

***DRAFT SAND ISLAND CAMPSITE AND DAY-USE PLAN AND
ENVIRONMENTAL ASSESSMENT
APOSTLE ISLANDS NATIONAL LAKESHORE***



SEPTEMBER 15, 2014

Sand Island Campsite and Day-use Plan and Environmental Assessment

Summary

The purpose of this plan is to determine how to correct a number of issues related to Sand Island visitor use facilities, respond to increasing visitor use and demand, enhance visitor experience, and increase Accessibility on the island. The Plan would help implement the park's 2011 General Management Plan (GMP), which calls for increased camping opportunities, accessible trails, a day use area, and improved docking on Sand Island.

Specific proposed actions include the following:

1. Replace the dock with a structure that improves protection for boaters and decreases impacts to coastal processes.
2. Relocate campsites and privies and re-route connecting trails.
3. Increase the number of campsites.
4. Provide for varying levels of accessible campsites and trails.

There are four alternatives included within the plan/environmental assessment (EA):

- **Alternative A** is continuation of current management.
- **Alternative B** addresses a number of issues needed to enhance visitor experience, but on a limited scale. It remedies the issue of trails being routed through campsites, relocates the vault toilet that is within group campsite A, and replaces the north and south docks with an improved dock (straight design). The total number of individual sites is increased by one, a day-use area is included, and accessibility is improved.
- **Alternative C** addresses issues needed to enhance visitor experience on a larger scale than under Alternative B. It remedies the issue of trails being routed through campsites and relocates the vault toilet that is within group campsite A. The north and south docks are replaced by one with an L-shaped design, providing more protection from easterly winds. The total number of individual sites is increased by two and the number of group campsites increased by one. This alternative also provides a greater amount of accessible features, including trails, group camping and a day-use area.
- **Alternative D** (preferred alternative) addresses issues needed to enhance visitor experience on a larger scale than under either Alternative B or C. Similar to Alternative C, trails are re-routed so they don't go through campsites, the vault toilet in group campsite A is relocated, and the north and south docks are by one with an L-shaped design. The total number of individual sites are increased by three and the number of group campsites are increased by one. This alternative also provides the greatest amount of accessible features, including the longest length of accessible trail, both group and individual campsites, and a day-use area.

Public Comment:

If you wish to comment on the environmental assessment, you may post comments online at <http://parkplanning.nps.gov/sandisland> or mail comments to: Chief, Planning and Resource Management, Apostle Islands National Lakeshore, 415 Washington Ave., Bayfield, WI 54814. This environmental assessment will be on public review for 30 days. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we would be able to do so.

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CHAPTER 1: Purpose and Need for Action

Introduction

This Environmental Assessment (EA) addresses potential environmental impacts of alternative actions on Sand Island related to public docking, camping, day-use and accessibility. Sand Island is one of the 21 Apostle Islands included within Apostle Islands National Lakeshore. The scope of this plan is limited to these visitor use activities in the northeast portion of Sand Island.

This EA has been prepared in compliance with:

- The National Environmental Policy Act (NEPA) of 1969 (42 USC 4321); which requires an environmental analysis for major Federal Actions having the potential to impact the quality of the environment;
- Council of Environmental Quality (CEQ) Regulations at 40 CFR 1500-1508, which implement the requirements of NEPA;
- Regulations of the Department of the Interior for the implementation of NEPA at 43 CFR 46; and
- Director's Order (DO) #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making.

There are three primary purposes of an EA:

- To help determine whether the impact of a proposed action or alternative could be significant;
- To aid in compliance with NEPA when no Environmental Impact Statement (EIS) is necessary by evaluating a proposal that will have no significant impact, but that may have measurable adverse impacts; and
- To facilitate preparation of an EIS if one is necessary.

Key goals of NEPA are to help Federal agency officials make well-informed decisions about agency actions and to provide a role for the general public in the decision-making process. The study and documentation mechanisms associated with NEPA seek to provide decision-makers with sound knowledge of the comparative environmental consequences of the several courses of action available to them. NEPA studies, and the documents recording their results, such as this EA, focus on providing input to the particular decisions faced by the relevant officials. In this case, the Superintendent is faced with a decision concerning a trails development plan as described below.

In making decisions about National Park Service (NPS)-administered resources, the NPS is guided by the requirements of the 1916 Organic Act. The authority for the conservation and management of the NPS is stated in the Organic Act as the agency's purpose: "...to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." This law provides overall guidance for the management of units of the National Park System, including the National Lakeshore.

The Organic Act establishes the management responsibilities of the NPS. While Congress has given the NPS management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that park resources and values be left unimpaired, unless a particular law directly and specially provides otherwise. This cornerstone of the Organic Act establishes the primary responsibility of the NPS. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

In addition to the National Park Service (NPS) Organic Act and the enabling legislation that created Apostle Islands National Lakeshore, park managers are also guided by Code of Federal Regulations, Federal Court cases, National Park Service policies and guidelines and park specific plans. Important guidance includes: NPS Management Policies 2006 and Director's Orders (DO). Relevant park specific plans include: the General Management Plan (2011), The Wilderness Feasibility Study (2004), the Long-range Interpretive Plan (2002), and the park's Accessibility Assessment (2012).

The Apostle Islands NL's 2011 General Management Plan proposes the following for Sand, a non-wilderness island:

- A small amount of new infrastructure, including day use areas that can accommodate groups and associated restrooms and picnic tables
- Upgrading some trails so they are accessible
- Improving, expanding, or relocating the public dock
- Increasing the number of individual designated campsites and group campsites, with increased accessibility

The Congressional designation of Wilderness (2004) for the Apostle Islands excluded all of Sand Island, in large part because of its cultural history. According to the 2004 park Wilderness Study, which preceded Congressional action, keeping Sand Island out of Wilderness would, "provide more possibilities to tell stories about the island and to interpret resources in ways that wilderness would not allow, and keep open the possibility of the island accommodating additional development to provide for increased use."

The park's Long-range Interpretive Plan (2002) proposes a number of wayside exhibits for Sand Island, some of which have been completed since the completion of the plan and others which are still pending. Volunteers offer guided tours of the lighthouse and tower during the visitor season.

Sand Island is included within Tier 1 of the Park's Accessibility Transition Plan (2012). The goal for Tier 1 sites is to make all facilities accessible. Recommendations specific to Sand Island that are within the scope of this plan include:

- Modify one existing group site and one existing individual site to provide features of accessibility (recommended timeframe: immediate)
- Dock – replace the dock to correct the wavy walking surface and make the route from the dock to the island accessible (recommended timeframe: short-term)
- Trail – create an accessible route from the public dock to the light station (recommended timeframe: short-term)
- Create an accessible route at the light station, including to the Light Station vault toilet (recommended timeframe: long-term)
- Create an accessible approach to the water pump (near the Quarters) (recommended timeframe: long-term)

Special Factors Influencing Development on Sand Island

Climate Change

Future changes in Lake Superior water levels are uncertain. There are competing impacts of both evapotranspiration and precipitation as well as uncertainties related to changes in ice cover and duration on evaporation from Lake Superior during winter months. Global Circulation Model (GCM) simulations suggest the Lake Superior water levels will decrease slightly, beginning mid-century, by approximately 0.33 to 0.66 ft. However, lake levels may periodically be higher. Overall decreases in Lake Superior water levels are considered likely (IUGLS, 2012), although they will most likely not be as large as previous studies have predicted, and periodic higher than average levels are possible (Huff and Thomas 2014).

These climate change related factors are most important in determining dock height and design. Taking into account predicted lowering of lake levels, the park has slightly lowered dock height when constructing dock replacement and incorporated adaptation techniques, such as vertical rails. Vertical rails prevent boats from going under docks during low water years.

Location and Background:

Apostle Islands National Lakeshore (NL) is located along Northern Wisconsin's Lake Superior coast on and adjacent to the Bayfield Peninsula (figure 1). It is within Bayfield and Ashland Counties. The park includes 69,372 acres (28,074 hectares), of which 27,232 acres (11,020 hectares) are submerged (park boundaries extend 0.25 miles from the shore of the mainland and from each island). There are 42,160 acres (17,061 hectares) of land area. The park includes 21 islands, ranging in size from 3 to 10,000 acres (1.2 to 4070 hectares) and a

12 mile (22.2 kilometer) segment along the mainland shore consisting of 2,565 acres (1043 hectares).

Figure 1. Project location map



The local climate is moderated by the “maritime” situation of the islands; compared with the adjacent Bayfield Peninsula, winters are warmer, spring arrives later, summers are cooler, and fall lasts longer. The far northern islands, Devils, and Outer, have noticeably cooler climates than ones like Sand Island that are closer to the mainland. Prevailing storm winds

blow from the northwest, north, and northeast, and winter storms from these quadrants are significant factors in determining island vegetation, especially in the northwestern and northern parts of the archipelago.

Sand Island is located on the far west side of the archipelago, within the inner ring of islands, 1.2 miles at its closest point to the Mainland and 2.8 miles from East Bay dock on Sand Island to Little Sand Bay dock on the Mainland. It is the fourth largest island within the lakeshore (2,949 acres). It has both a rich cultural history and diverse ecology. It is the only island within the park that historically had a year-round community. Fisherman-farmers began settling Sand Island in 1870, vacation resorts were built in the late 1800's and early 1900's, and a light station was built in 1881. Sand Island has large wetlands, pristine stretches of sand beaches and coves, spectacular sea caves, a remnant old growth forest, and a diverse population of birds, mammals and amphibians.

Purpose of and Need for Action:

The purpose of this plan is to determine how to correct a number of issues related to Sand Island visitor use facilities, respond to increasing visitor use and demand, enhance visitor experience, and increase Accessibility on the island. The Plan will help implement the park's 2011 General Management Plan (GMP), which calls for increased camping opportunities, accessible trails, a day use area, and improved docking on Sand Island.

Sand Island has a rich cultural history, very diverse natural resources, and is among the most popular areas in the park. It is commonly used for the first or last night by kayakers on multi-day trips. It is only 1.2 miles from Sand Point on the Mainland to the southern coast of Sand Island and less than 3 miles from Little Sand Bay to the East Bay dock. In addition, the lack of topography, in combination with high quality cultural (e.g, light station and farmsite) and natural features, makes Sand Island an excellent location for developing accessible trails and campsites.

Issues and proposed actions include:

- The dock is in very poor condition and is in need of replacement with a dock that improves protection for boaters and decreases impacts to coastal processes;
- Visitors are routed through campsites to access trails and privies. To correct this, campsites and vault toilets need to be relocated and connecting trails re-routed
- The demand for campsites far exceeds the availability, therefore, there is a need for more campsites.
- There are no campsites or trails on Sand Island that are accessible to people of all abilities. There is a need to provide for varying levels of accessible campsites and trails.

Scoping

Scoping is a process to identify the resources that may be affected by a proposed project, and to explore possible alternative ways of achieving the project objectives while minimizing adverse impacts. The planning team conducted internal scoping with appropriate NPS staff to identify potential issues, impact topics, and alternative ways to meet project needs. External scoping was also conducted with the public. Scoping is discussed in more detail within Chapter 5: Consultation and Coordination.

Impact Topics

NPS Policy requires that all proposed projects be screened for potential impacts against a list of natural and cultural resource categories. Park management used an interdisciplinary planning team to determine which resources could be affected by this project.

NEPA requires that agencies consider whether a number of different possible issues require detailed analysis as impact topics. Impact topics are resources of concern that could be affected, either beneficially or adversely, by implementing any of the proposed alternatives. Impact topics were identified during the completion of the Environmental Screening Form. The following impact topics are analyzed in this document:

Water Quality

NPS policies require protection of water resources consistent with the Clean Water Act. Both water quantity and water quality are important issues at Apostle Islands. Both action alternatives include removal of existing docks and building a new dock. They also include the removal, replacement and installation of vault toilets and privies. These actions have the potential to impact water quality.

Aquatic Resources

The Apostle Islands area provides very important habitat for fish habitat, including spawning areas, and is important for commercial and recreational fishing. It also provides habitat for other aquatic organisms, such as benthos and plankton. Removal and installation of docks involves disturbance of the lakebed and potential impacts to fish and benthic habitat.

Geology, Coastal Processes, and Soils

The park includes significant geologic features, including sandstone cliffs and a highly diverse collection of coastal features. Preserving geologic conditions is one of the purposes listed in the enabling legislation of Apostle Islands. Docks have the potential to impact coastal processes. In addition, soil disturbance would be associated with establishment of

campsites, removal and installation of vault toilets and privies, trail development, and installation of waysides and signs.

Wetlands

Presidential Executive Order 11990 mandates protection of wetlands. Sand Island tends to be low and poorly drained. It has a number of wetlands, including large swamps and beaver ponds, as well as poorly drained soils. Although wetlands and beaver ponds will be avoided, poorly drained soils may be impacted by boardwalk, campsite, and trail development.

Vegetation

Actions proposed within Alternatives A and B have the potential to impact vegetation, including campsite and trail development, removal or installation of vault toilets and privies, establishment of a day-use area and removal and installation of docks.

Wildlife

Sand Island provides important habitat for a variety of wildlife species. The action alternatives have the potential to impact wildlife and their associated habitat, therefore this impact topic will be evaluated.

Cultural Resources (Cultural Landscapes and Archeology)

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, provides the framework for federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. Human occupation and use of the park spans at least five millennia, and valuable archeological and ethnographic resources, historic structures and cultural landscapes are found within the park. Several of the alternatives could affect archeological resources, cultural landscapes, or ethnographic resources within the park, therefore, potential impacts to these cultural resources will be addressed.

Visitor Use and Experience

The 1916 National Park Service Organic Act directs the NPS to provide for public enjoyment of the scenery, wildlife, and natural and historic resources of national parks “in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations.” The enjoyment and education of visitors are emphasized in Apostle Island National Lakeshore’s purpose and mission statements. Action alternatives focus on actions designed to improve visitor use and experience. Therefore, the potential impacts of the proposed alternatives will be addressed.

Park Operations

This topic concerns NPS staffing levels and workloads, maintenance activities, costs and planning needs. Because workload and staff requirements may vary for different alternatives, this topic will be addressed.

Impact Topics Not Retained:

Several potential impact topics were dismissed because they would not be affected, or the potential for impacts under all of the alternatives would be negligible. These topics are listed below, with an explanation of why they were not considered in detail.

Air Quality

In all of the alternatives the National Park Service would continue to protect and conserve air quality as required under the NPS Organic Act and *NPS Management Policies 2006*. None of the alternatives being considered would alter the park's air quality.

Lightscape

Under the NPS Organic Act and *NPS Management Policies 2006*, the National Park Service is required to protect to the greatest extent possible the natural lightscapes (i.e., night sky) of the park. In particular, the policies call for the National Park Service to protect natural darkness. None of the alternatives in this plan would affect the park's lightscape.

Soundscape

Under the NPS Organic Act, Director's Order 47 ("Soundscape Preservation and Noise Management"), and *NPS Management Policies 2006*, the National Park Service is required to protect to the greatest extent possible the natural soundscape. A minimal amount of sound will be created as a result of minor construction and maintenance activities, however, none of the actions proposed are expected to have more than a negligible short-term adverse impact.

Floodplains

Sand Island does not have well developed drainages or floodplains. None of the alternatives would alter the park's floodplains. In all of the alternatives the National Park Service would continue to protect and conserve the park's floodplains as required under the NPS Organic Act, Executive Order 11988 (Floodplain Management), the NPS "Floodplain Management Guideline," and NPS Management Policies 2006.

Wilderness

The 1964 Wilderness Act states that wilderness, “in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” Approximately 80% of the land area of Apostle Islands National Lakeshore has been designated as wilderness and is managed to protect its wilderness values. However, the project area, which includes Sand Island, is not within designated Wilderness. Therefore, this impact topic is eliminated from further analysis.

Special Status Species

The Federal Endangered Species Act provides protection and directs recovery of fauna or flora listed by the U. S. Fish and Wildlife Service (USFWS) as being either threatened or endangered. In addition to protection from direct injury or mortality, the habitat on which they depend is also afforded protection. Section 7 of the Act also requires federal agencies to consult with the USFWS when any activity permitted, funded, or conducted by that agency may affect a listed species or designated critical habitat, or is likely to jeopardize proposed species or adversely modify proposed critical habitat. There are no federally listed species on Sand Island. The only state listed plant species that occurs on Sand Island is spike trisetum. This species occurs on rocky ledges. None of the activities proposed under the action alternatives would impact this species or its associated habitat. Concurrence with the NPS’s determination that implementation of the plan will not affect federally listed species (piping plover) was received September 2, 2014.

Public Health and Safety

Impacts to public health and safety are expected to be negligible for any of the alternatives.

Land Use

No local land use plans (outside the park boundary) would be affected by actions proposed under the alternatives. In addition, the proposed alternatives would not induce any changes in land use, or increase pressure for development on the mainland adjacent to the park.

