



Dunes Photographers



South Manitou Island Lighthouse

5

Environmental Consequences



Corn Crib Detail

INTRODUCTION

The National Environmental Policy Act of 1969 (40 CFR 1500-1508) mandates that environmental impact statements disclose the environmental impacts of a proposed federal action. In this case, the proposed federal action is implementation of the *General Management Plan / Wilderness Study / Environmental Impact Statement* for Sleeping Bear Dunes National Lakeshore. The alternatives in this document provide broad management direction. Thus, this environmental impact statement should be considered a programmatic document. Before undertaking specific actions to implement the approved plan, NPS managers will need to determine if more detailed environmental documents must be prepared, consistent with the provisions of the National Environmental Policy Act.

The first part of this chapter discusses terms and assumptions used in the discussions of impacts. The next two parts cover policy and terminology related to cumulative impacts and impairment of National Lakeshore resources. The third part discusses the relationship of the impact analyses to requirements of section 106 of the National Historic Preservation Act. The impacts of the alternatives are then analyzed in this order — the no-action alternative, the preferred alternative, alternative A, alternative B, and alternative C. Each impact topic includes a description of the impacts of the alternative, a discussion of cumulative effects, and a conclusion. At the end of the discussion for each alternative there is a required brief discussion of unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and effects on short-term uses and long-term productivity.

TERMS AND ASSUMPTIONS

Each impact topic includes a discussion of impacts, including the intensity, duration, and

type of impact. *Intensity* of impact describes the degree, level, or strength of an impact as negligible, minor, moderate, or major. Because definitions of intensity vary by resource topic, separate intensity definitions are provided for each impact topic. *Duration* of impact considers whether the impact would occur over the short term or long term. Unless otherwise noted, *short-term* impacts are those that, within a short period of time — generally less than five years — would no longer be detectable as the resource or value returns to its pre-disturbance condition or appearance. *Long-term* impacts refer to a change in a resource or value that is expected to persist for five or more years. The *type* of impact refers to whether the impact on the resource or value would be *beneficial* (positive) or *adverse* (negative).

The impact analyses for the action alternatives (preferred alternative and alternatives A, B, and C) describe the difference between implementing the no-action alternative and implementing the action alternative. In other words, to understand the consequences of any action alternative, the reader must also consider what would happen if no action were taken. For all but the no-action alternative, all impact analysis assumes that areas proposed for designated wilderness are ultimately designated as such by Congress. For the no-action alternative, this analysis assumes continuation of the current management direction — that is, the National Park Service continues to manage the areas to maintain their existing wilderness character to the extent possible given current conditions and constraints until “Congress determines otherwise.”

CUMULATIVE IMPACTS

Council on Environmental Quality regulations, which implement the National Environmental Policy Act (NEPA), require

assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions. Cumulative impacts can result from individually minor but collectively important actions taking place over a period of time.

Cumulative impacts are considered for both the no-action and the action alternatives. These impacts were determined by combining the impacts of the alternatives proposed in this document with the impacts of other past, present, and reasonably foreseeable future actions. To do this, it was necessary to identify other such projects or actions at Sleeping Bear Dunes National Lakeshore and in the surrounding area. For the purposes of most impact topics in this analysis, the cumulative impact analysis area was Benzie and Leelanau counties, Michigan. For other impact topics, the area was the northwestern lower peninsula of Michigan. The time horizon for the cumulative impacts analysis depends on the impact topic under consideration but in most cases was plus or minus five years.

The following ongoing projects or projects planned for the near future were identified for the purposes of conducting the cumulative effects analysis (see the “Ongoing NPS Projects and Projects Planned for the Near Future” section in chapter 1 for more information on these actions):

- Restoration of individual sites within the National Lakeshore (past, ongoing)
- Improvements to parking areas — ends of Leelanau County Roads 651 and 669 (future)
- Glen Haven Village improvements (ongoing)
- Lake Michigan overlooks improvements—Pierce Stocking Scenic Drive (future)
- Restore sites of the former Water Wheel and Casey’s Canoe Liveries — Platte River (ongoing)
- South Manitou Lighthouse Complex — exterior restoration and interior rehabilitation (future)
- Dune Climb parking area — paving and other minor improvements (future)

In addition, the following projects or actions were included.

Fire Management Plan (2005a)

The National Lakeshore’s “Fire Management Plan,” approved in 2005, will be implemented. The plan emphasizes protection of human life and property, both public and private, from wildfire within and adjacent to NPS lands. It includes measures to reduce hazardous fuels.

Dredging of the Platte River Mouth (Past, Ongoing)

The mouth of the Platte River is dredged annually for approximately 30 days, beginning immediately after Labor Day in September. Dredging allows larger boats to access Lake Michigan, primarily for sport fishing of Coho salmon, from the county launch ramp at the end of Lake Michigan Road. Dredging was originally performed by the state Department of Natural Resources, but the National Lakeshore took over dredging about 25 years ago, after the state indicated it intended to discontinue the activity. Dredging involves using heavy equipment to remove sand and sediment from the river channel and relocating it to an open sandy area adjacent to the river.

IMPAIRMENT OF NATIONAL LAKESHORE RESOURCES

In addition to determining the environmental consequences of implementing the preferred

and other alternatives, *NPS Management Policies 2006* (section 1.4) requires analysis of potential effects to determine whether or not proposed actions would *impair* National Lakeshore resources and values.

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 seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give NPS managers discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. That discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that would, in the professional judgment of the responsible NPS manager, harm the integrity of park resources and or values and violate the 1916 NPS Organic Act's mandate (*NPS Management Policies 2006* 1.4.5). An impact on a park resource or value may, but does not necessarily, constitute an impairment. An impact is more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park. A determination on impairment is made in the conclusion section for each impact topic related to the park's cultural and natural resources. A determination of impairment is not required for impact topics such as visitor experience, regional socioeconomics, and *NPS* operations.

IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this *General Management Plan*, impacts on cultural resources are described according to the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural Properties" (36 CFR 800) implementing Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470(f)).

Section 106 requires federal agency officials to take into account the effects of their undertakings on historic properties, and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment.

Unlike analyses under the National Environmental Policy Act, under the Section 106 process, an "effect" is defined as "an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register" (36 CFR 800.16i). According to the criteria of "adverse effect" in the regulations (36 CFR 800.5(a)(1)),

an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the

property's location, design, setting, materials, workmanship, feeling, or association.

The regulations further specify that

consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

The federal agency official consults with the state historic preservation officer and other consulting parties (possibly including the Advisory Council on Historic Preservation) regarding measures to avoid, minimize, or mitigate adverse effects to a historic property. These agreed-upon measures are memorialized in a memorandum of agreement that is signed by the agency, the state historic preservation officer, and other consulting parties.

The Advisory Council regulations do not specify thresholds for effects and do not recognize adverse versus beneficial effects. Effects are determined relative to the character-defining features of the National Register of Historic Places (NRHP) listed or eligible property—36 CFR 800 does not define what constitutes mitigation, but it provides a process for determining appropriate mitigation in consultation with the state historic preservation officer and other parties. Cultural resources, including historic properties, are nonrenewable. Adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss of integrity of the property that can

never be recovered. Therefore, although actions to mitigate the adverse effect may be carried out in compliance with Section 106, the effect on a historic property remains adverse.

A determination of no adverse effect means there is an effect, but the effect would not meet the criteria of adverse effect (36 CFR 800.5(b)).

The impact analyses in this *General Management Plan* are for the purposes of the National Environmental Policy Act. They are intended to assist the National Park Service with coordinating its compliance with this act and with Section 106 of the National Historic Preservation Act, as amended. However, it must be emphasized that the National Park Service does not intend to use this *General Management Plan / Wilderness Study / Environmental Impact Statement* to meet section 106 compliance for individual actions discussed in the document in accordance with 36 CFR 800.8(c). The National Park Service will comply with Section 106 in accordance with 36 CFR 800 as it continues land and resource planning and refines its management options with alternatives analyses and specific proposals for individual properties. As is required under 36 CFR 800, the National Park Service will consult with the Michigan state historic preservation officer and other consulting parties to determine areas of potential effects; to identify cultural resources and evaluate their National Register of Historic Places eligibility; to determine effects on historic properties; and to develop measures to avoid, minimize, or mitigate adverse effects on historic properties. Measures to avoid, minimize, or mitigate adverse effects would be outlined in a memorandum of agreement (or programmatic agreement). A Section 106 summary is included for each of the cultural resource topics discussed (in this case historic resources only).

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

HISTORIC RESOURCES

In chapter 4, it was determined that archeological resources, ethnographic resources, and museum collections would be considered but not analyzed in detail in this *General Management Plan / Wilderness Study / Environmental Impact Statement*. Only historic resources (buildings, sites, structures, objects, districts, and landscapes) are analyzed in detail in the environmental analysis.

Potential impacts to historic resources either listed in or eligible to be listed in the National Register of Historic Places were identified and evaluated in accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the National Historic Preservation Act (36 CFR 800, Protection of Historic Properties) by: (1) determining the area of potential effects; (2) identifying historic resources present in the area of potential effect that are national register listed or eligible; (3) applying the criteria of adverse effect to affected resources; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

In this document the criteria for characterizing the severity or intensity of impacts to national register listed or eligible historic resources are the Section 106 determinations of effect: adverse effect or no adverse effect.

SOILS AND GEOLOGIC RESOURCES

Analysis of the soils and geologic resources of the park area relative to the alternatives revealed two primary potential impact sources—impacts from visitor use and impacts from infrastructure development.

Visitor uses that impact soils and geologic resources (in this case, primarily the dunes and their dynamic processes) include hiking

and dispersed camping, use of rivers and lakes, and parking in nondesignated areas. Hiking on the dunes destabilizes the substrate in sandier areas of the dunes, and packs the soil down in areas with higher clay content. These actions can lead to *soil erosion* and *soil compaction*, respectively, either of which is an adverse impact on the dunes and their natural processes, as well as to other soils. The same kinds of impacts can occur to soils in other portions of the Lakeshore due to hiking and other off-trail activities. Dispersed camping can also lead to compaction and erosion through very similar mechanisms. Repeated use of an area for camping can compact the soils, leading to plant failure and then erosion.

Visitor use on the rivers and lakes, and particularly on the Platte River where use is relatively high during the summer, impacts soils in a number of ways. Informal entry and exit points along the water, where people get out to use or explore the adjacent area, cause bank destabilization, which leads to erosion. Loss of dune vegetation can cause sand to fill stream or lake beds as it is blown by the wind. Heavy foot traffic in the adjacent floodplain tramples vegetation, reducing plant cover, which can lead to erosion. Heavy foot traffic can also compact the soil to the point that plants can no longer grow; without this plant cover, the soils become more susceptible to erosion. Finally, high levels of *E. coli* from human excrement are found in the soils of some of these areas.

Vehicular parking in nondesignated areas can also lead to soil compaction and erosion, depending on the nature of the substrate and the soil moisture conditions. Parking in such areas when it is muddy can leave deep ruts, initiating erosion. On the other hand, parking on non-sandy soils when it is dry can lead to compaction, loss of plant cover, and then erosion.

Development activities frequently result in *soil disturbance* during the construction phase. Clearing of vegetation to provide a camping area would disturb soils. Removal of topsoil to build a foundation for a building or parking lot would be a soil disturbance. Representative activities considered in this document include site restoration activities, development of trails, campsites or campgrounds, picnic areas, parking area development or improvement, and upgrade or relocation of access points to rivers and lakes. Large-scale (i.e., NPS or private) development along the Benzie Corridor could impact soils and perhaps even underlying geologic strata, depending upon the nature and scale of the development.

To reduce repetitiveness, the discussions presented later in this chapter about impacts to soils and geologic resources will only briefly allude to the impacts detailed in the above paragraphs. Key words such as *compaction*, *erosion*, and *disturbance* refer the reader back to the cause and effect descriptions provided above.

Information describing soils and geologic resources was compiled and reviewed from existing research reports, planning documents, and consultation with park specialists. The impacts of potential visitation increases have been factored into the analysis.

The thresholds to determine the intensity of impacts on soils or geologic resources are defined as follows:

Negligible: The impact is barely detectable and/or would result in no measurable or perceptible changes to soils or geologic resources.

Minor: The impact is slight but detectable, and/or would result in small but measurable changes in soils or geologic resources; the effects would be localized.

Moderate: The impact is readily apparent and/or would result in easily detectable

changes to soils or geologic resources; the effects would be localized.

Major: The impact is severely adverse or exceptionally beneficial and/or would result in appreciable changes to soils or geologic resources; the effects would be regionally important.

VEGETATION AND WILDLIFE

Because a discussion of potential impacts to wildlife necessarily involves discussion of wildlife habitat, which is primarily the vegetation communities within the park, vegetation and wildlife are addressed together in this section. Preliminary analysis of potential impacts to the vegetation and wildlife resources of the Lakeshore indicated that impacts could be associated with two primary activities — visitor use and development of infrastructure.

Visitor use can impact vegetation and wildlife through a number of mechanisms. Obvious and direct impacts include *trampling* of vegetation when hiking off the trail or camping in nondesignated areas (i.e., dispersed camping, which is allowed only on North Manitou Island). A single *trampling* event might impact one or more individuals of a species. Repeated *trampling* of the vegetation along a path or in a campsite, as well as removal of down and dead wood for campfires, can lead to changes in the vegetation at the population level, which results in *habitat alteration*. *Habitat alteration* can, in turn, further impact remaining populations by making the habitat less suitable for the species. Introduction or spread of *invasive species* can also result from visitor activities. Establishment of invasive species often results in change in both the plant and wildlife composition of the infested area. Visitors often unwittingly introduce or spread propagules (e.g., seeds or larvae) of invasive species during recreational activities.

Although the potential to disturb wildlife when hiking off the trail is apparent to most, even when hiking or bicycling on established trails or roads, visitors can disturb wildlife with loud or unusual noises, or even just the sight or scent of visitors. Disturbance of wildlife due to noises, sights, or scents associated with visitor use is referred to as *sensory-based disturbance*. *Sensory-based disturbance* applies primarily to the individual response level but can lead to population level responses if the disturbance is intense or prolonged. An example would be individual abandonment of a nest in response to a disturbance. If such a disturbance were to occur over a large area, or for a long period of time, individual nest abandonment could translate to population level impacts.

Development of infrastructure can also impact vegetation and wildlife. The most obvious impact is the direct removal or loss of vegetation that serves as wildlife habitat (i.e., *habitat loss*). Consider development of a new road through an area of relatively native forest. The swath of vegetation removed to construct the road would represent habitat loss. That would not, however, be the only impact on the wildlife habitat. Opening the forest canopy where the road is constructed now creates an edge effect, with greater insolation of the forest edge and consequent changes in plant species composition. In some cases this can cascade into changes in wildlife species utilization. Further, new use of this road would increase sensory-based disturbance to wildlife along the new road corridor. Obviously, the larger the corridor required for the road, the greater these impacts can be. Therefore, a trail would have far less impact than a road. The placement of a road or trail within the area of forest is also important. Roads or trails established through the middle of a habitat tend to fragment the habitat, making it less usable for some wildlife species. Alternatively, placing the road or trail close to another road or a natural habitat boundary (e.g., the shoreline) may lessen this impact. The more indirect impacts of infrastructure

development described above are referred to as *habitat degradation*. *Habitat loss* and *habitat degradation* can impact a species at the individual or population level depending upon their extent.

To reduce repetitiveness, the discussions presented later in this chapter of impacts on vegetation and wildlife anticipated for each alternative will only briefly allude to the impacts detailed in the above paragraphs. Key words such as *trampling*, *habitat alteration*, *invasive species*, *sensory-based disturbance*, *habitat loss*, and *habitat degradation* refer the reader back to the cause and effect descriptions provided above.

Available information describing vegetation communities and distribution, and the wildlife species that inhabit them, including published scientific papers, NPS and USGS research reports, planning documents, state programs, national databases and mapping efforts, and consultation with park specialists, was gathered, reviewed, and summarized. Impacts on vegetation and wildlife were evaluated by comparing projected changes resulting from the action alternatives (preferred, A, B, and C) to the no-action alternative. The impacts of potential visitation increases have been factored into the analysis.

The thresholds to determine impacts on vegetation and wildlife are defined as follows:

- Negligible:** Impacts are barely detectable and/or would affect a minimal area of vegetation. Impacts to the plant and wildlife communities are not detectable.
- Minor:** Impacts are slight, but detectable, and/or would affect a small area of vegetation or few members of the wildlife community. The severity and timing of changes are not expected to be outside natural variability spatially or temporally. Key ecosystem processes and community structure are retained at the local level.
- Moderate:** Impacts are readily apparent and/or would affect a large area of

vegetation and/or a large portion of the wildlife community. The severity and timing of changes are expected to be outside natural variability spatially and/or temporally; however, key ecosystem processes and community structure are retained at the landscape (regional) level.

Major: Impacts are severely adverse or exceptionally beneficial and/or would affect a substantial area of vegetation and/or the majority of the inhabiting wildlife community. The severity and timing of changes are expected to be outside natural variability both spatially and temporally. Key ecosystem processes and community structure may be disrupted. Habitat for wildlife species may be rendered nonfunctional at the landscape level.

FEDERAL THREATENED AND ENDANGERED SPECIES

Federal threatened and endangered species addressed in this document include plants (Michigan monkey flower and Pitcher's thistle) and wildlife (piping plover). As such, the impacts associated with visitor use and infrastructure development described above for vegetation and wildlife would also apply to these federally listed species. Therefore, the reader is encouraged to refer to the above descriptions of activities leading to *trampling, habitat alteration, sensory-based disturbance, habitat loss, and habitat degradation*. These key words will be used in the alternative-specific impact analyses later in this chapter to remind the reader of, or refer the reader back to, the cause and effect descriptions of the nature of impacts and species responses to those impacts provided above.

In accordance with 50 CFR § 402(a), federal agencies are required to review all actions to determine whether an action may affect listed species or critical habitat. If such a determination is made, formal consultation is required,

unless the federal agency determines, with the written concurrence of the U.S. Fish and Wildlife Service, that the proposed action is not likely to adversely affect any listed species or critical habitat. It is NPS policy to survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The National Park Service strives to fully meet its obligations under the National Park Service Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. This is accomplished by cooperating with the U.S. Fish and Wildlife Service to ensure that NPS actions comply with both the written requirements and the spirit of the Endangered Species Act, and by cooperating with the U.S. Fish and Wildlife Service and other agencies/entities to facilitate delineation of critical habitat, development and implementation of species recovery plans and candidate conservation agreements, and proactively managing for proposed and candidate species.

NPS staff evaluated impacts on federally listed threatened and endangered species and provided an Endangered Species Act determination as defined in 50 CFR Section 402 and the *Endangered Species Consultation Handbook* (1998) for each alternative. Based on this analysis, anticipated impacts to the federally listed candidate species that have the potential to occur within the park, with the exception of the Indiana Bat (see table 8), are discussed in this chapter.

Impacts to the addressed federally listed or candidate species were evaluated by comparing projected changes resulting from the action alternatives to existing conditions. These evaluations were based on documented occurrences of the species within the park, the distribution of their preferred habitats within the park, and the distribution of designated critical habitat (piping plover). The impacts of potential visitation increases have been factored into the analysis.

Impact thresholds for the addressed federally listed or candidate species are defined based on USFWS Section 7 impact terminology as follows:

No effect means there are absolutely no effects to the species or its critical habitat, either positive or negative. A no-effect determination does not include small effects or effects that are unlikely to occur. If effects are insignificant (in size) or discountable (extremely unlikely), a determination of “not likely to adversely affect” is appropriate.

Not likely to adversely affect means that all effects to the species or its critical habitat are beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without adverse effects to the species (for example, there cannot be “balancing” so that the benefits of the action would outweigh the adverse effects). Insignificant effects relate to the size of the impact and should not reach the scale where take occurs. Discountable effects are considered extremely unlikely to occur. Determinations of “not likely to adversely affect, due to beneficial, insignificant, or discountable effects” typically require written concurrence from the U.S. Fish and Wildlife Service.

Likely to adversely affect means that an adverse effect to the species or its critical habitat may occur as a direct or indirect result of an action, and the effect is not discountable, insignificant, or beneficial. In the rare event that adverse effects could not be avoided, the project would either be discontinued or NPS staff would request formal consultation with the U.S. Fish and Wildlife Service.

In addition, table 21 provides a summary of past, present and ongoing (future) activities considered in the cumulative impacts analysis

for threatened and endangered species. This table will be referenced in the cumulative impacts section for threatened and endangered species under each of the alternatives.

MICHIGAN STATE-LISTED SPECIES

Michigan state-listed species addressed in this document include plant (e.g., walking fern and prairie moonwort) and wildlife (e.g., wood turtle and common loon) species. As such, the impacts associated with visitor use and infrastructure development described above for vegetation and wildlife would also apply to these state-listed species. Therefore, the reader is encouraged to refer to the above descriptions of activities leading to **trampling, habitat alteration, sensory-based disturbance, habitat loss, and habitat degradation**. These key words will be used in the alternative-specific impacts analyses later in this chapter to remind the reader of, or refer the reader back to, the cause and effect descriptions provided above.

NPS *Management Policies 2006* dictate that, to the greatest extent possible, parks will inventory, monitor, and manage state and locally listed species in a manner similar to the treatment of federally listed species. In addition, the parks are to inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and manage them to maintain their natural distribution and abundance.

The National Park Service considers how to protect and perpetuate federally, state, or locally listed species during park management planning, and consults with lead federal and state agencies, as appropriate.

TABLE 21: SUMMARY OF PAST, PRESENT, AND ONGOING (FUTURE) ACTIONS AND THEIR IMPACTS ON THREATENED AND ENDANGERED SPECIES

Activity	Species Potentially Affected	Potential Impacts
NPS ACTIVITIES		
Dredging the mouth of the Platte River*	Piping plover	Positive — adds nesting habitat (cobble) Negative — removes some rearing habitat
Site restoration activities*	Pitcher's thistle, Michigan monkey flower	Positive — net gain of restored habitat Negative — loss of individual plants
Nonnative plant control*	Pitcher's thistle	Positive — net gain of restored habitat Negative — loss of individual plants
Piping plover recovery program*	Piping plover	Positive — net gain in population Negative — loss of individuals from banding, handling, nest disturbance
Dredging at the island docks*	Pitcher's thistle	Positive — beach nourishment from deposition of dredged materials (provides better habitat) Negative—loss of individual plants from coverage
ACTIVITIES OF OTHERS		
Dogs disrupting wildlife on the beach	Piping plover	Negative — disturbance, mortality
Private adjacent landowners actively managing habitat	Michigan monkey flower	Positive — supports recovery of listed species
Nonnative plants used by adjacent landowners for landscaping	Piping plover, Pitcher's thistle	Negative — nonnative plants invade habitat
Shipping industry releases exotic species in ballast water (Lake Michigan)	Piping plover	Negative —invasives directly linked to listed species mortality
Visitor use	Pitcher's thistle	Negative —foot or vehicle traffic causes plant mortality Positive — human-caused disturbance provides seedbed

* Potential impacts on threatened and endangered species are avoided to the extent possible. NPS staff coordinate closely with the U.S. Fish and Wildlife Service through recovery plans, biological assessments, and regular communications.

Plant and animal species listed by Michigan as threatened, endangered, or as species of concern that have the potential to occur within the Lakeshore (see table 8), were analyzed relative to the anticipated impacts of, and differences of those impacts among, the five alternatives. To facilitate analysis and discus-

sion of potential environmental consequences, these species were grouped according to shared habitat requirements and will be discussed as follows:

Shoreline/Dunes/Near-shore Associates

- Caspian tern
- fascicled moonwort
- Lake Huron locust
- prairie moonwort
- prairie warbler

Lakes/Wetlands/Riparian Associates

- bald eagle
- Blanchard's cricket frog
- common loon
- cut-leaved water parsnip
- Douglas stenelmis riffle beetle
- Eastern box turtle
- ram's-head lady's-slipper
- trumpeter swan
- wood turtle

Mature Forest Associates

- merlin
- red-shouldered hawk
- green spleenwort
- walking fern
- Pumpelly's brome grass
- ginseng
- pine-drop
- three-birds orchid

Impacts on Michigan state-listed species were evaluated by comparing projected changes resulting from the action alternatives compared to the no-action alternative. The impacts of potential visitation increases have been factored into the analysis.

Impact thresholds for Michigan state-listed plant and wildlife species are defined as follows:

Negligible: Impacts on state-listed plant and wildlife species would not be observable or measurable and would be well within the range of natural variability.

Minor: Impacts on species or their habitat would be detectable, but still within the range of natural variability both spatially and temporally. No interference with feeding, reproduction, or other activities affecting population viability would result

from the impacts. Sufficient functional habitat would remain to support viable populations.

Moderate: Impacts on activities necessary for survival, and on species habitats, can be expected on an occasional basis, but are not anticipated to threaten potential or continued existence of the species in the park. Changes to population characteristics could be outside the natural range of variability spatially or temporally but would not be anticipated to result in loss of population viability.

Major: Impacts on Michigan state-listed plant and wildlife species or their habitats would be detectable, outside of the natural range of variability both spatially and temporally, and would be anticipated to result in loss of viability at the population level.

WETLANDS AND WATER QUALITY

Wetlands, in addition to the biodiversity they support (addressed above under "Vegetation and Wildlife" and "Michigan State-Listed Species") serve critical roles as water purifiers, facilitating settling of particulates out of the water column and filtering remaining impurities. Because of the importance of wetlands to water quality, potential impacts to wetlands and water quality will be addressed together in this chapter.

Similar to the other natural resources already addressed, wetlands and water quality can be impacted by two major types of activities — visitor use and development of infrastructure. Wetlands and water quality can be affected by mechanisms previously described such as *trampling* and *erosion*. Described below are how these and other mechanisms are related to visitor use and development, and how they impact wetlands and water quality.

Visitor use probably has a greater potential to impact wetlands and water quality along riparian areas (e.g., the Platte and Crystal Rivers,

Otter Creek), around lakes (e.g., School, North Bar, and Loon), and in the Bow Lakes area than in the numerous wetlands associated with the dune and swale topography common in certain less developed portions of the park. When a visitor walks through a wetland, the vegetation is trampled into the mud, and invertebrates living in the wetland can be crushed or buried in muck from which they cannot escape. If there is standing water, sediments from the bottom get stirred up into the water column. This *resuspension of sediments* reduces water quality and its suitability for biota dependent upon it. The overall physical nature of the wetland is altered in a way that typically reduces its ability to filter water. Thus wetland *trampling* impacts a wetland and its function at a variety of levels and ends up impacting not only the wetland but the resultant water quality in any water body serviced by that wetland.

Other visitor activities that could impact wetlands and water quality include activities such as swimming, bathing, and motorized boating, which may result in *pollution* of wetlands and water bodies with petroleum products, soaps, and other substances. This pollution of the wetlands can lead to loss of both structure and function over time, and thus further reduced water quality.

Development actions proposed in the alternatives of this document, such as development of parking areas, boat accesses, and other infrastructure, would be located to the extent feasible to avoid direct dredging or filling of wetlands and other “Waters of the U.S.” However, *runoff* from such development activities could change the hydrology (quality or amount of water) entering adjacent wetlands and waterways. Paved parking lots may increase the amount of runoff entering a wetland. If the runoff is filtered first, removing petroleum products originating from cars in the parking lot and other potential pollutants, this runoff could potentially augment the wetland and waterways during drier periods. However, installation of filtering systems

often increases the footprint and initial cost of a project and the ongoing maintenance costs associated with such systems. Packed dirt or graveled parking lots are not free of potential impacts to wetlands and waterways. Runoff from these areas can also contaminate wetlands, not only with chemicals, but also with a heavier sediment load. Additionally, under the right conditions, *dust* from packed dirt or even gravel parking lots or roads can blow onto and impact adjacent wetlands and waterways.

To reduce repetitiveness, the discussions presented later in this chapter of impacts to wetlands and water quality anticipated for each alternative will only briefly allude to the impacts detailed in the above paragraphs. Key words such as *trampling*, *resuspension of sediments*, *pollution*, *runoff*, and *dust* refer the reader back to the cause and effect descriptions provided above.

Available information describing wetlands characteristics and distribution and water quality for various water bodies across the park, including existing research reports, planning documents, state programs, national mapping efforts, and consultation with park specialists, was gathered, reviewed, and summarized for this document.

Wetlands are a protected resource managed under the following federal executive and director’s orders:

Executive Order 11990, “Protection of Wetlands,” was issued in 1977 “to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.” This order directs the National Park Service to: (1) provide leadership and to take action to minimize the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values

of wetlands; and (3) to avoid direct or indirect support of new construction in wetlands unless there are no practicable alternatives to such construction and the proposed action includes all practicable measures to minimize harm to wetlands.

Approved in 1998, Director's Order 77-1: "Wetland Protection" was developed for use by the National Park Service in carrying out its responsibilities under Executive Order 11990. The general policies, requirements, and standards included in the manual are: (1) no net loss of wetlands and a long-term goal of net wetlands gain, (2) parkwide wetlands inventories, (3) restoration and enhancement of degraded wetlands habitats, (4) planning and siting facilities to avoid or minimize effects on wetlands, (5) restoration of degraded wetlands as compensation for adverse effects to wetlands, and (6) compliance with federal environmental regulations.

Impacts to wetlands and water quality were evaluated by comparing projected changes resulting from implementing the alternatives to implementing the no-action alternative. The impacts of potential visitation increases have been factored into the analysis. The thresholds to determine wetlands impacts are defined as follows:

Negligible: The impact is barely detectable and/or would result in no measurable or perceptible changes to wetlands or water quality.

Minor: The impact is slight, but detectable, and/or would result in small but measurable changes in wetlands or water quality; the effects would be localized to one area in a drainage.

Moderate: The impact is readily apparent and would result in easily detectable changes to wetlands or water quality; the effects would be localized to a drainage.

Major: The impact is severely adverse or exceptionally beneficial and/or would

result in appreciable changes to wetlands or water quality; the effects would be regionally important.

VISITOR OPPORTUNITIES AND USE

Visitor Opportunities

This topic covers opportunities for recreation and interpretive experiences, access, scenic resources, natural soundscapes, and night skies. Throughout this plan's public involvement process, wide-ranging opinions about Lakeshore visitor opportunities (e.g., access, recreational infrastructure, activities, and educational opportunities) were expressed. Impacts on visitor opportunities were evaluated by comparing projected impacts from the action alternatives to the no-action alternative. These evaluations included consideration of the Lakeshore's purpose, significance, and fundamental resources and values and what contributes or detracts from desirable visitor opportunities.

Visitor Use

This topic addresses numbers of visitors. Visitor use at the Lakeshore has been relatively steady over time, though with some positive correlation to overall economic conditions in the broader Great Lakes region and to local population growth. Thus, visitor use at the National Lakeshore in the future will be primarily a function of population growth and continuing residential development in the vicinity of Benzie, Leelanau, and Grand Traverse counties; increases in the region's seasonal population; long-term growth across the Great Lakes and the range and type of visitor opportunities associated with the various alternatives. Population gains of nearly 3.3 million residents are projected for Michigan, Ohio, Illinois, and Indiana between 2000 and 2030 (U.S. Census Bureau 2005). Year-to-year changes in visitor use will vary, with periods of faster or slower growth, and

even periods of short-term declines. Peak visitor use is expected to continue to occur in July and August.

Changes in annual visitor use could also be affected by the management zoning, visitor opportunities, wilderness, and other aspects of the various alternatives. Those differences and uncertainties about when specific actions might occur provide a limited basis upon which to project changes in visitor use over time. Consequently, the approach to projecting visitor use relies on the professional judgment of the Lakeshore staff and their assessment as to the effects of changes in opportunities, capacities, activities, and wilderness proposals in promoting or discouraging use. The lack of predictive estimates reflects the lack of any major changes in visitor facilities and programs and uncertainties as to the timing and/or type of changes in recreational, cultural heritage, and other visitor opportunities associated with the alternatives.

Long-term increases in visitor use, albeit relatively modest in scale, are foreseen under all of the alternatives. Changes in future use levels were established in terms of discrete

increments over and above the change under the no-action alternative. Estimates of future visitor use are not intended to be predictive or absolute but rather provide a means of comparing the likely relative order in visitation changes — alternative A being the smallest and alternative C the largest. The projected long-term changes, on an annual basis are shown in table 22.

The long-term increase in average annual visitor use for the no-action alternative is estimated at about 5% above the long-term average since 1990. The estimated increase for the action alternatives ranges from about 1.6% to 8.2% above that of the no-action alternative.

The thresholds for this impact topic are as follows:

Negligible: Visitors would likely be unaware of any effects associated with implementation of the alternative. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.

TABLE 22: PROJECTED LONG-TERM INCREASES IN ANNUAL VISITOR USE ASSOCIATED WITH IMPLEMENTATION OF THE GENERAL MANAGEMENT PLAN (ROUGHLY 20 YEARS)

Alternative	Long-Term Annual Visitor Use	Increase in Long-Term Average Use*
Historical Average (1990-2006)	1,194,000	NA
No-Action Alternative	1,278,000	84,000
Preferred Alternative	1,341,000	147,000
Alternative A	1,299,000	105,000
Alternative B	1,362,000	168,000
Alternative C	1,383,000	189,000

* Peak annual visitor use of 1,364,834 at the National Lakeshore occurred in 1999.

Minor: Changes in visitor use and/or experience would be slight but detectable, but would not appreciably diminish or enhance critical characteristics of the visitor experience. Visitor satisfaction would remain stable.

Moderate: Few critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be altered. The visitor would be aware of the effects associated with implementation of the alternative and would likely be able to express an opinion about the changes. Visitor satisfaction would begin to either decline or increase as a direct result of the effect.

Major: Multiple critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or increased. The visitor would be aware of the effects associated with implementation of the alternative and would likely express a strong opinion about the change. Visitor satisfaction would markedly decline or increase.

WILDERNESS CHARACTER

The 1964 Wilderness Act states, “it is hereby declared to be the policy of Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” One of the central mandates of this act is to preserve wilderness character. Section 2.(a) states that wilderness areas shall be administered “so as to provide for the protection of these areas, the preservation of their wilderness character” Section 4.(b) states: “Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character.” Because the Lakeshore has proposed wilderness in each of the

action alternatives, and based on the act’s mandate to preserve wilderness character, this impact topic focuses on the extent to which a particular wilderness proposal secures for the public the benefits of an enduring (permanent) resource of wilderness, including preservation of wilderness character.

