

KETTLES TRAIL

**PLAN AND ENVIRONMENTAL ASSESSMENT
SLEEPING BEAR DUNES NATIONAL LAKESHORE**



**National Park Service
U.S. Department of the Interior
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1. Introduction

The National Park Service (NPS) at Sleeping Bear Dunes National Lakeshore (National Lakeshore) proposes to develop a trail system (“Kettles Trail”) on federal lands in the Bow Lakes area of the National Lakeshore. The Bow Lakes area is a detached section of the National Lakeshore, created when a 1982 amendment to the National Lakeshore’s enabling legislation authorized a boundary revision adding it to the park (Public Law 97-361). Currently, only the southern half of the Bow Lakes area is NPS property and the trail system would be confined to these federal lands lying south of Lanham Road. There are currently no developments in the project area other than old two-track logging roads (two-tracks).

This environmental assessment (EA) analyzes the impacts of the identified 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).

1.1 DESCRIPTION OF THE NATIONAL LAKESHORE

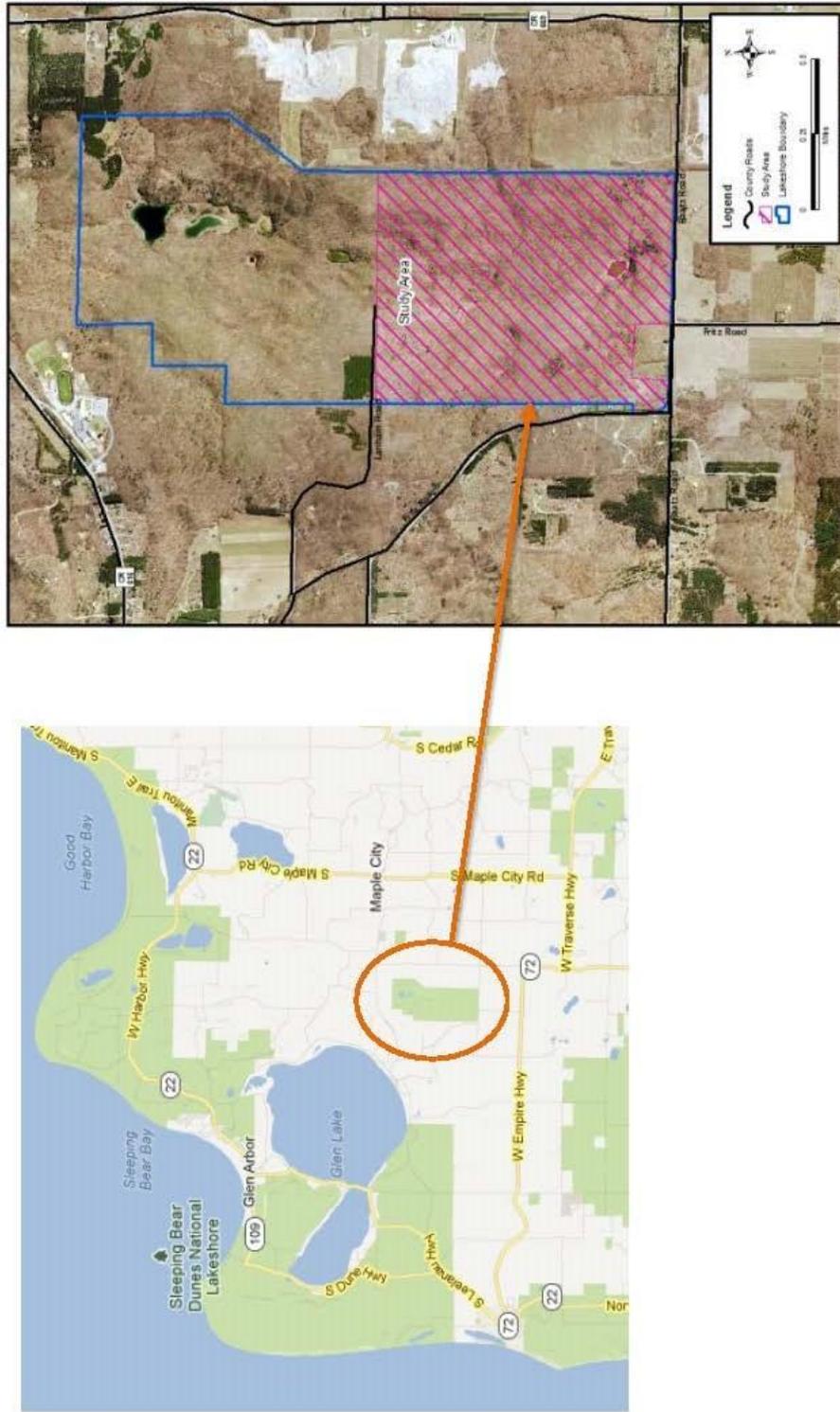
Sleeping Bear Dunes National Lakeshore (National Lakeshore) is located in Michigan’s northwestern Lower Peninsula, in Leelanau and Benzie Counties (Map 1. Regional Location). Situated 25 miles west of Traverse City, the National Lakeshore encompasses 35 miles of Lake Michigan’s eastern coastline, as well as another 35 miles on North and South Manitou Islands. It can be accessed by highways U.S.-31, M-72, and M-22.

The National Lakeshore was established by Public Law 91-479 on October 21, 1970, which states that “Congress finds that certain outstanding natural features, including forests, beaches, dune formations, and ancient glacial phenomena, exist along the mainland shore of Lake Michigan and on certain nearby islands in Benzie and Leelanau Counties, Michigan.” In addition to the natural features, the National Lakeshore is home to many cultural features, including an 1871 lighthouse, three former Life-Saving Service/Coast Guard Stations, and Port Oneida, a rural farm district.

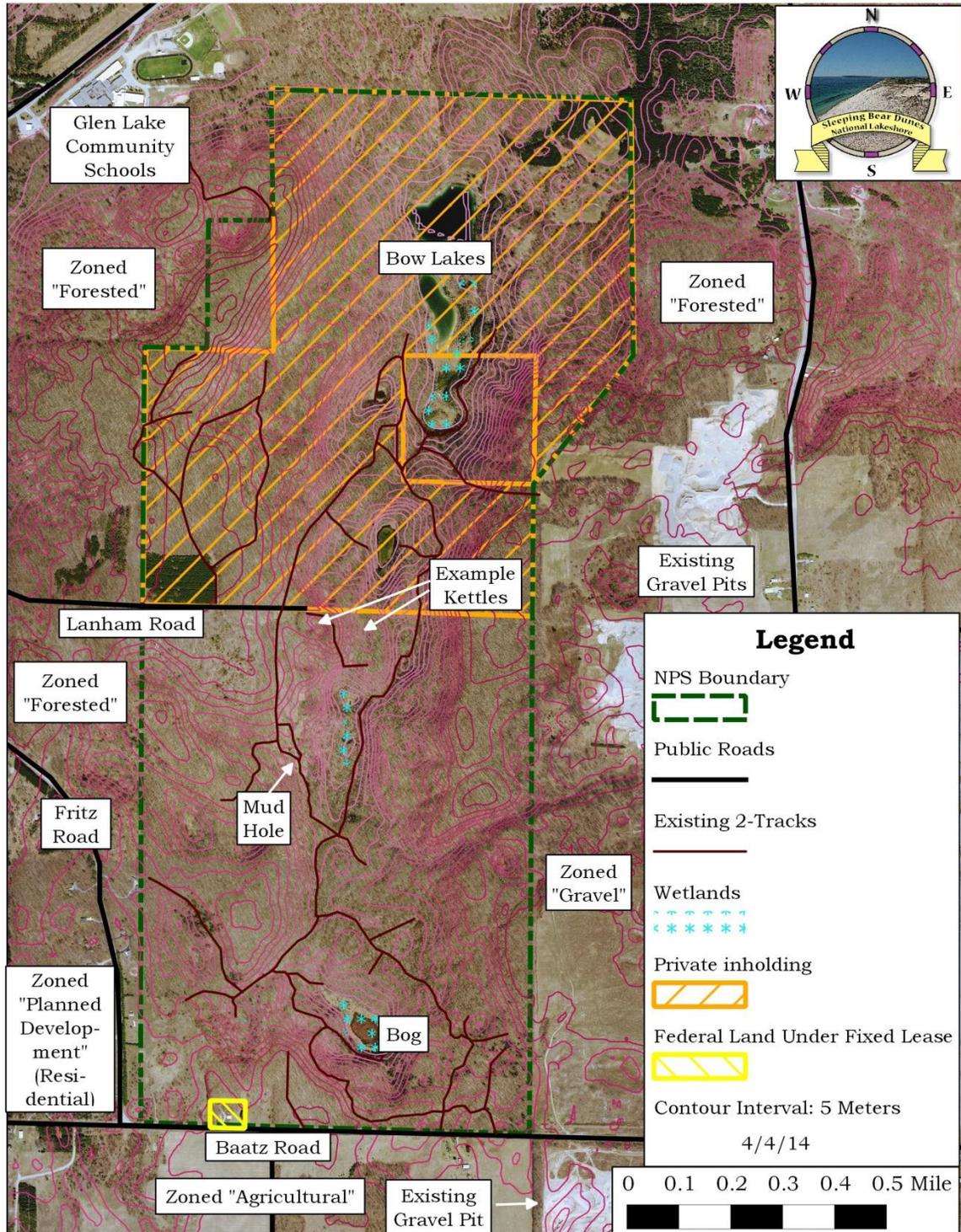
1.2 DESCRIPTION OF THE PROJECT AREA

The project area is located within the “Bow Lakes area” in Leelanau County, Michigan, entirely within Kasson Township, sections 17 and 18 (Map 2. Project Location). The entire Bow Lakes area (alternately called “Bow Lakes” in the 1982 legislation, “Bow Lakes and Bog Area” in the 2009 GMP, and “Bow Lakes Unit” by others) includes approximately 975 acres within the National Lakeshore boundary as authorized by Congress in 1982 (PL 97-361). Of these 975 acres, 540 acres are publicly-owned federal lands (Map 3. Existing Conditions). All lands in the Bow Lakes area south of Lanham Road, a county “seasonal” road that roughly divides the Bow Lakes area in half, are public. It is this southern half of the Bow Lakes area (480 acres) that constitutes the project area. The Bow Lakes area lands north of Lanham Road are mostly private, except for a 60-acre federal parcel. The actual Bow Lakes are contained entirely within private lands within this northern section. Private lands in the northern end of the Bow Lakes area

Map 2. Project Location



Map 3: Existing Conditions



may be acquired by the NPS by willing seller or donation and the NPS has the “right of first refusal” to acquire offered land, based on the 1982 legislation.

The project area is bounded by Baatz Road on the south, Fritz Road (on the southwest corner), and private lands around most of its perimeter. Glen Lake Community School lands are located northwest of the project area (Map 3. Existing Conditions). Other adjacent land uses are residential, agricultural and gravel extraction. Kasson Township has some of the best gravel resources in the area and, as a result, there are very large gravel pits near the project area, to the east and southeast. Kasson Township has developed a zoning ordinance to protect parkland and other resources from gravel mining activities. The NPS has periodically evaluated the impacts of gravel mining on National Lakeshore resources in this area since the 1980s (NPS 1989).

The Bow Lakes area, along with Miller Hill, was added to the National Lakeshore in the 1982 legislation specifically for its geologic and ecological features. The Bow Lakes area was long recognized as containing a variety of unique plants and geological phenomena. These resources were briefly described in a number of short resource studies that were conducted from the 1960s to the early 1980s prior to passage of the 1982 legislation.

Although no formal visitor surveys have been conducted for the project area, the little visitor use already occurring involves hiking, nature observation, snowshoeing, cross-country skiing, and hunting. The project area contains excellent examples of glaciation, including closed depressions called kettles. Some of the best examples of kettles are located at the north end of the project area and a large kettle with a bog (known as the “Bog”) is found at the southern end. The topography of the area would be considered “rugged” with many slopes steeper than 40% and elevation changes of almost 200 feet.

Vegetation in the project area is typical of northern hardwood forest, with American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), red pine (*Pinus resinosa*), white pine (*Pinus strobus*) and eastern hemlock (*Tsuga canadensis*) in well drained areas and white cedar (*Thuja occidentalis*) in the wetter areas. Understory plants include maidenhair fern (*Adiantum* sp.), trillium (*Trillium* sp.), dwarf or bunchberry dogwood (*Cornus canadensis*), Canada mayflower (*Maianthemum canadense*), sweet cicely (*Osmorhiza claytonia*), columbine (*Aquilegia canadensis*), and wild leeks (*Allium burdickii*). Bog species include sphagnum peat moss (*Sphagnum* sp.), black spruce (*Picea mariana*), water sedge (*Carex aquatilis*), cottongrass (*Eriophorum* sp.), speckled alder (*Alnus incana*), pitcher plant (*Sarracenia purpurea*), Labrador tea (*Ledum groenlandicum*), bog laurel (*Kalmia polifolia*), leatherleaf (*Chamaedaphne calyculata*), cranberry (*Vaccinium macrocarpon*), and sundew (*Drosera* sp.).

Developments are limited to a network of two-tracks in varying stages of recovery to natural conditions. Although no historic resources are known to exist in the project area, local place names suggest past use of some sites within the project area as homes or farms. Also the southwest corner of the project area includes an open grassy area or remnant field (Map 3. Existing Conditions).

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 EA for the Kettles Trail represents a continued commitment to preserve significant park resources and is compatible with management zoning in the General Management Plan (GMP). Most of the project area is zoned “Experience Nature,” meaning that it is managed primarily to provide a low number of visitors the opportunity to enjoy primitive recreation on foot. The southwest corner of the project area as well as the Lanham Road terminus are zoned “Recreation” to allow for a parking area, should it be developed.

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. Federal lands within the project area are subject to the provisions of this plan.

The *2011 Great Lakes Invasive Plant Management Plan/Environmental Assessment* is a long-term management plan intended 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 (NPS 2011b). The project area is believed to be relatively free of invasive plants, but detailed surveys have not been conducted. Measures described in this document will be applied to minimize the introduction or spread of invasive species due to this project.

1.4 IMPAIRMENT

NPS *Management Policies 2006* (NPS 2006a) 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.

1.5 PURPOSE AND NEED FOR THE PROPOSED PROJECT

The purpose of this proposed project is to facilitate safe use of the project area for nature observation and backcountry hiking, cross-country skiing, and snowshoeing. There is a need to address undirected visitor use in the area that could lead to undesirable outcomes such as resource damage and conflicts with adjacent landowners. There is also a need to provide visitors access so they may understand, appreciate, and enjoy the unique resources that made this area significant enough to add to the National Lakeshore in the 1982 amendment to the park's enabling legislation.

1.6 GOALS AND OBJECTIVES OF THE KETTLES TRAIL ENVIRONMENTAL ASSESSMENT

The goal of this proposed project is to implement the direction provided in the 2009 GMP, which stated "A small parking area and a loop hiking trail will be provided to facilitate visitor use (including nature observation and backcountry hiking) on NPS-owned lands."

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

- 1) Provide visitor facilities that meet the public need and are within the capacity of the NPS to maintain.
- 2) Provide for visitor facilities that are sensitive of, and protect, the natural features of the project area and the entire Bow Lakes area, some of which are not found elsewhere in the National Lakeshore.
- 3) Provide for visitor facilities that respect adjacent private property.
- 4) Provide for interpretation of natural features in the project area.
- 5) Provide for research and educational opportunities.

1.7 SCOPING AND ISSUES

The planning team identified the following issues during scoping:

- Consideration of impacts to adjacent private property owners

- Parking options
- End of Lanham Road ROW is not clearly understood
- Restroom facilities
- Concern about introducing invasive species
- Concern about visitor impacts to the bog
- Universal accessibility
- Restoring small, secondary two-tracks to natural conditions
- Adjacent gravel mining
- Design options for any planned overlooks and the trails
- Archeology
- Sensitive species (plant and animal)
- Impacts on geology and soils
- Additional demands on park operations

On April 15, 2013, a letter was mailed to 80 federal, state, and local agencies, tribes, elected officials, groups, and interested individuals asking for ideas on what issues and concerns 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 April 16, 2013, a press release was distributed electronically to the 58 media outlets in the National Lakeshore's media database. The official comment period ended on May 20, 2013.

As a result, 11 comments were received from the PEPC website, six emails, and four handwritten or typed letters, for a total of 23 comments. The topics addressed by these comments have been organized into seven subject areas that broadly describe the nature of the contents:

Private Property and Trespass:

Many of the commenters were concerned about trespass on private lands near the Bow Lakes and how the project proposal would impact the pristine nature of these areas. Some suggested that the NPS maps are not clear, and should indicate that most of the land north of Lanham Road, including the Bow Lakes, is private. There appeared to be a misconception on ownership, particularly since the unit is called the "Bow Lakes area." One commenter suggested changing the National Lakeshore boundary to omit all private lands. Signage, barriers (fences, posts), and better publications were all suggested as possible ways to reduce trespass. Others suggested limiting the size of the trail system, suggesting that trespass issues will increase when parking and trails are developed.

Parking, Access, and Support Facilities:

Three different sites were suggesting for parking: the end of Lanham Road, the Fritz/Baatz Roads intersection, and about one-half mile east of this intersection on an existing two-track. One commenter mentioned that parking along Baatz Road was not appropriate because it is like a roller coaster. Another commenter mentioned that the parking area should be located away from private homes, and a few

commenters mentioned that the parking area should be small and rustic (gravel surface). One commenter suggested that the parking area should be close to a county road and another said that restrooms were not needed. Designated hours of operation and a gate and booth were suggested by one commenter.

Visitor Use:

A variety of visitor uses were identified and some were concerned about overuse and diminished quality of the area. Camping, dogs, bicycles, and grooming machines (for cross-country skiing) were suggested as prohibited activities by some. Others suggested allowing mountain bikes and horses.

Resource Protection:

A variety of subjects were mentioned that related to resource protection, including impacts to wildlife from pets, keeping the trails as natural as possible (no hardened surface, no tree cutting to widen the trail, mitigating erosion problems), and impacts to bogs and other wetlands from foot traffic. One commenter mentioned that formal trails help to reduce social trails and another suggested that this is a special area that should not be improved.

Planning and Public Involvement:

One commenter asked why they were just hearing about this now, as they thought scoping had been occurring since prior to 2009. Another stated that the NPS plans to develop the area before seeking input. And another suggested that the NPS should wait until the entire area is acquired and then prepare a comprehensive plan.

Hazards:

A few hazards were mentioned by commenters, including quicksand (wetlands), gravel slopes (from adjacent pits), fire hazards from litter and smoking, excessive speed on roadways, and hunting (and the need for caution signs).

Other Comments:

The Michigan DNR and EPA-Region V had no concerns with the proposal, although EPA suggested a number of Best Management Practices to consider. Commenters were almost split as to “for” and “against” the proposal. One commenter mentioned that the primary purpose of the area was for peaceful enjoyment of nature, not mechanized/enhanced recreation. Another commenter stated that there are already numerous logging trails to enjoy and there are many other trails in the National Lakeshore to hike, so “please let this one be.”

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 alternatives, and consequently, has been retained for detailed analysis.

Water Resources (Wetlands and Bogs):

These resources are present in the project area and could be impacted by trail construction/maintenance activities and subsequent visitor use.

Vegetation:

A variety of types of vegetation are present in the project area. Trail building activities could impact the existing vegetation in the short term and long term, particularly where new trails would be constructed off existing two-track roads. Construction and increased visitation may introduce invasive plant species. Construction best management practices (BMPs) would mitigate these potential impacts but not those of visitor use.

Wildlife:

A variety of wildlife species inhabit the project area. These species could be impacted in the short term and long term by actions proposed in this plan.

Listed Species:

There are some federally-listed species and State Species of Special Concern that could potentially be impacted by this plan, both in the short term and long term. The Endangered Species Act (1973) requires an examination of impacts on all federally-listed threatened or endangered species (NPS 2006b). 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. The bald eagle and several migratory birds are listed as State Species of Special Concern. Migratory birds are protected under several acts.

Geology and Soils:

Soils could be impacted by actions in this plan, both in the short term and long term, especially where new trails would be constructed off existing two-track roads. This topic would also include slope gradient and soil suitability for construction.

Visitor Use and Experience:

The project would change the opportunity for solitude in an unstructured setting to a formal trail system and parking. The document will assess the impacts to current and potential project area visitors.

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. Relationships with and impacts to partnership organizations will be addressed in this discussion.

1.8.2 Impact Topics Dismissed from Detailed Analysis:

The following impact topics would not be affected by the proposed alternatives, resulting in their dismissal from detailed analysis.