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The lands and waters comprising Apostle Islands National Lakeshore, including the lands on the mainland that are part of the Red Cliff Indian Reservation (and possibly Long Island in relation to the Bad River Indian Reservation), are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as

Indians. Although not trust resources, tribes do have specific off-reservation treaty-related rights. Under the Treaty of 1842, Lake Superior Chippewa reserved off-reservation treaty rights to the lands and waters of Lake Superior that now fall within the park. None of the proposed actions are expected to impact Indian Trust Resources.

Museum Objects

Museum objects are manifestations and records of behavior and ideas that span the breadth of human experience and depth of natural history. None of the proposed alternatives have potential to affect museum objects.

Historic Structures

Historic structures on Sand Island date from the 1870s to the 1940s. Structures listed on the National Register of Historic Places include the Sand Island lighthouse, the Shaw/Hill Farm, and the Sevona Cabin. West Bay Lodge has been listed on the State Register of Historic Places and is in the process of being listed on the National Register of Historic Places. In addition, the Hansen Farm has been found to be eligible for listing on the national register. List of Classified Structure (LCS) surveys in (2014) have found that Camp Stella and the Campbell Cottage may also be eligible, though these structures have not yet been formally evaluated for listing. The Wellisch Cabin ("Plenty Charm") in East Bay was evaluated for listing on the national register in 2002 and was not found eligible for listing.

None of the proposed action alternatives will directly affect these historic structures. Indirect positive effects are anticipated from improved visitor access to Hansen Farm under alternatives C and D via a loop trail with improved accessibility, as well as a more accessible trail to Sand Island light under alternative D. At this time visitors can access the Hansen Farm and Light Station via unimproved park trails. The action alternatives will facilitate visitor and staff maintenance access by providing an improved trail surface, reducing potential impacts from social trailing and trampling by visitors. It is the park's experience that increased staff and visitor access (via improved trails) does not lead to increased vandalism -- rather the reverse. More frequent access by staff, volunteers, and visitors to Hansen Farm and Sand Island light will provide more "eyes and ears" on these historic properties, ensuring more prompt observing and reporting of maintenance problems such as downed trees and wind damage to roofing and windows.

None of the proposed action alternatives are expected to have adverse impacts on historic structures, therefore, this topic will not be retained for additional analysis.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. Since minority or low-income populations do not occur within the project area, this topic will not be retained for additional analysis.

Energy Requirements and Conservation Potential

None of the alternatives would result in a measurable change in energy consumption compared to current conditions.

Socioeconomic Environment

Apostle Islands National Lakeshore, located in Ashland and Bayfield Counties, primarily affects communities adjacent to and close to the lakeshore, in particular the communities of Bayfield, Cornucopia, Washburn, and Ashland. Although actions proposed may result in a slight increase in visitation to Sand Island, the overall impact to the socioeconomic environment is expected to be negligible.

Chapter 2: Alternatives

The National Environmental Policy Act (NEPA) requires that federal agencies conduct a careful, complete, and analytical study of the impacts resulting from proposals that have the potential to affect the environment, and to consider alternatives to those proposals, before decisions are made. This section describes the four alternatives considered, including the No-Action alternatives. The four action alternatives include varying levels of accessibility and campsite and trail development. Alternative A is no-action, or continuation of current management. Alternative B includes the least amount of accessibility and campsite and trail changes. Alternative C includes an intermediate amount of accessibility and campsite trail changes and Alternative D includes the greatest amount of accessibility, as well new campsite development. Following a description of the alternatives selected for analysis is a discussion of the environmentally-preferable alternative and preferred alternative.

Alternative A- No Action (continuation of current management)

Under this Alternative, there would be no changes in the number, location, or accessibility of campsites, vault toilets, or trails on Sand Island. There would also be no changes to the existing north dock at East Bay. Vault toilets are an outside toilet surrounded by a small building. Waste is contained in a vault that is periodically pumped. See Figure 2.

Campsites –

- There are four individual sites and two group sites. With the exception of individual campsite 3, located on the west side of Lighthouse Bay, the other campsites are located at East Bay (see Sand Island site map).
- Individual campsites 1 and 2 are located in a large opening just off of the north dock at East Bay.
- Individual campsite 4 is located behind sites 1 and 2.
- Two group campsites (A and B) are located to the south of the south dock and ranger quarters at East Bay. There is a vault toilet within group campsite A.
- **Campsite issues:**
 - Visitors are required to walk through campsites 1 and 2 to access the main trail and campsite 4, therefore, there is no privacy at either of these campsites.
 - The vault toilets that serves campsites 1, 2 and 4, as well as hikers, is within campsite 4. Visitors need to go into campsite 4 to access the vault toilet.
 - The vault toilet that serves group campsites A and B, as well as hikers, is located within group campsite A. Group campsite B is located 282 yards from group campsite A.

Trails –

- There is a developed trail along the east side of Sand Island from group campsite B on the south to the light station on the north.
- There is also an informal trail to the Hansen Farm that branches off the main trail. Buildings and the landscape of the Hansen Farm are being restored with the goal of interpreting the history of the farm for visitors. The park plans to improve the trail for visitor use once work at the Hansen Farm is complete.
- A primitive trail leads visitors from East Bay to the Noring Farm (0.36 miles).
- **Trail issues:**
 - o The trail to the Noring Farm goes through campsite 4.
 - o None of the trails are accessible under the standards of the Architectural Barriers Act (ABA).

Docks –

- At East Bay there is a north dock that is located near campsites 1 and 2 and a south dock that is located in front of the ranger station. The north dock is approximately 135 feet long and 12 feet wide. The south dock is approximately 116 feet long and 8 feet wide. The lakeward section of both docks are supported by timber crib structures.
- **Dock issues:**
 - o Both docks are in very poor condition and are minimally accessible due to shallow lake depths.
 - o Storms during the fall of 2013 and ice action over the winter of 2014 have caused extensive damage to the north dock, making it nearly unusable.
 - o Rocks from the cribs have started to fall out and the decking is very warped.
 - o There is a stream near the base of the north dock that periodically runs under the dock, undermining its structure.
 - o The docks have caused a build-up of sand, reducing their useful length.

FEATURES COMMON TO ACTION ALTERNATIVES (B, C, D)

Campsites and toilets

- Relocate individual campsites 1 and 2
- Redesign campsite 4 to include a tenting area, screening between campsite and vault toilet, and a spur trail to vault toilet from the main trail. When vault toilet needs replacement, it would be moved out of campsite 4 to a more central location.
- Remove vault toilet at the quarters and replace with a vault toilet at the junction of the new dock spur and main trail. The vault toilet would serve the new dock and picnic area, as well as hikers, campers and the quarters off-season.
- Remove the vault toilet from within Group site A and replace with a double vault toilet across the main trail near the campsite. This vault toilet would serve Group sites A and B, new individual sites 1 and 2, and hikers.
- Add a stump privy at any new remote campsites. A stump privy is an outside toilet that is not surrounded by a building. It does not have waste contained in a vault and is used for low use campsites.

Trails

- Create accessible boardwalk from new dock location to main trail.
- Create spur trails from any new individual sites (e.g., Lighthouse Bay, Justice Bay) to main trail and add stump privy.
- Create beach access to new sites, as needed.
- Realign trail leading to the Noring Farm so it doesn't direct visitors through campsite 4.
- Relocate part of Lighthouse Bay trail away from bluff edge.
- Realign beginning of Noring trail to the south, so it doesn't go through campsite 4.
- Replace stairs from beach to bluff at Lighthouse Bay and Justice Bay.

Dock

- Replace north and south docks at East Bay with an improved public dock that is designed to provide a level accessible surface, takes into account changing lake levels and minimizes impacts to coastal process. New dock location would be slightly south of the NPS Quarters.

Waysides

- Relocate orientation wayside panels and bulletin case from trail near campsite 4 to area near the new dock.

Miscellaneous

- Make water spigot (near ranger quarters) and approach accessible.
- Hansen Farm - the park would continue to maintain the current Hansen Farm clearing and work towards stabilizing and preserving the structures and cultural landscape and opening the farm-site to the general public, as time and staffing allow.

Alternative B – Improve Visitor Use Experience and Accessibility (minimum)

This alternative addresses a number of issues needed to enhance visitor experience, but on a limited scale. It remedies the issue of trails being routed through campsites, relocates the vault toilet that is within group campsite A, and replaces the north and south docks with an improved dock (straight design). The total number of individual sites is increased by one, a day-use area is included, and accessibility is improved. See Figure 3.

In addition to the actions outlined under, “Features Common to All Action Alternatives”, the following additional actions are included under Alternative B:

Campsites –

- A new individual campsite would be created at Lighthouse Bay east of the current individual campsite, increasing the total number of individual campsites on Sand Island from five to six.
- Individual campsite 4 would be converted to an accessible campsite.
- Campsites 1 and 2 would be relocated; one to the south and one to the north of their current location.

Day Use –

- A day use/picnic area would be created after individual campsites 1 and 2 are relocated.

Trails –

- An accessible boardwalk would be created from the new dock to the main trail, along the main trail to campsite 4, and accessible boardwalk spurs to campsite 4 and the adjacent vault toilet.
- The utility trail that provides access to the Hansen Farm would be improved for visitor use when work at the site has been completed.

Docking –

- Under Alternative B, the north and south docks at Sand Island would be removed and replaced with a single 200' straight dock (10' wide) just south (approx.. 100') of the existing south dock. The area of the new dock would be approximately 20% less, but would provide docking for at least the same number of boats.
- The dock would have a 125' section that is open, allowing flow through so waves and sediment can pass under the structure.
- The flow-through section of the dock would be supported by either piles in the shape of an H or steel bins, depending on depth to bedrock. Piles would be driven into the lake bottom, steel bins would sit on top of the lake bottom. If sediment depth allows for the use of H piles, this would be the preferred option because it would allow the maximum amount of flow-through. If depth to bedrock is very shallow, steel bins would be used.
- The lakeward 75' would be constructed of solid sheet pile to provide additional shelter.
- This alternative would accommodate mooring for four 25' vessels.
- See Appendix B for more detailed information.

Alternative C – Improve Visitor Use Experience and Accessibility (moderate)

This alternative addresses issues needed to enhance visitor experience on a larger scale than under Alternative B. Similar to Alternative B, it remedies the issue of trails being routed through campsites and relocates the vault toilet that is within group campsite A. The current docks would be replaced by one with an L-shaped design, providing more protection from easterly winds. Under this alternative, the total number of individual sites would be increased by two and the number of group campsites increased by one. This alternative also provides a greater amount of accessible features, including trails, group camping and a day-use area. See Figure 4.

Campsites –

- New individual campsites would be created at Lighthouse Bay east of the current individual campsite and at Justice Bay, increasing the total number of individual campsites on Sand Island from four to six.
- Individual campsites 1 and 2 would be relocated; one to the south and one to the north.
- Individual campsite 4 would be converted to an accessible campsite.
- An accessible group campsite would be created after individual campsites 1 and 2 are relocated, increasing the number of group campsites from 2 to 3.

Day Use –

- An accessible day use/picnic area would be created at the foot of the new dock.

Trails –

- An accessible boardwalk would be created from the new dock to the main trail and along the main trail to create an accessible route from group campsite B (south of dock) to a cut off that would go to the Hansen Farm. An accessible boardwalk would provide access to the Hansen Farm and loop back to the main trail (approx. 2/3rd mile). An accessible boardwalk spur would also be created to the accessible group campsite.
- After the West Bay Club life estate expires, the historic road between West Bay and East Bay would be reestablished as a trail, as called for in the park's GMP.

Docking –

- Under Alternative C, the north and south East Bay docks would be replaced with a 225' L-shaped dock (10' wide) would be constructed just south (approx.. 100') of the existing NPS dock . The area of the new dock would be slightly more than the current two docks combined and would increase docking availability.
- The dock would have a 125' section that is open, allowing flow through so waves and sediment can pass under the structure.
- The flow-through section of the dock would be supported by either H piles or steel bins, depending on depth to bedrock. If sediment depth allows for the use of H piles, this would be the preferred option because it would allow the maximum amount of flow-through. If depth to bedrock is very shallow, steel bins would be used.
- The lakeward 100' would consist of a solid steel sheet pile wall configured to form an L-shaped end. The end which is parallel to the shore and forms the L-shape would be approximately 40-feet long. The L would provide shelter from northeasterly and easterly winds.
- This alternative would accommodate mooring for six 25' vessels.
- See Appendix B for more detailed information.

**Alternative D -Improve Visitor Use Experience and Accessibility
(maximum)(preferred Alternative)**

This alternative addresses issues needed to enhance visitor experience on a larger scale than under either Alternative B or C. Similar to the other action alternatives, Alternative D remedies the issue of trails being routed through campsites and relocates the vault toilet that is within group campsite A. Similar to Alternative C, the north and south East Bay docks would be replaced by a dock with an L-shaped design, providing protection from easterly winds. Under this alternative, the total number of individual sites is increased by three and the number of group campsites is increased by one. This alternative also provides the

greatest amount of accessible features, including the longest length of accessible trail, both group and individual campsites, and a day-use area. See Figure 5.

Campsites –

- New individual campsites would be created at:
 - Lighthouse Bay, east of the current individual campsite
 - Justice Bay, south of the trail junction with the stairs
 - West Bay, on the east side of the bay in a former log landing clearing. This campsite would not be created until after the West Bay Club life estate has expired.
 - The total number of individual campsites on Sand Island would be increased from four to seven.
- Individual campsite 4 would be converted to an accessible campsite.
- Individual campsites 1 and 2 would be relocated; one to the south and one to the north.
- An accessible group campsite would be created after individual campsites 1 and 2 are relocated, increasing the number of group campsites from 2 to 3.

Day Use –

- An accessible day use/picnic area that includes a pavilion would be created at the foot of the new dock.

Trails –

- An accessible boardwalk would be created from the new dock to the main trail and along the main trail to create an accessible route from group campsite B (south of new dock) to the light station (approx. 2 miles). An accessible loop trail/boardwalk to provide access to the Hansen Farm would also be built (approx. 0.5 miles). Accessible boardwalk spurs would also be created to the accessible individual and group campsites.
- After the West Bay Club life estate expires, the historic road between West Bay and East Bay would be reestablished as a trail, as called for in the park's GMP.

Docking –

- Under Alternative D, a 225' L-shaped dock (10' wide) would be constructed just south (approx. 100') of the existing NPS dock.
- The dock would have a 125' section that is open, allowing flow through so waves and sediment can pass under the structure.
- The flow-through section of the dock would be supported by either H piles or steel bins, depending on depth to bedrock. If sediment depth allows for the use of H piles, this would be the preferred option because it would allow the maximum amount of flow-through. If depth to bedrock is very shallow, steel bins would be used.
- The lakeward 100' would consist of a solid steel sheet pile wall configured to form an L-shaped end. The end which is parallel to the shore and forms the L-shape would be

approximately 40-feet long. The L would provide shelter from northeasterly and easterly winds.

- This alternative would accommodate mooring for six 25' vessels.

Environmentally Preferable Alternative:

Department of Interior regulations for NEPA ((43 CFR 46.30), define the environmentally preferable alternative as the alternative "...that causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferable alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources. In some situations, such as when different alternatives impact different resources to different degrees, there may be more than one environmentally preferable alternative".

Alternative B is the environmentally preferable alternative. This alternative replaces the current dock(s) with one that minimizes impacts to coastal processes and has the smallest area of disturbance. Therefore, it would cause the least damage to the biological and physical environment while protecting and preserving historical, cultural, and natural resources. However, while Alternative B has the smallest area of disturbance (3 acres), the areas of disturbance from Alternatives C (5 acres) and D (6 acres) are also minimal and the disturbance short-term. In addition, approximately ½ of the disturbed area in all alternatives is in previously disturbed locations.

Preferred Alternative:

The NPS preferred alternative was developed following an analysis of the each preliminary alternative, including consideration of public comments received during the scoping process.

The topics that the interdisciplinary team used to evaluate the relative advantages between the alternatives were as follows:

- Replace north and south docks with one that minimizes impacts to coastal processes and maximizes docking space and protection
- Improve visitor experience through better layout and location of campsites and trails.
- Increase visitor related opportunities (e.g., camping, day-use)
- Increase accessibility for all visitors

The interdisciplinary team evaluated each alternative and, based on the above criteria, recommend Alternative D as the NPS preferred alternative.

