

**PORT ONEIDA HISTORIC LANDSCAPE MANAGEMENT
PLAN / ENVIRONMENTAL ASSESSMENT
SLEEPING BEAR DUNES NATIONAL LAKESHORE
AUGUST 2011**



Executive Summary

Summary

The National Park Service (NPS) at Sleeping Bear Dunes National Lakeshore proposes to implement landscape management treatments to preserve significant historic landscape characteristics of the Port Oneida Rural Historic District (Port Oneida) within the natural environment setting. The Port Oneida Historic Landscape Management Plan/Environmental Assessment (Plan) proposes desired future resource conditions for the Port Oneida landscape and an array of historic landscape management treatments. Implementation of these historic landscape management treatments would result in meeting the desired future resource conditions for Port Oneida.

Port Oneida is a 3,400-acre rural historic district that was listed on the National Register of Historic Places (NRHP) in 1997, with a period of significance of 1870-1945. It is a historic vernacular landscape, meaning that it has evolved through use by ordinary people over time. Through the social or cultural attitudes and practices of an individual, family or community, these places reflect the physical, biological, and cultural qualities of everyday lives.

Port Oneida includes 121 contributing buildings, 5 contributing sites, and 20 contributing structures with an additional 14 noncontributing buildings at 28 locations within Port Oneida. The locations include NPS-owned farms (14), NPS-owned barns (4), privately-owned farms (5), and schools (2, one of which is NPS-owned). The NPS has researched and developed a regional historical context for agriculture in the National Lakeshore, including detailed site inventory and resource condition documentation. These efforts indicate that Port Oneida is the largest and most complete historic agricultural landscape in public ownership in the country.

The purpose of the Port Oneida Historic Landscape Management Plan is to help park managers achieve an appropriate range of resource conditions. Since the end of agricultural activity in Port Oneida, historic spatial patterns have incrementally deteriorated. The physical and visual connections between landscape features, agricultural buildings, and community landmarks have diminished, and the number and diversity of historic plant materials has decreased. The overall result, which signifies the need for the Plan, is diminished integrity of design, setting, materials, workmanship, feeling, and association in the historic landscape; the qualities that make up historic integrity. The NPS seeks to prevent any further loss of integrity through the development and implementation of a historic landscape management plan.

Under the “No Action” Alternative, landscape stabilization and rehabilitation would continue under current management plans. Since 1984, the National Lakeshore has been mowing fields to provide a sense of the park’s agricultural history, preserve wildlife habitat, and make visible significant glacial and geologic formations. In the past, historic field edges have been determined by studying aerial photographs and on-the-ground investigation. Due to slow succession and some field maintenance activities, most of the fields in Port Oneida are open, although some include growth of pin cherry, black locust, juniper, red pine, and other species. Field maintenance activities to remove encroaching native and non-native woody vegetation in fields and important view sheds are accomplished in an ad hoc manner as funding is available. Much of this field maintenance consists of mowing on a periodic schedule. Clearing activities have been implemented during the past five years on fields that are adjacent

to roads travelled by many park visitors, and/or considered to have high opportunities for recreational use: Kelderhouse, Peter Burfiend, and Lawr fields (2006), Carsten Burfiend and Barratt fields (2008), and Dechow and Charles Olson fields (2010). Clearing has been conducted using a variety of methods such as mowing (with and without herbicide application), cutting (with and without herbicide application), and pulling.

The Preferred Alternative presents an active program of removing vegetation to maintain or reestablish the historic boundary (or a semblance of the historic boundary) and configuration of fields while addressing natural resource concerns such as invasive plant management, wetland protection, and soil conservation. Field maintenance is one of the primary objectives for the landscape management plan, as it is critical for retaining large-scale spatial patterns in the landscape.

This alternative provides direction for stabilizing existing or reestablishing missing patterns of field and forest and protecting existing historic vegetation through removal of non-historic (and often invasive) vegetation. It provides a general framework that will allow flexibility in applying techniques for removing and disposing of non-historic vegetation and maintaining the desired vegetation. This alternative will also permit the National Lakeshore to respond positively to proposals for adaptively using the farms that are compatible with objectives for Port Oneida.

Public Comment

The National Lakeshore encourages everyone to comment on the Plan until September 9, 2011. The document may be reviewed on the National Lakeshore's website at www.nps.gov/slbe. Paper copies are available for review at the National Lakeshore Visitor Center in Empire, the offices of Empire and Glen Arbor Townships, the Village of Empire Office, and at the following area libraries: Glen Lake Community Library, Benzie Shores District Library, Darcy Library of Beulah, Leelanau Township Library, Leland Township Library, Suttons Bay Bingham District Library, and Traverse City District Library.

We encourage comments to be sent electronically through a link on the National Lakeshore's website. Comments may also be mailed to the National Lakeshore at: Superintendent, Sleeping Bear Dunes National Lakeshore, 9922 Front Street, Empire, MI 49630. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire document – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

The National Lakeshore will be hosting an open house on the Plan on Tuesday, August 23, 2011. The open house will be held at the Visitor Center auditorium in Empire from 5:00 p.m. to 7:00 p.m., and will include a presentation at 5:30 p.m.

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1. Introduction

The National Park Service (NPS) at Sleeping Bear Dunes National Lakeshore proposes to implement landscape management treatments to preserve significant historic landscape characteristics of the Port Oneida Rural Historic District (Port Oneida) within the natural environment setting. The Port Oneida Historic Landscape Management Plan/Environmental Assessment (Plan) proposes desired future resource conditions for the Port Oneida landscape and an array of historic landscape management treatments. Implementation of these historic landscape management treatments would result in meeting the desired future resource conditions for Port Oneida. The NPS proposes to implement these historic landscape management treatments on lands managed by the NPS. While this Plan is intended only for lands managed by the NPS, the NPS will seek to work cooperatively with other landholders in Port Oneida who may wish to manage their property in a manner consistent with the goal of this Plan.

Much as land practices and use changed, and the landscape of Port Oneida evolved throughout its period of significance, the Plan does not propose to ‘freeze’ the Port Oneida landscape at a particular point in time. Rather, through the proposed landscape management treatments, the NPS seeks to preserve the sense of place that Port Oneida exhibits as a rural historic district. These treatments would support continued interpretation of the history of Port Oneida, whether through formal programs or informal visitor discovery, while also implementing sustainable management practices.

The Plan analyzes the impacts of the identified landscape management treatment alternatives on the environment and has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (40 CFR 1508.9), and NPS Director’s Order 12: *2001 Handbook for Environmental Impact Analysis* (NPS 2001).

1.2 DESCRIPTION OF THE PROJECT AREA

Located within Leelanau County, Port Oneida is just south of a point of land (Pyramid Point) that extends into Lake Michigan between Glen Arbor and Good Harbor Bay (Map A-2). Highway M-22 runs east and west through the southern edge of Port Oneida and several county roads extend off of M-22 to provide access to points within the area.

Port Oneida is a 3,400-acre rural historic district that was listed on the National Register of Historic Places (NRHP) in 1997, with a period of significance of 1870-1945. It is a historic vernacular landscape, meaning that it has evolved through use by ordinary people over time. Through the social or cultural attitudes and practices of an individual, family or community, these places reflect the physical, biological, and cultural qualities of everyday lives.

Port Oneida was a small closely-knit community, founded in the early 1860s, primarily by immigrants from the German states of Hanover and Prussia. Initially, it was a logging community, with small farms cultivated by homesteaders but Port Oneida’s economic and social structure was closely linked to the shipping industry that used the Manitou passage. Cordwood and surplus crops were sold at the

communities dock and many of the residents worked as both fishermen and farmers. By the 1890s, the Pyramid Point area had been almost completely deforested. With the demise of logging, residents turned to farming as their primary source of income.

Farming in Port Oneida may best be characterized as marginal, with some pockets of good soil yielding successful operations. Sandy glacial soils and a limited, unreliable water supply curtailed the success of most farms during the first half of the 20th century. Throughout the community's history, farmers grew an assortment of crops—potatoes, garden produce, poultry and hogs—to feed their large families. They also cared for small dairy herds. Port Oneida's landscape was greatly affected by dairying because of the substantial amount of acreage devoted to pasture and hayfields and the cultivation of grain crops such as oats.

Families also maintained small orchards of apple, peach, cherry and pear trees. These were not commercial operations but supplied the needs of the farm families and occasionally produced a limited surplus.

From the turn of the century until 1945, Port Oneida existed as a subsistence level farming community. From the end of WWII until 1970, farming constituted a secondary form of income for most of the community residents. Non-farming jobs were the primary means of support and limited agricultural activities occurred seasonally, after working hours or on weekends. By 1970, when the National Lakeshore was designated, farming was limited mostly to haying.

Port Oneida includes 121 contributing buildings, 5 contributing sites, and 20 contributing structures with an additional 14 noncontributing buildings at 28 locations within Port Oneida. The locations include NPS-owned farms (14), NPS-owned barns (4), privately-owned farms (5), and schools (2, one of which is NPS-owned). The NPS has researched and developed a regional historical context for agriculture in the National Lakeshore, including detailed site inventory and resource condition documentation. These efforts indicate that Port Oneida is the largest and most complete historic agricultural landscape in public ownership in the country.

Port Oneida is also one of the most complete early 20th century agricultural landscapes in the Upper Midwest and the National Park System. Because agricultural development in Port Oneida effectively ceased just after WWII, many of its small outbuildings such as sheds and chicken coops, and plantings such as maple rows and orchards that date to the period of significance can still be seen on the landscape. Public ownership has stalled change in much of Port Oneida and provides us with an opportunity to preserve and interpret a resource that is rapidly vanishing from the national landscape.

1.3 RELATIONSHIP TO OTHER PLANS

The *2009 General Management Plan* (NPS 2009a) provides a general framework to guide management decisions over a 20-year period. This Plan for Port Oneida represents a continued commitment to preserve significant park resources and is compatible with management zoning in the General Management Plan (GMP). All of Port Oneida is zoned "Experience History," meaning that it is managed primarily to preserve historic structures and landscapes.

The Sleeping Bear Heritage Trail is a planned 27-mile non-motorized multi-use trail, which will roughly parallel state highways M-109 and M-22 through the National Lakeshore in Leelanau County. A plan for this route, *Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment*, was completed in 2009 (NPS 2009c). The trail will traverse Port Oneida, from west to east, on the north side of M-22. Design is currently underway for Segment 5, the Dune Climb to Glen Arbor. Construction funding has been secured and development is scheduled to begin in fall 2011. In January 2011, the Federal Transit Administration awarded the Trail \$1.625 million to construct part of Segment 4 from the Dune Climb south to the Pierce Stocking Scenic Drive.

The *Port Oneida Rural Historic District Environmental Assessment (2008 Port Oneida EA)* was completed in June 2008 (NPS 2008). The selected alternative provides for upgrading the condition of selected structures and landscape features, additional interpretation including the development of a visitor contact station, employee housing in a rehabilitated historic farmhouse, small parking areas, roadside pull-offs, and an improved trail system. The trail improvements considered under this Environmental Assessment are envisioned as mowed or soft-surfaced hiking trails connecting the Kelderhouse farm with the Martin Basch farm and the Carsten Burfiend farm, and connecting with other existing hiking trails.

The *Open Field Management Plan* was approved in August 1990, and provides general direction on the use of mowing, hand-cutting and prescribed burning in the maintenance of approximately 700 acres of open fields in the National Lakeshore including portions of Port Oneida (NPS 1990).

The *2005 Fire Management Plan* for the National Lakeshore presents goals for preparedness and suppression, hazard fuels management, vegetation management, and public use/awareness; identifies fire management units; and identified actions for fires suppression, wildland fire use, prescribed fire use, and non-fire treatments to reduce hazard fuels (NPS 2005). Implementation of this Fire Management Plan will help the National Lakeshore achieve GMP established desired conditions related to natural and cultural resource preservation.

The Great Lakes Invasive Plant Management Plan/Environmental Assessment planning process has just begun. The scope of the Great Lakes Invasive Plant Management Plan is to develop a long-term management plan to reduce the impacts of (or threats from) invasive plants to native plant communities and other natural and cultural resources in ten Great Lakes region national park units, including Sleeping Bear Dunes National Lakeshore.

Two other visitor destination points nearby Port Oneida in the National Lakeshore are either undergoing improvements to visitor facilities or were recently the subject of planning for visitor facility improvements. Improvements to the Glen Haven Village Historic District are currently underway. This project includes improved parking, utilities, and pedestrian circulation, while protecting sensitive species and habitats. The *2009 Lake Michigan Overlooks Environmental Assessment* examined alternatives to provide improved access to two scenic Lake Michigan overlooks accessed via the Pierce Stocking Scenic Drive (NPS 2009b). Implementation of the selected alternative will satisfy a number of access, resources, maintenance, and safety concerns at the site.

1.4 IMPAIRMENT

NPS *Management Policies 2006* (NPS 2006) require analysis of potential effects to determine if actions would impair park resources. The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts to park resources and values.

However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the NPS the management discretion to allow certain impacts within a park, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of these resources or values. An impact to any park resource or value may, but does not necessarily, constitute an impairment, but an impact would be more likely to constitute an impairment when there is a major or severe adverse effect upon a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to pursue or restore the integrity of park resources or values and it cannot be further mitigated. An impairment analysis for the preferred alternative can be found in Appendix B-1.

1.5 PURPOSE AND NEED FOR THE PROPOSED PROJECT

The purpose of the Port Oneida Historic Landscape Management Plan is to help park managers achieve an appropriate range of resource conditions. All of Port Oneida lies within the “Experience History” zone in the 2009 GMP. This management zone is managed primarily to preserve historic structures and landscapes. This zone is characterized by cultural resources set within a natural environment and natural resources may be modified to preserve, rehabilitate, or restore cultural resources. The primary visitor experience in this zone is visiting historic areas and learning about history.

Since the end of agricultural activity in Port Oneida, historic spatial patterns have incrementally deteriorated. The physical and visual connections between landscape features, agricultural buildings, and community landmarks have diminished, and the number and diversity of historic plant materials has decreased. The overall result, which signifies the need for the Plan, is diminished integrity of design, setting, materials, workmanship, feeling, and association in the historic landscape; the qualities that make up historic integrity. The NPS seeks to prevent any further loss of integrity through the development and implementation of a historic landscape management plan.

1.6 GOALS AND OBJECTIVES OF THE HISTORIC LANDSCAPE MANAGEMENT PLAN

The goal of this historic landscape management plan is to establish a range of landscape management treatments for implementation throughout Port Oneida that best portray the evolution of rural life and farming activities with secondary consideration to the preservation of natural resources.

In order to meet this goal, the following objectives must be achieved:

- 1) Identify field boundaries.
- 2) Provide general recommendations for stabilizing, maintaining, or restoring historic biotic features such as tree rows, orchards, windbreaks and ornamental or garden plant varieties.
- 3) Develop an array of “desired future conditions,” or a palette of appropriate conditions for former agricultural fields.
- 4) Assign desired future conditions to each field or group of fields.
- 5) Develop a list of techniques or treatment options that may be applied to reach the desired future condition.

1.7 SCOPING AND ISSUES

The planning team, consisting of National Lakeshore and Midwest Regional Office staff, identified the following issues during scoping, regarding the need to rehabilitate the historic landscape:

- Interpretive Themes
- Current Condition
- Visibility of Fields
- Historic Association of Fields
- Natural Resources
- Soil Type/Likelihood of Erosion
- Habitat
- Potential for Partnerships
- Adaptive Reuse and Leasing
- Operational Sustainability
- Pesticide Use
- Invasive Species Control
- Archeology
- Views
- Pine Plantations

On November 4, 2010, a letter was mailed to 81 federal, state, and local agencies, elected officials, groups, and interested individuals asking for ideas on the future of Port Oneida, especially on visions for how the landscape will appear many years from now. We also asked for ideas on what impacts and issues should be considered in this planning effort. Simultaneously, the letter was placed on the park’s website (nps.gov/slbe), with a link to the NPS Planning, Environment, and Public Comment (PEPC) website, which allowed the public to comment electronically. On November 8, 2010, a press release was

distributed electronically to the 42 media outlets in the National Lakeshore's media database. The official public comment period ended on December 17, 2010.

As a result, we received 113 comments from the PEPC website, eight emails, and six handwritten or typed letters, for a total of 127 comments. These comments were analyzed and considered when developing the alternatives and addressing impacts.

The topics addressed by the public were organized into six major subject areas that broadly describe the nature of the contents:

- Trails and Roads
- Visitor Activities
- Developments
- Field Characteristics
- Lake Michigan Access
- Other Issues

A more comprehensive summary was provided to the public, through the PEPC website, on May 2, 2011.

1.8 SUMMARY OF 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 on the basis of federal laws, regulations, and executive orders, and *NPS Management Policies 2006* (NPS 2006), as well as agency and public input during scoping. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration.

1.8.1 Impact Topics Selected for Detailed Analysis:

Each of the following topics would be impacted by the proposed action alternative, and consequently, has been retained for detailed analysis.

- **Cultural Resources (includes Archeology, Historic Structures and Historic Landscapes):** Preserving the cultural resources in Port Oneida is the goal of this project. Some impacts may occur to these resources in order to reach this goal.
- **Water Resources (Wetlands, Surface Waters, and Groundwater):** These resources are present in Port Oneida and may be impacted by field clearing activities and potential agricultural practices.
- **Vegetation:** A variety of types of vegetation are present in Port Oneida. Field clearing activities would impact the existing vegetation in the short term and long term.

- **Wildlife:** A variety of wildlife species inhabit the fields, forests, scrublands, and forest edges in Port Oneida. These species could be impacted in the short term and long term by actions proposed in this plan.
- **Species of Special Concern:** There are some grassland bird species that are designated as Species of Special Concern that could be impacted by this plan, both in the short term and long term.
- **Soils (includes Prime and Unique Farmland):** A variety of soils could be impacted by actions in this plan, both in the short term and long term.
- **Visitor Use and Experience:** Visitors would be impacted adversely during field clearing activities, but would have a number of new opportunities to experience the agricultural heritage of the area in the long term.
- **Park Facilities and Operations:** The National Lakeshore's workload would change as a result of implementing actions in this plan. The impacts of these changes will be assessed.

1.8.2 Impact Topics Dismissed from Detailed Analysis:

The following impact topics would not be affected by the proposed alternatives or the differences between the alternatives in the terms of these factors would be negligible, resulting in their dismissal from detailed analysis.

Wilderness Character:

Three areas within Port Oneida were proposed as wilderness in the 1981 Wilderness Recommendation (NPS 1981): the large wetland area in the center of Port Oneida (the "donut hole"), the Pyramid Point area, and an area north of Narada Lake (Map A-3). The 1981 recommendations were strengthened in the 1982 amendment to the National Lakeshore enabling legislation (PL 97-361), which stated that the areas proposed in the 1981 recommendations were to be managed to maintain their existing wilderness character "until Congress determines otherwise." Because of this law, all lands included in the 1981 recommendation have been, and will continue to be, managed as wilderness unless and until Congress acts upon a new recommendation. The 2009 General Management Plan/Wilderness Study/Environmental Impact Statement removed the wilderness designation for lands within Port Oneida. A new wilderness recommendation, which reflects this proposal, is currently being considered by Congress. However, in the interim, any actions taken in fields included as proposed wilderness in the 1981 recommendations must conform to provisions of the Wilderness Act. None of the actions proposed in this plan would impact any wilderness characteristics in the Port Oneida area. Therefore, wilderness character is dismissed as an impact topic.

Floodplains:

Executive Order 11988, *Floodplain Management*, requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists.

The only designated floodplain within Port Oneida is along the Lake Michigan beach. Implementation of any of the alternatives would not affect the natural values and functions of any floodplain or increase

flood risks. Therefore, floodplains are dismissed as an impact topic.

Federally Threatened and Endangered Species:

The Endangered Species Act (1973) requires an examination of impacts on all federally-listed threatened or endangered species. The NPS must conference or informally consult with the United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service pursuant to Section 7 of the Endangered Species Act to (1) clarify whether and what listed, proposed, and candidate species or designated or proposed critical habitats may be in the project area; (2) determine what effect proposed actions may have on these species or critical habitats; and (3) determine the need to enter into formal consultation for listed species or designated critical habitats, or conference for proposed species or proposed critical habitats. On March 14, 2007, the USFWS provided a list of threatened or endangered species, candidate species, and species of special concern that may be potentially found in the vicinity of the National Lakeshore. The following species were identified: bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), Michigan monkey-flower (*Mimulus glabratus* var. *michiganensis*), and Pitcher's thistle (*Cirsium pitcheri*). It was also stated that the breeding range of the Indiana bat (*Myotis sodalis*) occurs within the southern half and western coastal counties of the Lower Peninsula, including Benzie and Leelanau Counties.

The bald eagle has since been delisted under the Endangered Species Act. Critical habitat for the piping plover does occur within the National Lakeshore, but would not be impacted by any of the alternatives. NPS staff have determined that neither the Michigan monkey-flower nor Pitcher's thistle are present in the Port Oneida area and while suitable habitat exists, Indiana bat has not been confirmed within the National Lakeshore. Therefore, threatened and endangered species was dismissed as an impact topic.

Air Quality:

The Clean Air Act, as amended (42 USC 7401 *et. seq.*) and Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. Section 118 of the Clean Air Act requires a national park unit to meet all federal, state, and local air pollution standards. Sleeping Bear Dunes National 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.

