooding impacts to Mineral Springs Road or residential areas.

Project Description

The project description in the EA should explain and illustrate the trees that are intended to remain, to provide a clear picture that the entire site is not being cleared.

Historic Homesite

The EA should explain the proposed avoidance of the site and what changes are allowed and not allowed as part of the project (i.e. seeding is okay, but earth moving is not). Need to obtain concurrence from the State Historic Preservation Officer (SHPO) that avoidance results in No Historic Properties Affected.

Threatened and Endangered Species

The EA should explain the basis for concluding that the project will not impact threatened and endangered species, through coordination with USFWS.

Impacts During Construction

The EA should explain how access will be provided during the tree removal work and what the impacts would be on Mineral Springs Road.

Appendix A
Invitations to Agency Coordination Meeting

June 27, 2011

Dr. Noel Pavlovic, Plant Ecologist
USGS
1100 North Mineral Springs Road
Porter, IN 46305

RE: Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie Coordination Meeting

Dear Dr. Pavlovic:

At the Indiana Dunes National Lakeshore, the National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore a Lake Plain wet-mesic prairie. NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, we would appreciate your input on the project.

An agency coordination meeting has been scheduled for Wednesday, July 20, 2011, at 1:00 p.m. at the following location:

Park Meeting Room
Park Headquarters
1100 North Mineral Springs Road
Porter, IN 46350

At this meeting, we will present information on the history of the site, the current conditions, and the desired future conditions. Then, the group will discuss various options for achieving the project's goals. Lastly, we will seek input on what issues of concern should be investigated in the Environmental Assessment. The meeting is expected to last approximately 1 ½ hours.

If desired, we are prepared to conduct a site visit prior to the meeting, beginning at 10:30 a.m. If you are interested in attending the site visit or have additional questions, please feel free to contact me at (219) 395-1553 or Daniel_Mason@nps.gov.

Sincerely,

Daniel Mason
Botanist
Indiana Dunes National Lakeshore

June 27, 2011

Mr. Paul Leffler, Senior Project Manager
USACE Regulatory Branch
111 North Canal Street
Suite 600
Chicago, IL 60606-7206

RE: Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie Coordination Meeting

Dear Mr. Leffler:

At the Indiana Dunes National Lakeshore, the National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore a Lake Plain wet-mesic prairie. NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, we would appreciate your input on the project.

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Sincerely,

Daniel Mason
Botanist
Indiana Dunes National Lakeshore

June 27, 2011

Mr. Andrew Blackburn, Project Manager
USACE Regulatory Branch
111 North Canal Street
Suite 600
Chicago, IL 60606-7206

RE: Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie Coordination Meeting

Dear Mr. Blackburn:

At the Indiana Dunes National Lakeshore, the National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore a Lake Plain wet-mesic prairie. NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, we would appreciate your input on the project.

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Sincerely,

Daniel Mason
Botanist
Indiana Dunes National Lakeshore

June 27, 2011

Mr. Marty Maupin, Mitigation Compliance Coordinator
Indiana Dept. of Environmental Management, Office of Water Quality
100 North Senate Avenue
MC 65-42 WQS IGCN 1255
Indianapolis, IN 46204

RE: Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie Coordination Meeting

Dear Mr. Maupin:

At the Indiana Dunes National Lakeshore, the National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore a Lake Plain wet-mesic prairie. NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, we would appreciate your input on the project.

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Sincerely,

Daniel Mason
Botanist
Indiana Dunes National Lakeshore

June 27, 2011

Mr. John Ervin, Ecologist
Indiana Department of Natural Resources
1600 North 25 East
Chesterton, IN 46304

RE: Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie Coordination Meeting

Dear Mr. Ervin:

At the Indiana Dunes National Lakeshore, the National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore a Lake Plain wet-mesic prairie. NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, we would appreciate your input on the project.

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Sincerely,

Daniel Mason
Botanist
Indiana Dunes National Lakeshore

June 27, 2011

Elizabeth McCloskey, Biologist
Northern Indiana Ecological Services
U.S. Fish and Wildlife Service
P.O. Box 2616
Chesterton, IN 46304-5716

RE: Restoration of Cowles Bog Wetland Complex's Lake Plain Wet-Mesic Prairie Coordination Meeting

Dear Ms. McCloskey:

At the Indiana Dunes National Lakeshore, the National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore a Lake Plain wet-mesic prairie. NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, we would appreciate your input on the project.

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Sincerely,

Daniel Mason
Botanist
Indiana Dunes National Lakeshore

Appendix B
Materials from Agency Coordination Meeting

Sign-In Sheet
Agenda
Fact Sheet

Cowles Bog Wetland Complex
Restoration of Lake Plain Wet-Mesic Prairie

Agency Coordination Meeting
July 20, 2011

Name	Organization	Phone	E-mail Address
Daniel Mason, Botanist	National Park Service INDU	219-395-1553	Daniel_Mason@nps.gov
Susan Daniels	Lawhon & Associates (consultant)	614-818-5200	sdaniels@lawhon-assoc.com
Nichole Lashley	Lawhon & Associates (consultant)	937-224-0164	nlashley@lawhon-assoc.com
JEFF NEUMEIER	NIPSCO	(219) 660-7098	jneumeier@nisource.com
John ERVIN	IDNR-DNP	(219) 309-7567 (260) 466-0096	jervin@dnr.IN.gov acesn-faces@live.com
Brenda Waters	NPS - INDU	(219) 395-1552	brenda-waters@nps.gov
DAN SULLIVAN	NISOURCE ES&S	(219) 647-5248	dsullivan@nisource.com
Noel Pavlovic	USGS	219-926-8336	npavlovic@usgs.gov
Paul Leffler	USACE	312-846-5529	paul.m.leffler@usace.army.mil
Andrew Blachburn	USACE	312 846 5543	andrew.j.blachburn@usace.army.mil
Elizabeth McCloskey	US FWS	219-983-9753	elizabeth_mccloskey@fws.gov
BOB DAUM	NPS - INDU	219-395-1571	bob_daum@nps.gov

Cowles Bog Wetland Complex
Restoration of Lake Plain Wet-Mesic Prairie

Agency Coordination Meeting
July 20, 2011

Agenda

Introductions

Purpose of the Project

History of Cowles Bog Wetland Complex

Existing Conditions

Alternatives Considered

Discussion

Next Steps

BACKGROUND INFORMATION AND PRESENTATION SUMMARY

GENERAL

- Great Marsh is the largest interdunal wetland associated with Lake Michigan.
- Great Marsh formed following the second Nipissing geologic phase.
- Cowles Bog Wetland Complex represents 205 acres of the western terminus of Great Marsh.
- Cowles Bog Wetland Complex includes the 54 acre National Natural Landmark; Cowles Bog.
- In the early 20th century, Cowles Bog then known as Mineral Springs Tamarack Swamp was used by Henry Cowles and other educators as an outdoor classroom for biodiversity study.
- Mineral Springs Tamarack Swamp was provided the name Cowles Bog by Herman Kurz a student of Henry Cowles who conducted the first quantitative study at Cowles Bog.
- Kurz documented the presence of circumneutral soils (pH 7.0 to 7.5).

DEGRADATION

- In 1850, all wetlands in Indiana were entitled to the state by the federal government.
- In 1852, Indiana initiated an aggressive program to drain wetland.
- Two jurisdictional ditches were constructed in the western portion of Great Marsh; Samuelson ditch and State ditch.
- In the early 1920's, two adjacent intradunal wetlands were drained into Cowles Bog Wetland Complex as part of construction of a Golf Course.
- The subject restoration unit, Cowles Bog wet/mesic prairie, was ditched and the lands farmed.
- In the 1960's, industrial development obliterated the western portion of Great Marsh resulting in Cowles Bog Wetland Complex becoming the new western terminus of Great Marsh.
- In the 1970's, altered hydrology due to beaver dams, berm construction, and surface water flow from adjacent intradunal wetlands resulted in the elimination of the graminoid/forb flora followed by colonization by hybrid cattail.

RESTORATION

- Inventory and investigations were conducted, 2002–2004, to determine if Cowles Bog Wetland Complex could be restored.
- Studies conducted in 2002-2004 suggested that restoration could be accomplished.
- Aggressive restoration actions were initiated in 2007 and are continuing.
- The subject unit was referenced as a "Disturbed Prairie Unit" with the desired restored unit being lake plain wet/mesic prairie.

SITE CONDITIONS

- Approximately 10,000 linear feet of ditches are present with width and depth varying from 4.0 to 2.5 feet and 2.5 to 0.5 feet, respectively.
- 3,481 trees are present.
- The tree canopy is dominated by red maple (1556 trees, 44.6%); black cherry (623 trees, 17.8%); sassafras (607 trees, 17.4%) and black locust (227 trees, 6.5%).
- A dense understory of spice bush prevents development of a herbaceous layer.
- Soils are comprised of a mosaic of soil types with the dominant soil being a wetland soil type; Granby.

INDICATORS OF WET/MESIC PRAIRIE

- April 30, 1830 land survey notes
- 1939 aerial photography
- Soil types

OBJECTIVES

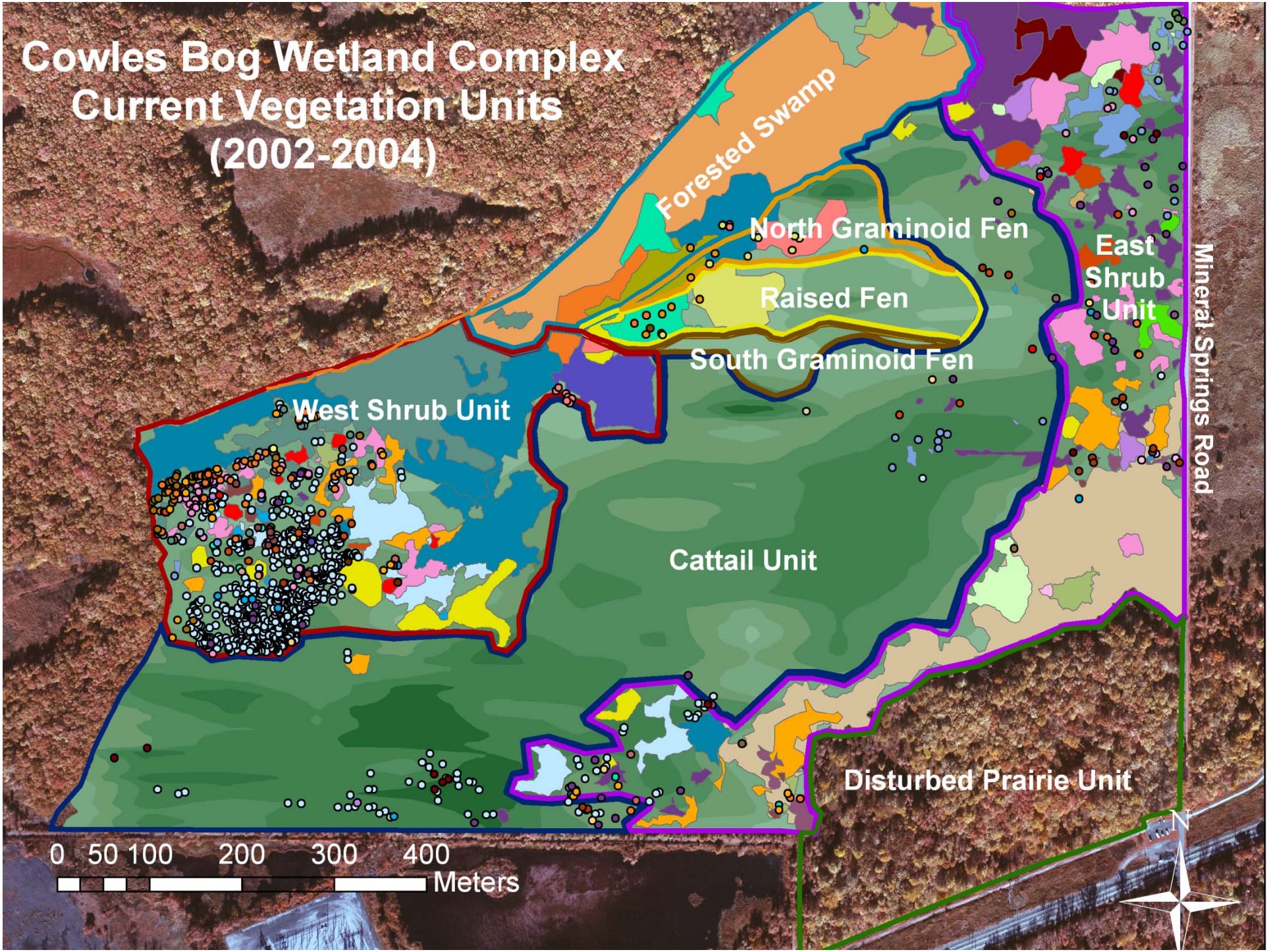
- Provide a viewshed reflective of that experienced by Henry Cowles and others who used Cowles Bog (Mineral Springs Tamarack swamp/quacking bog) as an outdoor classroom for biodiversity studies.
- Present a natural landscape developed by natural processes following the second Nipissing geologic phase.
- Restore Cowles Bog Wetland Complex.

Appendix C
Presentation Regarding 1830 Government Land Survey

Appendix D
Presentation Regarding History of Cowles Bog

RESTORATION OF COWLES BOG WETLAND COMPLEX DISTURBED PRAIRIE UNIT

1913 INTERNATIONAL PHYTOGEOGRAPHIC EXCURSION IN AMERICA


Cowles Bog Wetland Complex
Current Vegetation Units
(2002-2004)
Forested Swamp
North Graminoid Fen
Raised Fen
South Graminoid Fen
East Shrub Unit
Mineral Springs Road
West Shrub Unit
Cattail Unit
Disturbed Prairie Unit
0 50 100 200 300 400
Meters
N

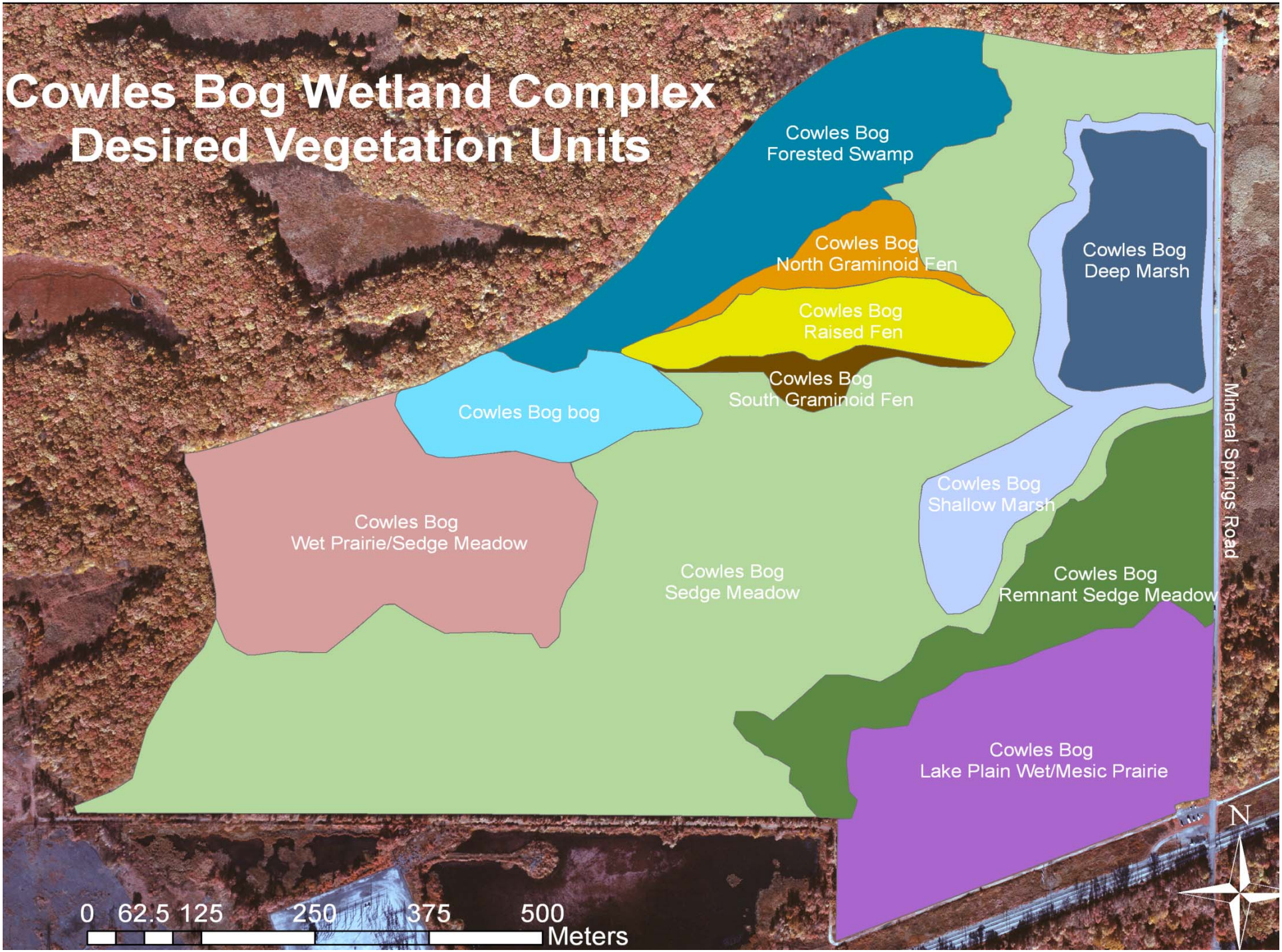

Cowles Bog Wetland Complex
Desired Vegetation Units
Cowles Bog
Forested Swamp
Cowles Bog
North Graminoid Fen
Cowles Bog
Raised Fen
Cowles Bog
South Graminoid Fen
Cowles Bog
Deep Marsh
Cowles Bog bog
Cowles Bog
Shallow Marsh
Cowles Bog
Wet Prairie/Sedge Meadow
Cowles Bog
Sedge Meadow
Cowles Bog
Remnant Sedge Meadow
Cowles Bog
Lake Plain Wet/Mesic Prairie
Mineral Springs Road
N
0 62.5 125 250 375 500
Meters

Exhibit #: 1939 Aerial Overview of the Cowles Bog Wetland Complex and the Surrounding Areas

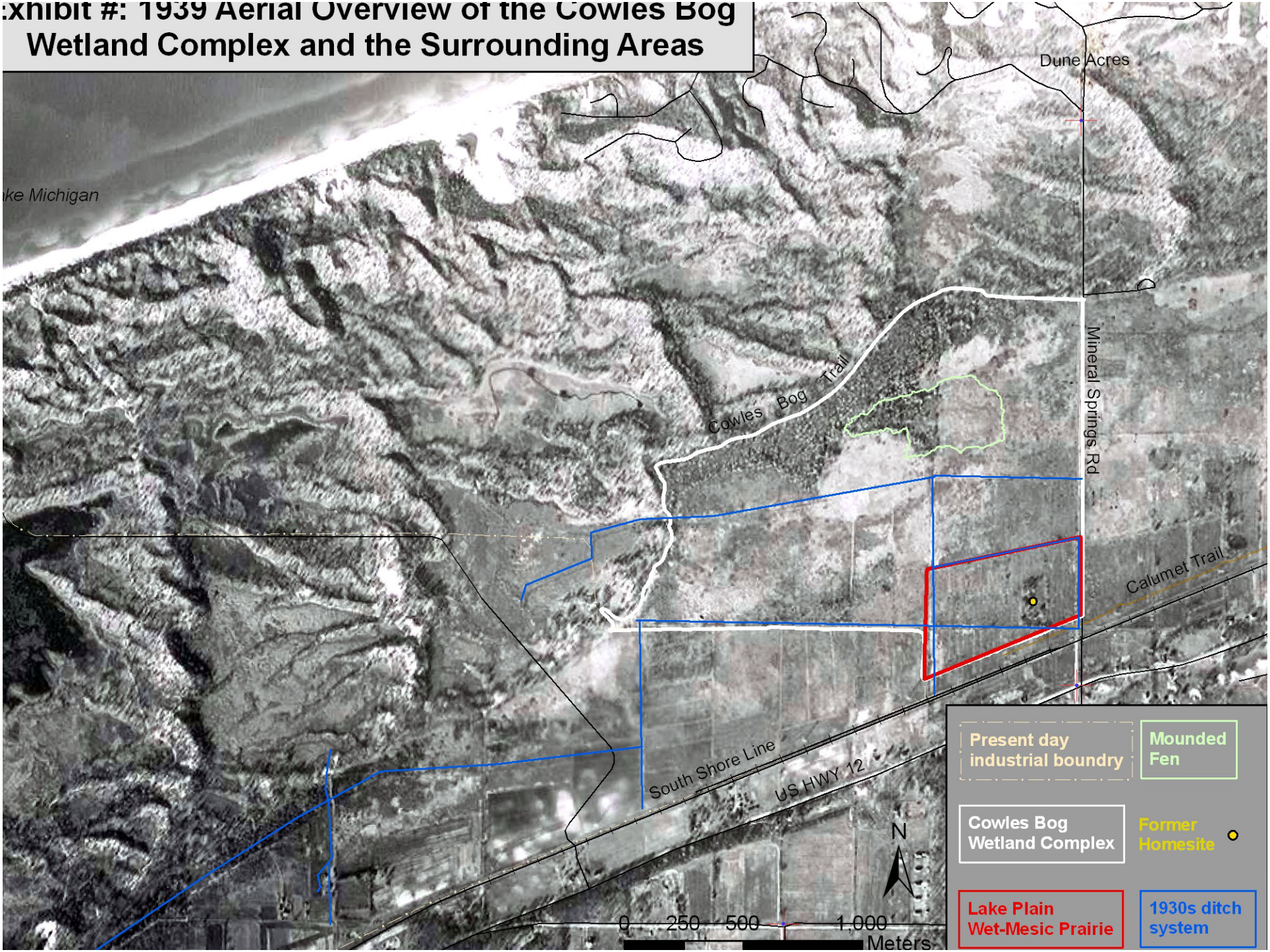


Exhibit #: 1938 Aerial Overview of the Land Use of the Cowles Bog Wetland Complex