For all but the no-action alternative, this impact assessment assumes that areas proposed for designated wilderness are ultimately designated as such by Congress. For the no-action alternative, this assessment assumes continuation of the current management direction — that is, the NPS continues to manage the areas to maintain their existing wilderness character until “Congress determines otherwise.”

Wilderness character is not specifically defined in the 1964 Wilderness Act, nor is its meaning discussed in the act’s legislative history. However, the Wilderness Act identifies the following qualities that unify wilderness areas regardless of their size, location, or any other feature.

- Undeveloped — “an area of undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation” This refers to areas that are essentially without permanent structures, enhancements, or modern human occupation. To retain its primitive character, a wilderness ideally is managed without the use of motorized equipment or mechanical transport.
- Natural — “protected and managed so as to preserve its natural conditions” This means areas that are largely free from effects of modern civilization. It also refers to maintenance of natural ecological relationships and processes, continued existence of native wildlife and plants in largely natural conditions, and absence of distractions (e.g., large groups of people; mechanization; and evidence of human

manipulation, unnatural noises, signs, and other modern artifacts.)

- **Outstanding Opportunities for Solitude or Unconfined Recreation** — “has outstanding opportunities for solitude or a primitive and unconfined type of recreation . . .” Solitude means encountering few, if any, people, and experiencing privacy and isolation. Primitive and unconfined recreation refers to freedom to explore with few restrictions, and the ability to be spontaneous. It means self sufficiency without support facilities or motorized transportation, and experiencing weather, terrain, and other aspects of the natural world with minimal shelter or assistance from devices of modern civilization.

Impact intensity definitions for wilderness character are as follows.

Negligible: Effects on opportunities for solitude or primitive and unconfined recreation would be confined to a small, localized area; any changes would not be perceived (or would be barely perceived) by most visitors. Also, any effects on the degree of development and the prevalence of natural conditions would be confined to a relatively small, localized area and would be barely perceived by most visitors.

Minor: Effects on opportunities for solitude or primitive and unconfined recreation would be slightly beneficial or adverse and confined to a limited area of a proposed wilderness area; (or a wilderness-eligible area); changes would be perceived by some visitors. Also, effects on the degree of development and the prevalence of natural conditions would be apparent and confined to a limited area of a proposed wilderness area (or a wilderness-eligible area) and would be perceived by some visitors; natural conditions would continue to predominate.

Moderate: Effects on opportunities for solitude or primitive and unconfined recreation would be apparent in one or

more proposed wilderness areas; (or wilderness-eligible areas); changes would be apparent to many visitors. Also, effects on the degree of development and the prevalence of natural conditions would be readily apparent in one or more proposed wilderness areas; (or wilderness-eligible areas); natural conditions would predominate overall; some changes in wilderness character would be apparent to many visitors.

Major: Effects on opportunities for solitude or primitive and unconfined recreation would be obvious in one or more proposed wilderness areas; (or wilderness-eligible areas); changes would be obvious to most visitors. Also, effects on the degree of development and the prevalence of natural conditions would be substantial in one or more proposed wilderness areas; (or wilderness-eligible areas); some changes in wilderness character would be obvious to most visitors.

REGIONAL SOCIOECONOMICS

Scoping identified potential economic and social implications of the alternatives as a topic of keen public interest. Economic effects are commonly expressed in terms of the number and types of jobs supported by the Lakeshore, changes in income, visitor use at the Lakeshore, and associated changes in visitor spending. Less well defined economic effects include the indirect effects from NPS operations and the effects on local government tax revenues. Examples of social impacts include effects on local and regional population growth, housing, community facilities and services, and effects on individual and community quality of life and lifestyles and attitudes.

The analytical approach used in this analysis considers the following three main factors:

- projected future expenditures for construction, rehabilitation, restoration

and maintenance of facilities and infrastructure

- changes in staffing and federal spending to operate the National Lakeshore
- changes in the levels of visitor use at the National Lakeshore

Implementation costs of the alternatives, including staffing, operations, and capital construction and maintenance, were estimated based on current budgets and actual project costs at the National Lakeshore and other NPS units. Actual future outlays would reflect future NPS policies, actual on-the-ground conditions, unanticipated events and opportunities, and budgets approved by Congress for the National Park Service in general, or Sleeping Bear Dunes National Lakeshore specifically.

Estimated changes in projected visitor use for the alternatives are presented in the “Visitor Opportunities and Use” section). Management guidance and zoning established under the *General Management Plan* is expected to attract higher visitor use under all of the action alternatives, as compared to the no-action alternative. Estimates of future visitor use are not intended to be predictive but rather reflective of the relative order in visitation changes — alternative A being the lowest and alternative C the highest. Actual visitor use over time will depend on temporary and multiyear variations due to such factors as regional or national economic conditions.

Impact Thresholds and Characterization

Economic and social impacts associated with the alternatives are assessed in terms of scale/intensity, duration, and type/character. These parameters are defined as follows.

Scale/Intensity. The scale or intensity of impacts refers to the change(s) associated with the alternatives when compared to current and future conditions under the no-action

alternative. In addition to the relative magnitude of changes, factors considered in assessing scale and intensity include the likelihood of people being aware of the changes, the ability to measure the effects of the changes, and the number of people or size of geographic region that would be affected. The scale/intensity thresholds for economic and social conditions are defined below.

None/Negligible: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc. would be nonexistent, barely detectable, or detectable only through indirect means and with no discernible impact on local social or economic conditions.

Minor: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc. would be small but detectable, geographically localized, affect few people, comparable in scale to typical year-to-year or seasonal variations, and not expected to substantively alter established social or economic structures over the long term.

Moderate: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc. would be readily apparent or observable across a wider geographic area and affect many people, and could have noticeable effects on the established economic or social structure and conditions over the long term.

Major: Effects on adjacent landowners, neighbors, businesses, agencies, community infrastructure, social conditions, etc., would be readily detectable or observable, affect a large segment of the population, extend across much of a community or region, and have a substantial influence on the established social or economic conditions.

Duration. Social and economic changes caused by an alternative may be temporary or last for an extended time. Temporary impacts

may be noticeable locally, but not result in long-term changes of underlying economic and social conditions. Long-term impacts, on the other hand, may lead to changes in the economic base, construction or closure of public facilities, changes in real estate markets and how people and groups relate to one another, and other changes in established social and economic conditions. Many long-term effects would extend beyond the life of the approved *General Management Plan / Wilderness Study / Environmental Impact Statement*.

Short-Term: Short-term effects are those that occur during and in response to planning; design; construction and major maintenance of buildings, trails, parking lots and other facilities. These effects diminish or disappear after the activity is completed. The “short-term” may include the initial response(s) in social or economic conditions to fundamental changes in park management and operations and changing visitor use, which later give way to broader changes over time. Generally, “short-term” captures effects lasting up to five years. The short-term, however, is not a specific five-year period tied to the signing of the “Record of Decision.” Distinct actions, implemented over time, could each trigger short-term effects, such that there are multiple “short-term” time horizons over time.

Long-Term: Long-term effects are generally those lasting longer than five years, including some that may not begin until after completion of direct activities associated with the initial federal government spending or changes in management associated with an alternative. Such changes include increases in the Lakeshore’s base budget for operations and maintenance and effects related to changes in visitation over time.

Type/Character. Social and economic consequences may be beneficial, adverse, or indeterminate.

Beneficial: Effects that many individuals or groups would accept or recognize as improving economic or social conditions, either in general or for a specific group of people, businesses, organizations, or institutions. Examples of beneficial effects include lower unemployment, higher personal income, and economic and social diversity and sustainability.

Adverse: Effects that most individuals or groups would accept or generally recognize as diminishing economic or social welfare, either in general or for a specific group of people, businesses, organizations, or institutions. Examples of adverse effects include fewer job opportunities, increases in the cost of living without matching increases in higher income, or an erosion of public sector fiscal resources to fund public facilities and services.

Indeterminate: Effects for which the size, timing, location, or individuals or groups that would be impacted cannot be determined, or those that include both beneficial and negative effects, in some instances affecting different communities, populations, or public entities or jurisdictions, such that the net effect is indeterminate.

NPS OPERATIONS

This impact topic refers to the ability of NPS staff to protect and preserve National Lakeshore resources and provide opportunities for effective and enjoyable visitor experiences. It also addresses the effectiveness and efficiency with which NPS staff are able to perform such tasks. Information about NPS operations was compiled from various sources, especially Sleeping Bear Dunes National Lakeshore managers and other NPS staff. Information gathered includes park staffing, maintenance, and expense records, business plans, annual reports, volunteer records, and documents. Examples of operational considerations include needs for maintenance, protection, and patrol activities, and time required for

park staff to get to/from various park sites requiring attention (e.g., research or monitoring sites, trailheads, campsites, etc.)

Impact Intensity Definitions

Negligible: Effects on NPS operations would be at or below the level of detection.

Minor: Effects on NPS operations would be small but detectable. The change would be noticeable to staff but probably not to the public.

Moderate: Effects on NPS operations would be readily apparent to staff and possibly to the public.

Major: Effects on NPS operations would be substantial, widespread, and apparent to staff and the public.

IMPACTS OF THE NO-ACTION ALTERNATIVE

HISTORIC RESOURCES

Under the no-action alternative the National Lakeshore would continue to preserve and protect all of its identified historic properties (buildings, sites, structures, objects, districts, and landscapes) to the best of its ability given the limitations of available funds. Prioritization decisions would be based on such factors as national register eligibility and/or listing, the Lakeshore's fundamental resources, interpretive values, resource condition, and suitability for NPS operations. Individual actions would require consultation with the Michigan state historic preservation officer and the Advisory Council on Historic Preservation, if needed, and would be appropriately documented through compliance with Section 106 of the National Historic Preservation Act of 1966, as amended.

The Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) identifies four treatment approaches that apply to a wide variety of resource types, including buildings, sites, structures, objects, districts, and landscape features and patterns. Three of those treatments are included in this plan — preservation, rehabilitation, and restoration — and they are defined on page 40. These treatment approaches apply to a wide variety of resource types, including buildings, sites, structures, objects, districts, and landscape features and patterns. The simplest of these treatment approaches is preservation, in which measures are undertaken to stabilize the resource to ensure that it does not deteriorate further from its existing condition and then to maintain and repair historic features and materials. The second option is rehabilitation, in which the resource is made useable for some purpose while preserving those features that convey its historical, cultural, or architectural value. The third is restoration, in which the historic appearance at a particular time is accurately

regained. The fourth treatment, reconstruction, is not proposed in this plan.

All preservation, rehabilitation or restoration efforts would be undertaken in accordance with the standards. Any materials removed during rehabilitation or restoration efforts would be evaluated to determine their value to the Lakeshore's museum collection and/or for their comparative use in future preservation work at the sites. Preservation, rehabilitation, or restoration would have no adverse effects on historic resources.

With more than 300 buildings, sites, structures, objects, districts, and landscapes present in the park, it is likely that many historic properties will not be restored to their historic appearance. Most structures would be preserved, or they would be rehabilitated if an appropriate use for them can be identified and funding procured either through federal appropriation or through partnerships with state or local organizations. Many of the properties include smaller outbuildings that such partnerships might take on, either to rehabilitate for some use or to continually monitor and repair to ensure their continued existence. Where possible, partner organizations would be identified to fund and/or undertake work on historic properties.

In the Glen Haven/Sleeping Bear Point U.S. Life-Saving Service Station area, all buildings, structures, and grounds would continue to be maintained in their current condition. Structures such as the Sleeping Bear Inn and associated garage may be leased out under the NPS historic leasing program; such structures would undergo rehabilitation for an adaptive modern use.

In the Port Oneida Rural Historic District, all buildings, structures, and the associated agricultural landscape would be maintained in their current condition. Buildings, structures,

and landscape features that are deteriorating and at risk would undergo stabilization measures. Those currently in a stabilized condition await a decision about possible future uses that might allow for rehabilitation by the National Park Service or by an NPS partner organization.

On North Manitou Island, continuation of the no-action alternative would result in the preservation (stabilization) of structures, buildings, and grounds that are currently unmaintained and maintenance of all others in their current condition.

South Manitou Island structures, buildings, and grounds would undergo mostly stabilization of structures not currently stabilized and maintenance of all others in their current condition.

All other properties on or determined eligible for inclusion in the National Register of Historic Places would undergo stabilization where that action has not already occurred or maintenance in the current condition where some preservation treatment has already been implemented.

The actions proposed above are general. The treatments for each resource (preservation, stabilization, and/or rehabilitation with adaptive use) have not yet been determined so impacts cannot be fully described. However, it is the National Park Service's intent that no action proposed be "adverse." All actions affecting these historic structures and landscapes will be undertaken in consultation with the Michigan state historic preservation officer.

The no-action alternative would not directly or indirectly affect any properties outside the boundary of the National Lakeshore that are listed on or eligible for the National Register of Historic Places, or that are listed by the state.

Cumulative Impacts

Over the years historic resources in the Lakeshore have been and continue to be adversely impacted by natural processes such as weathering, vegetative encroachment, and the wear and tear associated with visitor use. Actions proposed for the South Manitou Island Lighthouse Complex would result in both the restoration of the exterior of the keeper's quarters and connecting passageway and the rehabilitation of the interior for adaptive reuse. In addition, actions proposed for Glen Haven Village include the stabilization and maintenance of historic structures or their rehabilitation for adaptive reuse. All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995), and would result in no adverse effects on historic resources.

As described above, implementation of the no action alternative would result in no adverse effects on historic resources. The no adverse impacts of this alternative, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a no adverse effect cumulative impact. The no adverse effects of the no-action alternative would contribute modestly to the no adverse effect cumulative impact.

Conclusion

The no-action alternative would have a determination of no adverse effect under the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural Properties" (36 CFR 800). There would be *no impairment* of cultural resources from implementation of the no-action alternative (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section of this chapter.

NATURAL RESOURCES

Soils and Geologic Resources

Readers are encouraged to refer back to the “Soils and Geologic Resources” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Under the no-action alternative, current visitor activities that negatively impact dunes would continue. Although dunes impacts, primarily soils compaction and erosion, would be reduced in some areas by the use of sand ladders, boardwalks, and sidewalks, placement and maintenance would be limited to what the staff can accomplish with current resources. As such, short- and long-term adverse impacts on dunes resources, ranging from minor to moderate depending upon the specific location, would continue.

Ongoing high use of the Platte River would continue to impact soil resources within that corridor. Informal entry and exit points along the river and proliferation of informal social trails in the adjacent floodplain would continue to contribute to erosion of the riverbank and compaction of floodplain soils, resulting in long-term moderate adverse impacts on soil resources in that corridor.

No new trails or different use of existing trails would be proposed in the no-action alternative. Use of existing formalized trails would continue to have long-term minor adverse impacts on the soils due to erosion and compaction.

Soil disturbance or destruction from development of additional infrastructure would not occur in the no-action alternative because no changes to existing roads, parking areas, or campgrounds are proposed in this alternative. Parking area and road end upgrades that are underway are discussed under cumulative impacts. During periods of peak visitation,

visitors might continue to park in nondesignated areas for access, disturbing those soils and leading to soil compaction or erosion. This would continue to result in short- and long-term minor to moderate adverse impacts on soils resources, depending upon the specific location and the conditions under which parking in nondesignated areas occurred.

Under this alternative, the National Park Service would continue to acquire lands on a willing-seller basis within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Continued NPS acquisition of lands in the Benzie Corridor would protect the soils and geologic resources on NPS-owned parcels from development for the life of this plan, providing short- and long-term, moderate, beneficial effects. Private development within the corridor would probably continue at its current pace and would continue to have minor to moderate adverse impacts to these resources.

Cumulative Impacts. Other past, present, and anticipated projects that would contribute to impacts on soils and geologic resources include 1) improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (5) restoration of the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; (6) minor improvements to the Dune Climb parking area; and (7) continued dredging of the mouth of the Platte River. Although activities 1-6 would likely result in short-term adverse impacts during the construction phase, the net result would likely be long-term, minor to moderate beneficial impacts because all projects would contribute to a reduction of

the potential for soil compaction and erosion. Dredging the mouth of the Platte River results in continued addition of dredged material to the shoreline. During low-water periods deeper dredging is required and results in dredge materials with high clay content being deposited on the shoreline, resulting in armoring of the beach surface and consequent profile changes. This results in short- and long-term minor to moderate adverse impacts.

The impacts of other actions described above, in combination with those of the no-action alternative, would result in short- and long-term minor to moderate adverse, and long-term minor to moderate beneficial cumulative impacts. The no-action alternative is expected to contribute a small component to these impacts.

Conclusion. The no-action alternative would have short- and long-term, minor to moderate adverse impacts and short- and long-term moderate beneficial impacts on soils and geologic resources. Cumulative impacts would be anticipated to be short and long term, minor to moderate adverse, and long term, minor to moderate beneficial. There would be *no impairment* of soils or geologic resources from implementation of the no-action alternative (see definition of impairment in the “Impairment of National Lakeshore Resources” section).

Vegetation and Wildlife

Readers are encouraged to refer back to the “Vegetation and Wildlife” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Under the no-action alternative, 43% (30,903 acres) of the National Lakeshore would continue to be managed as wilderness. No new trails or roads would be constructed, so no further fragmentation of habitats would be

anticipated. No loss of habitat to infrastructure development is anticipated in this alternative. Lands along the Benzie Corridor would continue to be purchased on a willing-seller basis by the National Park Service, thus protecting those lands from development for the life of this plan. Access to the Giant Cedars area would continue to be by foot or, less frequently, via the lake (i.e., by boat), resulting in continued low visitor use of this sensitive area. The sum of these effects would be long-term, moderately beneficial impacts on the vegetation and wildlife of the Lakeshore.

Continuing to allow motorboats on School, Bass (Leelanau County), North Bar, and Loon lakes would result in short- and long-term, minor, adverse impacts on wildlife due to sensory-based disturbance at these locations. The no-action alternative would also continue to allow the use of motorized boats on the Crystal and Platte rivers, which could have short-term, minor adverse impacts on the wildlife along those rivers due to sensory-based disruption. High, unconstrained visitor use of the Platte River would continue to have short- and long-term, moderately adverse impacts on the vegetation and wildlife in or adjacent to that corridor due to visitors going up and down the riverbanks to use the areas alongside the river for a variety of activities. The effects of these activities include direct trampling of vegetation, sensory-based disruption of wildlife behaviors, and potential spread of invasive and pest species.

Continuation of the vehicle tours around the farm loop would have short- and long-term, negligible adverse impacts on habitat suitability and wildlife behaviors in that area because of the minor noise and visual disturbance associated with those tours and the introduction and spread of invasive species. The lack of a formal trail system in the Bow Lakes area would continue to encourage random movement of visitors through that habitat, resulting in short- and long-term, minor adverse impacts on the vegetation and wildlife of the

area due to trampling, habitat alteration, and sensory-based disruption. Dispersed camping on North Manitou Island would continue to have short- and long-term, minor adverse impacts on the vegetation and wildlife in the vicinity of repeatedly used sites for camping. Formation of new informal campsites, or repeated use of old ones, results in habitat alteration and sensory-based disturbance to the wildlife in the vicinity of the campsite.

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Continued NPS acquisition of lands in the Benzie Corridor would protect the vegetation and wildlife on NPS-owned parcels from development for the life of this plan, providing short- and long-term, moderate, beneficial effects. Private development within the corridor would probably continue at its current pace and would continue to have minor to moderate adverse impacts to these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on vegetation and wildlife include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the “Fire Management Plan”; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) river bank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; and (5) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas. These combined actions would likely have short- and long-term minor to moderate adverse impacts on vegetation and wildlife due to disturbance during the actions, and long-term minor beneficial impacts on vegetation and wildlife due to habitat restoration and enhancement. The impacts of the other

actions described above, together with the impacts of the no-action alternative, would result in short- and long-term minor to moderate adverse cumulative impacts, and long-term minor to moderate beneficial cumulative impacts on the vegetation and wildlife of the Lakeshore. The no-action alternative is expected to contribute a relatively small component to these cumulative impacts.

Conclusion. The no-action alternative would have long-term, moderately beneficial impacts, and short- and long-term negligible to moderate adverse impacts on the vegetation and wildlife of the Lakeshore. The impacts of other actions combined with those of the no-action alternative would likely result in short- and long-term negligible to moderate adverse cumulative impacts, and long-term, minor to moderate beneficial cumulative impacts on the vegetation and wildlife of the Lakeshore. There would be *no impairment* of vegetation or wildlife resources from implementation of the no-action alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Federal Threatened and Endangered Species

Readers are encouraged to refer back to the “Federal Threatened and Endangered Species” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Under the no-action alternative, as under all alternatives, the active Lake Michigan beach area is used for a variety of recreational activities. The beach area is also a means of access to the National Lakeshore for boaters, kayakers, etc. The U. S. Fish and Wildlife Service has designated 2.1 miles (3.3 km) around the southern end of North Manitou Island and 14.2 miles (22.5 km) along the Lakeshore’s mainland as critical piping plover habitat (USFWS 2001). Federally endangered

pipin plover nest in the active zone of the beach and are easily disturbed by human activity during the nest site selection, egg-laying, and incubation phases of nesting (approximately mid-May to mid-June) (USFWS 2001). Sensitivity to human activity declines as the nesting season progresses from mid-June to mid-July, by which time many of the young plovers are capable of flight. Although the critical habitat within the Lakeshore coincides with the actively used recreational beach area, NPS staff have demonstrated success in minimizing impacts on nesting piping plovers in areas with relatively high human activity (e.g., the mouth of the Platte River) through various actions (see “Mitigative Measures for the Action Alternatives” section in chapter 2). Human activity is currently restricted in breeding areas by use of a specialized fence system.

Although dogs are allowed in many parts of the National Lakeshore, they are required to be on a 2-meter (6-foot) leash at all times. Furthermore, the park issues a notice each year at the beginning of the piping plover reproductive season that prohibits pets on those segments of beaches where piping plovers have established territories or nests. That prohibition is kept in place until the piping plover reproductive season has ended (NPS 2006c). Other actions include further provision of information about the species and its habits and designating alternate access points.

No trail or other development is proposed within designated critical habitat under the no-action alternative.

Under the no-action alternative the one area in the Lakeshore where the federally endangered Michigan monkey flower is known to occur would continue to be managed for protection of this species. No new roads, trails, or other developments are proposed under the no-action alternative that could negatively impact this species.

Pitcher’s thistle occurs throughout the vegetated portions of the shoreline dunes on both the mainland and the islands. Most occurrences of this federally threatened species within the National Lakeshore are in areas managed for conservation of natural resources under the no-action alternative. No new roads, trails, or other developments are proposed under the no-action alternative that could negatively impact this species.

At the landscape level, the no-action alternative may affect but is not likely to adversely affect listed species (piping plover, Michigan monkey flower, and Pitcher’s thistle) because continuing the current management direction would result in conditions that are beneficial to preserving habitat and minimizing impacts on listed species.

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Private development within the corridor would probably continue at its current pace. These activities and conditions would have no effect on listed species because neither the species nor their habitats occur within the corridor.

Conservation Measures. Conservation measures are undertaken to reduce potential impacts on federally listed species or candidate species. Initiation of conservation measures would occur in consultation with the U. S. Fish and Wildlife Service and would be required if any of the following occurred:

- initiation of activities anticipated to have impacts on piping plovers or their designated critical habitat beyond those addressed in this document
- additional Michigan monkey flower occurrences within the Lakeshore were identified in areas where they might potentially be impacted

- initiation of activities anticipated to have impacts on Michigan monkey flower populations
- initiation of activities anticipated to have impacts on Pitcher's thistle populations beyond those addressed in this document

Renewed discussion and consultation with the U. S. Fish and Wildlife Service, should any of the above events occur, would focus on development of specific conservation measures to reduce potential impacts on these species and/or designated critical habitat. Such conservation measures would be based on the recommendations provided by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on federally listed species and designated critical habitat include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the "Fire Management Plan"; and (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; and (4) those activities presented in table 21. These actions would benefit natural resources including federally listed species. During implementation, actions would be taken to avoid or minimize potential adverse impacts on such species. This would result in actions that might affect but would not be likely to adversely affect federally listed species. The actions described above, in combination with the no action alternative, would result in no more than insignificant or discountable cumulative impacts resulting in overall impacts that may affect but are not likely to adversely affect these species. The no-action alternative would be expected to contribute a relatively small component to these cumulative impacts.

Conclusion. The no-action alternative may affect but would not be likely to adversely affect addressed federally listed species and designated critical habitat. The cumulative effects of other projects, combined with the

no-action alternative, may affect but would not be likely to adversely affect these species. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Michigan State-Listed Species

Readers are encouraged to refer back to the "Michigan State-Listed Species" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

Access to the Giant Cedars area would continue to be by foot from the ranger station, or, less frequently, via the lake (i.e., by boat). Management actions that occur or would be considered for reduction of impacts to plants and soils in this sensitive area would include educating visitors about the sensitive nature of the area, fencing to reduce compaction of root zones and/or trampling of vegetation, and the strategic use of boardwalks. As such, the no-action alternative would be anticipated to have short- and long-term minor adverse impacts on the Michigan state-listed species occurring in this general area.

The primary activity that would continue under the no-action alternative, and which would have the potential to impact state-listed species in the shorelines/dunes/near-shore complex would be recreational hiking. Hiking would likely continue to have short-term, minor adverse impacts on the fascicled moonwort, Lake Huron locust, prairie moonwort, and prairie warbler due to soil disturbance, erosion, compaction, and trampling for the plant species, and trampling and sensory-based disruption for the animal species.

Several activities that would continue under the no-action alternative and would likely

adversely impact state-listed species associated with lakes, wetlands, and riparian areas (i.e., bald eagle, Blanchard's cricket frog, common loon, cut-leaved water parsnip, Douglas stenelmis riffle beetle, ram's-head lady's-slipper, and wood turtle). Continued use of motorized boats on School, Bass (Leelanau County), North Bar, and Loon lakes would likely prevent common loons and trumpeter swans from using these lakes because they are sensitive to human disturbance, particularly loud noises. Continued high and relatively unconstrained visitor use of the Platte River corridor reduces the suitability of this corridor habitat for the Douglas stenelmis riffle beetle, wood turtle, and bald eagle due to sensory-based disruptions. Collectively, these activities would result in short- and long-term, minor to moderate, and adverse impacts on state-listed species associated with lakes, wetlands, and riparian areas.

Ongoing activities that might affect the mature forest associates — merlins and red-shouldered hawks — include dispersed camping on North Manitou Island; motorized boats on Bass (Leelanau County), North Bar and Loon Lakes; and hang gliding at designated sites.

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Private development within the corridor would probably continue at its current pace. These activities and conditions would have negligible effects on state-listed species because although some occurrences are known near the corridor, none are known or anticipated within the corridor.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on Michigan state-listed plant and animal species include the improvements to the parking areas at the ends of Leelanau

County Roads 651 and 669; Glen Haven Village improvements; implementation of the "Fire Management Plan"; improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; riverbank stabilization on the Platte River at the former Water Wheel and Casey's Corner canoe liveries; restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; and minor improvements to the Dune Climb parking area. Each of these projects would result in short-term adverse impacts during construction. The long-term impacts would likely be minor to moderate and beneficial. The no-action alternative would contribute short- and long-term, minor to moderate, adverse impacts to these effects on Michigan state-listed species. The impacts of the other actions, together with the impacts of the no-action alternative, would result in short- and long-term minor to moderate adverse, and long-term, minor to moderate, beneficial cumulative impacts. The no-action alternative would be expected to contribute a relatively small component of these cumulative impacts.

Conclusion. The no-action alternative would have short- and long-term, minor to moderate, adverse impacts on Michigan state-listed species. Cumulative impacts are predicted to be short- and long-term minor to moderate, adverse, and long-term, minor to moderate, beneficial. There would be *no impairment* of Michigan state-listed species from this alternative (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Wetlands and Water Quality

Readers are encouraged to refer back to the "Wetlands and Water Quality" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the

types of impacts resulting from visitor use and development.

Visitor activities that would continue under the no-action alternative and that could impact wetlands and water quality include visitor use of riparian areas, wetlands, and lakes, including those in the Bow Lakes area. Visitor use impacts in these areas includes wetland trampling due to walking through the wetlands, and pollution of wetlands through introduction of petroleum-based and other chemicals (e.g., motorized boats and swimming/bathing). Collectively, these impacts would likely have short- and long-term, minor to moderate, adverse impacts on wetlands and water quality within the National Lakeshore.

No development activities are proposed in the no-action alternative that would be anticipated to impact wetlands or water quality. Continued NPS acquisition of lands within the Benzie Corridor would help protect wetlands and water quality below this area, resulting in short- and long-term, negligible to minor beneficial impacts. Private development within the corridor would probably continue at its current pace and would continue to have minor to moderate adverse impacts to these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on wetlands and water quality include implementation of the “Fire Management Plan”; river bank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas, minor improvements to the Dune Climb parking area, and dredging of the Platte River mouth. Although each of these projects would involve short-term adverse impacts (e.g. dredging of the Platte River resulting in short-term suspension of particulates in the water

and resulting lower water quality immediately downstream (lakeside) of the dredging), the net result would likely be long-term, minor to moderate beneficial impacts (e.g. dredging the mouth of the Platte River allows boats to pass without continuously hitting the bottom, stirring up material, and reducing water quality). The no-action alternative would contribute short- and long-term, minor to moderate, adverse and short-and long-term, negligible to minor, beneficial impacts to the cumulative effects on wetlands and water quality. The impacts of the other actions, together with the impacts of the no-action alternative, would result in short- and long-term minor to moderate, adverse; short-term, negligible to minor beneficial; and long-term negligible to moderate beneficial cumulative impacts. The no-action alternative would likely contribute a relatively small component to these cumulative impacts.

Conclusion. The no-action alternative would have short- and long-term, minor to moderate, adverse impacts on wetlands and water quality. The cumulative impacts would be short- and long-term minor to moderate, adverse; short-term, negligible to minor beneficial; and long-term negligible to moderate beneficial. There would be *no impairment* of wetlands or water quality from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

VISITOR OPPORTUNITIES AND USE

Visitor Opportunities

Visitors would continue to have access to information, interpretation, and educational opportunities at a variety of locations, including the visitor center in Empire, at Glen Haven, and at the visitor contact station on South Manitou Island. Interpretive and educational activities throughout the Lakeshore would be similar to those currently offered (see chapter 4 “Visitor Opportunities

and Use” section). Continuation of these opportunities would have long-term, moderate, beneficial impacts.

Access to and through the Lakeshore would continue on the existing network of state, county, and NPS roads and Lakeshore trails, trailheads, and beach access points (see chapter 4 “Facilities and Infrastructure” section under “NPS Operations”). Seasonal ferry service would continue to be provided for overnight trips to North Manitou Island and day and overnight trips to South Manitou Island. Visitor access to the Benzie Corridor would not be provided due to the current limited NPS ownership. Continuation of the above-noted Lakeshore access would have long-term, moderate, beneficial impacts.

The scenic resources of the Lakeshore would largely reflect existing conditions. Visitors could experience relatively large areas of the Lakeshore that are natural in character, sites that reflect the area’s culture and history (e.g., Glen Haven, Port Oneida, and cultural resources on North Manitou and South Manitou islands), and areas with facilities that support recreational use (e.g., the Dune Climb and Trails End). NPS land acquisition would continue in the Benzie Corridor, on a willing-seller basis. The development of private properties within the Benzie Corridor might continue to occur although NPS properties would remain undeveloped. Currently the corridor is relatively undeveloped and the views of Crystal Ridge from below or more distant points within and outside the Lakeshore are natural in character. The largely natural scenic resources of the Lakeshore would continue to have long-term, moderate beneficial impacts on visitors.

The scale of recreation-oriented development would continue to be relatively modest (see chapter 4 “Facilities and Infrastructure” section). Some visitors would be disappointed not to have some additional improvements in recreation-oriented development. The current level of development would continue to have

long-term, minor beneficial impacts for most visitors. For those wanting additional developments there would be long-term, minor adverse impacts as a result of limitations in available developed recreational opportunities and amenities.

A wide range of recreational activities would continue to be available. Visitors would continue to experience crowding on the Platte River during peak use times, and there would be no visitor opportunities in the Benzie Corridor. Visitor opportunities related to wilderness are described in the “Wilderness Character” section of this chapter. The range of current recreational activities would provide an overall long-term, beneficial impact on visitors. However, the occasional crowding on the Platte River would continue to have long-term, minor adverse effects to some river users and might result in some visitor displacement.

Natural sounds would continue to dominate the Lakeshore except along roadways, in developed areas, where motorized boats are allowed (along rivers, at specific inland lakes, and on Lake Michigan), and when aircraft are flying over. The predominance of natural sounds would continue to have long-term, minor, beneficial impacts on visitors.

The naturally dark night sky would continue to be predominant in the Lakeshore despite vehicular lights along roadways and lighting in nearby developed areas. These conditions would continue to have long-term, minor, beneficial impacts for those who value dark night skies.

Visitor Use

Visitor opportunities under the no-action alternative would remain essentially unchanged. Consequently, visitor use at Sleeping Bear Dunes under the no-action alternative would be expected to increase modestly over the life of this plan (primarily as

a result of regional population growth) — perhaps on the order of 5% to 7% (up to 84,000 additional visitors per year). Year-to-year changes in visitor use would vary, with periods of faster or slower growth, and even periods of declining visitor use. However, the long-term growth trend would be expected to be positive. Peak visitor use would likely continue to occur in July and August. Current visitor use levels would have long-term and minor effects that may be concurrently viewed as beneficial or adverse. The differences between beneficial and adverse would depend on the expectations and preferences of the visitor related to the anticipated increased visitation.

Cumulative Effects

Other past, present, and reasonably foreseeable projects that would affect visitor opportunities and use include: (1) improvements to parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Pierce Stocking Scenic Drive Lake Michigan overlooks 9 and 10; (4) South Manitou Lighthouse Complex exterior restoration and interior rehabilitation; and (5) Dune Climb parking area paving and other minor improvements. These actions would improve visitor opportunities by improving enjoyment, access, and/or range of available opportunities for visitors and would have an overall long-term, minor, beneficial effect on visitor opportunities and use. The development of private properties within the Benzie Corridor and rural residential developments near the Lakeshore (particularly along the access roads and in/near Glen Arbor and Empire) might continue to occur; these would result in a degradation of natural scenic quality, natural soundscapes, and night sky. These actions would have a long-term, minor, adverse effect on visitors. Combined with the no-action alternative, these actions would have a long-term, minor, beneficial cumulative effect. Impacts of the no-action alternative would

comprise a relatively modest portion of the overall cumulative effect.