Adjacent Private Property Owners:

Of the 975 acres in the Bow Lakes area, 540 acres are publicly-owned federal lands (Map 3. Existing Conditions). All lands in the Bow Lakes area south of Lanham Road, a county "seasonal" road that roughly divides the Bow Lakes area in half, are public (less a life lease as described below). It is this southern half of the Bow Lakes area (480 acres) that constitutes the project area. The Bow Lakes area lands north of Lanham Road are mostly private, except for a total of 60 acres in two federal parcels. The actual Bow Lakes are contained entirely within private lands within this northern section. Private lands in the northern end of the Bow Lakes area may be acquired by the NPS by willing seller or donation and the NPS has the "right of first refusal" to acquire offered land, based on the 1982 legislation. The northern end of the project boundary has been marked by private landowners with "No Trespassing" signs.

The project area is bounded by Baatz Road on the south, part of Fritz Road (in the southwest corner), and private lands around most of its perimeter. Glen Lake Community School lands are located northwest of the project area (Map 3. Existing Conditions). Adjacent land uses to the west are residential, to the south, agricultural, and gravel extraction to the east and southeast. There is an approximately two-acre fixed lease parcel expiring in 2023, on the south end of the project area, which fronts on Baatz Road. Kasson Township has some of the best gravel resources in the area and, as a result, there are very large privately-owned gravel pits adjacent to the project area.

Adjacent private property owners are currently affected by conflicts with trespassing visitors who wander from federal land onto their land. This occurs principally because visitors are undirected and unmonitored, or they do not realize they have entered privately-owned lands. Adding a trail system of any size will undoubtedly increase traffic to the area to some extent, but conversely it will also provide a formal setting for visitors to park and recreate, with clearer boundaries about what is and is not accessible to them. And, an NPS presence will be formalized for the area. As such, there is a bit of an offset expected. There would be increased visitation, but it would be more controlled, with impacts from conflicts with visitors remaining similarly adverse overall (due to increases in visitation). The impacts would be the same in all action alternatives, since they all propose a trail at the northern end of the project area, where most conflicts with trespassing visitors are now occurring. Because of this, impacts to adjacent private property owners has been dismissed from further analysis.

Wilderness Character:

No lands in the project area are designated or proposed wilderness. Therefore, wilderness 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 (NPS 2003). There are no designated floodplains in the project area. Therefore, floodplains are 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 (NPS 2011a).

Under all action alternatives, trail construction activities, including heavy equipment 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. Therefore, air quality was dismissed as an impact topic.

Land Use:

The overall use and purpose of the project area would not change. Therefore, land use was dismissed as an impact topic.

Historic Resources:

The National Historic Preservation Act, as amended (16 USC 470 *et seq.*); the National Environmental Policy Act (42 USC 4321 *et seq.*); and Director's Order #28: *Cultural Resource Management Guideline* (NPS 1997), *Management Policies 2006* (NPS 2006a), and Director's Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision Making* (NPS 2001b), require the consideration of potential impacts on historic resources listed in or eligible for listing in the *National Register of Historic Places*. Historic resources include historic or prehistoric structures, cultural landscapes,

ethnographic resources, museum collections and archeological resources. There are no historic or prehistoric structures and no cultural landscapes known to exist in the project area. Therefore these topics were dismissed from further analysis.

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 1997). There are no known ethnographic resources or traditional cultural properties in the vicinity of the project area. Therefore, the topic was dismissed as an impact topic.

The NPS *Management Policies 2006* and Director’s Order 28, *Cultural Resource Management* (NPS 1997) 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.

On July 18 and 19, 2013, archeologists from the Midwest Archeological Center (MWAC) conducted field survey work in the project area. Shovel tests were conducted in the area proposed to be developed as a parking facility and a walk over of the proposed trail route was completed. No archeological resources were found. Areas of steep slope, such as are found in the northern sections of the project area, were found by the team to be unlikely to contain archeological resources.

Prior to constructing overlooks or any segments of trail not contained within the footprint of the existing two tracks (such as proposed universally accessible trail segments and overlooks), archeologists from MWAC will be consulted to determine if additional archeological survey is necessary. If additional survey is needed, this will be completed prior to finalizing the site of the overlook and/or trail route. If resources are discovered, design adjustments would be made in to ensure that adverse impacts to archeological resources are avoided.

If during trail construction 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 appropriate mitigation strategy developed, if necessary, in consultation with NPS archeologists and the State Historic Preservation Office (SHPO). In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during trail 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.

Due to these measures, impacts to archeological resources would not exceed a negligible impact under all alternatives and has been 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 developing a trails system and parking, it is expected that the number of visitors within the project area would increase. These improvements, however, would not draw a significant number of new visitors to the park, but may encourage existing park visitors to experience a new opportunity. 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.

Natural Soundscapes:

NPS Director’s Order #47: *Soundscape Preservation and Noise Management* (NPS 2006c) and NPS

Management Policies 2006 (NPS 2006a) direct NPS managers to protect, maintain, or restore unimpaired by inappropriate or excessive noise. Under this directive, noise is defined as “an unwanted or undesired sound, often unpleasant in quality, intensity, or repetition.” Neither the No Action Alternative nor any of the action alternatives addressed in this analysis would introduce long-term inappropriate sound levels to the National Lakeshore. The temporary sound produced during construction would result in negligible, short-term, localized adverse impacts. Therefore, natural soundscapes was dismissed as an impact topic.

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.” Trail construction and trail use would occur during daylight hours and would not affect appreciation of the night sky or interfere with activities of nocturnal creatures. Consistent with other trail head parking areas in the National Lakeshore, artificial lighting will not be considered for the parking lot or, if constructed, the vault toilet. 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 action alternative, energy would be consumed in the construction and maintenance of the trail system and parking lot. However, the scale and intensity of these maintenance activities are very similar and, as a result, any difference in energy consumption is negligible. Therefore, energy requirements and conservation potential is an impact topic dismissed from further consideration.

Prime and Unique Agricultural Lands:

Prime farmland, as defined by the Council on Environmental Quality 1980 memorandum, has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. These designations are established by the Natural Resource

Conservation Service, following soil and resource analyses. No lands within the project area are being used for crop production and no soils within the project area are defined as prime or unique. Therefore, this impact topic was dismissed from further analysis.

2. Alternatives

A range of alternatives to provide a trail system and parking on federal land within the National Lakeshore boundary was developed and evaluated throughout the preparation of this EA. Several alternatives were considered and dismissed because they either did not meet project objectives, or had the potential to produce unacceptable levels of adverse impacts. The alternatives dismissed from further consideration are described later in this chapter, under the heading “Alternatives Considered but Dismissed.”

2.1 ALTERNATIVE 1: NO ACTION

Under the No Action Alternative, no new trail system and parking would be developed on federal lands in the project area within the National Lakeshore. The project area would remain undeveloped and visitors would continue to access the area via un-maintained old two-tracks for activities such as hiking, nature observation, snowshoeing, cross-country skiing, and hunting. Existing social trails and two-tracks leading on to adjacent private property would continue to be used. Additional social trails will likely be created as visitors find their way on to and through the area. Visitors would continue to park at the end of Lanham Road or along other county roads. The NPS could close and restore two-tracks on federal land, as needed, to protect resources.

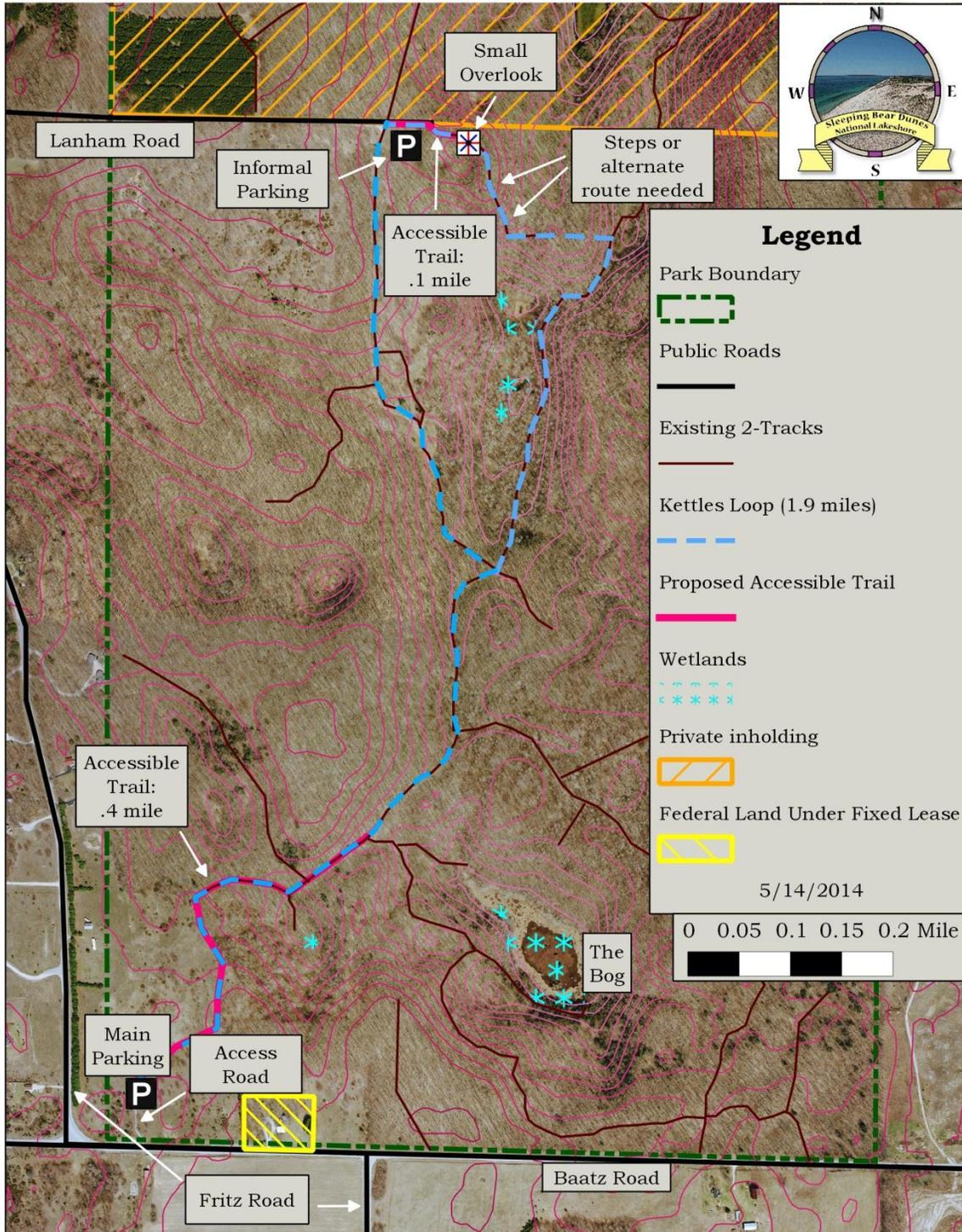
2.2 ALTERNATIVE 2: KETTLES LOOP

Under this alternative 1.9 miles of designated trail would be constructed, along with a six to eight vehicle parking facility at the southwest corner of the project area. Visitors would access the area for activities such as hiking, nature observation, snowshoeing, cross-country skiing and hunting. Horseback riding, camping and bicycling would not be allowed. The primary feature of interest along this trail is an area of dry kettles at the north end of the project area (Map 4. Alternative 2).

The trail would be a single track primitive trail with a typical maintained trail tread width of approximately three feet (Appendix 1. *Sustainable Trail Guidelines*). As a primitive trail, the trail tread will typically consist of native soil. In the winter, the trail would be un-groomed but available for visitor use. Use of the trail would be subject to the same park regulations as other comparable trails in the National Lakeshore.

Universal accessibility will also be a consideration of the primitive trail design and final alignment. Following universal design standards may result in the addition of resting areas (wide areas along the trail) or other features meant to enhance accessibility. These would occur where grade and other site conditions would allow following trail accessibility guidelines or standards without unreasonably impacting the resources of the area. Universally accessible segments are being considered at the end of Lanham Road (0.1 miles) at the north end of the project area and from the proposed parking area in the southwest corner to the spur to the bog (0.4 miles) (Map 4. Alternative 2). If constructed, these trail segments would include hardened surfaces, increased trail widths, and measures to reduce slopes such as switch-backs.

Map 4: Alternative 2 (Kettles Loop)



The majority of the trail would follow existing two-track routes. Segments of two-tracks and social trails not utilized as part of the trail would be blocked (using posts, brush piles, or vegetative plantings) and managed to allow these to return to a natural, re-vegetated state and to minimize trespass onto surrounding private property. Directional trail signage along the trail and at trail heads, and interpretive panels where provided, would be consistent in design with that used in other areas of the National Lakeshore and meet NPS guidelines.

For any new segment of trail and for any segments requiring re-routing from existing two-tracks (such as to provide universal accessibility), NPS maintenance, cultural, and natural resources staff would complete fieldwork to identify a final trail alignment. This work would focus on identifying a route that is sustainable from a trail maintenance standpoint (Appendix 1. *Sustainable Trail Guidelines*) and avoid unnecessary adverse impacts to natural and cultural resources. Surveys for archeological resources, and appropriate plant and animal surveys would be conducted in advance of finalizing trail alignments to protect these resources.

Visitors would be directed to a new gravel parking facility accessed from Baatz Road near the intersection with Fritz Road. The parking facility would be a year-round use facility and accessed by a gravel access road following the alignment of an old driveway. This area has been previously disturbed and would provide ample room for 6-8 vehicles to park and maneuver. Orientation and information signage would be provided at the parking lot. A vault toilet at the parking lot may be added in the future, should the need arise. If a vault toilet is added, it would be sited to minimize the visual impact to surrounding property while also addressing function and safety needs.

From the parking area, the trail route would cross the open field until connecting with the existing an old two-track near the edge of the forest. The path through the field would be mowed as needed and maintenance would be consistent with other park trails that require mowing of fields to mark the route. Upon entering the forest, visitors would follow the two-track to Lanham Road.

The trail would follow the Lanham Road right-of-way to its terminus, then east on a narrow ridge between two large dry kettles (approximately 0.1 miles). At the best vantage point, an overlook would be developed (a wide spot in the trail to allow for lingering), with interpretive signage.

After this point, visitors would be directed to leave the existing two-track to avoid a steep slope (over 40%). A new segment of trail would be constructed following contours through the forest until reaching an existing a two-track about 0.2 miles to the east. The construction of new trail here will require cut and fill, and some removal of small trees.

The trail again follows existing two-track for approximately 0.5 miles until rejoining the original two-track. Near the point where these two-tracks join together, there is a large mud pit. Wet conditions here may require a short re-route of the trail to avoid wet trail conditions, improve the long-term sustainability of the trail, and allow restoration of this muddy area to natural conditions.

The open area near the end of Lanham Road would continue to function as a seasonal informal parking area much as it currently does.* Minimal basic signage and orientation would be provided, including

information advising visitors that lands to the north are private and are not to be entered. No other services are planned for this informal parking area and visitors would not be directed to use this as the parking area. Coordination with the Leelanau County Road Commission would ensure that activities and developments at this site meet the expectations and needs of both parties.

*In the event it is decided to develop a universally accessible trail segment in this location, at least a portion of the parking area would be hardened to accommodate accessibility and parking would be formalized.

2.3 ALTERNATIVE 3: KETTLES LOOP AND BOG OVERLOOK

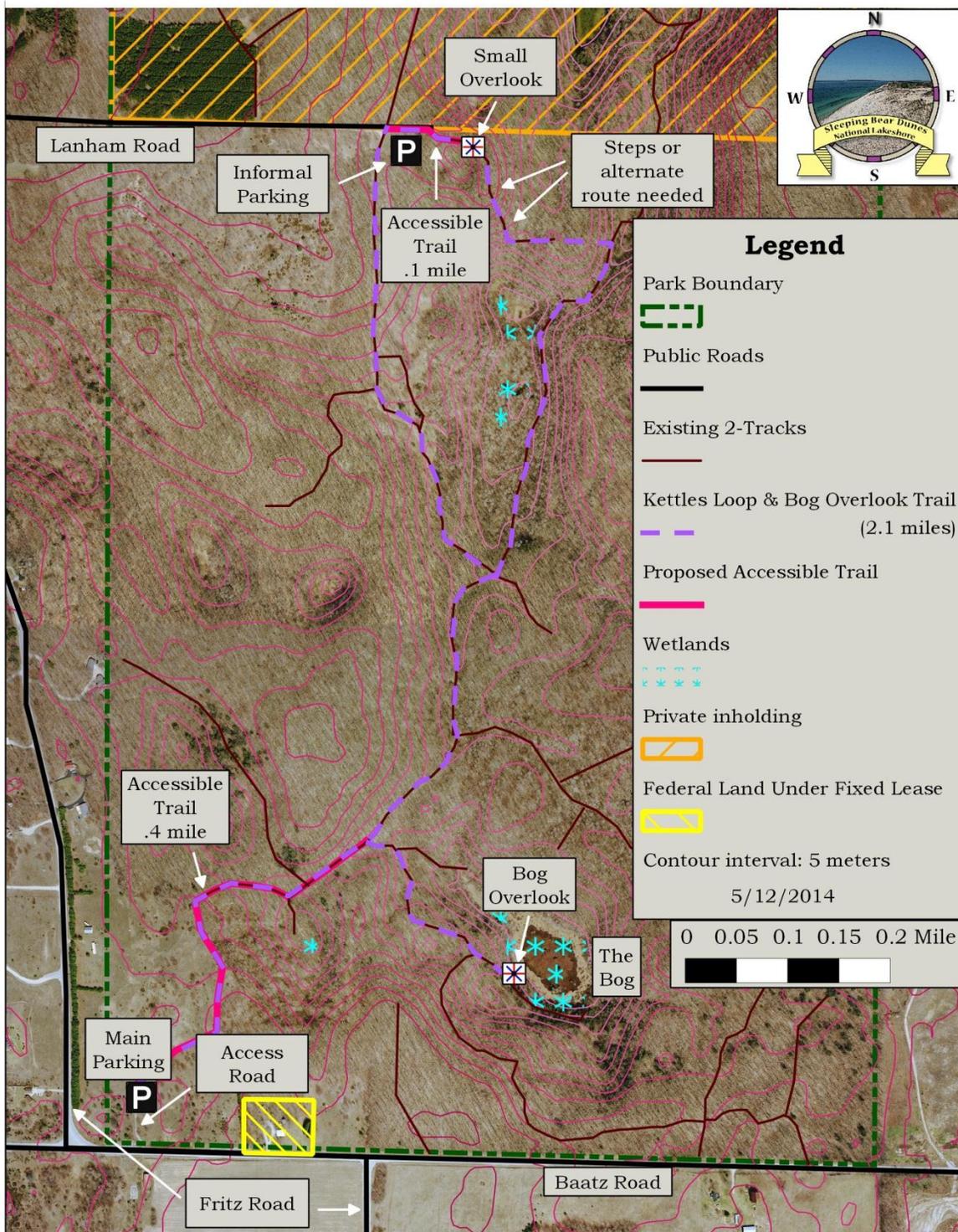
This alternative includes the trail routes, signage, interpretation, and parking described in Alternative 2, and adds a spur from the Kettles Loop to an overlook above the bog (Map 5. Alternative 3). The spur to the overlook, which follows a two-track, adds about 0.2 miles to the trail system, resulting in a total constructed trail length of about 2.1 miles. Access to the bog overlook would require constructing a new trail of less than 50-feet from the two-track to the overlook. The bog overlook is not envisioned as a formal structure but rather a flat natural surface viewing area with a barrier around the edge (posts, vegetation) and interpretive signage. Selective trimming of small trees would be required to permit views of the bog during leaf-on periods.

Universal accessibility will also be a consideration of the primitive trail design and final alignment. Following universal design standards may result in the addition of resting areas (wide areas along the trail) or other features meant to enhance accessibility. These would occur where grade and other site conditions would allow following trail accessibility guidelines or standards without unreasonably impacting the resources of the area. Universally accessible segments are being considered at the end of Lanham Road (0.1 miles) at the north end of the project area and from the proposed parking area in the southwest corner to the spur to the bog (0.4 miles) (Map 5. Alternative 3). If constructed, these trail segments would include hardened surfaces, increased trail widths, and measures to reduce slopes such as switch-backs. Parking at universally accessible trailheads would be hardened and formalized.