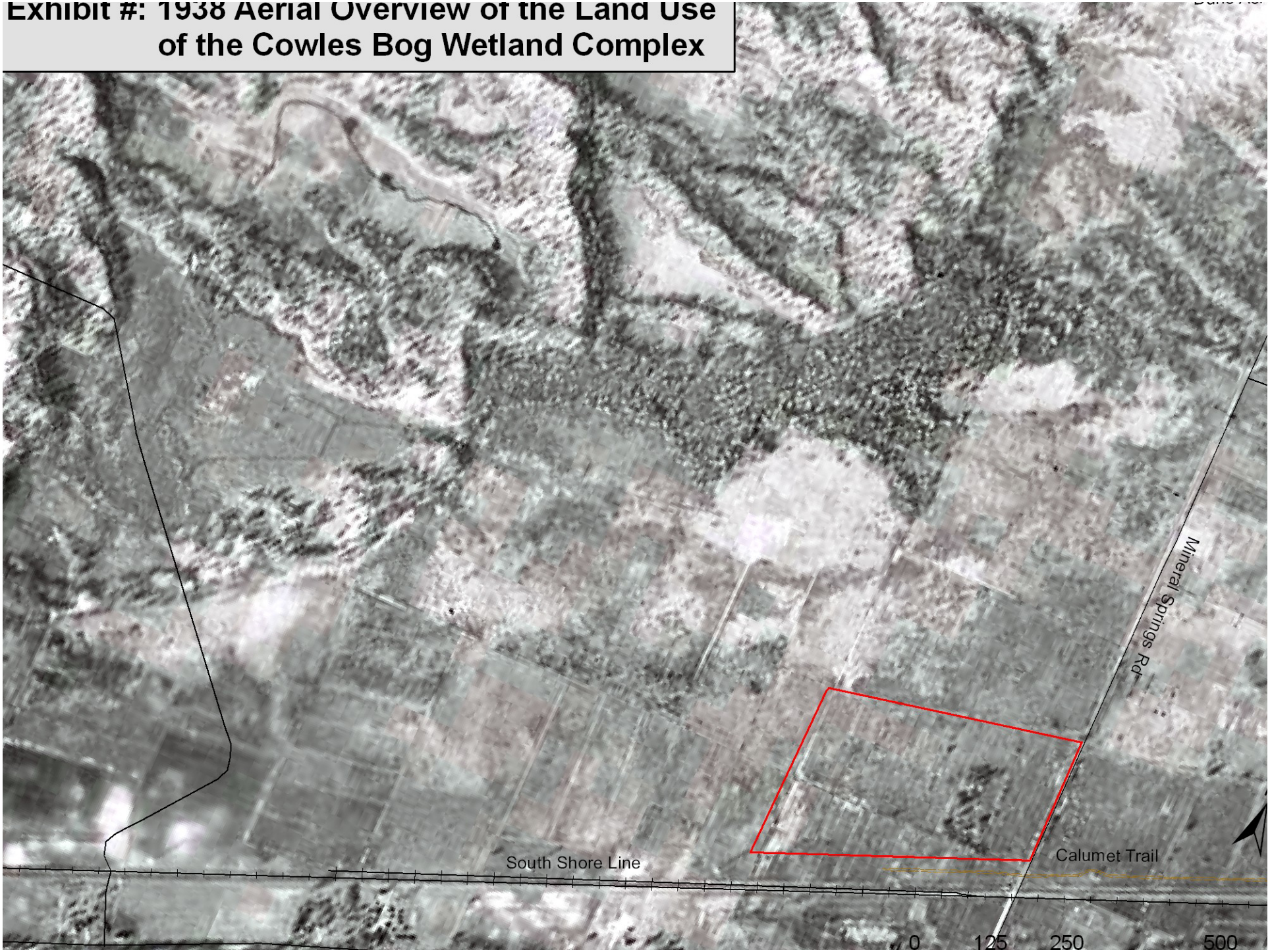


Exhibit #: 1954 Aerial Overview of the Land Use of the Cowles Bog Wetland Complex

Exhibit #: 1958 Aerial Overview of the Land Use of the Cowles Bog Wetland Complex

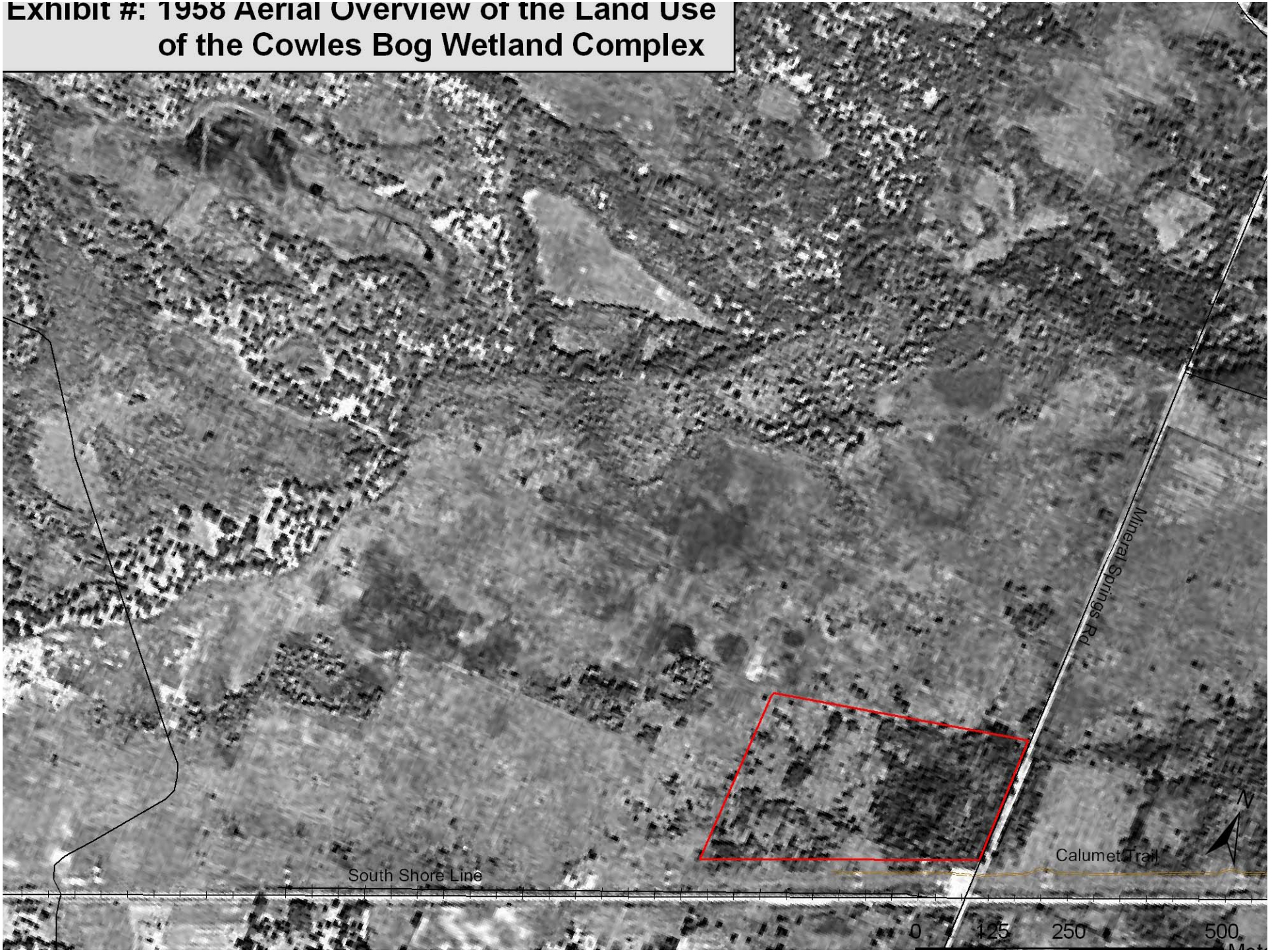


Exhibit #: 1971 Aerial Overview of the Cowles Bog Wetland Complex and the Encroaching Industry

Exhibit #: 2010 Aerial Overview of the Lake Plain Wet-Mesic Prairie

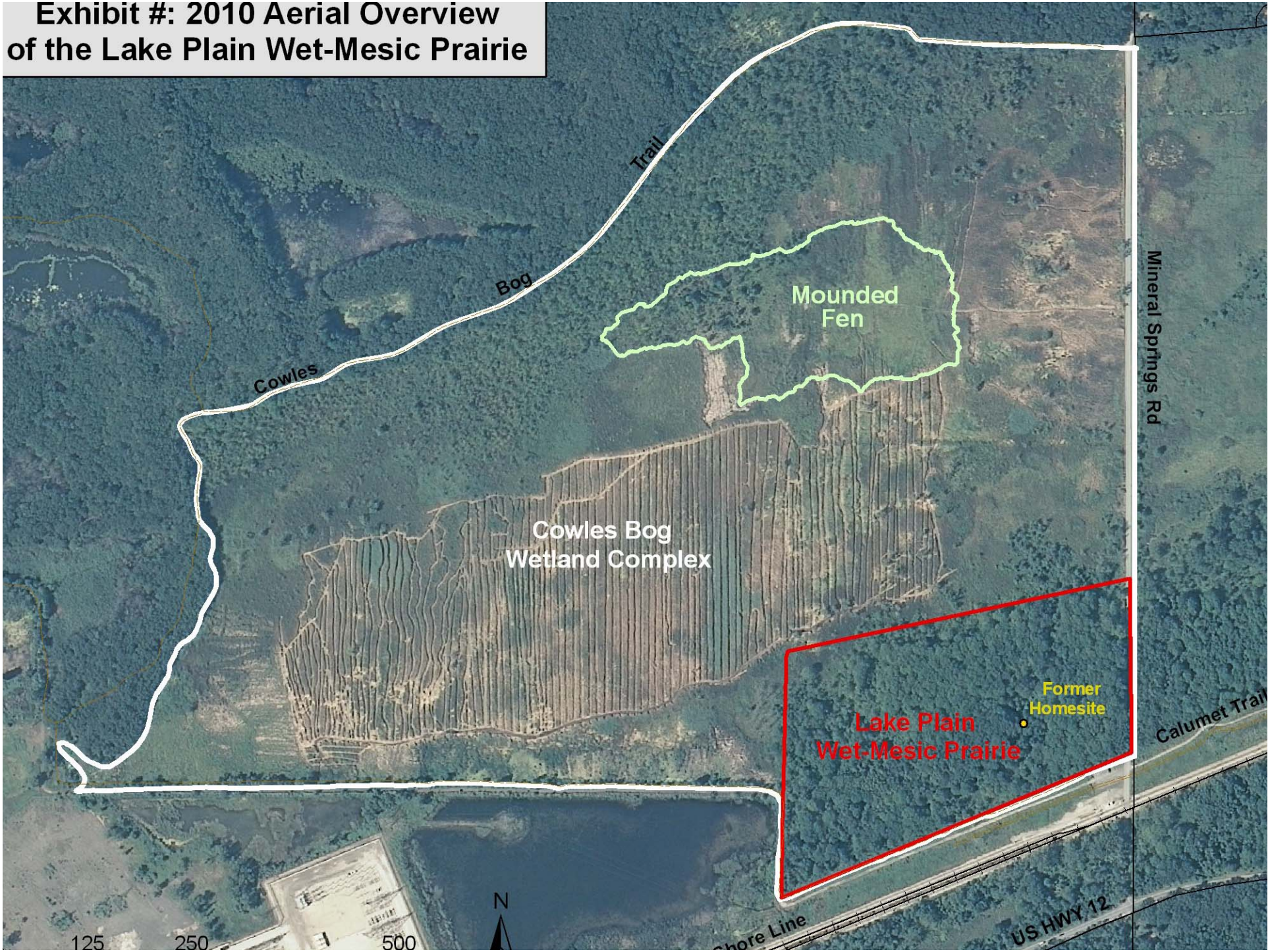


Exhibit #: Cowles Bog Wetland Complex
Lake Plain Wet-Mesic Prairie
1939 Tree Cover - Determined by Aerial Photography

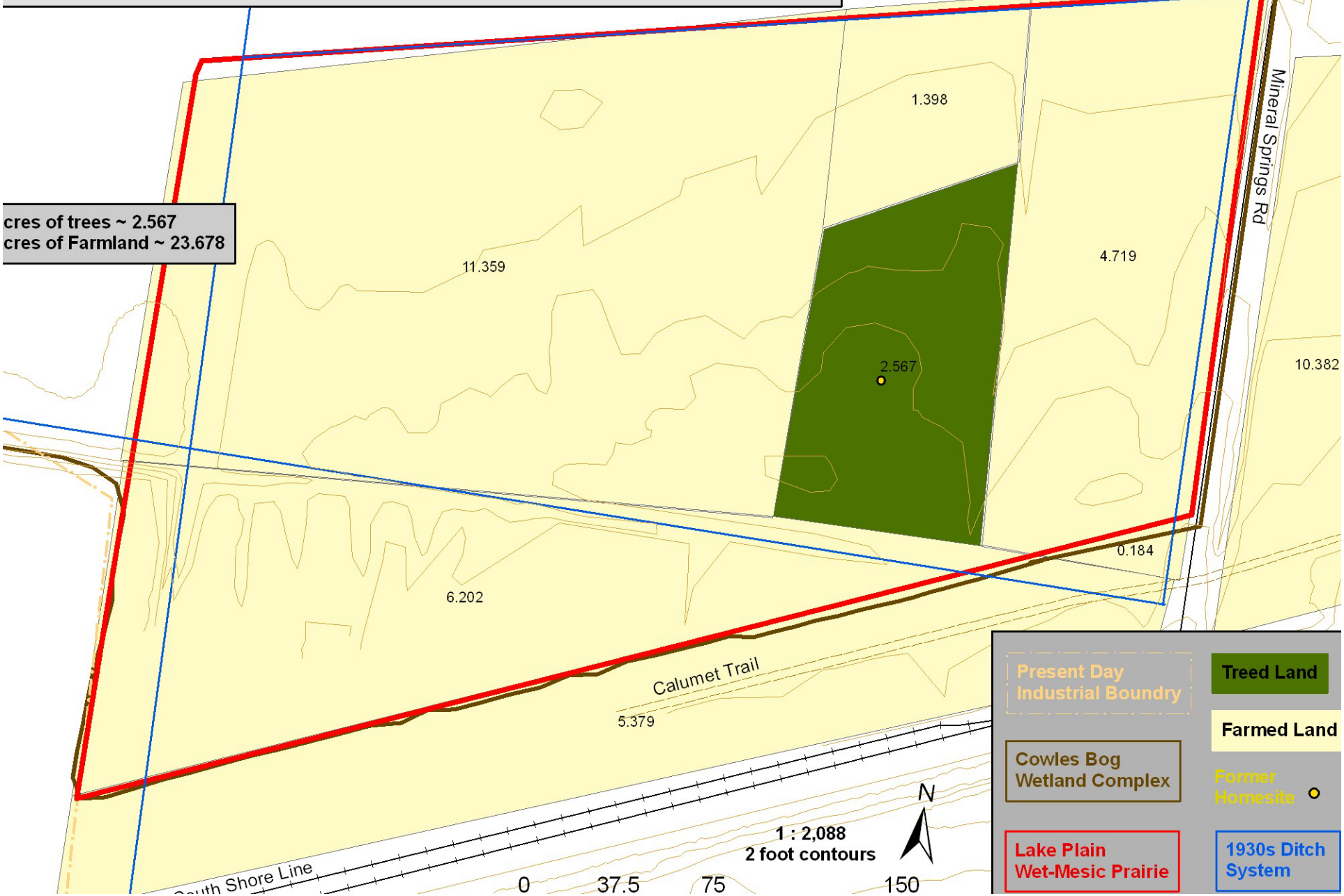


Exhibit #: Cowles Bog Wetland Complex
Lake Plain Wet-Mesic Prairie
954 Tree Cover - Determined by Aerial Photography

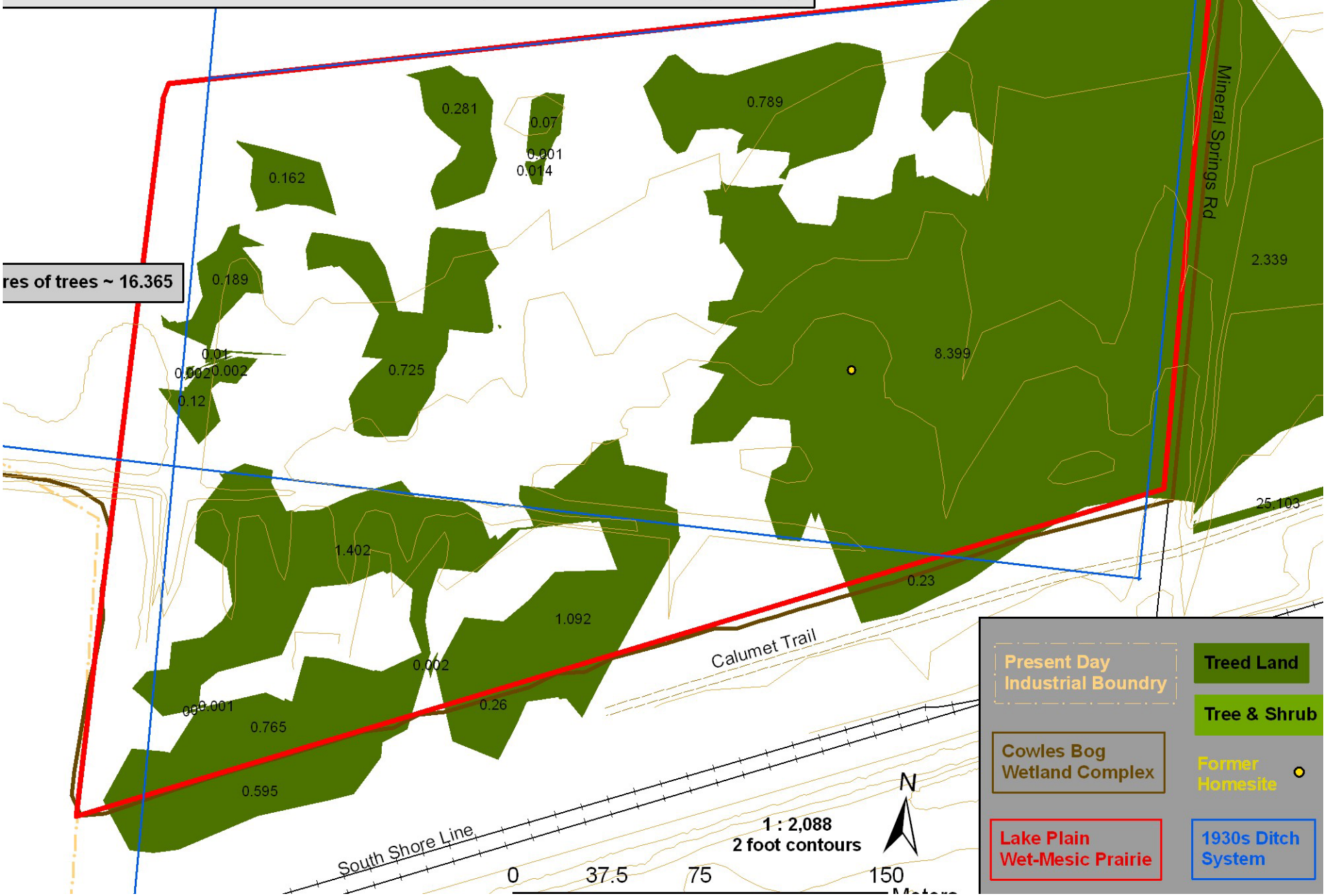


Exhibit #: Cowles Bog Wetland Complex
Lake Plain Wet-Mesic Prairie
958 Tree Cover - Determined by Aerial Photography