Conclusion

Visitors seem satisfied overall with most current opportunities in the Lakeshore. Maintaining the current access, scenic resources, range of visitor opportunities, experiences, and recreation-oriented facilities would have a long-term, minor to moderate beneficial impact on visitor opportunities and use. Some visitors would prefer some additional improvements in recreation-oriented facilities, a few additional visitor opportunities, or a reduction of crowding on the Platte River, and the lack of these would result in a long-term, minor adverse impact on these visitors. The cumulative effects would be long-term, minor, and beneficial.

WILDERNESS CHARACTER

Natural and Undeveloped

Under this alternative, 30,903 acres (43% of the National Lakeshore) would continue to be managed to maintain their existing wilderness character “until Congress determines otherwise.” For simplicity, these areas are referred to simply as “wilderness areas” in this section. In the no-action alternative, “wilderness areas” would continue to be interrupted by or interspersed with non-wilderness in some places (e.g., at Port Oneida, near Good Harbor, and on South Manitou Island), so adjacent motorized or mechanized uses (e.g., vehicle use, the motorized farm tour on South Manitou Island) would continue to intrude upon the “wilderness areas” undeveloped, primeval character. *Within* the “wilderness areas,” the presence of secondary roads with active motor vehicle and bicycle use and presence of historic structures would continue to locally diminish the areas’ naturalness. These would be continuing (not

new) adverse, localized, and minor long-term impacts.

Opportunities for Solitude

Outstanding opportunities for solitude would continue to be available in the “wilderness areas” on the mainland (particularly at the north and south ends) and on the Manitou Islands. Most portions of the “wilderness,” especially away from trails and developed areas, would continue to offer excellent prospects for privacy and isolation, although modest gradual increases in visitation would slightly diminish these opportunities over time. Solitude would continue to be more available on North Manitou Island than on South Manitou because the former is larger, has fewer visitors (many of whom are seeking solitude themselves), and lacks day use. This alternative would have continuing moderate beneficial impacts and long-term, minor, adverse impacts on opportunities for solitude.

Opportunities for Primitive, Unconfined Recreation

Due to the nature of the ferry schedule there would continue to be opportunities for both day and overnight wilderness experiences on South Manitou Island, but only overnight experiences on North Manitou. For visitor safety and resource reasons, permits are required for backcountry camping, and campers must stay in designated campgrounds except on North Manitou Island where camping would continue to be dispersed. Although most visitors would agree that there are outstanding opportunities for primitive, unconfined recreation both on the mainland and on the islands, permit and camping requirements would continue to diminish these qualities to some degree, resulting in a minor, long-term, adverse impact.

Cumulative Impacts

Over time, the Lakeshore’s ongoing program to restore nonhistoric areas disturbed by past land uses to more natural conditions has substantially increased the natural, undeveloped character of the Lakeshore. In 2006 alone, restoration was accomplished on 21 tracts amounting to 135 acres, and another 14 tracts were partially restored. The work includes removing nonnative trees and remnants of human enhancements such as house foundations, gravel, wells, and septic systems, plus reestablishing more natural contours and native vegetation. This restoration work would continue to have a long-term beneficial effect on naturalness. Combined with this ongoing program, the no-action alternative would have long term, moderate, beneficial cumulative effects. The contribution of the no-action alternative to these cumulative effects would be substantial.

Conclusion

As the result of ongoing management of nearly 31,000 acres to maintain its existing wilderness character, as directed by Congress, the National Lakeshore would continue to include extensive, largely natural undeveloped areas where outstanding opportunities for solitude or primitive, unconfined recreation would continue to be available. Impacts of the no-action alternative would continue to be mostly beneficial, moderate, and long term — but there would also be some continuing localized, minor adverse impacts on wilderness character. The no-action alternative, combined with other actions, would result in long-term moderate, beneficial cumulative effects.

REGIONAL SOCIOECONOMICS

Implementing the no-action alternative would occur at the same time as other economic, demographic and social changes in the region.

Economic projections for the region anticipate population growth of about 5% through 2010 and more than 25% through 2030, a net gain of more than 30,000 residents (NWMCOG 2006 and MDOT 2007). Most of the growth is expected in Grand Traverse County, although nearly 10,000 additional year-round residents are projected in Benzie and Leelanau counties. Seasonal population is also expected to climb. The influx of new residents will affect the social dynamics in the region. Employment increases will accompany the population growth, particularly the number of jobs in retail trade and services and in the residential construction industries.

Visitor-Related Economic Impacts

Visitor use at Sleeping Bear Dunes under the no-action alternative would be expected to increase modestly over the life of this plan — perhaps on the order of 5% to 7% (see “Impacts of the No-Action Alternative — Visitor Use” section in this chapter).

Increased visitor spending at local stores, motels and hotels, and other tourism-related businesses and attractions would accompany the rising visitation. Annual spending could climb to \$34.5 million over the life of this plan, a \$1.7 million increase over current levels. Future visitor use and spending would vary by season, with peak visitor use in the summer. Future visitor spending would include increases in entry and camping fees and sales of merchandise through the Eastern National cooperating association’s operations at the Lakeshore.

Projected spin-offs from the visitor spending include 30 to 35 additional jobs and increased personal income in the region. The visitor-related economic impacts would be long-term benefits, but negligible to minor relative to the 84,000-plus jobs and \$3.97 billion in personal income in the three-county region in 2005.

Visitor spending under no action would continue to be concentrated in Glen Arbor, Empire, Traverse City, and businesses located along M-22, M-72, and other highways providing access to the Lakeshore. Market opportunities created by the spending would help sustain the retail trade and service establishments in the region, with these businesses realizing a collective, albeit limited-scale increase in business revenues. The economic stimulus associated with visitor spending would remain highly seasonal.

The state and local governments would collect additional sales tax from the increased visitor spending.

The visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term due to the limited scale of increased visitation over time.

Economic Impacts Related to Implementation and NPS Operations

Implementing the no-action alternative would provide a sustained economic infusion to the region over the life of this plan. The infusion would result from ongoing Lakeshore operating expenditures, including payroll, and expenditures on projects beyond basic operations. Major project needs over the life of this plan include \$3.2 million in construction spending and \$3.4 million in other major spending (for total construction costs of \$6.6 million, plus funds to address deferred maintenance and continued maintenance of the Lakeshore’s infrastructure and resources.

NPS maintenance staff would perform much of the work to address deferred maintenance and preservation, restoration, and rehabilitation activities. The Lakeshore’s future outlays for materials and equipment to support construction and major maintenance would create short-term economic impacts in the region. Local merchants, equipment suppliers,

specialty contractors, and related industries would capture a substantial portion of those outlays. The timing and amount of these expenditures are uncertain, depending on the budgetary approvals by Congress, budget allocations within the National Park Service, and future collections of entry and camping fees at the Lakeshore that can be used to support projects. Annual NPS payroll, operating, and maintenance would produce long-term effects on employment, business sales, income, and other related measures.

No major changes in budgeted resources to fund NPS operations would be anticipated under the no-action alternative. Supportable staffing needs under the no-action alternative are estimated at about 66 full-time equivalent employees, and the Lakeshore would continue to benefit from substantial levels of volunteer efforts. Available resources would include about \$3.9 million in annual base budget appropriations, about \$1.0 million per year in entry and camping fees, and roughly \$1.5 million per year in various nonrecurring funding for other projects. Continued supplemental land acquisition funding would be required for land acquisition in the Benzie Corridor.

Establishment of the National Lakeshore and subsequent land acquisition removed lands and improvements from the local tax rolls. Some adverse effects on local businesses might have also resulted. These effects were offset in part by PILT payments, the likely boost in area property values due to the proximity and “amenity” values of the National Lakeshore, tax revenues associated with sales to Lakeshore visitors, and the economic infusions from NPS operations and staff. Some additional effects on tax rolls would result from future land acquisition in the Benzie Corridor and Bow Lakes areas.

Activities sponsored by the Lakeshore’s partners would provide additional sources of economic stimulus. The timing, magnitude,

and indirect economic consequences of those activities are indeterminate.

Economic effects associated with the Lakeshore’s operations would be beneficial and minor to moderate in the short and long term.

Effects on Regional Population

The Lakeshore would not be a major catalyst for future population growth under the no-action alternative. Staffing levels would remain about the same, and little economic expansion would result due to the modest increases in long-term visitor use.

The Lakeshore would continue to be an important “amenity” for many residents and for people considering relocation to the region, and thus could contribute indirectly to population growth. However, implementation of the no-action alternative would not dramatically affect the region’s heritage and outdoor recreation opportunities that contribute to its seasonal tourism economy.

The effects on regional population growth under the no-action alternative would be indeterminate, but likely negligible, both in the short and long terms.

Community Services

Little or no change in Lakeshore-related demands on community services and facilities across the region would result from implementing the no-action alternative. Local water and wastewater systems would be marginally affected by more people traveling through the area and staying locally in second homes or lodging accommodations. However, the incremental demands associated with the increased visitation would not require additional capacity or staffing, due to its seasonal nature, limited scale, and geographical dispersion. Tax revenues

generated by visitor spending would help provide resources to meet future needs.

Effects on community services under this alternative would be indeterminate and negligible over the short and long terms.

Traffic and Emergency Services

Traffic would increase marginally on area highways and roads as a result of travel associated with higher visitation under the no-action alternative. The incremental traffic would be highest on summer weekends. Traffic increases would be most noticed on M-22, M-109, and M-72, the main access roads to the Lakeshore, though future traffic volumes would be within the design capacities of these roads. Over time, increases in traffic volumes would lower the level of service below desired conditions at the intersection of M-22 and M-109 (Robert Peccia & Associates, 2001). Most Lakeshore-related traffic would consist of light-duty vehicles and self-contained recreational vehicles (RVs) that do not result in heavy wear on the paved roads and thus, would not require much additional maintenance.

More traffic would cause more traffic accidents and demands on local law enforcement, emergency medical and fire protection agencies. The scale of changes associated with the no-action alternative would not require law enforcement agencies to hire more staff, though they could contribute to overall needs for more staff. Although the frequency of incidents would remain relatively low, the distances and response times involved and the fact that many local emergency medical and fire protection agencies are staffed partially by volunteers, could impose burdens on these providers.

The effects of the no-action alternative on traffic and emergency services would be adverse, but negligible over the short term and long term.

Attitudes and Lifestyles

The Lakeshore's influence on community attitudes and lifestyles would not dramatically change under the no-action alternative. Continuing NPS operation within the current management framework would not substantially alter existing visitor use opportunities or patterns. Maintaining current land and lakeshore access plus management of some lands to preserve their wilderness characteristics would encourage continued low use levels in many areas of the Lakeshore. Such management would enjoy support from several affected publics.

For some members of the community, continued management under the no-action alternative would not be satisfactory because they might see it as lacking clear management direction for the National Lakeshore. People and groups who promote a positive commitment to continued county road access, specific recreation opportunities, preservation of historical and cultural resources and landscapes, or enhanced protection of natural resources might not view the management direction in this alternative favorably. At the same time, some may see benefits with the no-action alternative, either because it avoids situations or impacts that they would find less desirable, or because they believe it leaves open their desired management options to be considered in the future.

The net effects of the no-action alternative on community attitudes and lifestyles are indeterminate.

Cumulative Impacts

From the economic and social perspectives, one cannot readily isolate what happens at the Lakeshore from past, present, and future development in the surrounding areas. Forestry, maritime, and agricultural uses along with the establishment of the Lakeshore are largely responsible for existing land use pat-

terns. Those uses are also tied to the cultural and historical landscapes that are among the Lakeshore's fundamental resources. If not for establishment of the Lakeshore, the affected lands would undoubtedly provide far fewer opportunities for public use and natural resource protection.

Social and economic effects of the above actions include moderate short- and long-term increases in traffic on local roads, short-term moderate demands on local construction trades and services, short- and long-term moderate demands on community services, and changes in the seasonal resident and visitor population. Social and economic effects of ongoing or planned improvements/restoration at the Lakeshore would result in long-term negligible economic effects on visitor-related businesses due to changes in visitor use levels and distribution. Combined with these effects, the no-action alternative would result in short- and long-term minor to moderate beneficial and adverse cumulative effects. The no-action alternative would comprise a small portion of these overall cumulative impacts.

Conclusion

The economic and social effects of the no-action alternative would include negligible to minor short-term and long-term economic benefits and negligible, indeterminate, or adverse effects on population growth and demands on community services and facilities. Long-term consequences on attitudes and lifestyle are indeterminate, but in general would be more likely to be adverse than beneficial. The no-action alternative would have short- and long-term minor to moderate beneficial and adverse cumulative social and economic effects.

NPS OPERATIONS

Under the no-action alternative, NPS operations would continue to be characterized by (1) a substantial number of facilities or assets (e.g., visitor contact stations, parking and picnic areas, campgrounds, trails, and historic structures and landscapes) that must be maintained; (2) visitor-related operational demands (e.g., interpretative services, patrols, and campground maintenance) that are much greater in the busy summer visitor season than at other times of year; (3) island operations that command a disproportionate share of the Lakeshore's annual operating budget due to the logistics of transporting equipment, materials, and staff to and from the islands; and (4) increasingly better and stronger relationships with outside entities and organizations who are interested in the Lakeshore.

Assuming current funding trends continue and staffing levels remain similar to present, the Lakeshore would continue to be unable to fully achieve desired conditions in program areas such as resource protection, visitor services, cyclic maintenance, and the deferred maintenance backlog would continue to grow over time. Wilderness minimum requirement analysis would continue to be required for the 30,903 acres managed to maintain their existing wilderness character. The no-action alternative would have continuing long-term minor to moderate beneficial and adverse impacts on NPS operations, but there would be no new impacts.

Cumulative Impacts

Ongoing and planned facility upgrades and restoration/rehabilitation projects would have mostly beneficial impacts over the long term because these projects would result in reduced resource protection and cyclic maintenance needs. Minor adverse impacts would occur in the short term. Dredging of the Platte River mouth would continue to

place demands on the NPS maintenance staff and budget, a minor, long-term, adverse effect. Combined with impacts of the above actions, the no-action alternative would have long-term, minor beneficial and adverse cumulative effects. This alternative's contribution to these cumulative impacts would be substantial.

Conclusion

Ongoing impacts (long-term minor to moderate beneficial and adverse) would continue, but the no-action alternative would have no *new* impacts on NPS operations. The no-action alternative, combined with other actions, would result in long-term minor beneficial and adverse cumulative effects.

UNAVOIDABLE ADVERSE IMPACTS

Some negligible to moderate impacts to soils, vegetation, wildlife, water resources and wilderness character caused by ongoing recreational use or facilities are essentially unavoidable (e.g., soil compaction, vegetation trampling, wildlife disturbances, and decreased opportunities for solitude). Gradual increases in visitor use would have low level adverse impacts on regional socioeconomics (e.g., increased traffic).

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

With the exception of consumption of fuels and raw materials for maintenance activities, no actions in this alternative would result in consumptions of nonrenewable natural resources or use of renewable resources that would preclude other uses for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The National Lakeshore would continue to be used by the public, and most areas would be protected in a natural state. The National Park Service would continue to manage the Lakeshore to maintain ecological processes and native biological communities and to provide appropriate recreational opportunities consistent with preservation of cultural and natural resources. Actions would be taken with care to ensure that uses do not adversely affect the productivity of biotic communities. Under the no-action alternative there would be virtually no new development and no appreciable loss of long-term ecological productivity.

IMPACTS OF THE PREFERRED ALTERNATIVE

HISTORIC RESOURCES

The Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) identifies four treatment approaches that apply to a wide variety of resource types, including buildings, sites, structures, objects, districts, and landscape features and patterns. Three of those treatments are included in this plan — preservation, rehabilitation, and restoration. See page 40 for more detailed definitions. The simplest of these treatment approaches is preservation, in which measures are undertaken to stabilize the resource to ensure that it does not deteriorate further from its existing condition and then to maintain and repair historic features and materials. The second option is rehabilitation, in which the resource is made useable for some purpose while preserving those features that convey its historical, cultural, or architectural value. The third is restoration, in which the historic appearance at a particular time is accurately regained. The fourth treatment, reconstruction, is not proposed in this plan.

Although each alternative calls for preserving and protecting all historic properties, each action alternative provides a different management zone configuration based on that alternative's overall vision, and each management zone prescribes which of the three treatments could be used for historic properties. Thus, potential treatments for the National Lakeshore's various historic properties differ among the alternatives. Based on the locations and relative proportions of management zones in the preferred alternative, 79% of historic structures would undergo preservation, rehabilitation, or restoration (experience history zone), 13% of historic structures would undergo preservation or rehabilitation (recreation zone), and 8% of historic structures would undergo preservation

(experience nature zone). This information is summarized in table 3 on page 74.

All preservation, rehabilitation or restoration efforts would be undertaken in accordance with the standards. Any materials removed during rehabilitation or restoration efforts would be evaluated to determine their value to the Lakeshore's museum collection and/or for their comparative use in future preservation work at the sites. Implementation of the actions described above for this alternative, which would bring all historic resources up to a good condition, would result in no adverse effects on historic resources.

At Glen Haven the Glen Haven Historic District and Sleeping Bear Point Life-Saving Station would be preserved, rehabilitated, or restored (same action in all alternatives). Some buildings would be rehabilitated for visitor and/or staff use. The Sleeping Bear Inn and garage would be placed in the NPS historic leasing program to allow rehabilitation for adaptive use. All other structures would be stabilized and maintained in their current condition.

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

On North Manitou Island the historic life-saving station and Cottage Row structures would be preserved, rehabilitated, or restored. Preservation and/or adaptive use of the

rehabilitated historic former Manitou Island Association structures for administrative and operational purposes would continue. Historic structures and landscapes elsewhere on the island would be preserved.

On South Manitou Island the historic life-saving station, lighthouse complex, village historic structures, schoolhouse, and farm loop tour historic structures would be preserved, rehabilitated, or restored. Structures and landscapes elsewhere on the island would be preserved.

Other mainland historic structures and landscapes would be managed as specified for the management zone in which they lie (see alternative map and zone descriptions).

Actions involving other than historic property treatments, such as developing new trails, improving beach parking and access at selected locations, and providing new campgrounds on North Manitou Island and elsewhere in the National Lakeshore, would have no effect on historic properties because they would be designed to avoid possible impacts on properties on or eligible for the national register.

All properties on or determined eligible for inclusion in the National Register of Historic Places would, at a minimum, undergo stabilization (where that action has not already occurred) or maintenance in the current condition (where some preservation treatment has already been implemented).

The actions proposed above are general. The treatments for each resource (preservation [stabilization], rehabilitation with adaptive use, restoration) have not yet been determined so impacts cannot be fully described. However, it is the National Park Service's intent that no action proposed be adverse. All actions affecting these historic structures and landscapes would be undertaken in consultation with the Michigan state historic preservation officer.

The preferred alternative would not directly or indirectly affect any properties outside the boundary of the National Lakeshore that are listed on or eligible for the National Register of Historic Places, or that are listed by the state.

Cumulative Impacts

Over the years historic resources in the Lakeshore have been adversely impacted by natural processes such as weathering, vegetative encroachment, and the wear and tear associated with visitor use. Actions proposed for the South Manitou Island Lighthouse Complex would result in both the restoration of the exterior of the keeper's quarters and connecting passageway and the rehabilitation of the interior for adaptive reuse. In addition, actions proposed for Glen Haven Village include the stabilization and maintenance of historic structures or their rehabilitation for adaptive reuse. All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995), and would result in no adverse effects on historic resources.

As described above, implementation of the preferred alternative would result in no adverse effects on historic resources. The no adverse impacts of this alternative, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a no adverse effect cumulative impact. The no adverse effects of the preferred alternative would be a sizeable contribution to the no adverse effect cumulative impact.

Conclusion

The preferred alternative would have a determination of no adverse effect under the Advisory Council on Historic Preservation

“Regulations for the Protection of Historic and Cultural Properties” (36 CFR 800). There would be *no impairment* of cultural resources from implementation of the preferred alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

NATURAL RESOURCES

Soils and Geologic Resources

Readers are encouraged to refer back to the “Soils and Geologic Resources” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Use of motorized boats on School and Loon lakes and the Crystal and Platte rivers would also continue. Soil compaction and erosion of the dunes would be reduced in some areas by using sand ladders, boardwalks, and sidewalks to protect the substrate. These ongoing activities would continue to have minor to moderate (depending on location and activity), short- and long-term adverse impacts on soils and geologic resources. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and the M-22/M-109 hike/bike trail could result in soil disturbance and erosion during construction, and subsequent visitor use would result in erosion and compaction. Assuming use of best management practices (such as using silt fences and avoiding steep slopes and inundated areas) during construction and later use to prevent erosion and compaction, the overall adverse impacts would likely be short term and moderate and long term and minor.

The concession tours to near the Giant Cedars area on South Manitou Island and day trips to and camping in newly designated areas on North Manitou Island could increase visitor use and associated soil compaction and erosion; adverse impacts in such areas above the current level might be anticipated. However, careful monitoring and the use of sand ladders, boardwalks, or fencing to reduce compaction and erosion would result in short-term moderate and long-term minor adverse impacts on soils.

Improving the parking area at the end of Esch Road, improving the Glen Lake Picnic area and access to several inland lakes (for non-motorized boats) and the Crystal River, providing campgrounds associated with the bay-to-bay trail, and providing additional designated campsites on North Manitou Island would typically disturb soils and cause compaction and sometimes erosion. Assuming implementation of best management practices during design and construction, adverse impacts could be minimized. The development activities proposed in the preferred alternative would likely have short-term, moderately adverse impacts due to construction activities. The long-term impacts on soils would be minor and beneficial because, for example, trails in the Bow Lakes area would focus pedestrian traffic on the trails (reducing impacts in the rest of the area), Bass (Leelanau County) and North Bar lakes would be closed to motorized boats, and the current Valley View campground, which would be removed, would be restored to more natural conditions.

Under this alternative, the National Park Service would continue to acquire lands on a willing-seller basis within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Continued NPS acquisition of lands in the Benzie Corridor would protect the geology and soils on NPS-owned parcels from development for the life of this plan, providing short- and long-term, moderate, beneficial effects. Private development within

the corridor would probably continue at its current pace and would continue to have minor to moderate adverse impacts to these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on soils and geologic resources include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey's Corner canoe liveries; (5) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric sites disturbed by past land uses — particularly those in critical dunes areas; (6) minor improvements to the Dune Climb parking area, and (7) continued dredging of the mouth of the Platte River. Although activities 1-6 would likely result in short-term adverse impacts during the construction phase, the net result would likely be long-term, minor to moderate beneficial impacts because all projects would contribute to a reduction of the potential for soil compaction and erosion. Dredging the mouth of the Platte River results in continued addition of dredged material to the shoreline. During low-water periods deeper dredging is required and results in dredge materials with high clay content being deposited on the shoreline, resulting in armoring of the beach surface and consequent profile changes. This results in short- and long-term minor to moderate adverse impacts.

The impacts of other actions described above, in combination with the impacts of the preferred alternative, would result in short- and long-term, minor to moderate adverse cumulative impacts, and short- and long-term, minor to moderate, beneficial cumulative impacts. The preferred alternative's contribution to these cumulative impacts would be minimal.

Conclusion. The preferred alternative would have short- and long-term, minor to moderate adverse and beneficial impacts on soils and geologic resources. Cumulative impacts would be anticipated to be short term, moderately adverse, and short and long term, minor to moderate beneficial. There would be *no impairment* of soils or geologic resources from implementation of preferred alternative (see specific definition of impairment in the "Impairment of National Park Resources" section).

Vegetation and Wildlife

Readers are encouraged to refer back to the "Vegetation and Wildlife" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

The use of motorized boats on School and Loon lakes and the Crystal and Platte rivers would continue to result in trampling of vegetation, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Impacts on vegetation and wildlife from such activities would likely continue to be short and long term, negligible to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Under the preferred alternative, 46% (32,200 acres) of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), an increase of 1,297 acres (3%) over the no-action alternative. Management of these areas as wilderness conveys a higher level of protection to the vegetation and wildlife of the areas than any management zone. This wilderness proposal would likely have short-

and long-term minor beneficial impacts on vegetation and wildlife of the Lakeshore.

The development and use of the bay-to-bay trail and the M-22/M-109 hike/bike trail would impact vegetation and wildlife through trampling of vegetation, habitat loss and alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Assuming the use of best management practices (such as placement of trails/paths as close to existing disturbances as possible, minimization of construction footprint for both temporary and permanent impacts, and timing of construction outside peak breeding and nesting seasons), and careful monitoring of impacts during use, the overall impacts would likely be short and long term, negligible to minor, and adverse.

Cessation of motorized boating on Bass (Leelanau County) and North Bar lakes would likely have short- and long-term, minor beneficial impacts due to reductions in trampling, habitat alteration, and sensory-based disturbances, and the likelihood of introducing nonnative species.

Day trips to North Manitou Island and concession auto tours to near the Giant Cedars area on South Manitou Island, would increase visitor use resulting in associated increases in trampling of vegetation, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Assuming practicable levels of monitoring and remediation of visitor-related impacts, overall impacts of these types of new activities would likely be short and long term, negligible to minor, and adverse.

The loop trail and small parking area at Bow Lakes, improvements to inland lake access (for nonmotorized boats) and Crystal River access points, and the provision of additional designated campsites on North Manitou Island could result in habitat loss and degradation, both of which could be reduced by strategic location and design. These

improvements could result in introduction and spread of invasive species to inland waterways. Other development, such as improvements to the parking area at the end of Esch Road and improvements to the Glen Lake picnic area, and providing campgrounds associated with the bay-to-bay trail might result in increased visitor use and associated increases in vegetation trampling, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife in those areas. The sum of these impacts on vegetation and wildlife in the Lakeshore would likely be short- and long-term negligible to minor adverse impacts, and long-term, minor, beneficial impacts (e.g., development of a loop trail in the Bow Lakes area concentrating use on trails and leaving areas away from the trails relatively undisturbed, and removing and restoring the Valley View campground to more natural conditions).

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Continued NPS acquisition of lands in the Benzie Corridor would protect the vegetation and wildlife on NPS-owned parcels from development for the life of this plan, providing short- and long-term, moderate, beneficial effects. Private development within the corridor would probably continue at its current pace and would continue to have minor to moderate adverse impacts on these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on vegetation and wildlife include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the “Fire Management Plan”; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; and (5)

restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas. These actions would likely have short- and long-term negligible to minor adverse impacts due to trampling and sensory based disturbance during the activity and long-term minor beneficial impacts on vegetation and wildlife due to rehabilitation and enhancement of habitat. The impacts of other actions described above, together with the impacts of the preferred alternative, would result in short- and long-term, negligible to minor adverse cumulative impacts, and short- and long-term minor to moderate beneficial cumulative impacts. The contribution of the preferred alternative to these cumulative effects would be relatively small.

Conclusion. The preferred alternative would have short- and long-term negligible to minor adverse impacts, and short- and long-term minor to moderate beneficial impacts. The impacts of actions in the preferred alternative, combined with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, negligible to minor adverse cumulative impacts, and short- and long-term minor beneficial cumulative impacts. There would be *no impairment* of vegetation or wildlife resources from implementation of the preferred alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Federal Threatened and Endangered Species

Readers are encouraged to refer back to the “Federal Threatened and Endangered Species” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

The federally listed species considered are the Michigan monkey flower, piping plover (both populations and designated critical habitat), and Pitcher’s thistle. The piping plover and Pitcher’s thistle are found primarily in near-shore dunes; the Michigan monkey flower is restricted to one lakeside location in the Lakeshore interior. Although part of the designated critical habitat within the Lakeshore coincides with actively used recreational beach areas, NPS staff have demonstrated success in minimizing impacts on nesting piping plovers in areas with relatively high human activity (e.g., the mouth of the Platte River) through various actions (see “Mitigative Measures for the Action Alternatives” section in chapter 2). All impact analyses assume continued protection of threatened and endangered species as outlined in the Lakeshore-wide desired condition statements (see chapter 1).

Under the preferred alternative, 46% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 1,297-acre (3%) increase over existing conditions. This increase would potentially benefit the Pitcher’s thistle, and that benefit would be insignificant because much of the Lakeshore is currently managed to benefit native ecosystems regardless of its designation status. This increase in proposed wilderness would have insignificant effects on piping plovers and piping plover critical habitat because management of the Lake Michigan shoreline and near-shoreline areas would remain essentially the same despite the changes in wilderness status, and because piping plovers successfully nest and fledge under current management. This increase would have no effect on Michigan monkey flower because wilderness is not proposed in the area where this species is known to occur. Thus, overall, this increase in proposed wilderness would have only insignificant beneficial impacts on listed species.

Developing the bay-to-bay trail and associated campgrounds and providing additional designated campsites on North Manitou Island could result in habitat alteration and degradation, both of which could be reduced by strategic location and design. Other development, such as improvements to the parking area at the end of Esch Road, might result in increased visitor use and associated increases in Pitcher's thistle trampling, habitat alteration for both Pitcher's thistle and piping plover, and sensory-based disruption of piping plover in those areas.

Use of the proposed bay-to-bay trail and campgrounds, and the provision of day trips to North Manitou Island could have impacts on piping plover and Pitcher's thistle populations and habitat due to potential trampling and associated habitat alteration, and on piping plover populations due to sensory-based disturbance. These impacts could be reduced by strategic location and design such as careful selection and demarcation of trails outside of sensitive areas (e.g., away from piping plover critical habitat) and use of boardwalks.

Under the preferred alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Private development within the corridor would probably continue at its current pace. These activities and conditions would have no effect on listed species because neither the species nor their habitats occur within the corridor.

For projects proposed in the preferred alternative, the National Park Service would implement measures to ensure that adverse effects on listed species do not occur. These avoidance measures might include, but are not limited to, the following:

- Safeguarding the known locations of listed species.

- Restricting human activity in piping plover breeding areas by use of a specialized fence system.
- Increasing the number of NPS/volunteer piping plover nest monitors, should conditions warrant.
- Restricting human activity in piping plover breeding areas.
- Restricting dogs from piping plover breeding areas during the breeding season.
- Flagging or fencing plants prior to any work in or adjacent to Pitcher's thistle habitat. Every effort would be made to avoid any impacts to these plants.
- Providing education about the listed species and their habitats.
- Designating alternate access points away from areas occupied by listed species.

The National Park Service staff anticipates that adverse effects could be avoided in all the projects proposed under the preferred alternative. The National Park Service cannot foresee at this time any project proposed in this *General Management Plan* for which adverse effects could not be avoided. In the rare event that adverse effects could not be avoided, the project would either be discontinued or NPS staff would request formal consultation with the U.S. Fish and Wildlife Service. As such, any impacts from implementation of the preferred alternative would likely have only beneficial, insignificant, or discountable effects on piping plover and piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle.

At the landscape level, the preferred alternative may affect but would not be likely to adversely affect listed species because the proposed management direction would result in conditions that are beneficial to preserving habitat and would minimize adverse impacts on listed species to either insignificant or discountable. As such, implementation of the preferred alternative may affect but would not be likely to adversely affect piping plover and

piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle.

Conservation Measures. Conservation measures are activities above and beyond avoidance measures and are undertaken to reduce potential impacts on federally listed species or candidate species. Initiation of conservation measures would occur in consultation with the U. S. Fish and Wildlife Service and would be required if any of the following occurred:

- initiation of activities anticipated to have impacts on piping plovers or their designated critical habitat beyond those addressed in this document
- additional Michigan monkey flower occurrences within the Lakeshore were identified in areas where they might potentially be impacted
- initiation of activities anticipated to have impacts on Michigan monkey flower populations
- initiation of activities anticipated to have impacts on Pitcher's thistle populations beyond those addressed in this document

Renewed discussion and consultation with the U. S. Fish and Wildlife Service, should any of the above events occur, would focus on development of specific conservation measures to reduce potential impacts on these species and/or designated critical habitat. Such conservation measures would be based on the recommendations provided by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on federally listed species and designated critical habit include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the "Fire Management Plan"; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; and (4) activities presented in table 21. These actions would benefit natural

resources including federally listed species. During implementation, actions would be taken to avoid or minimize potential adverse impacts on such species. Any adverse impacts, such as trampling or sensory based disruption, would be insignificant or discountable. The impacts of the other actions described above, together with the impacts of the preferred alternative, may affect but would not be likely to adversely affect piping plover, Pitcher's thistle, or Michigan monkey flower. The preferred alternative would likely contribute a relatively small component to these cumulative impacts.

Conclusion. Any adverse impacts of the preferred alternative on the addressed federally listed species and designated critical habitat would be no more than insignificant or discountable over both the short and long terms. Implementation of the preferred alternative may affect but would not likely adversely affect the addressed listed species and critical habitat. The impacts of other projects, combined with the impacts of the preferred alternative, may affect but would not likely adversely affect piping plover, piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Michigan State-Listed Species

Readers are encouraged to refer back to the "Michigan State-Listed Species" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

Under the preferred alternative, 46% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 1,297-acre (3%)

increase over the no-action alternative. Management of these areas as wilderness conveys a higher level of protection to the Michigan state-listed species in those areas than any management zone. This level and amount of protection would likely have short- and long-term, minor beneficial impacts on state-listed species of the Lakeshore.

Concession auto tours to near the Giant Cedars area could negatively impact the state-listed species occurring in that vicinity through trampling, and habitat alteration due to soil compaction and erosion. However, NPS staff would monitor use of and impacts to this area and implement measures such as boardwalks or fencing to prevent trampling and habitat alteration. As such, new opportunities for visitor activities would likely have only short-term moderate and long-term minor adverse impacts on the state-listed species that are associated with this area.

Use of the new bay-to-bay trail and the provision of day trips to North Manitou Island might impact state-listed species associated with shoreline/dunes/near-shore habitat (i.e., fascicled moonwort, Lake Huron locust, prairie moonwort, and prairie warbler). Impacts would include trampling, habitat alteration due to soil compaction and erosion, and sensory-based disruption of the prairie warbler. Assuming continued monitoring and protection efforts, these activities would likely have short-term moderate and long-term minor adverse impacts on these state-listed species.

The ongoing use of motorized boats on School and Loon lakes and the Crystal and Platte rivers and development and use of the loop hiking trail in the Bow Lakes area could impact state-listed species associated with lakes, wetlands, and riparian areas (i.e., bald eagle, Blanchard's cricket frog, common loon, cut-leaved water parsnip, Douglas stenelmis riffle beetle, ram's-head lady's-slipper, and wood turtle). Impacts might include trampling, habitat alteration and degradation,

and sensory-based disruption of behaviors. Assuming continued monitoring and protection efforts, these activities would likely have short-term, moderate and long-term minor adverse impacts on these state-listed species. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Developing the bay-to-bay trail and associated campgrounds, and providing additional designated campsites on North Manitou Island could impact shoreline/dunes/near-shore species as well as mature forest species through habitat loss and degradation, both of which could be reduced by strategic location and design. Improvements to the parking area at the end of Esch Road might result in increased visitor use and associated increases in trampling and habitat alteration for both plants and animals, and sensory-based disruption of wildlife in those areas. The sum of these impacts on state-listed species associated with these habitats in the Lakeshore would likely be short and long term, minor to moderate, and adverse.