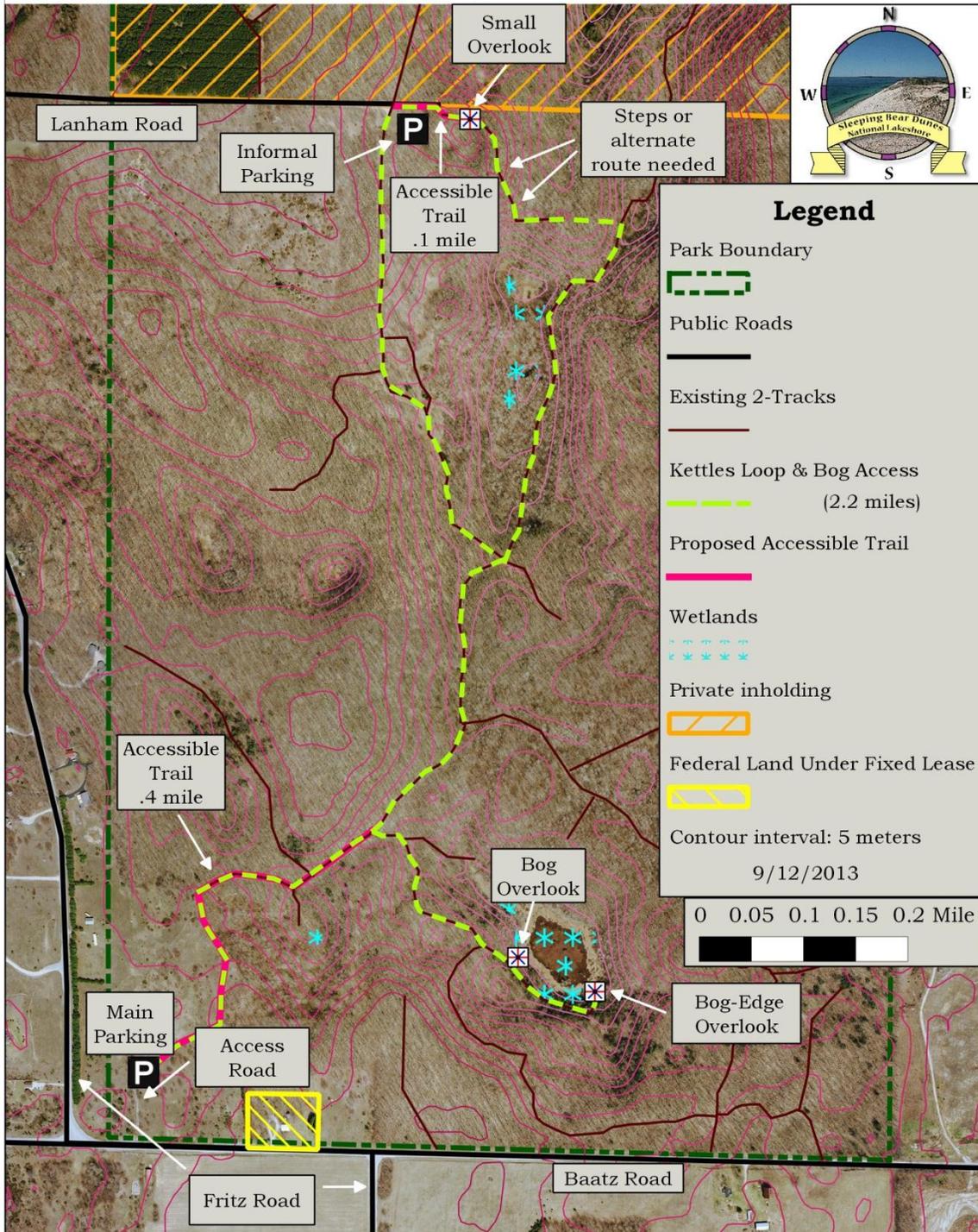
2.4 ALTERNATIVE 4 (THE PREFERRED ALTERNATIVE): KETTLES LOOP AND BOG ACCESS

The Preferred Alternative (Alternative 4) includes the trail routes, signage, interpretation, and parking described in Alternative 3, and adds a spur from the bog overlook about 0.1 miles to a bog edge overlook, resulting in a total constructed trail length of 2.2 miles (Map 6: Alternative 4). Access from the bog overlook to the bog edge is on a two-track, with slopes of almost 30%. The bog edge overlook would be a hardened elevated surface (such as wood, a composite material, or metal) due to the wetness of the area, especially in the spring, and will not protrude into the bog so as to minimize impacts to the bog and to the vista from the bog overlook above. This bog edge overlook may contain barriers such as rails to discourage access onto the bog. It would also include one or more interpretive panels.

Map 5: Alternative 3 (Kettles Loop & Bog Overlook)



Map 6: Alternative 4 (Preferred) (Kettles Loop & Bog Access)



Universal accessibility will also be a consideration of the primitive trail design and final alignment. Following universal design standards may result in the addition of resting areas (wide areas along the trail) or other features meant to enhance accessibility. These would occur where grade and other site conditions would allow following trail accessibility guidelines or standards without unreasonably impacting the resources of the area. Universally accessible segments are being considered at the end of Lanham Road (0.1 miles) at the north end of the project area and from the proposed parking area in the southwest corner to the spur to the bog (0.4 miles) (Map 6. Alternative 4, Preferred). If constructed, these trail segments would include hardened surfaces, increased trail widths, and measures to reduce slopes such as switch-backs. Parking at universally accessible trailheads would be hardened and formalized.

2.5 ACTIONS COMMON TO ALL ACTION ALTERNATIVES

- The following actions would occur under Alternatives 2, 3, and 4:
- An all-season gravel parking and access drive would be constructed near the intersection of Fritz and Baatz roads. A vault toilet may be constructed in the future at this location, should demand warrant it.
- The end of Lanham Road would function as an informal parking area. (see bullet 6)
- Visitor uses would include activities such as hiking, nature observation, snowshoeing, cross-country skiing and hunting. No horses, mountain bikes, or camping would be permitted.
- The trail would be a single track, primitive trail, designed and constructed in accordance with sustainable trail principles (Appendix 1. *Sustainable Trail Guidelines*), and which minimizes unnecessary impact to natural and cultural resources.
- Universal accessibility will be a consideration during trail design and selection of final alignment. Two universally accessible segments are being considered: at the end of Lanham Road (0.1 miles) in the north end of the project area and from the proposed parking area in the southwest corner to the spur to the bog (0.4 miles). Hardened, formalized trailhead parking would be included in these locations should these universally accessible trail segments be developed. In 2014, the park intends to have the MWAC crew evaluate areas that could be affected by ground disturbance, including these proposed universally accessible segments and parking.
- Two-tracks and social trails would be blocked on federal land to prevent motor vehicle traffic or entry onto private lands. Signage would also be used to help reduce trespass.
- Restoration to natural conditions would occur naturally or through NPS work efforts. Restoration areas include unused segments of two-tracks and social trails, segments of trail wider than desired and muddy areas.
- An overlook (a wide spot in the trail) would be developed between the two kettles on the Kettles Loop at the northern end of the project area. This may be universally accessible.
- Trails in the field in the southwest corner of the project area would be mowed and signed.
- Directional trail signage along the trail and at trail heads, and interpretive panels where provided, would be consistent in design with that used in other areas of the National Lakeshore and meet National Park Service guidelines.
- Natural and cultural resource surveys will be conducted prior to finalizing trail segments and construction, especially in those areas that leave previously disturbed two-tracks.

- Per the USFWS, tree clearing should be avoided when endangered bats (northern long-eared bat, Indiana bat) may be present (April 1 - September 30). Alternatively, the NPS would need to conduct emergence or other surveys before tree removal.

2.6 ALTERNATIVES CONSIDERED BUT DISMISSED

Four alternatives were considered but dismissed from further consideration because of resource impacts or because they did not adequately meet project objectives:

Incorporating a Loop Around the Bog

This option is shown on Map 7. Dismissed Alternatives. This route follows an old two-track from the Bog overlook, circles around the Bog, and connects with the Kettles Loop. It was originally considered because it added roughly 1.4 miles to the trail system and provided trail opportunities along high ridges and lowlands to the north. It was dismissed from further consideration because the two-tracks in this segment had significant vegetative recovery. Trail development along this route would result in removal of thousands of recovering wildflowers, would facilitate the spread of invasive plant species in the area, and would require significant effort to clear live and downed trees.

Creating One Large Loop

Consideration was given to creating one large loop, since the loop configuration is favored by many trail users. To do this, it would have been necessary to incorporate the loop around the Bog (already dismissed) and create new trail through the forest to connect with the Kettles Loop (Map 7. Dismissed Alternatives). Because the loop around the Bog was already dismissed and because of the impacts associated with constructing new trail off two-tracks, this alternative was dismissed.

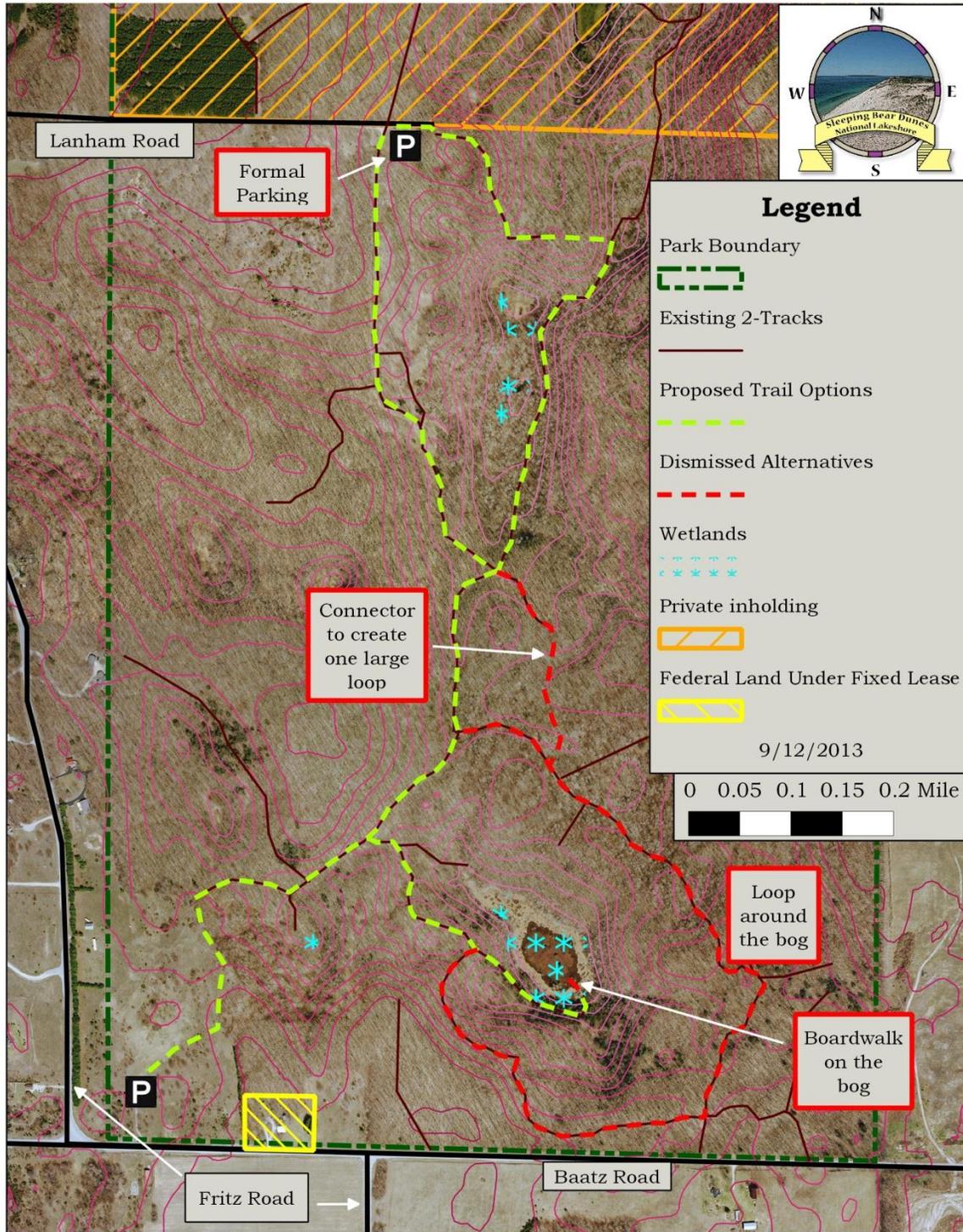
Creating a New Trail System Independent of Existing Two-tracks

Consideration was given to creating a new trail system with extensive new trail construction, independent of the existing two-track system. However, the adverse impacts associated with constructing extensive new trails in an area of severe topography and sensitive resources were determined to be too great for this alternative to be considered.

Lanham Road End Developed as Parking Facility

Consideration was given to provide parking at the end of Lanham Road, since it would be central to the entire Bow Lakes Unit (should the northern area be acquired from willing sellers in the future). Also, this location provides great access to kettles. However, this alternative was dismissed due to the proximity to private land, logistical problems associated with routine law enforcement patrols, distance to the bog in the southeast portion of the project area, and the seasonal designation of Lanham Road. *Note: If the end of Lanham Road is selected as a universally accessible trailhead, at least some of the parking surface would be hardened and formalized. The primary parking area for the trail system, however, would be at the intersection of Fritz and Baatz Roads.

Map 7: Dismissed Alternatives



Bog Boardwalk

Consideration was given to developing a boardwalk into the bog. This alternative was dismissed due to the potential impacts to water resources and vegetation, and the visual impacts from the overlook above.

2.7 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The environmentally preferable alternative is the alternative required by 40 CFR 1505.2(b) to be identified in a ROD that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historic, cultural, and natural resources. The “Environmentally Preferable Alternative” is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources (43 CFR 46.30).

Although an environmentally preferable alternative is identified, it may not be the NPS preferred alternative. The preferred alternative is the alternative the NPS believes would best fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors.

Continuing the current conditions under Alternative 1, No Action, would result in little additional resource damage to the project area. Use of existing two-tracks appears to be causing little erosion with the exception of a wet and muddy area caused by motor vehicle traffic near the intersection of two of the two-tracks. The National Lakeshore could close these two-tracks to motor vehicle traffic without this plan in order to protect and restore these areas. Other two-tracks, which are not currently used by motor vehicles, will continue to slowly restore to natural conditions. The lack of signage and orientation will contribute to the continued use of these two-tracks and the potential development of more trails as visitors find their own way through the area. This lack of orientation will also contribute to visitor trespass onto private property. Visitation levels will likely remain low, with visitation limited to those willing to explore the area. Therefore, Alternative 1 (No Action) is the environmentally preferable alternative since it provides more opportunity for restoration of impacted areas and best protects park resources.

2.8 COMPARISON OF IMPACTS BY ALTERNATIVE

The following table summarizes the impacts under each alternative.

TABLE 1. COMPARISON OF IMPACTS BY ALTERNATIVE

IMPACT TOPIC	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 (PREFERRED)
Water Resources	<p>Impacts to water resources under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and unlikely to impact water resources. Close coordination with the Road Commission would reduce impacts to water resources to a negligible level.</p>	<p>Impacts to water resources under Alternative 2 would be long-term, negligible, and adverse. No new trail would be constructed to or near the bog. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area and to provide universally accessible trail segments and trailhead parking would be guided by sustainable trail design guidelines to eliminate or minimize impacts water resources. Any residential development would be at a distance from the project area and unlikely to impact water resources. Close coordination with the Road Commission would reduce impacts to water resources from road improvements to a negligible level.</p>	<p>Impacts to water resources under Alternative 3 would be long-term, minor, and adverse since, although most trail construction is on existing two-tracks and not in wetland areas, increased social trails from the overlook to the bog could cause increased erosion and sedimentation of bog surface waters. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area, and to provide universally accessible trail segments and trailhead parking in selected areas, would be guided by sustainable trail design guidelines to eliminate or minimize impacts water resources. Any residential development would be at a distance from the project area and unlikely to impact water resources. Close coordination with the Road Commission would reduce impacts to water resources from road improvements to a negligible level.</p>	<p>Direct and indirect impacts to water resources under Alternative 4 would be long-term, minor, and adverse since, although most trail construction is on existing two-tracks and not in wetland areas, social trails developed from the overlook at the bog edge, may provide some impacts to bog waters due to erosion and sedimentation. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area, and to provide universally accessible trail segments and trailhead parking in selected areas, would be guided by sustainable trail design guidelines to eliminate or minimize impacts water resources. Cumulative impacts from residential construction and county road improvements would provide long-term, negligible, adverse impacts to water resources.</p>

IMPACT TOPIC	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 (PREFERRED)
Vegetation	Impacts to vegetation under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.	Impacts to vegetation under Alternative 2 would be long-term, negligible to minor, and adverse due to the 0.2-miles of trail construction off existing two-tracks, through the mature forest, in an area with steep side slopes and at any universally accessible trail segments. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.	Impacts to vegetation under Alternative 3 would be long-term, minor, and adverse due to the 0.2-miles of trail construction off existing two-tracks, development of a bog overlook, along social trails emanating from the overlook to the bog, and at any universally accessible trail segments. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.	Impacts to vegetation under Alternative 4 would be long-term, minor, and adverse due to the 0.2-miles of trail construction off existing two-tracks, at and near the bog and bog edge overlook, along social trails, and at any universally accessible trail segments. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.
Wildlife	Impacts to wildlife under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.	Impacts to wildlife under Alternative 2 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.	Impacts to wildlife under Alternative 3 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.	Impacts to wildlife under Alternative 4 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.

IMPACT TOPIC	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 (PREFERRED)
Listed Species	No impacts to federally-listed species are expected. Impacts to other listed species would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat in the road right-of-way to a negligible level.	Impacts to federally-listed species would be largely avoided through appropriate tree clearing restrictions and surveys. Impacts to other listed species under Alternative 2 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat to a negligible level. Many of these listed species are found in wetland habitats, which would be avoided.	Impacts to federally-listed species would be largely avoided through appropriate tree clearing restrictions and surveys. Impacts to other listed species under Alternative 3 would be long-term, minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat to a negligible level. Many of these listed species are found in wetland habitats, which would be avoided.	Impacts to federally-listed species would be largely avoided through appropriate tree clearing restrictions and surveys. Impacts to other listed species under Alternative 4 would be long-term, minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat to a negligible level. Many of these listed species are found in wetland habitats, which would be avoided.
Geology and Soils	Impacts to geology and soils under Alternative 1 (No Action) are expected to be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact geology and soils in the project area. Close coordination with the Road Commission would reduce impacts in and adjacent to the road right-of-way to a negligible level.	Impacts to geology and soils under Alternative 2 are expected to be short-term, minor, and adverse, principally due to the 0.2-miles of trail construction off existing two-tracks, in an area with steep side slopes, and where universally accessible trails and trailheads are proposed. In the long-term, however, impacts would be negligible, and adverse with sustainable trail construction and maintenance methods.	Impacts to geology and soils under Alternative 3 are expected to be short-term, minor, and adverse, principally due to construction of the new trail segment, overlooks, and potential universally accessible trails and trailheads, and negligible to minor in the long-term due to erosion impacts resulting from development of social trails to the bog.	Impacts to geology and soils under Alternative 4 are expected to be short-term, minor, and adverse, principally to construction of new trail segments, overlooks, and potential universally accessible trails and trailheads, and negligible to minor in the long-term due to erosion impacts resulting from development of social trails to the bog.

IMPACT TOPIC	ALTERNATIVE 1 (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4 (PREFERRED)
Visitor Use and Experience	Impacts to visitor use and experience under Alternative 1 (No Action) are expected to be beneficial. Some limited opportunities for recreation currently exist and adjacent county roads and residential areas would provide negligible impact.	Impacts to visitor use and experience under Alternative 2 are expected to be beneficial. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected. Impacts from adjacent county road maintenance and residential areas would provide negligible impact.	Impacts to visitor use and experience under Alternative 3 are expected to be beneficial. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected. Impacts from adjacent county road maintenance and residential areas would provide negligible impact.	Impacts to visitor use and experience under Alternative 4 are expected to be beneficial. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected. Impacts from adjacent county road maintenance and residential areas would provide negligible impact.
Park Facilities and Operations	Impacts to park facilities and operations under Alternative 1 (No Action) are expected to be long-term, negligible, and adverse. Little staff time is expended on this area, other than occasional law enforcement patrols. Adjacent residential development and county road maintenance provide additional negligible impacts.	Impacts to park facilities and operations under Alternative 2 are expected to be long-term, minor, and adverse. All park divisions, as well as the Friends group, would be affected by the proposed development. Adjacent residential development and county road maintenance provide additional negligible impacts.	Impacts to park facilities and operations under Alternative 3 are expected to be long-term, minor, and adverse. All park divisions, as well as the Friends group, would be affected by the proposed development. Adjacent residential development and county road maintenance provide additional negligible impacts.	Impacts to park facilities and operations under Alternative 4 are expected to be long-term, minor, and adverse. All park divisions, as well as the Friends group, would be affected by the proposed development. Adjacent residential development and county road maintenance provide additional negligible impacts.