Under all alternatives, landscape maintenance activities, including tractor operation and chainsaw use, would occur that could result in temporarily increased exhaust and emissions, as well as inhalable particulate matter. 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 activity area would be anticipated. Any maintenance-related, adverse effects to air quality would be temporary, lasting only as

long as the activity continued. Fire management in the National Lakeshore is guided by the Fire Management Plan and any burns occurring in Port Oneida would be conducted in accordance with that plan. The Fire Management Plan considered the air quality issues related to burning and any thus potential air quality impacts related to fire management in Port Oneida will not be reconsidered under this Environmental Assessment. Therefore, air quality was dismissed as an impact topic.

Land Use:

Port Oneida is comprised of a mix of publicly held lands, and privately held property. The alternatives being considered affect only public land managed as part of Sleeping Bear Dunes National Lakeshore. While the alternatives under consideration may change how National Lakeshore lands are maintained to preserve resources, the overall land use would remain parkland, open for public use and enjoyment. The overall use and purpose of Port Oneida would not change; therefore, land use was dismissed as an impact topic.

Ethnographic Resources:

Ethnographic resources are defined by the NPS as any “site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it” (NPS 1998). There are no known ethnographic resources or traditional cultural properties in the vicinity of the Port Oneida Rural Historic District; therefore, the topic was dismissed as an impact topic.

Museum Collections:

The NPS *Management Policies 2006* and Director’s Order 28, *Cultural Resource Management* (NPS 1998) require the consideration of impacts on museum collections (historic artifacts, natural history specimens, and archival and manuscript material). Because the park’s museum collections would be unaffected by any of the alternatives, museum collections was dismissed as an impact topic.

Socioeconomics :

Council on Environmental Quality regulations for implementing the National Environmental Policy Act require economic analyses of federal actions that would affect local or regional economy. The local and regional economies of this area are strongly influenced by tourism. By implementing historic landscape improvements within Port Oneida, it is expected that the number of visitors within Port Oneida would increase. These improvements, however, would not draw a significant number of new visitors to the park, but may encourage existing park visitors to increase the number of trips to Port Oneida. Should the proposed actions be implemented, short-term benefits from project-related expenditures would be minimal since most of the work would be by NPS employees or volunteers. While there may be slight short-term benefits to local economies, local and regional businesses would not be appreciably affected in the long term. Therefore, socioeconomics 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*, 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.

According to the Environmental Protection Agency, 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. 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 Sleeping Bear Dunes National Lakeshore contains both minority and low-income populations; however, environmental justice was dismissed as an impact topic for the following reasons:

- The staff and planning team at Sleeping Bear Dunes 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 any 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 any alternative would not disproportionately affect any minority or low-income population or community.
- Implementation of any alternative would not result in any identified effects that would be specific to any minority or low-income community.
- The park 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.

Lightscape Management:

The NPS *Management Policies 2006, Section 4.10*, directs the NPS 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.” Field management activities required to implement the treatments proposed in this plan would occur during daylight hours and would not affect appreciation of the night sky or interfere with activities of nocturnal creatures. For these reasons, night sky was dismissed as an impact topic for further consideration.

Indian Trust Resources:

Indian trust resources are owned by American Indians, but are held in trust by the United States. Secretarial Order 3175 requires that any anticipated impacts to Indian Trust Resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents.

The lands within Sleeping Bear Dunes National Lakeshore are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians. Therefore, no Indian Trust Resources are in Sleeping Bear Dunes National Lakeshore and Indian Trust Resources was dismissed as an impact topic.

Energy Requirements and Conservation Potential:

The Council on Environmental Quality guidelines for implementing the National Environmental Policy Act require examination of energy requirements, natural or depletable resource requirements and conservation potential as a possible impact topic. Sleeping Bear Dunes National Lakeshore strives to incorporate the principles of sustainable design and development into all facilities and park operations. National Lakeshore employees and partners/volunteers are required to take measures to be energy efficient and follow sustainable practices.

Under each alternative, energy would be consumed in the maintenance and management of the Port Oneida landscape. However, these scale and intensity of these maintenance activities are very similar and as a result, any difference in energy consumption is negligible. Under the action alternatives, some fields managed as open may be cultivated for cover crops or row crops. This cultivation may be considered to have the potential to impact conservation potential. However, in comparison to the total acreage maintained as open in Port Oneida, the amount of land ‘cultivated’ at any one time would be limited. Also, this management approach is proposed only for those areas of Port Oneida that are determined to be best able to sustain the activity after consideration of factors such as soil type, depth, and slope. These areas would also be subject to rotation out of cultivation. Due to the limited scope of areas considered under the action alternatives for cultivation and due to the negligible differences in energy consumption between the alternatives, energy requirements and conservation potential is an impact topic dismissed from further consideration.

2. Alternatives Considered

The National Lakeshore is mandated to follow *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (Standards) when considering how to manage historic resources in Port Oneida including the former farm fields (NPS 1996). The Standards are applied to all historic resource types (buildings, sites, objects, districts and landscapes) included in the National Register of Historic Places. Typically, a historic landscape is one in which the human activity that shaped the landscape over time has ceased while a cultural landscape is one in which the activity is ongoing. Port Oneida is considered and managed as a historic landscape.

The Standards provide four distinct, but interrelated, approaches to the treatment of historic properties - preservation, rehabilitation, restoration, and reconstruction. A treatment is defined as “work carried out to achieve a particular historic preservation goal.” These treatment standards are intended to assist property owners or land managers in making sound historic preservation decisions. Choosing an appropriate treatment approach for a historic property - whether preservation, rehabilitation, restoration, or reconstruction - is critical. This choice is shaped by a variety of factors, including the property's historic importance, physical condition (integrity), proposed use, and intended interpretation. In historic landscapes, it is not uncommon to identify an overarching treatment for the property as a whole and then implement another focused treatment at the individual feature level.

The treatment of preservation focuses on the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time and is defined in the Standards as:

the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.

Preservation is an appropriate treatment for the historic landscape resources associated with Port Oneida.

Rehabilitation acknowledges the need to alter or add to a historic property to meet continuing or changing uses while retaining the property's historic character and is defined in the Standards as:

the act or process of making possible an efficient compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Rehabilitation is also an appropriate treatment for the historic landscape resources associated with Port Oneida.

Restoration is undertaken to depict a property at a particular period of time in its history, while removing evidence of other periods. It is defined in the Standards as:

the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

Restoration is an appropriate treatment for small-scale agricultural features such as fences associated with the historic landscape resources in Port Oneida.

Reconstruction recreates vanished or non-surviving portions of a property for interpretive purposes and is defined in the Standards as:

the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

Reconstruction is not an appropriate treatment for the historic landscape resources associated with Port Oneida because the primary spatial pattern and built resources remain, and there is no need to replicate its appearance at a specific point in history.

The overarching treatment approach for Port Oneida is rehabilitation, because it will permit modest changes to buildings and landscape features so that visitors may access more of the area. A few of the changes that are needed include a visitor contact station, small parking lots and car pull-offs, seasonal staff housing, interpretive waysides, and hiking trails (these amenities were addressed and evaluated in the *2008 Port Oneida EA*). A rehabilitation treatment will also allow for more flexibility in determining appropriate vegetative cover for former fields and pastures. For example, woody vegetation would be removed using sustainable methods, fields might be mowed or cultivated using contemporary techniques, and new plant varieties could be grown. As the National Lakeshore takes on more intensive management of Port Oneida, there will be a necessary balance between resource condition and integrity, visitor amenities, and operational requirements so that these programs can be sustained. Within the overall rehabilitation approach, targeted preservation and restoration efforts may also be employed to maintain important features such as orchards or fence lines to perpetuate features that are critical to enhancing resource integrity and providing visitor understanding and enjoyment.

This Plan evaluates two alternatives to implement rehabilitation of the Port Oneida historic landscape; the No Action Alternative (continue current management) and Landscape Rehabilitation (the Preferred Alternative). Although the option of continuing with current management activities in the No Action Alternative does not represent a comprehensive maintenance approach, this alternative provides a baseline for evaluating the impacts of the Preferred Alternative. The Preferred Alternative includes an identification of important fields and their boundaries and a description of the “desired future conditions” for each field.

2.1 ALTERNATIVE 1: NO ACTION

Landscape stabilization and rehabilitation would continue under current management plans. The 2009 GMP zoning (“Experience History”) for Port Oneida allows for preservation (stabilization), rehabilitation, or restoration of historic landscapes and their associated buildings and features:

This zone is characterized by cultural resources set within a natural environment. Protecting and preserving cultural resources is a very high priority. In keeping with the focus on cultural resources, natural resources may be modified to preserve, rehabilitate, or restore cultural resources. Cultural resource treatments in this zone may range from preservation to restoration based on fundamental park resources, national register significance, documentation, condition, interpretive value, and suitability for NPS operations. Cultural resources may be modified to provide safe visitor access or to preserve them through adaptive use.

Further, the GMP states that, for Port Oneida:

Historic structures and landscapes would be preserved, rehabilitated, or restored. Structures on at least one farmstead would be restored for interpretive purposes. Some buildings in Port Oneida would be rehabilitated for visitor and/or staff use, including a visitor contact station and staff housing. At least one farmstead would be placed in the NPS historic leasing program to allow rehabilitation and adaptive use. All other structures would be stabilized and maintained in their current condition.

The GMP identifies the resources of Port Oneida as “fundamental” because they are critical to maintaining the park’s purpose and significance.

Since 1984, the National Lakeshore has been mowing fields to provide a sense of the park’s agricultural history, preserve wildlife habitat, and make visible significant glacial and geologic formations. The open fields provide habitat for upland sandpipers, bluebirds, bobolinks, field sparrows, harriers (marsh hawks), ground squirrels and red fox. White-tailed deer and other species that spend most of their time in forests also utilize the fields. The National Lakeshore’s *Open Field Management Plan (1990)* established a regimen of mowing and hand removal to keep uncultivated fields open. The plan has been partially implemented and does not include many important fields in Port Oneida (Map A-4).

In the past, historic field edges have been determined by studying aerial photographs and on-the-ground investigation. Due to slow succession and some field maintenance activities, most of the fields in Port Oneida are open, although some include growth of pin cherry, black locust, juniper, red pine, and other species. Field maintenance activities to remove encroaching native and non-native woody vegetation in fields and important view sheds are accomplished in an ad hoc manner as funding is available. Much of this field maintenance consists of mowing on a periodic schedule. Clearing activities have been implemented during the past five years on fields that are adjacent to roads travelled by many park visitors, and/or considered to have high opportunities for recreational use: Kelderhouse, Peter Burfiend, and Lawr fields (2006), Carsten Burfiend and Barratt fields (2008), and Dechow and Charles Olson fields (2010). Clearing has been conducted using a variety of methods such as mowing (with and without herbicide application), cutting (with and without herbicide application), and pulling. Brush piles created from these

activities are chipped (chips used for park projects) or hauled off site. Burning of piles is a possibility, under an approved burn unit plan.

Field clearing is an activity that can dramatically change the appearance of an area. Removal of a non-historic mature conifer row can open up a vista that had been previously concealed. Removal of non-historic mature vegetation surrounding a farmstead may visually reveal to visitors a resource not previously fully appreciated. It is important to understand that woody vegetation, either native or non-native, can threaten the historical integrity of these historic landscapes. The short- and long-term, adverse and beneficial, impacts associated with these activities are discussed in Chapter 4, Environmental Consequences.

2.2 ALTERNATIVE 2: LANDSCAPE REHABILITATION (PREFERRED ALTERNATIVE)

Although the direction provided by the *1990 Open Field Management Plan* has protected some of the open space in Port Oneida over the last 20 years, fields are beginning to exhibit more encroachment by woody vegetation (both native and non-native). Some of this woody vegetation, such as black locust (*Robinia pseudoacacia*), is invasive. A more comprehensive approach based on historic landscape research, guidance in the 2009 GMP, and a structured preservation maintenance approach is required.

This alternative strives to maintain the historic agricultural landscape so that the period of significance (1870-1945), and the changes that occurred over that time period, are conveyed to visitors. The landscape is not managed to portray a specific point in time. The broad patterns of agricultural activity represented in the Port Oneida landscape make it infeasible and inappropriate to restore the landscape to a particular point in time or to preserve it by “freezing” it in its current state. Not only have some buildings and landscape features been lost, but concerns about historic farming practices (e.g., potential to introduce invasive plants, soil depletion, and operational requirements) and the need to safely accommodate a range of visitor opportunities and activities rule out a return to full-scale agricultural activity.

This alternative presents an active program of removing vegetation to maintain or reestablish the historic boundary (or a semblance of the historic boundary) and configuration of fields while addressing natural resource concerns such as invasive plant management, wetland protection, and soil conservation. Field maintenance is one of the primary objectives for the landscape management plan, as it is critical for retaining large-scale spatial patterns in the landscape.

This alternative provides direction for stabilizing existing or reestablishing missing patterns of field and forest and protecting existing historic vegetation through removal of non-historic (and often invasive) vegetation. The alternative provides a general framework that will allow flexibility in applying techniques for removing and disposing of non-historic vegetation and maintaining the desired vegetation.

This alternative will also permit the National Lakeshore to respond positively to proposals for adaptively using the farms that are compatible with objectives for Port Oneida. The success of the partnerships already in place at two farms (Charles Olsen and Thoreson) demonstrates that it is possible to identify compatible new uses for the farms. The overall approach is to manage inherent landscape change, encourage compatible new uses for structures and outdoor spaces, and maintain fields in one or more of

the desired future conditions so that Port Oneida's appearance as a historic agricultural landscape continues. To support an active program of field maintenance, this alternative proposes establishing a range of landscape conditions throughout Port Oneida.

As the National Lakeshore continues to build a program of partnerships that allows collaborative protection and maintenance of Port Oneida, and as new uses that complement the National Lakeshore's mission are identified, individual site development plans that conform to the overarching direction of this plan can be completed to ensure that contributing landscape features are retained and new elements do not diminish historic views or landscape character.

2.2.1 Identifying Field Boundaries

The first objective of this alternative is to clearly identify field boundaries to which desired future conditions will be applied. Aerial photographs taken in 1938 were used as a general guide to determining the historic location of field edges and cultivated fields, since they offer the only comprehensive evidence of conditions dating to a time within Port Oneida's period of significance (1870-1945). Little photographic evidence exists for the time period before 1938. National Lakeshore and Midwest Regional Office staff reviewed 1938 and 2007 aerial photographs and performed field surveys to determine historic field boundaries and record the current vegetative cover. Based on this analysis, 15 fields have been addressed in this alternative (Table 1 and Field Maps, Appendix A-5).

There are areas of Port Oneida under National Lakeshore management that are not included in one of these 15 fields. In large part, these areas are consistent with the wooded/reforesting areas seen on the 1938 aerial photograph. Some are former open fields that have lost integrity due to encroachment by woody vegetation. These areas will remain, or be allowed to return to mature forest, but will continue to be managed as part of an Experience History Zone (as defined in the 2009 GMP).

In some cases, the field edges of the 15 fields conform closely to that documented by the 1938 aeriels; however, in most cases the fields have been reduced slightly in size due to environmental factors, such as soils, wetlands or topography. Also, in defining the 15 fields, no attempt was made to conform to past property ownership lines because these lines shifted over time. Instead, property lines were drawn to the edge of a forest, toe of a slope, or circulation feature. For example, Field #5 (Dechow), encompasses land that was historically part of the Charles Olsen Farm. Because the Olsen Farm land is on the same side of highway M-22 as the Dechow Farm, and is contiguous with fields associated with the Dechow Farm, the Olsen Farm land and the Dechow Farm land were considered as one field. This does not prevent the interpretation of property lines as the Plan is implemented. Property lines can be acknowledged by restoring fence lines to the landscape and through interpretive programs or displays.

TABLE 1. FIELDS INCLUDED FOR ANALYSIS

Field #	Field Name	Field Acreage
1	Thoreson	110
2	Thoreson Road Plateau	51
3	Brunson	17
4	Werner-Basch	60
5	Dechow	160
6	Charles Olsen	47
7	Miller	99
8	Kelderhouse	67
9	Port Oneida Dock Site	40
10	Burfiend-Barratt	117
11	Martin Basch	140
12	Lawr-Peter Burfiend	90
13	Eckhert-Ole Olsen	45
14	Schmidt-Hayms	35
15	Laura Basch	8
Total		1,086

Maps A-6, A-7, and A-8 illustrate open fields in 1938 and 2007, and fields addressed in this plan. 1,862 acres of open fields were present in Port Oneida in 1938, as determined by a review of 1938 black and white aerial photographs. In 2007, 986 acres of Port Oneida were considered “open,” as defined by the 2007 NPS vegetation mapping project (“open fields” defined as pasture field, grasslands, and shrub lands). 939 acres would be maintained as open fields under the proposed alternative. “Open fields” include the Open Meadow and Active Agriculture DFCs. Old Field Succession “fields” are not included since they will succeed to mature forest.

2.2.2 Desired Future Conditions

As stated previously, field maintenance is one of the primary objectives for the landscape management plan, as it is critical for retaining large-scale spatial patterns in the landscape. Once field boundaries were determined, the following range of “desired future conditions” (DFC) was developed. Each of the vegetative conditions in this range is historically appropriate within its broad period of significance (1870-1945), as the agricultural activities in fields would vary from season to season and year to year. Maintaining the overall landscape as a patchwork of vegetative conditions is consistent with the historic appearance and provides park managers and park or volunteer maintenance crews with flexibility in applying maintenance techniques. It also provides an interpretive value in that programs and materials can easily address and illustrate the dynamics between man and nature through these landscapes.

Old Field Succession:



Description: This DFC encompasses fallow fields and pasture that have undergone succession and have diminished integrity as fields, or have limited views, poor or erosive soils, and present limited opportunities for interpretive programming related to agriculture. As old field succession, they may offer enhanced opportunities for wildlife habitat and viewing, as well as case studies about succession. This DFC includes some conifer plantations, often established because of highly erodible soils or to stabilize “blowout” areas.

Resource Condition: This condition allows ongoing field-to-forest succession to continue. With conifer plantations, succession would be enhanced through gradual removal of individual trees or rows to allow a more diverse forest to establish. There are no buildings associated with this DFC.

Applicable Maintenance Techniques: Invasive plants would be removed by cutting, girdling, pulling, stump grinding, or herbicide application (described in section 2.2.6). This type of intervention would happen only occasionally within this DFC to curb the spread of invasive non-native plants. The general recommendations for maintaining landscape features identified in Appendix B-2 would apply as needed.

Visitor Opportunities: Visitors could access these areas by adjacent roads or trails. Recreational opportunities would include activities such as guided walks, hiking, hunting, cross-country skiing, wildlife viewing and quiet contemplation. These areas provide interpretive opportunities to relate the story of farming activity being curtailed due to the depletion of soils.

Support Facilities/Equipment Required: No new buildings or structures would be needed. Trails could be created and/or maintained. Equipment such as backpack sprayers, sprayer mounted utility terrain vehicles (UTVs), tractors, and chainsaws may be required for invasive plant removal activities or for conifer plantation manipulation.

Open Meadow:



Description: Fields in this DFC are typically still open with encroachment by woody vegetation at the edges of the field or scattered in certain areas. These fields offer multiple views and may present a variety of opportunities for recreation and interpretation. Some fields in this DFC could be leased for haying, as they have been in the past (scheduled to minimize impact to ground nesting birds). The Open Meadow DFC encompasses the greatest extent of open fields in Port Oneida.

Resource Condition: This condition would use a range of techniques to keep woody native and non-native vegetation out of former farm fields. A mix of native and non-native herbaceous plants would predominate, however areas may be intensively managed to achieve a mix of only native plants. Buildings related to these fields will be preserved. If a compatible partnership or use is identified in the future, the buildings related to these fields may be rehabilitated (subject to Section 106 review).

Applicable Maintenance Techniques: Chemical, mechanical, and prescribed fire techniques may be employed (described in section 2.2.6). The general recommendations for maintaining landscape features identified in Appendix B-2 would apply as needed.