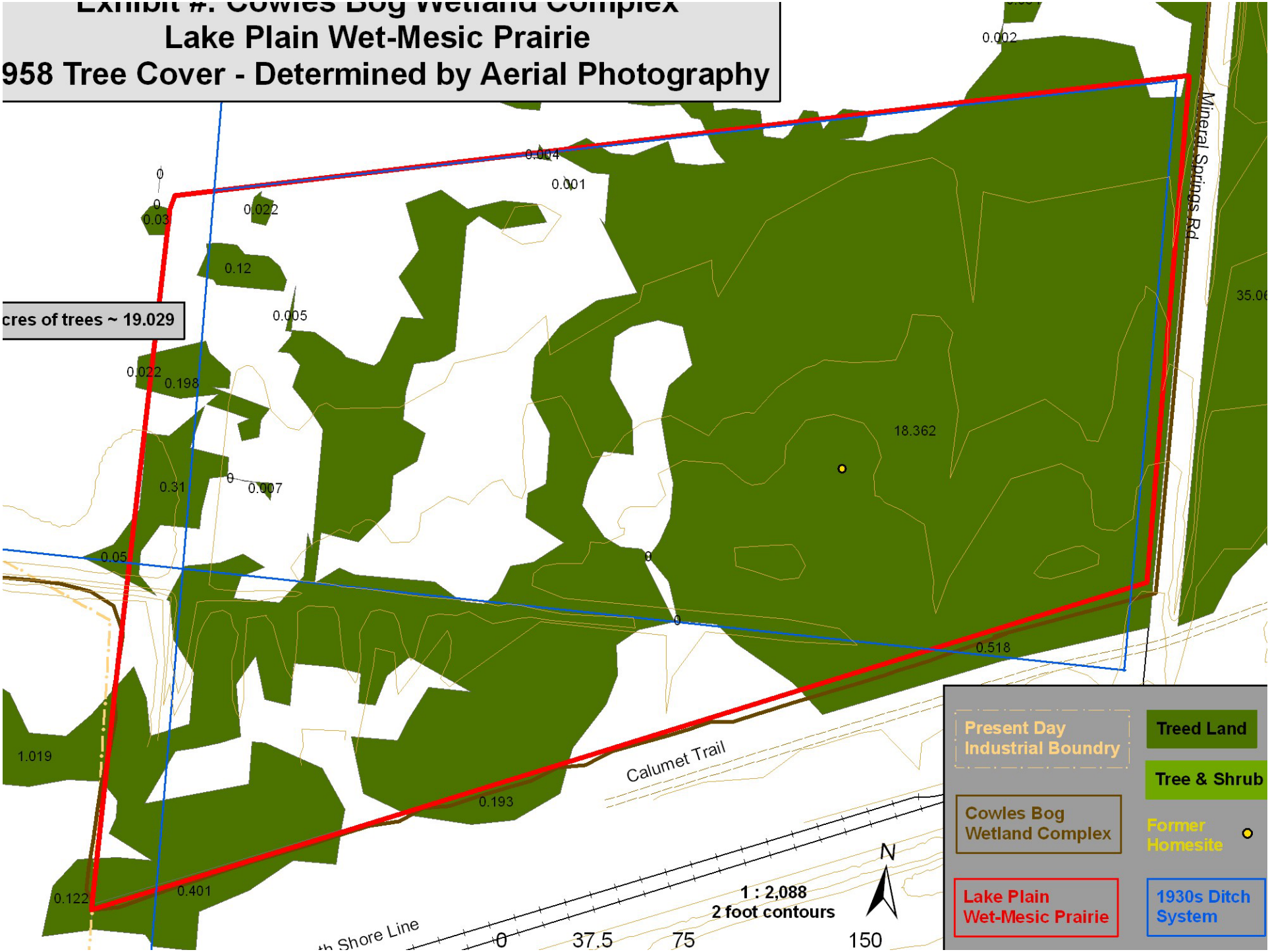


Exhibit #: Cowles Bog Wetland Complex
Lake Plain Wet-Mesic Prairie
1965 Tree Cover - Determined by Aerial Photography

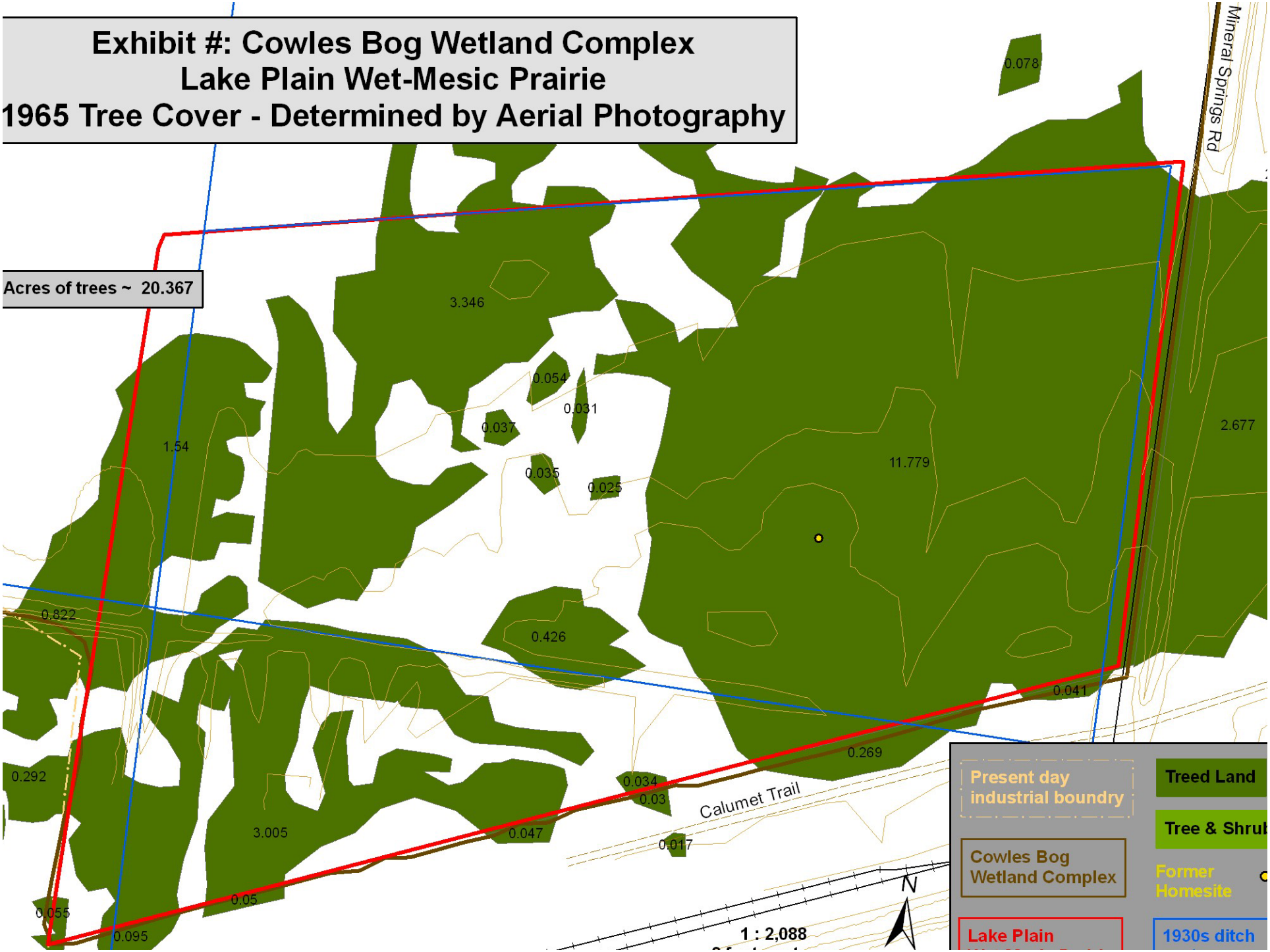
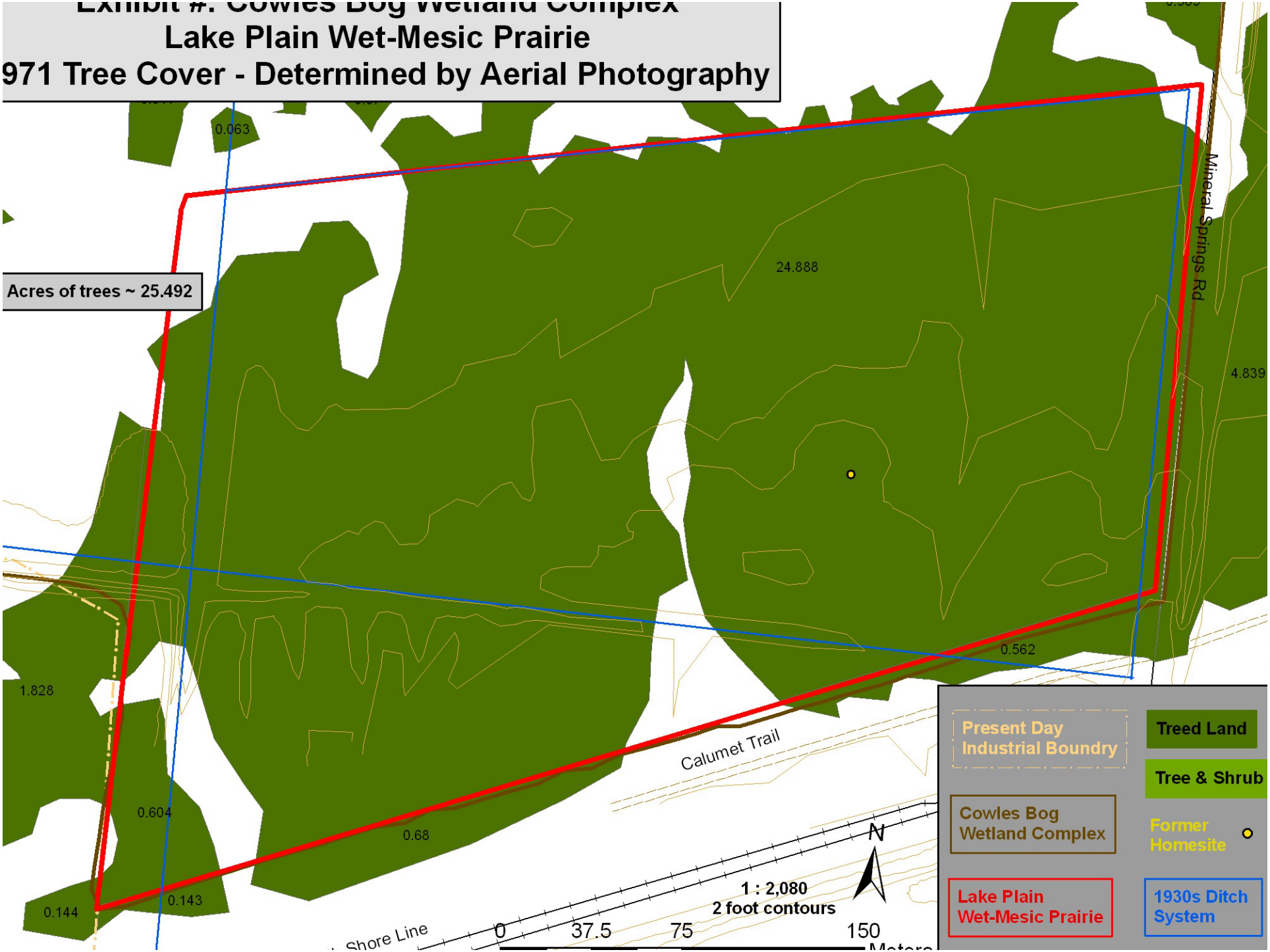


Exhibit #: Cowles Bog Wetland Complex
Lake Plain Wet-Mesic Prairie
971 Tree Cover - Determined by Aerial Photography



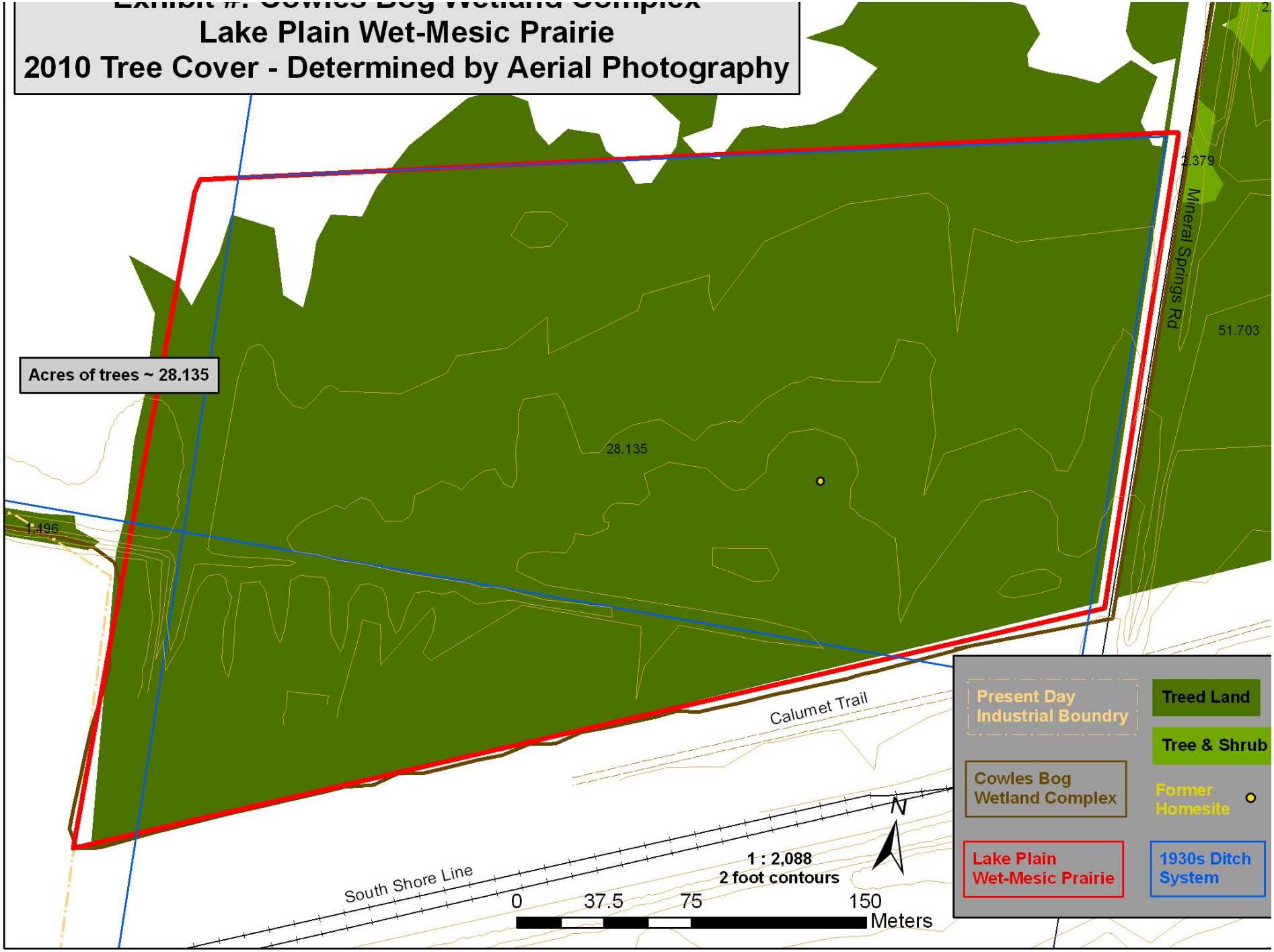


Exhibit #: Cowles Bog Wetland Complex
Lake Plain Wet-Mesic Prairie
2010 Tree Cover - Determined by Aerial Photography
Acres of trees ~ 28.135
28.135
1.496
2.379
51.703
Mineral Springs Rd
Calumet Trail
South Shore Line
N
1 : 2,088
2 foot contours
0
37.5
75
150
Meters
Present Day Industrial Boundry
Treed Land
Tree & Shrub
Cowles Bog Wetland Complex
Former Homesite
Lake Plain Wet-Mesic Prairie
1930s Ditch System

EVIDENCE OF PRAIRIE PRECEDING NINETEENTH CENTURY ANTHROPOGENIC STRESSORS

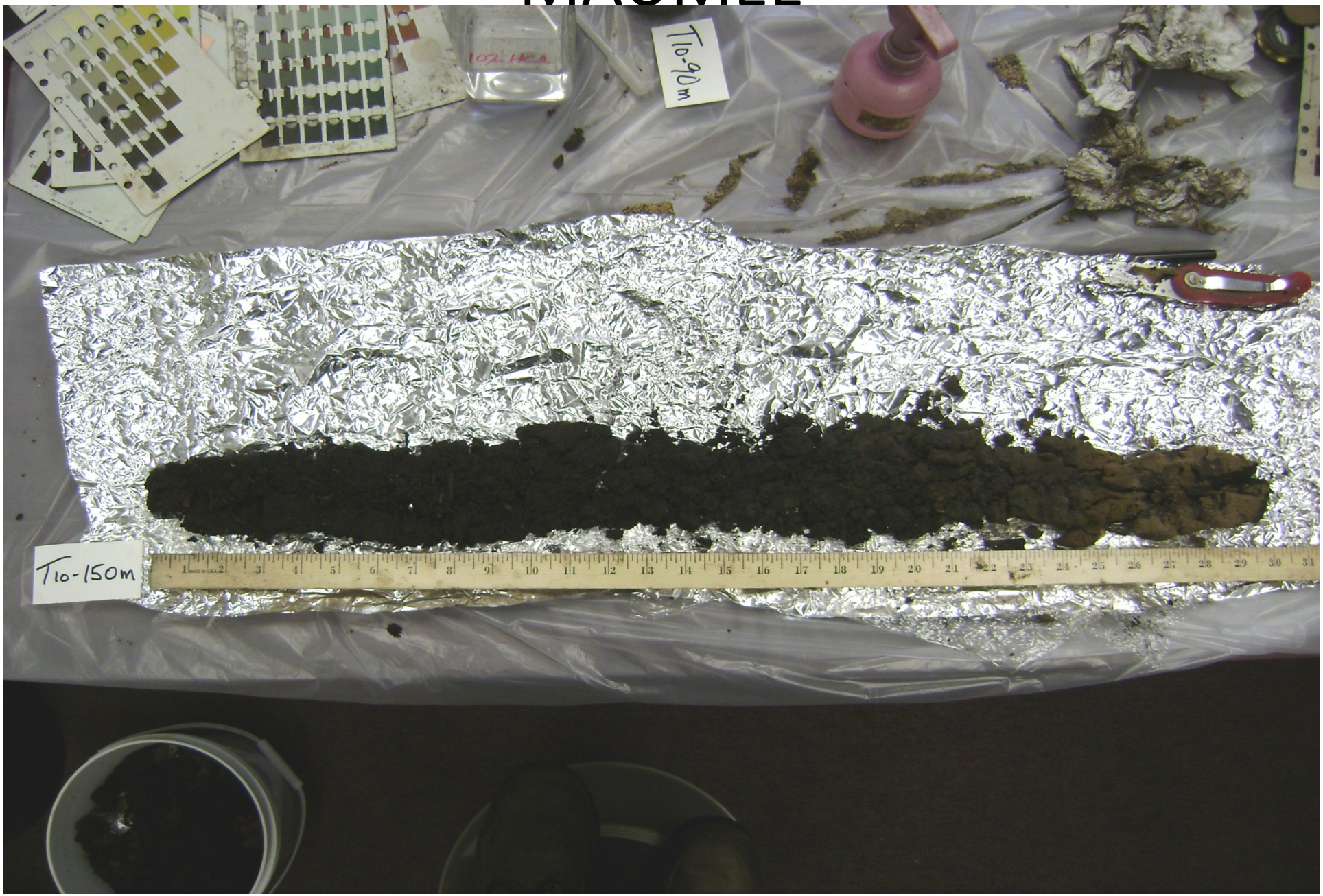
- Government Land Survey notes from April 13, 1830
- On the survey line running north from the section corner (down the middle of Mineral Springs Rd.), the surveyors encountered a prairie and marsh at 3 chains (chain = 66 feet, 80 chains = 1 mile, 3 chains = 198 feet). Dan and I measured to this point north on Mineral Springs Rd. and found it was only about a third of the distance to the existing forest to marsh edge. The presettlement forest edge was at the first telephone pole on the east side of the road north of the Calumet Trail. This suggests that much of the forest was not there in 1830.

EDAPHIC ANALOGY

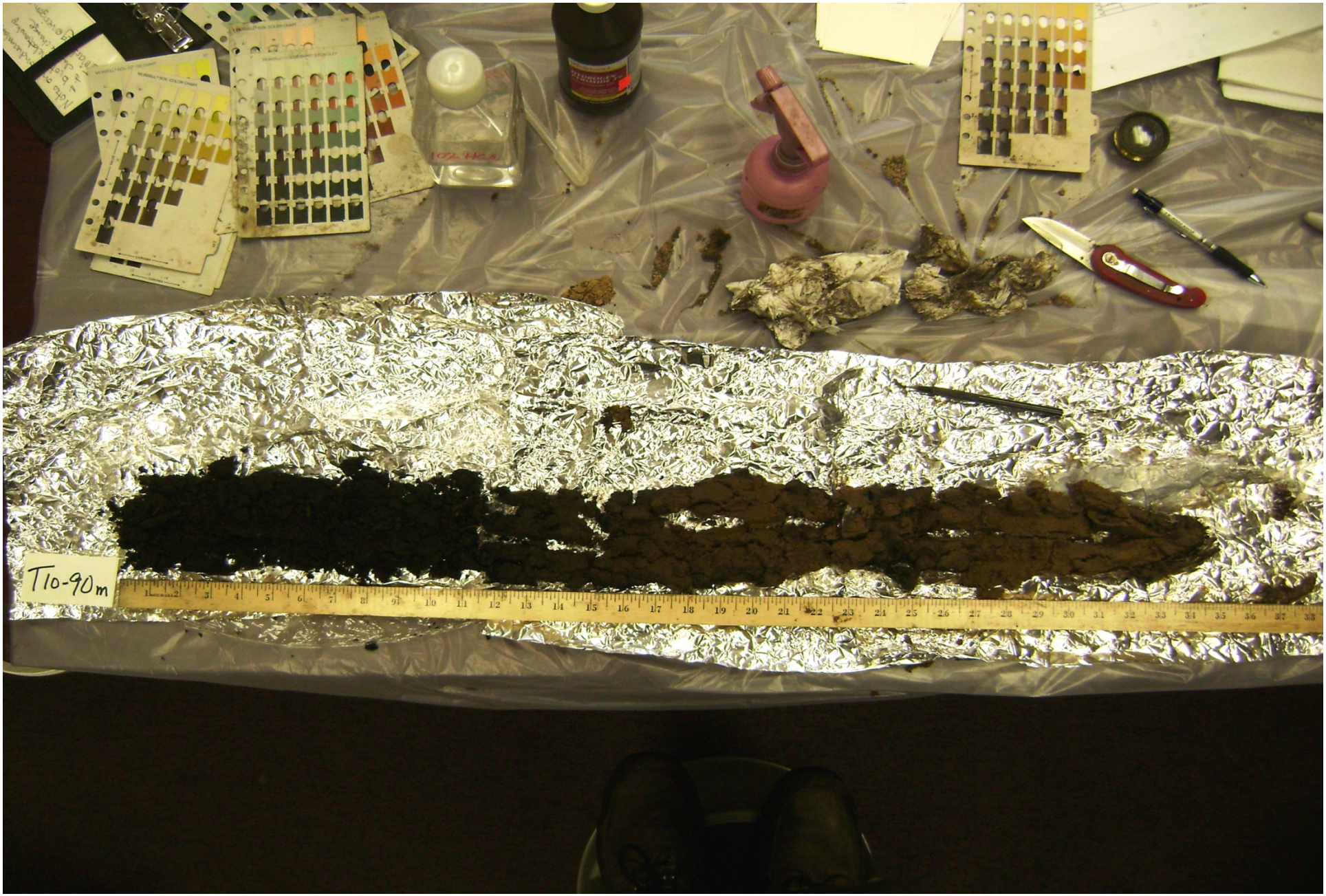
- The correspondences of native plant communities and their supporting soil series, called edaphic analogues, to develop and map the landscape for restoration planning.