2.9 PROJECT OBJECTIVES BY ALTERNATIVE

The following Table 2 illustrates how well each alternative addresses the objectives defined in section 1.6 of Chapter 1 of this environmental assessment.

TABLE 2. PROJECT OBJECTIVES BY ALTERNATIVE

Objective	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4 (Preferred)
Provide visitor facilities that meet the public need and are within the capacity of the NPS to maintain.	Does not address this objective.	Partially addresses this objective. Provides some formal public trail access to some natural resources and most key geologic resources.	Partially addresses this objective. Provides some formal public trail access to natural resources and most key geologic resources.	Fully addresses this objective. Provides formal public trail access to natural resources and all key geologic resources.
Provide for visitor facilities that are sensitive of, and protect, the natural features of the project area and the entire Bow Lakes area, some of which are not found elsewhere in the National Lakeshore.	Does not address this objective.	Fully addresses this objective. Development will be constructed using sustainable trail design guidelines to protect natural features.	Fully addresses this objective. Development will be constructed using sustainable trail design guidelines to protect natural features.	Fully addresses this objective. Development will be constructed using sustainable trail design guidelines to protect natural features.
Provide for visitor facilities that respect adjacent private property.	Does not address this objective.	Fully addresses this objective. Provides basic signage and orientation would be provided, including information advising visitors that lands to the north are private and are not to be entered. Provides signage between public and private land to help reduce trespass. Closes informal two-track leading to private land.	Fully addresses this objective. Provides basic signage and orientation would be provided, including information advising visitors that lands to the north are private and are not to be entered. Provides signage between public and private land to help reduce trespass. Closes informal two-track leading to private land.	Fully addresses this objective. Provides basic signage and orientation would be provided, including information advising visitors that lands to the north are private and are not to be entered. Provides signage between public and private land to help reduce trespass. Closes informal two-track leading to private land.

Objective	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4 (Preferred)
Provide for interpretation of natural features in the project area.	Does not address this objective.	Partially addresses this objective. Provides for interpretive opportunities of many geologic and natural resources. No formal access to the bog vicinity limits interpretation of that resource.	Partially addresses this objective. Provides for interpretive opportunities of many geologic and natural resources. No formal access to the bog edge limits interpretation of that resource.	Fully addresses this objective. Provides for interpretive opportunities of many geologic and natural resources. Formal access to the bog edge provides opportunity for interpretation of that resource.
Provide for research and educational opportunities.	Partially addresses this objective. Research activities could occur without the development of a trails system.	Partially addresses this objective. Provides for research and educational opportunities. No formal access to the bog vicinity limits education on that resource.	Partially addresses this objective. Provides for research and educational opportunities. No formal access to the bog edge limits education on that resource.	Fully addresses this objective. Provides for research and educational opportunities. Formal access to the bog edge provides opportunity for education on that resource.

3. Affected Environment

This chapter provides brief descriptions of the resources, defined as “impact topics” in Chapter 1, that may potentially be affected by the proposed project.

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

The Bow Lakes area is known for the interesting geological features and the associated water resources found there. This general area was formed by a mass of stagnant ice left over from the retreating ice sheet. Bow Lake and the other small lakes and bogs occupy the deepest areas of the depression, probably the sites of individual ice blocks that remained in the area while the extensive meltwater plain southeast and southwest of here was being formed. Today, in a long narrow valley nestled between two high wooded bluffs, there are a number of kettle lakes, surrounded by bogs, fens, wet meadows, and marshes. Bow Lake and its two sister lakes, to the north of the project area and on private land, are open marl lakes lying in the valley. Water resources within the project area include a classic bog with a floating mat of vegetation and Risk (1979) reported numerous spring-fed rivulets lacing the valley.

All water resources within the designated boundaries of the National Lakeshore including those within the project area are considered high quality waters that are designated as outstanding state resource waters (OSRW) by the State of Michigan. This designation provides that the level of water quality necessary to protect existing uses shall be maintained and protected. This designation also calls for controls on pollutant sources to OSRW waters so that the water quality is not lowered in the OSRW. The OSRW designation falls under the antidegradation rule of the State of Michigan’s water quality standards promulgated pursuant to Part 31 of Michigan’s Natural Resources and Environmental Protection Act of 1994.

The National Wetland Inventory (NWI) of the U.S. Fish and Wildlife Service identified, classified (according to Cowardin et al. 1979), and mapped wetlands of the National Lakeshore (FWS 1981). A total number of wetlands in excess of 300 (several wetland types were too numerous to count), representing 32 wetland types, was identified. The National Lakeshore is dominated by palustrine wetlands (approximately 80 percent of the total number of wetlands). Palustrine wetlands include all nontidal wetlands dominated by trees, shrubs, persistent emergent vegetation and emergent mosses or lichens. This broad classification was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie. It also includes small, shallow, permanent or intermittent water bodies often called ponds.

In 2009, the NPS Water Resources Division mapped National Lakeshore wetland types from data in original files from the NWI, the Michigan DNR Michigan Resource Information System (MIRIS), and the Soil Survey Geographic (SSURGO) database (NPS 2009b). The Bow Lakes Unit’s wetlands consist mainly of non-wooded wetlands and hydric soils.

Hazlett (1988) describes “the most noteworthy aquatic habitats” of the Bow Lakes area as a spring-fed fen on the south side of Bow Lakes (outside of the project area) and the bog at the section's south end (within the project area). The bog occurs in a depression in which the water table varies from year-to-year, when the water table is high the bog is surrounded by a water filled moat. The Bow Lakes Unit (including the northern, mostly privately owned area) also contains four acres of wooded wetlands and 17 acres of wetlands identified by wet soils alone.

Bogs usually form in low basins that have no drainage inlets or outlets, and that are less influenced by ground water inflows. The water has a low pH and sphagnum moss (*Sphagnum* spp.) is abundant.

Groundwater is important to the National Lakeshore’s aquatic ecology because it is connected to the park’s springs, lakes, and other surface waters (Ozaki 2001). In the project vicinity, a glacial aquifer consists of sand and gravel deposits 150-270 m thick (Handy and Stark 1984).

There are no lakes or perennial streams in the project area.

3.2 VEGETATION

Vegetation in the area is typical of northern hardwood forest, with American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), red pine (*Pinus resinosa*), white pine (*Pinus strobus*) and eastern hemlock (*Tsuga canadensis*) in well drained areas and white cedar (*Thuja occidentalis*) in the wetter areas. Understory plants include maidenhair fern (*Adiantum* sp.), trillium (*Trillium* sp.), dwarf or bunchberry dogwood (*Cornus canadensis*), Canada mayflower (*Maianthemum canadense*), sweet cicely (*Osmorhiza claytonia*), columbine (*Aquilegia canadensis*), and wild leeks (*Allium burdickii*).

The bog mat is largely covered by sphagnum moss species including *Sphagnum magellanicum*, *S. fallax*, *S. angustifolium*, *S. rubellum* and *S. russowii* with the rest of the mat is dominated by leatherleaf (*Chamaedaphne calyulata*). (Wilcox 1982) Other bog species include bog laurel (*Kalmia polifolia*), small cranberry (*Vaccinium oxycoccos*), arrowgrass (*Scheuchzeria palustris*), bog rosemary (*Andromeda glaucophylla*), and round-leaved sundew (*Drosera rotundifolia*). Species found in or along the bog moat include members of the sedge family (*Carex* sp.), Rattlesnake manna grass (*Glyceria canadensis*), jewelweed (*Impatiens* sp.), duckweed (*Lemna minor*), royal fern (*Osmunda regalis*), reed canarygrass (*Phalaris arundinacea*), water smartweed (*Polygonum amphibium*), march cinquefoil (*Potentilla palustris*), wool-grass (*Scirpus cyperinus*), common skullcap (*Scutellaria galericulata*), marsh fern (*Thelypteris palustris*) and marsh St. John’s-wort (*Triadenum fraseri*).

3.3 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 (*Zenaidura macroura*), downy woodpecker (*Picoides pubescens*), black-capped chickadee (*Parus 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*).

No recent detailed wildlife inventories have been conducted in the project area. Appropriate surveys will be conducted prior to finalizing trail segments and construction, especially in those areas that leave previously disturbed two-tracks.

3.4 LISTED SPECIES

The two Federally-listed plant species in the National Lakeshore, the threatened Pitcher's thistle (*Cirsium pitcheri*) and the endangered Michigan monkey flower (*Mimulus glabratus* var. *michiganensis*) are not known to occur in the project area. The Indiana bat (*Myotis sodalis*), is a Federally endangered mammal that summer roosts and forages in riparian, bottomland, and upland forests with trees that have loose or exfoliating bark (GMP 2009). It has not been documented in Leelanau County. The piping plover (*Charadrius melodus*), which is found on sandy lakeshore beaches with scattered cobble and sparse vegetation, does not occur in the project area.

The northern long-ear bat (*Myotis septentrionalis*), is proposed for listing by the U.S. Fish and Wildlife Service (USFWS) as endangered. Per the USFWS, during the summer, northern long-eared bats typically roost singly or in colonies underneath bark or in cavities, crevices, or hollows of both live and dead trees and/or snags, typically three inches dbh (diameter breast height). This species has also been found roosting in structures, such as barns and sheds on occasion (particularly when suitable tree roosts are unavailable). These bats forage for insects in upland and lowland woodlots and tree-lined corridors.

In addition to Federally-listed species, 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. Michigan currently lists 653 species of plants, mollusk, insects, fishes, amphibians, reptiles, birds, and mammals that are considered to be species of concern. The Michigan Natural Features Inventory (NRFI) is a cooperative program of Michigan State University Extension and the Michigan Department of Natural Resources. The NRFI database lists 36 species of concern that have been recorded as having been found in Leelanau County, either historically or currently.

The 2009 General Management Plan (GMP 2009) includes two insects, one amphibian, two reptiles, 11 birds, one mammal, and 15 plants as state species of concern that have been documented in the National Lakeshore (Table 3). Many of these species are not likely to be found in the project area due to habitat constraints. However, no detailed inventories have been conducted to date. Appropriate surveys will be conducted prior to finalizing trail segments and construction, especially in those areas that leave previously disturbed two-tracks.

TABLE 3. LISTED SPECIES

Type	Scientific Name	Common Name
Insect	<i>Stenelemis douglasensis</i>	Douglas Stenelemis riffle beetle
Insect	<i>Trimerotropis huroniana</i>	Lake Huron Locust
Amphibian	<i>Acris crepitans blanchardi</i>	Blanchard's cricket frog
Reptile	<i>Glyptemys insculpa</i>	Wood turtle
Reptile	<i>Terrapene carolina carolina</i>	Eastern box turtle
Bird	<i>Accipiter gentilis</i>	Northern goshawk
Bird	<i>Ammodramus savannarum</i>	Grasshopper sparrow
Bird	<i>Buteo lineatus</i>	Red-shouldered hawk
Bird	<i>Charadrius melodus</i>	Piping plover*
Bird	<i>Cygnus buccinator</i>	Trumpeter swan
Bird	<i>Dendroica discolor</i>	Prairie warbler
Bird	<i>Falco columbarius</i>	Merlin
Bird	<i>Gavia immer</i>	Common loon
Bird	<i>Haliaeetus leucocephalus</i>	Bald eagle
Bird	<i>Ixobrychus exilis</i>	Least bittern
Bird	<i>Sterna caspia</i>	Caspian tern
Mammal	<i>Myotis sodalis</i>	Indiana bat*
Plant	<i>Asplenium rhizophyllum</i>	Walking fern
Plant	<i>Asplenium trichomanesranosum</i>	Green spleenwort
Plant	<i>Bercula erecta</i>	Cut-leaved water-parsnip
Plant	<i>Botrychium campestre</i>	Prairie moonwort
Plant	<i>Bromus pumpellianus</i>	Pumpelly's brome grass
Plant	<i>Calypso bulbosa</i>	Calypso or fairy-slipper
Plant	<i>Carex concinna</i>	Beauty sedge
Plant	<i>Carex platyphylla</i>	Broad-leaved sedge
Plant	<i>Cirsium pitcheri</i>	Pitcher's thistle*
Plant	<i>Cypripedium arietinum</i>	Ram's head lady's-slipper
Plant	<i>Mimulus glabratus var. michiganensis</i>	Michigan monkey-flower*
Plant	<i>Orobanche fasciculata</i>	Fascicled broom-rape
Plant	<i>Panax quinquefolius</i>	Ginseng
Plant	<i>Pterospora andromedea</i>	Pine-drops
Plant	<i>Triphora trianthophora</i>	Three-birds orchid

*Also Federally listed.

3.5 GEOLOGY AND SOILS

The project area'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. 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 most extensive landform type in the region, though only a very small part of the National Lakeshore, is the proglacial pitted outwash plain. The outwash deposit is composed of stratified and sorted sand and gravel that represents a deposit of a large discharge of meltwater and sediment at and beyond the ice sheet margin at that time. The surface of the deposit forms a plain that slopes gently southward from about 1000 feet elevation towards Manistee. The plain is interrupted by numerous closed depressions called "kettles," of which some but not all contain lakes. The depressions were formed when blocks of ice were buried by sand and gravel outwash, then the ice melted and formed a void after sand and gravel deposition ceased. The project area illustrates the typical complex collapsed kettle topography formed by ice blocks buried in outwash. (NPS 2013). Two predominant kettles are found in the project area. The "Bog," a kettle in the southern end filled with water and wetland vegetation and a dry kettle near the end of Lanham Road at the north end.

The project area's glacial legacy is most evident in its soils, which generally consist of coarsely textured, highly permeable subsoil. Most of the project area consists of Loamy Sand, with a pocket of Sand in the northern part near Lanham Road, pockets of Silt to the north and south, and Muck and Sapric Material in and around the bog. All of the project area lies within the Montcalm-Leelanau-Blue Lake soil association, characterized by very deep, well drained soils formed in deep sandy glacial drift deposits on moraines and outwash plains.

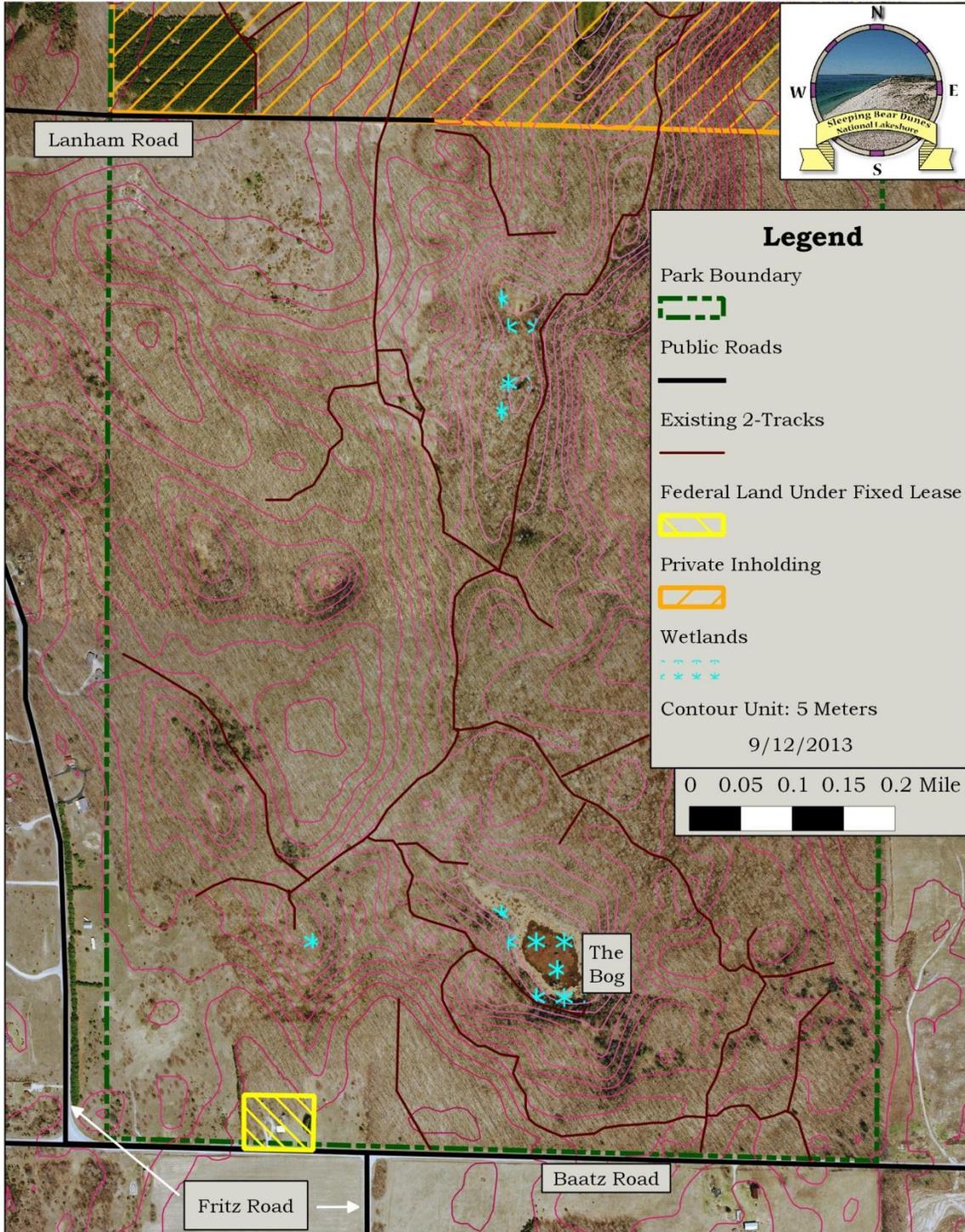
The project area is characterized with steep slopes (30-40 %) and elevations ranging from 721 to 918 feet (Map 8. Topography).

3.6 VISITOR USE AND EXPERIENCE

There are currently no NPS facilities in the project area. No formal visitor use surveys have been conducted. Most use involves hiking, nature observation, snowshoeing, cross-country skiing, and hunting with the two-tracks being used to access the area.

Visitor use counts for mainland National Lakeshore trails were conducted in early August 2000 as part of the *2001 Transportation Study* (NPS 2001a). A trail with similar visitation as is expected for the Kettles Trail is Windy Moraine, on M-109 near the Pierce Stocking Scenic Drive entrance. During the one-day (9:00 a.m. - 5:00 p.m., August 2000) use count, Windy Moraine Trail had 13 hikers.

Map 8: Topography



Of the roughly 100 miles (54 miles on the mainland) of designated trails within the National Lakeshore, none provide interpretation of dry kettle formations or bog environments. With construction of the Sleeping Bear Heritage Trail near the “Westman Bog,” (adjacent Tucker Lake), there is some opportunity in the future to interpret this feature.

NPS Policy (2006 Management Policies, Section 9.1.2) calls for the NPS to design and construct facilities so they are accessible to and useable by person with disabilities to the greatest extent reasonable, in accord with all applicable laws, regulations and standards. Universal accessibility will be provided consistent with preserving park resources and provide visitor safety and high quality visitor experiences. NPS Policy calls for the degree of accessibility to be proportionately related to the degree of human-made modifications associated with the facility and the importance of the facility to people visiting or working in the park. Undeveloped areas, such as those outside the immediate influence of buildings and roads, will not normally be modified for the sole purpose of providing to all segments of the population. Accessibility to facilities in threshold areas will be determined on the basis of topography, the significance of the attraction, the number of physical modifications being made to the environment and the modifications necessary to ensure programmatic accessibility.

Specific standards for primitive trails have not been established, however the United States Access Board is developing accessibility guidelines, “pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails and beach access routes.” (United States Access Board, 2010) The guidelines would apply to Federal land management agencies, including facilities of the NPS that are constructed or altered by or on behalf of the Federal government. General technical provisions of trail accessibility include the following design elements. Design and construction of trails dedicated for universal accessibility and limited accessibility will address these elements at all phases of the implementation process in accordance with the Architectural Barriers Act.

- Surface
- Clear Tread Width
- Openings
- Protruding Objects
- Tread Obstacles
- Passing Space
- Slope
- Resting Intervals
- Edge Protection
- Signage

The Outdoor Developed Areas Draft Final Rule by the United States Access Board has also defined four conditions that would allow for departure from the technical provisions in the guidelines. These conditions include;

- Where compliance would cause substantial harm to cultural, historic, religious or significant natural features or characteristics.

- Where compliance would substantially alter the nature of the setting or the purpose of the facility or portion of the facility.
- Where compliance would require construction methods or materials that are prohibited by federal regulations or statutes.
- Where compliance would not be feasible due to terrain or prevailing construction practices.

During a June 3, 2013 fieldtrip with Cynthia Burkhour, a private accessibility specialist working with the Friends of Sleeping Bear Dunes on a trail evaluation project, two segments of the existing two-track were preliminarily evaluated for their potential to be universally accessible. Existing slope and surface condition were observed to assess this potential. The first of these two segments extended from the end of Lanham Road to the proposed kettle overlook and second extended from the proposed Baatz Road parking facility to the bog overlook.