Figure 2. Alternative A – No Action

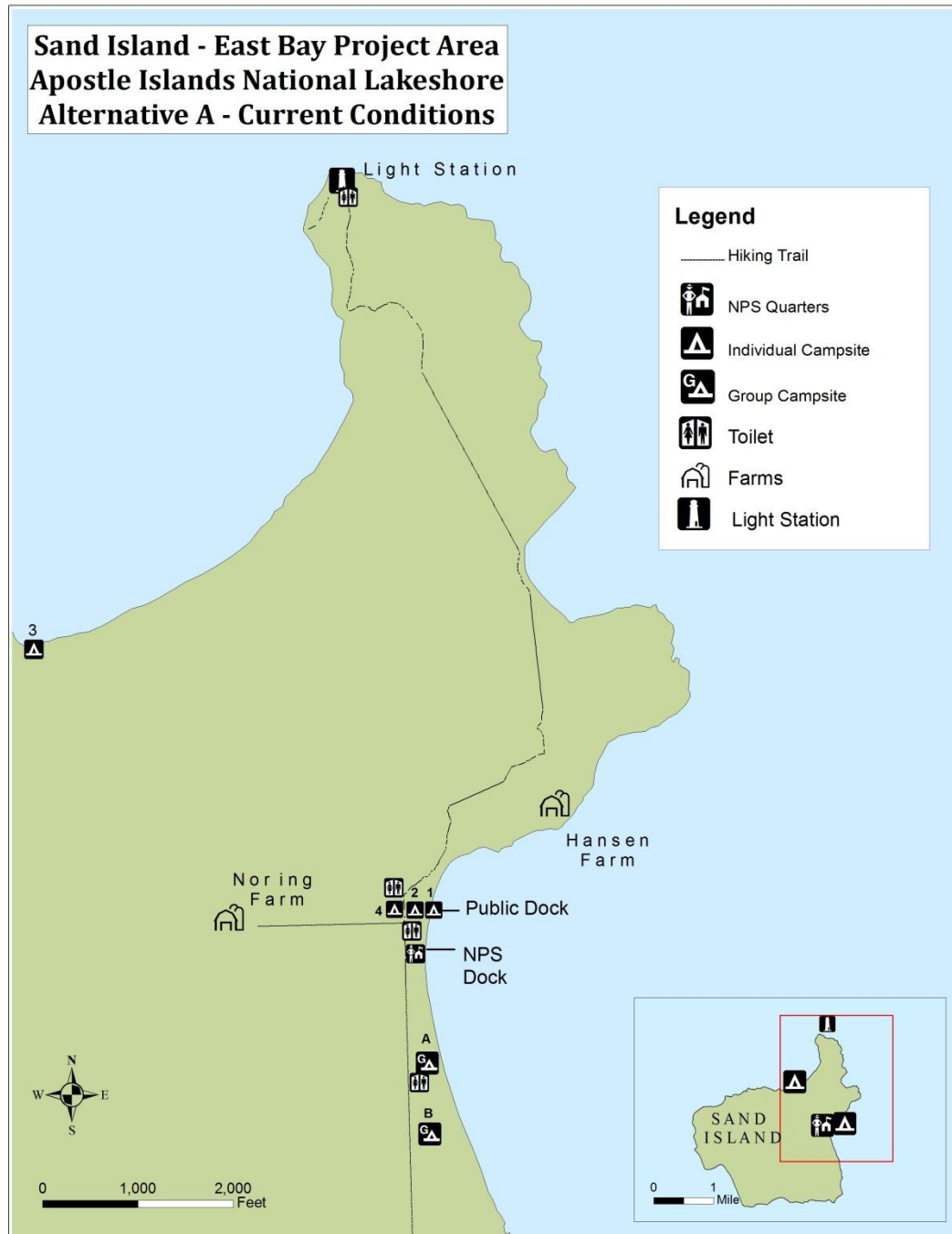


Figure 3. Alternative B – Improve Visitor Use Experience and Accessibility (minimum)

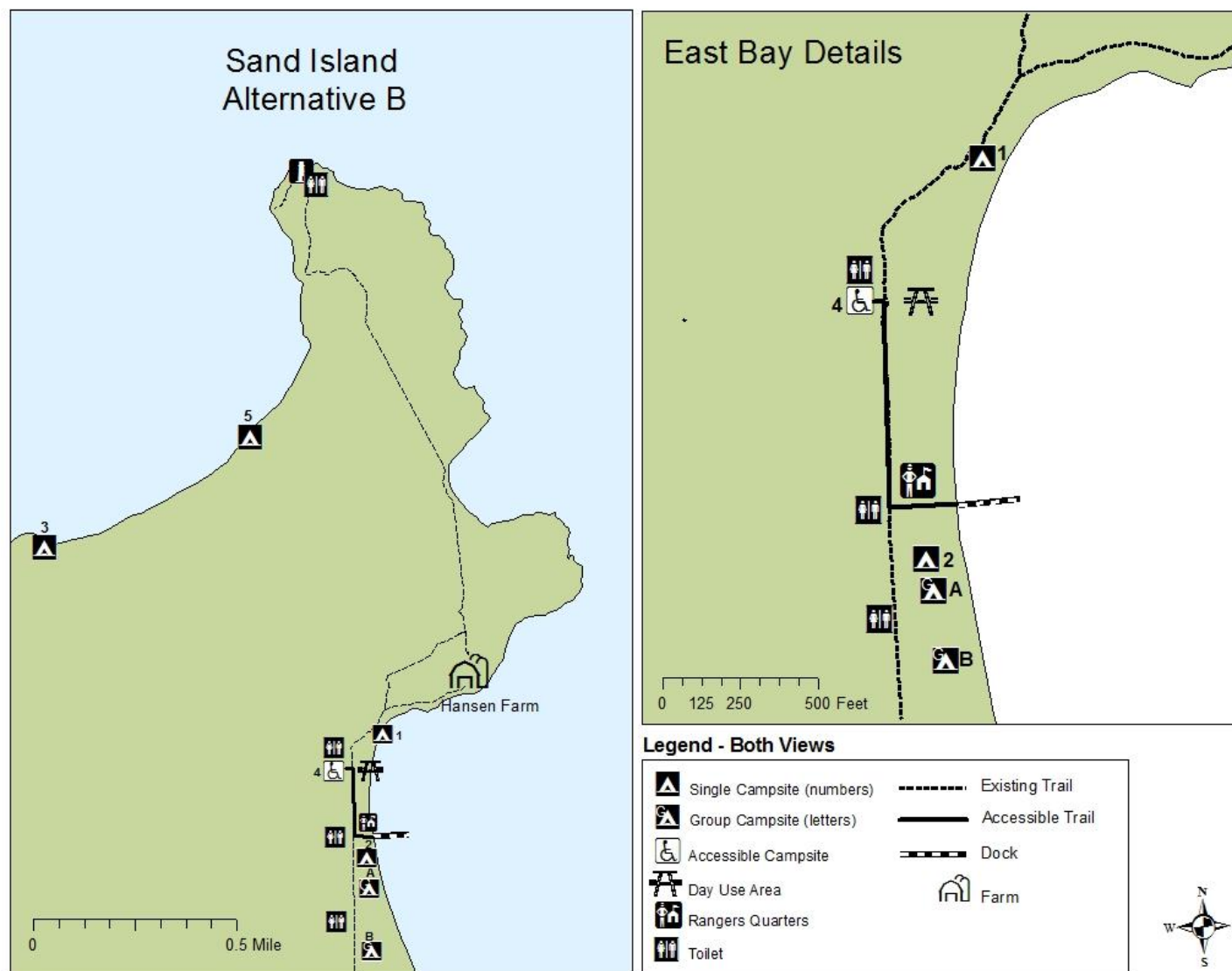


Figure 4. Alternative C – Improve Visitor Use Experience and Accessibility (moderate)

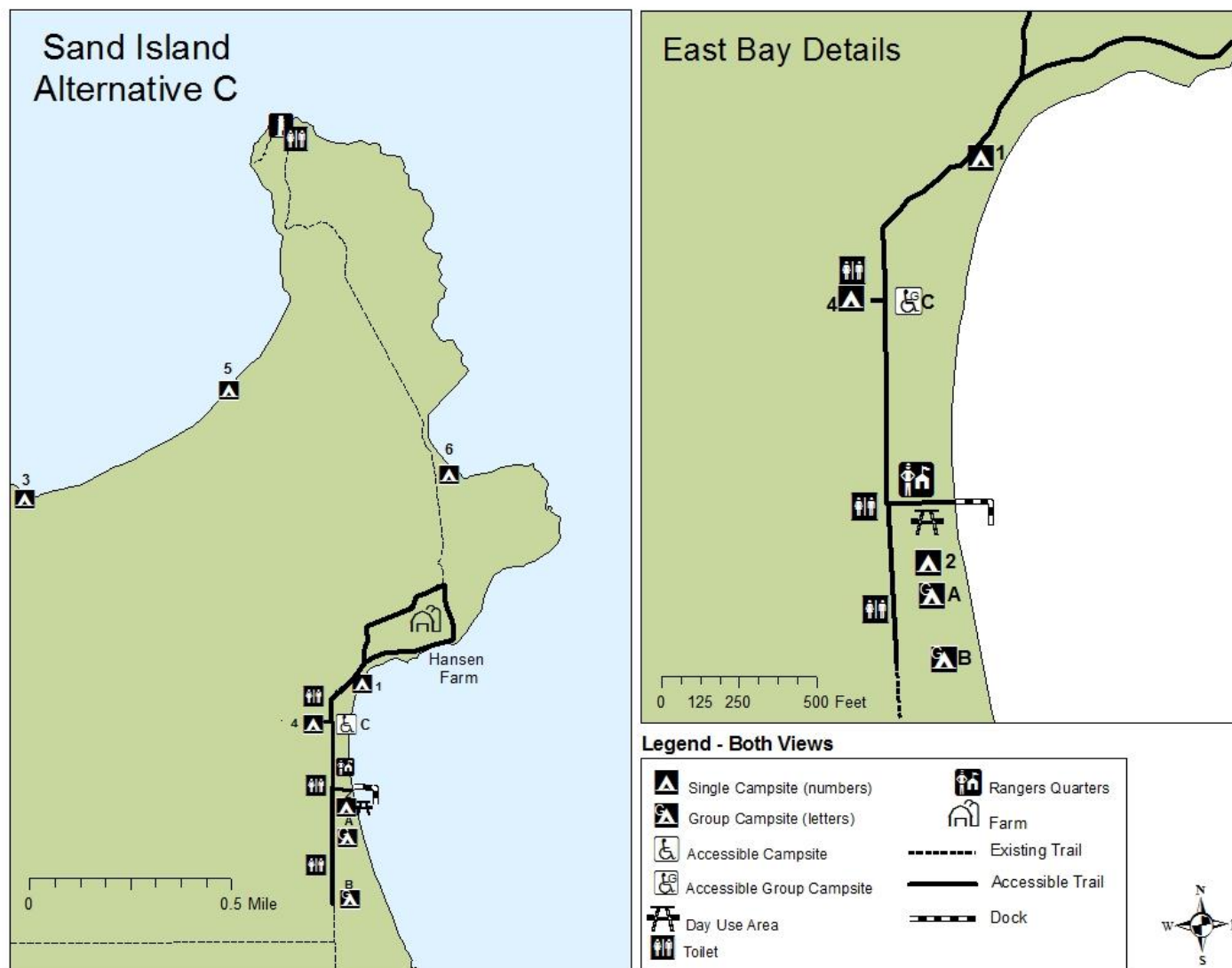


Figure 5. Alternative D – Improve Visitor Use Experience and Accessibility (maximum)

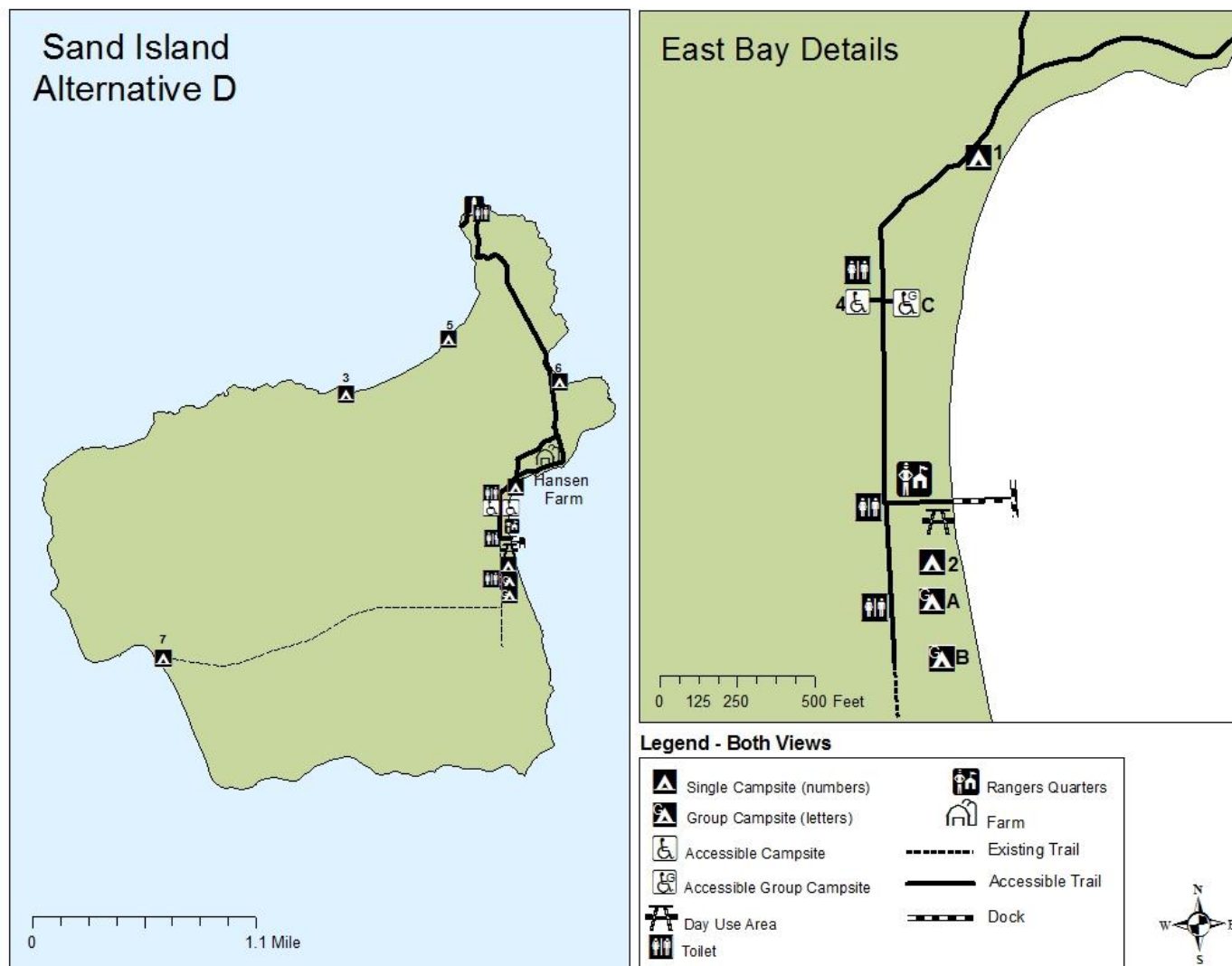


Table 1. Alternative Matrix

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Campsites</i>	4 individual campsites- 3 at East Bay 1 at Lighthouse Bay	5 individual campsites- 3 at East Bay (make CS 4 accessible) 2 at Lighthouse Bay	6 individual campsites- 3 at East Bay (make CS 4 accessible) 2 at Lighthouse Bay 1 at Justice Bay	7 individual campsites- 3 at East Bay (make CS 4 accessible) 2 at Lighthouse Bay 1 at Justice Bay 1 at West Bay	Relocate individual campsites 1 and 2; one to the north and one to the south. Redesign campsite 4. Remove vault toilet at the quarters and replace with an vault toilet at the junction of the dock spur and main trail. Add a stump privy at any new remote individual campsites.
	2 group campsites	2 Group Campsites	3 Group Campsites (1 accessible – create group campsite after relocating CS 1 and 2)	3 Group Campsites (1 accessible – create group campsite after relocating CS 1 and 2)	Relocate vault toilet from group site A with a double vault toilet across the main trail near the campsite.
<i>Day Use</i>	No day use areas.	Create a day use area after relocating CS 1 and 2.	Create a day use area at the foot of the new dock.	Create a day use area at the foot of the new dock, including a sheltered pavilion.	

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Trails</i>	<p>Main trail extends from Wellisch Cabin on the south to the Light Station on the north.</p> <p>Much of the trail from East Bay to the Light Station has boardwalk (non-accessible).</p> <p>A utility trail provides access to the Hansen Farm for restoration activities.</p>	<p>Create accessible route from dock to accessible individual campsite 4.</p>	<p>Create accessible route from group campsite B to Hansen Farm. Add accessible trail loop back to main trail.</p> <p>Create accessible route from the dock to an accessible group campsite.</p> <p>After the West Bay life estate expires, create trail along historic road that connected East Bay and West Bay.</p>	<p>Create accessible route from group campsite B to the light station.</p> <p>Add accessible trail from the dock to accessible individual and group campsites and Hansen Farm loop.</p> <p>After the West Bay life estate expires, create trail along historic road that connected East Bay and West Bay.</p>	<p>Create accessible spur trail from new dock location to main trail.</p> <p>Create spur trails from any new individual sites to main trail.</p> <p>Create trail/stairs from beach to new sites, as needed.</p> <p>Realign trail leading to the Noring Farm so it doesn't direct visitors through campsite 4.</p> <p>Relocate part of Lighthouse Bay trail away from bluff edge.</p> <p>Replace stairs from beach to bluff at Lighthouse Bay and Justice Bay.</p>

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Dock</i>	<p>North dock - 135' x 12' straight dock (closed due to unsafe conditions)</p> <p>South dock – 116' x 8' straight dock (in poor condition)</p>	<p>200' x 10' straight dock</p> <p>125' flow-through</p> <p>75' (lakeward) sheet pile</p> <p>Mooring for four 25' vessels.</p>	<p>225' x 10' L-shaped dock</p> <p>125' flow-through</p> <p>100' (lakeward) sheet pile</p> <p>40' L</p> <p>Mooring for six 25' vessels.</p>	<p>225' L-shaped dock</p> <p>125' flow-through</p> <p>100' (lakeward) sheet pile</p> <p>40' L</p> <p>Mooring for six 25' vessels.</p>	<p>Replace public and NPS dock with an improved dock that is designed to provide a level accessible surface, takes into account changing lake levels and minimizes impacts to coastal process.</p> <p>New dock location would be slightly south (approx.. 100') of the NPS Quarters.</p>

CHAPTER 3: Affected Environment

INTRODUCTION

This chapter describes the existing environment of Apostle Islands National Lakeshore and the surrounding region. The focus of this chapter is on key natural and cultural resources, visitor uses and experiences, and park operations that have the potential to be affected by proposed alternatives. There are other park resources that are also important elements of Apostle Islands National Lakeshore, but because they would not be affected under the proposed alternatives, they are not included in the descriptions that follow.