The M-22/M-109 hike/bike trail, a loop trail and small parking area at Bow Lakes, and improvements to the Glen Lake picnic area could result in habitat loss and degradation, both of which could be reduced by strategic location and design. These developments could also result in increased visitor use and associated increases in vegetation trampling, habitat alteration, and sensory-based disruption of state-listed species associated with wetlands, lakes, and rivers. The sum of these impacts on state-listed species in the Lakeshore would likely be short term, minor to moderate, and adverse during construction, and long term, minor, and adverse and beneficial (e.g., development of a loop trail in the Bow Lakes area would protect wetland-associated species over the long term).

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Private development within the corridor would probably continue at its current pace. These activities and conditions would have negligible effects on state-listed species because although some occurrences are known near the corridor, none are known or anticipated within the corridor.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on Michigan state-listed plant and animal species include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) implementation of the “Fire Management Plan”; (4) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (5) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (6) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric sites disturbed by past land uses — particularly those in critical dunes areas; and (7) minor improvements to the Dune Climb parking area. Each of these projects would result in short-term adverse impacts during construction (such as sensory-based disturbance). The long-term impacts would likely be minor to moderate and beneficial (such as habitat rehabilitation and enhancement). The impacts of the other actions described above, together with the impacts of the preferred alternative, would result in short- and long-term, minor to moderate, adverse cumulative impacts, and minor to moderate beneficial cumulative impacts. The preferred alternative would be expected to contribute a relatively small component to these cumulative impacts.

Conclusion. The preferred alternative would have short- and long-term, minor to moderate

adverse and beneficial impacts on state-listed species. The cumulative impacts would likely be short and long term, minor to moderate adverse, and minor to moderate beneficial. There would be *no impairment* of state-listed species from implementing this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Wetlands and Water Quality

Readers are encouraged to refer back to the “Wetlands and Water Quality” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Use of motorized boats on School and Loon lakes and the Crystal and Platte rivers would continue. Impacts on wetlands and water quality from motorboat use would include resuspension of sediments and pollution of wetlands and water bodies. Impacts on wetlands and water quality from such activities would likely continue to be short and long term, minor to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

The bay-to-bay trail and the M-22/M-109 hike/bike trail could impact wetlands and water quality through erosion, runoff, and pollution during construction, and trampling, erosion, resuspension of sediments, and pollution. Assuming use of best management practices during construction, and careful monitoring and management of impacts during use, the overall impacts would likely be short and long term, minor, and adverse.

Discontinuing motorboat use on Bass (Leelanau County) and North Bar lakes would

reduce trampling, erosion, resuspension of sediments, and pollution. The resulting beneficial impacts would be short and long term and minor to moderate.

Providing additional designated campsites on North Manitou Island, improving the Glen Lake picnic area, developing a short loop trail and small parking area in the Bow Lakes area, and relocating and upgrading the access point for the Crystal River could result in both adverse and beneficial impacts to wetlands and water quality. New visitor activities as a result of these new developments could contribute to impacts on wetlands and water quality through trampling, resuspension of sediments, erosion, and dust. Assuming implementation of best management practices during construction and practicable levels of impact monitoring and management by NPS staff, impacts of the Glen Lake picnic area improvements and the Bow Lakes trail and parking area would likely be short term, minor to moderate, and adverse during construction, and long term, minor to moderate, and beneficial after construction. These actions would focus visitor use on less sensitive areas (e.g., designated trails), thereby protecting the surrounding wetlands and areas adjacent to the water. Impacts of the remaining developments, assuming use of best management practices, would likely vary from minor to moderate over both the short and long terms, and would be adverse.

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor but would not implement any development within the corridor during the life of this plan. Continued NPS acquisition of lands in the Benzie Corridor would help protect the wetlands and water quality near the corridor from development for the life of this plan, providing short- and long-term, negligible to minor, beneficial effects. Private development within the corridor would probably continue at its current pace and would continue to have

negligible to minor adverse impacts to these resources near the corridor.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on wetlands and water quality include (1) implementation of the “Fire Management Plan”; (2) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (3) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric sites disturbed by past land uses — particularly those in critical dunes areas; (4) minor improvements to the Dune Climb parking area, and (5) dredging of the Platte River mouth. Although each of these projects would involve short-term adverse impacts (e.g., dredging of the Platte River resulting in short-term suspension of particulates in the water and resulting lower water quality immediately downstream (lakeside) of the dredging), the net result would likely be long-term, minor to moderate beneficial impacts (e.g., dredging the mouth of the Platte River allows boats to pass without continuously hitting the bottom, stirring up material, and reducing water quality).

The impacts of the other actions described above, together with the impacts of the preferred alternative, would result in short- and long-term, minor to moderate adverse cumulative impacts and short- and long-term negligible to moderate beneficial cumulative impacts; and long-term, negligible to moderate beneficial cumulative impacts. The preferred alternative would be expected to contribute a relatively small component to these cumulative impacts.

Conclusion. The preferred alternative would have short- and long-term, negligible to moderate adverse, and short- and long-term negligible to moderate beneficial impacts on wetlands and water quality. There would be short- and long-term, minor to moderate adverse cumulative impacts and short- and long-term negligible to moderate beneficial

cumulative impacts. There would be *no impairment* of wetlands or water quality from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

VISITOR OPPORTUNITIES AND USE

Visitor Opportunities

Opportunities would be available for visitors to experience the fundamental resources and values of the Lakeshore and to learn about the Lakeshore’s primary interpretive themes (see chapter 1 “Fundamental Resources and Values” and “Primary Interpretive Themes” sections). Visitors would have access to information, interpretation, and educational opportunities at a variety of locations, including the visitor center in Empire, at Glen Haven, and at the visitor contact station on South Manitou Island. Interpretive and educational activities throughout the Lakeshore would be similar to those currently offered. These opportunities would have long-term, moderate beneficial impacts.

Access to and through the Lakeshore would be on the existing network of state, county, and NPS roads (similar to the no-action alternative). Visitors would have increased Lakeshore access with the addition of the M-22/M-109 hike/bike trail (initiated by others) and the bay-to-bay hiker/paddler trail, and concessioner-operated interpretive tours to near the Giant Cedars area would be considered. Seasonal ferry service would be provided for day and overnight trips to South Manitou Island, overnight trips to North Manitou Island (similar to the no-action alternative), and additional occasional day trips to North Manitou Island would be allowed. Under the preferred alternative a scenic road and/or hike/bike trail would not be developed within the Benzie Corridor within the life of this plan, so there would be no new recreational opportunities or access in this area. The above-noted Lakeshore access

would have long-term, moderate beneficial impacts.

Similar to the no-action alternative, visitors could experience relatively large areas of the Lakeshore that are natural in character; sites that reflect the area’s culture and history (e.g., Glen Haven, Port Oneida, and cultural resources on North Manitou and South Manitou islands); and areas with facilities that support recreational use (e.g., the Dune Climb and Trails End). NPS land acquisition would continue in the Benzie Corridor on a willing-seller basis. For the life of the plan, the development of private properties within the Benzie Corridor might continue to occur, although NPS properties would remain undeveloped. Views of the Crystal Ridge from below or more distant points within and outside the Lakeshore would likely remain natural in character. Even with some modest new development, there would be long-term, moderate, beneficial impacts on opportunities to experience the natural and cultural scenic resources of the Lakeshore.

New recreation-oriented development would include the two trails identified above, associated primitive campgrounds, designated campgrounds on North Manitou Island, upgraded/expanded facilities at Little Glen Lake picnic/beach area, improved nonmotorized boat access at some inland lakes, parking and boat access upgrades at the Crystal River, improved parking at the end of Esch Road, and a trailhead parking area and loop trail in the Bow Lakes area. Valley View backcountry campground would be abandoned. Even with these changes, the scale of recreation-oriented development in the Lakeshore would be relatively modest. This level of development would have long-term, moderate beneficial impacts on visitors.

There would continue to be a wide range of recreational activities in the Lakeshore (similar to the no-action alternative); however, opportunities for nonmotorized recreational activities such as hiking, biking, backpacking,

paddling, cross-country skiing, and backcountry camping would be facilitated and expanded.

There would be a reduction in the number of lakes available for motorized boats, which some visitors might view as a reduction in recreational opportunities. User capacity management would improve visitor experiences on the Platte River. These changes to the range of recreational activities in the Lakeshore would have long-term, minor beneficial impacts.

Similar to the no-action alternative, natural sounds would dominate the Lakeshore except along roadways, in developed areas, where motorized boats are allowed (along rivers, at specific inland lakes, on Lake Michigan), and when aircraft are flying over. Two fewer inland lakes than in the no-action alternative would allow motorized boats (and accompanying sounds) resulting in a slight improvement in the natural soundscape. Natural sounds would also be temporarily disrupted locally by construction activities, and visitors could be inconvenienced. However, mitigative measures would minimize impacts. Overall impacts on those who value dark night skies would be long-term, minor, and beneficial, with some impacts that are short term, minor, and adverse.

Similar to the no-action alternative, the naturally dark night sky would continue to be predominant in the Lakeshore despite vehicular lights along roadways and lighting in developed areas. These conditions would have long-term, minor, beneficial impacts for those who value the dark night sky.

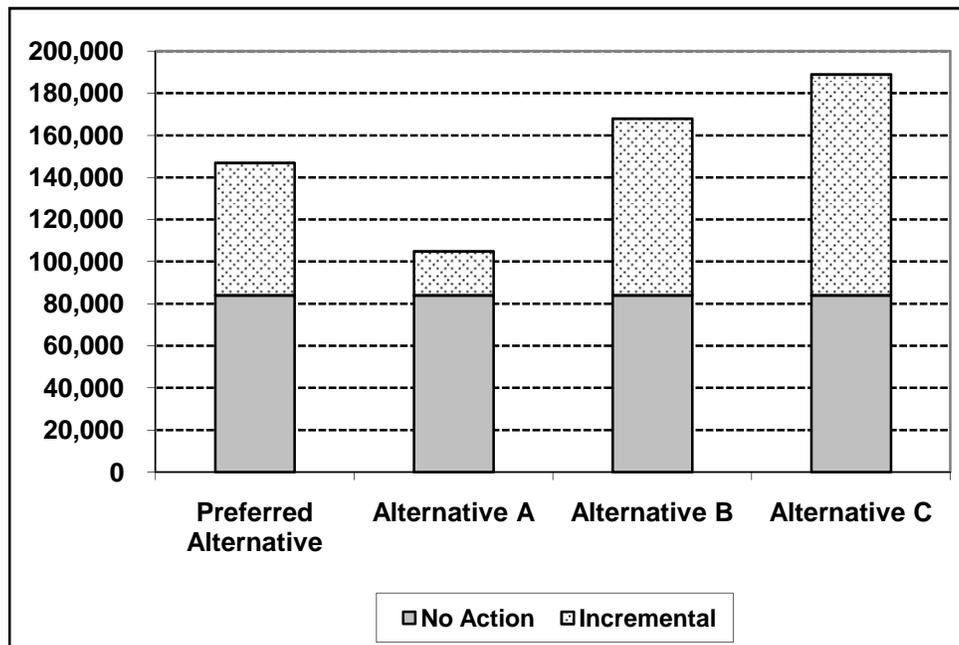
Visitor Use

Implementation of the preferred alternative would result in higher annual visitor use at the National Lakeshore over the long term than would occur under the no-action alternative. The increases would result from improved access to the Giant Cedars area, upgrades at Little Glen Lake picnic/beach area, facility improvements at road ends and inland lakes, the potential addition of day trip excursions to North Manitou Island, expanded hiking, an M-22/M-109 hike/bike trail (initiated by others) and the bay-to-bay hiker/paddler trail and associated primitive campgrounds.

The timing of increased visitor use is difficult to predict because it would depend on when projects are funded or carried out. Moreover, none of the projects represent major expansions in capacity, and most new opportunities would be focused on dispersed and back-country recreation use. Depending on the strategy(ies) chosen, implementation of user capacity management on the Platte River might locally reduce visitor numbers. Future completion of the M-22/M-109 hike/bike trail could result in more off-season use in the Lakeshore compared to the no-action alternative. Consequently, an eventual long-term visitation increase of up to an estimated 60,000 additional visits per year, over that expected for the no-action alternative could be foreseen.

Visitors to the Lakeshore from outside the region would likely account for the majority of future visits, though the number of visits by residents of the region would also increase. Increased visitor use levels would have long-term and minor effects that might be concurrently viewed as beneficial or adverse. The differences between beneficial and adverse would depend on the expectations and preferences of the visitor related to the new opportunities and increased visitation in the preferred alternative.

Figure 6: Comparison of Long-Term Increases in Average Annual Visitor Use to Sleeping Bear Dunes National Lakeshore under the Action Alternatives



Cumulative Impacts

Other past, present, and reasonably foreseeable projects that would affect visitor opportunities and use include: (1) improvements to parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Pierce Stocking Scenic Drive Lake Michigan overlooks 9 and 10; (4) South Manitou Lighthouse Complex exterior restoration and interior rehabilitation; and (5) Dune Climb parking area paving and other minor improvements. These actions would improve visitor opportunities by improving enjoyment, access, and/or range of available opportunities for visitors and would have an overall long-term, minor, beneficial effect on visitor opportunities and use. The development of private properties within the Benzie Corridor and rural residential developments near the Lakeshore (particularly along the access roads and in/near Glen Arbor and Empire) might continue to occur; these could result in a

degradation of natural scenic quality, natural soundscapes, and night sky. These actions would have a long-term, minor, adverse effect on visitors. Combined with the actions proposed in the preferred alternative, these actions would have a long-term, minor, beneficial cumulative effect. Impacts of the preferred alternative would comprise a relatively small portion of the overall cumulative effect.

Conclusion

Increased access and visitor opportunities related to additional recreation-oriented facilities would have a long-term, moderate beneficial impact on visitor opportunities and use. Implementation of user capacity management strategies would have a long-term, minor beneficial impact on visitor opportunities, but potentially long-term minor adverse effects on use. The removal of Valley View campground and disallowing motorized boats on two inland lakes would have long-term,

minor, adverse impacts on visitor opportunities and use. The increased visitor opportunities and facilities would have a long-term, minor, adverse impact on natural sound and the night sky. Construction activities would have short-term, minor, adverse impacts. The cumulative effects would be long-term, moderate, and beneficial.

WILDERNESS CHARACTER

Natural and Undeveloped

Under the preferred alternative, 32,200 acres (46% of the National Lakeshore) would be proposed for wilderness designation, a 1,297-acre (3%) increase over the no-action alternative. Assuming Congress acted to designate the proposed areas as wilderness, wilderness values would be protected forever in designated areas within the north, central, and south mainland portions of the Lakeshore and each island. In contrast to the no-action alternative, none of the Port Oneida Rural Historic District would be included, and a new area of designated wilderness and associated experiences would be available on the Sleeping Bear Plateau. Impacts on wilderness character would be long-term, moderate, and beneficial.

Similar to the no-action alternative, wilderness areas would be interrupted by or interspersed with nonwilderness in some places (e.g., near the Treat farmstead and on South Manitou Island), so adjacent motorized or mechanized uses (e.g., the motorized farm tour on South Manitou Island) would intrude upon naturalness and primitive character in some wilderness areas. In contrast to the no-action alternative, there would be no nonconforming motor vehicle or bicycle use *within* wilderness because county road rights-of-way would be excluded from wilderness. However, as in the no-action alternative, the presence of historic structures would continue to locally diminish the areas' undeveloped primeval character. Impacts would be long term, minor, and adverse.

Opportunities for Solitude

Outstanding opportunities for solitude would be available due to designated wilderness in all three portions of the mainland and on the Manitou Islands. In particular, areas away from trails and facilities would continue to offer excellent prospects for privacy and isolation. Solitude would be more easily found on North Manitou Island than on South Manitou Island due to the former's larger size and fewer visitors. However, on days with day ferry trips to North Manitou Island (once or twice per week), wilderness opportunities for solitude could be reduced within a few hours walk from the ferry dock, a long-term, minor, adverse impact.

Opportunities for Primitive, Unconfined Recreation

Due to the addition of occasional day ferry service to North Manitou Island there would be opportunities on both Manitou Islands for day and overnight wilderness experiences, a minor beneficial impact. The permit requirement for backcountry camping would continue. In contrast to the no-action alternative, backcountry campers would be required to stay in designated campgrounds not only on the mainland and South Manitou Island, but also on some portions of North Manitou Island. Outstanding opportunities for primitive, unconfined recreation would continue to be available on both the mainland and the islands, but permit and camping requirements would have a minor, long-term, adverse impact on these opportunities.

Cumulative Impacts

Over time, the Lakeshore's ongoing program to restore former nonhistoric sites to more natural conditions has substantially increased the natural, undeveloped character of the Lakeshore. The work includes removing nonnative trees and human enhancements,

plus reestablishing more natural contours and native vegetation. Combined with ongoing restoration work, the preferred alternative would have long-term, moderate, beneficial cumulative effects. The contribution of the preferred alternative to these cumulative effects would be substantial.

Conclusion

Establishment of 32,200 acres of designated wilderness in all three portions of the mainland and on both islands would permanently protect wilderness values (naturalness and opportunities for solitude or primitive, unconfined recreation). Impacts of the preferred alternative on wilderness character would be mostly beneficial, moderate, and long term (permanent), but there would also be some continuing localized, minor adverse impacts. Combined with other actions, the preferred alternative would have long-term, moderate, beneficial cumulative effects on wilderness character.

REGIONAL SOCIOECONOMICS

Implementing the preferred alternative would occur against the same backdrop of economic, demographic, and social conditions across the region described under the no-action alternative, i.e., a gain of more than 30,000 year-round residents between 2005 and 2030. The effects of the preferred alternative would add one more set of influences affecting the region's economic and social environment, but leave the basic foundation of the area's economic and demographic outlook unchanged.

Visitor-Related Economic Impacts

Implementation of the preferred alternative would result in higher annual visitor use at the Lakeshore over the long term than would occur under the no-action alternative (see

chapter 5 "Impacts to the Preferred Alternative — Visitor Use" section).

The timing of increased visitor use is difficult to predict because it would depend on when projects are funded or carried out and other factors. Moreover, none of the projects represent major expansions in visitor use opportunities or facility capacity, and most new opportunities would be focused on dispersed and backcountry recreation use. Implementation of capacity limits on the Platte River, if necessary, might adversely impact private canoe/kayak livery operations. Future completion of the M-22/M-109 hike/bike trail could result in more off-season visitor use in the Lakeshore as compared to the no-action alternative. An eventual long-term visitation increase of up to 63,000 additional visits per year over that expected for the no-action alternative could be foreseen.

Visitors to the Lakeshore from outside the region would be expected to account for the majority of future visits, though the number of visits by residents of the region would also increase.

Retail, lodging, and other tourism-type spending would accompany the increased use with expenditures projected to reach \$36.2 million per year, \$4.2 million higher than at the present time and \$1.7 million per year higher than for the no-action alternative. The Lakeshore would collect more in entry fees and sales of various passes, and Eastern National would sell more merchandise.

Economic spin-offs of visitor spending include higher personal income and 20–25 more jobs than under the no-action alternative. Most of these effects would be seasonal, concentrated in the summer. The visitor-related impacts would occur gradually over the long term but would be limited in scale relative to current employment and personal income in the two counties. Implementation of the preferred alternative could provide additional concession/commercial service

opportunities, for example, in conjunction with the bay-to-bay hiking/paddling trail. Many of these benefits would accrue outside the Lakeshore, including in Leland where the Manitou Island Transit's ferry and tour service is based.

The state and local governments would collect additional sales tax from the increased visitor spending.

The above visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term.

Economic Impacts Related to Implementation and NPS Operations

Implementing the preferred alternative would provide a sustained economic infusion to the region over the life of this plan—larger than that under the no-action alternative. The infusion would result from the Lakeshore's ongoing operating expenditures, including payroll, and \$17.5 million in future construction needs (\$10.9 million above that for no action). Projected budget needs for other major projects and deferred maintenance would be the same as for the no action alternative.

As under the no-action alternative, NPS maintenance staff would perform much of the work to address facility and infrastructure maintenance and preservation, restoration, and rehabilitation activities. Future construction needs would be higher than under the no-action alternative, supporting the local construction trades industry and associated vendors and suppliers.

Annual NPS payroll, operating, and maintenance would produce long-term effects on employment, business sales, income and other related measures. Completion of specific projects and the implementation of programs

and management would support increased staffing levels over time.

A need for a modest long-term increase in budgeted funds for NPS operations is identified in conjunction with the preferred alternative (there are no assurances that such increases will occur). Available resources would include about \$4.4 million base budget appropriations (\$500,000 per year above the no-action alternative), about \$1.0 million in entry and camping fees, and various nonrecurring funding for supplemental and specific project construction. Retained revenues from entry and camping fees would likely increase with higher visitation.

As with the no-action alternative, supplemental funding would be required for future land acquisition in the Benzie Corridor.

Activities sponsored by the Lakeshore's partners would provide additional sources of economic stimulus. The timing, magnitude, and indirect economic consequences of those activities are indeterminate.

The economic effects associated with NPS operations would be beneficial and minor to moderate in the short and long terms.

Effects on Regional Population

The preferred alternative would have little direct impact on regional population growth. The increases in construction and long-term jobs and visitor use over the life of this plan would provide a negligible impetus for growth, relative to other factors, and would be insufficient to trigger additional new economic development and job-related migration. It is more likely that many of the jobs would be filled by individuals already residing in the area.

Implementation of the preferred alternative could indirectly enhance the region's attractiveness for economic development as a

result of enhanced recreational opportunities and establishment of wilderness on the mainland.

The effects on regional population growth under this alternative would be negligible, both in the short and long terms.

Community Services

Impacts on community services associated with implementing the preferred alternative would be similar to those under the no-action alternative, although the demands related to levels of visitor use would be slightly higher. The limited scale, seasonal nature, and spatial dispersion of such demands across the region would be such that no facility expansions and additional staffing would be required.

Effects on community services under this alternative would be indeterminate and negligible over the short and long terms.

Traffic and Emergency Services

Traffic impacts of the preferred alternative on the highways and roads that serve the Lakeshore would be similar to but slightly higher than under the no-action alternative. Most of the additional traffic would be concentrated on M-22 and M-109, connecting local roads around the Glen Lakes area, and local roads connecting M-22 to US-31 in Benzie County.

Seasonal increases in traffic volumes could be noticeable in Glen Arbor and Empire, particularly on summer weekends. During the summer, some travelers might have to wait longer at intersections, or experience slightly slower travel speeds, but most travelers would see little change in travel conditions due to implementing the preferred alternative. Even with the increases in traffic, future traffic volumes would be below the roadway design capacities and would not necessitate substantially more road maintenance.

Increases in traffic volumes could accelerate the onset of less than desirable levels of service at the M-22/M-109 intersection in Glen Arbor, possibly triggering intersection improvements (Robert Peccia & Associates, 2001).

The frequency and number of traffic accidents and demands on first responders would be higher than under the no action alternative. The scale of demands associated with the preferred alternative would be such that they would not require additional law enforcement or emergency response staffing, though the increases in the number of “call outs” could burden area first response agencies because they are staffed partially by volunteers.

The effects of implementing the preferred alternative on traffic and emergency services would be adverse and negligible to minor over the short and long terms across most of the region.

Attitudes and Lifestyles

The preferred alternative establishes future management direction for the Lakeshore that best reflects public input, the fundamental resources and opportunities at the Lakeshore, and the mission of the Lakeshore and the National Park Service as a whole. In terms of attitudes, some individuals might still believe that the management zones and wilderness proposals do not go far enough to achieve their particular preferences, although they may also acknowledge the efforts made to balance the desired outcomes of a large and divergent public. As such, this alternative might be characterized as offering management direction, a wilderness proposal, recreational opportunities, and preservation and interpretation of cultural heritage resources for all to appreciate, but also aspects for some to disfavor.

The recreation, conservation, and resource management direction associated with the

preferred alternative would have direct and indirect lifestyle consequences, with the direct consequences most apparent to neighbors and visitors to the Lakeshore. For example, future visitors would have access to a broader range of experiences and options, including wilderness on the mainland and enhanced access to backcountry use along the shoreline. Individuals desiring improved boating access to Lake Michigan would be encouraged by the potential prospect for a feasibility study of providing such access. Many residents and local government officials would approve of the explicit statements and policies regarding state and county road rights-of-way and other valid existing rights reflected in this plan.

The management and access policies established under the preferred alternative might have indirect consequences on attitudes and lifestyles. Such consequences could arise primarily in terms of the extent to which the preferred alternative influences or changes recreation and resource conditions at a broader level over the long term. For example, changes in shoreline access might contribute to higher population growth in the region and attract new residents to the Lakeshore, which would mean more use at the Lakeshore and conflicts with the preferences and desires of others to discourage more use. Given the relatively small size of the community, such conflicts can become sources of long-term division or strength.

Cumulative Impacts

Social and economic impacts arising from implementing the preferred alternative are of the same type as those associated with past, present, and future residential development near the Lakeshore; the establishment of the Lakeshore; and those associated with the no-action alternative. The former includes population and economic growth across the region that would result in moderate long-term increases in traffic on highways and roads in the area; moderate, long-term

increases in resident and visitor spending, bolstering retail trade and service-oriented businesses in the region; long-term demands on community services; and additional public sector revenues to fund public services and facilities. The other cumulative actions could result in some long-term negligible economic effects on visitor-related businesses, and on local traffic and safety, due to changes in visitor use levels and distribution.

The incremental effects of the preferred alternative to these impacts would be small. For example, the incremental traffic would be small in relationship to travel by area residents, commercial and other personal travel passing through the area, and current demands associated with the Lakeshore. Additional visitor use under the preferred alternative would increase visitor spending, benefiting existing businesses and enhancing the commercial development potential for private lands along the access roads to the Lakeshore. Any subsequent development of those lands would have economic implications, as well as changing the visitor experience. Completion of the M-22/M-109 hike/bike trail could result in cumulative effects in the area of motorist/visitor safety along highway corridors in the region.

The contributions of the preferred alternative to the cumulative economic and social effects, including those associated with increases visitor and NPS operating expenditures, would be negligible to minor in the short term and minor in the long term, and beneficial. Impacts of other actions, in combination with those attributable to the preferred alternative, would result in minor short- and long-term adverse cumulative effects on traffic and highway safety. Impacts of the preferred alternative would comprise a small portion of these overall cumulative social and economic effects.

Conclusion

The economic effects of the preferred alternative would include negligible to minor short-term and moderate long-term economic benefits, the latter due to increased visitation tied to this alternative. Short- and long-term effects on lifestyles and attitudes would be minor benefits, because many interested parties could support the management direction established in the preferred alternative. Long-term social consequences would include a negligible to minor contribution to long-term population growth and demands on community infrastructure and services. Overall, the cumulative social and economic effects associated with the preferred alternative would be minor, short and long term, and indeterminate because they include effects that might be concurrently viewed as beneficial or adverse.

NPS OPERATIONS

Under the preferred alternative, the Lakeshore's maintenance and operational load would be increased by (1) the addition of a limited number of new trails and backcountry campgrounds, (2) upgrading the Glen Lake picnic area to support beach and picnic use, (3) possible occasional day trips by the ferry to North Manitou Island, (4) possible day use on North Manitou Island (with increased interpretive and ranger patrol needs), (5) possible concession tours to near the Giant Cedars area, and (6) modest increases in National Lakeshore visitation. Some increased maintenance would also be incurred with a new M-22/M-109 hike/bike trail. Most other facility-based changes, such as improving parking at the end of Esch and Lake Michigan roads, relocation or upgrading the Crystal River access area, and closure/removal of the Valley View campground, would decrease maintenance needs for individual areas or change the nature of the maintenance needs without increasing the burden. Wilderness minimum requirement analysis would be

required for 32,200 acres, a 1,297-acre (3%) increase over the no-action alternative. Impacts of the preferred alternative would be long term and minor, and both beneficial and adverse.

Cumulative Impacts

Ongoing and planned facility upgrades and restoration/rehabilitation projects would have mostly beneficial impacts because these projects would result in reduced resource management and cyclic maintenance needs. Dredging of the Platte River mouth would continue to place demands on the Lakeshore's maintenance staff and budget, a minor adverse effect. Combined with these impacts, the preferred alternative would have both long-term minor beneficial and adverse cumulative effects. Impacts of the preferred alternative would comprise a substantial portion of these overall cumulative effects.

Conclusion

The preferred alternative would have long-term, minor beneficial and adverse impacts on NPS operations. The preferred alternative, combined with other actions, would have both long-term minor beneficial and adverse cumulative effects.

UNAVOIDABLE ADVERSE IMPACTS

Some negligible to moderate impacts to soils, vegetation, wildlife, water resources, wilderness character, scenic resources, natural sound, and night sky caused by recreational use and facilities would be essentially unavoidable (e.g., soil compaction, vegetation trampling, wildlife disturbances, decreased opportunities for solitude, and decreased naturalness). Increases in visitor use would have low level adverse impacts on regional socioeconomics (e.g., increased traffic).

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

With the exception of consumption of fuels and raw materials for maintenance or construction activities, no actions in this alternative would result in consumptions of nonrenewable natural resources or use of renewable resources that would preclude other uses for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The National Lakeshore would continue to be used by the public and most areas would be protected in a natural state. The National Park Service would continue to manage the Lakeshore to maintain ecological processes and native biological communities and to provide appropriate recreational opportunities consistent with the preservation of cultural and natural resources. Actions would be taken with care to minimize adverse effects on the long-term productivity of biotic communities. Under the preferred alternative there would be a modest number of new recreational facilities such as trails, which could reduce ecological productivity in some localized areas. However, the preferred alternative would yield long-term benefits from a visitor experience perspective.

IMPACTS OF ALTERNATIVE A

HISTORIC RESOURCES

The Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) identifies four treatment approaches that apply to a wide variety of resource types, including buildings, sites, structures, objects, districts, and landscape features and patterns. Three of those treatments are included in this plan — preservation, rehabilitation, and restoration. See page 40 for more detailed definitions. The simplest of these treatment approaches is preservation, in which measures are undertaken to stabilize the resource to ensure that it does not deteriorate further from its existing condition and then to maintain and repair historic features and materials. The second option is rehabilitation, in which the resource is made useable for some purpose while preserving those features that convey its historical, cultural, or architectural value. The third is restoration, in which the historic appearance at a particular time is accurately regained. The fourth treatment, reconstruction, is not proposed in this plan.

Although each alternative calls for preserving and protecting all historic properties, each action alternative provides a different management zone configuration based on that alternative's overall vision, and each management zone prescribes which of the three treatments could be used for historic properties. Thus, potential treatments for the National Lakeshore's various historic properties differ among the alternatives. Based on the locations and relative proportions of management zones in alternative A, 69% of historic structures would undergo preservation, rehabilitation, or restoration (experience history zone), 3% of historic structures would undergo preservation or rehabilitation (recreation zone), and 28% of historic structures would undergo preservation

(experience nature zone). This information is summarized in table 3 on page 74.

All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the standards. Any materials removed during rehabilitation or restoration efforts would be evaluated to determine their value to the Lakeshore's museum collections and/or for their comparative use in future preservation work at the sites. Implementation of the actions described above for this alternative, which would bring all historic resources up to a good condition, would result in no adverse effects on historic resources.

At Glen Haven the Glen Haven Historic District and Sleeping Bear Point Life-Saving Station would be preserved, rehabilitated, or restored (same action in all alternatives). Some buildings would be rehabilitated for visitor and/or staff use. The Sleeping Bear Inn and garage would be placed in the NPS historic leasing program to allow rehabilitation for adaptive use. All other structures would be stabilized and maintained in their current condition.

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

On North Manitou Island the historic life-saving station structures would be preserved, rehabilitated, or restored. Preservation and/or adaptive use of the rehabilitated historic

former Manitou Island Association structures for administrative and operational purposes would continue. Historic structures and landscapes on Cottage Row and elsewhere on the island would be preserved.

On South Manitou Island the historic life-saving station, lighthouse complex, and village historic structures would be preserved, rehabilitated, or restored. Historic structures and landscapes elsewhere on the island would be preserved.

Other mainland historic structures and landscapes would be managed as specified for the management zone in which they lie (see alternative map and zone descriptions).

Actions involving other than historic property treatments, such as the new bay-to-bay trail and campgrounds, would have no effect on historic properties because they would be designed to avoid possible impacts on properties on or eligible for the national register.

All properties in or determined eligible for inclusion in the National Register of Historic Places would, at a minimum, undergo stabilization (where that action has not already occurred) or maintenance in the current condition (where some preservation treatment has already been implemented).

The actions proposed above are general. The treatments for each resource (preservation [stabilization], rehabilitation with adaptive use, restoration) have not yet been determined so impacts cannot be fully described. However, it is the National Park Service's intent that no action proposed be adverse. All actions affecting these historic structures and landscapes will be undertaken in consultation with the Michigan state historic preservation officer.

Alternative A would not directly or indirectly affect any properties outside the boundary of the National Lakeshore that are listed on or

eligible for the National Register of Historic Places, or that are listed by the state.

Cumulative Impacts

Over the years historic resources in the Lakeshore have been adversely impacted by natural processes such as weathering, vegetative encroachment, and the wear and tear associated with visitor use. Actions proposed for the South Manitou Island Lighthouse Complex would result in both the restoration of the exterior of the keeper's quarters and connecting passageways and the rehabilitation of the interior for adaptive reuse. In addition, actions proposed for Glen Haven Village include the stabilization and maintenance of historic structures or their rehabilitation for adaptive reuse. All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995), and would result in no adverse effects on historic resources.

As described above, implementation of alternative A would result in no adverse effects on historic resources. The no adverse impacts of this alternative, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a no adverse effect cumulative impact. The no adverse effects of alternative A would contribute modestly to the no; adverse effect cumulative impact.

Conclusion

Alternative A would have a determination of no adverse effect under the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural Properties" (36 CFR 800). There would be no impairment of cultural resources from implementation of the preferred alternative (see specific

definition of impairment in the “Impairment of National Lakeshore Resources” section).