Visitor Opportunities: Visitors would access these areas by adjacent roads and trails. Recreational opportunities may include guided walks, sightseeing, hiking, cross-country skiing, wildlife viewing, photography, enjoyment of the historic landscape, and quiet contemplation. Interpretive activities and media (e.g., tours, waysides, written materials) may include subjects such as the history of settlement and

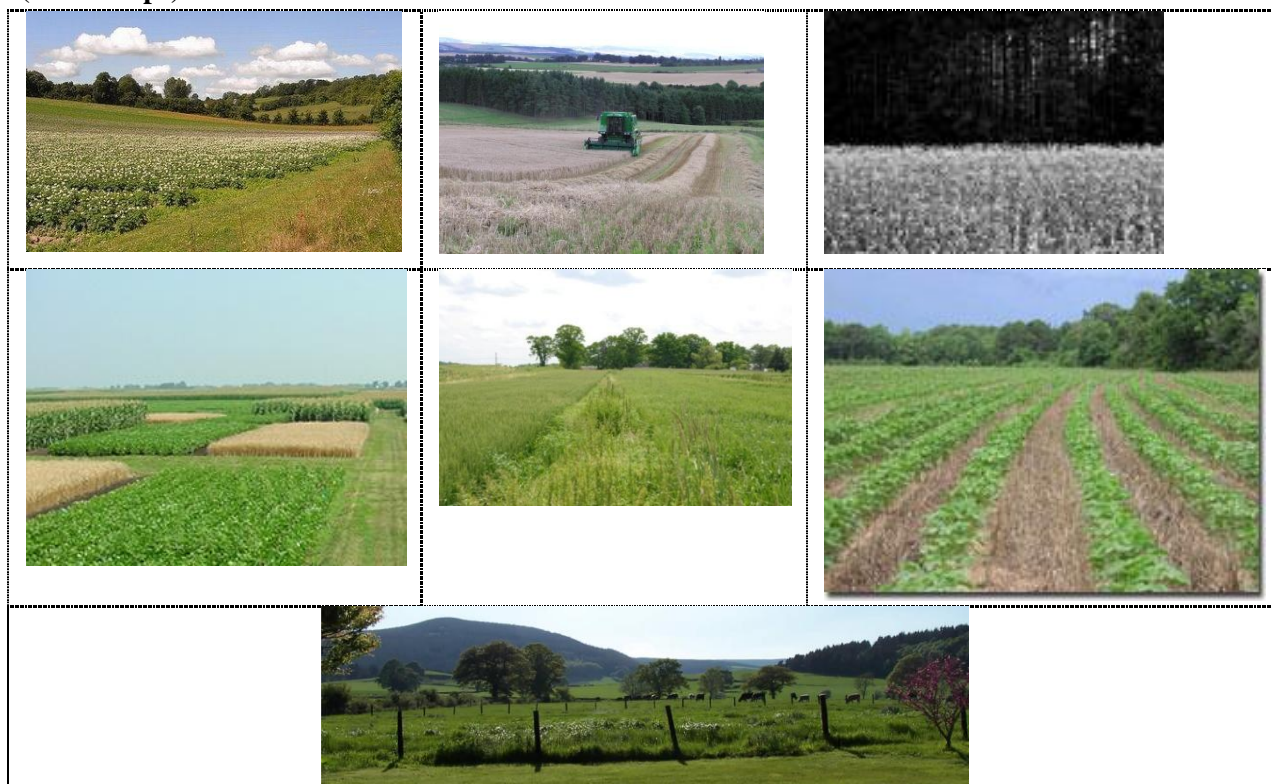
agriculture in Port Oneida, the geological history of the region, wildlife observation, and/or the process of natural succession.

Support Facilities/Equipment Required: No new buildings or structures would be needed; new hiking trails may be added to capitalize on views and recreational opportunities. Equipment such as dump trucks, loader/backhoes, tractors, chainsaws, wood chippers, stump grinders, brush hogs/mowers, and small mowers may be required, especially during major vegetative clearing activities.

**Active Agriculture:
(Cover Crops)**



(Row Crops)



Description: This DFC is intended for fields that have very little encroachment of woody vegetation, relatively good soils, and are highly visible from roads, trails, and viewpoints. They are often associated with the Open Meadow DFC and use sustainable techniques to return portions of the fields into agricultural production for interpretive and landscape purposes. They are intended to represent historic activities on the landscape, but contemporary methods would be appropriate as well. It is **not** the intent of the National Lakeshore to place all possible fields into agriculture, only to provide enough agricultural activity to adequately represent and interpret the past. The goal of this plan, stated in Chapter 1, is to “establish a range of landscape management treatments...that best portray the evolution of rural life and farming activities...”

Resource Condition: These plots would generally be located near farmsteads, but some cover crops may be planted in more remote areas to improve or stabilize eroded soils. The Natural Resources Conservation Service (NRCS), Leelanau Conservation District, and other specialists may be consulted to determine the best areas to develop specific crops based on soil type, drainage, economic, and other factors. Crops would be rotated as necessary. Buildings associated with these fields have been preserved or rehabilitated. The NPS will strive to find compatible partnerships for using and interpreting many of these buildings.

Applicable Maintenance Techniques: Sustainable techniques to maintain a specific cover crop (monoculture) would be employed, such as over seeding and mowing, or row crops (using no-till, IPM, etc.) (described in section 2.2.6). Fields will be mowed or cultivated in rectangular patterns similar to the field patterns seen in the 1938 aerial photographs. The general recommendations for maintaining landscape features identified in Appendix B-2 would apply as needed.

Visitor Opportunities: Visitors would view these fields and associated farming activities from adjacent roads, trails, viewpoints, and farmsteads. Visitor experiences would include sightseeing, guided walks, historic tours, and educational programs. Interpretive programs would include tours, presentations, waysides, written materials, and demonstrations within the rehabilitated buildings and in and around the landscape. Demonstration farming activities may include agricultural leasing, organic farming, haying, apiaries, maple syrup production, and limited pasturing of domestic farm animals.

Support Facilities/Equipment Required: This DFC might require minor alterations to buildings and the landscape (subject to National Historic Preservation Act, Section 106 review) to accommodate the return of limited agricultural activity and the use and storage of equipment. New hiking trails and small parking areas near farm buildings could also be necessary, and new hiking trails may be added between farms to capitalize on views or educational and recreational opportunities. Equipment such as tractors, brush hogs/mowers, seed drills, disks, herbicide applicators, and plows may be required.

2.2.3 Desired Future Conditions and Management Recommendations by Field

Through an analysis of resource conditions and management objectives, each field has been assigned one or more DFCs. In addition, recommendations are provided for treatments to historic vegetation, fence lines, buildings, and potential new facilities. Field maps are included in Appendix A-5.

NOTE: These are general field recommendations. The NPS will prepare annual work plans, to provide detailed implementation guidance, for specific fields on a scheduled basis. When active agriculture is contemplated (cover or row crops), the NRCS, Leelanau Conservation District, or other specialists may be consulted, as mentioned previously.

Field #1 (Thoreson):

These fields will be managed as **Open Meadow** and/or **Active Agriculture** due to their significance, views, and high recreation and interpretive potential. Active Agriculture will only be considered in the field west of Thoreson Road, near the farm, which includes prime soils and is mostly flat. The field east of Thoreson Road will be managed as Open Meadow since it has poorer soils, moderate slopes, and limited views from Thoreson Road.

Historic Vegetation: The yard in front of the house features herbaceous plants and large cottonwood trees that will be maintained according to the general landscape feature recommendations. The remnant fruit trees in the north central portion of the fields will be managed according to the orchard recommendations.

Fence Lines: Fences at the south perimeter and in the central part of the large field will be managed according to the fence line general recommendations.

Buildings: The house and primary outbuildings have been rehabilitated and some are currently being used under permit by the Glen Arbor Art Association for various activities. Should that use change, the buildings will be preserved until a compatible use is identified. Secondary outbuildings have been or will continue to be stabilized and eventually will be preserved or rehabilitated.

Potential New Facilities: This alternative will provide developments described in the 2008 Port Oneida EA such as improved vehicular/pedestrian access to the farm, low-key signs to identify the farm and provide information, and a gravel vehicular pull off along Thoreson Road to allow visitors to view the farm and Lake Michigan in the distance.

Field #2 Thoreson Road Plateau:

This field will be managed as **Old Field Succession** due to its diminished integrity as a field (from encroachment of woody vegetation), limited views, and limited interpretive/recreational potential related to agriculture. Because there is a high likelihood for soil erosion, any invasive non-native vegetation removal will need to be followed by stabilization efforts.

Historic Vegetation: No historic vegetation is located in this field and no specific recommendations are needed.

Fence Lines: No fence lines are located in this field and no specific recommendations are needed.

Buildings: No historic buildings are associated with this field and no specific recommendations are needed.

Potential New Facilities: No new facilities are required. The Bay View Trail traverses the eastern field and provides excellent views of the Thoreson farmstead and Lake Michigan.

Field #3 (Brunson):

This field will be managed as **Open Meadow** and **Old Field Succession** due to its relatively limited cultural significance, views, and interpretive and recreational potential. Old Field Succession areas are near the bluff over Lake Michigan and at the southeastern end.

Historic Vegetation: The large oaks and maples that can be seen in the 1938 aerials at the northwestern corner of the field will be maintained according to the general landscape recommendations. The remnant apple trees growing near the barn would be maintained according to the orchard management recommendations. The area immediately around the barn will be regularly mowed.

Fence Lines: The fence line running down the upper western perimeter of the field has been documented and will be maintained according to the general recommendations outlined above once the vegetation has been cleared from the area.

Building: The barn has been preserved and will be maintained as a discovery site for visitors. It may also be used as storage for park operations.

Potential New Facilities: No new facilities are required.

Field #4 (Werner-Basch):

These “M-22 Gateway” fields, which begin at the large Port Oneida sign and extend past the Werner-Basch Farm to include the fields around the Bay View Trailhead, will be managed as **Old Field Succession, Open Meadow, and Active Agriculture**. Old Field Succession areas include the wetlands and adjacent lands to the west of the farm. Most other areas will be Open Meadow, except that small areas of Active Agriculture will be considered at the farm and east of the farm, near M-22. These fields provide an introductory experience as visitors enter Port Oneida by car from the south. The fields on the east side of M-22 possess high value for views and to the north and west of the farm, they have high value for recreational use.

Historic Vegetation: The Werner-Basch farm is surrounded by thick plantings of pines that obscure views to and from the farm buildings. A number of conifer rows are found in other areas on both sides of M-22. Most of these plantings post-date the period of significance for Port Oneida and these will be removed. Measures to protect erosive soils will be taken following clearing. Sugar maples along the highway and large deciduous trees around the farm buildings will be managed according to the general recommendations. Any fruit trees located during field clearing will be maintained according to the orchard recommendations.

Fence Lines: No historic fence lines have been documented in this field and no specific recommendations are included.

Buildings: The farmhouse, outbuildings, and barns will be preserved until a compatible adaptive use is identified.

Potential New Facilities: Enhanced or expanded trails (including the proposed Sleeping Bear Heritage Trail and the Bay View Trail) and a few low-key signs to enhance wayfinding.

Field #5 (Dechow):

This field will be managed as **Old Field Succession** (the pine plantation to the west), **Open Meadow**, and **Active Agriculture**. This area has high cultural significance, multiple views, and high potential for recreation and interpretive programs. The threat of soil erosion appears to be relatively low. The fields around the farm and along M-22 will be considered for Active Agriculture.

Historic Vegetation: This farm contains scattered fruit trees, lilacs, windbreaks, sugar maple rows, large deciduous trees, and a few large conifers. These will all be managed according to the general recommendations.

Fence Lines: Former fence lines running along the southern edge and central portion of the field will be reestablished according the general recommendations.

Buildings: The farmhouse has been rehabilitated and the primary and secondary outbuildings will be available as an interpretive site.

Potential New Facilities: Improved vehicular/pedestrian access to farm buildings from M-22, improved parking, universal access, trails, waysides/wayfinding, exhibits, picnic table/seating, garbage, equipment storage.

Field #6 (Charles Olsen):

The fields that extend from the intersection of M-22 and Thoreson Road, surround the farm, and continue north of the Port Oneida School will be managed as **Open Meadow** and **Active Agriculture**. These fields have cultural significance and may support interpretive and recreational programs. They are also important because they provide a backdrop for the school (owned by Glen Lake Community Schools), which is one of the most significant buildings associated with the Port Oneida community. The fields including and southwest of the farm, along M-22, will be considered for Active Agriculture. The ridge north of the farm, currently vegetated with black locust trees, will be managed as Open Meadow. A variety of treatment options will be investigated to determine how best to remove this non-native invasive species and ensure that the steep slopes are stabilized.

Historic Vegetation: The large shade trees, sugar maple rows, Norway spruce windbreak (if dating to the period of significance), remnant orchards, lilacs and other flowering shrubs, and other ornamental vegetation will be managed according to the general recommendations.

Fence Lines: The fence line that runs along the toe of the slope just north of the farm will be managed according to the general recommendations.

Buildings: The farmhouse has been rehabilitated and is currently being used for offices and interpretation by Preserve Historic Sleeping Bear. Should that use change, the building will be preserved until a compatible use is identified. The barn/silo has also been preserved.

Potential New Facilities: In partnership with the school district, provide improved access to the school by mowing a parking area and use a gravel or stabilized soil surface to provide improved parking at the Charles Olsen Farm. Connect both properties to the Bay View Trail by mowing connector trails and add low-key signage to enhance wayfinding.

Field #7 (Miller):

The fields south of the Miller Barn will be managed as **Old Field Succession**, but ensuring that the views to the south from the trail overlook remain open. The other fields are designated as **Open Meadow**, except for the conifer “triangle” in the center of the site. This area will be managed as **Old Field Succession**, since the area has historically been prone to erosion. These fields have been moderately encroached by woody vegetation and have moderate potential for interpretive and recreational programs.

Historic Vegetation: Any remaining historic wind breaks and orchards remaining west of the Miller Barn will be maintained according to the general recommendations.

Fence Lines: No historic fence lines have been documented in this field and no specific recommendations are included.

Buildings: The barn will be preserved until a compatible use is identified.

Potential New Facilities: Trails will be mowed and enhanced wayfinding may be added through low-key signs. Vista maintenance at the trail overlook will provide 360-degree views of Glen Lake, Lake Michigan, and Port Oneida.

Field #8 (Kelderhouse):

The fields including and surrounding the William Kelderhouse Farm will be managed as **Open Meadow**. This area has high integrity and will support interpretive programming, as described in the *2008 Port Oneida EA*. These fields are important because they provide a backdrop for the buildings grouped around the intersection of M-22 and Port Oneida Road. No **Active Agriculture** is proposed due to poor soils.

Historic Vegetation: The large trees, sugar maple rows, remnant orchards, lilacs, and ornamental plants will be managed according to the general recommendations. The *2008 Port Oneida EA* recommends reestablishing the orchards and extending the sugar maple rows north of the farm buildings.

Fence Lines: The fence lines shown in the 1938 aerials may be reestablished.

Buildings: The house and outbuildings have been preserved and will be rehabilitated for use as a Visitor Contact Station, per the 2008 Port Oneida EA.

Potential New Facilities: As the National Lakeshore's focal point in Port Oneida for providing visitor information, this farm will offer the greatest degree of NPS development. Exhibits and an information desk will be added to the house, bathrooms will be added to one of the outbuildings, a small gravel or stabilized soil parking lot will be nestled behind a row of trees, and waysides will be added in the yard. In the southeastern corner of the field, a gravel pull-off for viewing will be added for cars traveling along M-22.

Field #9 (Port Oneida Dock Site):

Fields will be managed as **Open Meadow** and **Active Agriculture** (in the prime soils field west of Port Oneida Road). The prime soils at this site continue north into the Burfiend-Barratt field to the north. These fields possess moderate integrity (due to some encroachment by woody vegetation), high value for multiple views, and moderate potential for recreational activity (beach access).

Historic Vegetation: The large lilac shrub found in the central portion of the field will be maintained according to the general recommendations.

Fence Lines: No historic fence lines have been documented in this field and no specific recommendations are needed.

Buildings: The barn will be preserved until a compatible use is identified.

Potential New Facilities: A wayside may be added along Port Oneida Road and a mowed hiking trail may be added to help visitors access this site from the road.

Field #10 (Burfiend/Barratt):

These fields will be managed as **Old Field Succession**, **Open Meadow**, and **Active Agriculture**. They possess high value for views, historic significance, and recreational and interpretive programs. The overlook area on the south side of Baker Road, shown as Open Meadow, will retain some mature trees, with the understory removed, to provide sweeping views of Lake Michigan, the farmsteads, and across the valley to the south. **Active Agriculture** will be considered in the prime soils south of the Barratt inholding and west of Port Oneida Road, and around the outbuildings on the east side of Port Oneida Road. The pine plantation in the north is designated Old Field Succession. Succession to hardwood forest would be enhanced through gradual removal of individual trees or rows. The far eastern portion of the fields is within proposed wilderness, per the 1981 wilderness recommendation.

Historic Vegetation: A wide variety of historic vegetation remains around the farm buildings, including large deciduous and conifer trees, and ornamental shrubs and plants. The general recommendations will be implemented as needed.

Fence Lines: Fence lines east of the Burfiend outbuildings will be reestablished according to the general recommendations.

Buildings: NPS owned buildings associated with these farms have been preserved and will remain that way until a compatible use is identified.

Potential New Facilities: Improved vehicular/pedestrian access to farm buildings from Port Oneida Road, improved parking for farm access, universal access, new loop hiking trail, waysides/wayfinding, exhibits, picnic table/seating, garbage, and equipment storage.

Field #11 (Martin Basch):

The fields on the east and west sides of Baker Road and surrounding the Martin Basch farm will be managed as **Open Meadow**. These fields have moderate value for views, but only low to moderate integrity and recreational potential. The large pine plantation along Baker Road to the north will be managed as **Old Field Succession** and succession to hardwood forest would be enhanced through gradual removal of individual trees or rows. Most of these fields are within proposed wilderness, per the 1981 wilderness recommendation.

Historic Vegetation: The large trees and any shrubs around the Martin Basch farm will be maintained using the general recommendations.

Fence Lines: No historic fence lines have been documented in this field so no specific recommendations are needed.

Buildings: The Martin Basch Farm buildings have been preserved and will remain that way until a compatible use is identified.

Potential New Facilities: A new loop hiking trail that connects multiple farms in the central portion of Port Oneida will allow visitors to access this farm as a discovery farm.

Field #12 (Lawr-Peter Burfiend):

These fields will be managed as **Open Meadow**. They have moderate views, moderate potential for recreational/interpretive programs, and possess moderate integrity due to encroachment by woody vegetation.

Historic Vegetation: Large trees, remnant orchards, and any remaining herbaceous plants will be maintained according to the general recommendations.

Fence Lines: Reestablish or maintain existing fence lines according to the general recommendations.

Buildings: The Lawr and Peter Burfiend Farm buildings have been preserved or are currently being preserved by park maintenance crews. They may be rehabilitated to accommodate compatible adaptive uses through partnership agreements.

Potential New Facilities: There is an existing picnic area at the corner of Basch Road and M-22 that is managed by the county. No other facilities are planned.

Field #13 (Eckhert-Ole Olsen):

These fields will be managed as **Open Meadow**, with limited **Active Agriculture** in and around the Ole Olsen farm buildings and around and north of the Eckhert farm. They have moderate integrity, as encroaching vegetation has spread into the fields north and west of the Eckhert Farm. These fields also have moderate views and recreational/interpretive potential.

Historic Vegetation: The large trees, tree rows, ornamental vegetation, and fence lines will be maintained according to the general recommendations.

Fence Lines: Reestablish or maintain existing fence lines according to the general recommendations.

Buildings: The Eckhert and Olsen farm buildings have been preserved and will remain that way until a compatible adaptive use is identified.

Potential New Facilities: If the farms are designated for a compatible adaptive use, they will require improved access such as mowed parking areas and trails. The 2008 Port Oneida EA prescribes a new parking area (six to eight vehicles) in the vicinity of these farms on Basch Road and interpretive waysides at each farm.

Field #14 (Schmidt-Hayms):

These fields will be managed as **Open Meadow**. These fields possess moderate views and recreational/interpretive programming, and have relatively low integrity, due to woody vegetation encroachment, especially north of the driveway. They do not appear to be susceptible to erosion.

Historic Vegetation: The orchard east of the house and the row of Lombardy poplars lining the driveway will be maintained using the general recommendations.

Fence Lines: No historic fence lines have been documented in this field so no specific recommendations are needed.

Buildings: The buildings have been preserved and will remain that way until a compatible use is identified.

Potential New Facilities: No new facilities required.

Field #15 (Laura Basch):

These fields will be managed as **Old Field Succession**. They possess low integrity, due to woody vegetation encroachment, and minimal views and value for recreational/interpretive programs.

Historic Vegetation: No historic vegetation has been documented within this field so no specific recommendations are needed.

Fence Lines: No historic fence lines have been documented in this field so no specific recommendations are necessary.

Buildings: The buildings associated with these fields are within a private inholding, outside the field boundary.

Potential New Facilities: No new facilities are required.

2.2.4 Summary of Port Oneida Desired Future Conditions**Old Field Succession:**

Eight of the 15 fields will be managed partially or entirely under this DFC, including Thoreson Road Plateau, Brunson, Werner-Basch, Dechow, Miller, Burfiend-Barratt, Martin Basch, and Laura Basch. Eventually these fields will become forested.

Open Meadow:

Thirteen of the 15 fields will be managed partially or entirely under this DFC, including Thoreson, Brunson, Werner-Basch, Dechow, Charles Olsen, Miller, Kelderhouse, Port Oneida Dock Site, Burfiend-Barratt, Martin Basch, Lawr-Peter Burfiend, Eckhert-Ole Olsen, and Schmidt-Hayms. In this DFC, fields are maintained as open meadow through a variety of maintenance techniques.

Active Agriculture:

Maintenance and interpretive efforts will be focused on areas in this DFC, although the Open Meadow DFC requires some maintenance effort also. Seven of the 15 fields have the potential for active agriculture, including Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhert-Ole Olsen. With further research and analysis, select locations may be developed and managed with a sustainable and compatible cover crop or row crop. The intent of these plots is to interpret the history and activities of the Port Oneida community during the period of significance (1870-1945) and to rehabilitate the historic landscape of Port Oneida. These locations will be relatively small, may be rotated, and will be managed in a program that is consistent with the NPS mission of protecting both cultural and natural resources. Because Port Oneida is in the “Experience History Zone” as determined by the 2009 GMP, cultural resource management and interpretation are the

primary focuses. Natural resource impacts will be minimized and mitigated through best management practices. New developments at these farms will be limited to what is minimally required. Hiking trails will be mowed or mulched, parking lots will have a mowed, stabilized soil, or gravel surface, and new signs and interpretive media will be low key so that views of historic properties are unobstructed. Historic vegetation such as large shade trees, orchards, ornamental vegetation, and garden plants will be more actively managed by the park staff or through partnerships.