GEOLOGY, COASTAL PROCESSES, AND SOILS

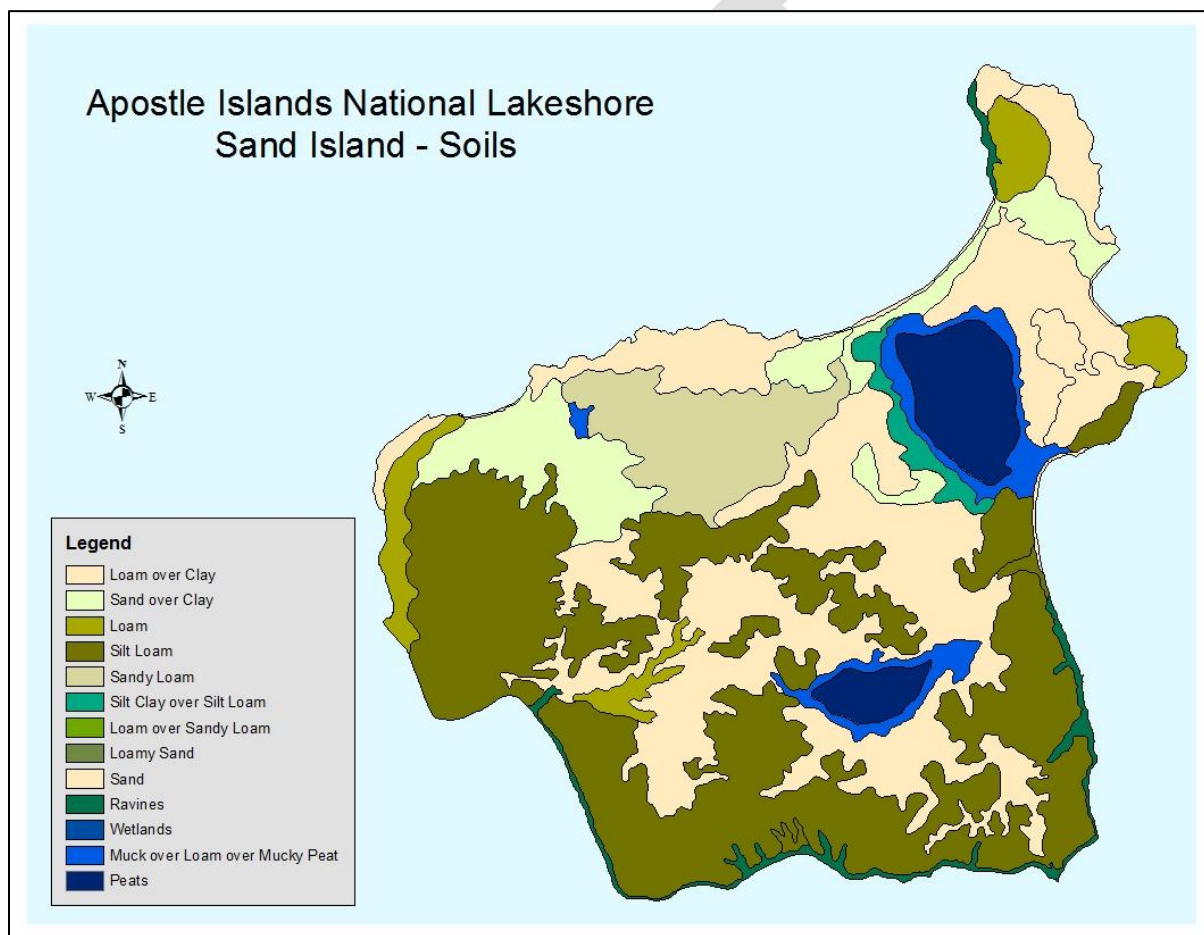
Precambrian sandstones, over 1 billion years old, form the underlying bedrock and core of the Apostle Islands. Formations include the Chequamegon, Devils Island and Orienta. On Sand Island, both Orienta and Devils Island formations are present. The Devils Island formation is associated with the famous and very scenic Devils Island sea caves. Intricately sculpted sea caves can be found on Sand Island at Swallow Point, just north of East Bay. The contact between the Devils Island Sandstone and underlying Orienta Sandstone is near the center of Justice Bay, with the Orienta formation in the northwestern half of the island and the Devils Island formation in the southeast. The Devils Island Sandstone is thinly-bedded in comparison to the thickly layered Orienta Sandstone that is well exposed at the light station, on the northeast tip of the island. (Nuhfer and Dalles 1987).

Pleistocene glaciation, from 3 million years to 10,000 years ago carved and shaped the Apostle Islands. Thick reddish glacial till was deposited on most of the islands. There were three deposits, with the oldest being a sandy till and the two youngest rich in clay. Glacial till covers most of the exposed surfaces of the islands and forms the reddish bluffs that occur on the western side of most islands. On Sand Island, glacial till is exposed in the bluffs at West Bay. (Nuhfer and Dalles 1987)

Soils on the Apostle Islands are young and very diverse, being formed from a variety of parent materials since the glaciers retreated, nearly 11,000 years ago. They range from sandy to clayey. There are 17 different types of soils on Sand Island ranging along texture and moisture gradients. Textures include sands, silts, and clays and moistures range from wetlands to sands. The most common soil type is the Portwing-Herbster complex (35% of the island), a type with loamy soils over clay. It is mixed in drainage with the Portwing portions moderately well drained, and the Herbster sections somewhat well drained. The Sedgewick-Munuscong complex comprises 26% of the Sand Island soils and the typess are sandy loam over clay. This is a wetter soil with Sedgewick portions somewhat poorly drained and Munuscong portions poorly and very poorly drained. The clay under various soil types holds water and this contributes to the moist nature of the island.

At East Bay, where much of the project work is proposed, soils are comprised of Portwing-Herbster and Cornucopia, the latter of which is a well-drained type. The soils at locations identified for installation of remote campsites are more variable. Soils at Justice Bay are Sedgewick-Munuscong while those at Lighthouse Bay where some alternatives propose a new campsite are Allendale, which is a sandy and somewhat poorly drained soil. West Bay soils are primarily the Portwing-Herbster complex, and those on the Mainland are Cornucopia silt loam.

Figure 6. Soils Types on Sand Island



In Lake Superior, the prevailing winds extend across the lake surface from a northwest, north, northeast, and occasionally easterly direction. Sand Island, East Bay, is exposed to Lake Superior waves generated over long distances that are mainly from the northeast and east. However, wave processes in East Bay are also affected by locally generated waves and wind driven currents. (COE 2014).

The current docks are impacting coastal process by causing a build-up of sand on their north sides and slight scouring to the south. Maximizing the amount of flow through, or amount of water freely flowing under the dock, will minimize these impacts. The north dock at East Bay is being undercut by a stream. An analysis of aerial photos from 1978 to 2009 revealed that this stream has migrated both north and south over time. Modelling recommendations recommend relocating the dock south of the south dock to avoid impacting natural stream processes. (COE 2014).

WATER QUALITY

The water quality of Lake Superior is generally very good. The overland drainage area of Lake Superior is small compared to its immense size, and the watershed has a high percentage of forest cover, which contributes to the high water quality. Water quality in and around the Apostle Islands reflects the general oligotrophic (low nutrient) character of Lake Superior in general. The water quality of the park's Lake Superior surface waters is considered to be good (Ledder 2003, NPS 2005c, NPS 2007b). The park's mainland streams, mainland coastline and bays, and the islands' coastline and bays all appear generally to have high water quality (NPS 2007b). There appears to be little impact of human activities on water quality within the park.

AQUATIC RESOURCES

Lake Superior has the lowest zooplankton density of all the Great Lakes, as well as the lowest number of taxa (Barbiero et al. 2001). Within the Apostle Islands, zooplankton production is approximately four times greater than within the open lake and copepods greatly outnumber cladocerans (Lake Superior Ecosystem Research Center 1997; Johnson et al. 2004). Montz (1986) found two major aquatic macroinvertebrate communities within the Apostle Islands – soft substrate and rock-rubble (Montz 1986). The soft substrate (sand) community was dominated by midges and segmented worms (Annelida (Oligochaeta)) and the rock-rubble substrate community was composed mainly of caddisflies (Trichoptera), mayflies (Ephemeroptera), midges (Chironomidae) and Mollusca species.

Gorman and Moore (2009) found the nearshore (<15 m) fish community of the Apostle Islands to be dominated by few species (ninespine stickleback, brook stickleback, slimy sculpin, lake chub, and burbot). The predominant nearshore habitat of the Apostle Islands region was characterized by low substrates with most margins of the islands unprotected from the open lake and subject to regular wave action which created a cobble-pebble-gravel band of substrate out to ~1 m depth. Some islands had shorelines of exposed sedimentary sandstone with nearshore zones dominated by rugged boulder and sandstone bedrock substrates. In areas of fine substrates, the fish community was dominated by ninespine stickleback but as slope and substrate size increased, slimy sculpin, burbot, lake chub, and brook stickleback became co-dominant with ninespine stickleback. Lake chub was the predominant species in areas with coarse substrates (boulder-bedrock). The offshore fish community was found to be distinct from that of the nearshore community. The offshore

community was dominated by coregonids and sculpins. Only the slimy sculpin was important in both communities. The most distinctive feature of the nearshore fish community was lake chub, as it was both unique to nearshore waters and was an abundant, conspicuous member of that community. (Gorman and Moore 2009).

WETLANDS

Sand Island is generally low and swampy with very little topography. There are a number of wetlands on Sand Island, including two large conifer swamps and two fairly large beaver flowages. The conifer swamps are dominated by black spruce with lower abundances of tamarack and white birch. The largest (111 acres) is between East Bay and Lighthouse Bay. The trail just skirts its east side. The other is 62 acres in size and is just over half a mile southwest of the East Bay dock. They have a number of typical wetland shrubs, including leatherleaf, Labrador-tea, lowbush blueberry, bog-laurel and small cranberry. The understory includes cotton-grass, pink lady's slipper, cinnamon fern, and false Solomon's seal. The swamps are surrounded by thickets of speckled alder. (Judziewicz 1993). There are two beaver flowages on the west side of the islands, one near West Bay and the other in the northwest portion of the island.

From a regulatory perspective, wetlands include "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas" (40 CFR 230.3(t)).

VEGETATION

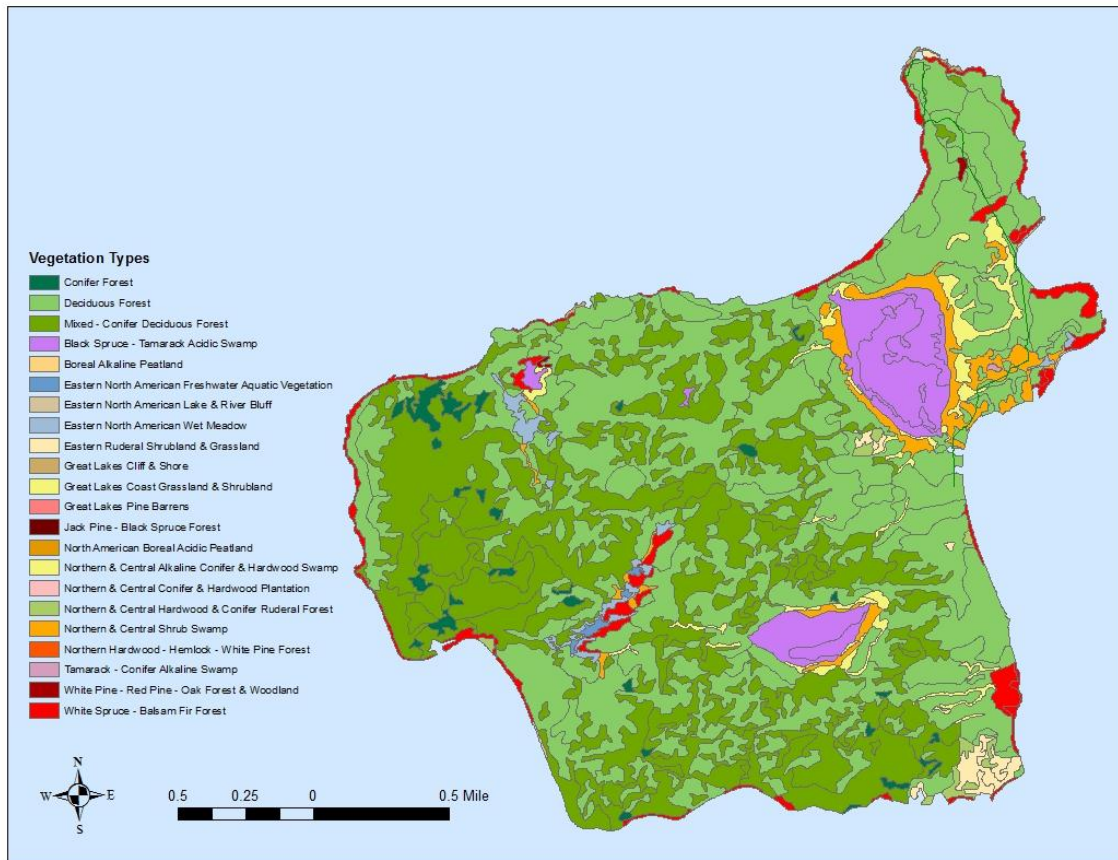
Sand Island has a moderately rich flora of 308 species. It is a low island, with very little topography and large wetlands. Its coastline is diverse and there are five large narrow beaches, however, they have few dune species. The pre-settlement forest was recorded as balsam fir, birch, sugar maple, and white pine (Frederick and Rakestraw 1976). Also noted were white cedar, spruce and hemlock. Based on stump counts and extant large trees, Anderson et al. (1982) suggests that the 90% of the islands was originally covered by a mix of hardwoods and conifers dominated by yellow birch, white pine, white cedar and hemlock. Most of Sand Island was repeatedly logged. From the late 19th century until 1975, there were seven major logging operations. Sand Island also had an active farming community that included a complex of farms between East Bay and Swallow Point, the Noring Farm west of East Bay and the Shaw Farm on the southeast corner of Sand Island. A number of exotic and uncommon native species occur in these old farmsites

The current forest is dominated by yellow birch, balsam-fir, white birch, white cedar, and red maple (Judziewicz 1993). There is a nearly 100 acre white-pine hemlock stand on Lighthouse and Swallow Points and two large black spruce-tamarack swamps totaling nearly

200 acres. At Lighthouse Bay a stand of white and yellow birches, balsam-fir and red maple includes scattered very large (up to 1 meter dbh) white pines and an herb layer that includes white mandarin, dwarf ginseng, bunchberry and Carolina spring-beauty. Canada yew, as well as mountain maple, is a dominant shrub on Sand Island, reflecting a history of few to no deer. (Judziewicz 1993). Although still abundant, Canada yew abundance was significantly decreased when deer became established and rapidly increased in the early 2000's. Deer numbers have since been greatly reduced and Canada yew and other browse sensitive species are starting to recover. Other important forest shrubs include beaked hazelnut, speckled alder, pin cherry, and red-osier dogwood. Common herbs on Sand Island include Canada mayflower, Clintonia, wood ferns, wild sasparilla, starflower and mash blue violet. (Judziewicz 1993).

Bird's-eye primrose, harebell and spike trisetum (State threatened) can be found on the sandstone ledges southeast of the light station. Shrubs in this area include ninebark, red-osier dogwood and long-beaked willow.

Figure 7. Vegetation Types on Sand Island



WILDLIFE

Thirty-seven species of mammals are known to occur in the park. Large mammals are not common on most of the islands and tend to be transient. Mammals that are common to most islands include red squirrel, snowshoe hare, deer mouse, and redback vole. Other species, such as black bear and white-tailed deer, are locally common on certain islands. Mammal species found on the islands less frequently include fox, coyote, bobcat, otter, and fisher. Some common mainland species that are less mobile or dormant in the winter (e.g., gray squirrel, least chipmunk, porcupine, skunk, and possibly some species of amphibians and reptiles) are not present on the islands.