NATURAL RESOURCES

Soils and Geologic Resources

Readers are encouraged to refer back to the “Soils and Geologic Resources” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Use of motorized boats on School, Loon, and North Bar lakes and the Crystal and Platte rivers would also continue. Although soil compaction and erosion of the dunes would be reduced in some areas by using sand ladders, boardwalks, and sidewalks to protect the substrate, placement and maintenance would be limited to what can be accomplished with current resources. These ongoing activities would continue to have minor to moderate (depending on location and activity) short- and long-term adverse impacts on soils and geologic resources. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and the M-22/M-109 hike/bike trail could result in soil disturbance and erosion during construction and subsequent visitor use would result in erosion and compaction. Assuming use of best management practices, such as using silt fencing and avoiding steep or inundated terrain, during construction, and later use to prevent erosion and compaction, the overall adverse impacts would likely be short-term and moderate and long-term and minor.

Closing the farm loop road at the west end of Chicago Road on South Manitou Island and

Tiesma Road on the mainland and no longer allowing motorized boats on Bass Lake (Leelanau County) would result in short- and long-term minor beneficial impacts on soils and geologic resources through reduction of soil erosion and compaction in these areas.

Proposed development and associated visitor use under alternative A, such as a loop trail and small parking area at Bow Lakes and restoration of the Glen Lake picnic area to a natural state, could result in short-term negligible to moderate adverse impacts during construction (due to soil disturbance, erosion, and compaction) and long-term minor beneficial impacts due to protecting adjacent resources (e.g., designated trail focusing visitors on the trail and sparing the adjacent soils).

Cessation of NPS acquisition of lands within the Benzie Corridor (the corridor would no longer be part of the Lakeshore under this alternative) would make the soils of this area susceptible to soil disruption, compaction, and erosion from private development. These impacts could range from negligible to moderate and would likely be adverse over the short and long terms.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on soils and geologic resources include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveryes; (5) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric sites disturbed by past land uses — particularly those in critical dunes areas; (6) minor improvements to the Dune Climb parking area; and (7) continued dredging of the mouth of the Platte River. Although activities 1-6 would likely

result in short-term adverse impacts during the construction phase, the net result would likely be long-term, minor to moderate beneficial impacts because all projects would contribute to a reduction of the potential for soil compaction and erosion. Dredging the mouth of the Platte River results in continued addition of dredged material to the shoreline. During low-water periods deeper dredging is required and results in dredge materials with high clay content being deposited on the shoreline, resulting in armoring of the beach surface and consequent profile changes. This results in short- and long-term minor to moderate adverse impacts.

The impacts of other actions described above, in combination with the impacts of alternative A, would result in short- and long-term, negligible to moderate adverse cumulative impacts, and short- and long-term minor to moderate and beneficial cumulative impacts. Alternative A's contribution to these cumulative impacts would be minimal.

Conclusion. Alternative A would have short- and long-term, negligible to moderate adverse impacts, and long-term, minor beneficial impacts on soils and geologic resources. Cumulative impacts would likely be short and long term, negligible to moderate and adverse, and short and long term, minor to moderate and beneficial. There would be *no impairment* of soils or geologic resources from implementation of alternative A (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Vegetation and Wildlife

Readers are encouraged to refer back to the "Vegetation and Wildlife" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

The use of motorized boats on School, Loon, and North Bar lakes and the Crystal and Platte rivers would continue to result in trampling of vegetation, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Continuing impacts on vegetation and wildlife from such activities would likely continue to be short and long term, negligible to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and the M-22/M-109 hike/bike trail would impact vegetation and wildlife through trampling of vegetation, habitat loss and alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Assuming use of best management practices (such as placement of trails/paths near existing disturbances, minimization of the construction footprint, and timing of construction outside of peak breeding/nesting periods) during construction, and careful monitoring and management of impacts during use, the overall impacts would likely be short and long term, negligible to minor, and adverse.

Under alternative A, 47% (33,600 acres) of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), with wilderness on both islands and in all three mainland portions of the Lakeshore. This would be a 2,697-acre (4%) increase over the existing conditions. Management of these areas as wilderness conveys a higher level of protection to the vegetation and wildlife of the areas than any management zone. This wilderness proposal would likely have short- and long-term minor beneficial impacts on vegetation and wildlife of the Lakeshore.

Under alternative A, motorized boats would no longer be allowed on Bass (Leelanau County) Lake, reducing impacts there caused by shoreline erosion, habitat alteration, introduction and spread of invasive species, and sensory-based disruptions. Closure of the farm loop to vehicles at the west end of Chicago Road on South Manitou Island and closure of Tiesma Road, along with cessation of motorized boat use on Bass (Leelanau County) Lake, would have short- and long-term negligible to minor beneficial impacts on the vegetation and wildlife of those areas.

Activities proposed and their associated visitor use under alternative A, such as developing a loop trail and small parking area at Bow Lakes and restoring the Glen Lake picnic area to a natural state, could result in short-term negligible to moderate adverse impacts during construction due to habitat loss and alteration, introduction and spread of invasive species, and sensory-based disruptions. Long-term, minor beneficial impacts would also result due to protecting adjacent resources (e.g., designated trail would focus visitor use there, protecting the habitat and wildlife) and restoration of the natural conditions around the Glen Lake picnic area.

Cessation of NPS acquisition of lands within the Benzie Corridor would make the vegetation and wildlife of this area susceptible to impacts associated with private development, including habitat loss, alteration, and degradation, sensory-based disruptions, and the likelihood of introducing nonnative species. These impacts could range from negligible to moderate and would likely be adverse over the short and long terms.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on vegetation and wildlife include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the “Fire Management Plan”; (3) improvements to the Lake Michigan

overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; and (5) restoration approximating the natural topography, hydrology and vegetative cover of nonhistoric sites disturbed by past land uses — particularly those in critical dunes areas. These actions would likely have short- and long-term negligible to minor adverse impacts due to trampling and sensory-based disturbance during the activity, and long-term minor beneficial impacts on vegetation and wildlife due to habitat restoration and enhancement.

The impacts of actions described above, together with the impacts of the alternative A, would result in short- and long-term, minor to moderate adverse cumulative impacts and short- and long-term minor to moderate beneficial cumulative impacts. The contribution of alternative A to these cumulative impacts would be relatively small.

Conclusion. Alternative A would have short- and long-term negligible to moderate adverse impacts, and short- and long-term negligible to moderate beneficial impacts. The impacts of alternative A combined with other past, present, and reasonably foreseeable actions would likely be short- and long-term, minor to moderate adverse cumulative impacts, and short- and long-term minor to moderate beneficial cumulative impacts. There would be *no impairment* of vegetation or wildlife resources from implementing alternative A (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Federal Threatened and Endangered Species

Readers are encouraged to refer back to the “Federal Threatened and Endangered Species” discussion in the “Methods and Assumptions for Analyzing Impacts” section

for additional details on the types of impacts resulting from visitor use and development.

The federally listed species considered are the Michigan monkey flower, piping plover (populations and designated critical habitat), and Pitcher's thistle. The piping plover and Pitcher's thistle are found primarily in near-shore dunes; the Michigan monkey flower is restricted to one lakeside location in the Lakeshore interior. Although part of the designated critical habitat within the Lakeshore coincides with actively used recreational beach areas, NPS staff have demonstrated success in minimizing impacts on nesting piping plovers in areas with relatively high human activity (e.g., the mouth of the Platte River) through various actions (see "Mitigative Measures for the Action Alternatives" section in chapter 2). All impact analyses assume continued protection of threatened and endangered species as outlined in the Lakeshore-wide desired condition statements (see chapter 1).

Under alternative A, 47% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), with wilderness on both islands and in all three mainland portions of the Lakeshore. This would be a 2,697-acre (4%) increase over the no-action alternative. This increase would potentially benefit the Pitcher's thistle, and that benefit would be insignificant because much of the Lakeshore is currently managed to benefit native ecosystems regardless of its designation status. This increase in proposed wilderness would have insignificant effects on piping plovers and piping plover critical habitat because management of the Lake Michigan shoreline and near-shoreline areas would remain essentially the same and because piping plovers successfully nest and fledge under current management. This increase would have no effect on Michigan monkey flower because wilderness is not proposed in the area where this species is known to occur. Thus, overall, this increase in proposed wilderness

would have only insignificant beneficial impacts on listed species.

New visitor activities such as use of the new bay-to-bay trail and campgrounds would have the same impacts as described for the preferred alternative and include trampling, habitat alteration, and sensory-based disturbance. These impacts could be reduced by strategic location and design such as careful selection and demarcation of trails outside of sensitive areas (e.g., away from piping plover critical habitat) and use of boardwalks.

Under this alternative, NPS acquisition of property within the Benzie Corridor would cease and the corridor would be removed from the Lakeshore boundary. The rate of private development would probably substantially increase in this corridor. However, this would not be anticipated to affect listed species because neither they nor their habitats occur within the corridor.

For projects proposed under alternative A, NPS staff would implement measures that would ensure that adverse effects on listed species do not occur. These avoidance measures might include, but are not limited to, the following:

- Safeguarding the known locations of listed species.
- Restricting human activity in piping plover breeding areas by use of a specialized fence system.
- Increasing the number of NPS/volunteer piping plover nest monitors, should conditions warrant.
- Restricting human activity in piping plover breeding areas.
- Restricting dogs from piping plover breeding areas during the breeding season.
- Flagging or fencing plants prior to any work in or adjacent to Pitcher's thistle habitat. Every effort would be made to avoid any impacts to these plants.

- Providing education about the listed species and their habitats.
- Designating alternate access points away from areas occupied by listed species.

The National Park Service staff anticipates that adverse effects could be avoided in all projects that are proposed under alternative A. The National Park Service cannot foresee at this time any project for which adverse effects could not be avoided. In the rare event that adverse effects could not be avoided, the project would either be discontinued or NPS staff would request formal consultation with the U.S. Fish and Wildlife Service. As such, any impacts from implementation of alternative A would likely have only beneficial, insignificant, or discountable effects on piping plover and piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle.

At the landscape level, alternative A is not likely to adversely affect listed species because the proposed management direction under this alternative would result in conditions that are beneficial to preserving habitat and would minimize adverse impacts on listed species to insignificant or discountable. As such, implementation of alternative A may affect but would not be likely to adversely affect piping plovers and piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle.

Conservation Measures. Conservation measures are activities above and beyond avoidance measures and are undertaken to reduce potential impacts on federally listed species or candidate species. Initiation of conservation measures would occur in consultation with the U. S. Fish and Wildlife Service and would be required if any of the following occurred:

- initiation of activities anticipated to have impacts on piping plovers or their designated critical habitat beyond those addressed in this document

- additional Michigan monkey flower occurrences within the Lakeshore were identified in areas where they might potentially be impacted
- initiation of activities anticipated to have impacts on Michigan monkey flower populations
- initiation of activities anticipated to have impacts on Pitcher's thistle populations beyond those addressed in this document

Renewed discussion and consultation with the U. S. Fish and Wildlife Service, should any of the above events occur, would focus on development of specific conservation measures to reduce potential impacts on these species and/or designated critical habitat. Such conservation measures would be based on the recommendations provided by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on federally listed species and designated critical habitat include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the "Fire Management Plan"; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive, and (4) activities presented in table 21. These actions would benefit natural resources including federally listed species. During implementation, actions would be taken to avoid or minimize potential adverse impacts on such species. Any adverse impacts, such as trampling or sensory-based disruption, would be insignificant or discountable.

The impacts of actions described above, together with the impacts of alternative A, may affect but would not be likely to adversely affect piping plover, piping plover critical habitat, Pitcher's thistle, and Michigan monkey flower. Alternative A would likely contribute a relatively small component to these cumulative impacts.

Conclusion. Any adverse impacts of alternative A on the addressed federally listed species and designated critical habitat would be no more than insignificant or discountable over both the short and long terms. Implementation of alternative A may affect but would not likely adversely affect the addressed listed species and critical habitat. Other projects, combined with the impacts of alternative A, on federally listed species and designated critical habitat may affect but would not likely adversely affect piping plover, piping plover critical habitat, Pitcher's thistle, and Michigan monkey flower. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Michigan State-Listed Species

Readers are encouraged to refer back to the "Michigan State-Listed Species" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

Under alternative A, 47% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), with wilderness on both islands and in all three mainland portions of the Lakeshore. This would be a 2,697-acre (4%) increase over the no-action alternative. Management of these areas as wilderness would convey a higher level of protection to the state-listed species of the areas than any management zone. This wilderness proposal would likely have short- and long-term minor beneficial impacts on state-listed species of the Lakeshore.

Access to the Giant Cedars area would continue to be by foot from the ranger station, or, less frequently, via the lake (i.e., by boat). Management actions that occur or would be

considered for reduction of impacts to plants and soils in this sensitive area would include educating visitors about the sensitive nature of the area, fencing to reduce compaction of root zones and/or trampling of vegetation, and the strategic use of boardwalks. As such, the no-action alternative would likely have short- and long-term minor adverse impacts on the Michigan state-listed species occurring in this area.

Closure of the farm loop to vehicles at the west end of Chicago Road would likely have long-term minor beneficial impacts on state-listed species associated with the dunes west of thereby reducing the potential for trampling, habitat alteration, and sensory-based disruptions.

New activities proposed such as use of the new bay-to-bay trail and campgrounds could result in trampling, habitat alteration, and sensory-based disruption of behaviors for state-listed species associated with the shoreline/dunes/near-shore habitats. Assuming practicable levels of monitoring and remediation of visitor-related impacts by NPS staff, impacts on Michigan state-listed species from such activities under alternative A would likely be short term moderate and long term minor and adverse.

Ongoing use of motorized boats on School, Loon, and North Bar lakes, as well as on the Crystal and Platte rivers, would likely have short- and long-term minor adverse effects on state-listed species associated with lakes/wetlands/riparian due to shoreline erosion, resuspension of sediments, pollution, and sensory-based disruption of wildlife. The cessation of motorized boating on Bass Lake (Leelanau County) would likely have equal but beneficial impacts (i.e., short- and long-term, minor, beneficial impacts). Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have

short- and long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and associated campgrounds, the M-22/M-109 hike/bike trail and a loop trail and small parking area at Bow Lakes could result in habitat loss and degradation for lakes/wetlands/riparian species and for mature forest species, which could be reduced by strategic location and design. Return of the Glen Lake picnic area to a natural state, could have beneficial impacts on species associated with wetlands and lakes in that area. The sum of these impacts on state-listed species associated with lakes, wetlands, and riparian areas and mature forests in the Lakeshore would likely be short and long term, negligible to minor, and adverse (e.g., the bay-to-bay trail), and long term, minor, and beneficial (e.g., development of a loop trail in Bow Lakes area and return of Glen Lake picnic area to more natural conditions).

Cessation of NPS acquisition of lands within the Benzie Corridor and removal of the corridor from the Lakeshore boundary would likely expose this area to an increased rate of private development. Although no state-listed species are known to occur within the actual corridor, such development could adversely impact state-listed species close to the ridge, including species associated with lakes, wetlands, and riparian areas. Impacts associated with private development, including habitat loss, alteration, and degradation, and sensory-based disruption, could result if this area undergoes such development. These impacts could range from negligible to moderate and would likely be adverse over the short and long terms.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on Michigan state-listed plant and animal species include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) implementation of

the “Fire Management Plan”; (4) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (5) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (6) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; and (7) minor improvements to the Dune Climb parking area. Each of these projects would involve short-term adverse impacts during construction (such as sensory-based disturbance). The long-term impacts would likely be minor to moderate and beneficial (such as habitat protection, restoration, and enhancement). The impacts of the actions listed above, together with the impacts of the alternative A, would result in short and long term minor to moderate adverse cumulative impacts, and minor to moderate beneficial cumulative impacts. Alternative A would be expected to contribute a relatively small component to these cumulative impacts.

Conclusion. Alternative A would have short- and long-term negligible to moderate adverse impacts and short- and long-term minor to moderate beneficial impacts on Michigan state-listed species. The cumulative impacts would likely be short and long term, minor to moderate adverse, and minor to moderate beneficial. There would be *no impairment* of state-listed species from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Wetlands and Water Quality

Readers are encouraged to refer back to the “Wetlands and Water Quality” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Current visitor activities that would continue and could impact wetlands and water quality include the use of motorized boats on School, Loon, and North Bar lakes and the Crystal and Platte rivers. Impacts would include resuspension of sediments and pollution of wetlands and water bodies. Impacts on wetlands and water quality from such activities under all action alternatives would likely continue to be short and long term, minor to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

The bay-to-bay trail and the M-22/M-109 hike/bike trail could impact wetlands and water quality through erosion, runoff, and pollution during construction, and trampling, erosion, resuspension of sediments, and pollution during use. Assuming implementation of best management practices during construction, and careful monitoring of impacts during use, the overall impacts would likely be short and long term, minor, and adverse.

Closure of the farm loop road to vehicles at the west end of Chicago Road on South Manitou Island, closure of Tiesma Road, and cessation of motorized boat use on Bass Lake (Leelanau County) would likely have short- and long-term, negligible to moderate beneficial impacts on the wetlands and waters in those areas.

Development activities proposed under alternative A that might impact wetlands and water quality include return of the Glen Lake picnic area to a more natural condition and development of a short loop trail and small parking area in the Bow Lakes area. Assuming use of best management practices during construction, the impacts of restoring the Glen Lake picnic area to more natural conditions and developing the Bow Lakes trail

and parking area would likely be short term, minor to moderate, and adverse during construction, and long-term, minor to moderate, and beneficial after construction because they would be designed to protect adjacent wetlands and water bodies.

Cessation of NPS acquisition of lands within the Benzie Corridor might render wetlands and water quality below this area susceptible to impacts of private development, such as increased sediment loads and pollution, resulting in short- and long-term, negligible to moderate adverse impacts.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on wetlands and water quality include (1) implementation of the “Fire Management Plan”; (2) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (3) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; (4) minor improvements to the Dune Climb parking area; and (5) dredging of the Platte River mouth. Although each of these projects would involve short-term adverse impacts (e.g., dredging of the Platte River resulting in short-term suspension of particulates in the water and resulting lower water quality immediately downstream [lakeside] of the dredging), the net result would likely be long-term, minor to moderate beneficial impacts (e.g., dredging the mouth of the Platte River allows boats to pass without continuously hitting the bottom, stirring up material, and reducing water quality).

The impacts of the other actions described above, together with the impacts of the alternative A, would result in short- and long-term negligible to moderate adverse cumulative impacts, and long-term negligible to moderate beneficial cumulative impacts. Alternative A would be expected to contribute

a relatively small component to these cumulative impacts.

Conclusion. Alternative A would contribute short- and long-term negligible to moderate adverse, and negligible to moderate beneficial impacts on wetlands and water quality. There would be short- and long-term negligible to moderate adverse cumulative impacts, and long-term negligible to moderate beneficial cumulative impacts. There would be *no impairment* of wetlands or water quality from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

VISITOR OPPORTUNITIES AND USE

Visitor Opportunities

Although natural resource interpretive and educational opportunities would be emphasized, opportunities would remain available for visitors to experience all of the fundamental resources and values of the Lakeshore as well as to learn about all of the Lakeshore’s primary interpretive themes (see “Fundamental Resources and Values” and “Primary Interpretive Themes” sections in chapter 1). Visitors would have access to information, interpretation, and educational opportunities at a variety of locations, including the visitor center in Empire, at Glen Haven, and at the visitor contact station on South Manitou Island. These opportunities would have long-term, moderate, beneficial impacts.

Access to and through the Lakeshore would generally be on the existing network of state, county, and NPS roads. However, visitors would no longer have vehicular access on Tiesma Road (for beach access) or the complete South Manitou Island farm auto tour. Visitors would have increased Lakeshore access with the addition of the M-22/M-109 hike/bike trail (initiated by others) and the bay-to-bay hiker/paddler trail, and concessioner-operated interpretive tours to

near the Giant Cedars area would be considered. Seasonal ferry service would be provided for overnight trips to North Manitou Island and day and overnight trips to South Manitou Island (similar to the no-action alternative). The National Park Service would recommend to Congress that the Benzie Corridor be removed from the Lakeshore boundary; therefore there would continue to be no visitor access in this area. The above-noted increases in Lakeshore access would have long-term, moderate beneficial impacts. The loss of access would have long-term, moderate adverse impacts.

The scenic resources of the Lakeshore would reflect relatively large areas that are natural in character (this alternative has the greatest amount of the experience nature zone). Visitors would also experience Lakeshore sites that reflect the area’s culture and history (e.g., Glen Haven, Port Oneida, and cultural resources on North Manitou and South Manitou islands) and areas with facilities that support recreational use (e.g., the Dune Climb and Trails End). If Congress acted to remove the Benzie Corridor from the National Lakeshore boundary, future development would likely be similar to other locally developed ridgelines (that is, the least natural appearing of any alternative). Private development of the Benzie Corridor would have long-term, moderate, negative impacts on scenic resources. Even with very modest new development, there would be long-term, moderate, beneficial impacts on opportunities to experience the natural and cultural scenic resources of the Lakeshore.

Additions and deletions to the Lakeshore’s recreation-oriented development would cause modest changes in recreational opportunities for visitors. Additions include the M-22/M-109 hike/bike trail (initiated by others), the bay-to-bay hiker/paddler trail and associated primitive campgrounds, and a trailhead parking area and a short loop trail in the Bow Lakes area. The Valley View backcountry campground would be abandoned, and the

Little Glen Lake picnic area would be removed. Even with these changes, the scale of recreation-oriented development in the Lakeshore would be relatively modest. This level of development would have long-term, minor beneficial impacts on visitors.

There would continue to be a wide range of recreational activities in the Lakeshore (similar to the no-action alternative); however, opportunities for nonmotorized recreational activities such as hiking, biking, backpacking, paddling, and backcountry camping would be facilitated and expanded. User capacity management would improve visitor experiences on the Platte River. There would be a reduction in the number of lakes available for motorized boats, hang gliding use at Empire Bluff would be suspended, and there would be no future NPS recreational opportunities in the Benzie Corridor. Some visitors might perceive these actions as a reduction in recreational opportunities. These changes to the range of recreational activities in the Lakeshore would have long-term, minor beneficial impacts.

Natural sounds would continue to dominate the Lakeshore except along roadways, in developed areas, where motorized boats are allowed (along rivers, at specific inland lakes, and on Lake Michigan), and when aircraft are flying over. One less inland lake than in the no-action alternative would allow motorized boats (and accompanying sounds) resulting in a slight improvement in the natural soundscape. The Benzie Corridor would be removed from the Lakeshore boundary and development would likely be similar to other locally developed areas. The increased residential development and its associated sounds would disrupt the natural soundscape. Natural sounds would also be temporarily disrupted locally by construction activities; however mitigation measures would minimize impacts. Overall impacts would be long term, minor, and beneficial with other impacts that are either short or long term, minor, and adverse.

The naturally dark night sky would continue to be predominant in the Lakeshore despite vehicular lights along roadways and lighting in developed areas. Overall impacts would be long-term, minor, and beneficial for those who value the dark night sky. However, the Benzie Corridor would be removed from the Lakeshore boundary and development would likely be similar to other locally developed areas. This increased private development and its associated lighting would have long term, minor, and adverse impacts on the dark night skies.

Visitor Use

Annual visitor use at the Lakeshore under alternative A would be expected to be slightly higher than under the no-action alternative, but lower than under the preferred alternative. The net change would result from counterbalancing factors affecting use — implementation of user capacity management strategies on the Platte River and closing two NPS roads — would be offset by potential increases in use associated with completion of the M-22/M-109 hike/bike trail (initiated by others) and the bay-to-bay hiker/paddler trail and associated primitive campgrounds. New opportunities would be focused on dispersed and backcountry uses. Consequently, a long-term increase of up to 25% above that anticipated under the no-action alternative could be foreseen (up to an estimated 21,000 additional annual visits).

Levels of visitor use to North Manitou and South Manitou islands would see little change, with no changes in ferry service occurring under alternative A.

The increases in visitor use would occur gradually over time, reflecting not only long-term local and regional population growth, but also the implementation of specific changes or projects that are contingent upon funding, actions of others, or both. Slightly increased visitor use levels would have long-

term and minor effects that might be concurrently viewed as beneficial or adverse. The differences between beneficial and adverse would depend on the expectations and preferences of the visitor related to the new opportunities and increased visitation in alternative A.

Cumulative Impacts

Other past, present, and reasonably foreseeable projects that would affect visitor opportunities and use include: (1) improvements to parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Pierce Stocking Scenic Drive Lake Michigan overlooks 9 and 10; (4) South Manitou Lighthouse Complex exterior restoration and interior rehabilitation; and (5) Dune Climb parking area paving and other minor improvements. These actions would improve visitor opportunities by improving enjoyment, access, and/or range of available opportunities for visitors and would have an overall long-term, minor, beneficial effect on visitor opportunities and use. Combined with actions proposed in alternative A, past, present, and reasonably foreseeable actions would have a long-term, minor, beneficial cumulative effect. Impacts of alternative A would comprise a relatively small portion of the overall cumulative effect.

Conclusion

Increased access and visitor opportunities related to modest additional recreation-oriented facilities would have a long-term, minor to moderate beneficial impact on visitor opportunities and use. Implementation of user capacity management strategies would have a long-term, minor beneficial impact on visitor opportunities, but potentially long-term minor adverse effects on visitor use. The loss of some vehicle access, visitor opportunities, and recreation-oriented development (e.g., Tiesma Road, Glen Lake picnic area, and part

of the farm tour) would have a long-term, moderate adverse impact on visitor opportunities and use. The removal of the Benzie Corridor from the Lakeshore boundary would have long-term, minor to moderate adverse impacts on visitor access and opportunities, scenic resources, natural soundscapes, and the night sky. Construction activities would have short-term, minor adverse impacts. The cumulative effects would be long term, minor, and beneficial.

WILDERNESS CHARACTER

Natural and Undeveloped

Under alternative A, 33,600 acres (47 % of the National Lakeshore, the most of any alternative), would be proposed for wilderness designation, a 2,697-acre (4%) increase over the no-action alternative. Assuming Congress acted to designate the proposed areas as wilderness, wilderness values would be permanently protected in designated areas of the north, central, and south portions of the Lakeshore and on each island. In contrast to the no-action alternative, none of the Port Oneida Rural Historic District would be included, and a new area of designated wilderness and associated experiences would be available on the Sleeping Bear Plateau. Impacts on wilderness character would be long term, moderate, and beneficial.

Alternative A's wilderness proposal is also the most contiguous wilderness proposal — that is, the places where wilderness areas would be interspersed with nonwilderness would be minimized. Thus, places where adjacent motorized or mechanized uses (e.g., the motorized farm tour on South Manitou Island) would intrude upon naturalness and primitive character would also be minimized. In contrast to the no-action alternative, there would be no nonconforming motor vehicle or bicycle use *within* wilderness because county road rights-of-way would be excluded. However, the presence of historic structures

would continue to locally diminish the areas' undeveloped primeval character. Impacts would be long term, minor, and adverse.

Opportunities for Solitude

Outstanding opportunities for solitude would be available due to wilderness designation in all three portions of the mainland and on the Manitou Islands. In particular, areas away from trails and facilities would continue to offer excellent prospects for privacy and isolation. Solitude would continue to be more easily found on North Manitou Island than on South Manitou Island because the former is larger, has fewer visitors (most of whom are seeking wilderness experiences), and would continue to lack day use.

Opportunities for Primitive, Unconfined Recreation

As in the no-action alternative, there would be opportunities for both day and overnight wilderness experiences on South Manitou Island, but due to the continued lack of day ferry service to North Manitou Island there would be only overnight wilderness experiences available there (no change from the no-action alternative). The permit requirement for backcountry camping would continue, and campers would be required to stay in designated campgrounds except on North Manitou Island where camping would continue to be dispersed. Based on the extent and configuration of designated wilderness, alternative A would provide more opportunities for primitive, unconfined recreation (mainland and both islands) than any other alternative. Permit and camping requirements would continue to diminish these qualities to some degree (a minor, long-term, adverse impact).

Cumulative Impacts

Over time, the Lakeshore's ongoing program to restore former nonhistoric sites to more natural conditions has substantially increased the natural, undeveloped character of the Lakeshore. The work includes removing nonnative trees and human enhancements, plus reestablishing more natural contours and native vegetation. Combined with this ongoing restoration program, alternative A would have long-term, moderate, beneficial cumulative effects. Impacts of alternative A would comprise a substantial portion of the overall cumulative effect.

Conclusion

Establishment of 33,600 acres of designated wilderness (the most of any alternative) in all three portions of the mainland and on both islands would permanently protect naturalness and opportunities for solitude or primitive, unconfined recreation. Impacts of alternative A on wilderness character would be mostly beneficial, moderate, and long term (permanent), but there would also be some localized minor adverse impacts on wilderness character. Combined with other actions, alternative A would have long-term, moderate, beneficial cumulative effects.

REGIONAL SOCIOECONOMICS

Implementing alternative A would occur against the same backdrop of economic, demographic, and social conditions across the region described under the no-action alternative. The economic and social effects of alternative A would contribute to those conditions, but not fundamentally change the area's economic and demographic outlook.

Visitor-Related Economic Impacts

Annual visitor use at the Lakeshore under alternative A would be expected to be slightly higher than under the no-action alternative; a long-term increase of up to 25% (up to 21,000 additional visits) above that under the no-action alternative could be foreseen. The timing of increased visitor use is difficult to predict because it would depend on when projects are funded or carried out and other factors.

The changes in visitor use would be accompanied by modest changes in annual visitor spending, about \$550,000 per year, with correspondingly limited effects on local personal income and jobs, i.e., 5 to 10 jobs.

The state and local governments would collect additional sales tax from the increases in visitor spending.

The above visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term.

Economic Impacts Related to Implementation and NPS Operations

Implementing alternative A would provide a sustained economic infusion to the region over the life of this plan. The infusion would result from the Lakeshore's ongoing operating expenditures, including \$14.4 million in future construction outlays (\$7.8 million above that for the no-action alternative). Projected budget needs for other major projects and to address deferred maintenance would be the same as for the no-action alternative.

As under the no-action alternative, NPS maintenance staff would perform much of the work to address deferred maintenance and preservation, restoration and rehabilitation activities. Identified budget needs for future construction would be higher than under the

no-action alternative, which if implemented would support the local construction trades industry and associated vendors and suppliers.

Annual NPS payroll, operating, and maintenance would produce long-term effects on employment, business sales, income and other related measures. Management under alternative A could support staffing increases of 11 full-time-equivalent employees. Staff would be added over time as projects, programs, and management were implemented.

A need for a modest long-term increase in budgeted funds for NPS operations is identified in conjunction with alternative A (there are no assurances that such increases will occur). Available resources would include about \$4.2 million in base budget appropriations (\$300,000 per year above the no-action alternative), about \$1.0 million in entry and camping fees, and various nonrecurring funding for supplemental and specific project construction. Retained revenues from entry and camping fees would likely increase with higher visitation.

If Congress acts to remove the Benzie Corridor from the National Lakeshore, land acquisition in the corridor by the National Park Service would cease and the eventual status of already acquired lands would be determined independent of this plan.

Activities sponsored by the Lakeshore's partners would provide yet additional sources of economic stimulus. The timing, magnitude, and indirect economic consequences of those activities are indeterminate.

The economic effects associated with NPS operations would be beneficial and minor to moderate in the short and long term.

Effects on Regional Population

Alternative A would have little direct impact on population growth. The increases in construction and long-term jobs and visitor use over the life of this plan would provide a negligible impetus for growth relative to other factors and would be insufficient to trigger additional new economic development and job-related migration. Many of the jobs would probably be filled by individuals who already reside in the area.

Implementation of alternative A could indirectly enhance the region's attractiveness for economic development as a result of a limited number of new recreational opportunities and establishment of wilderness on the mainland.

There would be some potential effects on future residential development in the area from curtailing land acquisition in the Benzie Corridor. Although the long-term retention or disposal of already acquired lands along the corridor would be determined separately from this plan, it is reasonable to expect the cessation of land acquisition to stimulate new residential development with corresponding increases in year-round or seasonable populations on private lands within and near the corridor boundary. However, the topography and amount of land involved might limit the amount of such development.

The effects on regional population growth under this alternative would be negligible, both in the short and long terms.

Community Services

The effects of implementing alternative A on community services and facilities across the region would be comparable to those under no action, again with the exception of higher demands related to future development in the vicinity of the Benzie Corridor, spurred by the curtailment of land acquisition by the

National Park Service. The limited scale, seasonal nature, and spatial dispersion of the effects across the broader region would not require facility expansions or more staff. Private development in the Benzie Corridor would primarily affect demand for services by Benzie County.

Effects on community services under this alternative would be indeterminate and negligible over the short and long terms.

Traffic and Emergency Services

Traffic impacts of alternative A on the highways and roads providing access to the Lakeshore would be comparable to those under the no-action alternative. Even with the long-term increases in traffic, future traffic levels would be within the current design capacity of the roads. Needs for future highway maintenance would not increase dramatically.

Long-term impacts on the number of traffic accidents and demands on first responders would be similar to those under no action. Demands associated with implementing alternative A would not require additional law enforcement or emergency response staffing, although the increases in the number of "call outs" could burden area first response agencies because they are staffed partially by volunteers.

The effects of implementing alternative A on traffic and emergency services would be adverse, but minor over the short and long terms.

Attitudes and Lifestyles

Alternative A establishes future management direction for the Lakeshore that reflects public input and the Lakeshore's purpose, significance, and fundamental resources and values, but with relatively more emphasis on

natural resource preservation. That emphasis will generally appeal to those valuing solitude, wilderness, and appreciation of the current cultural and recreation opportunities. Those more interested in developing facility-based recreation or maximizing the economic contributions associated with the Lakeshore might be less enthusiastic about the management direction set forth in alternative A.

Suspension of land acquisition in the Benzie Corridor would likely garner support from those who view the corridor as either a non-essential addition to the recreational resources at the Lakeshore or an area competing with other areas for scarce management and funding resources. Members of the public more interested in the addition of another access gateway into the Lakeshore and the expanded scenic and recreational opportunities associated with the corridor are less likely to favor alternative A. Property owners of lands in and adjacent to the corridor would be the most directly affected due to possible changes in nearby development and use.

Like the no-action alternative, the management direction for this alternative would result in relatively few direct lifestyle consequences because the influences of the Lakeshore would generally be consistent with those established under the no-action alternative.