- Soils retain the imprint of the native vegetation under which they formed, even when that vegetation is completely removed.

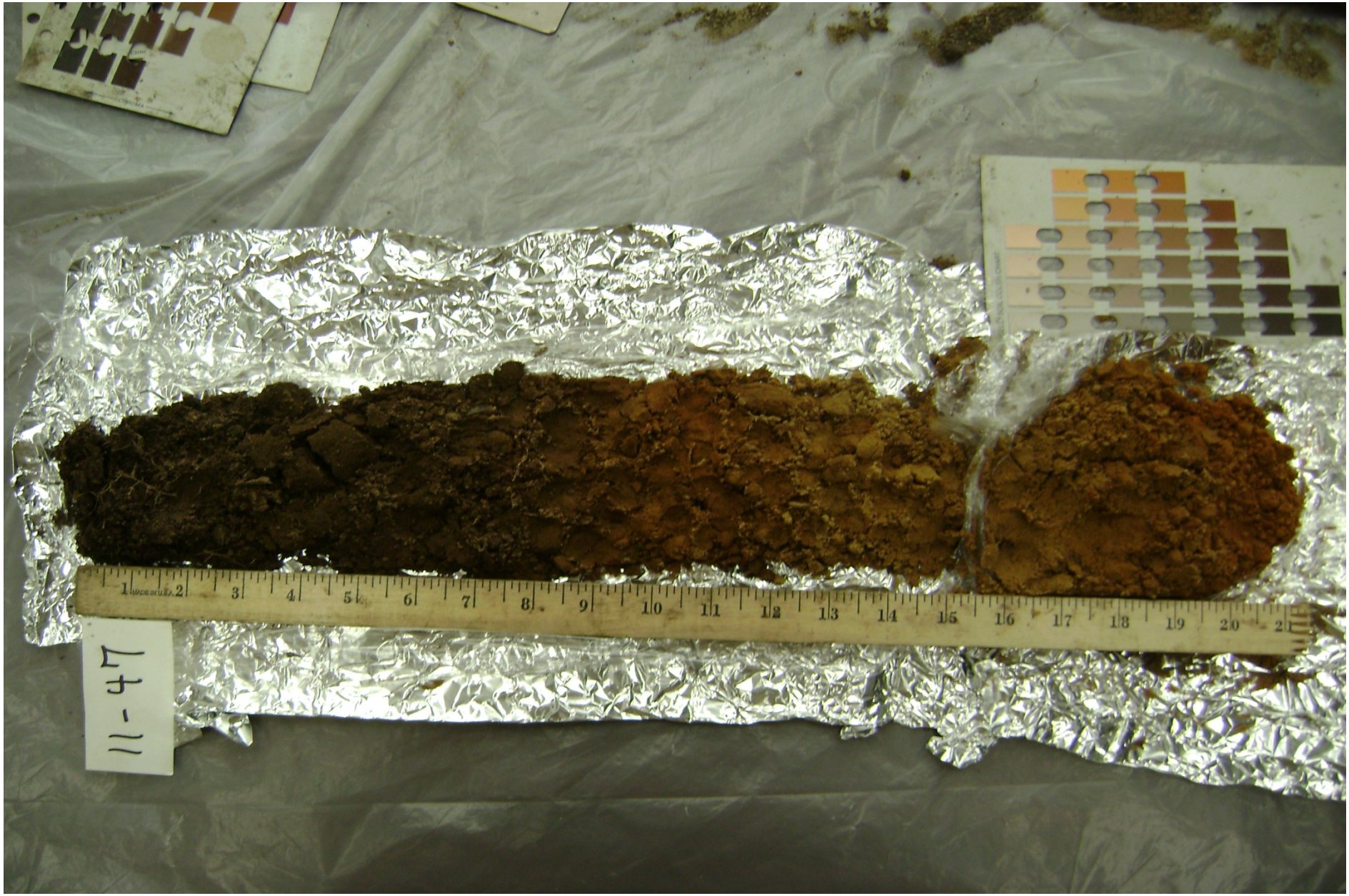
MAUMEE



GRANBY



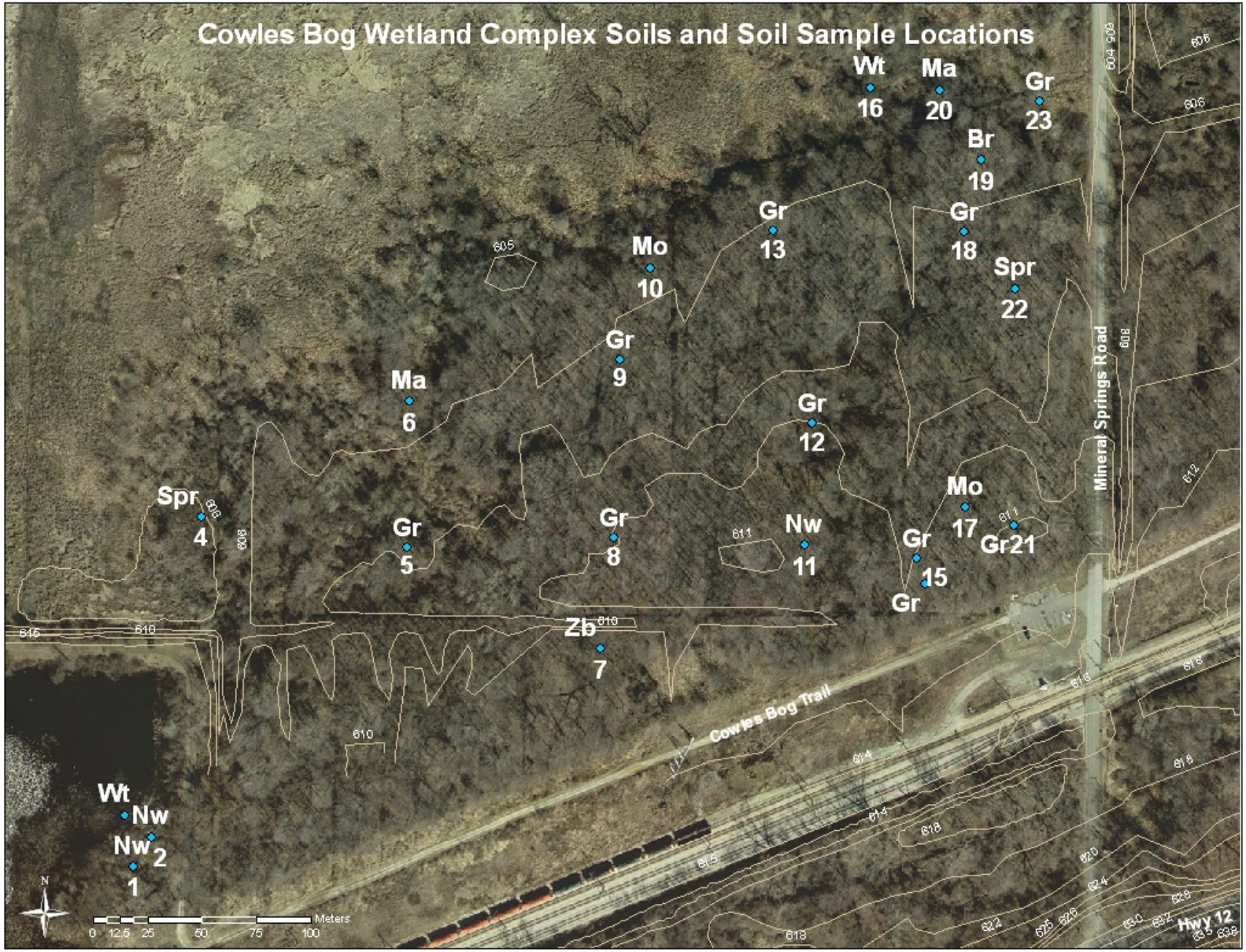
PIPESTONE

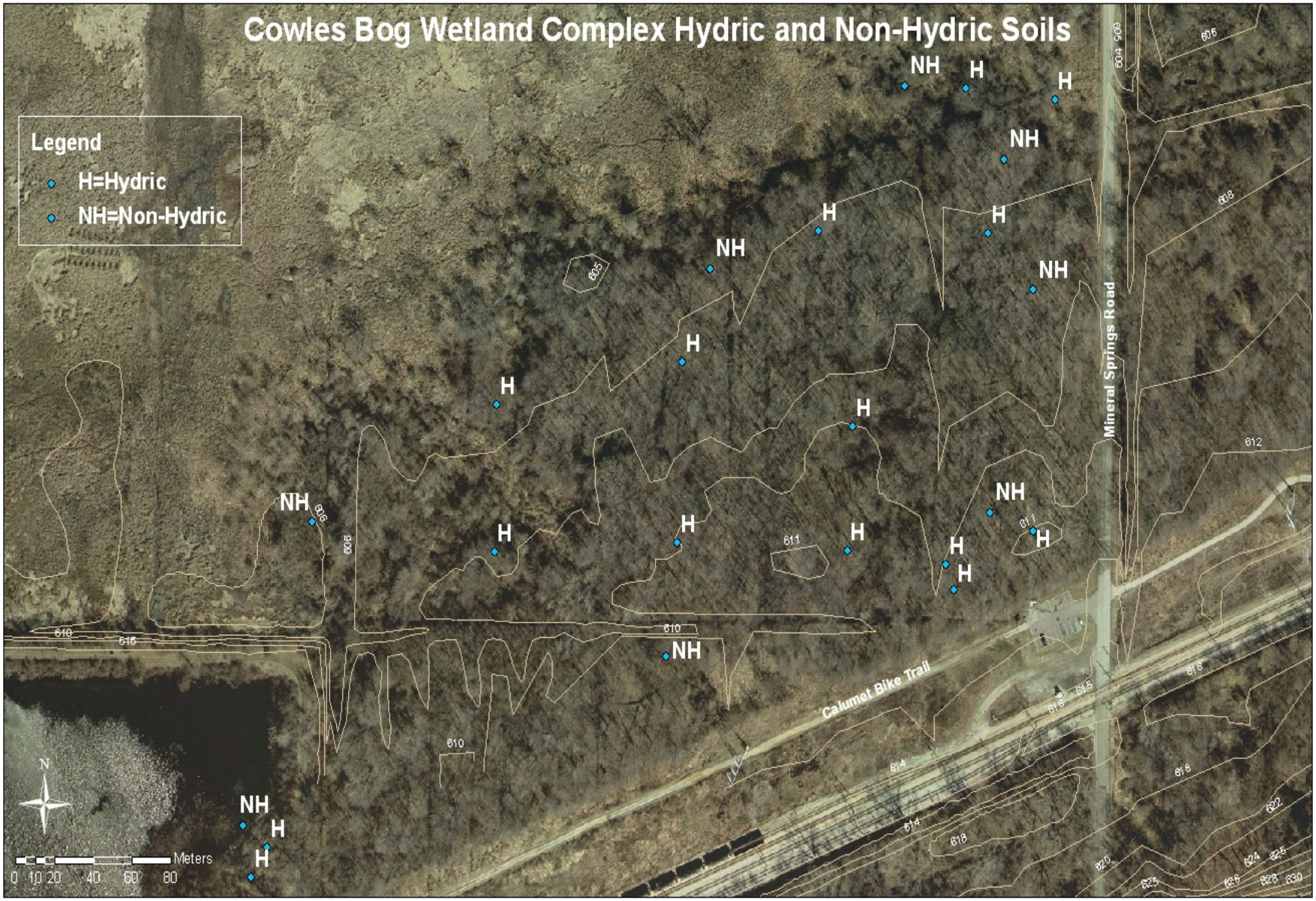


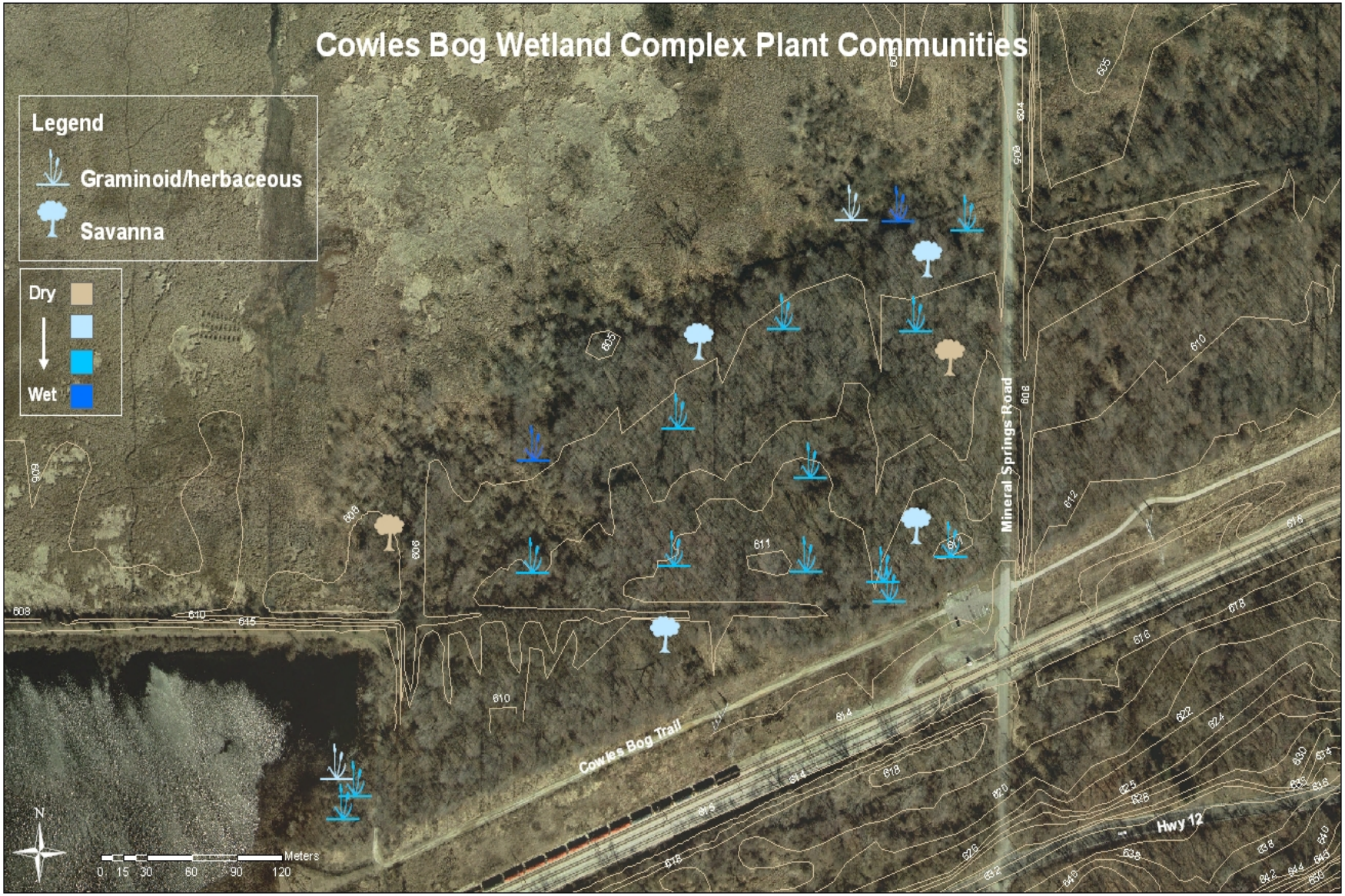
Savanna versus Prairie Soil Types

MOROCCO

GRANBY


Cowles Bog Wetland Complex Soils and Soil Sample Locations
Wt 16
Ma 20
Gr 23
Br 19
Gr 18
Spr 22
Gr 13
Mo 10
Gr 9
Ma 6
Gr 12
Spr 4
Gr 5
Gr 8
Nw 11
Mo 17
Gr 21
Gr 15
Gr
Zb 7
Wt
Nw
Nw 2
1
Mineral Springs Road
Cowles Bog Trail
Hwy 12
N
0 12.5 25 50 75 100
Meters


Cowles Bog Wetland Complex Hydric and Non-Hydric Soils
Legend
H=Hydric
NH=Non-Hydric
Mineral Springs Road
Calumet Bike Trail
N
0 10 20 40 60 80
Meters


Cowles Bog Wetland Complex Plant Communities
Legend
Graminoid/herbaceous
Savanna
Dry
Wet
Mineral Springs Road
Cowles Bog Trail
Hwy 12
N
0 15 30 60 90 120
Meters

Shrubs and Woody Vines			
Scientific Name	**Cover**	**Frequency**	**Importance**
MOST COMMON SPECIES			
Lindernia benzoin	52.37	96.70	135.42
Vitis labrusca	3.37	23.08	17.63
Rosa multiflora	0.49	19.78	11.26
OTHER SPECIES			
Acer rubra	1.49	10.99	8.21
Celastrus orbiculatus	0.26	4.40	2.75
Ilex verticillata	0.61	3.30	2.73
Ligustrum vulgare	0.01	1.10	0.59
Parthenocissus quinquefolia	0.10	4.40	2.49
Populus deltoides	0.19	1.10	0.89
Prunus serotina	2.08	12.09	9.75
Prunus virginiana	0.36	3.30	2.32
Quercus bicolor	0.08	1.10	0.71
Sassafras albidum	0.45	2.20	1.88
Ulmus Americanus	0.03	1.10	0.63
Viburnum lentago	0.23	3.30	2.12
Viburnum prunifolium	0.03	1.10	0.63
Total	**62.1**		

Herbaceous Vegetation			
Scientific Name	**Cover**	**Frequency**	**Importance**
MOST COMMON			
Lindera benzoin	7.36	64.77	91.52
Glyceria striata	2.19	15.91	25.56
multiflora	0.78	17.05	14.69
Other Species (36 species)	1.9		68.23

3481 TREES

DBH < 40cm 2841 Trees; DBH ≥ 40cm 640 Trees

139 Trees Per Acre

TWENTY-THREE SPECIES

FOUR DOMINANT SPECIES

ACER RUBRA (red maple) – 1556 (44.6%)

PRUNUS SEROTINA (black cherry) – 623 (17.8%)

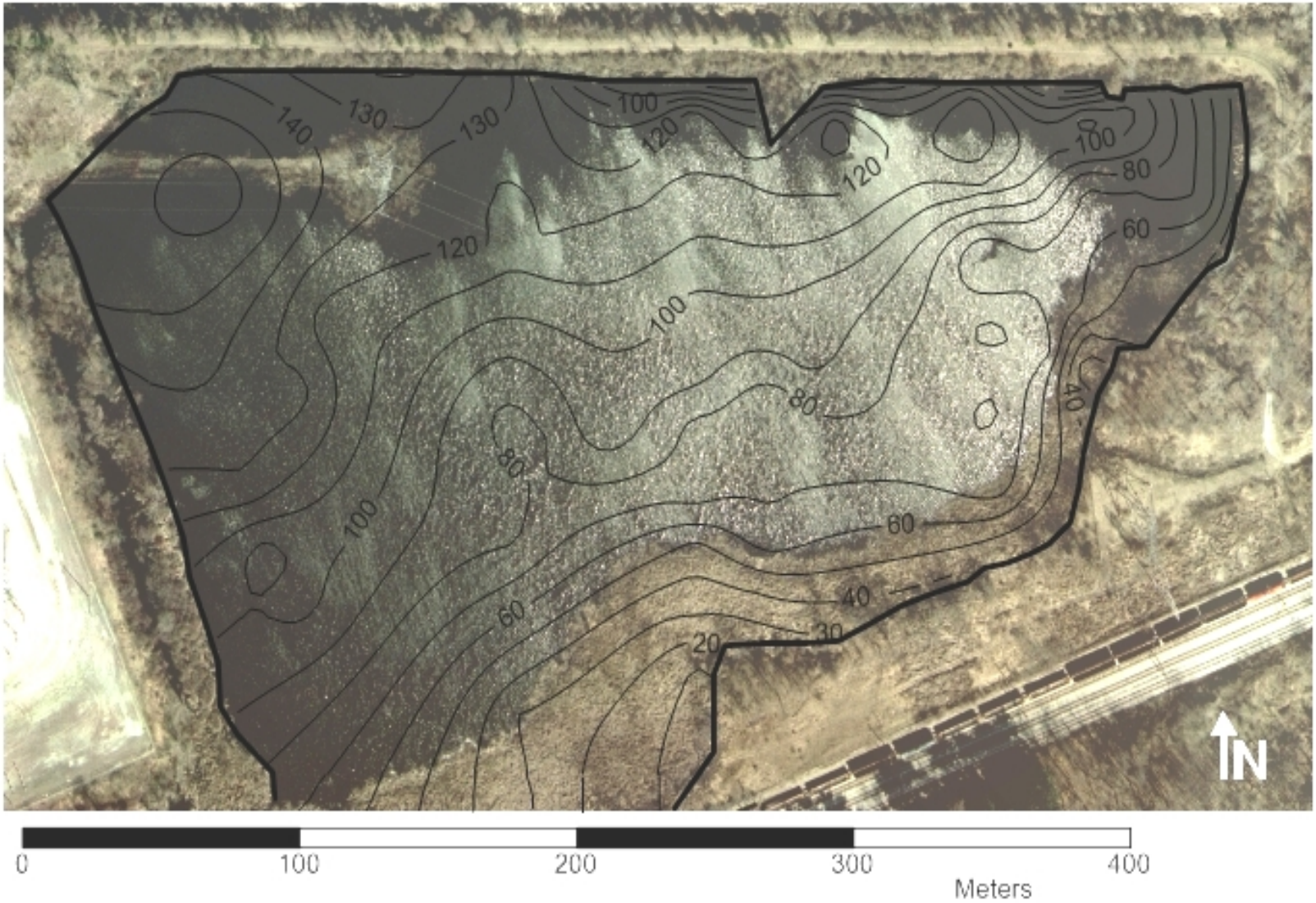
SASSAFRAS ALBIDUM (sassafras) – 607 (17.4%)