Many of these species occur on Sand Island, including black bear, white-tailed deer, fox, coyote, bobcat, otter (Doolittle 2003), beaver and fisher, as well as snowshoe hare, red squirrel, deer mouse and redback vole. Coyote, bobcat, and fisher have been detected on Sand Island through the use of trail cameras (2009-2012). In 2009, a small number of wolves crossed the ice to Sand Island. During 2009, there were visual observations of two distinct animals, a trail camera image and track sign. As of 2012, there was no recent wolf sign on the island. Raccoons, which tend not to occur on the Apostle Islands, were captured on a trail camera in 2012.

Sand Island has a very dense population of black bear, increasing from 6 in 2002 to 10 (0.84 bears/km²) in 2010 (Wilton et. al 2011). Analysis of DNA samples found that, of the three bear populations studied in the park, Sand Island had the highest degree of genetic variability and was not genetically distinct from the Mainland population. Genetic variability was intermediate on Oak and lowest on Stockton Island, the largest and most distant from the mainland (Belant 2004).

Sand is one of the few Apostle Islands that did not appear to have a historic population of deer. Even when harvest levels were at their peak in 1954, aerial surveys conducted by the Wisconsin Department of Natural Resources (WDNR 1946-1956) found no evidence of deer on Sand Island. Landscape scale Canada yew in its understory is strong evidence of a lack of high deer numbers. Sand is also the only island within Apostle Islands National Lakeshore that historically had a year-round human community. It is possible that residents kept deer to very low levels. All that changed around 2000 when deer became established and began rapidly increasing in number. By 2006, browse surveys and pellet counts indicated that impacts to Canada yew were becoming severe, with browse being recorded in nearly every plot (97%). To protect this rare plant community, aggressive management control began in 2009 and has successfully reduced the deer population on Sand Island. The current deer population on Sand Island is low (Van Deelen, et. al.2013) and the Canada yew is showing signs of recovery (NPS 2013).

Due to its strategic geographic location and wide diversity of habitats, Apostle Islands National Lakeshore provides a refuge for birds. Through the park's long-term monitoring program for forest breeding birds, 150 species of birds have been recorded (NPS 2012d). Sand Island provides diverse habitat for breeding birds. Breeding bird surveys indicate that

Sand Island has one of the highest density of breeding birds in the Apostle Islands. It also has a fairly high diversity with 160 species being recorded during breeding bird surveys. (NPS 2014).

The islands provide important habitats for resident breeding birds as well as neotropical migrant land birds (birds that migrate to Central and South America in winter). Over 89% of the breeding birds in the park are migrants, 59% of which are neotropical migrants. The Apostle Islands are an important migratory flyway stopover in the Great Lakes region. Nearly all of the islands provide habitat for migrating birds. The park provides important nesting habitat for the following colonial nesting birds: herring gulls, double-crested cormorants, great blue herons, and cliff swallows. Sand Island provides nesting habitat for herring gulls.

Six species of salamanders, ten species of frogs and toads, and six species of reptiles are known to occur within the park, including the islands. Blue-spotted salamander, four-toed salamander, garter snake, spring peepers, wood frog, green frog, and American toad have been documented from Sand Island (Casper 2001).

CULTURAL RESOURCES

Ethnographic Resources

Ethnographic resources are the cultural and natural features of a park that are of traditional significance to traditionally associated peoples (NPS 2006). Park neighbors include both the Red Cliff and Bad River Bands of Lake Superior Chippewa (Ojibwe). Part of the park's mainland unit is within the Red Cliff Reservation and the remainder of the park is included within lands ceded to the United States government in the Treaty of 1842 with the Lake Superior Ojibwe. In these ceded lands, Ojibwe tribes kept their off-reservation rights to hunt and trap.

Only limited research has been completed for the ethnographic significance of the Apostle Islands to associated Native American groups. In 1999, a team from the University of Arizona conducted field interviews with Ojibwe elders to begin the process (Stoffle 2000). This study provided some valuable preliminary information; however, given the archipelago's central role to the Ojibwe, it is likely that there is much yet to be learned. In the course of the University of Arizona study, Native consultants reported that all the islands were used by their people, primarily on a seasonal basis. Responses evidenced a pattern according to which the islands closer to the mainland were generally inhabited for longer periods of time than those further from the shore. Consultants also stressed that environmental constraints and uneven resource distribution both spatially and temporally, forced Ojibwe people to constantly move from island to island, to the mainland, and to places in the interior. In addition, Ojibwe people utilized the park for hunting. Use of the park resources extended to Ojibwe bands from the entire Lake Superior region.

Archeological Resources

Archeological evidence from Stockton Island indicates that human use of the islands may extend back at least as far as 3,000 BC (Bringelson 2008, Table 1). The physical remains of human activity on the islands constitutes an archeological record of the Lakeshore's cultural history. An intensive archeological survey of Sand Island was conducted by a Beloit College team in 1974, covering much of the island shoreline as well as upland portions of the island interior. While not a 100% survey, the survey did cover those areas thought most likely to contain evidence of human habitation. The evidence for human use of Sand Island pre-dating European contact was very sparse: one interior site produced two quartz flakes and a piece of fire-cracked rock, and one site closer to the lakeshore produced a single chert flake (Salzer and Overstreet 1976:68). It is likely that much pre-contact use of the island left very few remains, or occurred on surfaces (such as beaches and shoreline edges) where evidence has been lost through wave action and erosion.

Recorded historical archeological remains on Sand Island date to the 1880s through 1940s and include refuse middens deposited between the 1880s and the 1930s at Sand Island light as well refuse middens and structural remains at the early twentieth century Hansen and Moe farmsteads. More modern (twentieth century) refuse middens have also been observed along the former county road in East Bay, and additional historic farm remnants have been found (but not yet formally inventoried) at the former Noring and Dahl farmsteads behind East Bay. Historic dock remnants have been observed at West Bay Lodge, Sand Island light, Hansen and Moe farms, and north of the East Bay campground dock but no historic dock, boat, or shipwreck remains are known or believed to lie within the project area at East Bay.

Cultural Landscapes

Several historic structures on Sand Island have both associated archeological remains as well as cultural landscapes. Cultural landscapes have been formally inventoried by the National Park Service at Sand Island Light and Hansen Farm (NPS Cultural Landscape Inventory 2011). Potential cultural landscape resources have been identified (but not yet inventoried or evaluated) at West Bay Lodge, Campbell Cottage, Camp Stella, and Shaw/Hill Farm. Remains of field openings, plantings, and orchards at Noring, Dahl, and Moe farms (where no associated historic structures are present) may also have cultural landscape values but have not been evaluated.

VISITOR USE AND EXPERIENCE

The average number of annual recreational visitors to Apostle Islands National Lakeshore in the period from 1993-2013 was 174,040. In 2013 there were a little more than 148,500 recreational visitors in the park. Approximately 45,000 of these were island visitors. An additional 17,000 visitors toured the Apostle Islands by the concessioner's cruise boat. The

seasonal visitation patterns for this period show that the vast majority of visitation occurs in the summer months, from June-August. Peak use is during July and August, on weekends. Visitation rapidly drops off in September and October. In 2013, 2/3rds of park visitation occurred in June, July and August. Most motorboaters and sailboaters congregate at relatively secure anchorages or docks at Stockton, Rocky/South Twin, Raspberry, Oak and Sand Islands. These islands also receive the highest use levels. Also, islands that are closer to the mainland tend to receive higher use levels, while the more remote islands receive lower use levels.

Sand Island is one of the most frequently visited islands within the park. Its proximity to the mainland, boat and kayak launch facilities at Little Sand Bay, and excellent fishing grounds make it popular for boaters and paddlers. The island's three individual and two group campsites are among the busiest of the 64 campsites in the park. Approximately 2,500 visitors camp on the island annually. Sand Island has about 2.5 miles of hiking trails. The island's beaches, sea caves, old growth forest, and historic lighthouse all add to its attraction for visitors. The Sand Island lighthouse is toured by approximately 1,500 visitors annually. Most people who spend time on the island stay on the shorelines, particularly beaches, or in the general vicinity of the developed areas. In general, sail and power boat users tend to come on shore to use the park facilities, picnic, or explore. Kayakers are the most frequent users of campsites and tend to venture further into the interior of the islands than other visitors. As noted by historian William Cronon in 2003, the Apostle Island in general and Sand Island in particular allow visitors to experience a "superb example of a wilderness in which natural and human histories are intimately intermingled." Sand Island visitors gain a better understanding of "island living" from both a modern and historical perspective. Life lease properties at the south end of the island are regularly used by lease holders' family and friends. These buildings are not open to the general public. The island's cultural landscape still bears evidence of a time when the island hosted a year-round community.

Volunteers are staffed on Sand Island from mid-June through August. These volunteers provide various visitor services, including light station talks. In addition to personal interpretation, there are a number of waysides to provide both orientation information and to tell some of the Sand Island stories. The Apostle Islands National Lakeshore Wayside Exhibit Proposal (2002) provides direction for waysides within the park. There is a cluster of two upright orientation wayside panels and a bulletin case that are presently located near the north dock at East Bay between campsite 4 and the cleared area containing campsites 1 and 2. The cluster is adjacent to the trail leading from East Bay to the light station. The Sand Island orientation panel features historic photos and a description of the Sand Island community, a map of the island, and descriptions of present hiking and camping opportunities on the island. The park orientation panel features a map of Apostle Islands National Lakeshore, photos of Sand Island scenes, and an explanation of park user fees.

There are two wayside exhibits that serve to caption significant features along the trail near East Bay. One of the waysides is located adjacent to the trail near the foundation of the old Sand Island School, not far from group campsite A, and features an historic photo of the

school. The second wayside is located adjacent to two antique cars parked off the trail near the north East Bay dock and has a map of the island's old road and photos of vehicles that were once used on the island. Two more wayside exhibits are located on the grounds of the Sand Island light station. One describes details of the station's history and the other features a photo of the steamship *SEVONA* along with details of the ship's sinking in a 1905 storm.

There are hunting and trapping opportunities in the park, including Sand Island. Hunting and trapping seasons for most harvestable species on the islands are consistent with State of Wisconsin regulations. Deer management is the exception. There are special regulations for the islands, including Sand, that provide for increased harvest opportunities. There are Apostle Islands specific tags, an October muzzleloader hunt, and an archery season.

PARK OPERATIONS

The staff at Apostle Islands National Lakeshore is responsible for managing approximately 69,000 acres spread out in Lake Superior over a 250,000 acre area. Average annual visitation is approximately 174,000. The lakeshore currently (2014) has approximately 34 permanent and 15-25 seasonal employees who perform a variety of functions including: park management, administration, resource management (cultural and natural), maintenance or facility management, resource and visitor protection, and interpretation and education. The facility management division has the primary responsibility for campsites and trails, but works closely with resource management staff and the park's interdivision backcountry management team.

Chapter 4: Environmental Consequences

This chapter analyzes the potential environmental consequences, or impacts, that would occur as a result of implementing the Sand Island campsite and day-use plan, including the No Action Alternative. Topics analyzed in this chapter include: geology, coastal processes, and soils; water quality; aquatic resources; wetlands; vegetation; special status species; wildlife; cultural resources (cultural landscapes and archeology); visitor use and experience; and park operations.

General Methodology for Analyzing Impacts:

In accordance with the CEQ regulations, direct, indirect, and cumulative impacts are described (40 CFR 1502.16) and the impacts are assessed in terms of context and intensity (40 CFR 1508.27). Where appropriate, mitigating measures for adverse impacts for each resource may vary; therefore, these methodologies are described under each impact topic.

Type of Impact describes the classification of the impact as either *beneficial* or *adverse*, *direct* or *indirect*. The terms “impact” and “effect” are used interchangeably throughout this EA.

- *Beneficial*: An impact that would result in a positive change to the resource when compared to the existing conditions.
- *Adverse*: An impact that causes an unfavorable result to the resource when compared to the existing condition.
- *Direct*: Impacts that would occur as a result of the proposed action at the same time and place of implementation (40 CFR 1508.8).
- *Indirect*: Impacts that would occur as a result of the proposed action, but later in time or farther in distance, but still reasonably foreseeable from the action (40 CFR 1508.8).

Cumulative Impact Scenario Analysis Methodology

CEQ regulations require the assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for both the no-action and action alternatives.

Cumulative impacts were determined by combining the impacts of the action alternatives (implementation of the trails plan) with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects on Sand Island and, if applicable, the park and surrounding region. No reasonably foreseeable future development is anticipated for Sand Island.

Assessing Impacts Using CEQ Criteria:

The impacts of the alternatives are assessed using the CEQ definition of “significantly” (1508.27), which requires consideration of both context and intensity:

Context:

Significance varies with the physical setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale, rather than in the world as a whole. This means that the significance of any action may be analyzed within the appropriate context, such as society as a whole (human, national), the affected region, or the locality. Both short-term and long-term effects are relevant which is often characterized as duration.

Duration:

1. *Short-term*: impacts generally last only during the initiation and implementation of the project, and the resources resume their pre-project conditions following the implementation of the project.
2. *Long-term*: impacts last beyond the initiation and implementation of the project, and the resources may not resume their pre-project conditions for a longer period of time.

Intensity:

This refers to the severity of the impact. The following should be considered in evaluating intensity:

1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
2. The degree to which the proposed action affects public health or safety.
3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.
5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the impact.

For each impact topic analyzed, an assessment of the potential significance of the impacts according to context, intensity and duration is provided in the “conclusion” section that follows the discussion of the impacts under each alternative. Intensity of the impacts fully considers the relevant factors from the list above. Intensity factors that do not apply to a given resource topic and/or alternative are not discussed.

Table 2. Impact Matrix

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Geology, Coastal Processes, and Soils</i>	There would continue to be long-term negligible adverse impacts on coastal processes due to build-up of sediments on the north side of docks and disrupting streamflow into Lake Superior.	Approx. 3 acres (0.1% of island acreage) of short-term localized soil disturbance would occur from trail, campsite, vault toilets, privies, and picnic area development.	Approx. 5 acres (0.17% of island acreage) of short-term localized soil disturbance would occur from trail, campsite, vault toilets, privies, and picnic area development.	Approx. 6 acres (0.2% of island acreage) of long-term localized soil disturbance from trail, campsite, vault toilets, privies, and picnic area development.	<p>Long-term beneficial impacts to coastal processes due to a dock with a flow-through design that minimizes build-up of sand and disruption to sand movement.</p> <p>There would be some long-term soil compaction from visitor use. However, where boardwalks are installed there would be less compaction and long-term erosion because informal widening of the trail during muddy conditions by visitors would be eliminated or greatly minimized.</p> <p>More than 50% of new disturbance would be in areas that have been previously disturbed (e.g., old roadway, campsite, etc.)</p>

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Water Quality</i>	No impacts to water quality.	Under this alternative, there would be the least amount of accessible boardwalk built and fewest drainage crossings. Therefore, both adverse and beneficial impacts would be the least under this alternative.	Under this alternative, the amount of accessible boardwalk built and drainage crossings would be in-between Alternatives B and D. Therefore, both adverse and beneficial impacts would be more than Alternative B, but more than Alternative D.	This alternative includes the longest boardwalk and highest number of drainage crossings. Therefore both adverse and beneficial impacts would be greatest under this alternative.	Increased turbidity during dock removal and construction would result in minimal adverse impacts that are localized, short-term and indirect. During construction of accessible boardwalk and bridges over small drainages, there would be short-term localized, minimal adverse impacts. However, long-term localized benefit would be expected due to boardwalk minimizing soil erosion.
<i>Aquatic Resources</i>	No new adverse impacts.	See common to action alternatives.	See common to action alternatives.	See common to action alternatives.	Short-term localized impact due to increased turbidity and disturbance during construction. Negligible long-term localized impact from slightly decreased fish cover. Potential for exotic species introduction.

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Wetlands</i>	No impacts to wetlands.	No expected impacts to wetlands.	Less than 1/10 acre of long-term direct impacts.	Less than 1/10 acre of long-term direct impacts.	
<i>Vegetation</i>	No new adverse impacts.	Approximately 3 acres of long-term localized impacts on vegetation would occur as a result of clearing for campsite, trail/boardwalk, vault toilets, stump privies, and picnic area development.	Approximately 5 acres of long-term localized impacts on vegetation would occur as a result of clearing for campsite, trail/boardwalk, vault toilets, stump privies, and picnic area development.	Approximately 6 acres of long-term localized impacts on vegetation would occur as a result of clearing for campsite, trail/boardwalk, vault toilets, stump privies, and picnic area development.	More than ½ of the acres disturbed would be in areas of previous disturbance.
<i>Wildlife</i>	No impacts to wildlife.	The geographic area disturbed is the smallest of the action alternatives.	The geographic area disturbed is greater than Alt. B and smaller than Alt. D.	The geographic area disturbed is the greatest of the action alternatives, but still only represents 0.2% of the island's acreage.	Adverse impacts to wildlife are expected to be short-term, negligible, indirect and limited to narrow trail corridors, small campsite areas, and a picnic area period.
<i>Cultural Resources (Landscapes and Archeology)</i>	Negligible impacts due to continued use of current docks, trails, and campsites.	Approx. 3 acres of short-term localized soil disturbance from trail, campsite, vault toilets, privies, and picnic area development.	Approx. 5 acres of short-term localized soil disturbance from trail, campsite, vault toilets, privies, and picnic area dev.	Approx. 6 acres of long-term localized soil disturbance from trail, campsite, vault toilets, privies, and picnic area development.	Individual NHPA reviews would be done prior to campsite, trail, vault toilet, and privy development and any adverse effects would be avoided or mitigated as decided through 106 consultation.