Cumulative Impacts

Social and economic impacts due to implementation of alternative A would be similar to those of other past, current and future development across the region and those under the no-action alternative. The effects of underlying development trends in the region include long-term, moderate population and economic growth; long-term increases in traffic on local roads; related impacts on public safety; higher spending that bolsters community and recreation-oriented

businesses in the region; and additional tax revenues to fund public services and facilities. The effects of the other cumulative actions include negligible to minor changes in local economic conditions in response to changes in visitor use patterns at the Lakeshore precipitated by changes in traffic parking and circulation.

The incremental economic and social effects of implementing alternative A, including those associated with increases in visitor and NPS operating expenditures, would be negligible to minor in the short term and minor in the long term, and generally beneficial. Alternative A actions, combined with other actions described above, would result in minor short- and long-term adverse cumulative effects on traffic and highway safety. Impacts of alternative A would comprise a relatively small portion of the overall cumulative social and economic effects.

Conclusion

The economic and social effects of alternative A would include negligible to minor short-term and moderate long-term economic benefits compared to the no-action alternative. Short- and long-term effects on lifestyles and attitudes would be indeterminate. Long-term social consequences would include a negligible to minor contribution to long-term population growth and demands on community infrastructure and services. Alternative A actions, combined with other actions described above, would result in minor short- and long-term adverse cumulative effects on traffic and highway safety. Overall, the cumulative social and economic effects associated with the alternative A would be minor, short and long term, and indeterminate because they include effects that might be concurrently viewed as beneficial or adverse.

NPS OPERATIONS

A limited number of new trails, including the M-22/M-109 hike/bike trail, and backcountry campgrounds would increase the Lakeshore's maintenance and operational load compared to the no-action alternative. However, this would be tempered by reduced maintenance and operational needs resulting from (a) removal or closure of other facilities, such as Glen Lake picnic area, NPS-owned Tiesma Road, the NPS portion of the farm loop on South Manitou Island, and Valley View campground, and (b) removal of the Benzie Corridor from the Lakeshore. Wilderness minimum requirement analysis would be required for 33,600 acres, a 2,697-acre (4%) increase over the no-action alternative. Impacts of alternative A would be long term, minor, and both beneficial and adverse.

Cumulative Impacts

Ongoing and planned facility upgrades and restoration/rehabilitation projects would have mostly beneficial impacts because these projects would result in reduced resource management and cyclic maintenance needs. Dredging of the Platte River mouth would continue to place demands upon the Lakeshore's maintenance staff and budget, a minor adverse effect. Combined with these impacts, alternative A would have both long-term minor beneficial and adverse cumulative effects. Impacts of alternative A would comprise a substantial portion of these overall cumulative effects.

Conclusion

Alternative A would have long-term, minor beneficial and adverse impacts on NPS operations. This alternative, combined with other actions, would have both long-term minor beneficial and adverse cumulative effects.

UNAVOIDABLE ADVERSE IMPACTS

Some negligible to moderate impacts to soils, vegetation, wildlife, water resources, wilderness character, scenic resources, natural sound, and night sky caused by recreational use and facilities would be essentially unavoidable (e.g., soil compaction, vegetation trampling, wildlife disturbances, decreased opportunities for solitude, decreased naturalness). Increases in visitor use would have low level adverse impacts on regional socioeconomics (e.g., increased traffic).

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

If Congress acted to remove the Benzie Corridor from the National Lakeshore boundary, it is reasonable to assume that the corridor could be developed, subject to local zoning, development patterns, and market forces. Development of the corridor for residential or similar land uses would be an irreversible commitment of natural and scenic resources.

With the exception of consumption of fuels and raw materials for maintenance or construction activities, no other actions in this alternative would result in consumptions of nonrenewable natural resources or use of renewable resources that would preclude other uses for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The National Lakeshore would continue to be used by the public, and most areas would be protected in a natural state. The National Park Service would continue to manage the Lakeshore to maintain ecological processes and native biological communities and to

provide appropriate recreational opportunities consistent with preservation of cultural and natural resources. Actions would be taken with care to ensure that uses do not adversely affect the long-term productivity of biotic communities. Under alternative A there would be very little new development, and any losses of ecological productivity would be minimal.

IMPACTS OF ALTERNATIVE B

HISTORIC RESOURCES

The Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) identifies four treatment approaches that apply to a wide variety of resource types, including buildings, sites, structures, objects, districts, and landscape features and patterns. Three of those treatments are included in this plan — preservation, rehabilitation, and restoration. See page 40 for more detailed definitions. The simplest of these treatment approaches is preservation, in which measures are undertaken to stabilize the resource to ensure that it does not deteriorate further from its existing condition and then to maintain and repair historic features and materials. The second option is rehabilitation, in which the resource is made useable for some purpose while preserving those features that convey its historical, cultural, or architectural value. The third is restoration, in which the historic appearance at a particular time is accurately regained. The fourth treatment, reconstruction, is not proposed in this plan.

Although each alternative calls for preserving and protecting all historic properties, each action alternative provides a different management zone configuration based on that alternative's overall vision, and each management zone prescribes which of the three treatments could be used for historic properties. Thus, potential treatments for the National Lakeshore's various historic properties differ among the alternatives. Based on the locations and relative proportions of management zones in alternative B, 74% of historic structures would undergo preservation, rehabilitation, or restoration (experience history zone), 16% of historic structures would undergo preservation or rehabilitation (recreation zone), and 10% of historic structures would undergo preservation

(experience nature zone). This information is summarized in table 3 on page 74.

All preservation, rehabilitation or restoration efforts would be undertaken in accordance with the standards. Any materials removed during rehabilitation or restoration efforts would be evaluated to determine their value to the Lakeshore's museum collections and/or for their comparative use in future preservation work at the sites. Implementation of the actions described above for this alternative, which would bring all historic resources up to a good condition, would result in no adverse effects on historic resources.

At Glen Haven the Glen Haven Historic District and Sleeping Bear Point Life-Saving Station would be preserved, rehabilitated, or restored (same action in all alternatives). Some buildings would be rehabilitated for visitor and/or staff use. The Sleeping Bear Inn and garage would be placed in the NPS historic leasing program to allow rehabilitation for adaptive use. All other structures would be stabilized and maintained in their current condition.

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

On North Manitou Island the historic life-saving station and Cottage Row structures would be preserved, rehabilitated, or restored (same action as in the preferred alternative).

Preservation and/or adaptive use of the rehabilitated historic former Manitou Island Association structures for administrative and operational purposes would continue. Historic structures and landscapes elsewhere on the island would be preserved.

On South Manitou Island the historic life-saving station, lighthouse complex, and village historic structures would be preserved, rehabilitated, or restored. Historic structures and landscapes elsewhere on the island would be preserved or rehabilitated.

Other mainland historic structures and landscapes would be managed as specified for the management zone in which they lie (see alternative map and zone descriptions).

Actions involving other than historic property treatments, such as improving access to some inland lakes, would have no effect on historic properties because they would be designed to avoid possible impacts on properties on or eligible for the national register.

All properties on or determined eligible for inclusion in the National Register of Historic Places would, at a minimum, undergo stabilization (where that action has not already occurred) or maintenance in the current condition (where some preservation treatment has already been implemented).

The actions proposed above are general. The treatments for each resource (preservation [stabilization], rehabilitation with adaptive use, restoration) have not yet been determined so impacts cannot be fully described. However, it is the National Park Service's intent that no action proposed be adverse. All actions affecting these historic structures and landscapes would be undertaken in consultation with the Michigan state historic preservation officer.

Alternative B would not directly or indirectly affect any properties outside the boundary of the National Lakeshore that are listed on or

eligible for the National Register of Historic Places, or that are listed by the state.

Cumulative Impacts

Over the years historic resources in the Lakeshore have been adversely impacted by natural processes such as weathering, vegetative encroachment, and the wear and tear associated with visitor use. Actions proposed for the South Manitou Island Lighthouse Complex would result in both the restoration of the exterior of the keeper's quarters and connecting passageways and the rehabilitation of the interior for adaptive reuse. In addition, actions proposed for Glen Haven Village include the stabilization and maintenance of historic structures or their rehabilitation for adaptive reuse. All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995), and would result in no adverse effects on historic resources.

As described above, implementation of alternative B would result in no adverse effects on historic resources. The no adverse impacts of this alternative, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a no adverse effect cumulative impact. The no adverse effects of alternative B would be a sizeable contribution to the no adverse effect cumulative impact.

Conclusion

Alternative B would have a determination of no adverse effect under the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural Properties" (36 CFR 800). There would be *no impairment* of cultural resources from implementation of alternative B (see specific

definition of impairment in the “Impairment of National Lakeshore Resources” section).

NATURAL RESOURCES

Soils and Geologic Resources

Readers are encouraged to refer back to the “Soils and Geologic Resources” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Use of motorized boats on School, Loon, North Bar, and Bass (Leelanau County) lakes and the Crystal and Platte rivers would continue. Although soil compaction and erosion of the dunes would be reduced in some areas by using sand ladders, boardwalks, and sidewalks to protect the substrate, placement and maintenance would be limited to what can be accomplished with current resources. Therefore, short- and long-term adverse impacts on soils and geologic resources as a result of these ongoing visitor activities, ranging from minor to moderate depending upon the specific location and activity, would continue. These ongoing activities would continue to have minor to moderate (depending on location and activity), short- and long-term adverse impacts on soils and geologic resources. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and the M-22/M-109 hike/bike trail could result in soil disturbance and erosion during construction, and subsequent visitor use would result in erosion and compaction. Assuming use of best management practices, such as using silt fencing and avoiding steep or inundated terrain, during construction and later use to

prevent soil erosion and compaction, the overall adverse impacts would likely be short-term moderate and long-term minor.

Visitor activities under alternative B such as motorized boat use on additional inland lakes (Shell and Tucker), farm loop auto tours and concession auto tours to near the Giant Cedars area on South Manitou Island, and day trips to North Manitou Island could result in soil erosion and compaction in these areas. Impacts on soils and geologic resources (e.g., dune processes) from such activities under alternative B would likely be short and long term, negligible to moderate depending upon location and activity, and adverse.

Constructing a multi-loop trail and small parking area at Bow Lakes with potential connection to the local school, providing additional designated campsites on North Manitou Island, relocating the D. H. Day group campground to the D. H. Day main campground, and improving access at a few inland lakes and the Crystal River might result in soil disturbance, erosion, and compaction, all of which could be reduced, to some extent, by strategic location and design. Other development, such as improvements to the parking area at the ends of Peterson and Esch roads, improvements to the Glen Lake picnic area, and improvements at the mouth of the Platte River, might result in increased visitor use and associated increases in soil compaction and erosion in those areas. The sum of these impacts to soils and geologic resources in the Lakeshore would be short and long term, minor to moderate, and adverse.

Continued NPS acquisition of lands on a willing-seller basis within the Benzie Corridor would have short- and long-term, moderate beneficial impacts on soils in that area by protecting them from impacts associated with development. Construction of a road and associated bike trail along the Benzie Corridor would result in short-term minor to moderate adverse impacts on soils through soil erosion

and compaction. Long-term effects would include negligible to minor adverse impacts on soil resources due to erosion associated with increased impermeable surface area. Private development within the corridor would probably continue at its current pace and would be anticipated to have minor to moderate adverse impacts on these resources.

Elimination of dispersed camping on North Manitou Island with development of additional designated campsites would likely have short- and long-term negligible to minor adverse impacts on the soils of and adjacent to the new campsites. This action would also have short- and long-term negligible to minor beneficial impacts on the soils and geologic resources in wider areas that are being impacted by repeated use.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on soils and geologic resources include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey's Corner canoe liveries; (5) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; (6) minor improvements to the Dune Climb parking area; and (7) continued dredging of the mouth of the Platte River. Although activities 1-6 would likely result in short-term adverse impacts during the construction phase, the net result would likely be long-term, minor to moderate beneficial impacts because all projects would contribute to a reduction of the potential for soil compaction and erosion. Dredging the mouth of the Platte River results in continued addition of dredged material to the shoreline. During low-water periods deeper dredging is required and results in

dredge materials with high clay content being deposited on the shoreline, resulting in armoring of the beach surface and consequent profile changes. This results in short- and long-term minor to moderate adverse impacts. The impacts of other actions described above, in combination with the impacts of alternative B, would result in short-term, negligible to moderate adverse cumulative impacts, and short- and long-term, negligible to moderate, beneficial cumulative impacts. This alternative's contribution to these cumulative impacts would likely not be large.

Conclusion. Alternative B would have short- and long-term, negligible to moderate adverse and beneficial impacts on soils and geologic resources. Cumulative impacts would likely be short term, negligible to moderate, and adverse, and short and long term, negligible to moderate beneficial. There would be *no impairment* of soils or geologic resources from implementation of alternative B (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Vegetation and Wildlife

Readers are encouraged to refer back to the "Vegetation and Wildlife" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

Use of motorized boats on School and Loon lakes and the Crystal and Platte rivers would continue to result in trampling of vegetation, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Impacts on vegetation and wildlife from such activities would likely continue to be short and long term, negligible to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and

long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and the M-22/M-109 hike/bike trail would impact vegetation and wildlife through trampling of vegetation, habitat loss and alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Assuming use of best management practices (such as placement of trails/paths close to existing disturbances, minimization of the construction footprint, and timing of construction outside peak breeding/nesting periods) during construction, and careful monitoring and management of impacts during use, the overall impacts would likely be short and long term, negligible to minor, and adverse.

Under alternative B, only 20% (14,400 acres) of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 16,503-acre (23%) decrease over the no-action alternative. The only wilderness would be on North Manitou Island; there would be no areas managed as wilderness on South Manitou Island or in the mainland portions of the Lakeshore. This reduction in the portion of the Lakeshore conveying wilderness protection for vegetation and wildlife, combined with the majority of South Manitou Island and the mainland portions of the Lakeshore being zoned recreational, would likely have short- and long-term minor to moderate, adverse impacts on vegetation and wildlife within the Lakeshore.

Under alternative B, motorized boats would be allowed on more inland lakes than is currently allowed with the addition of Shell and Tucker lakes. Use of motorized boats on these water bodies would likely have short- and long-term minor adverse effects on their associated vegetation and wildlife due to shoreline erosion, resuspension of sediments, pollution, introduction and spread of invasive

species, and sensory-based disruption of wildlife.

The farm loop and Giant Cedars area, auto tours on South Manitou Island, and day trips to North Manitou Island could impact vegetation and wildlife through trampling of vegetation, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Assuming practicable levels of monitoring and remediation of visitor-related impacts by NPS staff, overall impacts of these types of new activities would likely be short term and long term, negligible to minor, and adverse.

Constructing a multi-loop trail and small parking area at Bow Lakes with potential connection to the local school, providing additional designated campsites on North Manitou Island, relocating the D. H. Day group campground to the D. H. Day main campground, and improving access at a few inland lakes and on the Crystal River could result in habitat loss and degradation, both of which could be reduced, to some extent, by strategic location and design. These improvements might result in introduction and spread of invasive species to inland waterways. Other development, such as improvements to the parking area at the ends of Peterson and Esch roads, at the Glen Lake picnic area, and at the mouth of the Platte River might result in increased visitor use and associated increases in vegetation trampling, habitat alteration, and sensory-based disruption of wildlife in those areas. The sum of these impacts on vegetation and wildlife in the Lakeshore would likely be short and long term, minor to moderate, and adverse.

Continued NPS acquisition of lands in the Benzie Corridor would have short- and long-term, minor beneficial impacts on the vegetation and wildlife in that area by protecting them from impacts associated with development. Construction of a road and associated bike trail along the Benzie Corridor would result in short-term minor to moderate

adverse impacts on vegetation and wildlife resources due to habitat loss and alteration, trampling, and sensory-based disturbances. Long-term effects would include negligible to minor adverse impacts on vegetation due to trampling of adjacent vegetation and sensory-based disruption of wildlife behaviors. Private development within the corridor would probably continue at its current pace and would be anticipated to have minor to moderate adverse impacts on these resources.

Elimination of dispersed camping on North Manitou Island with development of additional designated campsites would likely have short- and long-term negligible to minor adverse impacts on the vegetation and wildlife adjacent to the new campsites and short- and long-term negligible to minor beneficial impacts on the vegetation and wildlife in wider areas that are being impacted by repeated use.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on vegetation and wildlife include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the “Fire Management Plan”; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; and (5) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas. These actions would likely have short- and long-term negligible to minor adverse impacts due to trampling and sensory-based disruption, and long-term minor beneficial impacts on vegetation and wildlife due to habitat protection, restoration, and enhancement. The impacts of other actions described above, together with the impacts of alternative B, would result in short- and long-term, minor to moderate adverse cumulative effects, and short- and long-term, negligible to moderate beneficial cumulative effects. Alternative B

would likely not contribute an appreciable portion to these cumulative impacts.

Conclusion. Alternative B would have short- and long-term negligible to moderate adverse impacts, and short- and long-term negligible to moderate beneficial impacts. The actions proposed in alternative B, together with other past, present, and reasonably foreseeable actions, would likely result in short- and long-term, minor to moderate adverse, and short- and long-term negligible to moderate beneficial cumulative effects. There would be *no impairment* of vegetation or wildlife resources from implementation of this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Federal Threatened and Endangered Species

Readers are encouraged to refer back to the “Federal Threatened and Endangered Species” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

The federally listed species considered are the Michigan monkey flower, piping plover (populations and designated critical habitat), and Pitcher’s thistle. The piping plover and Pitcher’s thistle are found primarily in near-shore dunes; the Michigan monkey flower is restricted to one lakeside location in the Lakeshore interior. Although part of the designated critical habitat within the Lakeshore coincides with actively used recreational beach areas, NPS staff have demonstrated success in minimizing impacts on nesting piping plovers in areas with relatively high human activity (e.g., the mouth of the Platte River) through various actions (see “Mitigative Measures for the Action Alternatives” section in chapter 2). All impact analyses assume continued protection of threatened and endangered species as

outlined in the Lakeshore-wide desired condition statements (see chapter 1).

Under alternative B, only 20% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 16,503-acre (23%) reduction from existing conditions. The only wilderness would be on North Manitou Island; there would be no areas managed as wilderness on South Manitou Island or in the mainland portions of the Lakeshore. This reduction in area managed as wilderness would potentially affect Pitcher's thistle and piping plover. The wilderness status of areas occupied by the Michigan monkey flower would not change. Although management as wilderness would cease in some areas occupied by Pitcher's thistle, these areas would be managed as recreation zone or experience nature zone — management strategies that are very similar to existing management under which Pitcher's thistle currently does quite well in the Lakeshore. Given demonstrated persistence of this species under such management, combined with continued protection of threatened and endangered species as outlined in the Lakeshore-wide desired condition statements, this reduction in area managed as wilderness would be expected to have no more than discountable impacts on this species. The reduction in area managed as wilderness would have insignificant effects on piping plovers and piping plover critical habitat because management of the Lake Michigan shoreline and near-shoreline areas would remain essentially the same despite the change in wilderness status, and because piping plovers successfully nest and fledge under current management.

New visitor activities proposed in alternative B, such as use of the new bay-to-bay trail and campgrounds and day trips to North Manitou Island, could result in trampling and habitat alteration for all addressed federally listed plant species, and sensory-based disruption of piping plover. These impacts could be reduced by strategic location and design such

as careful selection and demarcation of trails outside of sensitive areas (e.g., away from piping plover critical habitat) and use of boardwalks.

Developing the bay-to-bay trail and associated campgrounds, providing additional designated campsites on North Manitou Island, and relocating the D. H. Day group campground to the D. H. Day main campground, could result in habitat alteration and degradation, both of which could be reduced, to some extent, by strategic location and design. Other development, such as improvements to the parking areas at the ends of Peterson and Esch roads and improvements at the mouth of the Platte River, might result in increased visitor use and associated increases in the potential for trampling and habitat alteration for piping plover and Pitcher's thistle, and sensory-based disruption of piping plover in those areas.

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor, and would construct a scenic road with accompanying bike lanes/trail during the life of this plan. Private development within the corridor would probably continue at its current pace. These conditions and activities are not anticipated to affect listed species as neither they nor their habitats occur within the corridor.

For projects proposed in alternative B, the National Park Service would implement measures that would ensure that adverse effects on listed species do not occur. These avoidance measures might include, but are not limited to, the following:

- Safeguarding the known locations of listed species.
- Restricting human activity in piping plover breeding areas by use of a specialized fence system.
- Increasing the number of NPS/volunteer piping plover nest monitors, should conditions warrant.

- Restricting human activity in piping plover breeding areas.
- Restricting dogs from piping plover breeding areas during the breeding season.
- Flagging or fencing plants prior to any work in or adjacent to Pitcher’s thistle habitat. Every effort would be made to avoid any impacts to these plants.
- Providing education about the listed species and their habitats.
- Designating alternate access points away from areas occupied by listed species.

The National Park Service staff anticipates that adverse effects could be avoided in all projects proposed under alternative B. The National Park Service cannot foresee at this time any project for which adverse effects could not be avoided. In the rare event that adverse effects could not be avoided, the project would either be discontinued or NPS staff would request formal consultation with the U.S. Fish and Wildlife Service. As such, any impacts from implementation of alternative B would likely have only beneficial, insignificant, or discountable effects on piping plover and piping plover critical habitat, Michigan monkey flower, and Pitcher’s thistle.

At the landscape level, alternative B is not likely to adversely affect listed species because the proposed management direction under this alternative would result in conditions that are beneficial to preserving habitat and would minimize adverse impacts on listed species to insignificant or discountable. As such, implementation of alternative B may affect but would not be likely to adversely affect piping plover, Michigan monkey flower, and Pitcher’s thistle.

Conservation Measures. Conservation measures are activities above and beyond avoidance measures and are undertaken to reduce potential impacts on federally listed species or candidate species. Initiation of conservation measures would occur in

consultation with the U. S. Fish and Wildlife Service and would be required if any of the following occurred:

- initiation of activities anticipated to have impacts on piping plovers or their designated critical habitat beyond those addressed in this document
- additional Michigan monkey flower occurrences within the Lakeshore were identified in areas where they might potentially be impacted
- initiation of activities anticipated to have impacts on Michigan monkey flower populations
- initiation of activities anticipated to have impacts on Pitcher’s thistle populations beyond those addressed in this document

Renewed discussion and consultation with the U. S. Fish and Wildlife Service, should any of the above events occur, would focus on development of specific conservation measures to reduce potential impacts on these species and/or designated critical habitat. Such conservation measures would be based on the recommendations provided by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on federally listed species and designated critical habit include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the “Fire Management Plan”; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; and (4) activities presented in table 21. These actions would benefit natural resources including federally listed species. During implementation, actions would be taken to avoid or minimize potential adverse impacts on such species. Any adverse impacts, such as trampling or sensory-based disruption, would be insignificant or discountable.

The impacts of the actions described above, together with the impacts of alternative B, would result in no more than insignificant or discountable adverse cumulative impacts and may affect but would not be likely to adversely affect piping plover, piping plover critical habitat, Pitcher's thistle, and Michigan monkey flower. Alternative B would be expected to contribute a relatively small component to these cumulative impacts.

Conclusion. Any adverse impacts of alternative B on the addressed federally listed species and designated critical habitat would be no more than insignificant or discountable over both the short and long terms. Implementation of alternative B may affect but would not likely adversely affect the addressed listed species and critical habitat. Other projects, combined with the impacts of alternative B, on federally listed species and designated critical habitat may affect but would not likely adversely affect piping plover, piping plover critical habitat, Pitcher's thistle, and Michigan monkey flower. There would be *no impairment* of federal threatened and endangered species from this alternative (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Michigan State-Listed Species

Readers are encouraged to refer back to the "Michigan State-Listed Species" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

Under alternative B, 20% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 16,503-acre (23%) reduction from the no-action alternative. The only wilderness would be on North Manitou Island; there would be no areas managed as wilderness on South Manitou Island or in the mainland portions of the Lakeshore. This

reduction in the portion of the Lakeshore conveying wilderness protection to vegetation and wildlife, combined with the majority of South Manitou Island and the mainland portions of the Lakeshore being zoned recreational, would likely have short- and long-term, minor to moderate, adverse impacts on Michigan state-listed species within the Lakeshore.

Increased visitation associated with concession tours to near the Giant Cedars area could result in adverse impacts on the state-listed species associated with this sensitive area. However, assuming modest levels of impact monitoring and remediation by NPS staff, these adverse impacts would likely not exceed short-term moderate and long-term minor on state-listed species in this area.

Under alternative B, continued or new visitor activities that might impact state-listed species associated with the shoreline/dunes/near-shore habitat complex include the farm loop auto tours and concession tours to near the Giant Cedars area on South Manitou, day trips to North Manitou, and use of the bay-to-bay and M-22/M-109 trails. Impacts would likely include trampling, habitat alteration, and sensory-based disruption. Assuming practicable levels of impact monitoring and mitigation, these impacts would likely be long term, minor, and adverse.

Under alternative B, motorized boats would be allowed on more inland lakes than currently, with the addition of Shell and Tucker lakes. Use of motorized boats on these water bodies would likely have short- and long-term minor adverse effects on their associated state-listed species due to shoreline erosion, resuspension of sediments, pollution, and sensory-based disruption of wildlife.

Development of the bay-to-bay trail and associated campgrounds, provision of additional designated campsites on North Manitou Island, development within the high-use area at the mouth of the Platte River, and

relocation of the D. H. Day group campground to the D. H. Day main campground could result in habitat loss and degradation for species associated with shoreline/dunes/near-shore habitat, both of which could be reduced, to some extent, by strategic location and design. Improvements to the parking area at the ends of Peterson and Esch roads, at the mouth of the Platte River, and at the Glen Lake picnic area might result in increased visitor use and associated increases in vegetation trampling, habitat alteration, and sensory-based disruption of shoreline/dunes/near-shore associates in those areas. The sum of these impacts on state-listed species in the Lakeshore would likely be short and long term, minor to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Development of the M-22/M-109 hike/bike trail, development of a multi-loop trail and small parking area at Bow Lakes with potential connection to the local school, development within the high-use area at the mouth of the Platte River, and improved access (parking areas, ramps or docks) at a few inland lakes (locations to be determined), could negatively impact state-listed species associated with lakes, wetlands, and riparian areas through trampling, habitat alteration, and sensory-based disruption. These adverse impacts would likely be short term moderate and long term minor to moderate, assuming continued NPS impact monitoring and remediation.

Continued NPS acquisition of lands in the Benzie Corridor would have short- and long-term negligible beneficial impacts on state-listed species near that area by protecting them from impacts associated with private development, which would probably continue at its current pace. Construction of a road and associated bike trail (integral or adjacent to

the road footprint) along the Benzie Corridor could result in short-term negligible adverse impacts on Michigan state-listed species occurring near the corridor due to habitat loss and alteration and sensory-based disruption of wildlife behaviors. Long-term effects would include negligible to minor adverse impacts on vegetation due to habitat alteration and sensory-based disruption of wildlife behaviors.

Elimination of dispersed camping on North Manitou Island and development of additional designated campsites would likely have short- and long-term negligible to minor adverse impacts on the state-listed species adjacent to the new campsites, but would also have short- and long-term negligible to minor beneficial impacts on state-listed species in wider areas that are being impacted by repeated use.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on Michigan state-listed plant and animal species include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) implementation of the “Fire Management Plan”; (4) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (5) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (6) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; and (7) minor improvements to the Dune Climb parking area. Each of these projects would involve short-term adverse impacts during construction. The long-term impacts would likely be minor to moderate beneficial (such as habitat restoration and enhancement). The impacts of the other actions described above, together with the impacts of alternative B, would result in short- and long-term, minor to moderate adverse cumulative impacts, and

minor to moderate beneficial cumulative impacts. Alternative B would likely contribute a relatively small component to these cumulative adverse impacts.

Conclusion. Alternative B would have short- and long-term, negligible to moderate, adverse impacts and short- and long-term negligible to moderate beneficial impacts on state-listed species. The cumulative impacts would likely be short and long term, minor to moderate adverse, and minor to moderate beneficial. There would be *no impairment* of state-listed species from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Wetlands and Water Quality

Readers are encouraged to refer back to the “Wetlands and Water Quality” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Use of motorized boats on School, Loon, North Bar, and Bass (Leelanau County) lakes and the Crystal and Platte rivers would continue to result in resuspension of sediments and pollution of wetlands and water bodies. The bay-to-bay trail and the M-22/M-109 hike/bike trail could impact wetlands and water quality through erosion, runoff, and pollution during construction, and trampling, erosion, resuspension of sediments, and pollution during use. Assuming use of best management practices during construction, the overall impacts would likely be short and long term, minor to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

New motorized boat use on Shell and Tucker lakes and potential activities in the high-use zone located at the mouth of the Platte River under alternative B could result in impacts on wetlands and water quality due to trampling, resuspension of sediments, erosion, and dust. Assuming practicable levels of NPS monitoring and mitigation, these impacts would likely range from minor to moderate depending on location and activity, and be adverse over both the short and long terms.

Upgrades to a few picnic areas, improvements to access areas on several inland lakes and the Crystal River, and development of a multi-loop trail and small parking area in the Bow Lakes area with potential links to a local school might impact wetlands and water quality. Impacts of these developments would be primarily due to potential erosion during construction, and erosion, dust, and pollution during use. Assuming use of best management practices, adverse short-term impacts would likely be minor to moderate, and adverse long-term impacts would be minor.

Continued NPS acquisition of lands in the Benzie Corridor would help protect wetlands and water quality below this area from impacts associated with private development, resulting in short- and long-term, negligible to minor beneficial impacts. Construction of a road and associated bike trail along the Benzie Corridor would result in short-term negligible adverse impacts on waters and water quality through sedimentation associated with erosion. Long-term effects would include negligible adverse impacts on water resources due to increased stormwater runoff associated with increased impermeable surface area.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on wetlands and water quality include (1) implementation of the “Fire Management Plan”; (2) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (3) restoration approximating the natural topography,

hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; (4) minor improvements to the Dune Climb parking area; and (5) dredging of the Platte River mouth. Although each of these projects would involve short-term adverse impacts (e.g., dredging of the Platte River resulting in short-term suspension of particulates in the water and resulting lower water quality immediately downstream (lakeside) of the dredging), the net result would likely be long-term, minor to moderate beneficial impacts (e.g., dredging the mouth of the Platte River allows boats to pass without continuously hitting the bottom, stirring up material, and reducing water quality).

The impacts of the other actions described above, together with the impacts of alternative B, would result in short- and long-term, negligible to moderate, adverse cumulative impacts, and long-term, negligible to moderate, beneficial cumulative impacts. Alternative B would likely contribute a relatively small component to these cumulative impacts.

Conclusion. Alternative B would have short- and long-term, negligible to moderate, adverse and short- and long-term, negligible to moderate, beneficial impacts on the on wetlands and water quality. There would be short- and long-term negligible to moderate, adverse cumulative impacts, and long-term negligible to moderate beneficial cumulative impacts. There would be *no impairment* of wetlands or water quality from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

VISITOR OPPORTUNITIES AND USE

Visitor Opportunities

Opportunities would be available for visitors to experience the fundamental resources and values of the Lakeshore and to learn about the Lakeshore’s primary interpretive themes (see chapter 1 “Fundamental Resources and Values” and “Primary Interpretive Themes” sections). Visitors would have access to information, interpretation, and educational opportunities at a variety of locations, including the visitor center in Empire, at Glen Haven, and at the visitor contact station on South Manitou Island. Interpretive and educational activities throughout the Lakeshore would be similar to those currently offered. These opportunities would have long-term, moderate beneficial impacts.

Alternative B would provide the greatest level of access to and through the Lakeshore via foot, bicycle, motor vehicle, and ferry. The existing network of state, county, and NPS roads plus a new road with bicycle lane/trail in the Benzie Corridor would provide increased access. Visitors would also have increased Lakeshore access with the addition of the M-22/M-109 hike/bike trail (initiated by others) and the bay-to-bay hiker/paddler trail, and concessioner-operated interpretive tours to near the Giant Cedars area would be considered. Seasonal ferry service would be provided for day and overnight trips to South Manitou Island, overnight trips to North Manitou Island (similar to the no-action alternative), and additional occasional day trips to North Manitou Island would be allowed. The above-noted increases in Lakeshore access would have long-term, moderate beneficial impacts.

The scenic resources of the Lakeshore would be the least natural in character of all the alternatives because of the potential level of recreation-oriented development allowed (this alternative has the most recreation zone of any alternative). However, even with this

increased development (proposed or potential), the overall character of the Lakeshore would remain relatively natural. The development of a road with bicycle lane/trail in the Benzie Corridor could result in views of the ridgeline from below or more distant points within and outside the Lakeshore being slightly less natural in character than the no-action alternative. However, the Benzie Corridor development would be carefully designed and would provide visitors with new access to panoramic views of the Lakeshore and surrounding landscape. As in the no-action alternative, visitors could continue to experience sites that reflect the area's culture and history (e.g., Glen Haven, Port Oneida, and cultural resources on North Manitou and South Manitou islands). Even with some increased development, there would be long-term, moderate, beneficial impacts on opportunities to experience the natural and cultural scenic resources of the Lakeshore.

New recreation-oriented development would include a new road with bicycle lane/trail in the Benzie Corridor, the M-22/M-109 hike/bike trail (initiated by others), the bay-to-bay hiker/paddler trail and associated primitive campgrounds, relocation of the D. H. Day group campground to the main D. H. Day campground, designation of campgrounds on North Manitou Island, picnic area upgrades at some locations, parking improvements at the ends of Peterson Road and Esch Road, facility improvements (i.e., parking, picnicking, comfort stations) at Platte River Point, improved parking areas and ramps/docks at some inland lakes, parking and boat access upgrades to the Crystal River, and a trailhead parking area and a multi-loop trail in the Bow Lakes area. Even with these changes, the scale of recreation-oriented development in the Lakeshore would be modest. This level of development would have long-term, moderate beneficial impacts on visitors.

There would continue to be a wide range of recreational activities in the Lakeshore (similar to the no-action alternative). However in this alternative, opportunities for motorized and nonmotorized recreational activities would be expanded to the greatest degree of any of the alternatives. In addition to the above-mentioned additional recreational activities there would be possible bicycle rentals on South Manitou Island, possible groomed trail skiing, and two additional inland lakes would be accessible to motorized watercraft. User capacity management would improve visitor experiences on the Platte River. All of these actions would have long-term, minor beneficial impacts on visitors. There would be a change from dispersed camping to designated camping on North Manitou Island, which for some visitors would have long-term, minor adverse impacts.