TABLE 2. SUMMARY OF DESIRED FUTURE CONDITIONS BY FIELD

Field	Field Name	Old Field Succession	Acres	Open Meadow	Acres	Active Agriculture	Acres	Totals
1	Thoreson			X	71	X	39	110
2	Thoreson Road Plateau	X	51					51
3	Brunson	X	2	X	15			17
4	Werner-Basch	X	13	X	41	X	6	60
5	Dechow	X	5	X	106	X	49	160
6	Charles Olsen			X	27	X	20	47
7	Miller	X	34	X	65			99
8	Kelderhouse			X	67			67
9	Port Oneida Dock Site			X	15	X	25	40
10	Burfiend-Barratt	X	4	X	85	X	28	117
11	Martin Basch	X	30	X	110			140
12	Lawr-Peter Burfiend			X	90			90
13	Eckhert-Ole Olsen			X	32	X	13	45
14	Schmidt-Hayms			X	35			35
15	Laura Basch	X	8					8
Totals			147		759		180	1086

2.2.5 Other Historic Properties in Port Oneida

While this Plan is intended only for lands managed by the NPS, the NPS will seek to work cooperatively with other landholders in Port Oneida who may wish to manage their property in a manner consistent with the goal of this Plan. Two publicly-owned properties are noted: the Kelderhouse Cemetery, just south of the Kelderhouse farm near M-22 and Port Oneida Road, is owned by Cleveland Township and the Port Oneida School, just across from the Kelderhouse farm, is owned by Glen Lake Community Schools. Additionally, there are a number of county road rights-of-way in Port Oneida. The NPS seeks to work closely with the Leelanau County Road Commission in areas where each agency's planned activities may impact the other such as road grading and conifer wind rows. The NPS also seeks working relationships with private property owners (inholders).

2.2.6 Treatment Options

In order to implement the desired future conditions, it is necessary to develop a list of treatment options or techniques, a primary objective of this plan. The key to keeping fields open is preventing the growth of

woody vegetation, which if left uncontrolled, would threaten the integrity of the historic landscape. To date, thin gravel soils and the thatch layer that has accumulated after years of mowing have retarded woody growth. Park staff will employ a combination of the following techniques to remove woody growth: mechanical removal by mowing, cutting, or pulling; herbicide application; and prescribed fire. Cultivation may be employed in selected areas once woody vegetation has been removed.

Mechanical Removal:

Woody vegetation can be quickly and efficiently removed using a tractor-pulled sickle mower, or rotor blade mower. This technique preserves historic patterns of open space, the texture of grassland cover, and allows for interpretation of agricultural patterns. Some areas with heavy woody seedling growth may require herbicide application. In areas where woody growth is slow, it may only be necessary to mow the field edge rather than entire fields. After mowing, vegetation should be left on the ground. This will add to the thatch layer that helps maintain the field as open by suppressing woody plant growth. Mowing will only be done prior to arrival of ground nesting birds or after the nesting period so birds can safely rear their young. Mowing must also be conducted when the ground is not saturated to prevent rutting. Clumps of juniper, wild rose, and individual trees can be removed by cutting, digging, or machine pulling. Because this method is labor intensive and does not eliminate the need for mowing, it may be more practical to hand-cut, dig, or pull on a periodic basis. This method is more appropriate for vegetation in the middle of fields rather than at the forest edge. Pulling is employed for small woody vegetation, which is too large to mow and too small for chainsaw use, generally up to 4 to 6-inch trees. Vegetation can sprout if roots remain so herbicide application may be required.

Herbicide Application:

There are two types of herbicide application that may be employed—hand treatment or machine spray. Hand treatment applications are used when individual deciduous woody stems are targeted, a very selective method. (No herbicides are required with conifer cutting.) Machine spray is used for non-selective application, for example, to treat an entire field of spotted knapweed. Timing issues, potential impacts to resources (ground and surface water, wildlife), cost, and public perception are considerations. The Great Lakes Invasive Plant Management Plan/Environmental Assessment (IPMP/EA), currently being prepared, will develop a long-term management plan to reduce the impacts of (or threats from) invasive plants to native plant communities and other natural and cultural resources in ten Great Lakes region national park units, including Sleeping Bear Dunes National Lakeshore. When completed, the IPMP/EA will provide direction for herbicide use in Port Oneida.

Prescribed Fire:

Conducting burns on a cyclic basis would control woody vegetation and maintain the open appearance of fields. It may also help generate seedbeds and add nutrients to the soil, which would increase the percentage of native grasses and forbs. Precautions would have to be taken to protect structures, landscape features, and subsurface resources that are found in the area. Prescribed fires would be timed to minimize the impact to wildlife including nesting birds. The *2005 Fire Management Plan* for the National Lakeshore presents goals for preparedness and suppression, hazard fuels management,

vegetation management, and public use/awareness; identifies fire management units; and identified actions for fires suppression, wildland fire use, prescribed fire use, and non-fire treatments to reduce hazard fuels. This document will provide direction for prescribed fire activities in Port Oneida.

Cultivation and Pasturing:

From a historic landscape perspective, an ideal management approach includes cultivating some fields. Cultivated land could include pasture, hay fields, orchards and field crops. This would perpetuate historic use and allow for more in-depth interpretation of Port Oneida's history.

The National Lakeshore does not anticipate using NPS staff, funds or equipment to actively cultivate fields or pasture livestock in Port Oneida. Rather, the intent is that small-scale farming be carried out through a leasing program. By developing a partnership/leasing program focused on sustainable farming methods and/or organic farming, the National Lakeshore could manage active agriculture in Port Oneida in a manner that is economically and ecologically sustainable.

Pasturing or raising domesticated farm animals (including apiaries) near and around farmsteads, would be considered on a case by case basis under the leasing process in the Active Agriculture DFC. Considerations would include visitor safety and capacity of the pasture/landscape to sustain the intended level of use.

2.2.7 Monitoring Field Condition

Periodic monitoring of fields is required to ensure that the fields retain their desired condition. In areas that are newly cleared, mowed or burned, monitoring for invasive native and non-native vegetation would be especially important.

2.2.8 Mitigation Measures

The action alternative would predominately result in beneficial effects. In areas where there is potential for adverse impacts, the following mitigation measures are proposed. More will be developed in the future.

- 1) If during vegetation removal previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted. The resources would be identified and documented and an appropriate mitigation strategy developed, if necessary, in consultation with NPS archeologists and the SHPO. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act (25 USC 3001) of 1990 would be followed. All human remains, funerary objects, sacred objects, or objects of cultural patrimony would be left in situ until the culturally affiliated tribe(s) was consulted and an appropriate mitigation or recovery strategy developed.
- 2) Conifers do not need to be pulled, because they will not re-sprout. Flush cutting with a chainsaw or clipping the smaller trees is sufficient. No herbicide is necessary.

- 3) No pulling of stumps or trees in areas with any slope. These sites have the greatest chance of causing erosion or loss of topsoil.
- 4) There should be no pockets of sand or holes left after trees are pulled.
- 5) For deciduous trees, to prevent re-sprouting from stump remnants, remove as many of the roots as possible. It is likely impossible to collect all of the root system on the larger trees. Treatment with herbicide may also be needed at these sites. For best results with less disturbance, pull only the smaller trees (6-10" DBH, depending on species).

- 6) Ideally, for treatments to have the least amount of re-sprouts, the best action would be to:

Girdle and/or basal treat, leave trees standing, and cut them down the following year. Make sure to treat with herbicide the first year. This treatment seems to have the best results. The more disturbance there is to a tree or site the more it is likely to send up new sprouts. This method has the least amount of initial and long term soil disturbance.

The next best alternative is to cut trees with chainsaws and stump treat. This treatment will have much less soil disturbance compared to pulling the trees. There may be a chance of re-sprouting with this treatment. If this method is used, it should only be used on smaller trees (no larger than 6-10" DBH depending on species).

- 7) Impacts to soils from equipment oil leakage would be minimized by routine equipment maintenance.
- 8) Soils leaching would be minimized by careful selection, mixing, transport, and storage of herbicides.
- 9) Disturbed soils would be revegetated as soon as possible to minimize wind and water erosion.
- 10) Use of heavy equipment would be limited in wet conditions.
- 11) Holes remaining after stumps are pulled would be filled immediately for safety, especially during mowing operations.
- 12) Impacts to groundwater from herbicide leaching would be minimized by proper selections of herbicides for use in wet areas, as applicable.
- 13) Impacts to groundwater by oil leakage from heavy equipment would be minimized by routine maintenance.
- 14) The National Lakeshore strives to reduce emissions in this project by using bio-lubricants and bio-fuels where possible, recycling materials (e.g., wood piles converted to woodchips for use on park trails and for landscaping), and using hybrid vehicles for activities relating to this project,

using handsaws and other non-motorized equipment when possible. In addition, eco-friendly herbicides will be used (when needed) and all precautions will be taken to prevent the spillage of herbicides and oil from heavy equipment.

The following practices have been recommended by Michigan Department of Natural Resources for managing and maintaining the opens fields in the National Lakeshore:

- 1) Grasslands, including cool season grasses and hayfields, should be mowed between July 15 and August 31. This will reduce the chance of destroying bird nests, and discourages the invasion of problem grass species that move in after late season mowing. Cutting height should be about 6 inches. *Note: This date works for all grassland bird species of concern.
- 2) Fragmenting existing grassland areas should be avoided. If hiking trails are to be developed, they should be located at the edges of a field. Hedgerows that may serve as predator perches should be avoided.
- 3) Planting or maintaining several types of grasslands is recommended. A mosaic of tall and short grass fields will provide habitat diversity. A mixture of warm season grasses with forbs is best. Cool season grasses mixed with legumes is a second choice.
- 4) Warm season grasses are the most productive of cover types for grassland birds. Big and little bluestem, Indiangrass, and switchgrass are examples of warm season prairie grasses, which grow most rapidly during summer's peak when warm nights follow hot days. Warm season grasses are considered the most productive because these prairie grasses stand up well to snow and they provide thermal cover for roosting birds and other wildlife.
- 5) Prescribed burns may be used to increase the productivity of warm season grasses in particular. Burns should be conducted in early spring (March or April) or late fall (October or November).
- 6) One-hundred-foot shrub buffers next to forest edges and human habitations help to reduce the harsh edge. An alternative to planting shrubs along the edge of a forest is to allow the fire to burn slowly into the woods so as to create a "feathered" edge.
- 7) Chemical treatments of grasslands can also be used to control woody plants. Herbicides can be used to control any type of undesirable plants in your grassland, from wood plants to grasses and weeds.
- 8) Reducing or eliminating the use of insecticides will provide more valuable insect food for birds

2.3 ALTERNATIVES CONSIDERED AND DISMISSED

The two alternatives below were both rejected because they would not fulfill the National Lakeshore's mandate to protect historic and natural resources:

Restore Agricultural Production to Historic Levels:

Under this approach, the landscape would be maintained to a specific period in time. With such a broad period of significance (1870-1945), it would be difficult to choose which time period to select and adequate documentation does not exist, even for 1938. For example, if the landscape were restored to the turn of the 20th century, some historic homes, garages and buildings would be removed, most pine windrows and sugar maple rows would be eliminated, fences and barns would be rebuilt, and field and woodland patterns altered. The return of modestly-scaled agricultural activities would permit visitors to better understand how the fields and farm buildings functioned, and how the landscape changed with the seasons at that time. However, the demands of this agriculture on site soils could lead to erosion, much like that experienced by farmers by the early decades of the last century. It would also place demands on park maintenance staff that would not be met by anticipated available budgets. For these reasons, this alternative was dismissed.

Return Landscape to Native Forest Cover:

Over time, this approach would result in impairment of historic resources in Port Oneida. Although a few select fields could be mowed and the rest left to succession, the loss of the overall pattern of forest and meadow and their relationship to topography would result in a wholesale deterioration of the landscape characteristics that made Port Oneida eligible for listing on the National Register of Historic Places. This action would be in direct conflict with management zoning (i.e., Experience History) in the 2009 GMP.

2.4 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

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

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferable alternative. The act directs that federal plans should:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and,
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Generally this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources (Council on Environmental Quality 1981).

Continuing the current conditions under Alternative 1, No Action, would not fully preserve cultural resources in a comprehensive manner. Encroaching woody vegetation would be removed, as needed, in areas deemed most critical. Steps taken to develop small-scale active agriculture would not be taken, reducing some interpretive opportunities for park visitors.

Alternative 2 (the Preferred Alternative) would provide a comprehensive method of addressing the objectives listed in this Plan. Field boundaries would be identified, recommendations for stabilizing, maintaining, or restoring historic biotic features would be developed, an array of “desired future conditions” would be developed and applied to fields, and a list of techniques or treatment options that may be applied to reach the desired future condition would be created. Implementation of these objectives would establish a range of landscape management treatments throughout Port Oneida that best portray the evolution of rural life and farming activities with secondary consideration to the preservation of natural resources.

Therefore, Alternative 2, the Preferred Alternative, is the environmentally preferable alternative.

2.5 COMPARISON OF ALTERNATIVES

The following table illustrates the impacts under each alternative.

TABLE 3. COMPARISON OF ALTERNATIVES

Impact Topic	Alternative 1- No Action	Alternative 2- Preferred Alternative
Cultural Resources	Cultural Resources would continue to be managed in an ad hoc manner. Historic field patterns and ornamental vegetation may continue to deteriorate over time and be lost, but there would be some progress in rehabilitating fields. This would result in long-term, minor, beneficial impacts.	Cultural Resources would be managed proactively. Historic field patterns would be reestablished and appropriate cover crops would be maintained so that visitors could experience Port Oneida as an agricultural Landscape. This would result in long-term, moderate, beneficial impacts.
Water Resources	Field clearing may result in increased sedimentation, increased ash from prescribed fire, and contamination from chemicals. This would result in long-term, minor, adverse impacts.	Clearing of fields may result in increased sedimentation, increased ash from prescribed fire, and contamination from chemicals. Mitigation, such as replanting, careful use of chemicals, and equipment maintenance could reduce the severity. This would result in long-term, minor, adverse impacts.

Impact Topic	Alternative 1- No Action	Alternative 2- Preferred Alternative
Vegetation	Field clearing impacts vegetation by direct removal, crushing by foot and vehicle traffic, introduction of invasive vegetation on disturbed sites or by “dirty” equipment, changes in vegetation by altering soils, removal of “edge” species, reduction in nesting, resting, and foraging habitat, and non-target plants affected by herbicides. This would result in short-term, minor, adverse impacts to non-invasive native vegetation and long-term, moderate, adverse impacts to native and non-native invasive vegetation.	Field clearing impacts vegetation by direct removal, crushing by foot and vehicle traffic, introduction of invasive vegetation on disturbed sites or by “dirty” equipment, changes in vegetation by altering soils, removal of “edge” species, reduction in nesting, resting, and foraging habitat, and non-target plants affected by herbicides. Additional impacts by active agriculture include non-native seed introduction, trampling, and overgrazing (permanent pastures). This would result in short-term, minor, adverse impacts to non-invasive native vegetation and long-term, moderate, adverse impacts to native and non-native invasive vegetation.
Wildlife	Field clearing impacts wildlife by direct mortality, harassment, removal of nesting, resting, and foraging habitat, increased predation by displacement, and increased sedimentation to surface waters may affect aquatic vegetation. Prescribed fire impacts wildlife by direct mortality, reduction in nesting, resting, and foraging habitat. Herbicide application would convert diverse vegetation to monoculture. This would result in short-term, negligible, adverse impacts to wildlife.	Field clearing impacts wildlife by direct mortality, harassment, removal of nesting, resting, and foraging habitat, increased predation by displacement, and increased sedimentation to surface waters may affect aquatic vegetation. Prescribed fire impacts wildlife by direct mortality, reduction in nesting, resting, and foraging habitat. Herbicide application would convert diverse vegetation to monoculture. Additional impacts by active agriculture (pasturing) include potential disease issues and fences that change migration patterns. This would result in long-term, minor, adverse impacts to wildlife.
Species of Special Concern	Field clearing impacts wildlife by direct mortality, harassment, removal of nesting, resting, and foraging habitat, increased predation by displacement, and increased sedimentation to surface waters may affect aquatic vegetation. Prescribed fire impacts wildlife by direct mortality, reduction in nesting, resting, and foraging habitat. Herbicide application would convert diverse vegetation to monoculture. This would result in short-term, negligible, adverse and long-term, minor, adverse impacts to species of special concern.	Field clearing impacts wildlife by direct mortality, harassment, removal of nesting, resting, and foraging habitat, increased predation by displacement, and increased sedimentation to surface waters may affect aquatic vegetation. Prescribed fire impacts wildlife by direct mortality, reduction in nesting, resting, and foraging habitat. Herbicide application would convert diverse vegetation to monoculture. Additional impacts by active agriculture (pasturing) include potential disease issues and fences that change migration patterns. This would result in short-term, negligible, adverse and long-term, moderate, adverse impacts to species of special concern.

Impact Topic	Alternative 1- No Action	Alternative 2- Preferred Alternative
Soils	Field clearing may result in increased soil erosion, disruption of soil profiles, altered historic contours, and contamination from chemical spills. This would result in long-term, minor adverse impacts.	Clearing of fields could result in increased soil erosion, disruption of soil profiles, altered historic contours, and contamination from chemical spills. Mitigation, such as replanting, recontouring, careful use of chemicals, and equipment maintenance could reduce the severity. This would result in long-term, minor, adverse impacts.
Visitor Use and Experience	In the short term, visitors would experience noise, exhaust smell, reduced visibility (during prescribed fires), and chemically burned vegetation (herbicide application). In the long term, visitors would experience a partially cleared agricultural landscape that does not accurately reflect historic patterns of spatial organization. This would result in short-term, minor, adverse and long-term, minor beneficial impacts.	In the short term, visitors would experience noise, exhaust smell, reduced visibility (during prescribed fires), and chemically burned vegetation (herbicide application). In the long term, visitors would experience an agricultural landscape with patterns very similar to those from the historic period. They would understand the relationship between topography, vegetation, and the influences of Lake Michigan. This would result in short-term, minor, adverse and long-term, moderate, beneficial impacts.
Park Facilities and Operations	Park operations would continue to clear vegetation as funding was available. Lack of planning for clearing may result in less productive worker hours and less efficient use of machinery. This would result in long-term, minor, adverse impacts.	Park operations would be able to prioritize and plan how and when fields would be cleared on a multi-year basis. They would be able to coordinate with volunteer efforts to achieve a more sustainable program of landscape maintenance. This would result in long-term, minor, adverse impacts.

2.6 PROJECT OBJECTIVES BY ALTERNATIVE

The following table illustrates how well each alternative addresses the objectives defined in Chapter 1.

TABLE 4. PROJECT OBJECTIVES BY ALTERNATIVE

Objective	Alternative 1 (No Action)	Alternative 2 (Preferred)
Identify field boundaries.	Does not address this objective. Some field clearing implemented to remove encroaching woody vegetation.	Fully addresses this objective.
Provide general recommendations for stabilizing, maintaining, or restoring historic biotic features such as tree rows, orchards, windbreaks and ornamental or garden plant varieties.	Does not address this objective. Some of this activity occurs on an ad hoc basis.	Fully addresses this objective.

Objective	Alternative 1 (No Action)	Alternative 2 (Preferred)
Develop an array of “desired future conditions,” or a palette of appropriate conditions for former agricultural fields.	Does not address this objective.	Fully addresses this objective.
Assign desired future conditions to each field or group of fields.	Does not address this objective.	Fully addresses this objective.
Develop a list of techniques or treatment options that may be applied to reach the desired future condition	Does not address this objective. Some activities are occurring on an ad hoc basis (mechanical removal, herbicide application).	Fully addresses this objective.

3. Affected Environment

This section describes the existing conditions of Port Oneida's historic landscape and provides the foundation for analyzing the potential impacts from the No Action and Preferred Alternatives.

3.1 CULTURAL RESOURCES

Historic Landscapes:

Port Oneida contains extensive historic resources related to the settlement and development of the area. Much of this data was collected as part of previous studies including: *Farming at the Water's Edge* (McEnaney, *et al.* 1995), *National Register of Historic Places Nomination Form* (NPS 1997) *Cultural Landscapes Inventory – Port Oneida Rural Historic District, Sleeping Bear Dunes National Lakeshore* (NPS 2004), and a 2008 Environmental Assessment completed as part of planning for visitor contact station and staff housing.

Spatial Character and Land Use:

The landscape of Port Oneida conveys at least 150 years of human manipulation. The most recent agricultural use resulted in physical elements that interrelate to create large-scale patterns and define space. Port Oneida is part of a glacially formed landscape that includes moraines, bluffs, ridges and hills. The ridges and hills are covered with woodland forests, forming an important backdrop for the historic landscape. Lake Michigan is a major presence in Port Oneida, having a significant climatic, sensory, and visual impact on the area. The setting today remains much the way it appeared while agricultural activity was present.

Port Oneida now lies completely within the boundaries of the National Lakeshore and is managed to protect its historic character. Compatible interpretive and recreational activities, such as tours, biking, and hiking are provided. Adjacent properties are primarily residential and recreational. Farming practices that once comprised the predominant historic land use no longer occur.

Port Oneida's spatial character is defined by its distinct natural topography, a rural landscape of open agricultural fields and farmsteads, and the presence of Lake Michigan. Open fields are defined and often enclosed by forested hillsides, rows of conifer windbreaks, pine plantations, and rows of mature sugar maple trees. Historic farms with their associated fields, fences and fence lines, orchards, and building clusters of houses, barns and outbuildings dot the rural landscape.