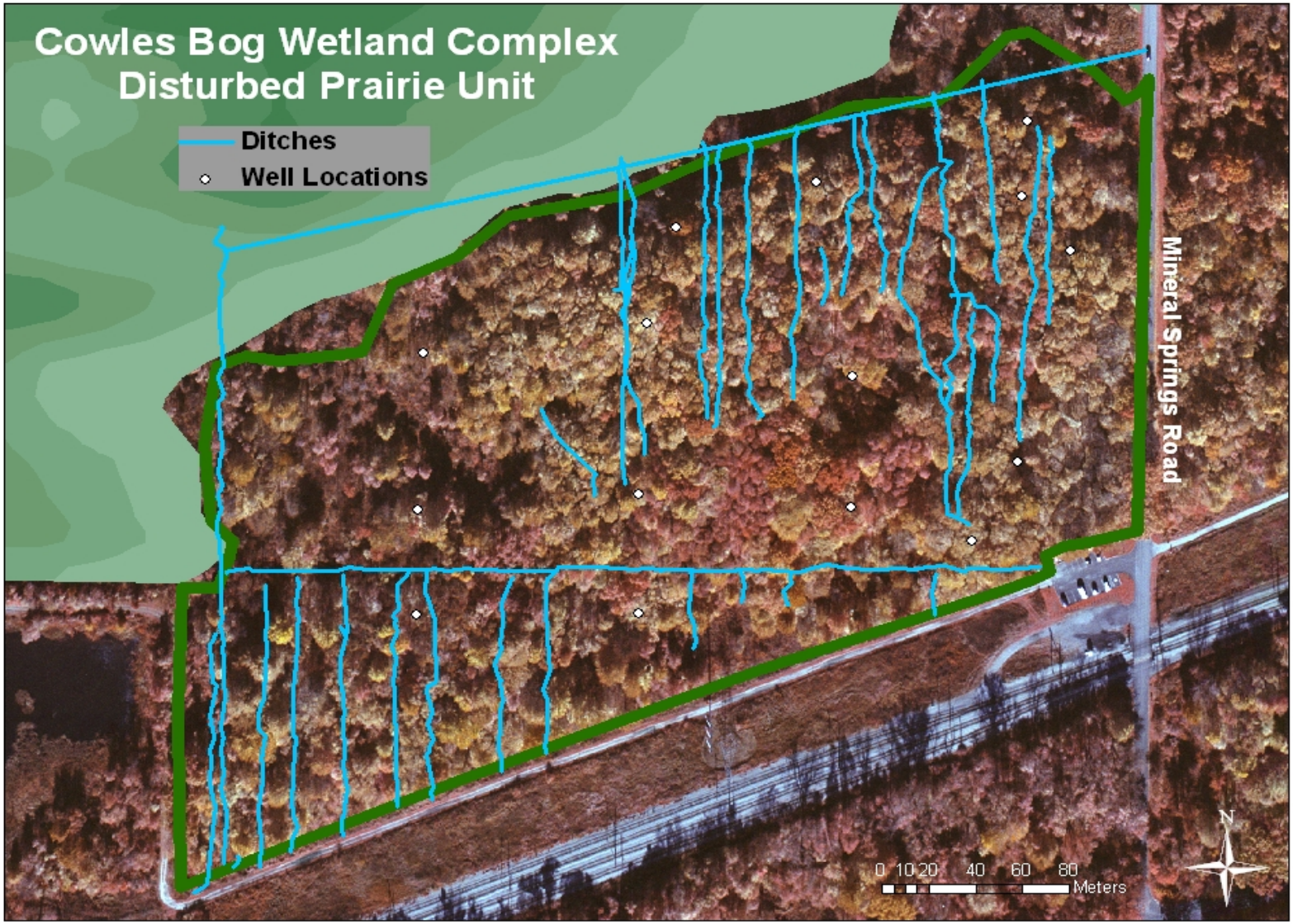
ROBINIA PSEUDOACACIA (black locust) – 227 (6.5%)

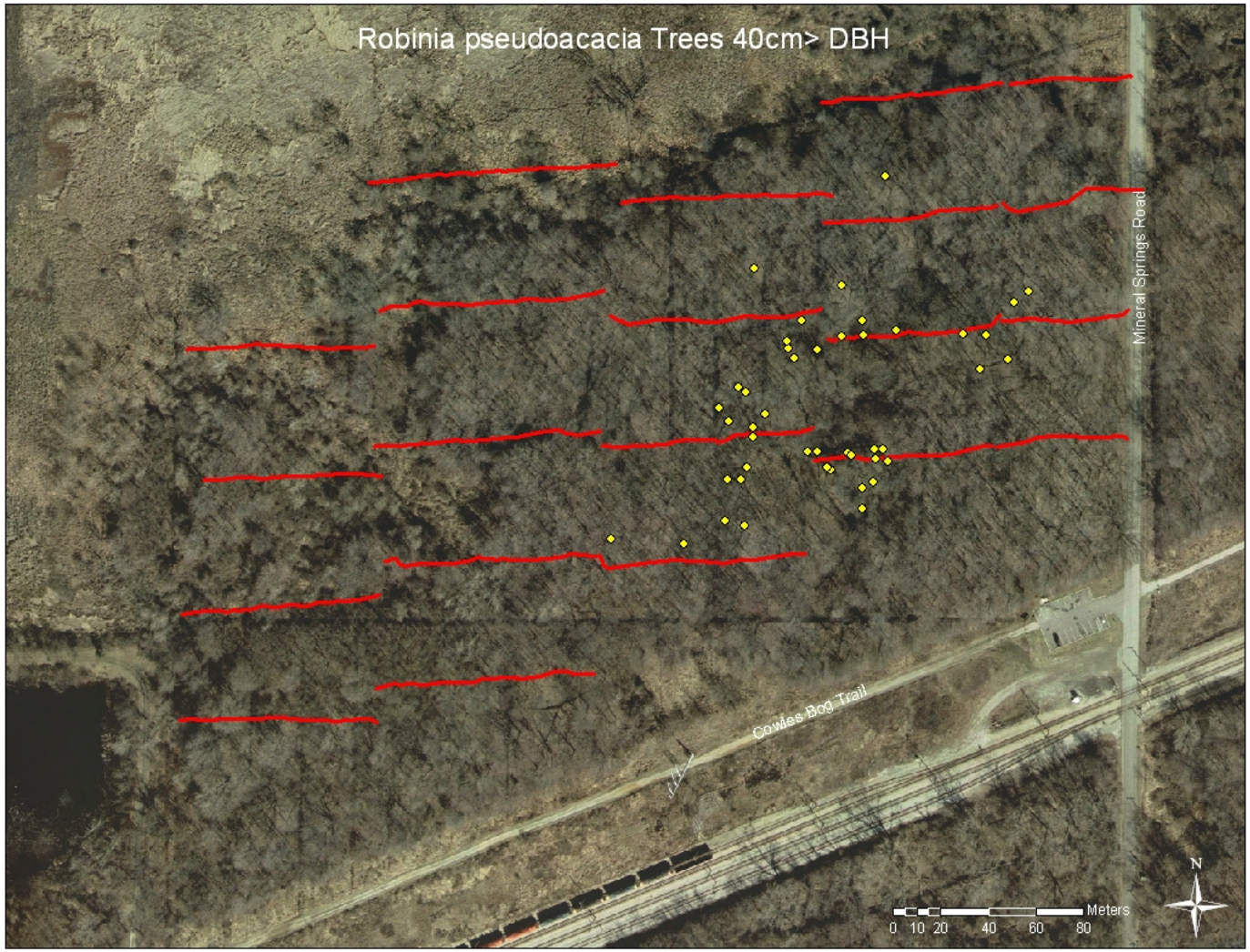
(2613 trees (75%))

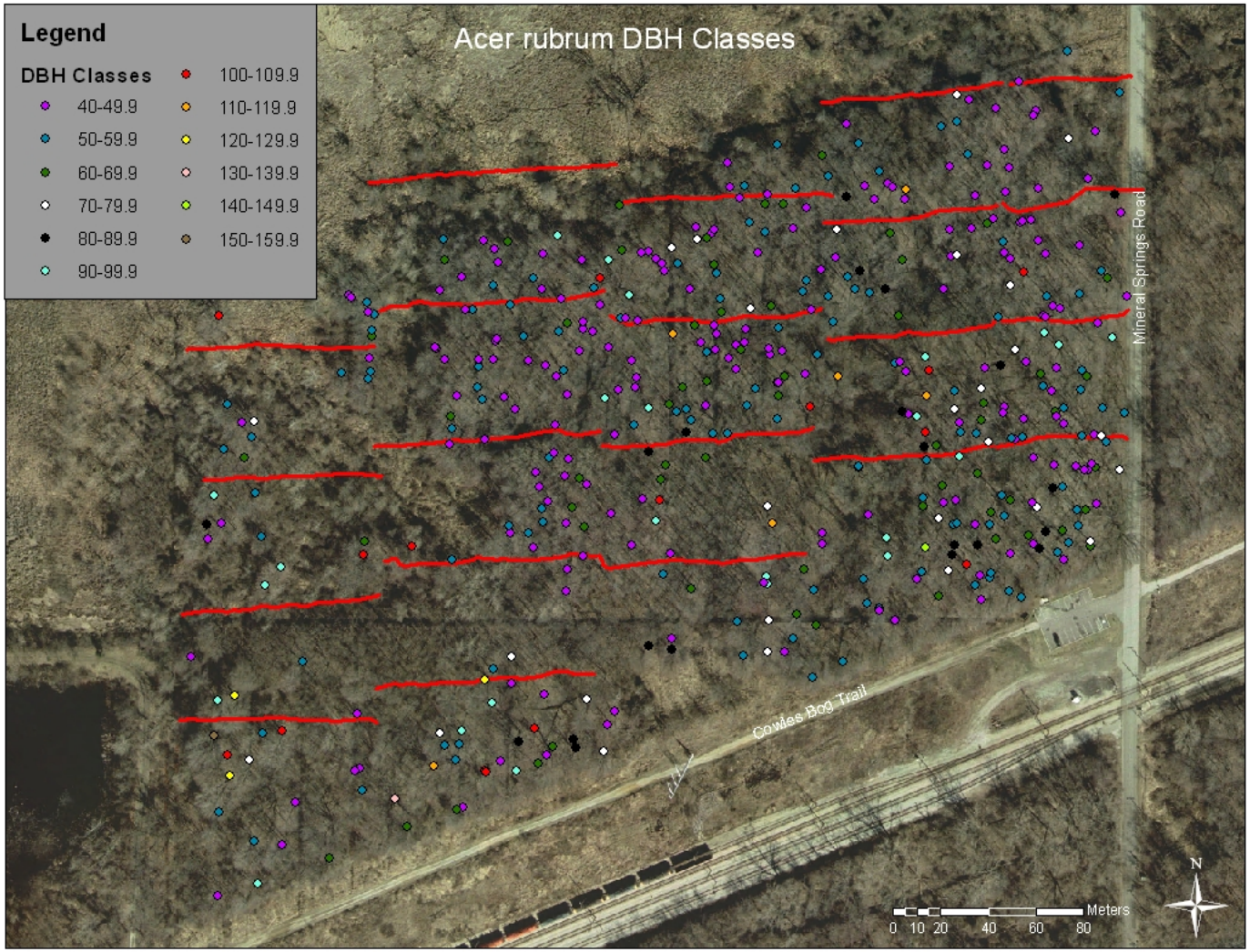
OBJECTIVES

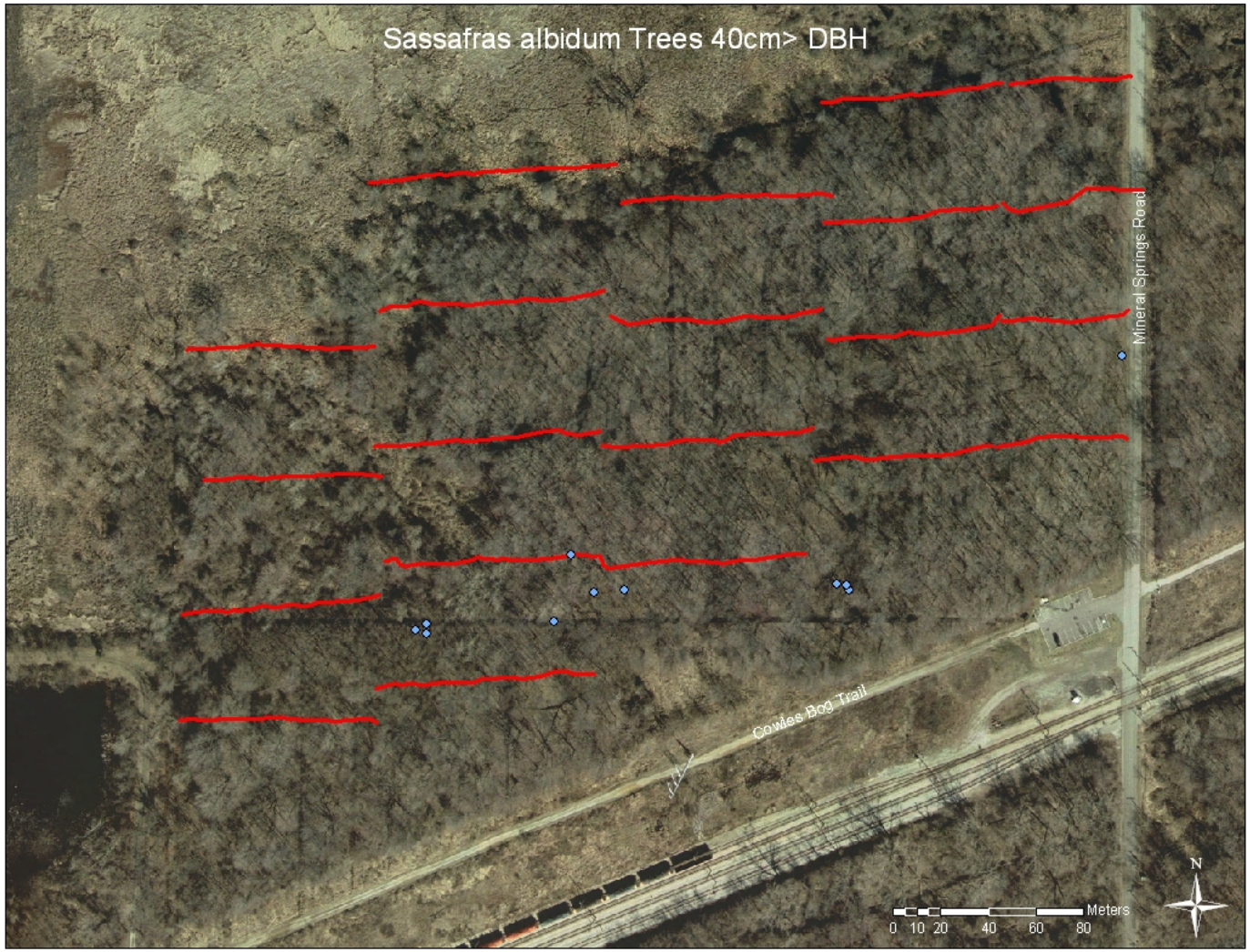
1. PROVIDE A VIEWSHED REFLECTIVE OF THAT EXPERIENCED BY HENRY COWLES AND OTHERS WHO USED COWLES BOG AS AN OUTDOOR CLASSROOM FOR BIODIVERSITY STUDY.
2. PRESENT A NATURAL LANDSCAPE DEVELOPED BY NATURAL PROCESSES FOLLOWING THE SECOND NIPISSING GEOLOGIC PHASE.
3. RESTORE COWLES BOG WETLAND COMPLEX


140
130
130
100
120
120
100
80
60
120
100
80
40
80
100
60
60
40
30
20
N
0
100
200
300
400
Meters


Cowles Bog Wetland Complex
Disturbed Prairie Unit
Ditches
Well Locations
Mineral Springs Road
0 10 20 40 60 80
Meters
N


Robinia pseudoacacia Trees 40cm> DBH
Mineral Springs Road
Cowles Bog Trail
N
Meters
0 10 20 40 60 80


Acer rubrum DBH Classes
Legend
DBH Classes
40-49.9
50-59.9
60-69.9
70-79.9
80-89.9
90-99.9
100-109.9
110-119.9
120-129.9
130-139.9
140-149.9
150-159.9
Mineral Springs Road
Cowles Bog Trail
Meters
0 10 20 40 60 80
N


Sassafras albidum Trees 40cm> DBH
Mineral Springs Road
Cowles Bog Trail
N
Meters
0 10 20 40 60 80

Prunus serotina DBH Classes
Legend
DBH Classes
40-49.9
50-59.9
60-69.9
70-79.9
80-89.9
90-99.9
Mineral Springs Road
Cowles Bog Trail
Meters
0 10 20 40 60 80
N

Appendix E
Presentation on Alternatives Considered

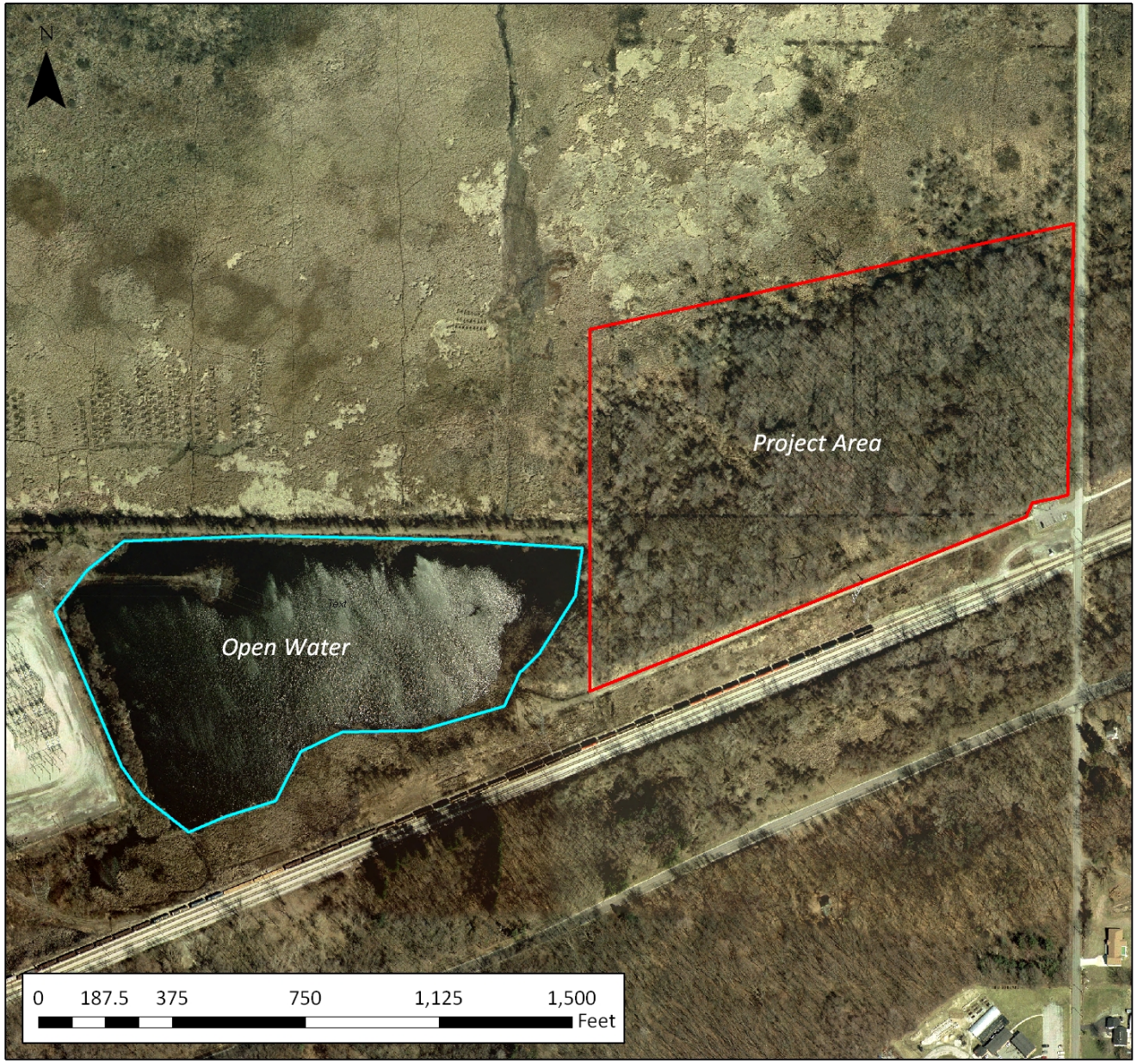
Cowles Bog Wetland Complex

Restoration of

Lake Plain Wet-Mesic Prairie

Existing Conditions

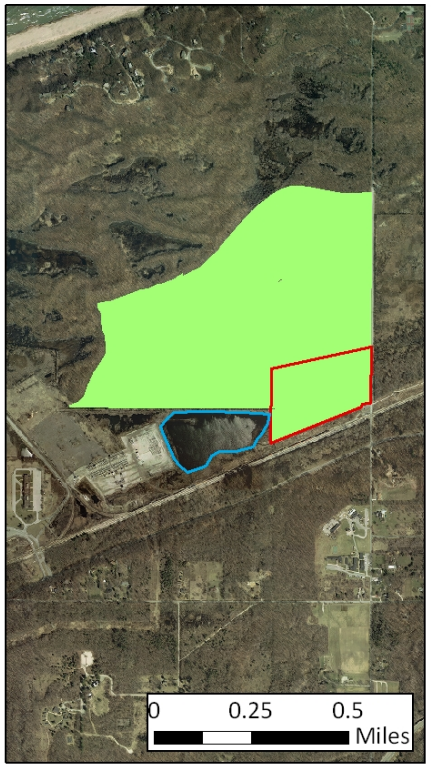
Cowles Bog Wetland Complex Improvements Project Area