3.7 PARK FACILITIES AND OPERATIONS

There are currently no NPS facilities in the project area. Law enforcement rangers occasionally patrol the area, especially during firearm deer hunting season. Most of the two-tracks in the area are fairly narrow, about eight-feet wide. The one exception is the two-track from the end of Lanham Road south to the intersection with a two-track to the northeast, which had incurred recent motor vehicle traffic. This segment is wider, up to 12 feet, has a gravel base, and a large mud hole that would need to be addressed (see photo section). None of these two-tracks are routes maintained by the NPS and no funds are received for maintenance or repair.

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.

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 the 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. The NPS has constructed no other developments at this site, since its inclusion in the National Lakeshore in 1982. NPS law enforcement rangers occasionally patrol the area, especially during firearms deer hunting season. No formal interpretive messaging has been developed, other than including the site on park maps. Historically, the site was minimally used for farming and logging, but due to its rugged topography it has remained relatively untouched. The NPS has no other plans for this site, other than the proposed trail system.

The project proposal will not change use in the project area, but action alternatives provide a more structured way to appreciate and protect the area through designated trails and parking, interpretive

messaging, and closing and restoring social trails. The actions that in combination with this project have the potential to have cumulatively effects include:

- **Residential development to the west:** The areas to the west of the project, across Fritz Road, have been zoned “Planned Development” and “Forested” by Kasson Township. A number of homes were built in this area in the early 2000s, but housing development has slowed considerably in the past six years. Home construction could result in some short-term noise impacts. Any future developments are screened from the project area by a row of large evergreens.
- **Improvements to Lanham Road, Fritz Road, and Baatz Road:** These county roads are managed by the Leelanau County Road Commission. Future improvements or maintenance to these roads could result in short-term noise impacts, long-term visual impacts, and erosion and sedimentation impacts.

4.3 WATER RESOURCES

Intensity

Negligible: Water quality would not be affected, or changes would be either non-detectable or below state water quality standard thresholds 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 permits for impacting wetlands would be necessary.

Minor: Changes in water quality would be measurable, although the changes would be below state water quality standard thresholds, 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. No site-specific wetland permit would 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 state 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. Wetland permits would be required.

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. Wetland permits would be required.

Duration

Short-term: Any impacts to water resources would be undetectable in less than two years.

Long-term: Water resources would take more than two years to recover to a level that was undetectable.

IMPACTS TO WATER RESOURCES FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people, using old two-tracks or travelling off-trail for access, would continue to visit the bog in the southern end of the project area. The small wetlands complex adjacent to an old two-track in the northeastern part of the project area would not be impacted by visitor use of the two-track. A large mud-hole with ponding north of the main two-track intersection would remain as long as motor vehicle use continued in this area. The NPS could close and restore this two-track, and others, on federal land as needed to protect resources. Impacts to water resources under Alternative 1 (No Action) would be long-term, negligible, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to water resources from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and unlikely to impact water resources. These activities would provide only additional negligible long-term and adverse impacts to water resources.

Conclusions: Impacts to water resources under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and unlikely to impact water resources. Close coordination with the Road Commission would reduce impacts to water resources to a negligible level.

IMPACTS TO WATER RESOURCES FROM ALTERNATIVE 2

Under Alternative 2, a gravel parking lot and drive would be constructed in the southwest corner of the project area and the Kettles Loop would be developed using two-track alignments to the extent possible. No new trail would be constructed to or near the bog. Small numbers of people, using old two-tracks or travelling off-trail for access, would continue to visit the bog in the southern end of the project area. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area would be guided by sustainable trail design guidelines to eliminate or minimize impacts to them. Roughly 0.2-miles of the Kettles Loop at the northern end of the project area would be located off old two-tracks and would require cut and fill, and removal of small trees. However, there are no wetlands in this area, so impacts would be negligible. The two short segments of trail and trailhead parking that could be hardened to provide universal accessibility are located in areas away from wetlands. Minor erosion and sedimentation in these hardened areas can be mitigated by using sustainable trail design guidelines. Impacts to water resources under Alternative 2 would be long-term, negligible, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to water resources from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and unlikely to impact water resources. These activities would provide only additional negligible long-term and adverse impacts to water resources.

Conclusions: Impacts to water resources under Alternative 2 would be long-term, negligible, and adverse. No new trail would be constructed to or near the bog. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area and to provide universally accessible trail segments and trailhead parking would be guided by sustainable trail design guidelines to eliminate or minimize impacts water resources. Any residential development would be at a distance from the project area and unlikely to impact water resources. Close coordination with the Road Commission would reduce impacts to water resources from road improvements to a negligible level.

IMPACTS TO WATER RESOURCES FROM ALTERNATIVE 3

Alternative 3 is similar to Alternative 2, except that a trail to the proposed bog overlook has been added, using an existing two-track road for most of the route (less than 50 feet of trail would be on undisturbed lands, between the old two-track and the new overlook). Trail construction near the bog (above it) and at the overlook would be guided by sustainable trail design guidelines to eliminate or minimize erosion and sedimentation impacts to the water quality of the bog below. However, resultant social trails could cause increased erosion and sedimentation of bog surface waters. The two short segments of trail and trailhead parking that could be hardened to provide universal accessibility are located in areas away from wetlands. Minor erosion and sedimentation in these hardened areas can be mitigated by using sustainable trail design guidelines. Impacts to water resources under Alternative 3 would be long-term, minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to water resources from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and unlikely to impact water resources. These activities would provide only additional negligible long-term and adverse impacts to water resources.

Conclusions: Impacts to water resources under Alternative 3 would be long-term, minor, and adverse since, although most trail construction is on existing two-tracks and not in wetland areas, increased social trails from the overlook to the bog could cause increased erosion and sedimentation of bog surface waters. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area, and to provide universally accessible trail segments and trailhead parking in selected areas, would be guided by sustainable trail design guidelines to eliminate or minimize impacts water resources. Any residential development would be at a distance from the project area and unlikely to impact water resources. Close coordination with the Road Commission would reduce impacts to water resources from road improvements to a negligible level.

IMPACTS TO WATER RESOURCES FROM ALTERNATIVE 4 (THE PREFERRED)

Alternative 4 is similar to Alternative 3, except that a trail from the bog overlook to the bog edge overlook has been added. This trail would be constructed on the existing two-track, with slopes of 30%, and would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Trail construction would be guided by sustainable trail design guidelines to eliminate or minimize erosion and sedimentation impacts to the water quality of the bog below. The bog edge overlook may be an elevated hardened surface (such as wood, a composite material, or metal) due to the wetness of the area, especially in the spring. This overlook may contain barriers such as rails and signage to discourage access onto or along the bog. However, some social trails from the overlook in and around the bog could cause increased erosion and sedimentation of bog surface waters. The two short segments of trail and trailhead parking that could be hardened to provide universal accessibility are located in areas away from wetlands. Minor erosion and sedimentation in these hardened areas can be mitigated by using sustainable trail design guidelines. Impacts to water resources under Alternative 4 would be long-term, minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to water resources from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and unlikely to impact water resources. These activities would provide only additional negligible long-term, and adverse impacts to water resources.

Conclusions: Direct and indirect impacts to water resources under Alternative 4 would be long-term, minor, and adverse since, although most trail construction is on existing two-tracks and not in wetland areas, social trails developed from the overlook at the bog edge, may provide some impacts to bog waters due to erosion and sedimentation. Trail construction on the old two-track adjacent to the complex of small wetlands in the northeastern part of the project area, and to provide universally accessible trail segments and trailhead parking in selected areas, would be guided by sustainable trail design guidelines to eliminate or minimize impacts water resources. Cumulative impacts from residential construction and county road improvements would provide long-term, negligible, adverse impacts to water resources.

4.4 VEGETATION

Intensity

Negligible: No native vegetation would be affected, or some individual native plants could be affected on a small scale as a result of the alternative, but there would be no effect on native species populations. 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: The alternative would temporarily affect some individual native plants and would also affect a relatively minor portion of that species' population. Mitigation to offset adverse effects, including special measures to avoid affecting species of special concern, could be required and would be effective. Effects

on special concern species or habitats would be measurable or perceptible, but localized within a small area. While the mortality of individual species could occur, the viability of populations would not be affected, and the community, if left alone, would recover.

Moderate: The alternative would affect some individual 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. Changes in special concern 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 on special concern species, and would likely be successful.

Major: The alternative would have a considerable long-term effect on native plant populations, including species of special concern, and would affect a relatively large area in and outside of the national lakeshore. Mitigation measures to offset the adverse effects would be required and extensive, and success of the mitigation measures would not be guaranteed. Effects on populations or habitats would be readily apparent and would substantially change populations over a large area in and outside of the national lakeshore. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured.

Duration

Short-term: Following treatment, recovery would take less than two years before impacts could no longer be detected.

Long-term: Following treatment, recovery would take more than two years before impacts could no longer be detected.

IMPACTS TO VEGETATION FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people would use old two-tracks or travel off-trail for access. Some trampling of vegetation on the two-tracks and off-trail would occur due to foot traffic. Vegetative growth would continue to be trampled on the portion of the route from the end of Lanham Road south that is currently being accessed by motor vehicles. However, the NPS could close and restore this two-track, and others, on federal land as needed to protect resources. Motor vehicle access and foot traffic has the potential to introduce invasive plant species to the area. Impacts to vegetation under Alternative 1 (No Action) would be long-term, negligible, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to vegetation from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation that could result in vegetative mortality or invasive plant migration. Any residential developments are at a distance from the project area and are not likely to impact vegetation, although

some invasive plant migration is possible. These activities would provide only negligible additional long-term and adverse impacts to vegetation.

Conclusions: Impacts to vegetation under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.

IMPACTS TO VEGETATION FROM ALTERNATIVE 2

Under Alternative 2, existing two-tracks included as part of the trails system would be transformed into single-track primitive trails. To accomplish this, one track would be restored, naturally or through enhanced NPS efforts. Small diameter woody vegetation and ground cover would be removed and deadfalls cleared off the trail tread. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area would be located off old two-tracks and would require some cut and fill, and removal of small trees. NPS natural resources staff would conduct appropriate plant surveys in different growing seasons in advance of finalizing new trail alignments off existing two-tracks to protect these resources. Grading activities for the formal parking area and drive in the southwest corner of the project area would require removal of grasses from this site, as would any grading activities required in the open area (informal parking) near the end of Lanham Road. In the event that universally accessible trail segments and trailheads are developed, any impacts to vegetation would be mitigated by using sustainable trail design guidelines. Small numbers of people would continue to travel off-trail for access to the bog and some trampling of vegetation would occur due to foot traffic. Ground disturbing activities and foot traffic have the potential to introduce invasive plant species to the area. Impacts to vegetation under Alternative 2 would be long-term, negligible to minor, and adverse, principally due to the 0.2-miles of trail construction off existing two-tracks, through the mature forest, in an area with steep side slopes.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to vegetation from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation that could result in vegetative mortality or invasive plant migration. Any residential developments are at a distance from the project area and are not likely to impact vegetation, although some invasive plant migration is possible. These activities would provide only negligible additional long-term and adverse impacts to vegetation.

Conclusions: Impacts to vegetation under Alternative 2 would be long-term, negligible to minor, and adverse due to the 0.2-miles of trail construction off existing two-tracks, through the mature forest, in an area with steep side slopes and at any universally accessible trail segments. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.

IMPACTS TO VEGETATION FROM ALTERNATIVE 3

Alternative 3 is similar to Alternative 2, except that a trail to the proposed bog overlook has been added. This trail would be constructed on the existing two-track and would be converted to a single-track by

restoring one track, naturally or through enhanced NPS efforts. Small diameter woody vegetation and ground cover would be removed and deadfalls cleared off the trail tread. Some vegetative ground cover would be removed to develop the bog overlook and access, and selective trimming or removal of small trees would be required to provide and maintain bog views during leaf-on periods. In spite of NPS efforts, social trails created from the bog overlook could impact vegetation on the steep slopes, as well as sensitive vegetation in and around the bog. In the event that universally accessible trail segments and trailheads are developed, any impacts to vegetation would be mitigated by using sustainable trail design guidelines. As a result, impacts to vegetation under Alternative 3 would be long-term, minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to vegetation from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation that could result in vegetative mortality or invasive plant migration. Any residential developments are at a distance from the project area and are not likely to impact vegetation, although some invasive plant migration is possible. These activities would provide only negligible additional long-term and adverse impacts to vegetation.

Conclusions: Impacts to vegetation under Alternative 3 would be long-term, minor, and adverse due to the 0.2-miles of trail construction off existing two-tracks, development of a bog overlook, along social trails emanating from the overlook to the bog, and at any universally accessible trail segments. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.

IMPACTS TO VEGETATION FROM ALTERNATIVE 4 (THE PREFERRED)

Alternative 4 is similar to Alternative 3, except that a trail from the bog overlook to the bog edge overlook has been added. This trail would be constructed on the existing two-track and would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Small diameter woody vegetation and ground cover would be removed and deadfalls cleared off the trail tread.

Under Alternative 4, the bog edge overlook may be a hardened surface (such as wood, a composite material, or metal) due to the wetness of the area, especially in the spring, and would be raised above the ground surface. Vegetation removal at this site would be limited to specific area where support posts were set. Some visitors may leave the overlook and walk on or at the edge of the bog, resulting in trampling, habitat alteration, or spread of invasive species. In the event that universally accessible trail segments and trailheads are developed, any impacts to vegetation would be mitigated by using sustainable trail design guidelines. Impacts to vegetation under Alternative 4 would be long-term, minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to vegetation from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation that could result in vegetative mortality or invasive plant migration. Any residential developments are at a distance from the project area and are not likely to impact vegetation, although

some invasive plant migration is possible. These activities would provide only negligible additional long-term and adverse impacts to vegetation.

Conclusions: Impacts to vegetation under Alternative 4 would be long-term, minor, and adverse due to the 0.2-miles of trail construction off existing two-tracks, at and near the bog and bog edge overlook, along social trails, and at any universally accessible trail segments. Any residential development would be at a distance from the project area and is unlikely to impact vegetation in the project area. Close coordination with the Road Commission would reduce impacts to vegetation to a negligible level.

4.5 WILDLIFE

Intensity

Negligible: Any effects to wildlife would be at or below the level of detection, site-specific, and so slight that they would not be of any measurable or perceptible consequence to the wildlife populations. 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: Effects to wildlife would be detectable, site-specific, small, and of little consequence to the wildlife populations. Mitigation measures, if needed to offset adverse impacts, would be simple and successful. Effects on 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: Effects to wildlife would be readily detectable and site-specific, with consequences at the population level. Mitigation measures, if needed to offset adverse impacts, would be extensive and likely successful. A change in populations or habitats, including for special concern species, 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 to wildlife would be obvious and either local or regional, and would have substantial consequences to wildlife populations in the area. Extensive mitigation measures would be needed to offset any adverse impacts, and their success would not be guaranteed. Effects on populations or habitats, including for special concern species, would be readily apparent, and would substantially change populations over a large area in and outside of the national lakeshore. Extensive mitigation would be needed to offset adverse effects, and the success of mitigation measures could not be assured.

Duration

Short-term: Following treatment, recovery would take less than two years before impacts could no longer be detected.

Long-term: Following treatment, recovery would take more than two years before impacts could no longer be detected.

IMPACTS TO WILDLIFE FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people would use old two-tracks or travel off-trail for access. There would be long-term, negligible, and adverse impact from possible trampling of small animals or wildlife disturbance from noises, sights, or scents associated with visitor use (sensory-based disturbance).

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to wildlife from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact wildlife. These activities would provide only negligible additional long-term and adverse impacts to wildlife.

Conclusions: Impacts to wildlife under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.

IMPACTS TO WILDLIFE FROM ALTERNATIVE 2

Under Alternative 2, existing two-tracks included as part of the trails system would be transformed into single-track primitive trails. To accomplish this, one track would be restored, naturally or through enhanced NPS efforts. Restored areas would provide increased wildlife habitat, a beneficial impact. But, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area is located off old two-tracks and would require some cut and fill and tree removal, resulting in habitat alteration. Additionally, some possible trampling would occur, as well as the introduction of visitors to an area that has seen little use, resulting in increased sensory-based disturbance to wildlife. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines.

Overall, Alternative 2 would result in increased visitor use of the area and increased wildlife mortality from possible trampling, some habitat alteration (northern area or on universally accessible trail segments), and increased sensory-based disturbance. Additionally, hunting activity may increase due to more awareness of this area. Impacts to wildlife under Alternative 2 would be long-term, negligible to minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to wildlife from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact wildlife. These activities would provide only negligible additional long-term and adverse impacts to wildlife.

Conclusions: Impacts to wildlife under Alternative 2 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.

IMPACTS TO WILDLIFE FROM ALTERNATIVE 3

Alternative 3 is similar to Alternative 2, except that a trail to the proposed bog overlook has been added. This trail would be constructed on the existing two-track and would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Restored areas would provide increased wildlife habitat, a beneficial impact. But, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. As in Alternative 2, approximately 0.2-miles of the Kettles Loop at the northern end of the project area is located off old two-tracks and would require some cut and fill and tree removal, resulting in habitat alteration. Additionally, some possible trampling could occur, as well as the introduction of visitors to an area that has seen little use, resulting in increased sensory-based disturbance to wildlife. Development of the bog overlook and access, and vista clearing, would result in habitat degradation and increased sensory-based disturbance. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Impacts to wildlife under Alternative 3 would be long-term, negligible to minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to wildlife from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact wildlife. These activities would provide only negligible additional long-term and adverse impacts to wildlife.

Conclusions: Impacts to wildlife under Alternative 3 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.

IMPACTS TO WILDLIFE FROM ALTERNATIVE 4 (THE PREFERRED)

Alternative 4 is similar to Alternative 3, except that a 0.1-mile trail from the bog overlook to the bog edge overlook has been added. This trail would be constructed on the existing two-track and would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Restored areas would provide increased wildlife habitat, a beneficial impact. But, trail development would also

result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area is located off old two-tracks and would require some cut and fill and tree removal, resulting in habitat degradation. Additionally, some possible trampling could occur, as well as the introduction of visitors to an area that has seen little use, resulting in increased sensory-based disturbance to wildlife. Development of the bog overlook, access, and vista clearing, as well as development of the bog edge overlook would result in habitat degradation and increased sensory-based disturbance. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Impacts to wildlife under Alternative 4 would be long-term, negligible to minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to wildlife from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact wildlife. These activities would provide only negligible additional long-term and adverse impacts to wildlife.

Conclusions: Impacts to wildlife under Alternative 4 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Residential development would be at a distance from the project area and is unlikely to impact wildlife in the project area. Close coordination with the Road Commission would reduce impacts to wildlife to a negligible level.

4.6 LISTED SPECIES

Intensity

Negligible: Listed species or habitats would not be affected or the effects would be at or below the level of detection and would not be measurable or of perceptible consequence to these species.

Minor: Listed 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 before impacts could no longer be detected.

Long-term: Effects lasting longer than two years before impacts could no longer be detected.

IMPACTS TO LISTED SPECIES FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people would use old two-tracks or travel off-trail for access. Small animals could be impacted from possible trampling or disturbance from noises, sights, or scents associated with visitor use (sensory-based disturbance). Some trampling of vegetation on the two-tracks and off-trail would occur due to foot traffic. Vegetative growth would continue to be trampled on the portion of the route from the end of Lanham Road south that is currently being accessed by motor vehicles (unless that road was closed to motor vehicles). Impacts to listed species under Alternative 1 (No Action) are expected to be long-term, negligible, and adverse, but no site-specific surveys have been conducted.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to wildlife from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact listed species. These activities would provide only negligible additional long-term and adverse impacts to listed species.

Conclusions: Impacts to federally-listed species would not be expected. Impacts to other listed species under Alternative 1 (No Action) would be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat in the road right-of-way to a negligible level.

IMPACTS TO LISTED SPECIES FROM ALTERNATIVE 2

Under Alternative 2, existing two-tracks included as part of the trails system would be transformed into single-track primitive trails. To accomplish this, one track would be restored, naturally or through enhanced NPS efforts. Restored areas would provide increased wildlife habitat, a beneficial impact. But, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Small numbers of people would also continue to travel off-trail to access the bog. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area is located off old two-tracks and would require some cut and fill and tree removal, resulting in habitat alternation. Additionally, some possible trampling could occur, as well as the introduction of visitors to an area that has seen little use, resulting in increased sensory-based disturbance to wildlife. Small

diameter woody vegetation and ground cover would be removed and deadfalls cleared off the trail tread. NPS natural resources staff would conduct appropriate plant and animal surveys in advance of finalizing new trail alignments off existing two-tracks to protect these resources. In the event that universally accessible trail segments and trailheads are developed, any potential impacts to listed species would be mitigated by avoidance or by using sustainable trail design guidelines. Overall, Alternative 2 would result in increased visitor use of the area and an increased potential for listed species mortality from possible trampling, some habitat alteration (northern area or on universally accessible trail segments), and increased sensory-based disturbance. Additionally, hunting activity may increase due to more awareness of this area. Impacts to listed species under Alternative 2 would be long-term, negligible to minor, and adverse.