Circulation Systems:

Port Oneida is accessed by M-22, a two-lane, asphalt-paved state highway that follows a glacial melt water channel through the south central portion of Port Oneida and several gravel county and seasonal roads. M-22 connects Port Oneida with the remainder of the National Lakeshore, including the Philip A. Hart Visitor Center in Empire. M-22 is also the primary connection to surrounding counties and small towns.

Port Oneida has a pedestrian circulation system of soft-surface and mowed grass hiking trails. Several hiking trails follow the alignments of historic farm and logging roads or historic field lines. Others connect the historic farms, particularly those frequently used as visitor sites. Several hiking trails access Port Oneida's natural sites, including the Pyramid Point Trail at Port Oneida's northern end and the Bay View Trail at the southwestern end. A number of social trails also exist, several of which access the Lake Michigan shoreline.

Buildings, Structures, and Small-scale Features:

A range of buildings, structures and small-scale features exist at individual farmsteads that collectively establish the character of Port Oneida as a rural historic district, which is described below. Small-scale features – in particular, foundations, fences and fence lines, gates, signs and cisterns – also contribute to establishing Port Oneida's character. Fences and fence lines delineate the open fields that are associated with the individual farms. For example, at Burfiend and Kelderhouse farms, remnants of building foundations and barn corners mark the locations of barns. At Charles Olsen and Kelderhouse farms, remnants of building foundations mark the locations of outbuildings. Modern site elements on properties managed by the NPS include restrooms, electric power lines and poles, septic tanks, and signs associated with the National Lakeshore.

Views:

Views and vistas are important to the historic landscape, establishing the character of Port Oneida as a rural historic district. Significant views, particularly those towards the Dechow and Charles Olsen farms along M-22 and to the Kelderhouse and Burfiend farms along Port Oneida and Baker Roads, provide a visual introduction to the historic scene, showcasing the buildings, open fields, and land use patterns that define the character of Port Oneida.

Lake Michigan is visible from several locations in Port Oneida, including along Thoreson Road near the Thoreson farm, from the Burfiend farmstead's west building cluster and Baker Road, from the Bay View and Pyramid Point hiking trails, and from the overlook along Basch Road.

Historically, many of the farms were visually connected to each other (McEnaney, *et. al.* 1995) and remain so today.

Vegetation:

Port Oneida has a range of native and naturalized plant species, non-native plant species, and domesticated plantings that establish its rural agricultural character. As woodlands, the native and naturalized species primarily occur on the forested hillsides and wooded bluffs that surround the agricultural fields and farmsteads, and also in the large emergent wetland in the center of Port Oneida. Non-native plant species include domesticated plantings as well as weedy species that are encroaching into the open fields and hardwood forests. Small groves of black locust trees were historically planted to provide wood for fence posts and wagon tongues (McEnaney, *et. al.* 1995). The trees have become invasive, expanding into fields and hillsides, most notably on the forested moraine and fields behind the Charles Olsen farm and the Port Oneida schoolhouse.

Open Fields and Fence Lines:

The 1990 *Open Field Management Plan* introduced a regimen of mowing and hand-removal to keep uncultivated fields open. The plan has been partially implemented and includes only parts of some of the important fields in Port Oneida (including all or parts of the Thoreson, Thoreson Road Plateau, Dechow, Charles Olsen, Kelderhouse, Burfiend-Barratt, Lawr-Peter Burfiend, and Eckhert-Ole Olsen fields—Map A-4). Although some fields have been impacted by successional shrub growth, the large-scale pattern of open fields remains. The successional growth has occurred at field edges and to a lesser degree within fields. Most of the growth consists of cherry, black locust, juniper, and red pine. Some of the fields are edged or bisected by conifer windbreaks that were planted to reduce soil erosion caused by winds on sandy soils.

Historically, the fields were defined and divided by post and wire fences. With the cessation of farming, fences have either been removed or have deteriorated. The fences remaining on the landscape usually consist only of posts, although some wire may still be found in places.

Along with the open meadows that were once cultivated or grazed by livestock, Port Oneida's landscape includes non-native and native plants that were introduced for agricultural and ornamental purposes. These include sugar maple tree rows, conifer windbreaks, pine plantations, remnant orchards, and ornamental plantings such as lilacs and roses. This mix of vegetative cover presents the primary challenge to maintaining the historic character of Port Oneida. As these features age and decline, the landscape integrity will diminish.

Tree Rows:

A number of sugar maple tree rows line the roads in Port Oneida. These trees are all around 95 years of age and possess problems that plague any mature tree. Overall, they appear to be in relatively good condition, with some limb breakage due to the effects of age, wind, and ice.

Conifer windbreaks and pine plantations define many of the former field edges and property boundaries. They also line many of the roads in Port Oneida. The plantings are often a mix red pine, white pine, and Norway spruce. Most windbreaks and all plantations postdate the period of significance. The conifers appear to be in good condition, especially given their age. Many of the rows feature volunteer woody growth at their edges.

There are a number of county road rights-of-way in Port Oneida. The NPS seeks to work closely with the Leelanau County Road Commission in areas where each agency's planned activities may impact the other such conifer windrows. Conifer rows that were planted to provide buffer from wind and snow will be retained if they date to the period of significance (1870-1945). Non-historic windrows that currently protect roadways from snow deposition may need to be replaced seasonally with some other non-intrusive barrier.

Orchards:

Remnants of small fruit orchards occur next to many of the farms or in isolated patches in former fields. The NPS has documented most of the varieties found in the orchards. A reconnaissance level survey of the trees, which are primarily apples, found that while the trees are beginning to

show the effects of age and limited maintenance, many are still producing fruit. Often, the classic geometric configuration of the former orchard can still be discerned. The orchards contain some historic varieties that have vanished from the common market and are increasingly rare worldwide.

Ornamental Vegetation:

Many of the farms in Port Oneida feature remnant flowering shrubs or herbaceous vegetation planted for aesthetic or agricultural purposes. The most evident shrubs are lilacs and roses. They often exist next to or near farm houses, and can also mark the location of non-extant farm sites. Many of these shrubs are large and overgrown but continue to flower. They are rarely invasive.

Archeological Resources:

Archeological resources are the material remains or physical evidence of past human life or activities. An archeological survey was completed for the Port Oneida Rural Historic District in late summer 2006. Field surveys were completed for the Kelderhouse, Dechow, Peter Burfiend, Eckhert, and Werner farms that focused on the residential farmstead components and any specific areas where ground disturbance might occur as part of the action alternatives in the 2008 Port Oneida Environmental Assessment. The surveys included shovel testing. No significant archeological resources were encountered during the surveys; however, if during landscape rehabilitation or maintenance activities, previously undiscovered archeological resources are discovered, all work in the immediate vicinity of the discovery will be halted until the resources can be identified and documented, and an appropriate mitigation strategy developed, if necessary, in consultation with the Michigan SHPO.

3.2 WATER RESOURCES (WETLANDS, SURFACE WATERS, AND GROUNDWATER)

There is a large wetland central to the Port Oneida area and other smaller wetland areas (Map A-9). This large, mixed scrub-shrub and emergent wetland includes northern white cedar (*Thuja occidentalis*), larch (*Larix laricina*) and speckled alder (*Alnus rugosa*) (Hazlett, 1991). The wetland is primarily groundwater fed; however, beaver activity has expanded its boundaries. Fields adjacent to wetlands include Werner-Basch, Charles Olsen, Miller, Kelderhouse, Port Oneida Dock Site, Burfiend-Barratt, Martin Basch, Lawr-Peter Burfiend, and Eckhert-Ole Olsen.

The only other surface waters in the area are found in Narada Lake and Lake Michigan. Narada Lake is east of the fields addressed in this plan and nearest to the Lawr-Peter Burfiend and Eckhert-Ole Olsen fields. Lake Michigan lies adjacent to the Brunson, Miller, Port Oneida Dock Site, and Burfiend-Barratt fields.

There are two major aquifers represented in the National Lakeshore (Handy and Stark 1984; USGS 2000). Material deposited during the Pleistocene glacial advances comprises the surficial aquifer system. This system is hydraulically connected to streams because of its shallow depth, ease of recharge via precipitation, and short groundwater flow paths (USGS 2000). Handy and Stark (1984) provided the first and only study of the National Lakeshore's groundwater and developed generalized maps.

3.3 VEGETATION

The project area occurs within the Great Lakes section of the Hemlock-White Pine-North Hardwoods Region as described by Braun (1950). The original hardwood and hemlock-hardwood forests were dominated by sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), basswood (*Tilia americana*), and eastern hemlock (*Tsuga canadensis*). Once these forests were cut for lumber and farming, secondary forests often included a predominance of both quaking aspen (*Populus tremuloides*) and big-tooth aspen (*Populus grandidentata*). The original pine forests in the region were dominated by white pine (*Pinus strobus*), red pine (*Pinus resinosa*) and jack pine (*Pinus banksiana*).

The vegetative landscape in Port Oneida is dominated by inactive farm fields, forested morainal hills and wetlands (see also “Vegetation” narrative in section 3.1 Cultural Resources). Old fields in Port Oneida are dominated by smooth brome (*Bromus inermis*). They are being overtaken by early successional species such as black cherry (*Prunus serotina*), red pine (*Pinus resinosa*), and exotic plants such as black locust (*Robinia pseudoacacia*) and spotted knapweed (*Centaurea maculosa*).

Forested morainal hills provide the dominant topographic element in Port Oneida. They are a result of retreating ice from the Wisconsin glacier occurring approximately 11,000 years ago. The *Flora of Sleeping Bear* (Hazlett 1991) provides data on existing vegetation conditions throughout the park. Port Oneida is contained within the Good Harbor Bay Unit. Hazlett notes that the northern hardwoods on the moraines of this area are largely composed of sugar maple, beech, white ash (*Fraxinus americana*) and red oak (*Quercus rubra*).

A large, mixed scrub-shrub and emergent wetland is found central to Port Oneida. Dominant species include northern white cedar (*Thuja occidentalis*), larch (*Larix laricina*) and speckled alder (*Alnus rugosa*) (Hazlett 1991).

Map A-10 provides an overview of vegetation in Port Oneida.

3.4 WILDLIFE

Park staff compiled lists of vertebrate wildlife found in the National Lakeshore. Approximately 21 species of amphibians, 19 species of reptiles, and 45 species of mammals have been reported in the park. Common amphibians include American toad (*Bufo americana*), gray tree frog (*Hyla versicolor*), green frog (*Rana clamitans*), wood frog (*Rana sylvatica*) and red-backed salamander (*Plethodon cinereus*). Common reptiles are northern water snake (*Nerodia sipedon*), common garter snake (*Thamnophis sirtalis*), eastern box turtle (*Terrapene carolina*), and midland painted turtle (*Chrysemys picta marginata*). Frequently observed mammals include American beaver (*Castor canadensis*), Virginia opossum (*Didelphis virginiana*), meadow vole (*Microtus pennsylvanicus*), red squirrel (*Tamiasciurus hudsonicus*), striped skunk (*Mephitis mephitis*) and white-tailed deer (*Odocoileus virginianus*).

According to the *Atlas of Breeding Birds of Michigan* (Brewer, et al. 1992), 159 species of birds were recorded as breeding in Leelanau County during the 1983 to 1988 survey. Approximately 250 species of

birds have been observed within the park. Some of the common breeding birds include Cooper's hawk (*Accipiter cooperii*), mourning dove (*Zenaida macroura*), downy woodpecker (*Picoides pubescens*), black-capped chickadee (*Poecile atricapillus*), red-breasted nuthatch (*Sitta canadensis*), red-eyed vireo (*Vireo olivaceus*), hermit thrush (*Catharus guttatus*), magnolia warbler (*Dendroica magnolia*), pine warbler (*Dendroica pinus*), red-winged blackbird (*Agelaius phoeniceus*), song sparrow (*Melospiza melodia*) and white-throated sparrow (*Zonotrichia albicollis*).

3.5 SPECIES OF SPECIAL CONCERN

NPS Policy (2006 *Management Policies*, Section 4.4.2) requires examination of potential impacts on state-listed threatened, endangered, candidate, rare, declining, and sensitive species that are known collectively as species of concern. In the summer of 2002, an assessment of historic open lands (fields) was conducted at the park (Corace, *et al.* 2002). Their observations in the Thoreson field area included the five following bird species of "conservation priority" by the U.S. Fish and Wildlife Service (USFWS): northern harrier (*Circus cyaneus*), field sparrow (*Spizella pusilla*), grasshopper sparrow (*Ammodramus savannarum*), bobolink (*Dolichonyx oryzivorus*) and eastern meadowlark (*Sturnella magna*). It is likely that these species would be found in all fields in Port Oneida.

In addition to the species listed above, the following birds have been observed in Port Oneida: Savannah sparrow (*Passerculus sandwichensis*), vesper sparrow (*Pooecetes gramineus*), song sparrow (*Melospiza melodia*), chipping sparrow (*Spizella passerina*), and the upland sandpiper (*Bartramia longicauda*), which is considered a shorebird even though it also uses pastures and grasslands for its life cycle.

The potential exists that there may be other species of special concern that reside in this area but are unknown at this time.

3.6 SOILS (INCLUDING PRIME AND UNIQUE SOILS)

Port Oneida's existing physical features were formed 11,000 years ago, during the Port Huron sub stage of the Wisconsin glacial stage, during which the retreating ice left behind the moraines, bluffs, drainage channels, and bays that characterize the Sleeping Bear Dunes region.

Following the glacial retreat, the low-lying areas in the region were covered by a series of prehistoric lakes; the first, known as Lake Algonquin, covered all of what later became Port Oneida. The high hills that remain were islands in the lake. The second and smaller Lake Nipissing disappeared within 700 years of the glacial retreat.

The thick layer of till left by the retreating glacier covers most of the Lakeshore's underlying bedrock. This rubble remains in the form of ridges and hills that terminate in steep bluffs near Lake Michigan. These bluffs eventually developed into perched dunes after prevailing westerly winds deposited sand from the bluffs on upland areas. Pyramid Point is an example of such a dune. Other topographical features created by glacial activity include the wetlands and small inland lakes that constitute a significant portion of Port Oneida.

Port Oneida's glacial legacy is most evident in its soils, which generally consist of coarsely textured, highly permeable subsoil. These soils have a reduced water holding capacity; any inherent or supplemented organic matter is continually leached away. Historically, this phenomenon limited agricultural productivity. Scattered pockets of more productive soil can be found in Port Oneida. Soil associations in Port Oneida include:

Kalkaska-Mancelona: well-drained, nearly-level to steeply sloping and sandy; found on outwash plains. The Kalkaska soil group consists of surface and subsoil layers of sand. The Mancelona soil group consists of a surface and subsoil layers of a dark loamy sand and sandy gravel. Minor soils of this association include Adrian, East Lake, and Houghton.

Leelanau-East Lake: loamy sands and sands located on nearly-level to very steep slopes such as till plains, drumlins, and moraines. Level areas with this soil type with this soil type are often used for crops, hay and orchards, while sloping areas are reserved for woodlots and pasture.

The Kalkaska-Mancelona association and the minor types comprising this soil profile support a variety of vegetation strongly correlated with the area's glacial and post-glacial geology. Native hardwood species once predominated, but through the years much of it was cleared—first through lumbering, and later through the development of farms and orchards. Despite many disturbances, soils in Port Oneida are in good condition.

Map A-11 provides an overview of soils in Port Oneida.

Prime and Unique Farmland:

Prime farmlands are identified as land that has the best combination of physical and chemical characteristics for producing food, forage, fiber and oilseed crops. Unique farmland is land other than prime farmland that has special characteristics, such as unique soil types and topographic features, which make it suitable for the production of specific high value crops. Prime farmland soils are present within Port Oneida in the following fields: Thoreson, Thoreson Road Plateau, Werner-Basch, Dechow, Port Oneida Dock Site, and Burfiend-Barratt. There are no unique farmland soils within Port Oneida (Map A-11).

3.7 VISITOR USE AND EXPERIENCE

Visitor facilities within Port Oneida consist of two gravel-surfaced parking lots at trailheads for the Bay View Trail and Pyramid Point. Hiking trails can be accessed from these trailheads and at other locations throughout Port Oneida. Visitors can access the publicly-owned farms within the park, but the buildings are locked. Paths have been mowed through some fields to connect farmsteads (e.g. between Dechow and Charles Olsen and Charles Olsen and Thoreson). These pathways are mostly used during the annual Port Oneida Fair in August. A vault toilet is located at the Pyramid Point parking lot. A privy is located at the Port Oneida schoolhouse; however, this is owned and operated by the local school district. County-owned and operated facilities include an undeveloped pull-off located along Basch Road overlooking Vacation Valley and a picnic area at the corner of Basch Road and M-22, in the M-22 right-of-way.

Currently, visitors to Port Oneida may obtain information and a map for Port Oneida from the Philip A. Hart Visitor Center located in Empire and at the Charles Olsen House, currently staffed by Preserve Historic Sleeping Bear. However, the 2008 *Port Oneida EA* proposes an unstaffed visitor center at the Kelderhouse farmhouse, in central Port Oneida. The Charles Olsen farm is currently being used as a partner site by Preserve Historic Sleeping Bear. They provide interpretive materials through exhibits and field guides available at the farm. The house at the farmstead is open to the public at varying hours. The park also holds the annual Port Oneida Fair annually during August. This event is held at several farms in Port Oneida and provides educational and interpretive opportunities highlighting the history of Port Oneida.

Port Oneida is used by visitors for a number of other activities. The Lake Michigan beach is generally accessed at the end of Lane Road (steps provided) and at the Burfiend farm (small grass-surfaced parking area provided). The beach is used year-round by hikers and snowshoers. Artists enjoy painting the views afforded by the landscape. Hiking, snow-shoeing, cross-country skiing, and bicycling the county roads are popular pursuits. Hunters are attracted to the area for deer, wild turkey, and small game. This wildlife also attracts photographers and other wildlife viewers. Many enjoy driving the paved and gravel roads, and appreciating the views afforded.

Many visitors are attracted to Port Oneida for the solitude, especially in and around those farmsteads that were abandoned years ago. The area is generally very quiet, except during field maintenance activities and the Port Oneida Fair.

3.8 PARK FACILITIES AND OPERATIONS

Currently, NPS facilities within Port Oneida consist of two gravel parking lots at the Bay View and Pyramid Point trailheads, a vault toilet at the Pyramid Point parking lot, hiking trails, and the structures at the various farms. The park maintains and operates these facilities in accordance with the *General Management Plan* (NPS 2009).

There are a number of county road rights-of-way in Port Oneida. The NPS seeks to work closely with the Leelanau County Road Commission in areas where each agency's planned activities may impact the other such as road grading and conifer windrows. Conifer rows that were planted to provide buffer from wind and snow will be retained if they date to the period of significance (1870-1945). Non-historic windrows that currently protect roadways from snow deposition may need to be replaced seasonally with some other non-intrusive barrier.

Current annual operation and maintenance expenditures on structures in Port Oneida are \$5,606. Annual grounds expenditures are currently approximately \$2,500. Maintaining open fields through mowing has been performed by volunteers. Staff time has been limited to providing training on equipment and equipment maintenance, an annual time expenditure of about 0.2 FTE (fulltime equivalent).

Significant clearing activities have been implemented during the past five years on fields that have high historic integrity, are adjacent roads travelled by many park visitors, and have high opportunities for recreation use: Kelderhouse, Peter Burfiend, and Lawr fields (2006), Carsten Burfiend and Barratt fields (2008), and Dechow and Charles Olson fields (2010). Clearing has been conducted using a variety of methods such as mowing, mowing and herbicide application, cutting (with and without herbicide application), and pulling. An estimated XXX was expended during the past XXX years.

The National Lakeshore strives to reduce emissions in this project by using bio-lubricants and bio-fuels where possible, recycling materials (e.g., wood piles converted to woodchips for use on park trails and for landscaping), using hybrid vehicles for activities relating to this project, and using handsaws and other non-motorized equipment when possible. In addition, environmentally-friendly herbicides will be used (when needed) and all precautions will be taken to prevent the spillage of herbicides and oil from heavy equipment.

As a participant in the NPS Climate Friendly Parks program, the National Lakeshore belongs to a network of parks that are putting climate friendly behavior at the forefront of sustainability planning in national parks. By conducting an emission inventory, setting an emission reduction target, developing an action plan, and committing to educate park staff, visitors, and community members about climate change, the National Lakeshore is serving as a model for climate friendly behavior within the National Park Service.

Chapter 4. Environmental Consequences

A determination of the probable impacts of each alternative on park resources has been made in accordance with the National Environmental Policy Act (NEPA). The analysis for each impact topic includes the identification of impacts of the various actions comprising the alternative, characterization of the impacts, an assessment of cumulative impacts, and a conclusion.

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies 2006* and DO-12 require an analysis of potential effects to determine if actions would impair park resources. A Determination of Impairment is included in this document in Appendix B-1.

4.1. METHODOLOGY

For each impact topic, the analysis includes an evaluation of effects as a result of implementing each alternative discussed in Chapter 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 impact topic.

Duration of impacts is evaluated based on the short-term or long-term nature of alternative-associated changes on existing conditions. Type of impact refers to the beneficial or adverse consequences of implementing a given alternative. More exact interpretations of intensity, duration, and type of impact are given for each impact topic examined.

4.2 CUMULATIVE IMPACTS

The Council on Environmental Quality (Council on Environmental Quality, 1978) regulations for implementing the National Environmental Policy Act and NPS 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 both the No Action and Preferred Action alternatives.