Legend

- Open Water
- Project Area
- Cowles Bog Wetland Complex

7.20.11



L&A ECT GCS North American 1983 NAD83_UTM_Zone16N

Existing Conditions- Hydrology and Elevations

** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

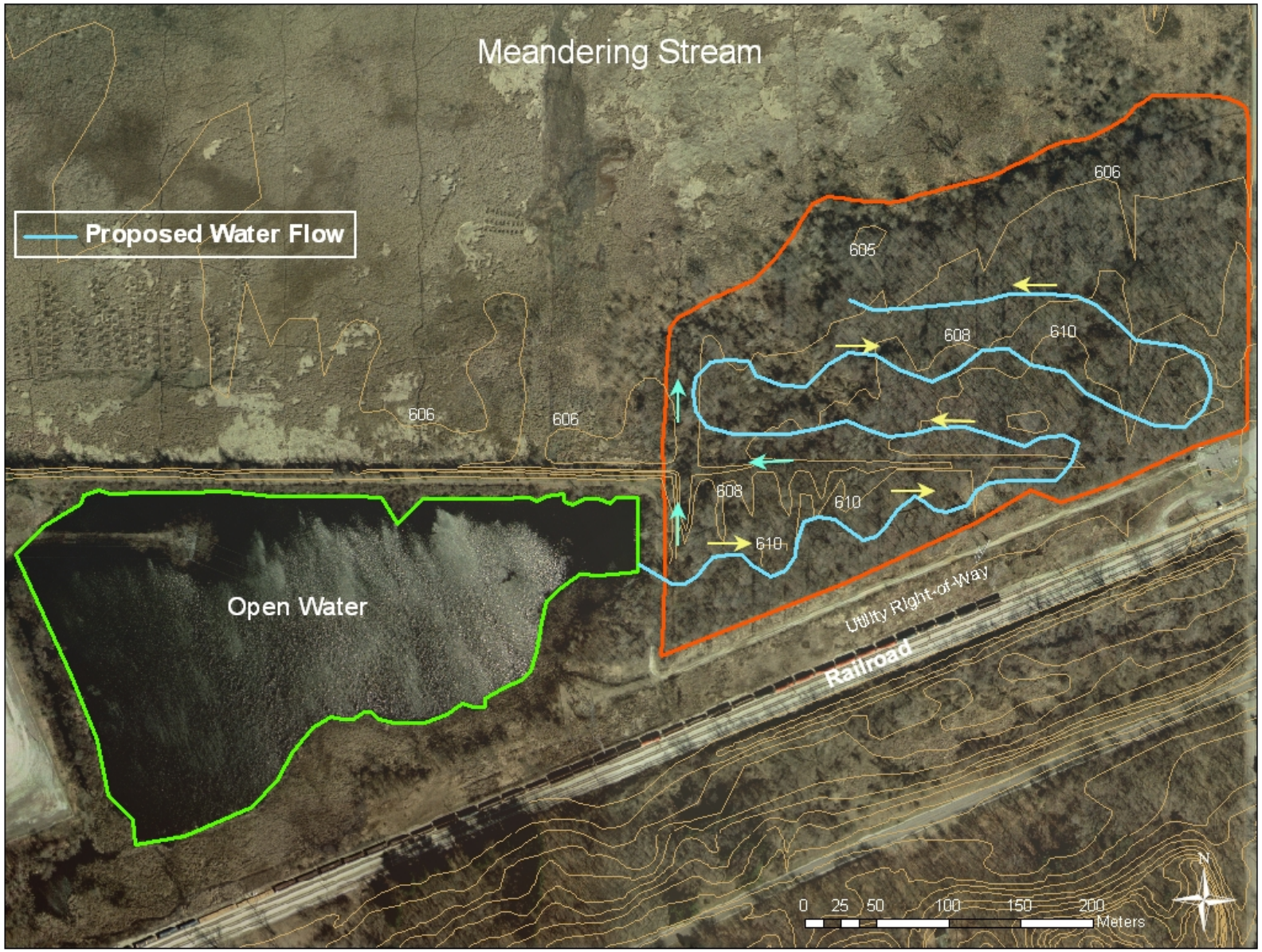
Alternatives Under Consideration

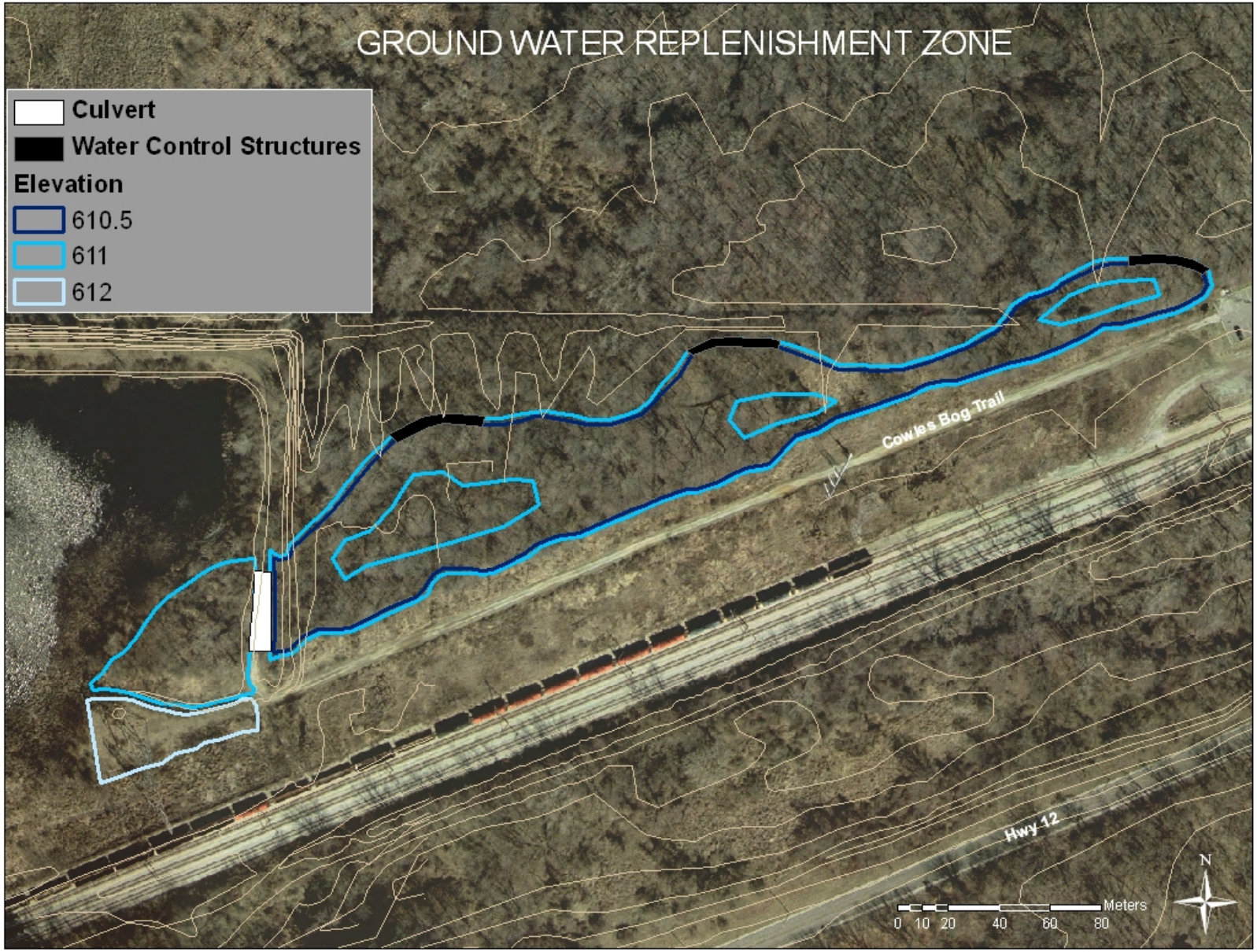
Success Factors

- To restore Lake Plain Wet-Mesic Prairie, three factors are important
  - Water source/hydrology
  - Planting of desired species
  - Extent of tree canopy
- Presence of historic site is a constraint
  - Will commit to avoid impacts to site

Hydrology Alternatives

- Construct a pool and riffle meandering stream throughout the unit
- Construct groundwater replenishment zones along the southern perimeter
- Restore connection to adjacent water body


Meandering Stream
Proposed Water Flow
606
605
608
610
606
606
608
610
610
Open Water
Utility Right-of-Way
Railroad
0 25 50 100 150 200
Meters
N


GROUND WATER REPLENISHMENT ZONE
Culvert
Water Control Structures
Elevation
610.5
611
612
Cowles Bog Trail
Hwy 12
Meters
0 10 20 40 60 80
N

Hydrology Alternatives

- Meandering stream alternative would not achieve project goals
- Proposed hydrology will use a combination of adjacent pond and ground water replenishment zones

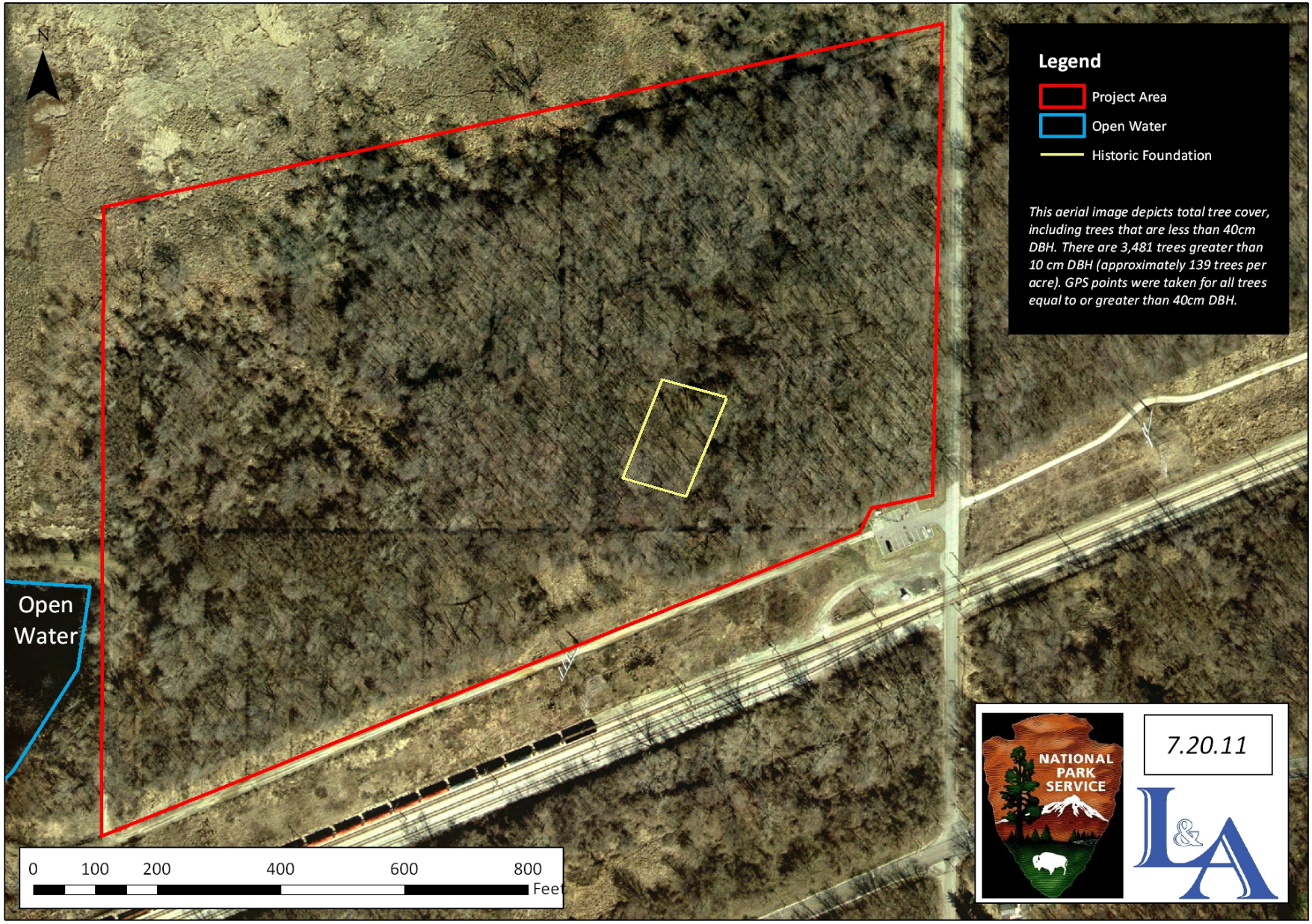
Planting Activities

- Wet/mesic prairie species
- Adaptability based upon water depth

Tree Canopy Alternatives

- Key issues
  - Maintain the trees at the historic site (“foundation” trees)
  - Consistency with historical conditions (edaphic analogy study and 1830 land survey)
  - Buffer to Mineral Springs Road

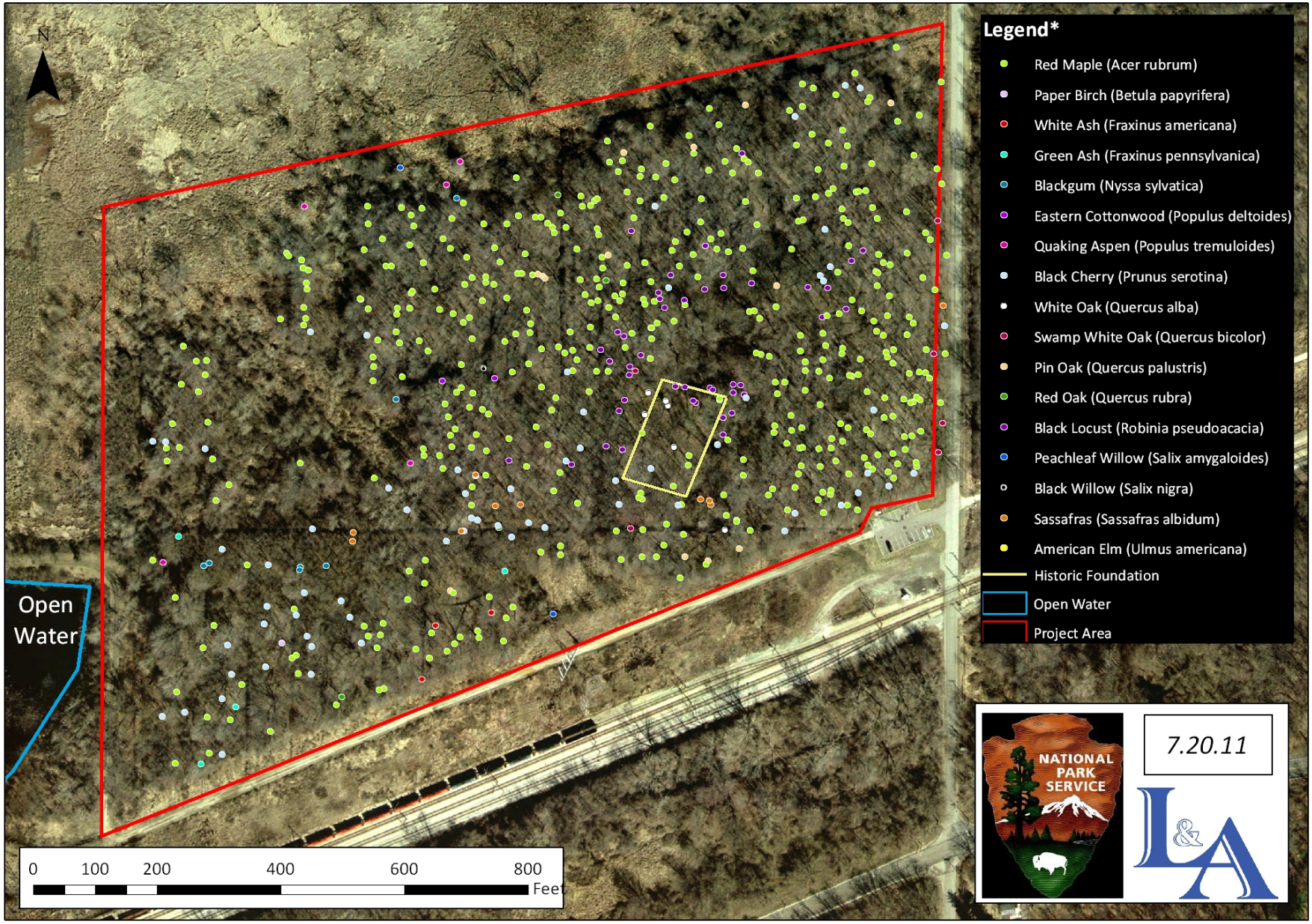
Alternative 1- No Action



* Only trees with a DBH equal to or greater than 40cm were mapped.

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

Alternative 1- No Action



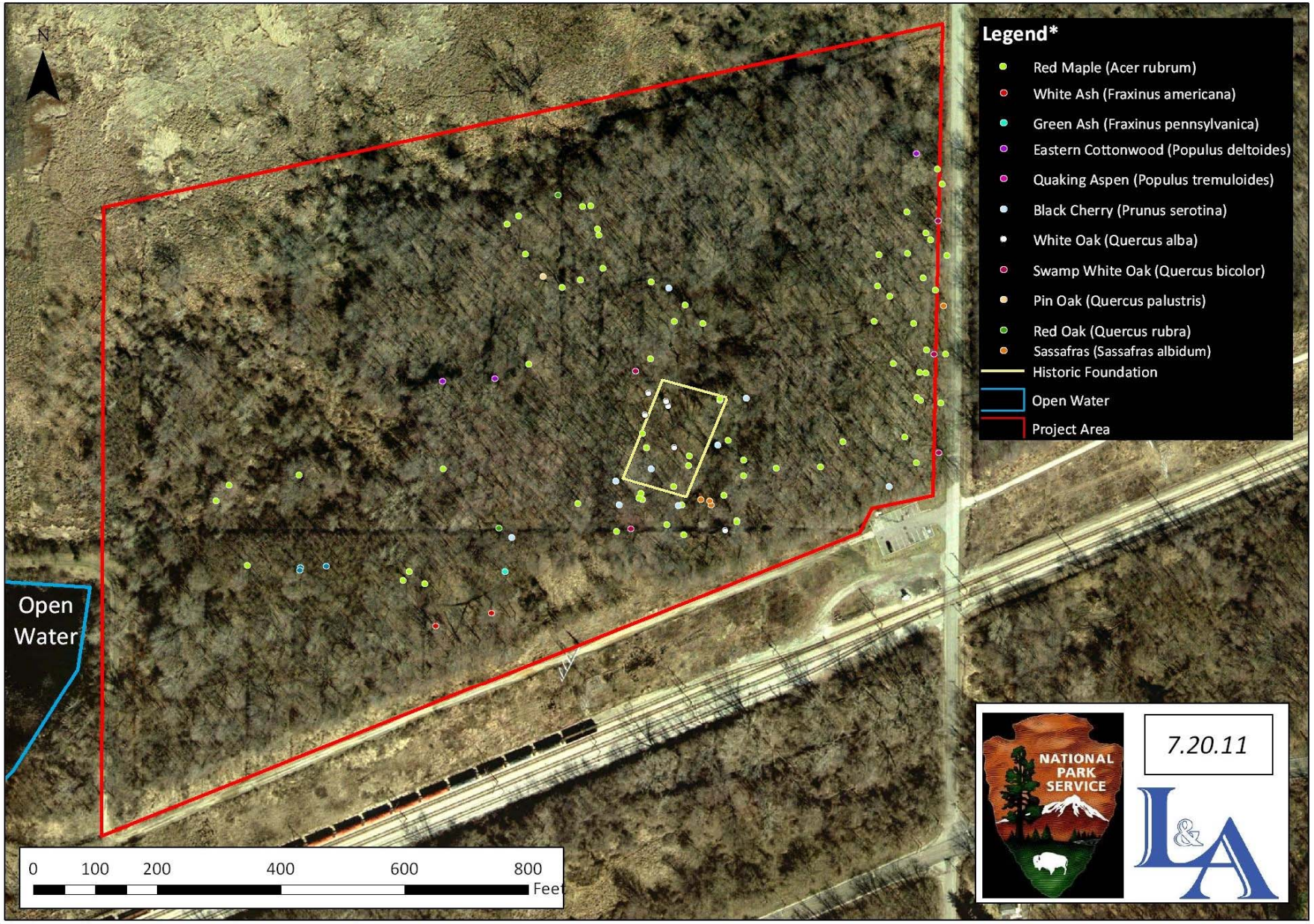
** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

Alternative 1
No Action

- Maintains existing conditions
- Tree growth will continue
- Canopy cover will expand to fill site
- Does not meet project goals