Per the USFWS, tree clearing would be avoided when endangered bats (northern long-eared bat, Indiana bat) may be present (April 1 - September 30). Alternatively, the NPS would need to conduct emergence or other surveys before tree removal.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to listed species from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact listed species. These activities would provide only negligible additional long-term and adverse impacts.

Conclusions: Impacts to federally-listed species would be largely avoided through appropriate tree clearing restrictions and surveys. Impacts to other listed species under Alternative 2 would be long-term, negligible to minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat to a negligible level. Many of these listed species are found in wetland habitats, which would be avoided.

IMPACTS TO LISTED SPECIES FROM ALTERNATIVE 3

Alternative 3 is similar to Alternative 2, except that a trail to the proposed bog overlook has been added. This trail would be constructed on the existing two-track and would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Restored areas would provide increased wildlife habitat, a beneficial impact. But, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area is located off old two-tracks and would require some cut and fill and tree removal, resulting in habitat alteration. Additionally, some possible trampling would occur, as well as the introduction of visitors to an area that has seen little use, resulting in increased sensory-based disturbance to wildlife. Development of the bog overlook and access, and vista clearing, would result in habitat degradation and increased sensory-based disturbance. Small diameter woody vegetation and ground cover would be removed and deadfalls cleared off the trail tread. In spite of NPS

efforts, social trails created from the bog overlook could impact listed species in and around the bog. In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines. Impacts to listed species under Alternative 3 would be likely be long-term, minor, and adverse, due to surveys conducted prior to trail and overlook construction to protect these resources. Many of these listed species are found in wetland habitats, which would be avoided.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to listed species from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact listed species. These activities would provide only negligible additional long-term and adverse impacts.

Conclusions: Impacts to federally-listed species would be largely avoided through appropriate tree clearing restrictions and surveys. Impacts to other listed species under Alternative 3 would be long-term, minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat to a negligible level. Many of these listed species are found in wetland habitats, which would be avoided.

IMPACTS TO LISTED SPECIES FROM ALTERNATIVE 4 (THE PREFERRED)

Alternative 4 is similar to Alternative 3, except that a 0.1-mile trail from the bog overlook to the bog edge overlook has been added. This trail would be constructed on the existing two-track and would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Restored areas would provide increased wildlife habitat, a beneficial impact. But, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area is located off old two-tracks and would require some cut and fill and tree removal, resulting in habitat degradation. Additionally, some possible trampling could occur, as well as the introduction of visitors to an area that has seen little use, resulting in increased sensory-based disturbance to wildlife. Development of the bog overlook, access, and vista clearing, as well as development of the bog edge overlook would result in habitat degradation and increased sensory-based disturbance. Small diameter woody vegetation and ground cover would be removed and deadfalls cleared off the trail tread. Resource surveys conducted prior to finalizing the alignment of new trail segments and the location of overlooks would allow for project adjustments to be made to protect listed species. In spite of NPS efforts, social trails created from the bog edge overlook could impact listed species in and around the bog. Impacts to listed species under Alternative 4 would be likely long-term, minor, and adverse. Many of the state species of concern are found in wetland habitats, and the bog edge overlook would introduce increased visitation to this fragile area. This increased visitation would increase the potential for adverse impacts to sensitive bog species.

In the event that universally accessible trail segments and trailheads are developed, any impacts to wildlife would be mitigated by using sustainable trail design guidelines.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to listed species from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation, and invasive plant migration that could result in habitat loss. Any residential developments are at a distance from the project area and are not likely to impact listed species. These activities would provide only negligible additional long-term and adverse impacts.

Conclusions: Impacts to federally-listed species would be largely avoided through appropriate tree clearing restrictions and surveys. Impacts to other listed species under Alternative 4 would be long-term, minor, and adverse. Restored portions of trail (one track on non-universally accessible segments) would provide increased wildlife habitat, a beneficial impact. But conversely, trail development would also result in increased visitation and possible trampling of small animals, as well as sensory-based disturbance. Any residential development would be at a distance from the project area and is unlikely to impact listed species in the project area. Close coordination with the Road Commission would reduce impacts to habitat to a negligible level. Many of these listed species are found in wetland habitats, which would be avoided.

4.7 GEOLOGY AND SOILS

Intensity

Negligible: Soils would not be affected, or the effects to soils would be below or at the lower levels of detection. Changes in drainage characteristics, including water flow, soils, and topography, within the project area would not be detectable using standard measurement techniques.

Minor: The effects to soils would be detectable. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful. Changes in drainage characteristics within the project area would be detectable but would have a local and temporary impact. Mitigation could possibly be required to offset adverse impacts and would be relatively simple to implement (e.g., increasing culvert size, configuration, or placement).

Moderate: The effect on soils 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. Changes in drainage characteristics within the project area would be detectable, would impact a large area, and could result in some localized flooding during rain events. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.

Major: The effect on soils would be readily apparent and would substantially change the character of the soils over a large area in and outside of the national lakeshore. Mitigation measures to offset adverse effects would be necessary and extensive, and their success could not be guaranteed. Changes in drainage characteristics within the project area would be readily apparent and widespread, and could result in increased flooding during rain events.

Duration

Short-term: Recovers in less than three years. Impacts are not detectable after this time.

Long-term: Takes more than three years to recover. Impacts are still detectable after three years.

IMPACTS TO GEOLOGY AND SOILS FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people would use old two-tracks or travel off-trail for access. Recent field observations found little to no erosion from use of these two-tracks, except for the highly-rutted mud hole caused by motor vehicles south of the end of Lanham Road. This road could be closed by the NPS to protect park resources. Impacts to geology and soils under Alternative 1 (No Action) would be long-term, negligible, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to geology and soils from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and are not likely to impact geology and soils. These activities would provide only negligible additional long-term and adverse impacts to geology and soils.

Conclusions: Impacts to geology and soils under Alternative 1 (No Action) are expected to be long-term, negligible, and adverse. Current visitor use is low and most is on existing two-tracks. Any residential development would be at a distance from the project area and is unlikely to impact geology and soils in the project area. Close coordination with the Road Commission would reduce impacts in and adjacent to the road right-of-way to a negligible level.

IMPACTS TO GEOLOGY AND SOILS FROM ALTERNATIVE 2

Under Alternative 2, existing two-tracks included as part of the trails system would be transformed into single-track primitive trails. To accomplish this, one track would be restored, naturally or through enhanced NPS efforts. Long-term, minor, and adverse impacts to soils would occur during this activity. Approximately 0.2-miles of the Kettles Loop at the northern end of the project area is the only section in any of the action alternatives (other than a short spur at the bog overlook in Alternatives 3 and 4) that is located off old two-tracks and would require some cut and fill along steep side slopes. Grading activities for the formal parking area and drive would require some earth movement at these sites, which have been previously disturbed. Also, possible grading activities would be required in the open area near the end of Lanham Road if universally accessible parking is proposed, but this area has also been previously disturbed. A universally accessible trail segment at this location and in the southwest corner of the project area would require grading to construct a hardened surface and to minimize grades. Impacts to geology and soils under Alternative 2 would be short-term minor and adverse, principally due to the 0.2-miles of trail construction off existing two-tracks, in an area with steep side slopes, and where universally accessible trails and trailheads are proposed. Sustainable trail construction and maintenance methods

would minimize long-term erosion issues resulting in long-term impacts to geology and soils being negligible and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to geology and soils from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and are not likely to impact geology and soils. These activities would provide only negligible additional long-term and adverse impacts to geology and soils.

Conclusions: Impacts to geology and soils under Alternative 2 are expected to be short-term, minor, and adverse, principally due to the 0.2-miles of trail construction off existing two-tracks, in an area with steep side slopes, and where universally accessible trails and trailheads are proposed. In the long-term, however, impacts would be negligible, and adverse with sustainable trail construction and maintenance methods.

IMPACTS TO GEOLOGY AND SOILS FROM ALTERNATIVE 3

Alternative 3 is similar to Alternative 2, except that a 0.2 mile trail to the proposed bog overlook has been added. The existing two-track would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Some soil would be removed to develop this trail, the short spur from the two-track to the overlook, and to the bog overlook itself. Also, possible grading activities would be required in the open area near the end of Lanham Road if universally accessible parking is proposed, but this area has also been previously disturbed. A universally accessible trail segment at this location and in the southwest corner of the project area would require grading to construct a hardened surface and to minimize grades. Impacts to geology and soils under Alternative 3 would be short and long-term, minor, and adverse, principally due in the short-term to construct new trail segments, overlooks, and any universally accessible trails or trailheads, and negligible to minor in the long-term due to erosion impacts resulting from the development of social trails to the bog.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to geology and soils from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and are not likely to impact geology and soils. These activities would provide only negligible additional long-term and adverse impacts to geology and soils.

Conclusions: Impacts to geology and soils under Alternative 3 are expected to be short-term, minor, and adverse, principally due to construction of the new trail segment, overlooks, and potential universally accessible trails and trailheads, and negligible to minor in the long-term due to erosion impacts resulting from development of social trails to the bog.

IMPACTS TO GEOLOGY AND SOILS FROM ALTERNATIVE 4 (THE PREFERRED)

Alternative 4 is similar to Alternative 3, except that a new trail would be constructed from the bog overlook to the bog edge overlook, using an existing two-track road, with slopes of 30%. The existing two-track would be converted to a single-track by restoring one track, naturally or through enhanced NPS efforts. Trail construction would be guided by sustainable trail design guidelines (Appendix 1) to eliminate or minimize erosion and sedimentation impacts to the water quality of the bog below.

Under Alternative 4, the bog edge overlook may be a hardened surface (such as wood, a composite material, or metal) due to the wetness of the area, especially in the spring, and would be raised above the ground surface. Soil removal at this site would be limited to specific area where support posts were set. Also, possible grading activities would be required in the open area near the end of Lanham Road if universally accessible parking is proposed, but this area has also been previously disturbed. A universally accessible trail segment at this location and in the southwest corner of the project area would require grading to construct a hardened surface and to minimize grades. Impacts to geology and soils under Alternative 4 would be short-term, minor, and adverse, principally due in the short-term to construction of new trail segments and overlooks, and negligible to minor in the long-term due to erosion impacts resulting from the development of social trails to the bog.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. Measures would be taken to reduce or eliminate any impacts to geology and soils from county road improvements by closely working with the Road Commission to reduce erosion and sedimentation. Any residential developments are at a distance from the project area and are not likely to impact geology and soils. These activities would provide only negligible additional long-term and adverse impacts to geology and soils.

Conclusions: Impacts to geology and soils under Alternative 4 are expected to be short-term, minor, and adverse, principally to construction of new trail segments, overlooks, and potential universally accessible trails and trailheads, and negligible to minor in the long-term due to erosion impacts resulting from development of social trails to the bog.

4.8 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 effects 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 FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people would use old two-tracks or travel off-trail for access. Activities would include hiking, nature observation, snowshoeing, cross-country skiing, and hunting. The opportunities for experiencing a unique geological with unique vegetation would be limited to a few. No formal educational or interpretive programs would be offered by the NPS. Impacts to visitor use and experience under Alternative 1 (No Action) would be beneficial, because some opportunities would be available.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements may impact visitor use from noise or visual impacts during construction. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact visitors. These activities would provide only negligible additional long-term and adverse impacts to visitors.

Conclusions: Impacts to visitor use and experience under Alternative 1 (No Action) are expected to be beneficial. Some limited opportunities for recreation currently exist and adjacent county roads and residential areas would provide negligible impact.

IMPACTS TO VISITOR USE AND EXPERIENCE FROM ALTERNATIVE 2

Under Alternative 2, visitors would experience a trail system that provides the opportunity to experience geological phenomena and unique plants in a natural, primitive setting. The trail system would access kettles and wetlands, but would not access the bog. Safe, off-highway parking would be provided and a well-marked, but primitive, trail would provide security to those unfamiliar with the area. Orientation and interpretive signage would be provided at appropriate locations. Some universally accessible trail segments and trailheads may be developed. Visitor use numbers would likely increase from existing numbers, although since no surveys have ever been conducted, the NPS is not aware of current visitation. Visitor use counts for mainland National Lakeshore trails were conducted in early August 2000 as part of the *2001 Transportation Study* (NPS 2001). A trail with similar visitation as is expected for the Kettles Trail is Windy Moraine, on M-109 near the Pierce Stocking Scenic Drive entrance. During the one-day (9:00 a.m. - 5:00 p.m., August 2000) use count, Windy Moraine Trail had 13 hikers. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected since this location is removed from other trails on

the mainland and the typical park visitor has so many places to go and things to experience in a short time period. Hunting activity would continue, especially in the fall, but due to low numbers of hunters and trail users, conflicts would be unlikely (similar to most other areas in the park). Impacts to visitor use and experience under Alternative 2 would be beneficial due to additional opportunities afforded to visitors.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements may impact visitor use from noise or visual impacts during construction. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact visitors. These activities would provide only negligible additional long-term and adverse impacts to visitors.

Conclusions: Impacts to visitor use and experience under Alternative 2 are expected to be beneficial. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected. Impacts from adjacent county road maintenance and residential areas would provide negligible impact.

IMPACTS TO VISITOR USE AND EXPERIENCE FROM ALTERNATIVE 3

Alternative 3 is similar to Alternative 2, but it includes a new trail to a new bog overlook. This alternative would provide an estimated 0.8 miles of additional trail (roundtrip) and access to an overlook above the bog. This added trail and overlook would provide additional opportunities for education and interpretation by a variety of methods. Some universally accessible trail segments and trailheads may be developed. Hunting activity would continue, especially in the fall, but due to low numbers of hunters and trail users, conflicts would be unlikely (similar to most other areas in the park). Impacts to visitor use and experience under Alternative 3 would be beneficial due to the additional opportunities afforded to visitors.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements may impact visitor use from noise or visual impacts during construction. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact visitors. These activities would provide only negligible additional long-term and adverse impacts to visitors.

Conclusions: Impacts to visitor use and experience under Alternative 3 are expected to be beneficial. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected. Impacts from adjacent county road maintenance and residential areas would provide negligible impact.

IMPACTS TO VISITOR USE AND EXPERIENCE FROM ALTERNATIVE 4 (THE PREFERRED)

Alternative 4 is similar to Alternative 3, but it includes an additional 0.2 mile trail (roundtrip) from the bog overlook to a new bog edge overlook. This added trail and overlook would provide additional opportunities for education and interpretation by a variety of methods. Some universally accessible trail segments and trailheads may be developed. Hunting activity would continue, especially in the fall, but due to low numbers of hunters and trail users, conflicts would be unlikely (similar to most other areas in

the park). Impacts to visitor use and experience under Alternative 4 would be beneficial due to the additional opportunities afforded to visitors.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements may impact visitor use from noise or visual impacts during construction. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact visitors. These activities would provide only negligible additional long-term and adverse impacts to visitors.

Conclusions: Impacts to visitor use and experience under Alternative 4 are expected to be beneficial. Even with the construction of off-highway parking, formal trails, possible universally accessible trails, and interpretation, low visitor use counts would be expected. Impacts from adjacent county road maintenance and residential areas would provide negligible impact.

4.9 PARK FACILITIES AND OPERATIONS

Intensity

Negligible: National Lakeshore 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 National Lakeshore operations.

Minor: The effect would be detectable, but would be of a magnitude that would not have an appreciable effect on National Lakeshore operations. If mitigation were 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 National Lakeshore 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 National Lakeshore operations in a manner noticeable to staff and the public, and would be markedly different from existing operations. Mitigation measures to offset adverse effects would be necessary and 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 ON PARK FACILITIES AND OPERATIONS FROM ALTERNATIVE 1 (NO ACTION)

Under No Action, no new developments would be constructed and the project area would continue to exist as a little known part of the National Lakeshore. Small numbers of people would use old two-tracks or travel off-trail for access. Law enforcement rangers occasionally patrol the area, especially during

firearm deer hunting season. Impacts to park facilities and operations under Alternative 1 (No Action) would be beneficial, since the project area has little to no impact on park operations currently.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements would require NPS staff time to coordinate activities with the Road Commission to insure minimal impacts on park resources. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact park facilities or operations. These activities would provide only negligible additional long-term and adverse impacts to park facilities and operations.

Conclusions: Impacts to park facilities and operations under Alternative 1 (No Action) are expected to be long-term, negligible, and adverse. Little staff time is expended on this area, other than occasional law enforcement patrols. Adjacent residential development and county road maintenance provide additional negligible impacts.

IMPACTS ON PARK FACILITIES AND OPERATIONS FROM ALTERNATIVE 2

Under Alternative 2, a trail system and parking would be constructed, and appropriate signage and interpretation added. All park divisions, as well as park management, would be affected. The Maintenance Division would construct and maintain the facilities, with assistance from the Friends of Sleeping Bear Dunes. The Interpretation and Visitor Services Division would provide information publications, as well as educational and interpretive programs and materials. The Visitor and Resource Protection Division would provide law enforcement, search and rescue, and medical emergency services. The Natural Resources Division would provide research, monitoring, invasive plant eradication, and restoration services. And, the Administrative Division would provide administrative support to all of the above activities. Park management would oversee and coordinate the activities of the five divisions. Partnership groups, such as the Friends of Sleeping Bear Dunes, would be actively involved in trail maintenance and use monitoring, which would lessen the burden on park staff and budget. Impacts to park facilities and operations under Alternative 2 would be long-term, minor, and adverse. This project is only a very small part of the overall National Lakeshore facilities and operations system.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements would require NPS staff time to coordinate activities with the Road Commission to insure minimal impacts on park resources. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact park facilities or operations. These activities would provide only negligible additional long-term and adverse impacts to park facilities and operations.

Conclusions: Impacts to park facilities and operations under Alternative 2 are expected to be long-term, minor, and adverse. All park divisions, as well as the Friends group, would be affected by the proposed development. Adjacent residential development and county road maintenance provide additional negligible impacts.

IMPACTS ON PARK FACILITIES AND OPERATIONS FROM ALTERNATIVE 3

Impacts under Alternative 3 would be similar to Alternative 2, except that another 0.2 miles of trail and an additional overlook would increase operational time and costs slightly. Impacts to park facilities and operations under Alternative 3 would be long-term, minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements would require NPS staff time to coordinate activities with the Road Commission to insure minimal impacts on park resources. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact park facilities or operations. These activities would provide only negligible additional long-term and adverse impacts to park facilities and operations.

Conclusions: Impacts to park facilities and operations under Alternative 3 are expected to be long-term, minor, and adverse. All park divisions, as well as the Friends group, would be affected by the proposed development. Adjacent residential development and county road maintenance provide additional negligible impacts.

IMPACTS ON PARK FACILITIES AND OPERATIONS FROM ALTERNATIVE 4 (THE PREFERRED)

Impacts under Alternative 4 would be similar to Alternative 3, except that another 0.1 miles of trail and an additional overlook at the bog edge would increase operational time and costs slightly. Impacts to park facilities and operations under Alternative 4 would be long-term, minor, and adverse.

Cumulative Impacts: Residential development and county road improvement activities could occur adjacent to the project area. County road improvements would require NPS staff time to coordinate activities with the Road Commission to insure minimal impacts on park resources. Any residential developments are at a distance from the project area, screened by large evergreens, and are not likely to impact park facilities or operations. These activities would provide only negligible additional long-term and adverse impacts to park facilities and operations.

Conclusions: Impacts to park facilities and operations under Alternative 4 are expected to be long-term, minor, and adverse. All park divisions, as well as the Friends group, would be affected by the proposed development. Adjacent residential development and county road maintenance provide additional negligible impacts.

4.10 ENVIRONMENTAL COMMITMENTS

In order to reduce, minimize, and avoid impacts to the impact topics identified previously, the NPS will conduct the following activities before, during, and after trail construction, should an action alternative be selected:

- Follow the elements of Appendix 1. *Sustainable Trail Guidelines*.
- Prior to constructing overlooks or any segments of trail not contained within the footprint of the existing two tracks, archeologists from MWAC will be consulted to determine if additional archeological survey is necessary. If additional survey is needed, this will be completed prior to

finalizing the site of the overlook and/or trail route. If resources are discovered, design adjustments would be made in to ensure that adverse impacts to archeological resources are avoided.