	<i>Alternative A No Action- Continuation of Current Management</i>	<i>Alternative B Improve Visitor Use Experience and Accessibility (minimum)</i>	<i>Alternative C Improve Visitor Use Experience and Accessibility (moderate)</i>	<i>Alternative D Improve Visitor Use Experience and Accessibility (maximum)</i>	<i>Common to Alternatives B, C, and D</i>
<i>Visitor Use</i>	Long-term, direct, negligible to minimal impacts from deteriorating docks and continued lack of privacy at campsites.	Minor long-term beneficial impacts would occur due to better docking, improved day-use facilities, and increased accessibility.	Minor to moderate long-term direct beneficial impacts. Alt. C would provide better protection and greater docking capacity than Alt. A or B, a higher number of campsites and a longer accessible boardwalk.	Moderate long-term direct beneficial impacts. Alt. D would provide slightly better protection for docked boats than Alts. A or B, the highest number of campsites and the greatest amount of accessible trail and campsites.	
<i>Park Operations</i>	Continued need to try to repair docks that are in very poor condition.	Reduced dock maintenance. Increased workload due to additional boardwalk and campsites – least of the action alternatives.	Reduced dock maintenance. Increased workload due to additional boardwalk and campsites – more than Alt. B and less than Alt. D.	Reduced dock maintenance. Increased workload due to additional boardwalk and campsites – greatest of the action alternatives.	

GEOLOGY, COASTAL PROCESSES, AND SOILS

Alternative A: No Action

- **Impacts:**

Under this alternative, there would not be additional trail, campsite or picnic area development. The docks would not be replaced, continuing impacts to coastal processes. There would be a continued build-up of sediments and the north East Bay dock would continue to impede the outlet of a small stream that periodically flows beneath the dock. Areas of erosion, such as the trail segment near Lighthouse Bay and Justice Bay would be realigned, as needed. No to negligible impacts would occur under this alternative.

- **Cumulative Impacts:**

The largest past actions impacting geology and soils occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. The park's trail system was primarily developed on old roadways and most campsites are located in old homesites. No additional impacts would occur under the no action alternative.

- **Conclusion:**

Negligible adverse impacts would continue due to docks impacting coastal movement of sediment and natural erosion would continue to impact soils.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

This alternative includes replacing the north and south East Bay docks with a dock that minimizes sediment build-up and impacts to coastal processes. The current public dock is approximately 135' long and the NPS dock is 116' long. Both structures are built on wood cribs. The new dock would have a straight design, be 200' in length, and have a 125' flow-through section closest to the shore and a 75' solid sheet pile section to provide protection to docked vessels. The flow-through design would reduce current impacts to coastal processes, resulting in a long-term beneficial impact that is direct and local in context. In addition, removal of the existing docks would have a beneficial impact on coastal process and sediment flow.

This alternative also includes a new individual campsite at Lighthouse Bay; converting campsite 4 into an accessible individual campsite; creating a picnic area in an already disturbed location; relocating two individual campsites; creating an accessible route from the dock to campsite 4; relocating vault toilets; adding privies at remote campsites; realigning small trail sections; and replacing stairs that provide beach access. This would result in approximately three acres of short-term localized soil disturbance during construction. There would be some long-term soil compaction from visitor use at campsites and trails, however, the use of boardwalks would reduce compaction and

erosion. Boardwalks would also eliminate or greatly reduce informal trail widening during muddy conditions by visitors.

- **Cumulative Impacts:** The largest past actions impacting geology and soils occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. The park's trail system was primarily developed on old roadways and most campsites are located in old homesites. This alternative would reduce current impacts to coastal processes. Cumulative impacts on soil erosion and compaction would be minimal.
- **Conclusion:**
There would be beneficial long-term impacts to coastal processes resulting from removal of the current crib docks with a single dock that allows for movement of sand. Short-term soil disturbance would occur during construction and there would be some long-term soil compaction from visitor use. The impacts would be direct and restricted to a narrow area along the east side of Sand Island, primarily at East Bay, and a small campsite along Lighthouse Bay, impacting approximately three acres. Overall impacts to soils and geology associated with Alternative D do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**
Similar to Alternative B, the NPS and public dock would be removed and replaced with a public dock that has a flow-through section. Under this alternative, the dock would be 225' in length, with a 125' flow-through section. There would be 100' solid sheet pile section and a 40' L section to provide protection from easterly winds. The removal of the current docks and replacement with a new dock with a flow-through design would reduce current impacts to coastal processes, resulting in a long-term beneficial impact that is direct and local in context.

This alternative also includes new individual campsites at Lighthouse Bay and Justice Bay; converting campsite 1 and 2 into an accessible group campsite; creating a picnic area at the end of the new dock; relocating two individual campsites; creating an accessible route from the dock to the Hansen Farm; relocating vault toilets; adding privies at remote locations; realigning small trail sections; creating an east-west trail across the island along an old roadbed; and replacing stairs that provide beach access. This would result in approximately five acres of short-term localized soil disturbance during construction. There would be some long-term soil compaction from visitor use at campsites and trails, however, the use of boardwalks would reduce compaction and erosion. Boardwalks would also eliminate or greatly reduce informal trail widening during muddy conditions by visitors.

- **Cumulative Impacts:**

The largest past actions impacting geology and soils occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. The park's trail system was primarily developed on old roadways and most campsites are located in old homesites. This alternative would assist in reducing current impacts to coastal processes. Cumulative impacts on soil erosion and compaction would be minimal.

- **Conclusion:**

There would be beneficial long-term impacts resulting from replacement of current docks with one that allows for movement of sand, reducing impacts to coastal processes. Adverse impacts to soil would occur during construction that would be short-term in duration. There would also be some long-term soil compaction from visitor use. The impacts would be direct and restricted to a narrow area along the east side of Sand Island, a narrow east-west trail corridor, and small campsites at Lighthouse Bay and Justice Bay, impacting approximately 5 acres. Overall impacts to soils and geology associated with Alternative D do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

Similar to Alternatives B and C, the NPS and public dock would be removed and replaced with a public dock that has a flow-through section. Under this alternative, the dock would be 200' in length, with a 115' flow-through section and 10' wide. There would be 85' solid sheet pile section and a 70' T section to provide protection from easterly winds. The removal of the current docks and replacement with a new dock with a flow-through design would reduce current impacts to coastal processes, resulting in a long-term beneficial impact that is direct and local in context.

This alternative also includes new individual campsites at Lighthouse Bay, Justice Bay, West Bay and on the Mainland Unit; converting campsite 1 and 2 into an accessible group campsite and campsite 4 into an accessible individual campsite; creating a picnic area at the end of the new dock with a sheltered pavilion; relocating two individual campsites; creating an accessible route from the dock to the Light Station, including a Hansen Farm loop; creating an east-west trail across the islands along an old roadbed; relocating vault toilets; adding privies at remote locations; realigning small trail sections; and replacing stairs that provide beach access. This would result in approximately six acres of short-term localized soil disturbance during construction. There would be some long-term soil compaction from visitor use at campsites and trails, however, the use of boardwalks would reduce compaction and erosion. Boardwalks would also eliminate or greatly reduce informal trail widening during muddy conditions by visitors.

- **Cumulative Impacts:**

The largest past actions impacting geology and soils occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. The park's trail system was primarily developed on old roadways and most campsites are located in old homesites. This alternative would assist in reducing current impacts to coastal processes, but to a lesser extent than under Alternatives B or C. Cumulative impacts on soil erosion and compaction would be minimal.

- **Conclusion:**

There would be beneficial long-term impacts resulting from replacement of current docks with one that allows for movement of sand, reducing impacts to coastal processes. Short-term adverse soil disturbance would occur during construction and there would be some long-term soil compaction from visitor use. The impacts would be direct and restricted to a narrow area along the east side of Sand Island, a narrow east-west trail corridor, and small campsites at Lighthouse Bay, Justice Bay and on the Mainland Unit, impacting approximately 6 acres. Overall impacts to soils and geology associated with Alternative D do not meet any of the significance criteria.

WATER QUALITY

Alternative A: No Action

- **Impacts:**

There would be no impact to water quality because dock, trail and campsite construction would not occur.

- **Cumulative Impacts:**

This alternative would not impact water quality.

- **Conclusion:**

The no-action alternative would have no impact on water quality.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

Removal of the existing docks and construction of a new dock would result in short-term increases in turbidity and suspended sediment. These adverse impacts are expected to be minimal and very localized in context. During trail construction, there may be short-term increases in turbidity from erosion near drainages. However, especially where boardwalk is being constructed, over the long-term there may be a decrease in erosion and associated turbidity near drainages.

- **Cumulative Impacts:**

Natural erosion and run-off periodically results in increased turbidity to Lake Superior. This project would add to this by creating a short-term localized increase in turbidity and suspended sediment.

- **Conclusion:**

Adverse impacts on water quality as a result of implementing this alternative are expected to be short-term, minimal and localized in context. Overall, impacts to water quality associated with Alternative B to not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**

Removal of the existing docks and construction of a new dock would result in short-term increases in turbidity and suspended sediment. These adverse impacts are expected to be minimal and very localized in context. This alternative includes more trail construction than Alternative B, but less than Alternative D. During trail construction, there may be short-term increases in turbidity from erosion near drainages. However, especially where boardwalk is being constructed, over the long-term there may be a decrease in erosion and associated turbidity near drainages.

- **Cumulative Impacts:**

Natural erosion and run-off periodically results in increased turbidity to Lake Superior. This project would add to this by creating a short-term localized increase in turbidity and suspended sediment. .

- **Conclusion:**

Adverse impacts on water quality as a result of implementing this alternative are expected to be short-term, minimal and localized in context. Overall, impacts to water quality associated with Alternative C to not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

Removal of the existing docks and construction of a new dock would result in short-term increases in turbidity and suspended sediment. These adverse impacts are expected to be minimal and very localized in context. This alternative includes more trail construction than either Alternative B or C. During trail construction, there may be short-term increases in turbidity from erosion near drainages. However, especially where boardwalk is being constructed, over the long-term there may be a decrease in erosion and associated turbidity near drainages.

- **Cumulative Impacts:**
Natural erosion and run-off periodically results in increased turbidity to Lake Superior. This project would add to this by creating a short-term localized increase in turbidity and suspended sediment.
- **Conclusion:**
Adverse impacts on water quality as a result of implementing this alternative are expected to be short-term, minimal and localized in context. Overall, impacts to water quality associated with Alternative D do not meet any of the significance criteria.

AQUATIC RESOURCES

Alternative A: No Action

- **Impacts:**
The current docks provide some habitat for aquatic species, such as fish. Negative impacts to aquatic resources would not result from leaving the docks in place.
- **Cumulative Impacts:**
This alternative would not impact aquatic resources.
- **Conclusion:**
The no-action alternative would have no impact on aquatic resources.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**
Adverse impacts to aquatic resources may occur as a result of dock removal and construction. During removal and construction, short-term, localized turbidity would be expected. There would be a negligible adverse impact from decreasing the amount of cover currently available underneath the existing docks. The existing docks are 251' in total; the new dock would be 200'. Removal of rocks from the dock cribs may decrease habitat availability for benthos, however, more natural substrate would be restored. Due to heavy equipment needed for dock removal and construction, there would be an increased risk of introduction of aquatic invasive species. This could be mitigated through proper cleaning and disinfecting of vessels and equipment.
- **Cumulative Impacts:**
The cumulative impacts on aquatic resources from this alternative would be minimal. Historically, there were a number of docks at East Bay. Most have been removed. This alternative would result in a small reduction in potential fish cover.

- **Conclusion:**

Potential adverse impacts under Alternative B would be very localized in context, limited to the dock area at East Bay on Sand Island. Alternative B would have short-term minimal adverse impacts to aquatic resources due to increased turbidity, negligible long-term impact from decreased fish cover, and potential long-term impact if aquatic invasive species are introduced during construction. Overall, impacts to aquatic resources associated with Alternative B do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**

Impacts to aquatic resources under Alternative C would be very similar to those described for Alternative B. During dock removal and construction, short-term, localized turbidity would be expected. There would be a negligible adverse impact from decreasing the amount of cover currently available underneath the existing docks. The existing docks are 251' in total; the new dock would be 225'. The L shape at the end of the dock may be beneficial to fish by providing an area protected from waves. Removal of rocks from the dock cribs may decrease habitat availability for benthos, however, more natural substrate would be restored. Due to heavy equipment needed for dock removal and construction, there would be an increased risk of introduction of aquatic invasive species. This could be mitigated through proper cleaning and disinfecting of vessels and equipment.

- **Cumulative Impacts:**

The cumulative impacts on aquatic resources from this alternative would be minimal. Historically, there were a number of docks at East Bay. Most have been removed. This alternative would result in a small reduction in potential fish cover.

- **Conclusion:**

Potential adverse impacts under Alternative C would be very localized in context, limited to the dock area at East Bay on Sand Island. Alternative C would have short-term minimal adverse impacts to aquatic resources due to increased turbidity, negligible long-term impact from decreased fish cover, and potential long-term impact if aquatic invasive species are introduced during construction. There may be a potential beneficial impact to fish from a small sheltered area created by the dock. Overall, impacts to aquatic resources associated with Alternative C do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

Impacts to aquatic resources under Alternative D would be very similar to those described for Alternative B and C. During dock removal and construction, short-term, localized turbidity would be expected. There would be a negligible adverse impact from

decreasing the amount of cover currently available underneath the existing docks. The existing docks are 251' in total; the new dock would be 200'. The T shape at the end of the dock may be beneficial to fish by providing an area protected from waves. Removal of rocks from the dock cribs may decrease habitat availability for benthos, however, more natural substrate would be restored. Due to heavy equipment needed for dock removal and construction, there would be an increased risk of introduction of aquatic invasive species. This could be mitigated through proper cleaning and disinfecting of vessels and equipment.

- **Cumulative Impacts:**

The cumulative impacts on aquatic resources from this alternative would be minimal. Historically, there were a number of docks at East Bay. Most have been removed. This alternative would result in a small reduction in potential fish cover.

- **Conclusion:**

Potential adverse impacts under Alternative D would be very localized in context, limited to the dock area at East Bay on Sand Island. Alternative D would have short-term minimal adverse impacts to aquatic resources due to increased turbidity, negligible long-term impact from decreased fish cover, and potential long-term impact if aquatic invasive species are introduced during construction. There may be a potential beneficial impact to fish from a small sheltered area created by the dock. Overall, impacts to aquatic resources associated with Alternative D do not meet any of the significance criteria.

WETLANDS

Alternative A: No Action

- **Impacts:**

There are currently small sections of boardwalk (approx. 2' wide) that cross areas of trail that tend to be wet and muddy. These boardwalks reduce widening of the trail and keep soil disturbance to a minimum. The no action alternative would not change the ability of wetlands to function.

- **Cumulative Impacts:**

The small sections of boardwalk that occur along the existing trail would not adversely impact wetland function.

- **Conclusion:**

Adverse impacts on wetlands would occur from Alternative A.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**
Under Alternative B, trail construction/expansion would be limited to a short accessible boardwalk from the dock to along the main trail to campsite 4. Although nearly all of Sand Island is low and wet, this route would not cross wetlands or hydric soil.
- **Cumulative Impacts:** Alternative B would not impact wetlands.
- **Conclusion:**
No impacts to wetlands are expected from implementation of this alternative.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**
Under Alternative C, trail construction/expansion would include an accessible boardwalk to Hansen Farm, including a loop. Portions of the existing trail that would be widened for an accessible boardwalk run very close to a large wetland and the route contains approximately 1300' of hydric soil. The trail has boardwalk in this area that would be widened approximately 6' to meet accessibility standards. This alternative also includes creating a trail from East Bay to West Bay along an old roadway. The trail would deviate from the old roadway, when needed, to avoid wetlands and hydric soils. Executive Order (EO) 11990 (Wetland Protection) requires Federal agencies "...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 practical alternative...". Director's Order No. 77-1, Wetland Protection, exempts activities that impact less than 1/10 acre of wetlands where the purpose is for scenic overlooks, and foot/bicycle trails or boardwalks. It is expected that less than 1/10 acre would be disturbed under this alternative.
- **Cumulative Impacts:**
A very short segment of the main trail on Sand Island passes through hydric or very poorly drained soil. Currently there are sections of two foot wide boardwalk along wet sections of the trail. This project would result in the boardwalk along this section (approx. 1300') being widened from approximately two feet to approximately six feet.
- **Conclusion:**
Adverse impacts to wetlands are expected to be long-term, direct, and restricted to below the 1/10 acre threshold. Overall, impacts to wetlands associated with Alternative C do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

Under Alternative D, trail construction/expansion would include an accessible boardwalk to the light station, including a Hansen Farm loop. The portion of the existing trail that runs very close to a large wetland and contains hydric soil is the same portion of the trail that would be impacted under Alternative C. As with Alternative C, the existing boardwalk would be widened for an accessible boardwalk along a route that includes approximately 1300' of hydric soil. The boardwalk in this area that would be widened approximately 6' to meet accessibility standards. This alternative also includes creating a trail from East Bay to West Bay along an old roadway. The trail would deviate from the old roadway, when needed, to avoid wetlands and hydric soils. Executive Order (EO) 11990 (Wetland Protection) requires Federal agencies "...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 practical alternative...". Director's Order No. 77-1, Wetland Protection, exempts activities that impact less than 1/10 acre of wetlands where the purpose is for scenic overlooks, and foot/bicycle trails or boardwalks. It is expected that less than 1/10 acre would be disturbed under this alternative.