Alternative 2- Retention of Selected Trees



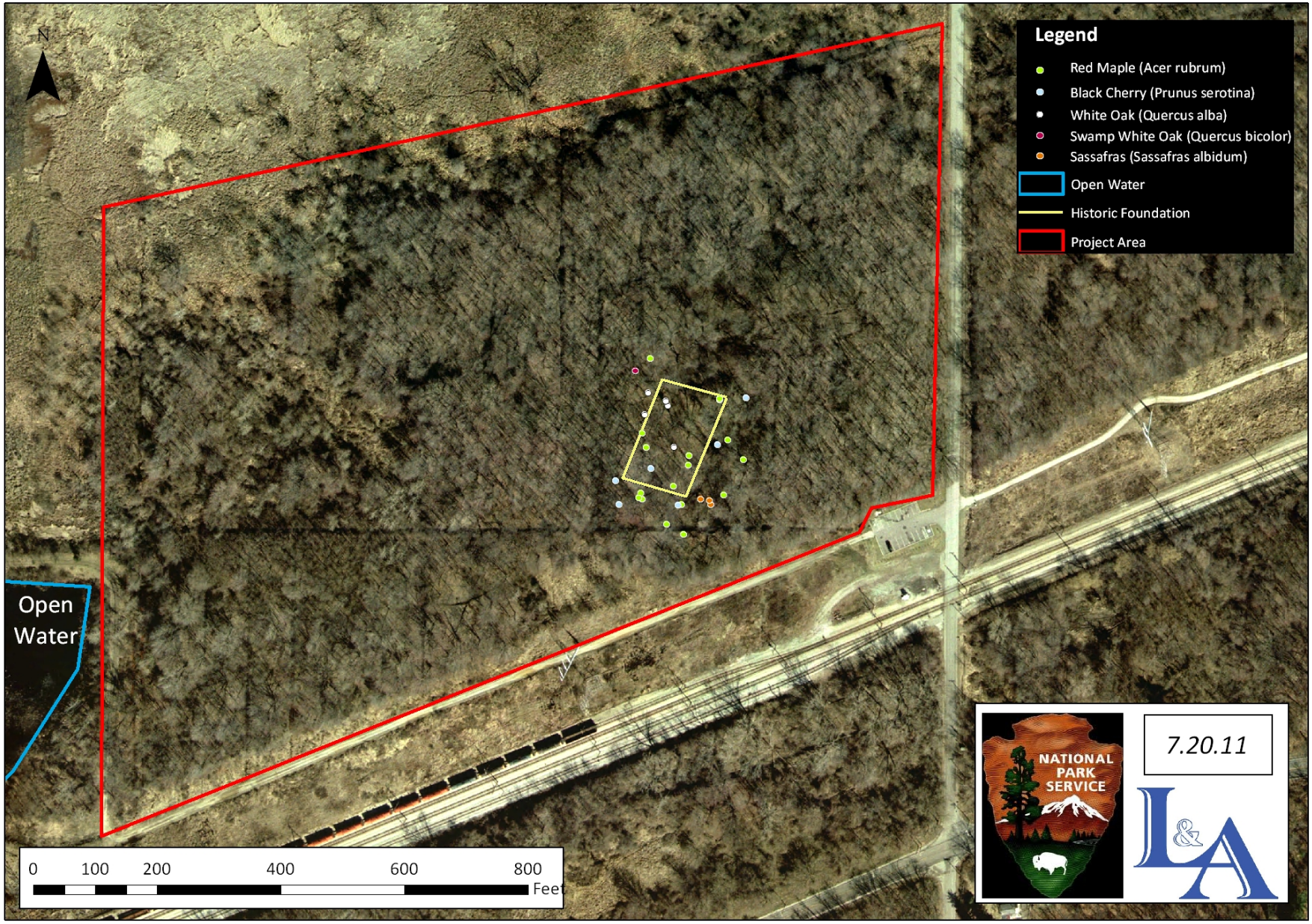
** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

Alternative 2
Retention of Selected Trees

- Maintains trees around historic foundation
- Reduces canopy to allow for development of desired species
- Consistent with historical conditions
- Provides buffer to Mineral Springs Road

Alternative 3- Retention of Trees by Historic Foundation



** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

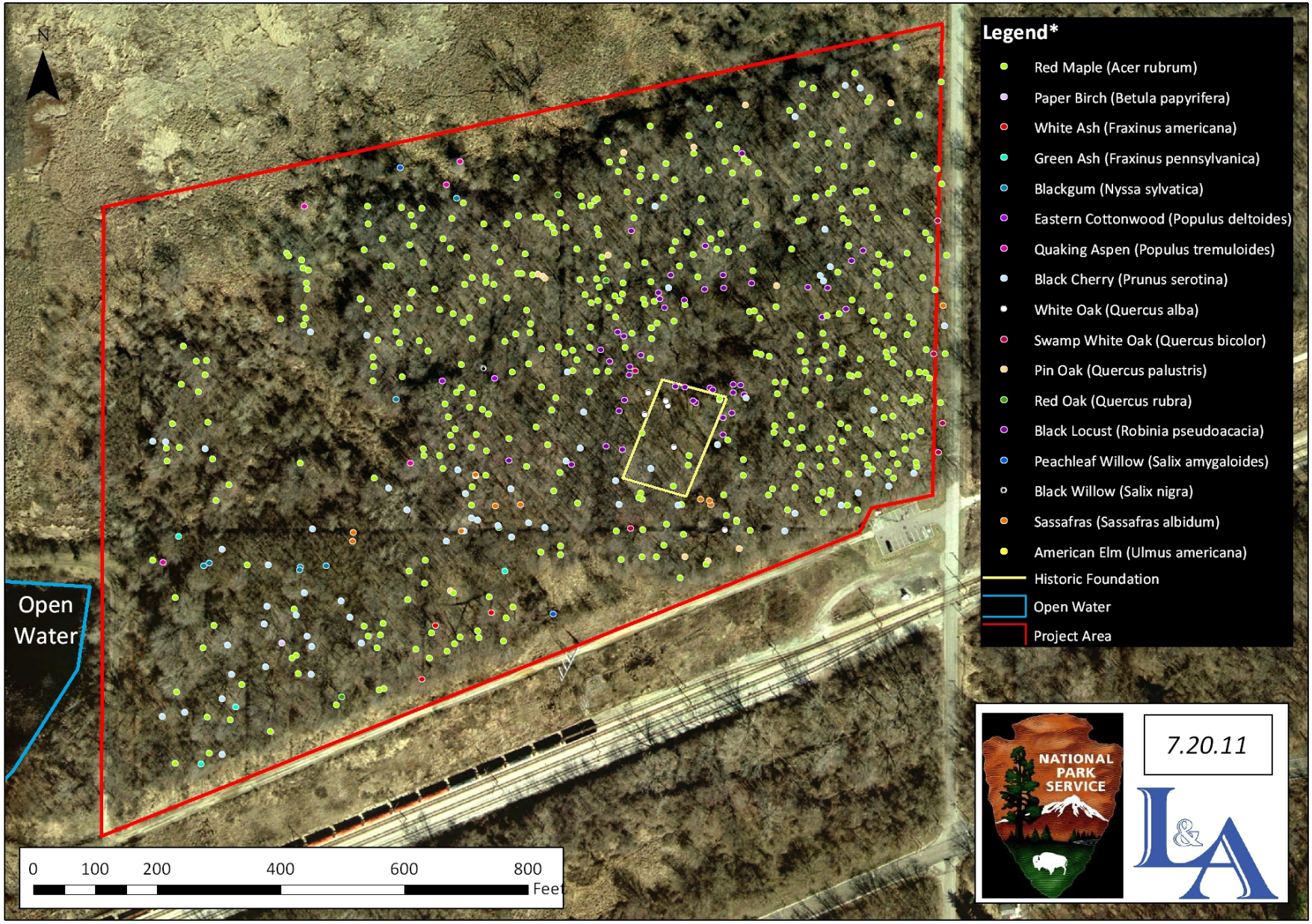
Alternative 3 "Foundation" Trees

- Maintains trees around historic foundation only
- Reduces canopy to allow for development of desired species
- Not consistent with historical conditions
- Does not provide buffer to Mineral Springs Road

Other Options Considered

- Also considered
  - Maintain all trees greater than 40 cm dbh
  - Maintain all trees greater than 70 cm dbh
- Eliminated for these reasons
  - Does not provide buffer to Mineral Springs Road
  - Does not reduce canopy enough to support desired species

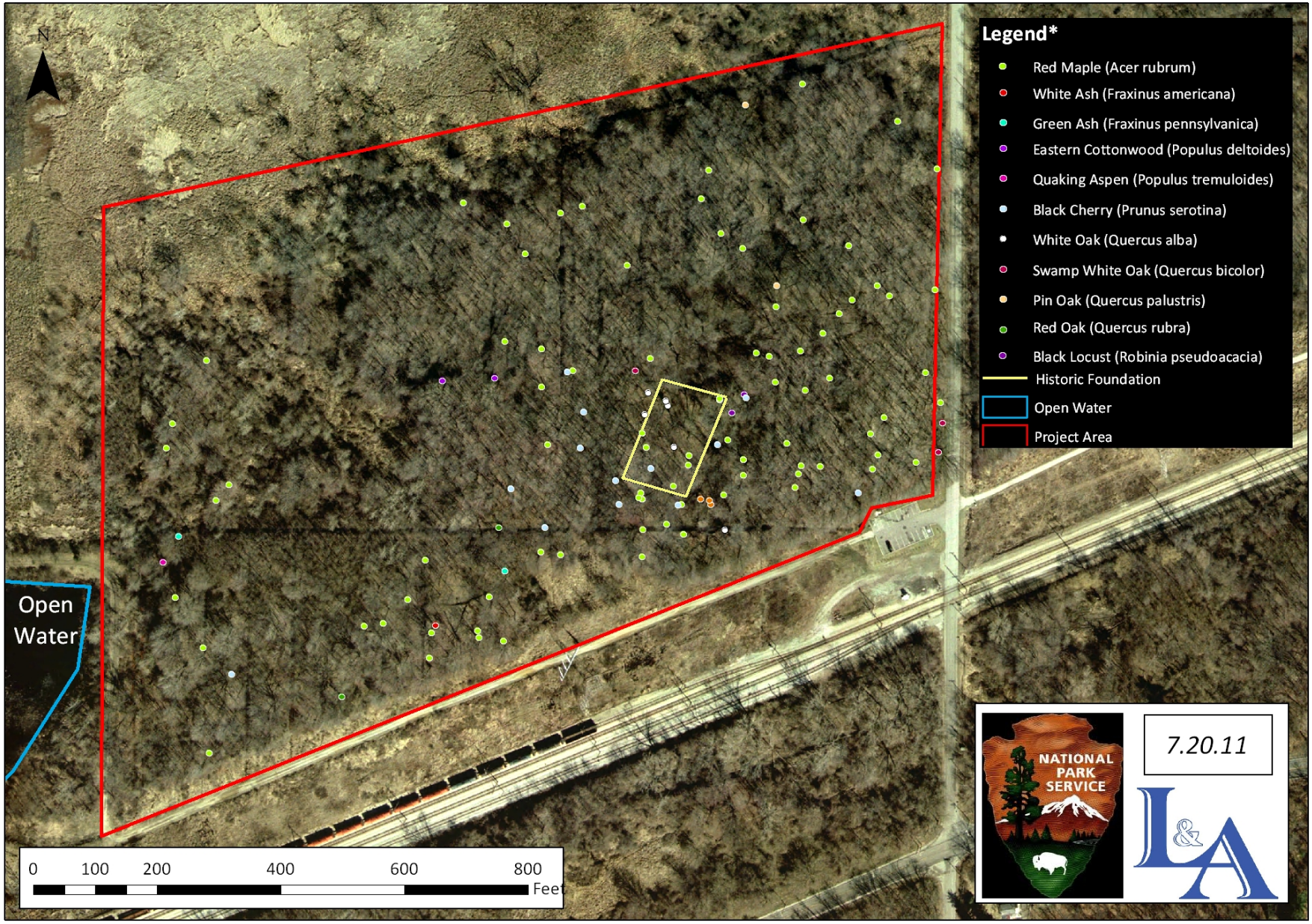
Trees Equal to or Greater than 40cm DBH



** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

Trees Equal to or Greater Than 70cm DBH



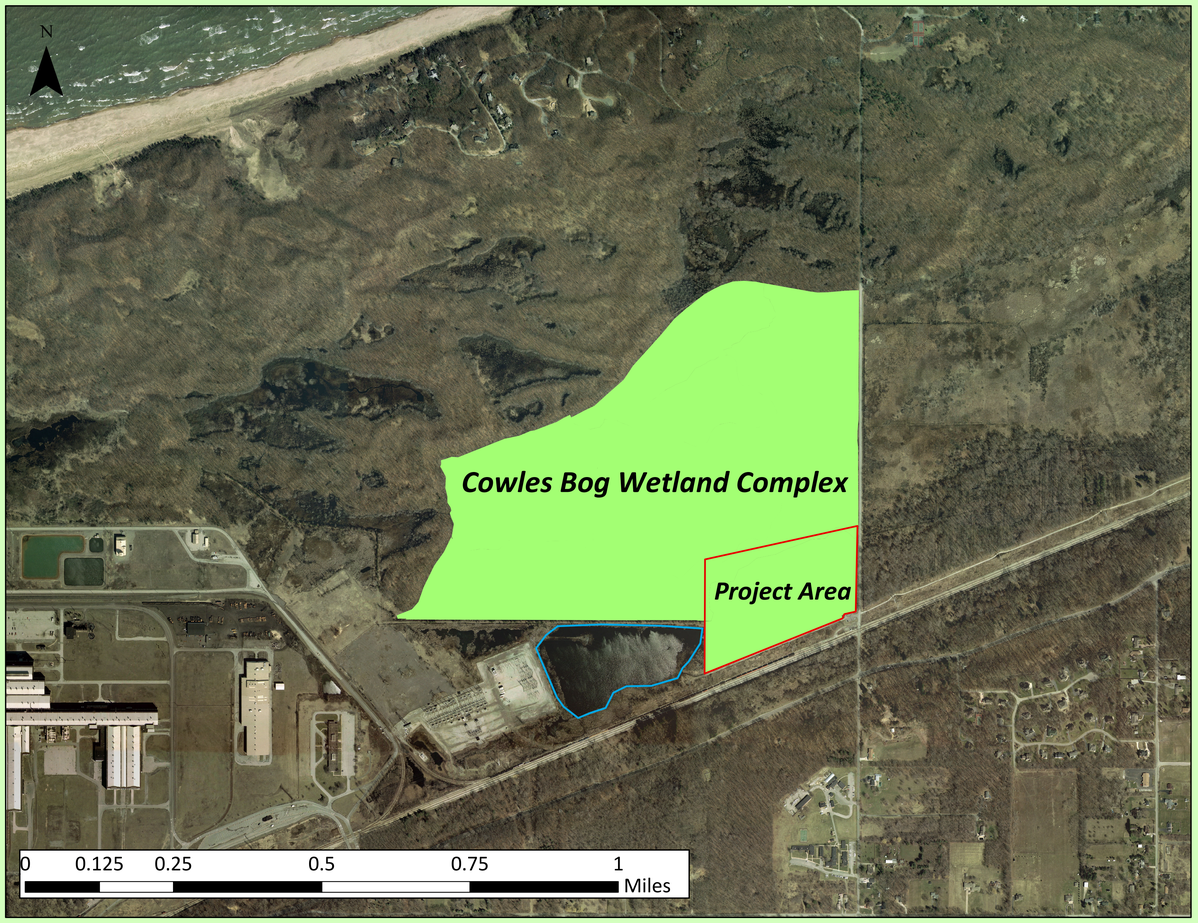
** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

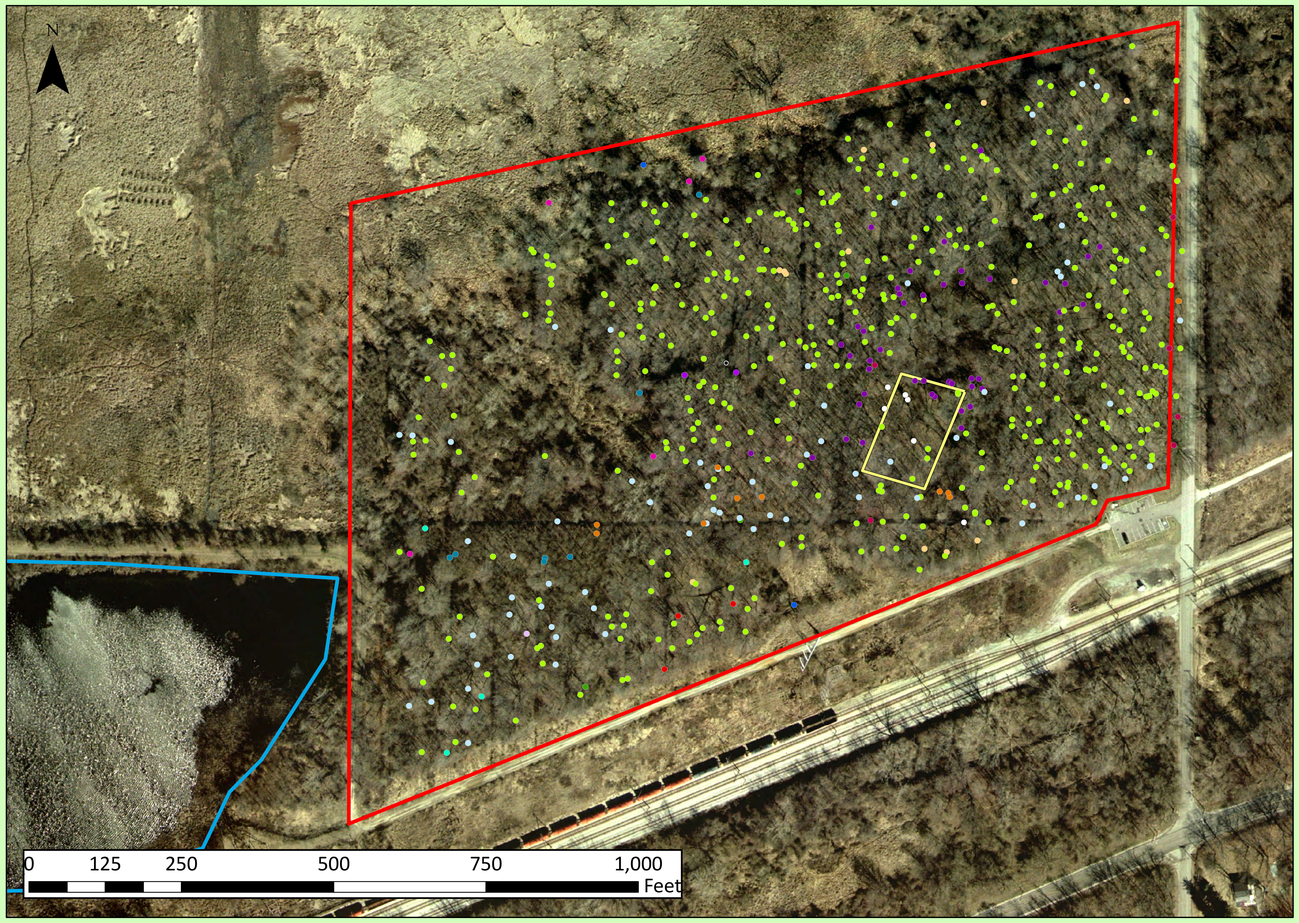
Appendix F
Exhibits

Cowles Bog Wetland Complex
Restoration of Lake Plain Wet-Mesic Prairie

Cowles Bog Wetland Complex



Existing Conditions



Existing Conditions

The existing hydrology has been modified by a series of ditches. Tree cover prevents the establishment of wet-mesic species.

Proposed Alternative

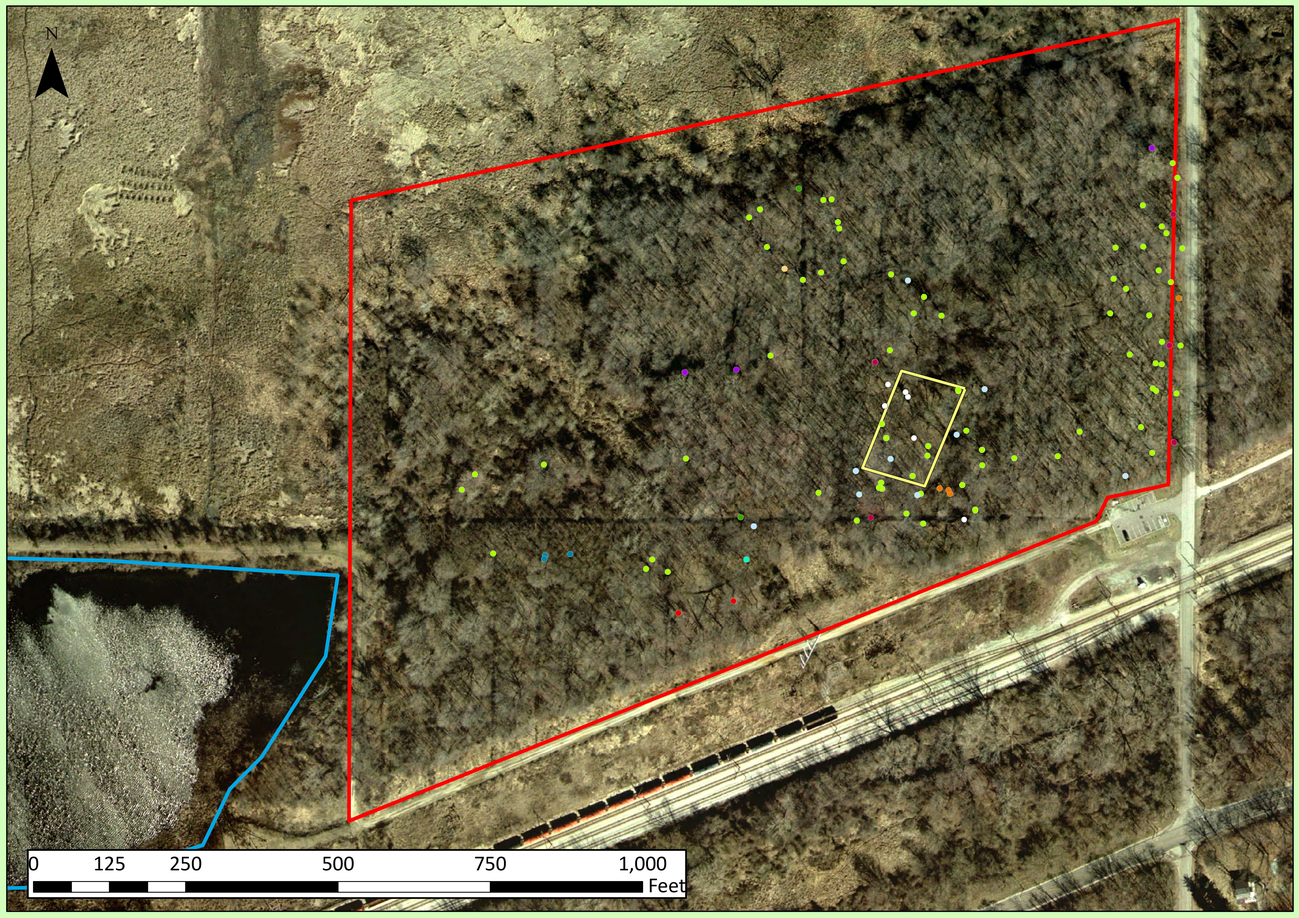
Proposed hydrology will use a combination of adjacent pond and ground water replenishment zones. Wet-mesic prairie species will be planted according to their adaptability to different water depths. Trees will be retained surrounding the historic foundation. The proposed plan reduces canopy to allow for development of desired species. It will be consistent with historic conditions and will provide a buffer to Mineral Springs Road.