If during trail construction 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 appropriate mitigation strategy developed, if necessary, in consultation with NPS archeologists and the State Historic Preservation Office (SHPO). In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during trail 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.

- No recent detailed wildlife or plant inventories have been conducted in the project area. Appropriate surveys will be conducted prior to finalizing trail segments and construction, especially in those areas that leave previously disturbed two-tracks. Surveys during different growing seasons (spring, summer, fall) are necessary to identify these resources.
- Per the USFWS, tree clearing would be avoided when listed bats (northern long-eared bat, Indiana bat) may be present (April 1 - September 30). Alternatively, the NPS would need to conduct emergence or other surveys before tree removal.
- Signs would be erected in the vicinity of Lanham Road to alert visitors that lands to the north are private. Any site information (maps and brochures) provided by the NPS would clearly identify private lands and discourage public entry.
- Fire management activities would be sensitive of the areas resources.
- All activities would closely follow the provisions of the 2011 *Great Lakes Invasive Plant Management Plan / Environmental Assessment* to reduce the potential spread of invasive plant species.
- Construction equipment and tools would be cleaned prior to being brought on site to minimize the potential of transferring invasive plant seeds to the area.

5. Consultation and Coordination

5.1 EARLY COORDINATION (SCOPING)

On April 15, 2013, a letter was mailed to 80 federal, state, and local agencies, tribes, elected officials, groups, and interested individuals asking for ideas on what issues and concerns 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 April 16, 2013, a press release was distributed electronically to the 58 media outlets in the National Lakeshore's media database. The official comment period ended on May 20, 2013.

As a result, 11 comments were received from the PEPC website, six emails, and four handwritten or typed letters, for a total of 21 comments. The comments received were organized into seven broad subject areas:

- Private property and trespass
- Parking and access
- Visitor use
- Resource protection
- Planning and public involvement
- Hazards
- Other comments

Descriptions of these comment categories are found in section 1.7 Scoping and Issues. Copies of the public scoping letter and press release are found in Appendix 2.

5.2 PUBLIC PARTICIPATION

A public open house for this project is planned for summer 2014. The purpose of this open house is to provide the general public with information regarding the project purpose and need, alternatives considered, and the Preferred Alternative. Input from this meet will be used to obtain comments and further refine information assembled to date.

5.3 LIST OF PREPARERS

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Photographs



Wider Two-Track (Photo courtesy of Kerry Kelly)



Narrower Two-Track (Photo courtesy of Kerry Kelly)



Steep Topography in Northern Part of the Project Area (Photo courtesy of Kerry Kelly)

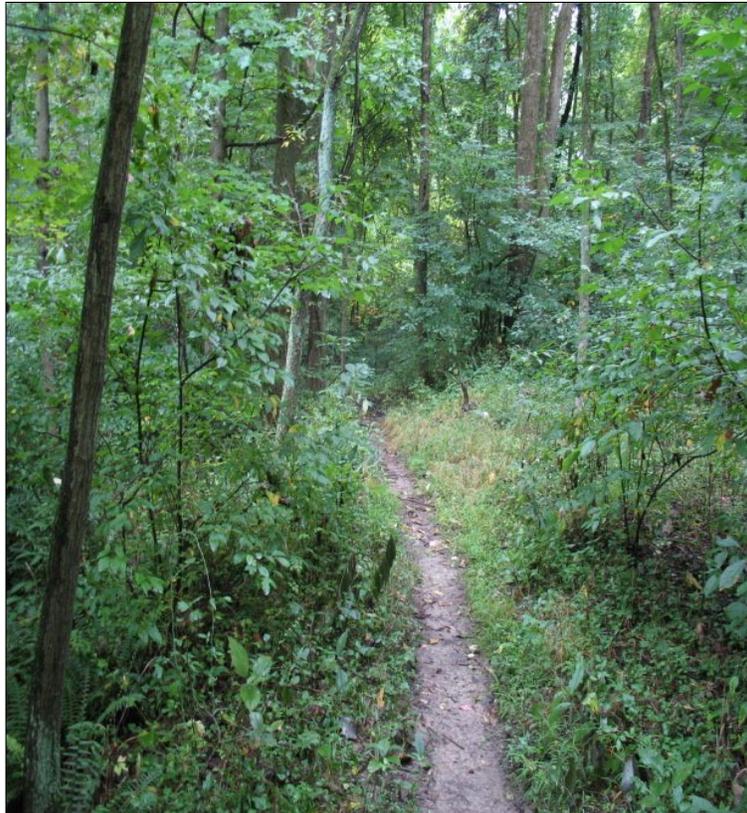


The Bog (Photo courtesy of Kerry Kelly)

Appendix 1

Sustainable Trail Guidelines

Sleeping Bear Dunes National Lakeshore



Sleeping Bear Dunes National Lakeshore
National Park Service
2014

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Section 1: Introduction

Successful management of trails on National Park Service (NPS) owned lands in the Bow Lakes Unit of Sleeping Bear Dunes National Lakeshore (National Lakeshore, Park), will be critical for the protection of park resources and to provide safe and enjoyable recreational trails. These Sustainable Trail Guidelines (Guidelines) were developed with the purpose of establishing a trail(s) that can be managed with minimal resources. The Guidelines will assist the Park in setting benchmarks for trail conditions that will result in an optimum trail system within the Bow Lakes Unit. These Guidelines are meant to supplement existing NPS and National Lakeshore trail construction and maintenance standards.

Currently these Guidelines are to be applicable to the Kettles Trail being planned for the southern half of the Bow Lakes Unit. If lands north of Lanham Road come into federal ownership, the trail system may be extended. If extended, these Guidelines would serve to guide the development of additional segments of trail.

• **Key Guidance and Principles for Sustainable Trail Guidelines.**

National Park Service Management Policies (2006) direct the policy of the National Park Service and its management of park units. Section 9.2.2, Trails and Walks of the NPS Management Policies, outline general guidance for their management in National Park units:

“All trails and walks will be carefully situated, designed and managed to 1) reduce conflicts with automobiles and incompatible uses; 2) allow for a satisfying park experience; 3) allow accessibility by the greatest number of people; and 4) protect park resources.”

Sustainable Trails in Bow Lakes Unit of Sleeping Bear Dunes National Lakeshore. To achieve the NPS management policy for trails and goals for sustainability, the National Lakeshore will adhere to the desired sustainable condition of its trails.

“A trail that has been designed and constructed to such standard that it does not adversely impact natural and cultural resources, can withstand the impacts of the intended user while receiving only routine cyclic maintenance and meets the needs of the intended user to a degree that they do not deviate from the established trail alignment” (Beers, 2009).

Guiding Principles. To achieve the desired condition of trails in the Park, principles are set forth to guide the work of the park and its partners.

Ecological: Develop trails in a manner to avoid diminishing the natural environment or the experience of being in a natural setting through the protection, restoration and management of natural ecosystems associated with trail development.

Physical: The physical condition of the trails shall aim to achieve the following goals.

- Design trails to retain their physical form relative to their use and natural conditions in which they exist.
- Safety for trail users is a primary part of the design process.
- Connectivity to provide key access areas for multiple trail options and linking trails

together for commuting and exercise.

Stewardship: Design trails that will provide a positive visitor experience that encourages the trail user to want to protect that experience through stewardship activities including using trails appropriately, avoiding impacts and educating others about sustainable trail ethics.

(Adapted from Minnesota Department of Natural Resources, Trail Guidelines, 2007)

Sections of the Guidelines. The Trail Guidelines are divided into four primary sections. Note that existing National Lakeshore and NPS standards and practices will be followed for construction and general maintenance.

Section 1: Introduction.

Section 2: Trail Plan Procedures and General Trail Classification Guidance. This section outlines general trail classification system that will be utilized by the Park for design and management.

Section 3: Trail Planning and Design of Trail. This section outlines the basic principles, steps and practices to administer for the site assessment and design of a trail in the Park.

Section 4: Management and Maintenance. This section sets forth basic policy guidance for trail management that will sustain the trails for future generations.

Section 2: Trail Planning Procedures and Trail Classification Guidance

This section outlines guidance for general planning and site design of trails on federal lands in the Bow Lakes Unit of the National Lakeshore. This section includes general steps of the trail development process, trail development levels compatible with the area, design guidelines for each trail type in the area, elements of site assessment, and best practices for physical design of the trail. Additionally, general guidance for trail facilities is provided.

• **Trail Development Process**

The long-term success of a trail and its sustainability is predicated on the concept that all phases of trail development are equally critical. This section outlines activities to be conducted during the life cycle of a trail. This cycle begins with approval of a trail by the Superintendent. Upon this approval, the following planning steps are recommended:

Trail Design Team. A project manager will be assigned at the initiation of the project. The team will serve as advisors and reviewers during the trail planning, design, and construction process. The team can consist of maintenance trails supervisor, natural resource specialists, and cultural resource specialists as deemed necessary to the trail location and conditions. Based upon the conditions of the proposed trail, additional trail team members, including volunteers, may be identified.

Determine Intent of Trail. The Trail Design Team will determine the trail (or trail segment) development level and its intended use to guide its planning and design.

General Site Assessment for Trail Alignment. A site visit will be conducted to identify challenges and opportunities for its general alignment. The assessment will identify sensitive areas of native plant communities, critical habitat, wetlands, archeological, historic, cultural landscape features, steep slopes, erodible soils, and pertinent issues specific to the site that will need to be addressed during its design and construction. The assessment will identify landscape features, viewsheds, and destinations that provide interest, sequence, and reduce repetitiveness. The Trail Design Team will assist to identify areas, features, conditions and issues.

Flagging the Trail Alignment Corridor. The project manager will flag the proposed trail layout in the field. The layout will be reviewed by the Trail Design Team for cultural and ecological, recreational, interpretive and sustainability considerations.

Finalize construction plans and permits. This will include final specifications, cost estimates, construction techniques, and equipment guidance as appropriate to the construction requirements.

Construct Trail. Follow existing NPS and National Lakeshore trail construction and maintenance guidelines for sustainable trail development consistent with the intended use.

Formalize management and maintenance plan. Identify schedule and staffing and/or volunteers for maintenance and monitoring.

• **Trail Management Objectives, Classifications & Types**

The environmental surroundings of a trail can have a profound effect on its design, desired experience

and how it is maintained and managed. The varied user interests and volume of use guides planning and development needed to satisfy visitor expectations while minimizing disturbance and impacts. To achieve sustainable trails, the National Lakeshore will utilize the trail classification guidance of the National Park Service and U.S. Forest Service and trail types based upon its primary trail use.

Trail classification and designed use establishes the general level of management of a trail based upon their level of development and relationship to park resources. Trail types provide specific design prescriptions of trail types based upon the primary trail use of a trail segment.

Combined, the general trail class and specific trail type establishes a trail management system for each trail in the Park that prescribes applicable design, construction and maintenance for specific conditions.

As defined by the U.S. Forest Service, “a standard trail is a trail that has a surface consisting predominantly of the ground and that is designed and managed to accommodate use on that surface.” Trail classes are general categories reflecting trail development scale. The U.S. Forest Service has established five trail classes ranging from least developed to the most developed. These classes and their level of development are:

- Class 1: Primitive/Undeveloped
- Class 2: Simple/Minor Development
- Class 3: Developed/Improved
- Class 4: Highly Developed
- Class 5: Fully Developed

Only Classes 2 through 3 are considered applicable to the Bow Lakes Unit.

The National Park Service has five similar types of trails of similar but not identical classification.

- Type C: Wilderness Trails
- Type B: Minor Trails
- Type A: Major Trails
- Type D: Walks
- Type E: Other

Type B would be considered applicable to the Bow Lakes Unit.

Design parameters provide technical guidelines for the survey, design, construction, maintenance, and assessment of trails. Design parameters are based on their Designed Use and Trail Class/Type and consistency with management intent. Local deviations from any Design Parameter may be established based on trail-specific conditions, topography, or other factors, provided that the deviations are consistent with the general intent of the applicable use and type.

Table 1: General Trail Classifications

	Trail Class 2 Simple/Minor Development	Trail Class 3 Developed/ Improved
		
Typical Trail Experience	Natural and generally unmodified	Natural but modified in some areas
Tread & Traffic Flow	Tread narrow and rough Few or no allowances for passing Native materials	Tread is obvious and continuous. Width accommodates unhindered one-lane travel, occasional allowances for passing.
Obstacles	Obstacles occasionally present. Blockages cleared to define route and protect resources. Vegetation may encroach into trailway.	Obstacles infrequent. Vegetation cleared outside of trailway with minimum edge.
Constructed Features & Trail Elements (bridges, walls, raised trail, steps, etc)	Structures are minimal to non-existent, where they do exist, are limited in size, scale and number. Structures where protection of trail infrastructure and resources are needed. Natural drainage and infiltration practices are utilized.	Trail structures as needed for resource protection and appropriate access. Generally native materials used. Limited drainage structures or natural drainage practices are utilized.
Maintenance Indicators & Intensity	Routine annual maintenance. Maintenance in response to reports of unusual resource problems requiring repair/resource protection/ trail safety.	Routine annual maintenance. Maintain clearance for user convenience/recreational experience. Maintenance in response to reports of unusual resource problems requiring repair/resource protection/ trail safety.

Based on United States Forest Service Trail Classification System but modified for National Lakeshore use.

Trail Types

Two types of trails are identified for potential implementation on federal lands in the Bow Lake Unit. Each trail type has a distinctive use and visitor experience that informs its design criteria for design guidelines recommended for each trail type. These guidelines provide a range of limits based upon the user type, intended experience, and conditions in specific trail locations. An overview of the two types is provided below and followed by specific design guidelines for each trail type. Under each trail type description, the recommended design guidance is provided for each applicable Trail Class.

Hiking Trails. Hiking Trails are used primarily by hikers. They may be used for cross-country skiing but are not designed to meet the standards for cross-country skiing. The trail tread range is typically 2-5 feet less than the 6-10 feet standard for skiing.

Interpretive Trails. Interpretive Trails are fully accessible meeting American Disability Act standards. The trail tread width is typically 5 feet.



Hiking Trails

Hiking trails are used by hikers only and in the winter for snowshoe and cross-country ski activities. Trail width is generally not designed to meet the standards for cross-country skiing and not recommended for cross-country ski activities. Two levels of hiking trail development and their design recommendations are provided.

Materials: Surfaces will range from natural to imported materials and hardened surfaces based upon trail user volume and resource conditions.

Table 2: Design Guidance, Hiking Trails

Trail Class		Trail Class 2 Simple/Minor Developed	Trail Class 3 Developed/Improved
Tread Width		12"-24"	24"-48"
Tread Surface/Material		Native with minimal to no grading and use of imported material. Mown path through meadow areas.	Native with limited grading and use of imported material. Mown path through meadow areas.
Trail Grade	Target Range (>90% of trail)	<18%	<10%
	Short Pitch Max (up to 200' lengths)	25%	20%
	Max Pitch Density	<5% of trail	<5% of trail
Cross-Slope	Target Range	5-10%	3-5%
	Maximum	Up to natural side-slope	10%
Design Clearing	Width	6"-12" outside of tread edge	12"-18" outside of tread edge
	Height	6'	8'
Design Turns	Radius	No minimum	8'-10'



Interpretive Trail

Interpretive trails are accessible from primary trail corridors or trailheads. Interpretive trails serve as the primary venue to provide interpretation and education on distinctive Park resources. The trail tread width and surface will adhere to the minimum ADA standards and create a trail that provides access to the widest range of trail user abilities.

Materials: Surfaces will range from natural to imported materials and hardened surfaces based upon trail user volume and resource conditions.

Table 3: Design Guidance, Interpretive Trail

Designed Use Interpretive Trail		Trail Class 3 Developed/Improved
Tread Width		ADA/minimum
Tread Surface/Material		Surface meet ADA standards
Trail Grade	Target Range	<5%
	Short Pitch Max (up to 200' length)	8%
	Max Pitch Density	<3% of trail
Cross-Slope	Target Range	ADA/Minimum
	Maximum	ADA/Minimum
Design Clearing	Width	ADA standards
	Height	ADA Standards
Design Turns	Radius	ADA standards

Section 3: Guidance for Site Planning and Design

General Site Assessment/Design

Site planning is the first step to establish a safe and sustainable trail for visitors to enjoy. Evaluating general site conditions for trails and trailheads is critical to the long term management and sustainability of the trail and surrounding park resources. These general trail alignment and design principles have been compiled from other recent National Park Service Trail Plans and guided from past work and publications on sustainable trail development throughout the United States.

Existing National Lakeshore trail construction standards will be followed during construction implementation but are guided by these sustainable trail standards.

Trail Location. Existing use corridors that meet the sustainable guidelines should be considered during the site assessment process. The most sustainable trails are located along sidehills. Sidehill design assists with water drainage on the trail and keeps users on the trail preventing trail widening. Where available in the Park, utilize sidehills for laying out the trail alignment. Where applicable and suitable conditions exist, full bench construction is recommended.

Trail Alignment. Sustainable trails traverse slopes rather than directly descending a hill side. A trail traversing a slope allows for sheet runoff of water, which will cause less erosion and minimize the creation of gullies. The following design principles and their use should be evaluated for each trail.

The Half Rule. The grade of a trail should not exceed half of the grade of the sidehill on which it is located. Exceptions to the half rule occur when soils in the location of the trail are prone to erosion, in which case the maximum sustainable trail grade may be considerably less than half of the grade of the sidehill. Except in rare and limited situations, the grade of a trail should not exceed 15 percent. In less developed trails, the cross-slope should exceed the running slope.

Sustainable Grade. The overall average grade of the trail should be generally 10% or less. An average grade of 10% or less can decrease the impacts of erosion.

Grade reversals. A grade reversal is a brief change in elevation where the trail drops subtly before rising again. Incorporating the use of grade reversals in trail design will assist in water drainage and minimize the potential for erosion.

Outslope. Trails should be built with a slight tilt (about 5%) of the trail tread toward the low side of the trail. Where outslope is difficult to implement, the use of grade reversals should be considered.

Trail Construction. Techniques such as retaining walls, switchbacks, stone paving, bridges, etc., improve trail surfaces, reduce impacts and increase sustainability. Surface hardening solutions may be required when implementing trails; these may additionally include climbing turns, stone paving, paved dips, waterbars, turnpikes, puncheon, trench drains, bridges and other solutions.

Customizing trail project guidelines per state-of-the-art scientific research and landscape architectural criteria will increase sustainability.

Natural Resources.

Sensitive Habitats and Seasonal Nesting Areas. Trails should avoid sensitive areas where: a rare and/or endangered plant or animal species exist, or is known habitat for a rare or endangered species. Trails should also avoid seasonal nesting areas or the park shall adhered to seasonal park policy, such as temporary closures, on trail use or tree clearing for those specified areas. A review of site conditions where sensitive habitats may exist within the trail planning area shall be conducted with the park biologist and if necessary with U.S. Fish and Wildlife Service. If conditions exist, establishment of buffers based upon habitat sensitivity shall be developed where temporary seasonal closures would be required, or limitations on seasonal construction. Viewing of distinct park features should also be identified during site assessment and the feasibility for visitor access.

Consultation with U.S. Fish and Wildlife Service is to be conducted for the evaluation of impacts to threatened and endangered species.

Wetlands. Trails whenever possible should avoid placement within a designated wetland. When evaluating trail elements proposed to lie within or adjacent to a wetland, the trail design team should consider means to improve wetland quality and conditions as part of the design process.

All trails where wetlands may be affected shall be evaluated in compliance with Director's Orders 77. Where the proposed trail is within 125' of a wetland, additional site evaluation by a wetland biologist may be required. Any impacts or changes to identified wetlands are required to develop and submit a Clean Water Act CWA 404 permit through the U.S. Army Corps of Engineers and permits required by the State of Michigan. To minimized impacts to aquatic resources, trail or overlook construction should occur during late fall or early spring months (winter if feasible). Access routes for construction purposes should be kept to the minimum needed.

Drainage. Problems occur when the trail interrupts the processes of natural drainage. The trail can intercept sheet flow or stream flow and become itself a stream channel. When the trails become wet, puddle or become muddy, trail users will utilize the side of the tread, thus widening the exposed soil of the tread. Trail alignment on topography that naturally assists to minimize long term drainage issues is encouraged and routing trails on primary drainage paths is discouraged. Design methods to manage stormwater and trail runoff naturally through dissipation and infiltration that will reduce runoff velocity, erosive conditions and stream headcutting should identified and developed as part of the overall design of the trail. Minor drainage infrastructure improvement may be necessary to maintain good trail drainage, but use of substantial drainage infrastructure is discouraged unless no feasible options exist and the benefit of providing the trail justifies its use.