- **Cumulative Impacts:**

A very short segment of the main trail on Sand Island passed through hydric or very poorly drained soil. Currently there are sections of two foot wide boardwalk along wet sections of the trail. This project would result in the boardwalk along this section (approx. 1300') being widened from approximately two feet to approximately six feet.

- **Conclusion:**

Adverse impacts to wetlands are expected to be long-term, direct, and restricted to below the 1/10 acre threshold. Overall, impacts to wetlands associated with Alternative D do not meet any of the significance criteria.

VEGETATION

Alternative A: No Action

- **Impacts:**

The no action alternative would not result new adverse impacts to vegetation.

- **Cumulative Impacts:**

The largest past actions impacting vegetation occurred prior to the park's establishment. Impacts included land alteration and clearing such as plowing, logging, filling, leveling,

road construction, ditching, and grading. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

- **Conclusion:**

The no-action alternative would not create new impacts to vegetation.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

Alternative B would adversely impact approximately three acres of vegetation, primarily deciduous and mixed conifer forest. Dominant tree species include yellow birch, balsam-fir, white birch, white cedar and red maple. Indirectly, trail and campsite users may spread exotic invasive species.

- **Cumulative Impacts:**

The largest past actions impacting vegetation occurred prior to the park's establishment. Impacts included land alteration and clearing such as plowing, logging, filling, leveling, road construction, ditching, and grading. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

Other potential cumulative impacts associated with vegetation include the potential spread of invasive species. Trail users can unknowingly spread non-native exotic species through transporting by clothing, boots, or equipment. However, proper education of trail users would help minimize vegetation impacts and invasive species.

- **Conclusion:**

Alternative B would have adverse impacts on vegetation. Impacts associated with campsite and trail development would be direct and limited, resulting in approximately three acres or 0.1% of the island's acreage. However, trail and campsite users may spread of invasive exotic species. The intensity of impact to vegetation would be minimal in overall context. Overall, impacts to vegetation associated with Alternative B do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**

Alternative C would adversely impact approximately five acres of vegetation, primarily deciduous and mixed conifer forest. Dominant tree species include yellow birch, balsam-fir, white birch, white cedar and red maple. In addition to impacts associated with Alternative B, this alternative includes a longer section of accessible boardwalk, a trail from East Bay to West Bay (approx. 2 miles) and a small campsite near Justice Bay. In addition to direct impacts, indirect impacts include the potential for trail and campsite users to inadvertently spread exotic invasive species.

- **Cumulative Impacts:**

The largest past actions impacting vegetation occurred prior to the park's establishment. Impacts included land alteration and clearing such as plowing, logging, filling, leveling, road construction, ditching, and grading. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

Other potential cumulative impacts associated with vegetation include the potential spread of invasive species. Trail users can unknowingly spread non-native exotic species through transporting by clothing, boots, or equipment. However, proper education of trail users would help minimize vegetation impacts and invasive species.

- **Conclusion:**

Alternative C would have adverse impacts on vegetation. Impacts associated with campsite and trail development would be direct and limited, resulting in approximately five acres or 0.17% of the island's acreage. In addition to direct impact, there is increased potential for campsite or trail users to spread invasive exotic species. The intensity of impact to vegetation would be minimal in overall context. Overall, impacts to vegetation associated with Alternative C do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

Alternative D includes the greatest amount of trail and campsite development and would adversely impact approximately six acres of vegetation, primarily deciduous and mixed conifer forest. Dominant tree species include yellow birch, balsam-fir, white birch, white cedar and red maple. In addition to impacts associated with Alternative C, this alternative includes a longer section of accessible boardwalk and small campsites at West Bay and on the Mainland Unit between Sand Point and the Mainland sea caves. In addition to direct impacts indirect impacts include the potential for trail and campsite users to inadvertently spread exotic invasive species.

- **Cumulative Impacts:** The largest past actions impacting vegetation occurred prior to the park's establishment. Impacts included land alteration and clearing such as plowing, logging, filling, leveling, road construction, ditching, and grading. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

Cumulative potential impacts associated with vegetation include the potential spread of invasive species. Trail users can unknowingly spread non-native exotic species through transporting by clothing, boots, or equipment. However, proper education of trail user could help minimize vegetation impacts and invasive species.

- **Conclusion:**

Alternative D would have adverse impacts on vegetation. Impacts associated with campsite and trail development would be direct and limited, resulting in approximately six acres or 0.2% of the island's acreage. In addition to direct impact, there is increased potential for campsite or trail users to spread invasive exotic species. The intensity of impact to vegetation would be minimal in overall context. Overall, impacts to vegetation associated with Alternative D do not meet any of the significance criteria.

WILDLIFE

Alternative A: No Action

- **Impacts:**

No new impacts would occur to wildlife as a result of the no action alternative.

- **Cumulative Impacts:**

The largest past actions impacting wildlife habitat occurred prior to the park's establishment. There were primitive roads, farmsites, and a small community.

- **Conclusion:**

Impacts to wildlife would not occur as a result of the no action alternative.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

During construction, there may be short-term negligible impacts to wildlife, however, they would be indirect and limited. The total area disturbed is small (<3 acres) and is geographically limited. With the exception of a remote campsite along Lighthouse Bay, campsite and trail improvements are restricted to the already developed area surrounding East Bay. The addition of a remote campsite at Lighthouse Bay slightly increases the likelihood of negative human-bear interaction.

- **Cumulative Impacts:**

The largest past actions impacting wildlife habitat occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. Existing campsites and trails increase the likelihood of human-wildlife, primarily bear, interactions. Under Alternative B, one new campsite would be added, slightly increasing the potential for human-wildlife interactions.

- **Conclusion:**

Adverse impacts during construction, if any, are expected to be negligible, indirect and limited. Campsites and day-use area and, to a lesser extent trails, provide opportunities

for human-wildlife interactions (both positive and negative). Negative interactions with bears can be mitigated through visitor education, the use of bear lockers and campsite design. Adverse impacts associated with human-wildlife interaction under this alternative are expected to be negligible. Overall impacts to wildlife associated with Alternative B do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**

During construction, there may be short-term negligible impacts to wildlife, however, they would be indirect and limited. The total area disturbed is fairly small (<5 acres) and most of it follow existing trails or occurs in the already developed area around East Bay. Under this alternative, new additional remote campsites would be added – one at Lighthouse Bay and one at Justice Bay. Also, a picnic area would be created at the foot of the dock. The addition of these remote campsites and the picnic area increases the likelihood of negative human-bear interaction. This alternative also includes development of a trail connecting East Bay with West Bay, following an old road corridor. The trail would provide a corridor for wildlife and create a minor amount of disturbance. Since the trail would be a narrow, primitive trail, the impacts from this disturbance are expected to be direct, limited and negligible.

Cumulative Impacts:

The largest past actions impacting wildlife habitat occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. Existing campsites and trails increase the likelihood of human-wildlife, primarily bear, interactions. Under Alternative C, two new campsites and a picnic area would be added, increasing the potential for human-wildlife interactions by a small amount. Overall impacts to wildlife associated with Alternative C do not meet any of the significance criteria.

- **Conclusion:**

Adverse impacts during construction, are expected to be negligible, indirect and limited. Campsites and day-use area and, to a lesser extent trails, provide opportunities for human-wildlife interactions (both positive and negative). Negative interactions with bears can be mitigated through visitor education, the use of bear lockers and campsite design. Adverse impacts associated with the potential for increased human-wildlife interaction under this alternative are expected to be negligible to minor.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

During construction, there may be short-term negligible impacts to wildlife due to human disturbance, however, the impacts would be indirect and limited. The total area disturbed

is small (<6 acres) and most of it follows existing trails or occurs in the already developed area around East Bay. The addition of remote campsites at Lighthouse Bay, Justics Bay and West Bay and a picnic area at the foot of the dock increases the likelihood of negative human-bear interaction. The development of a primitive trail connecting East Bay with West Bay would provide a corridor for wildlife and have the potential for direct beneficial impacts.

- **Cumulative Impacts:**

The largest past actions impacting wildlife habitat occurred prior to the park's establishment. There were primitive roads, farmsites, multiple docks, and a small community. Existing campsites and trails increase the likelihood of human-wildlife, primarily bear, interactions. Under Alternative C, three new campsites and a picnic area would be added, increasing the potential for human-wildlife interactions.

- **Conclusion:**

Although Alternative D has the highest amount of campsite and trail development, the area disturbed is still relatively small and mostly limited to existing trail corridors and developed areas. Adverse impacts during construction are expected to be negligible, indirect, and limited. Campsites and day-use area and, to a lesser extent trails, provide opportunities for human-wildlife interactions (both positive and negative). Negative interactions with bears can be mitigated through visitor education, the use of bear lockers and campsite design. Adverse impacts associated with the potential for increased human-wildlife interaction under this alternative are expected to be negligible to minor. Overall impacts to wildlife associated with Alternative D do not meet any of the significance criteria.

CULTURAL RESOURCES (cultural landscapes and ethnographic resources)

Alternative A: No Action

- **Impacts:**

Under this alternative, there would not be additional trail, campsite or picnic area development. The docks would not be replaced. Areas of erosion, such as the trail segment near Lighthouse Bay and Justice Bay would be realigned, as needed. Negligible adverse impacts would occur under this "no action" alternative.

- **Cumulative Impacts:**

The largest past actions impacting pre-European archeological sites occurred prior to the park's establishment. Impacts included land alteration such as plowing, logging, filling, leveling, road construction, ditching, and grading. No evidence of pre-European archeological remains has been found in the project area. The island's trail system was primarily developed on old roadways and most campsites are located in former

homesites. No additional impacts to Pre-European or historic Euro-American archeological remains (such as farmsteads, the light station, historic refuse middens, or historic roadways) would occur under the no action alternative.

- **Conclusion:**

Negligible adverse impacts would continue due to continued use of current docks, trails, and campsites. Overall impacts to cultural resources associated with Alternative A do not meet any of the significance criteria.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

This alternative includes a new individual campsite at Lighthouse Bay; converting campsite 4 into an accessible individual campsite; creating a picnic area in an already disturbed location; relocating two individual campsites; creating an accessible route from the dock to campsite 4; relocating vault toilets; adding privies at remote campsites; outhouses; realigning small trail sections; and replacing stairs that provide beach access. This would result in approximately three acres of short-term and very localized soil disturbance during construction which has the potential to impact archeological resources. There would be some long-term soil compaction from visitor use at campsites and trails, however, the use of boardwalks would reduce compaction and erosion. The location and design of each of these features has been planned to avoid known cultural resources and to minimize potential resource impacts. Based on literature review and visual inspection by the park cultural resource specialist, no known or anticipated cultural resources are present in the proposed dock site location. The campsite, trail, and vault toilet and stump privy locations have also been selected to avoid cultural resources. In each case, ground disturbance for campsite, trail, and vault toilets and privies would be preceded by archeological shovel testing to determine presence/absence of archeological materials. Individual reviews of these undertakings would be handled through the National Historic Preservation Act (NHPA) Section 106 review process, either using streamlined review or standard four-step review as appropriate. If cultural resources are found to be present, sites would be evaluated for significance, and a determination would be made as to whether the individual undertaking would be allowed to proceed or if it must be redesigned or relocated.

- **Cumulative Impacts:**

The largest past actions impacting pre-European archeological sites occurred prior to the park's establishment. Impacts included land alteration such as plowing, logging, filling, leveling, road construction, ditching, and grading. No evidence of pre-European archeological remains has been found in the project area. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

Some negligible adverse impacts to cultural resources may occur during construction and as a result of increased visitation levels on Sand Island. However this will be offset by improved campsite design and trail surfacing, which would have a beneficial effect on protecting cultural resources in the project area. This would be accomplished by directing traffic away from sensitive known resources, and by providing hardened surfaces such as boardwalks where needed.

- **Conclusion:**

There would be no adverse effect to cultural resources under this alternative. Potentially adverse effects would be identified through individual NHPA reviews of campsite, trail, vault toilet and stump privy placement, and adverse effects would be either avoided or mitigated as decided through Section 106 consultation. Overall impacts to cultural resources associated with Alternative B do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**

This alternative includes new individual campsites at Lighthouse Bay and Justice Bay; converting campsite 1 and 2 into an accessible group campsite; creating a picnic area at the end of the new dock; relocating two individual campsites; creating an accessible route from the dock to the Hansen Farm; relocating vault toilets; adding privies at remote campsites; realigning small trail sections; creating an east-west trail across the island along an old roadbed; and replacing stairs that provide beach access. This would result in approximately five acres of short-term localized soil disturbance during construction which has the potential to impact archeological resources. There would be some long-term soil compaction from visitor use at campsites and trails, however, the use of boardwalks would reduce compaction and erosion. Boardwalks would also eliminate or greatly reduce informal trail widening during muddy conditions by visitors.

The location and design of each of these features has been planned to avoid known cultural resources and to minimize potential resource impacts. Based on literature review and visual inspection by the park cultural resource specialist, no known or anticipated cultural resources are present in the proposed dock site location. The campsite, trail, stair, picnic area, vault toilet and stump privy locations have also been selected to avoid cultural resources. In each case, ground disturbance for camp site, trail, and vault toilet and privies would be preceded by archeological shovel testing to determine presence/absence of archeological materials. Individual reviews of these undertakings would be handled through the National Historic Preservation Act (NHPA) Section 106 review process, either using streamlined review or standard four-step review as appropriate. If cultural resources are found to be present, sites would be evaluated for significance, and a determination will be made as to whether the individual undertaking would be allowed to proceed or if it must redesigned or relocated.

- **Cumulative Impacts:**

The largest past actions impacting pre-European archeological sites occurred prior to the park's establishment. Impacts included land alteration such as plowing, logging, filling, leveling, road construction, ditching, and grading. No evidence of pre-European archeological remains has been found in the project area. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

Some negligible adverse impacts to cultural resources may occur during construction and as a result of increased visitation levels on Sand Island. However this would be offset by improved campsite design and trail surfacing, which will have a beneficial effect on protecting cultural resources in the project area. This would be accomplished by directing traffic away from sensitive known resources, and by providing hardened surfaces such as boardwalks where needed.

- **Conclusion:**

This alternative has a greater area of potential effect than alternative A or B. However, our analysis concludes there would be no adverse effect to cultural resources under this alternative. Potentially adverse effects would be identified through individual NHPA reviews of campsite, trail, stair, picnic area, vault toilet and stump privy placement, and adverse effects would be either avoided or mitigated as decided through Section 106 consultation. Overall impacts to cultural resources associated with Alternative C do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

Similar to Alternatives B and C, the NPS and public dock would be removed and replaced with a public dock that has a flow-through section. Under this alternative, the dock would be 200' in length, with a 115' flow-through section. There would be 85' solid sheet pile section and a 70' T section to provide protection from easterly winds. The removal of the current docks and replacement with a new dock with a flow-through design would reduce current impacts to coastal processes, resulting in a long-term beneficial impact that is direct and local in context.

This alternative also includes new individual campsites at Lighthouse Bay, Justice Bay, West Bay and on the Mainland Unit; converting campsite 1 and 2 into an accessible group campsite and campsite 4 into an accessible individual campsite; creating a picnic area at the end of the new dock with a sheltered pavilion; relocating two individual campsites; creating an accessible route from the dock to the Light Station, including a Hansen Farm loop; creating an east-west trail across the islands along an old roadbed; relocating vault toilets; adding privies at remote campsites; realigning small trail sections; and replacing stairs that provide beach access. This would result in approximately six acres of short-term localized soil disturbance during construction. There would be some

long-term soil compaction from visitor use at campsites and trails, however, the use of boardwalks would reduce compaction and erosion. Boardwalks would also eliminate or greatly reduce informal trail widening during muddy conditions by visitors.

- **Cumulative Impacts:**

The largest past actions impacting pre-European archeological sites occurred prior to the park's establishment. Impacts included land alteration such as plowing, logging, filling, leveling, road construction, ditching, and grading. No evidence of pre-European archeological remains has been found in the project area. The island's trail system was primarily developed on old roadways and most campsites are located in former homesites.