Natural sounds would continue to dominate the Lakeshore except along roadways in developed areas, where motorized boats are allowed (along rivers, at specific inland lakes, and on Lake Michigan), and when aircraft are flying over. Two more inland lakes than in the no-action alternative would allow motorized boats (and accompanying sounds). A road/bicycle trail would be developed in the Benzie Corridor; associated noise impacts (minor) would likely be similar to those of the Pierce Stocking Scenic Drive. Natural sounds would also be temporarily disrupted locally by construction activities. Because of more visitor opportunities and development in this alternative, there would be slightly more disruptions to natural sounds compared to the no-action alternative; with mitigation these impacts would be long-term, minor, and adverse.

The naturally dark night sky would continue to be predominant in the Lakeshore despite vehicular lights along roadways and lighting in developed areas. A road/bicycle trail would be developed in the Benzie Corridor; lighting would be designed to minimize impacts on the

naturally dark night sky. Because of potential increases in development in this alternative, there would be slightly more disruptions to the naturally dark night sky than in the no-action alternative; with mitigation these impacts would be long-term, minor, and adverse for those who value the dark night sky.

Visitor Use

Alternative B reflects a broad emphasis on dispersed recreation across much of the Lakeshore. New facilities are proposed at present and other opportunities for expanded facilities could be evaluated during the life of this plan. Completion the M-22/M-109 hike/bike trail (initiated by others), the bay-to-bay hiker/paddler trail, facility improvements at road ends and inland lakes, opportunities for skiing on groomed trails, and improved access to the Giant Cedars area, the potential for day excursions to North Manitou Island, and the Benzie Corridor road/bicycle lane/trail would provide additional impetus for increased visitor use. Depending on the strategy(ies) chosen, implementation of user capacity management strategies on the Platte River might locally reduce visitor numbers.

The timing of increased visitor use is difficult to predict because it would depend on when projects are funded or carried out. The net effect of alternative B would be a long-term increase of up to 100% above the increase anticipated under the no-action alternative (up to an estimated 84,000 additional annual visits).

Visitors to the Lakeshore from outside the region would likely account for the majority of future visits, though the number of visits by local residents would be expected to account for a larger share of future visitor use than is occurring now. The largest estimated increase in visitor use levels of any alternative would have long-term and minor effects that might be concurrently viewed as beneficial or

adverse, depending on the expectations and preferences of visitors.

Cumulative Impacts

Other past, present, and reasonably foreseeable projects that would affect visitor opportunities and use include: (1) improvements to parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Pierce Stocking Scenic Drive Lake Michigan overlooks 9 and 10; (4) South Manitou Lighthouse Complex exterior restoration and interior rehabilitation; and (5) Dune Climb parking area paving and other minor improvements. These actions would improve visitor opportunities by improving enjoyment, access, and/or range of available opportunities for visitors and would have an overall long-term, minor, beneficial effect on visitor opportunities and use. Developments near the Lakeshore (particularly along the access roads and in/near Glen Arbor and Empire) may continue to occur; these could result in a degradation of natural scenic quality, natural soundscapes, and night sky. These actions would have a long-term, minor, adverse cumulative effect on visitors. Combined with alternative B, these actions would have a long-term, minor, beneficial cumulative effect. Impacts of alternative B would comprise a relatively small portion of the overall cumulative effect.

Conclusion

Increased access and visitor opportunities related to additional recreation-oriented facilities would have a long-term, minor to moderate beneficial impact on visitor opportunities and use. Implementation of user capacity management strategies would have a long-term, minor beneficial impact on visitor experiences but potentially long-term minor adverse effects on visitor use. The removal of dispersed camping on North Manitou Island

would have long-term minor adverse impacts on visitor opportunities and use. The increased visitor opportunities and facilities would have a long-term minor adverse impact on scenic resources, natural sound, and the night sky. Construction activities would have short-term minor adverse impact. The cumulative effects would be long-term, moderate, and beneficial.

WILDERNESS CHARACTER

Natural and Undeveloped

Under alternative B, 14,400 acres on North Manitou Island (20% of the National Lakeshore, the least of any alternative), would be proposed for wilderness designation. This is 16,503 acres (23%) less than in the no-action alternative. Assuming Congress acted to designate this area as wilderness, wilderness values therein would be protected permanently, a long-term minor beneficial impact compared to the no-action alternative. In contrast to the no-action alternative, there would be no wilderness protection on South Manitou Island or on the mainland portion of the Lakeshore, a major, long-term, adverse impact.

The wilderness would be rather small compared to the no-action alternative, but it would be contiguous. In contrast to the no-action alternative, there would be no nonconforming motor vehicle or bicycle use within wilderness. As in the no-action alternative, the presence of historic structures within wilderness would continue to locally diminish the areas' undeveloped primeval character, a localized long-term minor adverse impact.

Opportunities for Solitude

Outstanding opportunities for solitude would be available within wilderness on North Manitou Island. In particular, island areas away from trails and facilities would continue

to offer excellent prospects for privacy and isolation. On days with day ferry trips to North Manitou Island (once or twice per week at most), opportunities for solitude could be reduced within a few hours' walk from the ferry dock, a long-term, minor, adverse impact. In contrast to the no-action alternative, there would be no wilderness protection on the mainland or South Manitou Island; this would reduce prospects for solitude, a long-term, major adverse impact.

Opportunities for Primitive, Unconfined Recreation

Due to the addition of occasional day ferry service to North Manitou Island, opportunities would be available there for day and overnight wilderness experiences, a minor, long-term, beneficial impact. However, opportunities for primitive, unconfined recreation in wilderness would no longer be available on 16,503 acres of South Manitou Island and the mainland. The permit requirement for backcountry camping would continue. In contrast to the no-action alternative, backcountry campers would be required to stay in designated campgrounds not only on the mainland and South Manitou Island, but also on North Manitou Island. Opportunities for primitive unconfined recreation would be substantially reduced overall, a major, long-term, adverse impact.

Cumulative Impacts

Over time, the Lakeshore's ongoing program to restore former nonhistoric sites to more natural conditions has substantially increased the natural, undeveloped character of the Lakeshore. The work includes removing nonnative trees and human enhancements, plus reestablishing more natural contours and native vegetation. Combined with the ongoing restoration program, alternative B would have long-term, moderate, adverse cumulative effects. Impacts of alternative B would

comprise a substantial portion of these overall cumulative effects.

Conclusion

Establishment of 14,400 acres of designated wilderness on North Manitou Island would permanently protect wilderness values therein. However, about 16,503 acres on the mainland and South Manitou Island would no longer have wilderness protection, so naturalness and opportunities for solitude and primitive recreation would be substantially reduced there. Alternative B would have long-term (some permanent), minor beneficial and minor to major adverse impacts on wilderness character. Combined with other actions, alternative B would have long-term, moderate, adverse cumulative effects on wilderness character.

REGIONAL SOCIOECONOMICS

Implementation of alternative B would occur against the same backdrop of economic, demographic, and social conditions described under the no-action alternative. The economic and social effects of alternative B would contribute to those conditions, but would not fundamentally alter the area's economic and demographic outlook.

Visitor-Related Economic Impacts

Alternative B reflects a broad emphasis on dispersed recreation across much of the Lakeshore and an overall reduction in amount of area managed as wilderness. The net effect of alternative B would be a projected long-term increase of up to 100% above the increase anticipated for the no-action alternative (up to an estimated 84,000 additional annual visits).

Retail, lodging, and other tourism-related spending would accompany the increased use

with expenditures projected to reach \$37.4 million per year, \$4.6 million higher than at present and \$2.3 million per year higher than for the no-action alternative. The Lakeshore would collect additional entry fees and revenues from the sales of various passes, and Eastern National would sell more merchandise at the visitor center, with portions of these receipts retained to support recreational, cultural, and educational programs in the Lakeshore.

Economic spin-offs of visitor spending include higher personal income and 30–35 more jobs than under the no-action alternative, most of the latter being seasonal. These visitor-related impacts would be long term but limited in scale relative to current employment and personal income in the two counties. Implementation of alternative B could provide additional concession/commercial service opportunities, for example, in conjunction with recreational opportunities on South Manitou Island, winter use, and the bay-to-bay hiker/paddler trail.

Under alternative B, Lakeshore visitors from within the region would be expected to be a larger share of the incremental use than under the no-action alternative, although the number of visits by nonresidents would also increase.

The state and local governments would collect additional sales tax from the increases in visitor spending.

The visitor-related economic impacts would be beneficial, but negligible in the short term and minor to moderate and beneficial over the long term.

Economic Impacts Related to Implementation and NPS Operations

Alternative B would provide a sustained economic infusion to the region over the life of this plan resulting from ongoing NPS

operating expenditures, and \$42.8 million in identified future project construction needs (\$36.2 million above that for the no-action alternative). The future construction budget includes an allowance of \$26.0 million for eventual construction of the road and accompanying bike lanes/trail in the Benzie Corridor. There are no assurances that such funding would be received. Identified costs for other major projects would be \$700,000 less than for the no-action alternative. Spending to address deferred maintenance would be the same as for the no-action alternative.

As under the no-action alternative, NPS maintenance staff would perform much of the work to address deferred maintenance and preservation, restoration and rehabilitation activities. Future construction spending would be higher than under the no-action alternative, supporting the local construction trades industry and associated vendors and suppliers.

Annual NPS payroll, operating, and maintenance would produce long-term effects on employment, business sales, income and other related measures. Up to 13 additional full-time equivalent employees, could be supported in conjunction with alternative B. Staffing needs would increase over time as the implementation of specific projects, programs, and management included in this alternative proceed.

A need for a modest long-term increase in budgeted funds for NPS operations is identified in conjunction with alternative B (there are no assurances that such increases will occur). Available resources would include about \$4.4 million in base budget appropriations (\$500,000 per year above the no-action alternative), more than \$1.0 million in entry and camping fees, and various nonrecurring funding for supplemental and specific project construction. Retained revenues from entry and camping fees would likely increase with higher visitation.

Supplemental funding would be required for future land acquisition in the Benzie Corridor, the same as under the no-action alternative.

The eventual construction of a scenic road and bike lanes/trail in the Benzie Corridor would produce short-term effects on local employment, business revenues, income, taxes, and other related economic measures. Some local heavy construction firms and related suppliers and vendors would likely garner a portion of the project construction spending. The magnitudes of the effects would be indeterminate, in large part because the length of time required to complete the project — a single or multiple construction seasons — is uncertain. Based on preliminary cost estimates, it is reasonable to anticipate that the effects would be beneficial, short term, and minor to moderate. Completion of the scenic road and accompanying bike lanes/trail would likely encourage new residential development on private lands near the corridor, although topography would act to limit the level of such development.

Activities sponsored by the Lakeshore's partners would provide additional sources of economic stimulus. The timing, magnitude, and indirect economic consequences of those activities are indeterminate.

The economic effects associated with the NPS operations would be beneficial, but negligible to minor in the short term and beneficial and minor over the long term.

Effects on Regional Population

Alternative B would have little direct impact on regional population growth. Increases in construction and long-term jobs and visitor use over the life of the plan would provide a negligible impetus for growth, relative to other factors. The increases would be insufficient to trigger additional job-related migration. Rather, it is more likely that many of the jobs

would be filled by individuals already residing in the area.

Implementation of alternative B could indirectly enhance the region's attractiveness for job-related and retirement migration as a result of enhanced dispersed recreational opportunities on the mainland.

The effects on regional population growth under this alternative would be negligible to minor, both in the short and long terms. Generally, population growth would be viewed as beneficial.

Community Services

Over time, more visitors to the Lakeshore would indirectly result in added demands on community services and facilities across the region. The limited scale, seasonal nature, and spatial dispersion of such demands across the region would be such that facility expansions and additional staffing would not be required.

Effects on community services under this alternative are indeterminate but would likely be negligible to minor over the short and long terms.

Traffic and Emergency Services

Traffic impacts of alternative B would include higher traffic volumes on the highways and roads providing access to the Lakeshore, with minor increases in travel times, wait times at major intersections, and frequency of encountering full parking lots. Even with the increases in traffic, estimated future traffic volumes would remain below design capacity on the major routes and not dramatically increase maintenance requirements. Increases in traffic volumes could accelerate the onset of less than desirable levels of service at the M-22/M-109 intersection in Glen Arbor, possibly triggering intersection improvements (Robert Peccia & Associates. 2001).

The eventual completion of a scenic road with bike lanes/trail in the Benzie Corridor would increase traffic on roadways in the southern portion of the Lakeshore and potentially alter traffic patterns on the public roadways adjacent to the Lakeshore. Traffic, noise, and related factors would become more noticeable to residents and their guests on properties in the vicinity of the corridor.

Impacts on the number of traffic accidents and demands on first responders would be similar to but larger than under the no-action alternative. Demands associated with this alternative would not require additional law enforcement or emergency response staffing, although the increases in the number of "call outs" could burden area first response agencies because they are staffed partially by volunteers. Emergency responders in Benzie County could see larger increases in demand with the completion of the road and bike lanes/trail in the Benzie Corridor.

The effects of implementing alternative B on traffic and emergency services across the region would be adverse but minor over the short and long terms.

Attitudes and Lifestyles

Alternative B establishes future management direction for the Lakeshore that reflects public input and the Lakeshore's purpose, significance, and fundamental resources and values, but with added emphasis on providing recreational opportunities. That emphasis will generally appeal to those valuing interested in developing facility-based recreation or maximizing the economic contributions associated with the Lakeshore. Those valuing solitude, wilderness, and appreciation of the current cultural and recreation opportunities might be less enthusiastic about the management direction set forth in alternative B.

Construction and completion of the Benzie Corridor scenic road and bike lane/trail would affect the lifestyles of residents and their

guests in the general vicinity of the corridor. Short-term effects during construction would include noise, potentially including blasting, heavy truck traffic, and a generally increased presence of other humans in settings that had been more remote and private. The construction-related noise and traffic would diminish over the long term, but general increases in traffic, noise, and increased presence of others would continue. Most of these impacts would be viewed as adverse.

Some property owners, along with members of the broader community would view the opening of a scenic road and bike lane/trail within the Benzie Corridor positively for the visitor opportunities (scenic vistas, recreational driving, and bicycling) it would provide.

The management direction for this alternative would result in the most direct lifestyle consequences because it recasts many of the influences of the Lakeshore — for example, potentially promoting more commercial development and human use adjacent to the Lakeshore on the south, in the Glen Arbor and Empire communities, and in Leland.

Cumulative Impacts

Cumulative social and economic impacts from alternative B would be of the same type, but larger in scale, as those under the no-action alternative. The effects of underlying development trends in the region include long-term, moderate population and economic growth; long-term increases in traffic on local roads; related impacts on public safety; higher spending that bolsters community and recreation-oriented businesses in the region; and additional tax revenues to fund public services and facilities.

The incremental economic and social effects of alternative B, including those associated with increases visitor and park operating expenditures, would be negligible to minor in the short term and minor in the long term, and generally beneficial. Alternative B, combined

with the impacts of other actions described above, would result in minor short- and long-term adverse cumulative effects on traffic and highway safety. Impacts of alternative B would comprise a small portion of these overall cumulative effects.

Conclusion

The economic and social effects of alternative B would include negligible to minor short-term and moderate long-term economic benefits compared to the no-action alternative. Short- and long-term effects on lifestyles and attitudes are indeterminate. Long-term social consequences would include a negligible to minor contribution to long-term population growth and demands on community infrastructure and services. Overall, the cumulative social and economic effects associated with alternative B would be minor, short and long term, and indeterminate as they include effects that might be concurrently viewed as beneficial or adverse.

NPS OPERATIONS

Under alternative B, the Lakeshore's maintenance and operational load would be increased by (1) managing a substantial portion of the Lakeshore as the recreation zone (with more need to monitor for use-related impacts); (2) development of a scenic road and bike lane/trail within the Benzie Corridor (with a new area to patrol and new facilities to maintain); (3) managing the area around the mouth of the Platte River as a more developed beach access area; (4) bicycle use on South Manitou Island (with increased ranger patrol and resource monitoring needs); (5) addition of new trails and backcountry campgrounds; and possible occasional day trips by the ferry to North Manitou Island; (6) possible day use on North Manitou Island (with increased interpretive and ranger patrol needs); (7) possible concession tours to near the Giant Cedars area, and (8) a modest visitation increase over time. Some increased

maintenance would also be incurred with a new M-22/M-109 hike/bike trail. Most other facility-based changes, such as minor picnic area upgrades, improving parking at the end of Esch and Peterson roads, and relocation or upgrading the Crystal River access area would decrease maintenance needs for individual areas or change the nature of maintenance needs without increasing the burden.

Wilderness minimum requirement analysis would be required for 14,400 acres (all on North Manitou Island), a 16,503-acre (23%) decrease compared to the no-action alternative. Impacts of alternative B would be long term, minor beneficial and long term, moderate adverse.

Cumulative Impacts

Ongoing and planned facility upgrades and restoration/rehabilitation projects would have mostly beneficial impacts because these projects would result in reduced resource management and cyclic maintenance needs. Dredging of the Platte River mouth would continue to place demands upon the NPS maintenance staff and budget, a minor adverse effect. Combined with these impacts, alternative B would have long-term minor beneficial and moderate adverse cumulative effects. Impacts of alternative B would comprise a substantial portion of these overall cumulative effects.

Conclusion

Alternative B would have long-term minor beneficial and moderate adverse impacts on NPS operations. This alternative, combined with other actions, would have both long-term minor beneficial and moderate adverse cumulative effects.

UNAVOIDABLE ADVERSE IMPACTS

Some negligible to moderate impacts to soils, vegetation, wildlife, water resources,

wilderness character, scenic resources, natural sounds, and night sky from recreational use and facilities would be essentially unavoidable (e.g., soil compaction, vegetation trampling, wildlife disturbances, decreased opportunities for solitude, and decreased naturalness). Increases in visitor use would have low level adverse impacts on regional socioeconomics (e.g., increased traffic).

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

With the exception of consumption of fuels and raw materials for maintenance or construction activities, no actions in this alternative would result in consumptions of nonrenewable natural resources or use of renewable resources that would preclude other uses for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The National Lakeshore would continue to be used by the public, and most areas would be protected in a natural state. The National Park Service would continue to manage the Lakeshore to maintain ecological processes and native biological communities and to provide appropriate recreational opportunities consistent with preservation of cultural and natural resources. Actions would be taken with care to minimize adverse effects on the long-term productivity of biotic communities. Under alternative B there would be expanded (but still relatively modest) facilities to support recreational use and some localized loss of ecological productivity.

IMPACTS OF ALTERNATIVE C

HISTORIC RESOURCES

The Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) identifies four treatment approaches that apply to a wide variety of resource types, including buildings, sites, structures, objects, districts, and landscape features and patterns. Three of those treatments are included in this plan — preservation, rehabilitation, and restoration. See page 40 for more detailed definitions. The simplest of these treatment approaches is preservation, in which measures are undertaken to stabilize the resource to ensure that it does not deteriorate further from its existing condition and then to maintain and repair historic features and materials. The second option is rehabilitation, in which the resource is made useable for some purpose while preserving those features that convey its historical, cultural, or architectural value. The third is restoration, in which the historic appearance at a particular time is accurately regained. The fourth treatment, reconstruction, is not proposed in this plan.

Although each alternative calls for preserving and protecting all historic properties, each action alternative provides a different management zone configuration based on that alternative's overall vision, and each management zone prescribes which of the three treatments could be used for historic properties. Thus, potential treatments for the National Lakeshore's various historic properties differ among the alternatives. Based on the locations and relative proportions of management zones in alternative C, 79% of historic structures would undergo preservation, rehabilitation, or restoration (experience history zone), 15% of historic structures would undergo preservation or rehabilitation (recreation zone), and 6% of historic structures would undergo preservation

(experience nature zone). This information is summarized in table 3 on page 74.

All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the standards. Any materials removed during rehabilitation or restoration efforts would be evaluated to determine their value to the Lakeshore's museum collections and/or for their comparative use in future preservation work at the sites. Implementation of the actions described above for this alternative, which would bring all historic resources up to a good condition, would result in no adverse effects on historic resources.

At Glen Haven the Glen Haven Historic District and Sleeping Bear Point Life-Saving Station would be preserved, rehabilitated, or restored (same action in all alternatives). Some buildings would be rehabilitated for visitor and/or staff use. The Sleeping Bear Inn and garage would be placed in the NPS historic leasing program to allow rehabilitation for adaptive use. All other structures would be stabilized and maintained in their current condition.

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

On North Manitou Island the historic life-saving station and Cottage Row structures would be preserved, rehabilitated, or restored (same action as in the preferred alternative).

Preservation and/or adaptive use of the rehabilitated historic former Manitou Island Association structures for administrative and operational purposes would continue. Historic structures and landscapes elsewhere on the island would be preserved.

On South Manitou Island (same action as in the preferred alternative) the historic life-saving station, lighthouse complex, village historic structures, the schoolhouse, and farm loop tour historic structures would be preserved, rehabilitated, or restored. Historic structures and landscapes elsewhere on the island would be preserved.

Other mainland historic structures and landscapes would be managed as specified for the management zone in which they lie (see alternative map and zone descriptions).

Actions involving other than historic property treatments, such as relocating the D.H. Day group campground and improving or expanding the main D.H. Day campground, would have no effect on historic properties because they would be designed to avoid possible impacts on properties on or eligible for the national register.

All properties on or determined eligible for inclusion in the National Register of Historic Places would, at a minimum, undergo stabilization (where that action has not already occurred), or maintenance in the current condition (where some preservation treatment has already been implemented).

The actions proposed above are general. The treatments for each resource (preservation [stabilization], rehabilitation with adaptive use, restoration) have not yet been determined so impacts cannot be fully described. However, it is the National Park Service's intent that no action proposed be adverse. All actions affecting these historic structures and landscapes will be undertaken in consultation with the Michigan state historic preservation officer.

Alternative C would not directly or indirectly affect any properties outside the boundary of the National Lakeshore that are listed on or eligible for the National Register of Historic Places, or that are listed by the state.

Cumulative Impacts

Over the years historic resources in the Lakeshore have been adversely impacted by natural processes such as weathering, vegetative encroachment, and the wear and tear associated with visitor use. Actions proposed for the South Manitou Island Lighthouse Complex would result in both the restoration of the exterior of the keeper's quarters and connecting passageways and the rehabilitation of the interior for adaptive reuse. In addition, actions proposed for Glen Haven Village include the stabilization and maintenance of historic structures or their rehabilitation for adaptive reuse. All preservation, rehabilitation, or restoration efforts would be undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (1995), and would result in no adverse effects on historic resources.

As described above, implementation of alternative C would result in no adverse effects on historic resources. The no adverse impacts of this alternative, in combination with both the adverse and no adverse impacts of other past, present, and reasonably foreseeable future actions, would result in a no adverse effect cumulative impact. The no adverse effects of alternative C would be a sizeable contribution to the no adverse effect cumulative impact.

Conclusion

Alternative C would have a determination of no adverse effect under the Advisory Council on Historic Preservation "Regulations for the Protection of Historic and Cultural

Properties” (36 CFR 800). There would be *no impairment* of cultural resources from implementation of alternative C (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

NATURAL RESOURCES

Soils and Geologic Resources

Readers are encouraged to refer back to the “Soils and Geologic Resources” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

The use of motorized boats on School, Loon, North Bar and Bass (Leelanau County) lakes and the Crystal and Platte rivers would continue. Although soil compaction and erosion of the dunes would be reduced in some areas by the use of sand ladders, boardwalks, and sidewalks to protect the substrate, placement and maintenance would be limited to what can be accomplished with current resources. These ongoing activities would continue to have minor to moderate (depending on location and activity), short- and long-term adverse impacts on soils and geologic resources. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Development of the bay-to-bay trail and the M-22/M-109 hike/bike trail could result in soil disturbance and erosion during construction, and subsequent erosion and compaction due to use. Assuming use of best management practices (such as using erosion avoidance and control mechanisms) during construction and later use and NPS monitoring of impacts during use to prevent soil erosion and compaction, the overall

adverse impacts would likely be short-term moderate and long-term minor.

The new farm loop and Giant Cedars area auto tours on South Manitou Island, dispersed camping on North Manitou Island, and a variety of as yet undefined but new opportunities within the high-use zones in the central and southern mainland portions of the Lakeshore would likely contribute to soil compaction and erosion in these areas. Although practicable levels of monitoring and remediation of visitor-related impacts by staff could address these impacts to some extent, the large size of the high-use areas suggests that the sum of these types of activities would likely have short- and long-term, negligible to moderate adverse impacts.

Constructing a short loop trail and small parking area at Bow Lakes; providing additional designated campsites on North Manitou Island; relocating the D. H. Day group campground to the D. H. Day main campground; upgrading or expanding the D. H. Day campground and Glen Lake picnic area and upgrading the Dune Climb facilities; and improving access (parking areas, ramps or docks) at a few inland lakes (locations to be determined), could result in soil disturbance, compaction, and erosion — all of which could be reduced by use of best management practices during location, design, and development. Other development, such as potential improvements to the parking areas and development of picnic areas and comfort stations at the ends of County Road 669 and Esch Road and the mouth of the Platte River, might result in increased visitor use and associated increases in soil erosion and compaction in those areas. The sum of these impacts on soils and geologic resources in the Lakeshore would likely be short and long term, minor to moderate, and adverse.

Continued NPS acquisition of lands on a willing-seller basis in the Benzie Corridor would have short- and long-term moderate beneficial impacts on the soils and geologic

resources in that area by protecting them from impacts associated with private development. Construction of a nonmotorized hike/bike trail along the Benzie Corridor would result in short-term minor adverse impacts on soils through soil erosion and compaction. Long-term effects would include negligible adverse impacts on soil resources due to erosion associated with increased impermeable surface area. Private development would probably continue at its current pace and have minor to moderate adverse impacts on these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on soils and geologic resources include (1) improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; riverbank stabilization on the Platte River at the former Water Wheel and Casey's Corner canoe liveries; (4) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; (5) minor improvements to the Dune Climb parking area; and (6) continued dredging of the mouth of the Platte River. Although activities 1-5 would likely result in short-term adverse impacts during the construction phase, the net result would likely be long-term, minor to moderate beneficial impacts because all projects would contribute to a reduction of the potential for soil compaction and erosion. Dredging the mouth of the Platte River results in continued addition of dredged material to the shoreline. During low-water periods deeper dredging is required and results in dredge materials with high clay content being deposited on the shoreline, resulting in armoring of the beach surface and consequent profile changes. This results in short- and long-term minor to moderate adverse impacts.

The impacts of other actions described above, in combination with the impacts of the alternative C, would result in short-term, negligible to moderate, adverse cumulative impacts, and long-term, minor to moderate beneficial cumulative impacts. Alternative C's contribution to these cumulative impacts would be minimal.

Conclusion. Alternative C would have short- and long-term, negligible to moderate adverse and beneficial impacts on soils and geologic resources. The cumulative impacts would likely be short term, negligible to moderate, and adverse, and long term, minor to moderate, and beneficial. There would be *no impairment* of soils or geologic resources from implementing alternative C (see specific definition of impairment in the "Impairment of National Lakeshore Resources" section).

Vegetation and Wildlife

Readers are encouraged to refer back to the "Vegetation and Wildlife" discussion in the "Methods and Assumptions for Analyzing Impacts" section for additional details on the types of impacts resulting from visitor use and development.

The use of motorized boats on School, Loon, North Bar and Bass (Leelanau County) lakes and the Crystal and Platte rivers would continue to result in trampling of vegetation, habitat alteration, introduction and spread of invasive species, sensory-based disruption of wildlife, and the likelihood of introducing nonnative species. Impacts on vegetation and wildlife from such activities would likely continue to be short and long term, negligible to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

The bay-to-bay trail and the M-22/M-109 hike/bike trail would impact vegetation and wildlife through trampling of vegetation, habitat loss and alteration, and sensory-based disruption of wildlife. Assuming use of best management practices (such as locating trails/paths close to existing disturbances, minimization of the construction footprint, and timing of construction outside the peak breeding/nesting periods) during construction, and careful monitoring of impacts during use, the overall impacts would likely be short and long term, negligible to minor, and adverse.

Under alternative C, 32% (23,200 acres) of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness) a 7,703-acre (11%) decrease from the no-action alternative. Areas on both islands and in the central and southern portions of the mainland would be managed as wilderness. This reduction in the portion of the Lakeshore conveying wilderness protection to vegetation and wildlife, combined with a relatively large portion of the mainland portions of the Lakeshore being zoned high-use, would likely have short- and long-term, minor to moderate, adverse impacts on vegetation and wildlife within the Lakeshore.

The new farm loop and Giant Cedars area auto tours on South Manitou Island, dispersed camping on North Manitou Island, and a variety of as yet undefined but new opportunities within the high-use zones in the central and southern mainland portions of the Lakeshore, would likely result in trampling of vegetation, habitat alteration, introduction and spread of invasive species, and sensory-based disruption of wildlife. Impacts on vegetation and wildlife from such activities under alternative C would likely be short and long term, negligible to moderate, and adverse.

Constructing a short loop trail and small parking area at Bow Lakes; providing

additional designated campsites on North Manitou Island; relocating the D. H. Day group campground to the D. H. Day campground; upgrading or expanding the D. H. Day campground; and improving access (parking areas, ramps or docks) at a few inland lakes (locations to be determined), could result in habitat loss and degradation, both of which could be reduced, to some extent, by strategic location and design. These improvements might result in introduction and spread of invasive species to inland waterways. Other development, such as potential improvements to the parking areas and development of picnic areas and comfort stations at the ends of County Road 669, Esch Road, and at the mouth of the Platte River, might result in increased visitor use and associated increases in vegetation trampling, habitat alteration, and sensory-based disruption of wildlife in those areas. The sum of these impacts on vegetation and wildlife in the Lakeshore would likely be short and long term, minor to moderate, and adverse.

Continued NPS acquisition of lands within the Benzie Corridor would have short- and long-term minor beneficial impacts on the vegetation and wildlife in that area by protecting them from impacts associated with private development. Construction and use of a nonmotorized hike/bike trail along the Benzie Corridor would result in short-term (construction) and long-term (use) negligible adverse impacts on vegetation and wildlife through trampling of vegetation, habitat loss and alteration, and sensory-based disruption of wildlife behaviors. Private development would probably continue at its current pace and have minor to moderate adverse impacts on these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on vegetation and wildlife include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the “Fire Management Plan”; (3) improvements to the Lake Michigan

overlooks accessed from the Pierce Stocking Scenic Drive; (4) riverbank stabilization on the Platte River at the former Water Wheel and Casey's Corner canoe liveries; and (5) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas. These actions could have short- and long-term negligible to minor adverse impacts (due to trampling and sensory-based disturbance during the activity) and long-term minor beneficial impacts (such as habitat protection, restoration and enhancement) on vegetation and wildlife.

The impacts of other actions described above, together with the impacts of alternative C, would result in short and long term, negligible to moderate adverse cumulative impacts, and short- and long-term negligible to moderate beneficial cumulative impacts. Alternative C would likely contribute a relatively small portion of these cumulative impacts.

Conclusion. Alternative C would have short- and long-term negligible to moderate adverse impacts, and short- and long-term, minor to moderate beneficial impacts. The cumulative impacts of alternative C combined with other past, present, and reasonably foreseeable actions would likely be short and long term, negligible to moderate, adverse, and short and long term, negligible to moderate, beneficial. There would be *no impairment* of vegetation or wildlife resources from implementation of alternative C (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Federal Threatened and Endangered Species

Readers are encouraged to refer back to the “Federal Threatened and Endangered Species” discussion in the “Methods and Assumptions for Analyzing Impacts” section

for additional details on the types of impacts resulting from visitor use and development.

The federally listed species considered are the Michigan monkey flower, piping plover (populations and designated critical habitat), and Pitcher's thistle. The piping plover and Pitcher's thistle are found primarily in near-shore dunes; the Michigan monkey flower is restricted to one lakeside location in the Lakeshore interior. Although part of the designated critical habitat within the Lakeshore coincides with actively used recreational beach areas, NPS staff have demonstrated success in minimizing impacts on nesting piping plovers in areas with relatively high human activity (e.g., the mouth of the Platte River) through various actions (see “Mitigative Measures for the Action Alternatives” section in chapter 2). All impact analyses assume continued protection of threatened and endangered species as outlined in the Lakeshore-wide desired condition statements (see chapter 1).

Under alternative C, 32% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 7,703-acre (11%) decrease over existing conditions. This reduction in area managed as wilderness would potentially affect Pitcher's thistle and piping plover. The wilderness status of areas occupied by Michigan monkey flower would not change. Although management of wilderness would cease in some areas occupied by Pitcher's thistle, these areas would be managed as recreation zone or experience nature zone — management strategies that are very similar to existing management under which Pitcher's thistle currently does quite well in the Lakeshore. Given demonstrated persistence of this species under such management, combined with continued protection of threatened and endangered species as outlined in the Lakeshore-wide desired condition statements, this reduction in area managed as wilderness would be expected to have no more than discountable impacts to

this species. The reduction in area managed as wilderness would have insignificant effects on piping plovers and piping plover critical habitat because management of the Lake Michigan shoreline and near-shoreline areas would remain essentially the same despite the change in wilderness status, and because piping plovers successfully nest and fledge under current management.

Continuing dispersed camping on North Manitou Island, and developing the new visitor activities proposed in alternative C, such as use of the new bay-to-bay trail, provision of concession auto tours to near the Giant Cedars area on South Manitou Island, potentially expanded bicycle use, and a variety of as yet undefined but new opportunities in the high-use zones in the central and southern mainland portions of the Lakeshore, could result in trampling of Pitcher's thistle, habitat alteration, and sensory-based disruption of piping plover. These impacts could be reduced by strategic location and design such as careful selection and demarcation of trails outside of sensitive areas (e.g., away from piping plover critical habitat) and use of boardwalks.

Developing the bay-to-bay trail, providing designated campsites on North Manitou Island, relocating the D. H. Day group campground to the D. H. Day main campground and upgrading or expanding the D. H. Day campground could result in trampling and habitat alteration and degradation, all of which could be reduced, to some extent, by strategic location and design. Other development, such as potential improvements to the parking areas and development of picnic areas and comfort stations at the ends of County Road 669, Esch Road, and the mouth of the Platte River, might result in increased visitor use and associated increases in trampling and habitat alteration for both Pitcher's thistle and piping plover, and sensory-based disruption of piping plover in those areas.

Under this alternative, the National Park Service would continue to acquire lands within the Benzie Corridor, and would construct a hike/bike trail during the life of this plan. Private development within the corridor would probably continue at its current pace. These conditions and activities are not anticipated to affect listed species because neither they nor their habitats occur within the corridor.