Vegetation. Trails should avoid rare plant species or large tracts of forest areas with high diversity and quality. Areas under ecological restoration should be identified and steps taken to minimize disturbance to the restoration process. Alignment of trails should reduce fragmentation of existing blocks of forest. Two actions should occur to verify the presence of rare plants in proposed trail areas. First, a review of historical plant data should be conducted. Secondly, a site survey is to be conducted to identify rare plants or sensitive vegetative communities along the flagged route. The survey will be conducted by

qualified park or contract professionals to identify conditions in a trail planning area with a 100% visual survey of the proposed alignment. Based upon vegetation sensitivity, buffer zones may be required to protect area plants or plant communities.

Soil Conditions. The soil conditions need to be considered when determining final layout of a trail. Conditions related to a soil types, susceptibility to erosion, drainage and permeability characteristics, and its compatibility for recreational use should be evaluated. The USDA NRCS Soil Survey information will be utilized as the primary reference. When adverse trail conditions are identified in the soil survey information, the park will determine alternative options for trail design and its implementation, including but not limited to rerouting to avoid address adverse soil conditions.

Where feasible, trails are to be designed to avoid abrupt corners and sharp hills. They should be designed to insloped turns. Trail hardening practices should be used where trail soils are susceptible to soil displacement.

Cultural Resources. Coordination between the park’s cultural staff, regional archeologist, and the project team will occur to ensure that cultural resources are considered during the planning and implementation process. Cultural resources including landscape, archeological, and ethnographic features will be surveyed, identified, assessed and monitored. The level of cultural resource evaluation will be predicated on the design of the trail and its local resource conditions.

All trails where cultural resources may be affected shall be evaluated in compliance with Section 106 of the National Historic Preservation Act, Executive Order 11593 and 36 CFR Part 800. Properties identified in the area of potential effect must be evaluated according to the National Register criteria, in consultation with the State Historic Preservation Office (SHPO).

Trail alignment should avoid cultural resources. Where the proposed trail is within proximity of cultural resources restrictive fencing and contract language should protect them from construction activities.

Trailheads.

Parking. As outlined in the NPS Management Policies (Section 9.2.4, Parking Areas), “permanent parking areas will not normally be sized for the peak day, but rather for the use anticipated on an average weekend day during the peak season of use.” Materials for parking areas, including the use of porous or permeable pavement will be determined based upon site conditions, use levels and use types with the goal of minimizing impervious cover in a manner consistent with available funds. Parking design will take into consideration the types of vehicles associated with trail use.

Restrooms. Restroom facilities should be designed utilizing NPS Sustainable Design Guidelines (NPS, 2009) and NPS Climate Friendly Guidance (NPS, 2011). The type of restroom facility will be based upon demonstrated need, maintenance requirements, available infrastructure and access.

• Accessibility & Mobility Guidance

In addition to providing sustainable trails and trail amenities, it is the goal of the NPS to ensure that all people have the highest level of accessibility that is reasonable to our programs, facilities and services in conformance with applicable regulations and standards as outlined in Director’s Order #42: Accessibility for Visitors with Disabilities in National Park Service Programs and Services. It is the intent to provide accessibility to the extent feasible to all trail and facilities within the Bow Lakes Unit of the National

Lakeshore. Trails in the Bow Lakes Unit (and any associated amenities/facilities) will be evaluated to determine if compliance with standards is or is not feasible and to comply with applicable laws, standards, and park policies. The Forest Service Trail Accessibility Guidelines (FSTAG) provides guidance intended for hiker and pedestrian trails and complies with the Architectural and Transportation Barriers Compliance Board (Access Board)'s proposed guidelines for outdoor developed areas. It provides guidance for maximizing accessibility, while recognizing and protecting the unique characteristics of the natural setting of each trail.

Section 4: Trail Management and Maintenance

Existing National Lakeshore and National Park Service standards for trail maintenance (tread maintenance, viewshed management, mowing, pruning, and pathway clearing of downed trees) will be followed for trails within the Bow Lakes Unit. Additionally, the National Lakeshore may utilize seasonal or temporary trail closures not only for visitor safety reasons but also to protect sensitive habitat or species or to prevent damage to trail infrastructure. If temporary or seasonal closures prove to be ineffective, segments of trail within the Bow Lakes Unit may be rerouted. If rerouted, the previously provided sustainable trail guidelines will be followed to identify the alternate trail route.

The presence of non-designated or 'social' trails and former two-tracks within the National Lakeshore and within the Bow Lakes Unit is prevalent. The unmanaged nature of these routes can create conditions that dissect habitats, alter natural drainage conditions or otherwise impact sensitive resources. Where deemed necessary for the purposes of resource protection and/or visitor safety these routes will be actively restored to natural conditions.

Appendices

• **Appendix A. Accessible Trails Design Guidelines**

It is the goal of the NPS to ensure that all people have the highest level of accessibility that is reasonable to our programs, facilities and services in conformance with applicable regulations and standards as outlined in Director's Order #42: Accessibility for Visitors with Disabilities in National Park Service Programs and Services. This section includes two parts; applicable laws and standards and accessibility guidance for outdoor developed areas. These parts will be part of the evaluation throughout site planning, design, construction and management of all trails and trail facilities by park staff.

1.0 Applicable Laws and Standards

Architectural Barriers Act of 1968. (P.L. 90-480) requires all buildings and facilities built or renovated in whole or in part with Federal funds to be accessible to, and usable by, physically disabled persons.

Architectural Barriers Act Accessibility Standards of 2004 (ABAAS). All new and altered buildings and facilities must be designed and constructed in conformance with these standards.

Section 504 of the Rehabilitation Act of 1973. (P.L. 93-112) Section 504 requires program accessibility in all programs, activities, and services provided with Federal dollars.

Department of Interior Regulations for Section 504 (29 USC 701). Regulations for implementation of Section 504.

American with Disabilities Act of 1990 (ADA). Prohibits discrimination on the basis of disability in all State and Local Government entities (Title II) and Place of Public Accommodation (Title III). (Although Federal government is not covered by ADA, the ADA and its regulations provides guidance to Federal entities as they parallel closely with the requirements for Section 504 of the Rehabilitation Act.)

Accessibility guidance for the Park's trails will adhere to the federal guidelines for access and use of mobility devices. The guidelines will address the following items.

- Application of Revised Final Title II Regulations of the American with Disabilities Act of 1990. (42.U.S.C 12131)
- Application of the proposed and final rule of the Federal Accessibility Guidelines for Outdoor Developed Areas
- Utilization of Universal Trail Access Information Signage System
- Future reference to proposed rule on Shared Use Path Accessibility Guidelines.

2.0 Draft Accessibility Guidelines for Outdoor Developed Areas

The United States Access Board is developing accessibility guidelines, "pursuant to the Architectural Barriers Act (ABA) for camping facilities, picnic facilities, viewing areas, outdoor recreation access routes, trails and beach access routes." (United States Access Board, 2010) The guidelines would apply to

Federal land management agencies, including facilities of the National Park Service that are constructed or altered by or on behalf of the Federal government.

2.1 General technical provisions of trail accessibility. These provisions for accessibility determination include the following design elements. Design and construction of trails dedicated for universal accessibility and limited accessibility will address these elements at all phases of the implementation process in accordance with the Architectural Barriers Act

- Surface
- Clear Tread Width
- Openings
- Protruding Objects
- Tread Obstacles
- Passing Space
- Slope
- Resting Intervals
- Edge Protection
- Signage

2.2. Adherence to technical provisions for access routes, outdoor recreation access routes and accessible trails. Under the definitions of the Federal Accessibility Guidelines, there are three types of accessible routes; 1) Access routes relate to the built environment where all routes need to meet accessibility requirements, 2) outdoor recreation access routes relate to facilities in the outdoor environment where reasonable access is required, and 3) Accessible trail relates to a natural trail that is designated as suitable for all levels of ability and consistent with conditions that have been set forth by the federal guidelines.

(Table 1)

2.3 Conditions for Departure. The Outdoor Developed Areas Draft Final Rule by the United States Access Board has defined four conditions that would allow for departure from the technical provisions in the guidelines. These conditions include;

- Where compliance would cause substantial harm to cultural, historic, religious or significant natural features or characteristics.
- Where compliance would substantially alter the nature of the setting or the purpose of the facility or portion of the facility.
- Where compliance would require construction methods or materials that are prohibited by federal regulations or statutes.
- Where compliance would not be feasible due to terrain or prevailing construction practices.

Table 1. Access Route Guidance

(Source: United States Access Board, Draft Accessibility Guidelines for Outdoor Developed Areas)

TECHINICAL PROVISION FOR ACCESS ROUTES, OUTDOOR ACCESS ROUTES AND ACCESSIBLE ROUTES			
	Access Route (ADAAG)	Outdoor Access Route	Accessible Trail
Surface	Stable, firm, and slip resistant	Firm and stable	Firm and stable (exception)*
Maximum Running Slope	1:12 (8.33%)	1:20 (5%) (for any distance) 1:12 (8.33%) (for max. 50 ft) 1:10 (10%) (for max. 30 ft.)	1:20 (5%) (for any distance) 1:12 (8.33%) (for max. 50 ft.) 1:10 (10%) (for max. 30 ft.) 1:8 (12.5%) (for max. 10 ft) (Exception: 1:7 (14.3%) for 5 feet maximum for open drainage structures when * applies)
Maximum Cross-Slope	1:50 (2%)	1:33 (3.03%) (Exception: 1:20 (5%) for drainage purposes)	1:20 (5%) (Exception: 1:10 (10%) at the bottom of an open drain where clear tread width is a minimum of 42 inches.)
Minimum Clear Tread Width	36 inches 32 inches for no more than 24 inches	36 inches (Exception 32 inches when * applies)	36 inches (Exception: 32 inches when * applies)
Tread Obstacles	Changes in level: ¼ inch with no beveled edge, 1/4 – ½ inch must have a beveled edge with a max slope of 1:2 (50%) (over ½ inch = ramp)	1 inch high maximum (Exception: 2 inches high maximum where beveled with a slope no greater than 1:2 (50%) and where * applies.)	2 inches high maximum. (Exception: 3 inches maximum where running and cross slopes are 1:20 (5%) or less. (Exception *))
Passing Space	Every 200 feet where clear tread width is less than 60 inches, a minimum 60 x 60 inch space, or a T-shaped intersection of two walks or corridors with arms and stem extending minimum of 48 inches.	Every 200 feet where clear tread width is less than 60 inches, a minimum 60 x 60 inch space, or a T-shaped intersection of two walks or corridors with arms and stem extending minimum of 48 inches. (Exception: Every 300 feet where * applies.)	Every 1000 feet where clear tread width is less than 60 inches, a minimum 60 x 60 inch space, or a T-shaped intersection of two walks or corridors with arms and stem extending minimum of 48 inches. (Exception: *)
Resting Intervals	Landings: 60 inch min length, minimum width as wide as the ramp run leading to it, if change in direction occurs, much have 60 x 60 inch space.	60 inches minimum length, width at least as wide as the widest portion of the trail segment leading to the resting interval and a max slope of 1:33 (3.03%) (Exception: A max slope of 1:20 (5%) is allowed for drainage purposes.	60 inches minimum length, width, at least as wide as the widest portion of the trail segment leading to the resting interval and a max slope of 1:20 (5%) (Exception *)
*The provision may not apply if it cannot be provided because compliance would cause substantial harm to cultural, historic, religious or significant natural features or characteristics; substantially alter the nature of the setting or purpose of the facility; require construction methods or materials that are prohibited by Federal, state, or local regulations or statutes; or be infeasible due to terrain or the prevailing construction practices.			

References

Minnesota Department of Natural Resources, 2006. Trail Planning, Design and Development Guidelines.

National Park Service, U.S. Department of Interior. 2009. NPS Project Sustainability Checklist, Building and Non Building Projects (for new construction and renovation.

National Park Service, U.S. Department of Interior. 2011. NPS Climate Friendly Program Guidance.

National Park Service, U.S. Department of Interior. 2012. CVNP Sustainable Trail Guidelines. Cuyahoga Valley National Park.

U.S. Access Board. October, 2009. Draft Final Accessibility Guidelines for Outdoor Developed Areas.

U.S. Forest Service. 2005. National Trail Management Classes and Design Parameters

U.S. Forest Service. 2003 Trail Accessibility Guidelines

Appendix 2
Public Scoping Materials



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Sleeping Bear Dunes National Lakeshore
9922 Front St. (Hwy M-72)
Empire, Michigan 49630-9797

April 15, 2013

I.A.(SLBE)

Dear Friends:

Sleeping Bear Dunes National Lakeshore (National Lakeshore) proposes to develop a trail system ("Kettles Trail") on federal lands in the Bow Lakes area of the National Lakeshore. The Bow Lakes area is a detached section of the National Lakeshore, created when a 1982 amendment of the National Lakeshore's enabling legislation authorized a boundary revision adding it to the park. There are currently no developments in this area (see enclosed project location map).

The 2009 *Sleeping Bear Dunes National Lakeshore Final General Management Plan/Wilderness Study/Environmental Impact Statement (GMP/WS/EIS)* proposed a small parking area and a loop hiking trail to facilitate visitor use (including nature observation and backcountry hiking on NPS-owned lands). Development of these facilities would fulfill the intent of the GMP and would provide opportunities that do not currently exist in this area. The objectives of the project are to provide: 1) user facilities that meet the public need and are within the capacity of the National Park Service to maintain, 2) facilities that are sensitive to, and protect, the natural features of this area, 3) facilities that respect adjacent private property, 4) interpretation of natural features, and 5) research and educational opportunities.

The concept is to develop a trail system for hiking, cross-country skiing and snowshoeing, a small parking area, adequate signing, and interpretive information.

An Environmental Assessment (EA) of this project will be prepared and, as part of this planning process, we welcome your ideas and input regarding issues or concerns relevant to you. We are especially interested in things you would like us to consider as we plan the project. Please provide your comments electronically through a link on the National Lakeshore's website at www.nps.gov/slbe. Comments may also be mailed to the National Lakeshore (Superintendent, Sleeping Bear Dunes National Lakeshore, 9922 Front Street, Empire, Michigan 49630).

We request that you provide your comments to us by May 20, 2013. The comments you submit during this "scoping" phase of planning will be evaluated and considered during the development of alternatives and analysis of impacts. The EA is scheduled for release in late summer and will then be made available for further public review. At that time, we will again solicit your input.

If you have any questions on this project, please call us at (231) 326-5134.

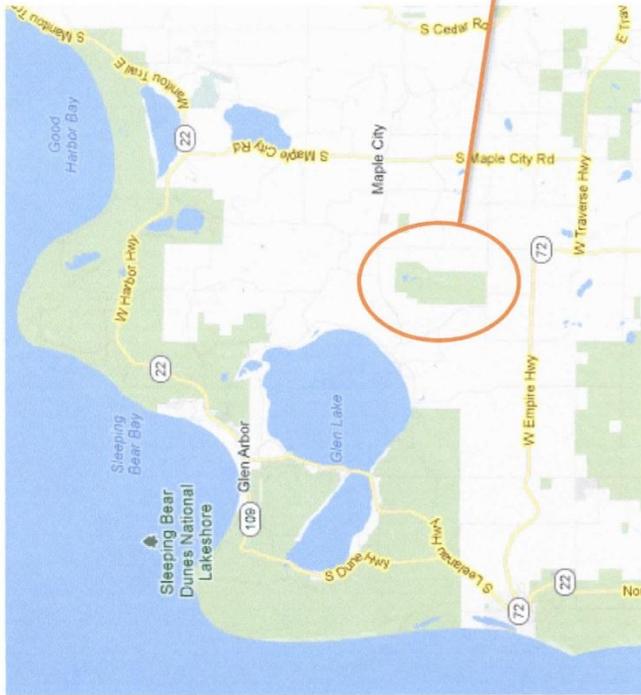
Sincerely,

Dusty Shultz
Superintendent

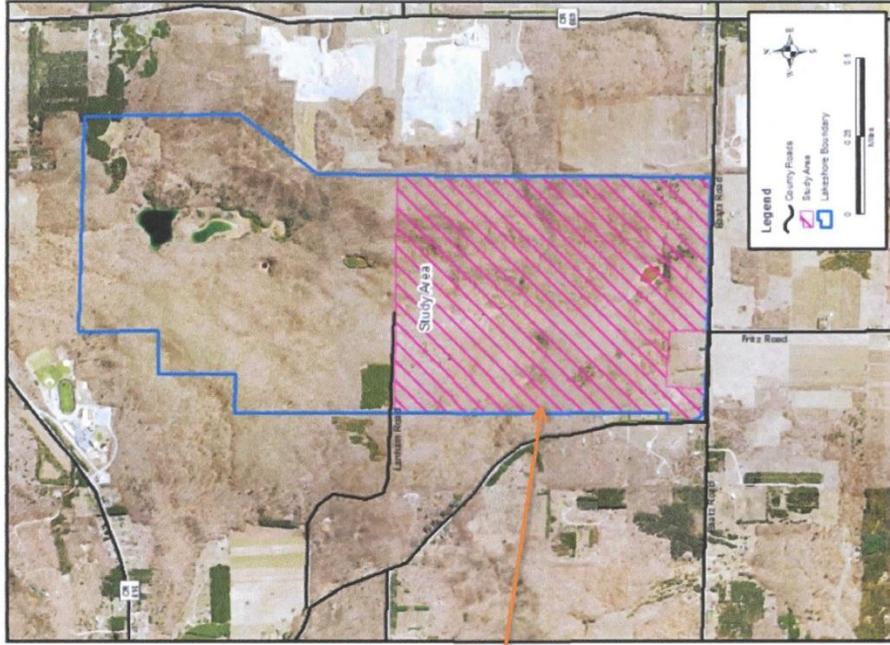
Enclosure

Sleeping Bear Dunes National Lakeshore

Location of Bow Lakes Area



Kettles Trail Study Area





National Park Service
U.S. Department of the Interior

Sleeping Bear Dunes NL
9922 Front Street
Empire, MI 49630
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www.nps.gov

Sleeping Bear Dunes NL News Release

Release Date: April 16, 2013

Contact: Dianne Flaugh, dianne flaugh@nps.gov, 231-326-5135, ext. 113

Kettles Trail at Bow Lakes Environmental Assessment Public Scoping

EMPIRE, MI – Sleeping Bear Dunes National Lakeshore (National Lakeshore) Superintendent Dusty Shultz announced today that the National Park Service proposes to develop a trail system (“Kettles Trail”) on federal lands in the Bow Lakes area of the National Lakeshore. To do so, the National Lakeshore will prepare an Environmental Assessment (EA) which will describe and analyze alternatives for the Kettles Trail.

The Bow Lakes area is a detached section of the National Lakeshore, created when a 1982 amendment of the National Lakeshore’s enabling legislation authorized a boundary revision that added the area to the park.

There are currently no developments in this area.

The *2009 Sleeping Bear Dunes National Lakeshore Final General Management Plan/Wilderness Study/Environmental Impact Statement (GMP)* proposed a small parking area and a loop hiking trail in the Bow Lakes area to facilitate visitor use (including nature observation and backcountry hiking on NPS-owned lands). Development of these facilities would fulfill the intent of the GMP and would provide opportunities that do not currently exist in this area. The objectives of the project are to provide: 1) user facilities that meet the public need and are within the capacity of the National Park Service to maintain, 2) facilities that are sensitive to, and protect, the natural features of this area, 3) user facilities that respect adjacent private property, 4) interpretation of natural features, and 5) research and educational opportunities.

-More-

The project concept is to develop a trail system for hiking, cross-country skiing and snowshoeing, a small parking area, adequate signing, and interpretive information.

Planning for the Kettles Trail is just beginning and, as part of this planning process, the National Lakeshore welcomes your ideas and input regarding issues or concerns relevant to you. They are especially interested in things you would like them to consider as they plan the project. Please provide your comments electronically through a link on the National Lakeshore's website at www.nps.gov/slbe/. Comments may also be mailed to the National Lakeshore (Superintendent, Sleeping Bear Dunes National Lakeshore, 9922 Front Street, Empire, Michigan, 49630).

The National Lakeshore requests that you provide your comments to them by May 20, 2013. The comments you submit during this "scoping" phase of planning will be evaluated and considered during the development of alternatives and analysis of impacts. The EA is scheduled for release in late summer and will then be made available for further public review. At that time, the National Lakeshore will again solicit public input. For more information, please contact the National Lakeshore at 231-326-5134 or visit their website at www.nps.gov/slbe/.

www.nps.gov/slbe/

About the National Park Service: More than 20,000 National Park Service employees care for America's 401 national parks and work with communities across the nation to help preserve local history and create close-to-home recreational opportunities. Learn more at www.nps.gov.

Experience Your America™

The National Park Service cares for special places saved by the American people so that all may experience our heritage.