Cumulative impacts were determined by combining the effects of the alternative with other past, present, and reasonably foreseeable future actions at the National Lakeshore and in the surrounding region. These other actions, in conjunction with this project, are intended to preserve and restore cultural and natural resources and to improve visitor experience. These actions include:

Completed:

M-22 Scenic Heritage Route. M-22 from the Benzie/Leelanau county line (Manning Road) to the junction with M-72 northwest of Traverse City was designated as a Scenic Heritage Route. The Michigan Heritage Route Program, created by the Public Act 69 of 1993, is designed to identify, inventory, protect, enhance, and in some cases, promote state trunk lines and adjacent land with distinctive or unique scenic, cultural, or historic qualities. A Scenic Heritage Route is a state highway having outstanding natural beauty.

Stabilize and rehabilitate buildings in Glen Haven Village Historic District. The primary goal of the project is to provide basic infrastructure upgrades within the Glen Haven Village to accommodate expanded interpretive and water-related recreational opportunities. The implementation of proposed improvements in the Glen Haven Village Historic District would allow visitors to park in one of several locations and safely walk to the various points of destination. The majority of the construction work was completed in 2010. The project is expected to be completed during summer 2011.

Ongoing/Future:

The Sleeping Bear Heritage Trail from the Benzie/Leelanau county line to County Road 651: This non-motorized trail would be constructed near or adjacent to highways M-22 and M-109. The trail would provide pedestrians and bicyclist opportunities to safely travel separately from vehicular traffic and throughout Sleeping Bear Dunes National Lakeshore. Segment 5, from the Dune Climb to Glen Arbor, is funded and construction is expected to begin in 2011.

Improvements to the Port Oneida Rural Historic District: These include creation of a new visitor contact station, rehabilitation and stabilization of selected historic structures, the stabilization of selected historic landscapes, improved pedestrian and vehicular circulation, and the rehabilitation of an existing structure for employee housing. Some landscape rehabilitation proposals in this project are addressed in the current plan.

Proposed improvements to Lake Michigan Overlooks 9 and 10 on the Pierce Stocking Scenic Drive: Improvements include either a tunnel or boardwalk to access the overlooks to provide visitor access to the panoramic views, provide a quality interpretive experience, restore the site and reduce or eliminate future impacts, reduce or eliminate injuries, reduce emergency response costs, and reduce maintenance costs.

4.3 CULTURAL RESOURCES

Intensity

Negligible: Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 of the Historic Preservation Act would be *no adverse effect*.

Minor: Adverse impact – alteration of a feature(s) or landscape pattern(s) would not diminish the overall integrity of the resource (structure or landscape). The determination of effect for Section 106 would be *no adverse effect*.

Moderate: Adverse impact – Alteration of a feature(s) or landscape pattern(s) would diminish the overall integrity of the resource (structure or landscape). The determination of effect for §106 would be *adverse effect*. A memorandum of agreement (MOA) is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Major: Adverse impact – Alteration of a feature(s) or landscape pattern(s) would diminish the overall integrity of the resource (structure or landscape). The determination of effect for Section 106 would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon, and the NPS and applicable state or tribal historic preservation officer and/or advisory council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Duration

Short-term: The impact occurs only during treatment actions or less than two years after the treatment option is completed.

Long-term: The impact would be semi-permanent to permanent.

IMPACTS TO CULTURAL RESOURCES BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

There are four general types of mechanical vegetation removal that may be employed: mowing, cutting, pulling, and pruning. Many of these activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. During field clearing activities there would be a minor disruption of the historic scene. If, during landscape rehabilitation or maintenance activities, previously undiscovered archeological resources are discovered, all work in the immediate vicinity of the discovery will be halted until the resources can be identified and documented, and an appropriate mitigation strategy developed, if necessary, in consultation with the Michigan SHPO.

Prescribed fire, if employed, would also disrupt the historic scene during burning and with the blackened landscape sometime after. Intense fires could cause cracked shards.

Herbicide application would change the historic scene by killing targeted vegetation.

Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

SUMMARY OF IMPACTS TO CULTURAL RESOURCES BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, the historic scene would be impacted by mechanical removal (mowing, cutting, pulling) or herbicide application, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur. Prescribed fire has not yet been employed, so no impacts to cultural resources from this activity have occurred. However, the approved *2005 Prescribed Fire Management Plan* permits this use. Cultural resources would continue to be managed in an ad hoc manner. Historic field patterns and ornamental vegetation may continue to deteriorate over time and be lost, but there would be some progress in rehabilitating some fields. This would result in long-term, minor, beneficial impacts.

Cumulative Impacts: Other plans and actions occurring in the park that would impact cultural resources at the project site include development of the Sleeping Bear Heritage Trail; improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, minor, adverse impacts to cultural resources. Alternative 1, in combination with these other actions, would result in long-term, minor, beneficial impacts to cultural resources.

Conclusions: Implementation of the No Action Alternative would result in long-term, minor, beneficial impacts as a result of initial and long-term maintenance activities. A *no adverse effect* determination would be expected.

SUMMARY OF IMPACTS TO CULTURAL RESOURCES BY ALTERNATIVE 2 (THE PREFERRED)

Cultural resources would be managed proactively. Historic field patterns would be reestablished and appropriate cover crops would be maintained so that visitors could experience Port Oneida as an agricultural landscape. A variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC, which includes cover crops, row crops, orchards, and permanent pastures.

Fields that include the Active Agriculture DFC would be subject to the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhert-Ole Olsen. Table 2, Summary of Desired Future Conditions by Field, identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Impacts to cultural resources would be long-term, moderate, and beneficial.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would not address the need to reestablish historic field patterns, since cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to cultural resources in these fields would be long-term, negligible, and beneficial.

Cumulative Impacts: Other plans and actions occurring in the park that would impact cultural resources at the project site include development of the Sleeping Bear Heritage Trail; improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, minor, adverse impacts to cultural resources. Alternative 2, in combination with these other actions, would result in long-term, moderate, beneficial impacts to cultural resources.

Conclusions: Implementation of the Preferred Alternative would result in long-term, moderate, beneficial impacts. A *no adverse effect* determination would be expected since the purpose of this plan is to implement landscape management treatments to preserve significant landscape characteristics in Port Oneida.

4.4 WATER RESOURCES (WETLANDS, SURFACE WATERS, AND GROUNDWATER)

Intensity

Negligible: Water quality would be affected, or changes would be either non-detectable or below water quality standards and have effects that would be considered slight, site specific, and short-term. Any effects to wetlands would be below or at the lower levels of detection. There would be no long-term effects to wetlands, and any detectable effects would be slight. No Corps of Engineers 404 permit would be necessary.

Minor: Water quality would be measurable, although the changes would be below water quality standards, small, likely short-term, and effects would be site-specific or local. No water quality or hydrology mitigation measures would be necessary. The effects to wetlands would be detectable and relatively small and short-term to individual plants. No effects would be detectable to populations of plants. The effect would be site specific. A Corps of Engineers 404 permit would not be required. No long-term effects to wetlands would occur.

Moderate: Changes in water quality or hydrology would be measurable and long-term, may exceed water quality standards, but would be relatively local. Necessary water quality or hydrology mitigation measures would likely succeed. The effects to wetlands would be detectable and readily apparent, including a long-term effect on individual plants and short- or long-term effect on populations of plants. The effect could be site-specific or local.

Major: Changes in water quality or hydrology 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. Effects to wetlands would be observable over a relatively large localized or regional area and would be long-term. The character of the wetland would substantially change its functions over the long term.

Duration

Short-term: Recovers in less than three years.

Long-term: Takes more than three years to recover.

IMPACTS TO WATER RESOURCES BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Water resources (including wetlands, surface waters, and groundwater), may be directly impacted from surface disturbances that cause erosion (mechanical removal), ash (prescribed fire), and chemicals from the application of herbicides. Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

There are three general types of mechanical vegetation removal that may be employed: mowing, cutting, and pulling. Many of these activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. During field clearing activities, disturbed soils could erode and disburse sediments into surrounding surface waters. Surface waters and groundwater could be contaminated from chemical spills from heavy equipment, chainsaws, and other motorized equipment.

Prescribed fire, should it be employed, would result in the loss of vegetation, making soils more susceptible to wind and water erosion, with possible sedimentation into surface waters. Ash produced from burned vegetation could be transported onto surface waters by wind or runoff. There may be possible short-term effects from firefighting chemical (retardants and foams), if they are applied.

Herbicide application has the potential to impact groundwater (through leaching) or surface waters (through pesticide drift). Pesticides approved for use in the vicinity of surface waters would lessen the potential impact.

SUMMARY OF IMPACTS TO WATER RESOURCES BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, water resources may be impacted by mechanical removal (mowing, cutting, pulling), herbicide application, or prescribed fire, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur in this alternative. Virtually all clearing activity is on previously-disturbed lands. No mowing or other mechanical removal treatments or herbicide applications are conducted near wetlands or surface waters to minimize possible impacts to water resources. Prescribed fire has not yet been employed, but the approved *2005 Fire Management Plan* permits this use. Impacts to groundwater

from herbicide leaching and equipment oil leakage is minimized by the proper selection of herbicides designed for use in wet and good equipment maintenance. Impacts to water resources would be long-term, minor, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact water resources at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, negligible, adverse impacts to water resources. Alternative 1, in combination with these other actions, would result in short-term, minor, adverse impacts to water resources.

Conclusions: Implementation of the No Action Alternative would result in long-term, minor, adverse impacts as a result of initial and long-term maintenance activities.

SUMMARY OF IMPACTS TO WATER RESOURCES BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC. It includes cover crops, row crops, orchards, and permanent pastures, and can create wind and water erosion and sedimentation (until vegetative growth occurs), and contamination from herbicides, fertilizers, and animal waste.

Fields that include the Active Agriculture DFC would be subject to water resources impacts from the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhert-Ole Olsen. Table 2 identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Impacts to water resources would be short-term, minor, and adverse.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would be subjected to fewer impacts to water resources, since impacts related to cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to water resources at these fields would be long-term, negligible, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that could impact water resources at the project site include development of the Sleeping Bear Heritage Trail, potential improvements or realignments of the Bay View Trail, and small parking areas and roadside pull-offs proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, negligible, and adverse impacts to water resources. Alternative 2, in combination with these other actions, would result in long-term, minor, adverse impacts to water resources.

Conclusions: Implementation of the Preferred Alternative would result in long-term, minor, adverse impacts to water resources as a result of initial and long-term maintenance activities.

4.5 VEGETATION

Intensity

Negligible: No non-invasive 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 non-invasive 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 non-invasive native plants and would also affect a sizeable segment of the species' population 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 non-invasive native plant populations, including species of special concern, and affect a relatively large area in and out of the National Lakeshore. 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 two years.

Long-term: Following treatment, recovery would take less than two years.

IMPACTS TO VEGETATION BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Vegetation may be impacted by mechanical removal, prescribed fire, and herbicide application. Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

There are three general types of mechanical vegetation removal that may be employed: mowing, cutting, and pulling. Many of these activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. During field clearing activities, vegetation may be impacted by direct removal and crushing due to foot and heavy equipment traffic. Indirectly, vegetation may be impacted by the introduction of invasive seeds onto disturbed sites, invasive seed introduction from "dirty" equipment, alterations in soils resulting in changes to vegetation, and removal of "edge" species.

Prescribed fire, should it be employed, would result in the direct loss of vegetation and, indirectly, a reduction in nesting, resting, and foraging habitat for birds and small mammals.

Herbicide application can result in a 100% kill, often affecting non-target plants. Non-target plants subjected to pesticide drift could experience no effect, reduced vigor, or death depending on the plant species to specific herbicide and the dose applied.

SUMMARY OF IMPACTS TO VEGETATION BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, invasive native and non-native vegetation would be impacted by mechanical removal (mowing, cutting, pulling), herbicide application, or prescribed fire, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur in this alternative. Virtually all clearing activity is on

previously-disturbed lands. Prescribed fire has not yet been employed, but the approved *2005 Fire Management Plan* permits this use. Impacts to non-invasive native vegetation would be short-term, negligible, and adverse. Impacts to invasive vegetation (native and non-native), would be long-term, moderate, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact vegetation at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, minor, adverse impacts to vegetation. Alternative 1, in combination with these other actions, would result in short-term, minor, adverse impacts to non-invasive native vegetation and long-term, moderate, adverse impacts on native and non-native invasive vegetation.

Conclusions: Implementation of the No Action Alternative would result in short-term, minor, adverse impacts on non-invasive native vegetation and long-term, moderate, adverse impacts to native and non-native invasive vegetation as a result of initial and long-term maintenance activities.

SUMMARY OF IMPACTS TO VEGETATION BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC and includes cover crops, row crops, orchards, and permanent pastures. With cover crops and row crops, most existing vegetation is removed manually, by prescribed fire, or by herbicides, then maintained as a homogeneous crop. With orchards, dead trees are removed and replaced, fertilizers are periodically applied, pruning is implemented, and the area in and around the orchard is kept open by mowing or controlled grazing. Permanent pastures, in the vicinity of the farmsteads, could result in non-native seed introduction, trampling, and overgrazing resulting in loss of vegetation.

The impacts on vegetation can vary widely, as some fields have essentially already met their DFC (e.g., Brunson, Kelderhouse, and Thoreson Road Plateau), while others, such as Werner-Basch, Miller, and Eckhert-Ole Olsen would change dramatically with the removal of non-historic conifer rows. Following, is a field-by-field description of the major changes in vegetation, excluding the treatment of ornamental plants. Also refer to the field maps, Appendix A-5, the Summary of Desired Future Conditions by Field (Chapter 2), and Table 2, which identifies the acres in each DFC by field and for all of Port Oneida. Impacts to non-invasive native vegetation would be short-term, negligible, and adverse. Impacts to invasive vegetation (native and non-native), would be long-term, moderate, and adverse.

Thoreson: Many of the fields would remain as they are now, i.e., open meadow. Some small areas of brushy vegetation may develop in areas of moderate to steep slopes. Some selected areas, west of Thoreson Road in areas of prime farmland soils, may be planted in cover or row crops. Some pasturing may occur.

Thoreson Road Plateau: Vegetation would continue to succeed into mature forest.

Brunson: Most of the fields would remain as they are now, i.e., open meadow, with continued succession into forest at the top of the bluff near Lake Michigan and a small area in the east. Encroaching vegetation along the north-south fence line on the western boundary would be removed.

Werner-Basch: Non-historic conifer rows would be removed and the wetlands and areas to the west of the wetlands would continue to succeed into mature forest. Much of the open meadow would remain,

with removal of woody vegetation, as needed. A small area of cover or row crops may be planted around the farm or east of the farm, across M-22.

Dechow: In recent years, much native and non-native invasive vegetation has been removed from this field to the historic fence line. This work will continue on an as-needed basis. The pine area to the west will succeed into mature forest, as conifers are removed. Much of the field will remain as open meadow, with selected areas near M-22 possibly planted in cover or row crops. Orchards will be maintained or improved. Some pasturing may occur.

Charles Olsen: Fields would generally remain as open meadow. Some selected areas southwest of the farm may be planted in cover or row crops. Non-native black locust on the high ridge to the northeast would be removed and replaced with native vegetation (as open meadow).

Miller: Much of this area would remain in open meadow. Eradication of non-native black locust would continue, with conversion to open meadow. Non-historic conifer rows would be removed and the conifer “triangle” would be converted to hardwood forest with the gradual removal of the conifers. The high ridge to the west, where the overlook is located, would be selectively cleared to allow for views. This area, and the area to the south, would become hardwood forest.

Kelderhouse: Most of the fields would remain as they are now, i.e., open meadow. Encroaching woody vegetation would continue to be removed.

Port Oneida Dock Site: The field to the east of Port Oneida Road would remain as it is now, i.e., open meadow. The field west of Port Oneida Road could be planted in a cover or row crop, since this field has prime soils and is very visible from the road. The forested buffer on the bluff above Lake Michigan would remain.

Burfiend-Barratt: Many of the fields would remain as they are now, i.e., open meadow, with a forested buffer along the bluff near Lake Michigan. The prime farmlands surrounding the Burfiend Farm could be planted in cover or row crops and limited pasturing could occur. Vegetation would be selectively cleared along Baker Road to allow for views of the farm, Lake Michigan and the valley to the south. Clearing would include removal of small diameter understory vegetation and some large trees in the area of best views. The pine plantation in the northeast would be gradually replaced by native hardwoods and allowed to evolve into hardwood forest.

Martin Basch: The pine plantation in the northeast would be gradually replaced by native hardwoods and allowed to succeed into mature forest. The remainder of the fields would remain as open meadow. Encroaching woody vegetation would continue to be removed.

Lawr-Peter Burfiend: Most of the fields would remain as they are now, i.e., open meadow, with some small woody vegetation in the wetland areas to the north. Non-historic conifer rows would be removed. Encroaching woody vegetation would continue to be removed.

Eckhert-Ole Olsen: Much of the area would remain as open meadow, with continued clearing of woody vegetation. Non-historic conifer rows north and west of the Eckhert farm would be removed. Around the farms, some small areas of cover or row crops may be planted to interpret subsistence farming.

Schmidt-Hayms: Encroaching woody vegetation would be removed and the entire field would be open meadow. The pine plantation north of the driveway near Port Oneida Road would be removed. The Lombardy poplars along the north side of the driveway would be removed, except for the row immediately adjacent to the drive.

Laura Basch: Vegetation would continue to succeed into mature hardwood forest. Non-historic pine plantations would be removed.

Cumulative Impacts: Other plans and actions occurring in the park that would impact vegetation at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, minor, adverse impacts to vegetation. Alternative 1, in combination with these other actions, would result in short-term, minor, adverse impacts to non-invasive native vegetation and long-term, moderate, adverse impacts on native and non-native invasive vegetation.

Conclusions: Implementation of the Preferred Alternative would result in short-term, minor, adverse impacts on non-invasive native vegetation and long-term, moderate, adverse impacts to native and non-native invasive vegetation as a result of initial and long-term maintenance activities.

4.6 WILDLIFE

Intensity

Negligible: Any effects to wildlife would be at or below the level of detection, short-term, site-specific, and so slight that they would not be of any measurable or perceptible consequence to the wildlife populations.

Minor: Effects to wildlife would be detectable, although short-term, site-specific, small, and of little consequence to the wildlife populations. Mitigation measures, if needed to offset adverse impacts, would be simple and successful.

Moderate: Effects to wildlife would be readily detectable, short- or long-term, and site-specific, with consequences at the population level. Mitigation measures, if needed to offset adverse impacts, would be extensive and likely successful.

Major: Effects to wildlife would be obvious, long-term, local or regional, and would have substantial consequences to wildlife populations in the region. Extensive mitigation measures would be needed to offset any adverse impacts and their success would not be guaranteed.

Duration

Short-term: Following treatment, recovery would take less than two years.

Long-term: Following treatment, recovery would take less than two years.

IMPACTS TO WILDLIFE BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Wildlife may be directly and indirectly impacted by mechanical removal, prescribed fire, and herbicide application. Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

There are three general types of mechanical vegetation removal that may be employed: mowing, cutting, and pulling. Many of these activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. During field clearing activities, wildlife that cannot escape may be killed. All wildlife in the vicinity of removal activities will be harassed, and nesting sites, resting sites, and foraging habitat may be removed. Displaced wildlife may experience increased predation. Indirectly, forest edge areas may be removed (resulting in loss of habitat) and increased sedimentation to surface waters may affect aquatic wildlife functions.

Prescribed fire, should it be employed, would result in the direct loss of vegetation and, indirectly, a reduction in nesting, resting, and foraging habitat for birds and small mammals. Direct mortality is unlikely for aquatic wildlife during any prescribed fires, but some terrestrial wildlife would be killed.

With herbicide application, it is unlikely that most wildlife would receive direct exposure. Most would fly or run away, or burrow. The conversion of a diverse vegetative species to a monoculture (with cover or row crops) would indirectly impact wildlife by altering their habitat.

SUMMARY OF IMPACTS TO WILDLIFE BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, wildlife would be impacted by mechanical removal (mowing, cutting, pulling), herbicide application, or prescribed fire, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur in this alternative. Virtually all clearing activity is on previously-disturbed lands. Mowing activities are conducted so as to not impact nesting birds. Prescribed fire has not yet been employed, but the approved *2005 Fire Management Plan* permits this use. Impacts to wildlife would be short-term, negligible, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact wildlife at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, negligible, adverse impacts to wildlife. Alternative 1, in combination with these other actions, would result in short-term, negligible, adverse impacts to wildlife.

Conclusions: Implementation of the No Action Alternative would result in short-term, negligible, adverse impacts to wildlife.

SUMMARY OF IMPACTS TO WILDLIFE BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC. Cultivation, which includes cover crops, row crops, orchards, and permanent pastures, results in direct mortality and displacement, as well as habitat loss and habitat degradation. Deer populations would increase and their habits would be altered. Grassland bird populations would likely decrease. Pasturing would introduce potential disease issues and fences would impact wildlife migration.

Fields that include the Active Agriculture DFC would be subject to wildlife impacts from the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhart-Ole Olsen. Table 2, Summary of Desired Future Conditions by Field, identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Impacts to wildlife would be long-term, minor, and adverse.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would be subjected to fewer impacts to wildlife, since impacts related to cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to wildlife would be long-term, negligible, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact wildlife at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, negligible, adverse impacts to wildlife. Alternative 2, in combination with these other actions, would result in long-term, minor, adverse impacts to wildlife.