7.20.11

Legend*

- Red Maple (Acer rubrum)
- Paper Birch (Betula papyrifera)
- White Ash (Fraxinus americana)
- Green Ash (Fraxinus pennsylvanica)
- Blackgum (Nyssa sylvatica)
- Eastern Cottonwood (Populus deltoides)
- Quaking Aspen (Populus tremuloides)
- Black Cherry (Prunus serotina)
- White Oak (Quercus alba)
- Swamp White Oak (Quercus bicolor)
- Pin Oak (Quercus palustris)
- Red Oak (Quercus rubra)
- Black Locust (Robinia pseudoacacia)
- Peachleaf Willow (Salix amygaloides)
- Black Willow (Salix nigra)
- Sassafras (Sassafras albidum)
- American Elm (Ulmus americana)
- Historic Foundation
- Open Water
- Project Area

Proposed Alternative

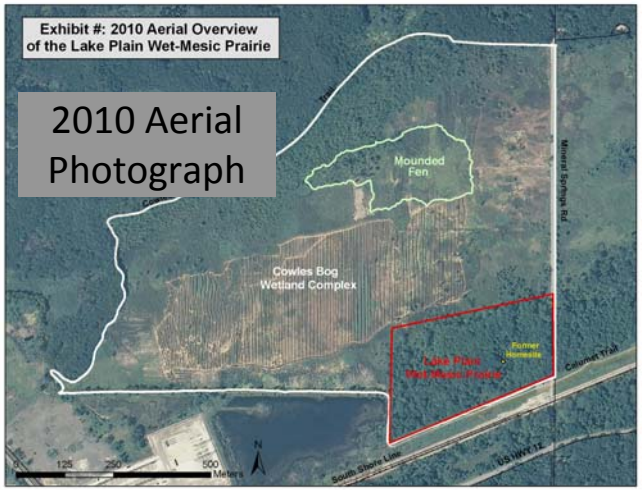


** Only trees with a DBH equal to or greater than 40cm were mapped.*

L&A ECT GCS North American 1983 NAD83_UTM_Zone16N Data Source: NPS

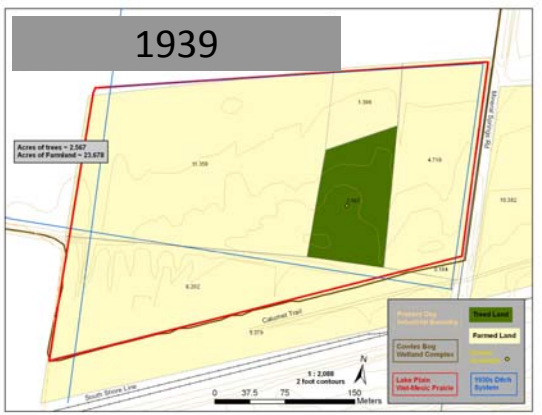
Cowles Bog Wetland Complex

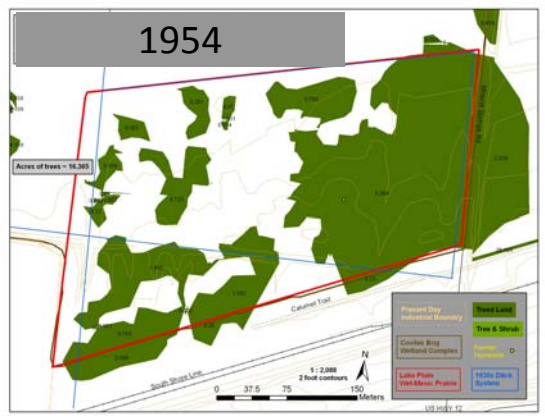
Restoration of Lake Plain Wet-Mesic Prairie

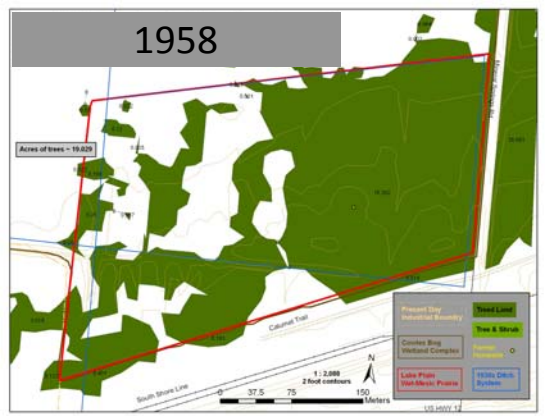


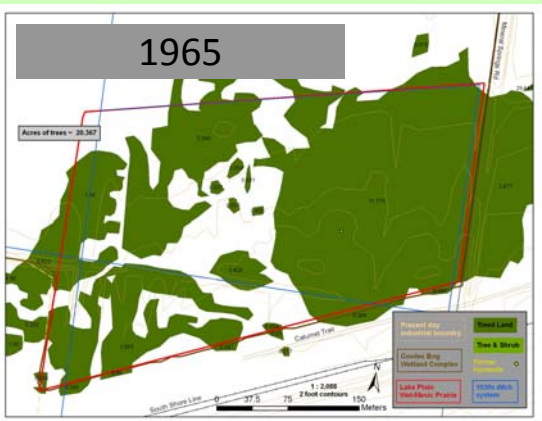
Tree Cover Changes: 1939 to Present

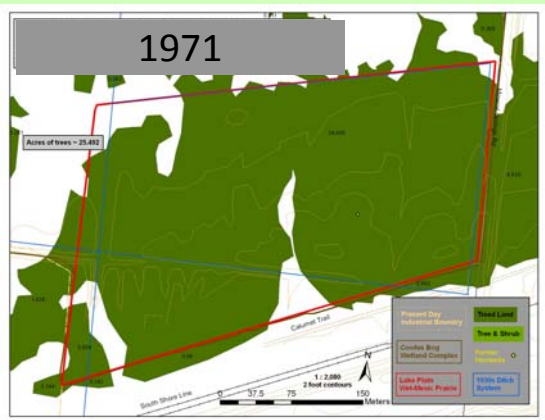
The graphics below, based upon historic aerial photography, illustrate how the tree canopy has changed over time.

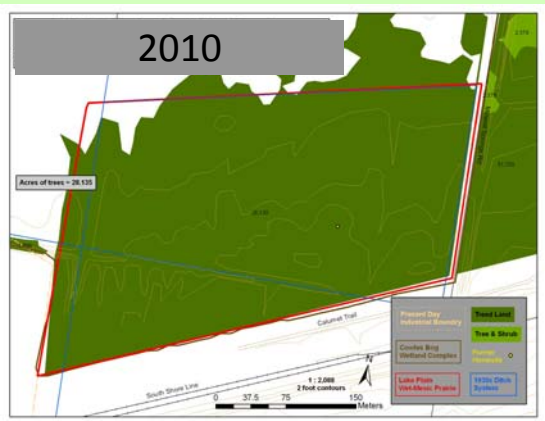












L&A 7.20.11

Appendix G
Public Notices and Materials from Public Meeting

News Release for Public Meeting
Sign-in Sheet
Agenda
Fact Sheet

FOR IMMEDIATE RELEASE

PORTER, IN -- At the Indiana Dunes National Lakeshore, the National Park Service (NPS) is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore the area as a lake plain wet-mesic prairie, the wetland type that existed prior to disturbance by human activities over the last century. A lake plain wet-mesic prairie is a unique wetland type that develops only on mineral soil created by glaciation, influenced by groundwater seepage. The project is located in the southeast portion of the Cowles Bog Wetland Complex, directly situated on the west side of Mineral Springs Road, north of the railroad tracks.

The NPS is preparing an Environmental Assessment for the proposed action. To fully consider the impacts and thoroughly evaluate alternatives, they are seeking public input on the proposed project.

A public meeting has been scheduled for Wednesday, July 20, 2011, at 7:00 p.m. at the following location:

Park Meeting Room
Park Headquarters
1100 North Mineral Springs Road
Porter, IN 46350

At this meeting, NPS staff will present information on the history of the site, the current conditions, and the desired future conditions. In addition, NPS will discuss alternatives that are being considered for achieving the project's goals. The public will be asked to provide input on the project, including what issues of concern should be investigated in the Environmental Assessment. The meeting is expected to last approximately 1 ½ hours.

For more information, citizens may contact Mr. Daniel Mason by e-mail at Daniel_Mason@nps.gov or by mail at:

Daniel Mason, Botanist
Indiana Dunes National Lakeshore, Resources Management
1100 North Mineral Springs Road
Porter, IN 46304-1299

Cowles Bog Wetland Complex
Restoration of Lake Plain Wet-Mesic Prairie

Public Meeting
July 20, 2011

Name	Address	Organization, if any
Daniel Mason, Botanist	1100 North Mineral Springs Road, Porter, IN 46350	National Park Service INDU
Susan Daniels	975 Eastwind Drive, Suite 190, Westerville, OH 43081	Lawhon & Associates (consultant)
Nichole Lashley	11 W. Monument Ave., Suite 303, Dayton, OH 45402	Lawhon & Associates (consultant)
J. M.	225 Dogwood Drive Chesterton	private citizen
BILL NIXON	14 EAST RD DUNE ACRES	NONE
LOIS NIXON	"	
Carolyn + Lou Mellen	17 Ridge Dr Dune Acres	
TOM + LOU ROBERTS	8 Shore Dr Dune Acres	town of DA
John Sullivan	33 Crest St, DA	" "
Mary + Chuck Chumon	64 E. Rd (PO Box 1009, Chesterton)	resident, Town of DA
Bob Ehrs	70 West Rd Chesterton	
J Bapst	10 Crest, 46304	
Patrice Bapst	12 Crest 46304	
Peter Bomberger	1 Circle Drive Dune Acres	

Cowles Bog Wetland Complex
Restoration of Lake Plain Wet-Mesic Prairie

Public Meeting
July 20, 2011

Name	Address	Organization, if any
Bill Fullewski	24 Summit Drive Dune Acres, IN	
HERB & CHARLOTTE READ	791 N. Calumet Ave Valpo	
MARY Ann & JOHN CRAYTON	2 CRES Dune Acres	
A Henry Studebaker	32 Crest Dr. Dune Acres	
John & Margaret Saylor	21 Hill Dr. Dune Acres	
Tom Beauvais	PO Box 130137 Ann Arbor, MICH	
Jim Mannel	204 Highland Dr. Valparaiso, IN 46383	
Mark Hull	85 West Road Dune Acres	
Laura Truax	46 Circle Dr. D.A.	

Cowles Bog Wetland Complex
Restoration of Lake Plain Wet-Mesic Prairie

Public Meeting
July 20, 2011

Agenda

Introductions

Purpose of the Project

History of Cowles Bog Wetland Complex

Existing Conditions

Alternatives Considered

Public Comments

BACKGROUND INFORMATION AND PRESENTATION SUMMARY

GENERAL

- Great Marsh is the largest interdunal wetland associated with Lake Michigan.
- Great Marsh formed following the second Nipissing geologic phase.
- Cowles Bog Wetland Complex represents 205 acres of the western terminus of Great Marsh.
- Cowles Bog Wetland Complex includes the 54 acre National Natural Landmark; Cowles Bog.
- In the early 20th century, Cowles Bog then known as Mineral Springs Tamarack Swamp was used by Henry Cowles and other educators as an outdoor classroom for biodiversity study.
- Mineral Springs Tamarack Swamp was provided the name Cowles Bog by Herman Kurz a student of Henry Cowles who conducted the first quantitative study at Cowles Bog.
- Kurz documented the presence of circumneutral soils (pH 7.0 to 7.5).

DEGRADATION

- In 1850, all wetlands in Indiana were entitled to the state by the federal government.
- In 1852, Indiana initiated an aggressive program to drain wetland.
- Two jurisdictional ditches were constructed in the western portion of Great Marsh; Samuelson ditch and State ditch.
- In the early 1920's, two adjacent intradunal wetlands were drained into Cowles Bog Wetland Complex as part of construction of a Golf Course.
- The subject restoration unit, Cowles Bog wet/mesic prairie, was ditched and the lands farmed.
- In the 1960's, industrial development obliterated the western portion of Great Marsh resulting in Cowles Bog Wetland Complex becoming the new western terminus of Great Marsh.
- In the 1970's, altered hydrology due to beaver dams, berm construction, and surface water flow from adjacent intradunal wetlands resulted in the elimination of the graminoid/forb flora followed by colonization by hybrid cattail.

RESTORATION

- Inventory and investigations were conducted, 2002–2004, to determine if Cowles Bog Wetland Complex could be restored.
- Studies conducted in 2002-2004 suggested that restoration could be accomplished.
- Aggressive restoration actions were initiated in 2007 and are continuing.
- The subject unit was referenced as a "Disturbed Prairie Unit" with the desired restored unit being lake plain wet/mesic prairie.

SITE CONDITIONS

- Approximately 10,000 linear feet of ditches are present with width and depth varying from 4.0 to 2.5 feet and 2.5 to 0.5 feet, respectively.
- 3,481 trees are present.
- The tree canopy is dominated by red maple (1556 trees, 44.6%); black cherry (623 trees, 17.8%); sassafras (607 trees, 17.4%) and black locust (227 trees, 6.5%).
- A dense understory of spice bush prevents development of a herbaceous layer.
- Soils are comprised of a mosaic of soil types with the dominant soil being a wetland soil type; Granby.

INDICATORS OF WET/MESIC PRAIRIE

- April 30, 1830 land survey notes
- 1939 aerial photography
- Soil types

OBJECTIVES

- Provide a viewshed reflective of that experienced by Henry Cowles and others who used Cowles Bog (Mineral Springs Tamarack swamp/quacking bog) as an outdoor classroom for biodiversity studies.
- Present a natural landscape developed by natural processes following the second Nipissing geologic phase.
- Restore Cowles Bog Wetland Complex.

Appendix H
Media Coverage

Chesterton Tribune

AdChoices

Cowles Bog restoration meeting set

Back to Front Page

AdChoices

Still Working & Committed
BP is Still Committed to Restoring the Gulf. Follow the Progess
youtube.com/bp

The National Park Service will hold a public meeting on July 20 regarding a restoration project at the Cowles Bog wetland complex.

The NPS is preparing an environmental assessment for the project and is now seeking public comments. The NPS is proposing to modify the southeast portion of the wetland complex to restore the area to a pre-European settlement habitat known as the Lake Plain Wet-Mesic Prairie. This is a rare wetland type that develops only on mineral soil created by glaciations and is influenced by groundwater seepage.

The project is located on the west side of Mineral Springs Road, north of the railroad tracks.

The July 20 meeting will be at 7 p.m. in the park meeting room, located at 1100 N. Mineral Springs Road in Porter.

At this meeting, NPS staff will present information on the history of the site, the current conditions, and the desired future conditions. Alternatives that are being considered for achieving the project's goals will be introduced. The public will be asked to provide input on the project including the issues of concern that should be in the environmental assessment. For more information, contact Dan Mason by e-mail at Daniel_Mason@nps.gov

Posted 6/8/2011

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National Park Service
U.S. Department of the Interior

Indiana Dunes National Lakeshore

National Park Service Seeks Public Comment on Cowles Bog Project

Date: July 6, 2011

Subscribe | What is RSS

PORTER, IN - The National Park Service is preparing an Environmental Assessment for a restoration project at Cowles Bog Wetland Complex located within Indiana Dunes National Lakeshore. The NPS is seeking public input on the proposed project and will hold a public meeting on Wednesday July 20, 2011 at 7:00 p.m. at the Park Meeting Room located at 1100 N. Mineral Springs Road in Porter, Indiana.

The National Park Service is proposing to modify the southeast portion of the Cowles Bog Wetland Complex to restore the area to a pre-European settlement habitat; the Lake Plain Wet-Mesic Prairie. This is a rare wetland type that develops only on mineral soil created by glaciations and is influenced by groundwater seepage. The project is located in the southeast portion of the Cowles Bog Wetland Complex, directly situated on the west side of Mineral Springs Road, north of the railroad tracks.

At this meeting, NPS staff will present information on the history of the site, the current conditions, and the desired future conditions. Alternatives that are being considered for achieving the project's goals will be introduced. The public will be asked to provide input on the project including what issues of concern should be investigated in the Environmental Assessment. For more information, please contact Dan Mason by e-mail at Daniel_Mason@nps.gov.

Indiana Dunes National Lakeshore is one of 394 units of the National Park System ranging from Yellowstone to the Statue of Liberty. Indiana Dunes National Lakeshore includes 15 miles of the southern shoreline of Lake Michigan and 15,000 acres of beach, woods, marshes, and prairie in the northwest corner of Indiana. More than two million visitors come to this national park each year.

Did You Know?
Indiana Dunes National Lakeshore has more than 1,135 native plant species distributed over six plant communities. Among all the national parks in the United States, it ranks seventh in plant diversity. This is an amazing feat for 15,000+ acres.

Last Updated: July 13, 2011 at 09:37 MST

ValpoCommunity.com

Returning Cowles Bog back to its roots

By Mallory Jindra Times Correspondent | Posted: Wednesday, July 20, 2011 9:03 pm | (2) Comments

Font Size:

PORTER | About 40 people attended a meeting Wednesday to learn about and comment on a Cowles Bog wetland complex restoration project at the Indiana Dunes National Lakeshore. The plan would restore the area to what is called a Lake Plain Wet-Mesic Prairie, a rare wetland type that dates to a pre-European settlement habitat.

Industrialization in the 1960s led to a drastic change in the area's hydrology and vegetation, officials explained. Because of the increase of certain tree species, types of cattail and other invasive species, much of the natural plant life in Cowles Bog has disappeared.

"The underbrush is too dense to allow a normal, natural understory of ground vegetation," Indiana Dunes National Lakeshore botanist Dan Mason said. "But soils retain the imprint of the native vegetation under which they formed, even when that vegetation is removed."

Mason said reducing the tree count and the underbrush will make room for the growth of desired vegetation. Another component of the restoration plan is to reintroduce plant species to get back to the native ecosystem.

The Cowles Bog wetland complex was studied locally and internationally for its biodiversity system starting in the early 1900s. Mason said one of the main reasons for restoring Cowles Bog is to give students and professionals the chance to explore and learn from the land.

"This was one of the first outdoor classrooms," Mason said. "That wasn't always a common thing."

Dune Acres resident John Sullivan asked how the restored Cowles Bog would affect flooding. Mason said the plan's proposed landscape would help to slow the movement of water to certain areas.

According to the Indiana Dunes National Lakeshore website, a full restoration of the ecosystem can be completed in 10 to 15 years and could cost anywhere from $1.4 million to $1.6 million.

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Posted in Valparaiso, Beverly-shores, Burns-harbor, Chesterton, Dune-acres, Westchester-township, Town-of-porter on *Wednesday, July 20, 2011 9:03 pm* | Tags: Indiana Dunes National Lakeshore, Local News, Cowles Bog, Industrialization, Environment, Dune Acres

Read more: http://www.nwitimes.com/news/local/porter/valparaiso/article_91a02982-63bc-52b6-9351-6b1d73a1144e.html#ixzz1oHNGOLK4

Source: http://www.nwitimes.com/news/local/porter/valparaiso/article_91a02982-63bc-52b6-9351-6b1d73a1144e.html

Public Meeting: Cowles Bog Project

Wednesday, July 20, 2011 • 7pm

Indiana Dunes National Park Service Meeting Room, Porter

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Map & directions >

Category: Arts & Culture

July Calendar

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ValpoLife.com Events

Event

.....

Title:	Indiana Dunes Public Meeting
When:	Jul 20 07:00 PM
Category:	Parks

Description

The National Park Service is preparing an Environmental Assessment for a restoration project at Cowles Bog Wetland Complex located within Indiana Dunes National Lakeshore. The NPS is seeking public input on the proposed project and will hold a public meeting on Wednesday July 20, 2011 at 7:00 p.m. at the Park Meeting Room located at 1100 N. Mineral Springs Road in Porter, Indiana.

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