For projects proposed in alternative C, the National Park Service would implement measures that would ensure that adverse effects on listed species do not occur. These avoidance measures might include, but are not limited to, the following:

- Safeguarding the known locations of listed species.
- Restricting human activity in piping plover breeding areas by use of a specialized fence system.
- Increasing the number of NPS/volunteer piping plover nest monitors, should conditions warrant.
- Restricting human activity in piping plover breeding areas.
- Restricting dogs from piping plover breeding areas during the breeding season.
- Flagging or fencing plants prior to any work in or adjacent to Pitcher's thistle habitat. Every effort would be made to avoid any impacts to these plants.
- Providing education about the listed species and their habitats.
- Designating alternate access points away from areas occupied by listed species.

The National Park Service staff anticipates that adverse effects could be avoided in all projects proposed under alternative C. The National Park Service cannot foresee at this time any project for which adverse effects could not be avoided. In the rare event that adverse effects could not be avoided, the project would either be discontinued or NPS staff would request formal consultation with

the U.S. Fish and Wildlife Service. As such, any impacts from implementation of alternative C would likely have only beneficial, insignificant, or discountable effects on piping plover and piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle.

At the landscape level, alternative C is not likely to adversely affect listed species because the proposed management direction under this alternative would result in conditions that are beneficial to preserving habitat and would minimize adverse impacts on listed species to insignificant or discountable. As such, implementation of alternative C may affect but would not be likely to adversely affect piping plover and piping plover critical habitat, Michigan monkey flower, and Pitcher's thistle.

Conservation Measures. Conservation measures are activities above and beyond avoidance measures and are undertaken to reduce potential impacts on federally listed species or candidate species. Initiation of conservation measures would occur in consultation with the U. S. Fish and Wildlife Service and would be required if any of the following occurred:

- initiation of activities anticipated to have impacts to piping plovers or their designated critical habitat beyond those addressed in this document
- additional Michigan monkey flower occurrences within the Lakeshore were identified in areas where they might potentially be impacted
- initiation of activities anticipated to have impacts on Michigan monkey flower populations
- initiation of activities anticipated to have impacts on Pitcher's thistle populations beyond those addressed in this document

Renewed discussion and consultation with the U. S. Fish and Wildlife Service, should any of the above events occur, would focus on

development of specific conservation measures to reduce potential impacts on these species and/or designated critical habitat. Such conservation measures would be based on the recommendations provided by the U.S. Fish and Wildlife Service.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on federally listed species and designated critical habitat include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) implementation of the "Fire Management Plan"; (3) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; and (4) activities presented in table 21. These actions would benefit natural resources including federally listed species. During implementation, actions would be taken to avoid or minimize potential adverse impacts on such species. Any adverse impacts, such as trampling and sensory-based disruption, would be insignificant or discountable. The impacts of the actions described above, together with the impacts of alternative C, may affect but would not be likely to adversely affect piping plover, piping plover critical habitat, Pitcher's thistle, and Michigan monkey flower. Alternative C would likely contribute a relatively small component to these cumulative impacts.

Conclusion. Any adverse impacts of alternative C on the addressed federally listed species and designated critical habitat within the Lakeshore would be no more than insignificant or discountable over both the short and long terms. Implementation of alternative C may affect but would not likely adversely affect the addressed listed species and critical habitat. Other projects, combined with the impacts of alternative C, on federally listed species and designated critical habitat may affect but would not likely adversely affect piping plover, piping plover critical habitat, Pitcher's thistle, and Michigan monkey flower. There would be *no impairment* of federal threatened and endangered

species from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Michigan State-Listed Species

Readers are encouraged to refer back to the “Michigan State-Listed Species” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Under alternative C, 32% of the National Lakeshore would be managed as wilderness (assuming that Congress acts to designate wilderness), a 7,703-acre (11%) decrease over the no-action alternative. Areas on both islands and in the central and southern portions of the mainland would be managed as wilderness. This reduction in the portion of the Lakeshore conveying wilderness protection to vegetation and wildlife, combined with a relatively large portion of the mainland portions of the Lakeshore being zoned high use, would likely have short- and long-term, minor to moderate, adverse impacts on Michigan state-listed species within the Lakeshore.

Use of the new bay-to-bay trail, concession tours to near the Giant Cedars area on South Manitou Island; and potential activities at the end of Esch Road, in the area stretching from the Pierce Stocking Scenic Drive to Sleeping Bear Bay, and at the end of County Road 669 could impact Michigan state-listed species associated with the shoreline/dunes/near-shore habitat complex. The concession tours to near the Giant Cedars area could also impact the state-listed species associated with that sensitive area. Although short-term impacts due to trampling, habitat alteration, and sensory-based disturbance, which would likely be moderately adverse, could be somewhat reduced by continued NPS vigilance in monitoring and actively managing such impacts, the extensive nature of the proposed

high-use zones and their proximity to sensitive resources suggests that long-term adverse impacts would also range from minor to moderate.

Continued use of motorized boats on School, Bass (Leelanau County), North Bar, and Loon lakes and on the Crystal and Platte rivers would continue to have short- and long-term minor adverse effects on their associated state-listed species due to shoreline erosion, resuspension of sediments, pollution, and sensory-based disruption, and on mature forest species in areas close to these lakes. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

Developing the bay-to-bay trail; providing designated campsites on North Manitou Island; relocating the D. H. Day group campground to the D. H. Day campground; upgrading or expanding the D. H. Day campground; and development within the high-use zones at the ends of County Road 669, Esch Road, and at the mouth of the Platte River could all negatively impact state-listed species associated with shoreline/dunes/near-shore habitat due to trampling, habitat alteration, and sensory-based disruption. Developments such as the M-22/M-109 hike/bike trail, a short loop trail and small parking area at Bow Lakes, and improved access (parking areas, ramps or docks) at a few inland lakes (locations to be determined) could result in habitat loss and degradation for species associated with lake/wetland/riparian habitat, which could be reduced, to some extent, by strategic location and design. Increased visitor use and associated increases in trampling, habitat alteration, and sensory-based disruption of species in these areas could also be expected. The sum of these impacts on Michigan state-listed species in the Lakeshore would likely be short and long term, minor to moderate, and adverse.

Continued NPS acquisition of lands in the Benzie Corridor would have short- and long-term minor beneficial impacts on state-listed species near that area by protecting them from impacts associated with private development. Construction and use of a nonmotorized hike/bike trail along the Benzie Corridor could result in short-term (construction) and long-term (use) negligible adverse impacts on state-listed species occurring near the corridor through habitat loss and alteration and sensory-based disruption of wildlife behaviors. Private development would probably continue at its current pace and have negligible to minor adverse impacts on these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on Michigan state-listed plant and animal species include (1) the improvements to the parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) implementation of the “Fire Management Plan”; (4) improvements to the Lake Michigan overlooks accessed from the Pierce Stocking Scenic Drive; (5) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (6) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; and (7) minor improvements to the Dune Climb parking area. Each of these projects would involve short-term adverse impacts during construction. The long-term impacts would likely be minor to moderate beneficial, such as habitat enhancement.

The impacts of the other actions described above, together with the impacts of alternative B, would result in short- and long-term, negligible to moderate adverse cumulative impacts, and minor to moderate beneficial cumulative impacts. Alternative C would likely contribute a relatively small component to these cumulative impacts.

Conclusion. Alternative C would have short- and long-term, minor to moderate, adverse impacts, and short- and long-term minor to moderate beneficial impacts on state-listed species. The cumulative impacts would likely be short and long term, negligible to moderate adverse, and minor to moderate beneficial. There would be *no impairment* of state-listed species from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

Wetlands and Water Quality

Readers are encouraged to refer back to the “Wetlands and Water Quality” discussion in the “Methods and Assumptions for Analyzing Impacts” section for additional details on the types of impacts resulting from visitor use and development.

Current visitor activities that would continue and might impact wetlands and water quality include continued use of motorized boats on School, Loon, North Bar and Bass (Leelanau County) lakes and the Crystal and Platte rivers. Motorboat use would continue to result in resuspension of sediments and pollution of wetlands and water bodies. Impacts on wetlands and water quality from such activities would likely continue to be short and long term, minor to moderate, and adverse. Implementation of user capacity management (see discussion in chapter 2) to reduce impacts of visitor use in sensitive and yet popular areas such as the Platte River corridor, would have short- and long-term, minor to moderate beneficial impacts.

The bay-to-bay trail and the M-22/M-109 hike/bike trail could impact wetlands and water quality through erosion, runoff, and pollution during construction, and trampling, erosion, resuspension of sediments, and pollution during use. Assuming use of best management practices during construction, and careful monitoring of impacts during use,

the overall impacts would likely be short and long term, minor to moderate, and adverse.

Potential improvements at the end of Esch Road, County Road 669, and at the mouth of the Platte River could result in impacts from trampling, resuspension of sediments, erosion, and dust. Given the extensive area zoned as high use under this alternative, and assuming practicable levels of NPS monitoring and management, the sum of these impacts would likely be moderately adverse over both the short and long terms.

Upgrades to boat access at some inland lakes, upgrade of the Glen Lake picnic area and Dune Climb facilities, additional trails in the Glen Lake high-use zone, upgrades or expansion of the D. H. Day campground, and a short loop trail and small parking area in the Bow Lakes area might impact wetlands and water quality. Assuming use of best management practices during construction, impacts due to the Bow Lakes trail and parking area would likely be short term, minor to moderate, and adverse during construction, and long term, minor to moderate, and beneficial after construction. These actions would focus visitor use on less sensitive areas (e.g., designated trails). Impacts of the remaining developments would be primarily due to potential erosion during construction, and erosion, dust, and pollution during use. Assuming use of best management practices, impacts would likely be short and long term, moderate, and adverse.

Continued NPS acquisition of lands within the Benzie Corridor would help protect wetlands and water quality below this area from the impacts of private development, resulting in short- and long-term, negligible to minor beneficial impacts. Construction and use of a non-motorized hike/bike trail along the Benzie Corridor would result in short-term (construction) and long-term (use) negligible adverse impacts on water resources through increased stormwater runoff associated with construction activities and

subsequent increased impermeable surface area. Private development would probably continue at its current pace and have negligible to minor adverse impacts on these resources.

Cumulative Impacts. Past, present, and anticipated projects that would contribute to impacts on wetlands and water quality include (1) implementation of the “Fire Management Plan”; (2) riverbank stabilization on the Platte River at the former Water Wheel and Casey’s Corner canoe liveries; (3) restoration approximating the natural topography, hydrology, and native vegetative cover of nonhistoric areas disturbed by past land uses — particularly those in critical dunes areas; (4) minor improvements to the Dune Climb parking area; and (5) dredging of the Platte River mouth. Although each of these projects would involve short-term adverse impacts (e.g. dredging of the Platte River resulting in short-term suspension of particulates in the water and resulting lower water quality immediately downstream (lakeside) of the dredging), the net result would likely be long-term, minor to moderate beneficial impacts (e.g. dredging the mouth of the Platte River allows boats to pass without continuously hitting the bottom, stirring up material, and reducing water quality).

The impacts of the other actions described above, together with the impacts of alternative C, would result in short- and long-term, negligible to moderate adverse cumulative impacts, and short- and long-term, negligible to moderate beneficial cumulative effects. Alternative C would likely contribute a relatively small component to these cumulative impacts.

Conclusion. Alternative C would have short-term, negligible to moderate, adverse; short- and long-term, moderate, adverse; short-term, negligible to minor, beneficial; and long-term negligible to moderate beneficial impacts on wetlands and water quality. The cumulative impacts would be short and long term,

negligible to moderate adverse, and short and long term, negligible to moderate beneficial. There would be *no impairment* of wetlands or water quality from this alternative (see specific definition of impairment in the “Impairment of National Lakeshore Resources” section).

VISITOR OPPORTUNITIES AND USE

Visitor Opportunities

Opportunities would be available for visitors to experience the fundamental resources and values of the Lakeshore and to learn about the Lakeshore’s primary interpretive themes (see chapter 1 “Fundamental Resources and Values” and “Primary Interpretive Themes” sections). Visitors would have access to information, interpretation, and educational opportunities at a variety of locations, including the visitor center in Empire, at Glen Haven, and at the visitor contact station on South Manitou Island. Interpretive and educational activities would be more structured (e.g., more guided programs) in the concentrated use areas, and self-guided elsewhere, providing options at both ends of the spectrum. These opportunities would have long-term, moderate beneficial impacts.

Access to and through the Lakeshore would be on the existing network of state, county, and NPS roads. Visitors would have increased Lakeshore access with the addition of a hike/bike trail in the Benzie Corridor, the M-22/M-109 hike/bike trail (initiated by others), and the bay-to-bay hiker/paddler trail, and concessioner-operated interpretive tours to near the Giant Cedars area would be considered. Seasonal ferry service would be provided for overnight trips to North Manitou Island and day and overnight trips to South Manitou Island (similar to the no-action alternative). The above-noted increases in Lakeshore access would have long-term, moderate beneficial impacts.

The scenic resources of the Lakeshore would reflect relatively large areas that are natural in character (this alternative has the second greatest amount of experience nature zone) and other areas with concentrated recreation-oriented development (this alternative has the greatest amount of the high-use zone). The development of a hike/bike trail in the Benzie Corridor could result in views of the Crystal Ridge being slightly less natural in character than the no-action alternative. However, the Benzie Corridor trail would provide visitors with new access to panoramic views of the Lakeshore and surrounding landscape. As in the no-action alternative, visitors could continue to experience Lakeshore sites that reflect the area’s culture and history (e.g., Glen Haven, Port Oneida, and cultural resources on North Manitou and South Manitou islands). Even with some increased development, there would be long-term, moderate, beneficial impacts on opportunities to experience the natural and cultural scenic resources of the Lakeshore.

Much of the additional recreation-oriented development would be concentrated in select areas resulting in a modest level of development, while fewer and more primitive facilities would be provided elsewhere. Additional facilities include a hike/bike trail in the Benzie Corridor; the M-22/M-109 hike/bike trail (initiated by others); the bay-to-bay hiker/paddler trail; additional trails south of Glen Haven and to Shauger Hill; the relocation of the D. H. Day group campground to the main D. H. Day campground; the addition of amenities and/or capacity at the D. H. Day campground; the addition of designated campgrounds on North Manitou Island; upgraded/expanded facilities at Little Glen Lake picnic/beach area; upgraded facilities at the Dune Climb to support continued heavy visitor use; improved parking areas and ramps/docks at a few inland lakes; expanded facilities at the ends of County Road 669, Esch Road, and Platte River Point; and a trailhead parking area and short loop trail in the Bow Lakes area. Even with these changes, the scale

of recreation-oriented development in the Lakeshore would be modest. This level of development would have long-term, moderate beneficial impacts for visitors.

There would continue to be a wide range of recreational activities in the Lakeshore (similar to the no-action alternative) however, opportunities for nonmotorized recreational activities such as hiking, biking, backpacking, paddling, cross-country skiing, and backcountry camping would be facilitated and expanded. Opportunities for facility-based recreational activities would primarily be increased in the high-use zones (e.g., 669/Good Harbor Bay, south of Glen Haven to Shauger Hill, Esch Beach, and Platte River Point). User capacity management would improve visitor experiences on the Platte River. These changes to the range of recreational activities in the Lakeshore would have long-term, minor beneficial impacts.

Natural sounds would continue to dominate the Lakeshore except along roadways, in developed areas, where motorized boats are allowed (along rivers, at specific inland lakes, and on Lake Michigan), and when aircraft are flying over. There is the potential for increased visitor opportunities and facilities in the 669/Good Harbor Bay, south of Glen Haven to Shauger Hill, Esch Beach, and Platte River Point areas. A hike/bike trail would be developed in the Benzie Corridor; associated noise (minor) would likely be comparable to similar Lakeshore facilities. Natural sounds would also be temporarily disrupted locally by construction activities. Because of more visitor opportunities and development in this alternative, there would be slightly more disruptions to natural sounds compared to the no-action alternative; with mitigation these impacts would be long term, minor, and adverse.

The naturally dark night sky would continue to be predominant in the Lakeshore despite vehicular lights along roadways and lighting in developed areas. There is the potential for increased development in the 669/Good

Harbor Bay, south of Glen Haven to Shauger Hill, Esch Beach, and Platte River Point areas. A hike/bike trail would be developed in the Benzie Corridor. Associated disruptions to the naturally dark night sky would likely be similar to other Lakeshore developed areas. Because of this localized increased development, compared to the no-action alternative there would be slightly more disruptions to the naturally dark night skies; with mitigation these impacts would be long term, minor, and adverse for those who value the dark night sky.

Visitor Use

Among the alternatives in this plan, alternative C would be expected to result in the largest increase in annual recreation use of any alternative. Alternative C reflects an emphasis on concentrated use in several high use zones, several of which would be near Lake Michigan. Expansion/improvements of the D. H. Day Campground, the M-22/M-109 hike/bike trail (initiated by others), the bay-to-bay hiker/paddler trail, more guided interpretive programs, improved access to near the Giant Cedars area, the Benzie Corridor hike/bike trail, facility improvements at road ends and inland lakes, and increased interpretive opportunities on the South Manitou Island farm loop tours would provide additional impetus for increased visitor use. Depending on the strategy(ies) chosen, implementation of user capacity management strategies on the Platte River might locally reduce visitor numbers. The net effect of the management direction established under alternative C would be a long-term increase of up to 125% above the increase anticipated under the no-action alternative (up to an estimated 105,000 additional annual visits). The timing and magnitude of increased visitor use is difficult to predict because it would depend on when projects are funded or carried out.

Visitors to the Lakeshore from outside the region would likely account for the majority of future visits, though the number of visits by local and seasonal residents would be expected to account for a large share of future visitor use. The largest increase in visitor use levels of all of the alternatives would have long-term and minor effects that might be concurrently viewed as beneficial or adverse, depending on the expectations and preferences of visitors.

Cumulative Impacts

Other past, present, and reasonably foreseeable projects that would affect visitor opportunities and use include: (1) improvements to parking areas at the ends of Leelanau County Roads 651 and 669; (2) Glen Haven Village improvements; (3) improvements to the Pierce Stocking Scenic Drive Lake Michigan overlooks 9 and 10; (4) South Manitou Lighthouse Complex exterior restoration and interior rehabilitation; and (5) Dune Climb parking area paving and other minor improvements. These actions would improve visitor opportunities by improving enjoyment, access, and/or range of available opportunities for visitors and would have an overall long-term, minor, beneficial effect on visitor opportunities and use. Developments near the Lakeshore (particularly along the access roads and in/near Glen Arbor and Empire) might continue to occur; these could result in a degradation of natural scenic quality, natural soundscapes, and night sky. These actions would have a long-term, minor, adverse effect on visitors. Combined with alternative C, these actions would have a long-term, minor, beneficial cumulative effect. Impacts of alternative C would comprise a relatively small portion of the overall cumulative effect.

Conclusion

Increased access and visitor opportunities related to additional recreation-oriented

facilities would have a long-term, minor to moderate beneficial impact on visitor opportunities and use. Implementation of user capacity management strategies would have a long-term, minor, beneficial impact on visitor opportunities, but potentially long-term minor, adverse effects on visitor use. The increased visitor opportunities and facilities in the high-use zones would have a long-term, minor, adverse impact on scenic resources, natural sounds, and the night sky. Construction activities would have short-term, minor, adverse impacts. The cumulative effects would be long-term, moderate, and beneficial.

WILDERNESS CHARACTER

Natural and Undeveloped

Under alternative C, about 23,200 acres (32 % of the National Lakeshore) would be proposed for wilderness designation, a 7,703-acre (11%) decrease from the no-action alternative. Assuming Congress acted to designate the proposed areas as wilderness, wilderness values would be protected forever in designated areas within the central and south mainland portions of the Lakeshore and each island. In contrast to the no-action alternative, there would be no wilderness protection for the north portion of the mainland, the Otter Creek area, or the southeastern portion of South Manitou Island. Naturalness and opportunities for solitude and primitive recreation would be reduced in these areas, but this effect would be tempered by management as the experience nature zone. A new area of designated wilderness and associated experiences would be available on the Sleeping Bear plateau. Impacts would be long term, minor, beneficial, and adverse.

In contrast to the no-action alternative, there would be no nonconforming motor vehicle or bicycle use *within* wilderness because county road rights-of-way would be excluded from wilderness. However, the presence of historic structures within wilderness would continue

to locally diminish the areas' undeveloped primeval character (same as the no-action alternative). Impacts would be localized, long term, minor, and beneficial and adverse.

Opportunities for Solitude

Outstanding opportunities for solitude would be available due to designated wilderness in two of three portions of the mainland and on the Manitou Islands. In particular, areas away from trails and facilities would continue to offer excellent prospects for privacy and isolation. Solitude would continue to be more easily found on North Manitou Island than on South Manitou Island because the former is larger, has fewer visitors (most of whom are seeking wilderness experiences), and would continue to lack day use. Also, in contrast to the no-action alternative, about one-third of South Manitou would not be managed as wilderness. Impacts on opportunities for solitude would be long term, minor, and beneficial and adverse.

Opportunities for Primitive, Unconfined Recreation

Compared to the no-action alternative, there would be reduced opportunities for day and overnight wilderness experiences on South Manitou Island. Due to the lack of day ferry service to North Manitou Island there would continue to be only overnight wilderness experience opportunities there. The back-country camping permit requirement would remain in place, as would the requirement for campers to stay in designated campgrounds (except on North Manitou Island where camping would continue to be dispersed). Permit and camping requirements would continue to diminish opportunities for primitive, unconfined recreation to some degree. Alternative C's impact on opportunities for primitive, unconfined recreation would be long term, minor, and beneficial and adverse.

Cumulative Impacts

Over time, the Lakeshore's ongoing program to restore former nonhistoric sites to more natural conditions has substantially increased the natural, undeveloped character of the Lakeshore. The work includes removing nonnative trees and human enhancements, plus reestablishing more natural contours and native vegetation. Combined with this ongoing restoration program, alternative C would have long term, minor, beneficial and adverse cumulative effects. Impacts of alternative C would comprise a substantial portion of these overall cumulative effects.

Conclusion

Establishment of 23,200 acres of designated wilderness in the central and south portions of the mainland and on both islands would permanently protect wilderness values (naturalness and opportunities for solitude or primitive unconfined recreation). However, wilderness values in several areas (north portion of the mainland, Otter Creek area, and southeast portion of South Manitou Island) would no longer have wilderness protection. Impacts of alternative C on wilderness character would be long term (some permanent), minor, and adverse and beneficial. Combined with other actions, alternative C would have long-term minor, beneficial and adverse cumulative effects on wilderness character.

REGIONAL SOCIOECONOMICS

Implementing alternative C would occur against the same backdrop of economic, demographic, and social conditions described under the no-action alternative. The economic and social effects of alternative C would contribute to those conditions, but would not fundamentally alter the area's economic and demographic outlook.

Visitor-Related Economic Impacts

Among the alternatives in this plan, alternative C would be expected to result in the largest increase in annual recreational use.

Alternative C reflects an emphasis on concentrating use in several high-use areas in the Lakeshore. Several of these areas would be near the Lake Michigan lakeshore. The net effect of alternative C would be a long-term increase of up to 125% above the increase anticipated under the no-action alternative — up to an estimated 105,000 additional annual visits (see the “Impacts to the Alternative C — Visitor Use” section in this chapter).

Retail, lodging, and other tourism-type spending would accompany the increased use with expenditures projected to reach \$38.0 million per year, \$5.2 million higher than at present, and \$2.9 million per year higher than for the no-action alternative. The National Lakeshore would collect more in entry fees and revenues from the sales of various passes, and Eastern National would sell more merchandise at the visitor center, with portions of these receipts retained to support recreational, cultural, and educational programs in the Lakeshore.

Economic spin-offs of the visitor spending include higher personal income and 35 to 45 more jobs than under the no-action alternative. Most of these added jobs would be seasonal. The visitor-related impacts would be long term but limited in scale relative to current employment and personal income in the two counties.

The state and local governments would collect additional sales tax from the increases in visitor spending.

The above visitor-related economic impacts would be beneficial, but negligible in the short term and minor and beneficial over the long term.

Economic Impacts Related to Implementation and NPS Operations

Alternative C would provide a sustained economic infusion to the region over the life of this plan resulting from ongoing NPS operating expenditures and \$30.5 million in future construction spending (\$23.9 million above that for the no-action alternative). The future construction budget includes \$7.3 million for the eventual construction of the Benzie hike/bike trail. However, there would be no assurances that the construction funds for the hike/bike trail would be forthcoming. Budgeted needs to address deferred maintenance would be the same as for the no-action alternative.

As under the no-action alternative, maintenance staff would perform much of the work to address deferred maintenance and preservation, restoration and rehabilitation activities. Future construction needs would be higher than under the no-action alternative, supporting the local construction trades industry and associated vendors and suppliers.

Annual NPS payroll, operating, and maintenance would produce long-term effects on employment, business sales, income and other related measures. A long-term increase of up to 19 full-time-equivalent employees could be supported by the management and actions included in alternative C. Staff would be added over time as specific projects, programs, and management included in this alternative were implemented.

A need for a long-term increase in budgeted funds for NPS operations is identified in conjunction with alternative C (there are no assurances that such increases will occur). Available resources would include about \$4.5 million base budget appropriations (\$600,000 per year above the no-action alternative), more than \$1.0 million in retained entry and camping fees, and various nonrecurring funding for supplemental and specific project construction. Total retained fees would be

higher under alternative C than for the no-action alternative.

As with the no-action alternative, supplemental funding would be required for future land acquisition in the Benzie Corridor.

The eventual construction of a hike/bike trail in the Benzie Corridor would produce short-term effects on local employment, business revenues, income, taxes, and other related economic measures. Some local heavy construction firms and related suppliers and vendors would likely garner a portion of the project construction spending. The magnitudes of the effects are indeterminate, in large part because the length of time required to complete the project is uncertain. Based on preliminary cost estimates, it is reasonable to anticipate that the effects would be beneficial, short term, and minor.

Activities sponsored by the Lakeshore's partners would provide additional sources of economic stimulus. The timing, magnitude, and indirect economic consequences of those activities are indeterminate.

The economic effects associated with NPS operations would be beneficial, but negligible to minor in the short term and beneficial and minor over the long term.

Effects on Regional Population

Alternative C would have little direct impact on regional population growth. The increases in construction and long-term jobs and visitor use over the life of this plan would provide a minor impetus for growth, relative to other factors.

Implementation of alternative C could indirectly enhance the region's attractiveness for both job-related and retirement migration to the region as a result of enhanced developed recreational opportunities and establishment of wilderness on the mainland.

The effects of implementing alternative C on regional population growth under this alternative would be negligible to minor, both in the short term and the long term. Generally, population growth would be viewed as beneficial.

Community Services

Over time, increasing visitor use at the Lakeshore under alternative C would indirectly result in added demands on community services and facilities across the region. The limited scale, seasonal nature, and spatial dispersion of such demands across the region would be such that facility expansions and additional staffing would not be required.

Effects on community services under alternative C would be indeterminate and negligible over the short and long terms.

Traffic and Emergency Services

Traffic impacts of alternative C would be similar to, but greater than those under the no-action alternative. With the concentration of high-use zoning in the vicinity of the Dunes Climb / Glen Haven / Glen lakes areas, traffic increases would be more heavily concentrated on M-22, M-109, and surrounding local roads. Even with the increases, future traffic volumes would remain substantially below design capacity and not dramatically increase maintenance requirements. Increases in traffic volumes could accelerate the onset of less than desirable levels of service at the M-22/M-109 intersection in Glen Arbor, possibly triggering intersection improvements (Robert Peccia & Associates. 2001).

The eventual completion of a hike/bike trail in the Benzie Corridor would increase traffic on public roadways in the southern portion of the Lakeshore — both vehicular and bicycle. The increases could be accompanied by limited increases in noise and related factors.

Motorized vehicular traffic would not be allowed on the hike/bike trail.

Implementation of alternative C would result in greater increases in demand on law enforcement and first responders in Leelanau County as compared to the no-action alternative. Demands associated with this alternative would not require additional law enforcement or emergency response staffing, although the increases in the number of “call outs” could burden area first response agencies because they are partially staffed by volunteers.

The effects of implementing alternative C on traffic and emergency services across most of the region would be adverse, but minor over the short and long terms.

Attitudes and Lifestyles

Alternative C establishes future management direction for the Lakeshore that reflects public input and the Lakeshore’s purpose, significance, and fundamental resources and values. In terms of attitudes, some individuals might be dismayed because they might feel that the management zones and wilderness proposals do not go far enough to achieve their particular preferences. For example, the reconfiguration of wilderness to exclude county roads and sizable sections of the mainland but continue management of a substantial area as wilderness might not satisfy those who favor a maximum wilderness proposal.

The recreation, conservation, and resource management opportunities associated with alternative C would have both direct and indirect lifestyle consequences, with the direct consequences most apparent to neighbors and visitors to the Lakeshore. For example, future visitors would have access to a broader range of experiences and options, including wilderness on the mainland and enhanced access to backcountry use along the shoreline.

Individuals promoting improved boating access to the Lake Michigan would be encouraged by the long-term potential to study the feasibility of providing such access. Many residents and local government officials would approve of the explicit statements and policies regarding state and county roads and other valid existing rights reflected in this plan.

Construction and completion of the Benzie hike/bike trail would affect the lifestyles of residents and their guests in the vicinity of the corridor. Short-term effects during construction would include noise, potentially blasting, truck traffic, and an increased presence of humans into settings that had been more remote and private. The construction-related noise and traffic would diminish over the long term, but some limited increase in noise and awareness of the presence of others would continue. Most of these impacts would be viewed as adverse.

Some property owners, along with members of the broader community, would view the opening of the Benzie hike/bike trail positively for the visitor opportunities (hiking, enjoying the scenic vistas, picnicking, and bicycling) it would provide.

The management and access policies established under alternative C might have indirect consequences on attitudes and lifestyles. Such consequences could arise primarily in terms of the extent to which alternative C influences or changes recreation and resource conditions at a broader level over the long term. For example, changes in shoreline access might contribute to higher population growth in the region and attract more use at the Lakeshore and conflicts with the preferences and desires of others to discourage more use. Given the relatively small size of the community, such conflicts can become sources of long-term division or strength.

Cumulative Impacts

Cumulative social and economic impacts from alternative C would be of the same type, but larger in scale, as those under the no-action alternative. The effects of underlying development trends in the region include long-term, moderate population and economic growth, long-term increases in traffic on local roads, related impacts on public safety, higher spending that bolsters community- and recreation-oriented businesses in the region, and additional tax revenues to fund public services and facilities. The other cumulative actions could result in some long-term negligible economic effects on visitor-related businesses, and on local traffic and safety, due to changes in visitor use levels and distribution.

The incremental economic and social effects of alternative, C including those associated with increased visitor and NPS operating expenditures, would be negligible to minor in the short term and minor in the long term, and generally beneficial. Alternative C, combined with the impacts of other actions described above, would result in minor short- and long-term adverse cumulative effects on traffic and highway safety. Impacts of alternative B would comprise a small portion of these overall cumulative effects.

Conclusion

The economic effects of alternative C would include negligible to minor short-term and minor to moderate long-term economic benefits, the latter due to increased visitation. Among the alternatives, alternative C offers the largest economic benefits for the region. Short- and long-term effects on lifestyles and attitudes are indeterminate; many interested parties would support this alternative, but some would be disappointed in one or more of its aspects. Long-term social consequences include a negligible to minor contribution to long-term population growth and demands on

community infrastructure and services.

Overall, the cumulative social and economic effects associated with alternative C would be minor, short and long term, and indeterminate as they include effects that might be concurrently viewed as beneficial or adverse.

NPS OPERATIONS

Under alternative C, the Lakeshore's maintenance and operational load would be increased by (1) managing the busy high use zone west of Little Glen Lake (with more need for patrols and monitoring for use-related impacts); (2) developing a hike/bike trail within the Benzie Corridor (a new area to patrol and new facilities to maintain); (3) adding other new trails and backcountry campgrounds; improving and/or expanding the D. H. Day Campground; (4) managing the ends of County Road 669, Esch Road, and the Platte River mouth as more developed beach access areas; (5) upgrading the Glen Lake picnic area to support beach and picnic use; (6) possibly adding concession tours to near the Giant Cedars area; (7) providing more structured interpretive opportunities in concentrated use areas, and (8) a modest increase in visitation over time. Some increased maintenance would also be incurred with a new M-22/M-109 hike/bike trail. Concentrating use in specific areas and most other facility-based changes, such as relocating the D. H. Day group campground to the main D. H. Day Campground and upgrades at the Dune Climb, would decrease maintenance needs for individual areas or change the nature of the maintenance needs without increasing the burden. Wilderness minimum requirement analysis would be required for 23,200 acres, a 7,703-acre (11%) reduction from the no-action alternative. Impacts of alternative C would be long term, minor beneficial and moderate adverse.

Cumulative Impacts

Ongoing and planned facility upgrades and restoration/rehabilitation projects would have mostly beneficial impacts because these projects would result in reduced resource management and cyclic maintenance needs. Dredging of the Platte River mouth would continue to place demands upon the maintenance staff and budget, a minor adverse effect. Combined with these impacts, alternative C would have long-term minor beneficial and moderate adverse cumulative effects. Alternative C would comprise a substantial portion of these cumulative effects.

Conclusion

Alternative C would have long-term minor beneficial and moderate adverse impacts on NPS operations. This alternative, combined with other actions, would have long-term minor beneficial and moderate adverse cumulative effects.

UNAVOIDABLE ADVERSE IMPACTS

Some negligible to moderate impacts to soils, vegetation, wildlife, water resources, wilderness character, scenic resources, natural sound, and night sky caused by recreational use and facilities would be essentially unavoidable (e.g., soil compaction, vegetation trampling, wildlife disturbances, decreased opportunities for solitude, decreased naturalness). Increases in visitor use would have low level adverse impacts on regional socioeconomics (e.g., increased traffic).

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are actions that result in loss of resources that cannot be reversed. Irretrievable commitments of resources are actions that result in the loss of resources but only for a limited period of time.

With the exception of consumption of fuels and raw materials for maintenance or construction activities, no actions in this alternative would result in consumption of nonrenewable natural resources or use of renewable resources that would preclude other uses for a period of time.

RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The National Lakeshore would continue to be used by the public, and most areas would be protected in a natural state. The National Park Service would continue to manage the Lakeshore to maintain ecological processes and native biological communities and to provide appropriate recreational opportunities consistent with the preservation of cultural and natural resources. Actions would be taken with care to minimize adverse effects on the long-term productivity of biotic communities. Under alternative C there would be expanded (but still relatively modest) facilities to support recreational use and some localized loss of ecological productivity.