Conclusions: Implementation of the Preferred Alternative would result in long-term, minor, adverse impacts to wildlife as a result of initial and long-term maintenance activities.

4.7 SPECIES OF SPECIAL CONCERN

Intensity

Negligible: Special concern 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 special concern 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 two years.

Long-term: Effects lasting longer than two years.

IMPACTS TO SPECIES OF SPECIAL CONCERN BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Species of special concern may be directly and indirectly impacted by mechanical removal, prescribed fire, and herbicide application. Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

There are three general types of mechanical vegetation removal that may be employed: mowing, cutting, and pulling. Many of these activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. During field clearing activities, species that cannot escape may be killed. However, manual vegetation removal would be timed to avoid nesting periods. All species in the vicinity of removal activities will be harassed, and nesting sites, resting sites, and foraging habitat may be removed. Displaced species may experience increased predation. Indirectly, forest edge areas may be removed, resulting in loss of habitat.

Prescribed fire, should it be employed, would result in the direct loss of vegetation and, indirectly, a reduction in nesting, resting, and foraging habitat for these species.

With herbicide application, it is unlikely that most species would receive direct exposure, especially if application were timed to avoid nesting periods. Most would fly away. The conversion of a diverse vegetative species to a monoculture (with cover or row crops) would indirectly impact species by altering their habitat.

SUMMARY OF IMPACTS TO SPECIES OF SPECIAL CONCERN BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, species of special concern would be impacted by mechanical removal (mowing, cutting, pulling), herbicide application, or prescribed fire, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur in this alternative. Virtually all clearing activity is on previously-disturbed lands. Mowing activities are conducted so as to not impact nesting birds. Prescribed fire has not yet been employed, but the approved *2005 Fire Management Plan* permits this use. Impacts to species of special concern would be short-term, negligible, adverse and long-term, minor, adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact species of special concern at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, negligible, adverse impacts to species of special concern. Alternative 1, in combination with these other actions, would result in short-term, negligible, adverse impacts and long-term, minor, adverse impacts to these species.

Conclusions: Implementation of the No Action Alternative would result in short-term, negligible, adverse impacts and long-term, minor, impacts to species of special concern.

SUMMARY OF IMPACTS TO SPECIES OF SPECIAL CONCERN BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC. Cultivation, which includes cover crops, row crops, orchards, and permanent pastures, could result in direct mortality and displacement, as well as habitat loss and habitat degradation. Species of special concern populations would likely decrease.

Fields that include the Active Agriculture DFC would be subject to impacts to species of special concern from the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhert-Ole Olsen. Table 2, Summary of Desired Future Conditions by

Field, identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Impacts to species of special concern would be short-term, negligible, adverse and long-term, moderate, and adverse.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would be subjected to fewer impacts to these species, since impacts related to cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to species of special concern would be short-term, negligible, adverse and long-term, minor, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact these species at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, negligible, adverse impacts to species of special concern. Alternative 2, in combination with these other actions, would result in long-term, minor, adverse impacts to these species.

Conclusions: Implementation of the Preferred Alternative would result in short-term, negligible, adverse impacts and long-term, moderate, adverse impacts to species of special concern as a result of initial and long-term maintenance activities.

4.8 SOILS (INCLUDING PRIME)

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.

Duration

Short-term: Recovers in less than three years.

Long-term: Takes more than three years to recover.

IMPACTS TO SOILS BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Soils may be directly impacted from surface disturbances that alter soil structure (mechanical removal, cultivation), prescribed fire, and from the application of herbicides. Cultivation is not an option under the

No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

There are three general types of mechanical vegetation removal that may be employed: mowing, cutting, and pulling. Many of these activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. During field clearing activities, soil profiles would be disturbed due to compaction and ruts from heavy equipment and from pulling tree stumps. Historic contours would be altered during any grading activities, particularly when filling holes left by removed tree stumps. Soils could be contaminated from chemical spills from heavy equipment, chainsaws, and other motorized equipment. Once vegetation is removed, soils would be more susceptible to wind and water erosion. Oxygen in soils would be depleted under any wood piles.

Prescribed fire, should it be employed, would result in the loss of vegetation, making soils more susceptible to wind and water erosion. Burning vegetation would increase nutrient availability. If wood piles are burned, soils under them could become sterile.

Herbicide application has the potential to persist in soils, which would lead to herbicide buildup in soils. Coarse to medium-textured soils, like many of the soils in Port Oneida, are less likely to retain herbicides than medium and fine-textured soils with higher organic matter content.

SUMMARY OF IMPACTS TO SOILS BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, soils would be impacted by mechanical removal (mowing, cutting, pulling) or herbicide application, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur. Prescribed fire has not yet been employed, so not impacts to soils from this activity have occurred. However, the approved *2005 Prescribed Fire Management Plan* permits this use. Virtually all clearing activity is on previously-disturbed lands. Impacts to soils would be long-term, minor, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact soils at the project site include development of the Sleeping Bear Heritage Trail; improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, minor, and adverse impacts to soils. Alternative 1, in combination with these other actions, would result in long-term, minor, and adverse impacts to soils.

Conclusions: Implementation of the No Action Alternative would result in long-term, minor, adverse impacts as a result of initial and long-term maintenance activities.

SUMMARY OF IMPACTS TO SOILS BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC. Cultivation, which includes cover crops, row crops, orchards, and permanent pastures, can disturb upper soil profiles, create wind and water erosion (until vegetative growth occurs), cause nutrient depletion, and can result in contamination from herbicides, fertilizers, and animal waste.

Fields that include the Active Agriculture DFC would be subject to soils impacts from the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhart-Ole Olsen. Table 2, Summary of Desired Future Conditions by Field, identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Impacts to soils

would be long-term, minor, and adverse.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would be subjected to fewer impacts to soils, since soils impacts related to cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to soils would be long-term, negligible to minor, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact soils at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, minor, adverse impacts to soils. Alternative 2, in combination with these other actions, would result in long-term, minor, adverse impacts to soils.

Conclusions: Implementation of the Preferred Alternative would result in long-term, minor, adverse impacts to soils as a result of initial and long-term maintenance activities.

4.9 VISITOR USE AND EXPERIENCE

Intensity

Negligible: Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.

Minor: Changes in visitor use and/or experience would be detectable. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

Moderate: Changes in visitor use and/or experience would be readily apparent. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.

Major: Changes in visitor use and/or experience would be readily apparent and have important consequences. The visitor would be aware of the effect associated with the alternative and would likely express a strong opinion about the changes.

Duration

Short-term: Occurs only during proposed implementation activities.

Long-term: Occurs after proposed implementation activities.

IMPACTS TO VISITOR USE AND EXPERIENCE BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Visitor use and experience would be directly and indirectly impacted under both alternatives, relative to manual vegetation removal, prescribed fire, and herbicide application. Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred

Alternative.

Mechanical vegetation removal (mowing, cutting, and pulling) activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. These activities produce noise from heavy equipment and chainsaws, exhaust from internal combustion engines, and sometimes drastic and rapid changes in the landscape. Public perception may be negative, especially related to cutting mature trees. In the long-term, the landscape will be changed, and will remain so through routine maintenance activities.

Prescribed fire, if implemented, results in reduced visibility, sometimes negative perception, and the public's lack of access during burning activities. In the short-term, fields are transformed into blacken areas, until new vegetative growth appears, making them unattractive to visitor use (e.g., hiking) and viewing landscapes.

Herbicide application restricts visitor use of treated areas during application and for a period of time after. There are public health and safety issues, possible wind drift (resulting in more plant mortality) and negative public perception of chemically-burned vegetation.

SUMMARY OF IMPACTS TO VISITOR USE AND EXPERIENCE BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, visitor use and experience would be impacted by mechanical removal (mowing, cutting, pulling), herbicide application, or prescribed fire, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur in this alternative. Virtually all clearing activity is on previously-disturbed lands. Prescribed fire has not yet been employed, but the approved *2005 Fire Management Plan* permits this use. Impacts to visitor use and experience would be short-term, minor, adverse, and in the long term, minor and beneficial.

Cumulative Impacts: Other plans and actions occurring in the park that would impact visitor use and experience at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, minor, beneficial impacts to visitor use and experience. Alternative 1, in combination with these other actions, would result in short-term, minor, adverse and long-term, minor, beneficial impacts to visitor use and experience.

Conclusions: Implementation of the No Action Alternative would result in short-term, minor, adverse impacts and long-term, minor, beneficial impacts to visitor use and experience.

SUMMARY OF IMPACTS TO VISITOR USE AND EXPERIENCE BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC and includes cover crops, row crops, orchards, and permanent pastures. Conversion to these landscape features may preclude active visitor use of these areas and may be viewed negatively by some, particularly those who enjoyed hiking through the open meadows. Alternatively, these landscape features would provide educational and interpretive opportunities not currently offered. With pasturing, there is also the potential of escape for domesticated animals and possible vehicle-animal collisions on adjacent roadways.

Fields that include the Active Agriculture DFC would be subject to the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhert-Ole Olsen. Table 2, Summary of Desired Future Conditions by Field, identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Many long-term positive benefits would result from this action including visitor understanding, visitor appreciation, sightseeing tours, educational programming, hiking, and enjoyment of the cultural setting. Impacts to visitor use and experience would be short-term, minor, adverse and long-term, moderate, beneficial.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would be subjected to fewer impacts to visitor use and experience since cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to visitor use and experience would be short-term, minor, adverse and long-term, minor, beneficial.

Cumulative Impacts: Other plans and actions occurring in the park that would impact visitor use and experience at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in long-term, minor, beneficial impacts to visitor use and experience. Alternative 2, in combination with these other actions, would result in short and long-term, minor, adverse and beneficial impacts to visitor use and experience.

Conclusions: Implementation of the Preferred Alternative would result in short-term, minor, adverse and long-term, moderate, beneficial impacts to visitor use and experience.

4.10 PARK FACILITIES AND OPERATIONS

Intensity

Negligible: Park operations would not be affected or the effect would be at or below the lower levels of detection, and would not have an appreciable effect on park operations.

Minor: The effect would be detectable, but would be of a magnitude that would not have an appreciable effect on park operations. If mitigation was needed to offset adverse effects, it would be relatively simple and would likely be successful.

Moderate: The effects would be readily apparent, and would result in a substantial change in park operations in a manner noticeable to staff and the public. Mitigation measures would probably offset adverse effects and would likely be successful.

Major: The effects would be readily apparent, would result in a substantial change in park operations in a manner noticeable to staff and the public and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed.

Duration

Short-term: Effects occur only during proposed implementation activities.

Long-term: Effects persist beyond the period of implementation activities.

IMPACTS TO PARK FACILITIES AND OPERATIONS BY TREATMENT OPTIONS UNDER BOTH ALTERNATIVES:

Park facilities and operations may be directly and indirectly impacted by landscape management activities (manual vegetation removal prescribed fire, and herbicide application) under both alternatives. Cultivation is not an option under the No Action Alternative and impacts associated with this activity are addressed in the Preferred Alternative.

Mechanical vegetation removal (mowing, cutting, and pulling) activities are more intense at the onset of field clearing, and then less so as the operations evolve into routine field maintenance. These activities require staff time, volunteer time, equipment and supplies, equipment storage and transport. There are safety issues that must be addressed (through plans, training, and equipment) and the activities can be expensive to implement. Also, some activities may conflict with other operations (e.g., stump pulling and mowing). This activity creates large quantities of biomass (brush piles, logs, stumps, and grass) that must be removed. A variety of methods (including chipping, burning, public donation as firewood, or contracted removal) have been considered.

Prescribed fire, if implemented, requires staff for planning and implementation, equipment and materials, equipment transport and storage. There are many issues that must be addressed, such as safety, escape issues, timing, and training, and the activity is weather dependent.

Herbicide application requires staff time, planning, and training. Equipment and supplies must be secured, stored, and transported. Employees must be state-certified applicators and all herbicides must meet state and federal pesticide standards. Herbicides are expensive and multiple applications may be required for success.

SUMMARY OF IMPACTS TO PARK FACILITIES AND OPERATIONS BY ALTERNATIVE 1 (NO ACTION)

Under the No Action alternative, park facilities and operations would be impacted by mechanical removal (mowing, cutting, pulling), herbicide application, or prescribed fire, since the current efforts are to maintain open fields, restore fields to historic fence lines, and remove non-native and native invasive plant species. No cultivation would occur in this alternative. Virtually all clearing activity is on previously-disturbed lands. Prescribed fire has not yet been employed, but the approved *2005 Fire Management Plan* permits this use. Impacts to park facilities and operations would be long-term, minor, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact park facilities and operations at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, minor, adverse impacts to park facilities and operations. Alternative 1, in combination with these other actions, would result in long-term, minor, adverse impacts to park facilities and operations.

Conclusions: Implementation of the No Action Alternative would result in long-term, minor, adverse impacts to park facilities and operations.

SUMMARY OF IMPACTS TO PARK FACILITIES AND OPERATIONS BY ALTERNATIVE 2 (THE PREFERRED)

Under Alternative 2, a variety of treatment options may be applied, resulting in one of the three Desired Future Conditions: Old Field Succession, Open Meadow, or Active Agriculture. Cultivation is a treatment option appropriate in the Active Agriculture DFC. It includes cover crops, row crops, orchards, and permanent pastures, and could require additional staff time to implement. Volunteers and lessees may assist in this endeavor, but would need to be supervised.

Fields that include the Active Agriculture DFC would be subject to the full range of treatment options: Thoreson, Werner-Basch, Dechow, Charles Olsen, Port Oneida Dock Site, Burfiend-Barratt, and Eckhert-Ole Olsen. Table 2, Summary of Desired Future Conditions by Field, identifies the amount of acreage in the Active Agriculture DFC by field and for all of Port Oneida. Impacts to park facilities and operations would be long-term, minor, and adverse.

Fields with Open Meadow and Old Field Succession, or Old Field Succession only, would be subjected to fewer impacts to park facilities and operations since cultivation would not occur. Included in this category are Thoreson Road Plateau, Brunson, Miller, Kelderhouse, Martin Basch, Lawr-Peter Burfiend, Schmidt-Hayms, and Laura Basch. Table 2 illustrates the amount of acreage in these two DFCs. Impacts to park facilities and operations would be long-term, minor, and adverse.

Cumulative Impacts: Other plans and actions occurring in the park that would impact park facilities and operations at the project site include development of the Sleeping Bear Heritage Trail; potential improvements or realignments of the Bay View Trail; and small parking areas, roadside pull-offs, and an improved soft-surface trail system proposed in the 2008 Port Oneida Environmental Assessment. These projects would result in short-term, minor, adverse impacts to park facilities and operations. Alternative 1, in combination with these other actions, would result in long-term, minor, adverse impacts to park facilities and operations.

Conclusions: Implementation of the Preferred Alternative would result in long-term, minor, adverse impacts to park facilities and operations.

Chapter 5. Consultation and Coordination

5.1 EARLY COORDINATION

On November 4, 2010, a public scoping letter was mailed to 81 federal, state, and local agencies, elected officials, groups, and interested individuals asking for ideas on the future of Port Oneida, especially on visions for how the landscape will appear many years from now. We also asked for ideas on what impacts and issues should be considered in this planning effort. Included on this list were elected officials at the local, state, and federal levels, a variety of state offices (including the State Historic Preservation Office and the Department of Natural Resources and Environment), the U.S Fish and Wildlife Service, and Indian Tribes. Simultaneously, the letter was placed on the park's website (nps.gov/slbe) with a link to the NPS Planning, Environment, and Public Comment (PEPC) website, which allowed the public to comment electronically. On November 8, 2010, a press release was distributed electronically to the 42 media outlets in the National Lakeshore's media database. The official public comment period ended on December 17, 2010.

As a result, we received 113 comments from the PEPC website, eight emails, and six handwritten or typed letters, for a total of 127 comments. These comments helped set the stage for the major topics that the Plan/EA addressed. Copies of the public scoping letter, press release, and public comment summary are found in Appendices B-3, B-4, and B-5.

5.2 PUBLIC PARTICIPATION

A public open house for this project is planned for late summer 2011. The purpose of this open house is to provide the general public with information regarding the study purpose and need, alternatives considered, and the Preferred Alternative. Input from this meeting will be used to obtain comments and further refine study information assembled to date.

5.3 LIST OF PREPARERS

The following persons assisted with the preparation of this document:

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Chris Johnson	District Ranger	Sleeping Bear Dunes NL	Planning and Review
Cassidy Edwards	Park Intern	Sleeping Bear Dunes NL	Planning, field verification, GIS

6. Selected References

Braun, Lucy E.

1950 Deciduous Forests of Eastern North America. Philadelphia, PA.

Brewer, Richard; McPeck, Gail A.; Adams, Ryan J.

1992 The Atlas of Breeding Birds of Michigan

Corace, Greg and Thomas Wyse

2002 An Assessment of Historic Openlands (fields) at Sleeping Bear Dunes National Lakeshore

Council on Environmental Quality

1981 Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations. 40 CFR 1500-1508. Federal Register Vol. 46, No. 55, 18026-18038

Handy, A. and J. Stark

1984 Water Resources of Sleeping Bear Dunes National Lakeshore, Michigan. U.S. Geological Survey, Water Resources Investigations Report 83-4253, Lansing, MI.

Hazlett, Brian T.

1991 Flora of Sleeping Bear, The Michigan Botanist, Volume 30, No. 4

McEnaney, M.J.; Tishler, W.H.; Alanen, A.R.

1995 Farming at the Water's Edge: Assessment of Agricultural and Cultural Landscape Resources in the Proposed Port Oneida Rural Historic District at Sleeping Bear Dunes National Lakeshore, Michigan

National Park Service

1981 Sleeping Bear Dunes National Lakeshore Wilderness Recommendation

1990 Sleeping Bear Dunes National Lakeshore Open Field Management Plan

1995 Secretary of the Interior's Standards for the Treatment of Historic Properties

1997 National Register of Historic Places Nomination Form – Port Oneida Rural Historic District

1998 Director's Order 28: Cultural Resources Management Handbook

2001 Director's Order 12: Handbook for Environmental Impact Analysis

- 2002 Sleeping Bear Dunes National Lakeshore Water Resources Management Plan
- 2004 Cultural Landscape Inventory – Port Oneida Rural Historic District, Sleeping Bear Dunes National Lakeshore
- 2005 Sleeping Bear Dunes National Lakeshore Fire Management Plan
- 2006 Management Policies
- 2008 Sleeping Bear Dunes National Lakeshore Port Oneida Plan/Environmental Assessment
- 2009a Sleeping Bear Dunes National Lakeshore General Management Plan / Wilderness Study / Environmental Impact Study
- 2009b Sleeping Bear Dunes National Lakeshore Lake Michigan Overlooks Environmental Assessment
- 2009c Sleeping Bear Dunes National Lakeshore Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment

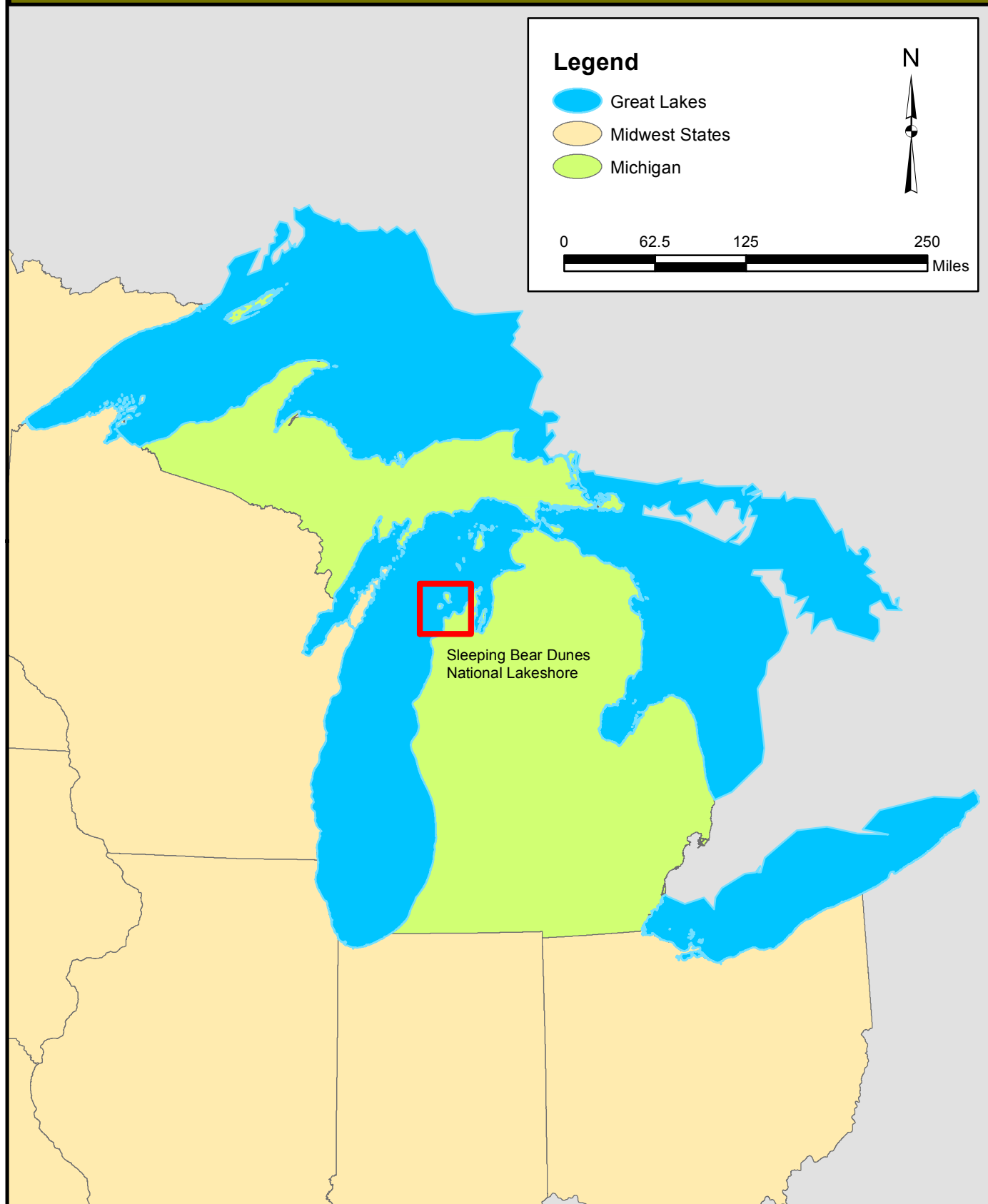
U.S. Geological Society

- 2000 Groundwater Atlas of the United States, Iowa, Michigan, Minnesota, Wisconsin HA 730-J.

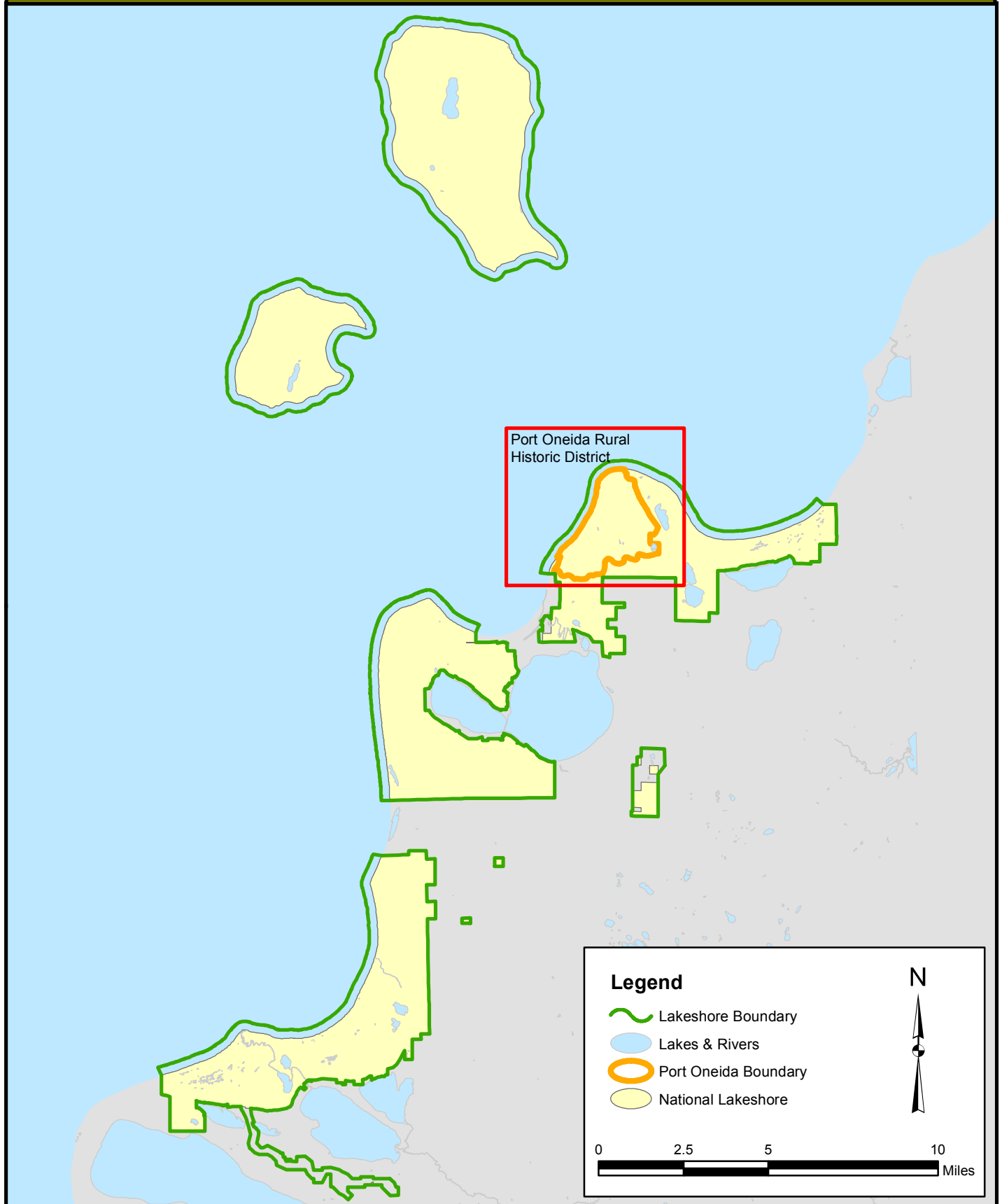
Appendix A. Maps

- A-1.** National Lakeshore Location
- A-2.** Port Oneida Rural Historic District Location
- A-3.** 1981 Proposed Wilderness
- A-4.** Open Field Management Plan Fields in Port Oneida
- A-5.** Overview Map and the 15 Fields in this Plan
- A-6.** Open Fields in Port Oneida in 1938
- A-7.** Open Fields in Port Oneida in 2007
- A-8.** Composite of Fields Addressed in this Plan
- A-9.** Surface Waters and Wetlands in Port Oneida
- A-10.** Vegetation in Port Oneida
- A-11.** Soils in Port Oneida (with soils key)

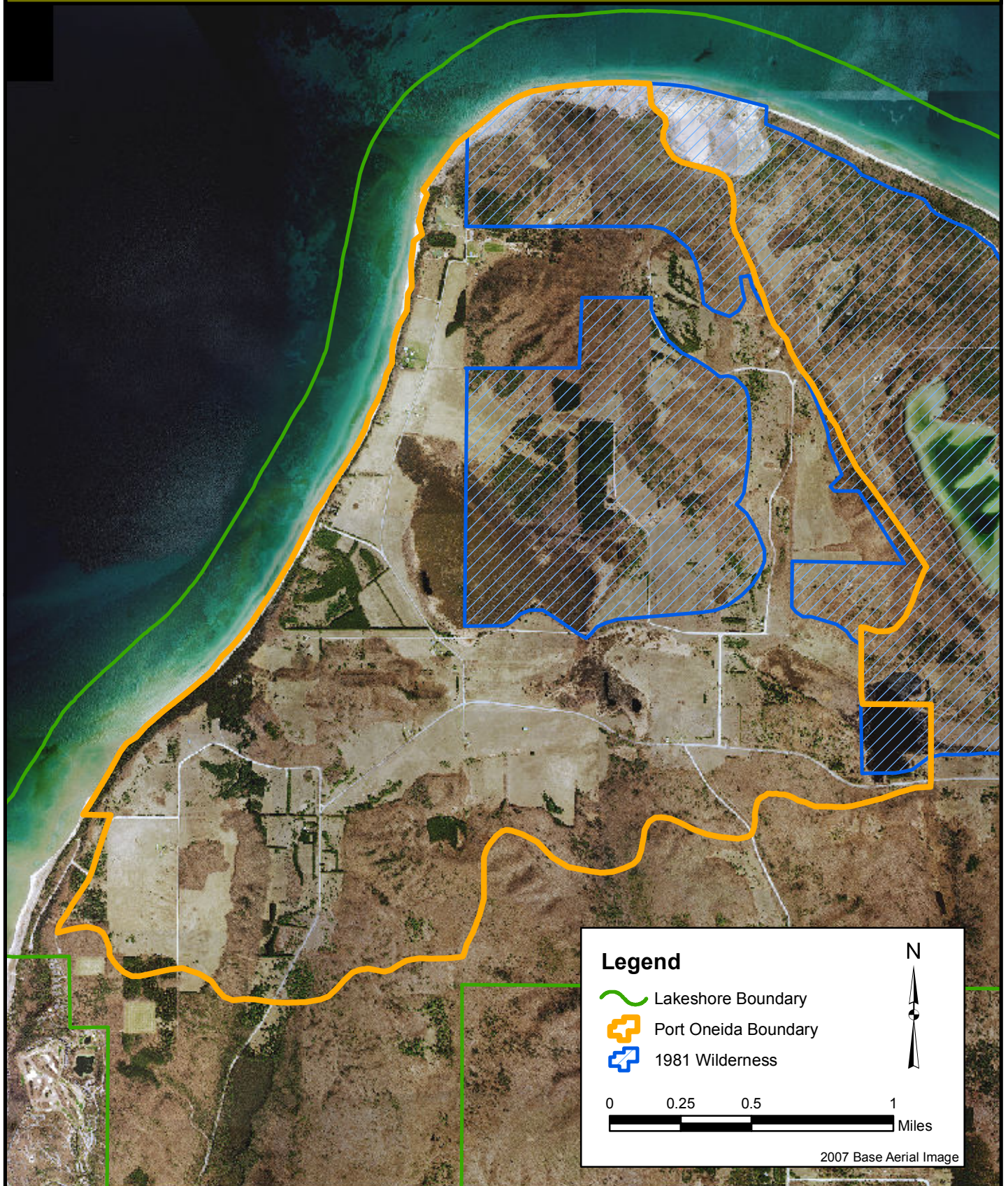
Map A-1: Port Oneida Landscape Management Plan/Environmental Assessment Location of the Sleeping Bear Dunes National Lakeshore



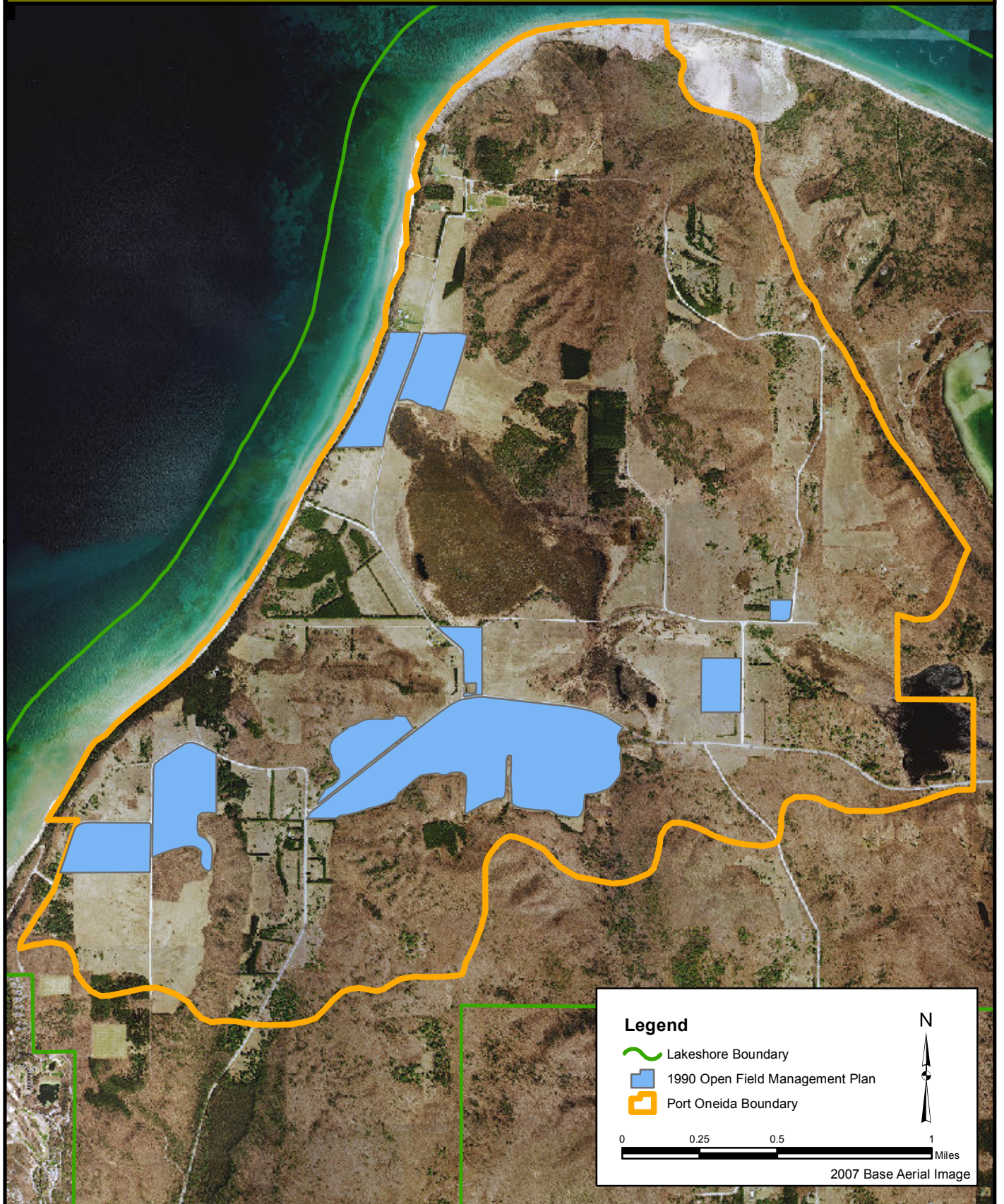
Map A-2: Port Oneida Landscape Management Plan/Environmental Assessment Port Oneida Rural Historic District Location



Map A-3: Port Oneida Landscape Management Plan/Environmental Assessment 1981 Proposed Wilderness

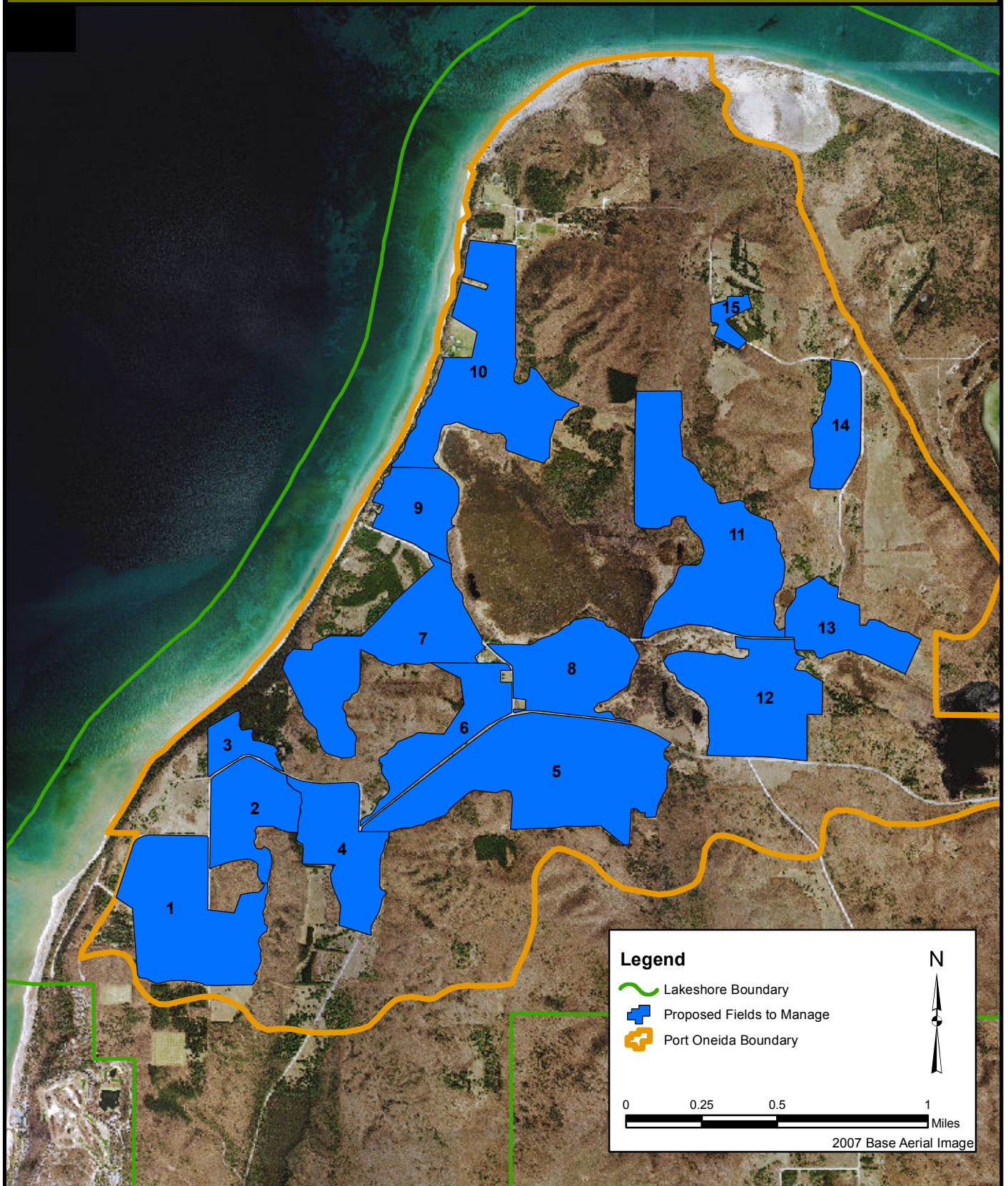


Map A-4: Port Oneida Landscape Management Plan/Environmental Assessment Fields Identified in the 1990 Open Field Management Plan

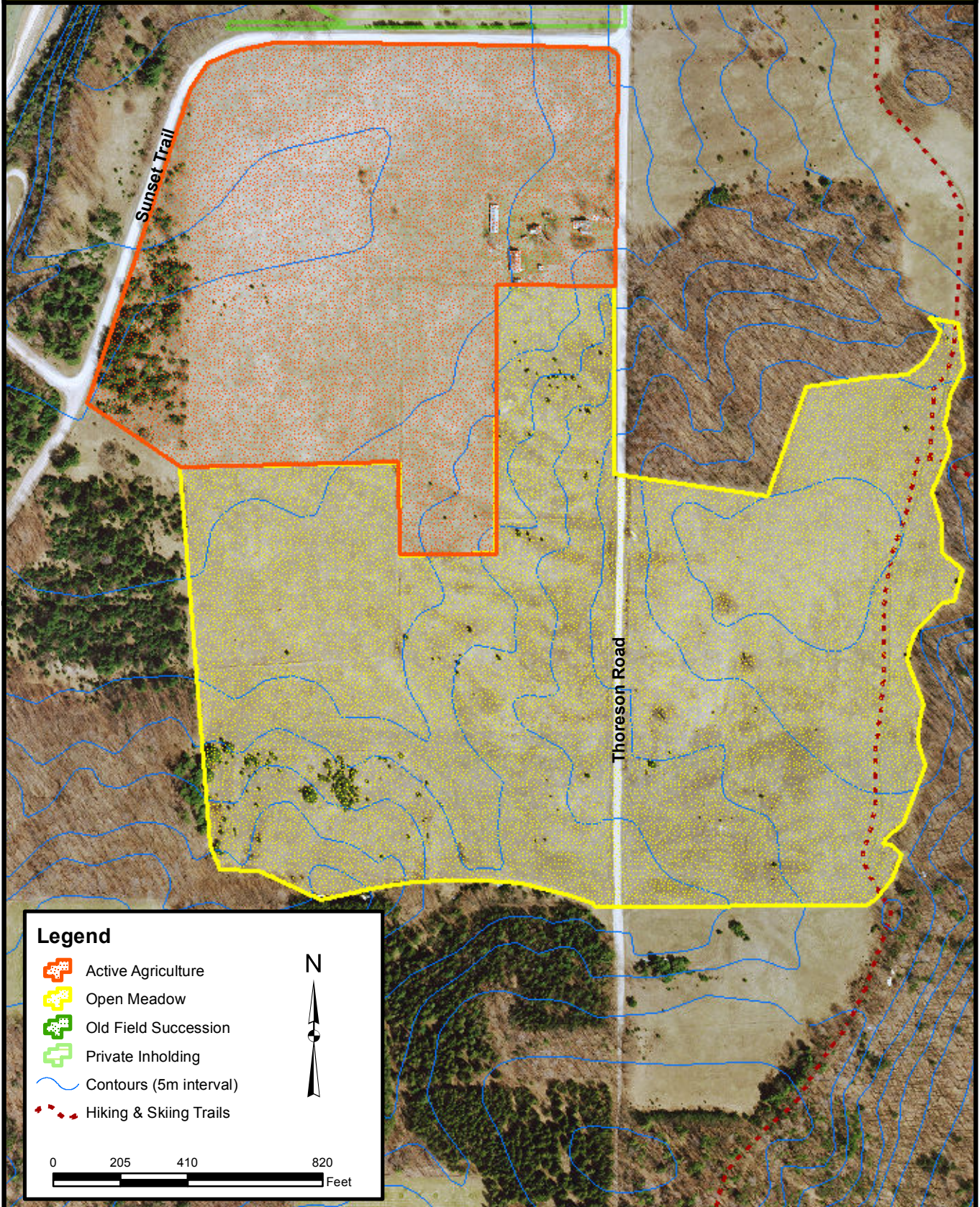


Maps A-5. Includes an overview map of the 15 fields and 15 individual field maps.

Map A-5: Port Oneida Landscape Management Plan/Environmental Assessment Overview of the 15 Fields in this Plan



Port Oneida Landscape Management Plan/Environmental Assessment Field #1 - Thoreson



Port Oneida Landscape Management Plan/Environmental Assessment

Field #2 - Thoreson Road Plateau