Some negligible adverse impacts to cultural resources may occur during construction and as a result of increased visitation levels on Sand Island. However this would be offset by improved campsite design and trail surfacing, which would have a beneficial effect on protecting cultural resources in the project area. This would be accomplished by directing traffic away from sensitive known resources, and by providing hardened surfaces such as boardwalks where needed.

- **Conclusion:**

This alternative has a slightly greater area of potential effect than alternative C. However, our analysis concludes there would be no adverse effect to cultural resources under this alternative. Potentially adverse effects would be identified through individual NHPA reviews of campsite, trail, stair, picnic area, stump privy, and vault toilet placement, and adverse effects would be either avoided or mitigated as decided through Section 106 consultation. Overall impacts to cultural resources associated with Alternative D do not meet any of the significance criteria.

VISITOR USE AND EXPERIENCE

Alternative A: No Action

- **Impacts:**

Under the No Action alternative, the docks would continue to deteriorate and become irreparable. The public dock is currently at that stage. Issues associated with visitors walking through campsites to reach trails and vault toilets would continue as would poor placement of vault toilets. Demand for campsites would continue to far exceed availability. The island would continue to lack accessible visitor facilities.

- **Cumulative Impacts:**

Adverse impacts associated with deteriorating to unavailable safe docking and lack of privacy in current campsites would continue.

- **Conclusion:**

Under the No Action alternative, there would be direct, long-term, negligible to minor adverse impacts resulting from deteriorating docks and lack of privacy in campsites. Overall impacts to visitor use associated with Alternative A do not meet any of the significance criteria.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

Under Alternative B, long-term direct beneficial impacts would result from the construction of a new dock, correcting visitor flow issues, adding a picnic area and increasing accessibility. An accessible route would be developed from the dock to campsite 4, which would be modified for accessibility.

- **Cumulative Impacts:**

Long-term issues related to visitor flow and lack of flow would be resolved under this alternative. Lack of accessible campsites and trails would be addressed to a minor degree under this alternative.

- **Conclusion:**

This alternative would result in minor long-term direct beneficial impacts to visitor use. Overall impacts to cultural resources associated with Alternative B do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:** Under Alternative C, long-term direct beneficial impacts are similar to under Alternative B, but greater. In addition to construction of a new dock, correcting visitor flow issues, and adding a picnic area, Alternative C would also add a remote campsite, an accessible group and individual campsite, and greatly increase the amount of accessible trail. An accessible route would be developed from group campsite B to the Hansen Farm, including a small loop trail. In addition, the dock included under Alternative C would provide better protection and greater docking capacity than under Alternative B.

- **Cumulative Impacts:**

Long-term issues related to visitor flow and lack of privacy would be resolved under this alternative. Lack of accessible campsites and trails would be addressed to a moderate degree under this alternative.

Conclusion: This alternative would result in minor to moderate long-term direct beneficial impacts to visitor use. Overall impacts to cultural resources associated with Alternative C do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**
Alternative D would provide the greatest degree of beneficial visitor use related impacts. In addition to construction of a new dock, correcting visitor flow issues, and adding a picnic area, Alternative D adds two remote campsites, accessible individual and group campsites, and has the greatest amount of accessible trail. An accessible route would be developed from group campsite B to the Light Station, including the Hansen Farm loop trail. The dock included under Alternative D would provide slightly better protection than under Alternative B or C and the same docking capacity as under Alternative C.
- **Cumulative Impacts:**
Long-term issues related to visitor flow and lack of privacy would be resolved under this alternative. Lack of accessible campsites and trails would be addressed to the greatest degree under this alternative.
- **Conclusion:**
This alternative would result in moderate long-term direct beneficial impacts to visitor use. Overall impacts to cultural resources associated with Alternative D do not meet any of the significance criteria.

PARK OPERATIONS

Alternative A: No Action

- **Impacts:**
No new impacts to park operations would occur under the no action alternative.
- **Cumulative Impacts:**
East Bay on Sand Island is one of the more developed areas in the park. There are two docks, a public and NPS dock. The public dock is in such poor condition that it is nearly unusable. The NPS dock is in poor condition and is too short to allow reliable docking for most boats. At East Bay, there are two group campsites, two individual campsites, a NPS quarters that is used by volunteers during the visitor season, and three vault toilets. In addition, there is a trail that extends from group campsite B to the light station, and an historic light station and non-historic vault toilet. The vault toilets require periodic pumping. The NPS quarters and light station require regular maintenance. Recent work has been done at the Hansen Farm to stabilize existing buildings and clear part of the historic grounds.
- **Conclusion:**
The no action alternative would not result in additional impacts to park operations.

Alternative B: Improve Visitor Use Experience and Accessibility (minimum)

- **Impacts:**

A beneficial direct benefit to park operations would result from replacing the current dock, with a new, well designed and lower maintenance dock. The area of the new dock would be less (2000 ft²) to the size of the current docks (2548 ft²). A short-term direct workload would be required during construction of campsites, vault toilets, privies and a picnic area. Following construction, annual maintenance is expected to be slightly greater than under the no action alternative. Under this alternative, one remote campsite would be added at lighthouse bay, campsites 1 and 2 relocated and a picnic area created in an area that is currently mowed. The total number of vaults that require pumping would not change. A short accessible boardwalk is also included in this alternative that would require periodic maintenance. This alternative has the shortest section of accessible boardwalk. Most of the route currently has a non-accessible boardwalk.

- **Cumulative Impacts:**

East Bay on Sand Island is one of the more developed areas in the park. There are two docks, a public and NPS dock. The public dock is in such poor condition that it is nearly unusable. The NPS dock is in poor condition and is too short to allow reliable docking for most boats. At East Bay, there are two group campsites, two individual campsites, a NPS quarters that is used by volunteers during the visitor season, and three vault toilets. In addition, there is a trail that extends from group campsite B to the light station, and an historic light station and non-historic vault toilet. The vault toilets require periodic pumping. The NPS quarters and light station require regular maintenance. Recent work has been done at the Hansen Farm to stabilize existing buildings and clear part of the historic grounds. Other potential cumulative impacts include a slightly increased potential for increased control of exotic invasive plants and addressing human-wildlife interactions.

- **Conclusion:**

Impacts that would result from Alternative B are both beneficial and adverse. Negligible to minor direct beneficial impacts would result from a new and improved dock. This primarily reduces the maintenance workload and may also slightly reduce the number of visitor assists because the dock would provide better protection. Adverse direct impacts are expected to be negligible. These would result from a slightly increased workload associated with new or relocated campsites and the accessible boardwalk (approx. ¼ mile) and a potential for increased exotic plant control and human-wildlife interactions. Overall impacts to cultural resources associated with Alternative B do not meet any of the significance criteria.

Alternative C: Improve Visitor Use Experience and Accessibility (moderate)

- **Impacts:**

A beneficial direct benefit to park operations would result from replacing the current dock, with a new, well designed and lower maintenance dock that has protection from easterly winds. The area of the proposed dock (2650 ft²) is very similar in size to the current docks (total 2548 ft²). A short-term direct workload would be required during construction. Following construction, a minor amount of additional maintenance in comparison to the no action alternative is expected. Under this alternative, two remote campsites would be added and campsites 1 and 2 relocated. A picnic area would be constructed, adding a new location that would require mowing. The total number of vaults that require pumping would not change. An accessible boardwalk (approx. 0.8 miles) is also included in this alternative. Most of the route currently has a non-accessible boardwalk.

- **Cumulative Impacts:**

East Bay on Sand Island is one of the more developed areas in the park. There are two docks, a public and NPS dock. The public dock is in such poor condition that it is nearly unusable. The NPS dock is in poor condition and is too short to allow reliable docking for most boats. At East Bay, there are two group campsites, two individual campsites, a NPS quarters that is used by volunteers during the visitor season, and three vault toilets. In addition, there is a trail that extends from group campsite B to the light station, and an historic light station and non-historic vault toilet. The vault toilets require periodic pumping. The NPS quarters and light station require regular maintenance. Recent work has been done at the Hansen Farm to stabilize existing buildings and clear part of the historic grounds. Other potential cumulative impacts include a slightly increased potential for increased control of exotic invasive plants and addressing human-wildlife interactions.

- **Conclusion:**

Impacts that would result from Alternative C would be both beneficial and adverse. Negligible to minor direct beneficial impacts would result from a new and improved dock. This primarily reduces the maintenance workload, at least over the short-term, but may also reduce the number of visitor assists because the dock would provide much better protection than the current dock. Adverse direct impacts are expected to be minor. These would result from an increased workload associated with new or relocated campsites, an accessible campsite, a picnic area, an accessible boardwalk (approx. 0.8 miles), an east-west trail, and a potential for increased exotic plant control and human-wildlife interactions. Overall impacts to cultural resources associated with Alternative C do not meet any of the significance criteria.

Alternative D: Improve Visitor Use Experience and Accessibility (maximum)

- **Impacts:**

A beneficial direct benefit to park operations would result from replacing the current dock, with a new, well designed and lower maintenance dock that has protection from easterly winds. The area of the proposed dock (2650 ft²) is very similar in size to the current docks (total 2548 ft²). A short-term direct workload would be required during construction of campsites, trails, accessible boardwalk and a picnic area. Following construction, a minor amount of additional maintenance in comparison to the no action alternative is expected. Under this alternative, three remote campsites would be added and campsites 1 and 2 relocated. A picnic area would be constructed, adding a new location that would require mowing. The total number of vaults that require pumping would not change. An accessible boardwalk (approx. 2.25 miles) is also included in this alternative. Most of the route currently has a non-accessible boardwalk.

- **Cumulative Impacts:**

East Bay on Sand Island is one of the more developed areas in the park. There are two docks, a public and NPS dock. The public dock is in such poor condition that it is nearly unusable. The NPS dock is in poor condition and is too short to allow reliable docking for most boats. At East Bay, there are two group campsites, two individual campsites, a NPS quarters that is used by volunteers during the visitor season, and three vault toilets. In addition, there is a trail that extends from group campsite B to the light station, and an historic light station and non-historic vault toilet. The vault toilets require periodic pumping. The NPS quarters and light station require regular maintenance. Recent work has been done at the Hansen Farm to stabilize existing buildings and clear part of the historic grounds. Other potential cumulative impacts include a slightly increased potential for increased control of exotic invasive plants and addressing human-wildlife interactions.

- **Conclusion:**

Impacts that would result from Alternative D would be both beneficial and adverse. Negligible to minor direct beneficial impacts would result from a new and improved dock. This primarily reduces the maintenance workload, at least over the short-term, but may also reduce the number of visitor assists because the dock would provide much better protection than the current dock. Adverse direct impacts are expected to be minor. These would result from an increased workload associated with new or relocated campsites, a picnic area, the accessible boardwalk (approx. 2.25 miles), and a potential for increased exotic plant control and human-wildlife interactions. Overall impacts to cultural resources associated with Alternative D do not meet any of the significance criteria.

Chapter 5: Consultation and Coordination

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PUBLIC INVOLVEMENT

The park sought public scoping comments during a 30 day review period (November 25 through December 23, 2013). A public meeting was held on December 12, 2013 to present issues and options. The public review period for this draft Plan/EA is September 15 through October 17, 2014. During this time, a public meeting will be held to provide additional opportunities for input.

Appendix A – References

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Appendix B – Dock Designs

Structural Configuration

Alternatives considered are designed with two sections—an open section that allows longshore currents and longshore sediment transport through and a closed cell structure that will protect moored vessels against waves. The top of the structure would be at 603.5-feet (IGLD 85). All steel would be galvanized to slow the effects of corrosion. Preliminary steel sheet pile (SSP) design calculations were prepared using USACE software (CWALSHT and Packshaw).

Open Sections

The proposed open sections of the dock are designed with two different alternatives—steel bins in the case the shallow bedrock is encountered and another in which the bedrock is deeper and steel H-piles can be driven to a minimum embedment depth of 584.5-feet (IGLD 85).

Steel Bins

The steel bin wall is a system of adjoining closed faced bins made of lightweight steel members normally backfilled with gravel or granular fill material with a concrete cap to prevent loss of fill material. This type of structure has been in use at nearby Stockton Island for more than 20 years with satisfactory performance. Preliminary stability calculations indicate the bins need to be filled with concrete and widened to 10 feet to resist sliding and overturning. The span between bins varies between alternatives. The bin-wall would be connected to the shoreline by a dock consisting of a steel grating deck and steel girders bearing on the bin-wall concrete cap.

H-Piles

As an alternative to steel bins and where an embedment depth of 584.5-feet (IGLD 85) can be reached, steel H-piles could be considered. The structure is supported by H-piles and will be relatively simple to construct versus the steel bin design. The H-piles will be placed every 25-feet and steel girders would bear on the piles. A steel grating deck would then be placed on the girder.

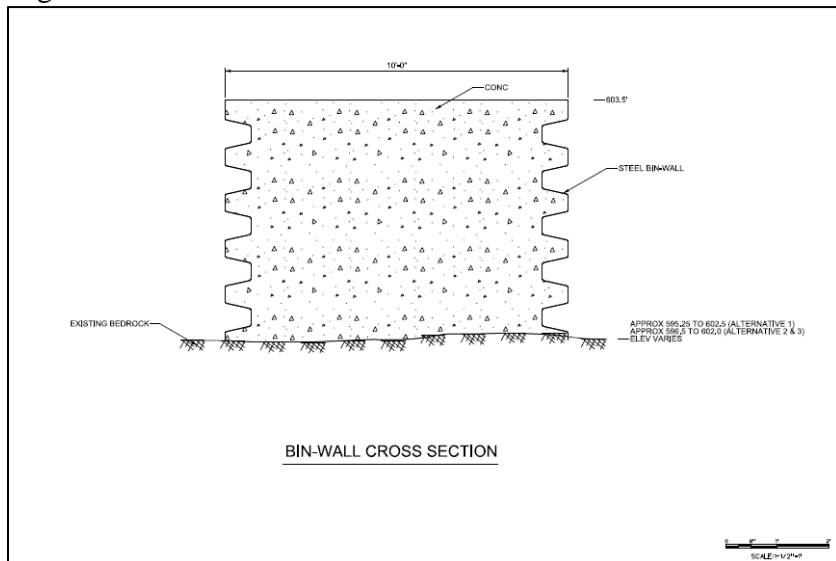
Solid Sections

The proposed closed cell, or solid sections, of the dock are also designed with two different alternatives—steel bins and double SSP walls.

Steel Bins

Similar to the steel bins as described in Section 4.2.1, with the only significant difference being no spacing between bins. The bins will be placed such that they form a continuous wall, allowing no flow through, which protects moored vessels. A typical cross section of a steel bin can be seen below.

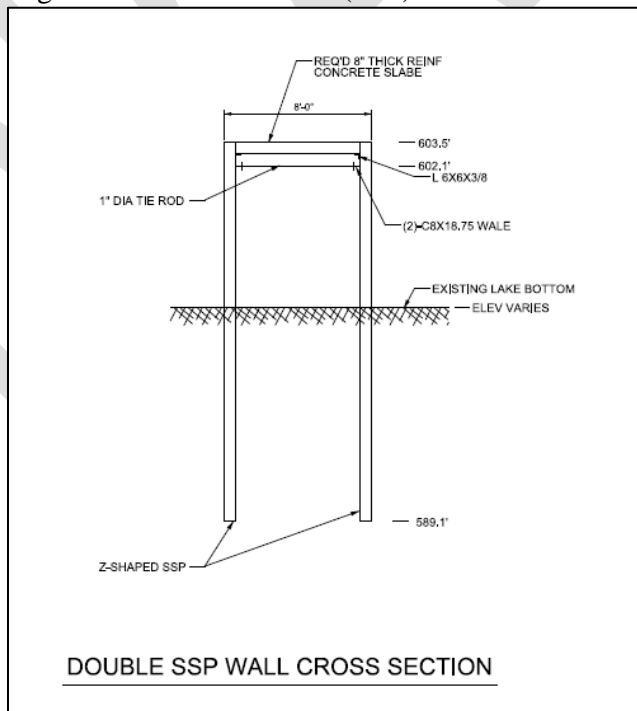
Figure 8. Steel Bin



Steel Sheet Pile

The double SSP wall system is two parallel SSP walls tied together with steel tie rods and backfilled with small stone with a concrete cap to prevent loss of fill. This was adequate for the SSP alternative but had to be increased for the bin-wall alternative as discussed below. A typical cross section can be seen below.

Figure 9. Solid Sheet Pile (SSP)



Alternative B – Straight dock (125' flow through, 75' solid)

This alternative consists of constructing a replacement dock that is supported by steel bins or H piles, depending on depth to bedrock. The replacement dock would consist of two zones and would be approximately 200-feet in total length and would accommodate mooring for four 25-foot long vessels. The nearshore zone would be open, or in other words it would allow flow through so that waves and sediment can pass under the structure.

If steel bins are used, they would be 10-feet wide, placed 25-feet apart and act as supports for the steel joists; the total length of open sections would be 125-feet. The lakeward component would consist of a closed cell structure—a group of solid steel bins placed together that allow no flow through, providing better protection to moored vessels.

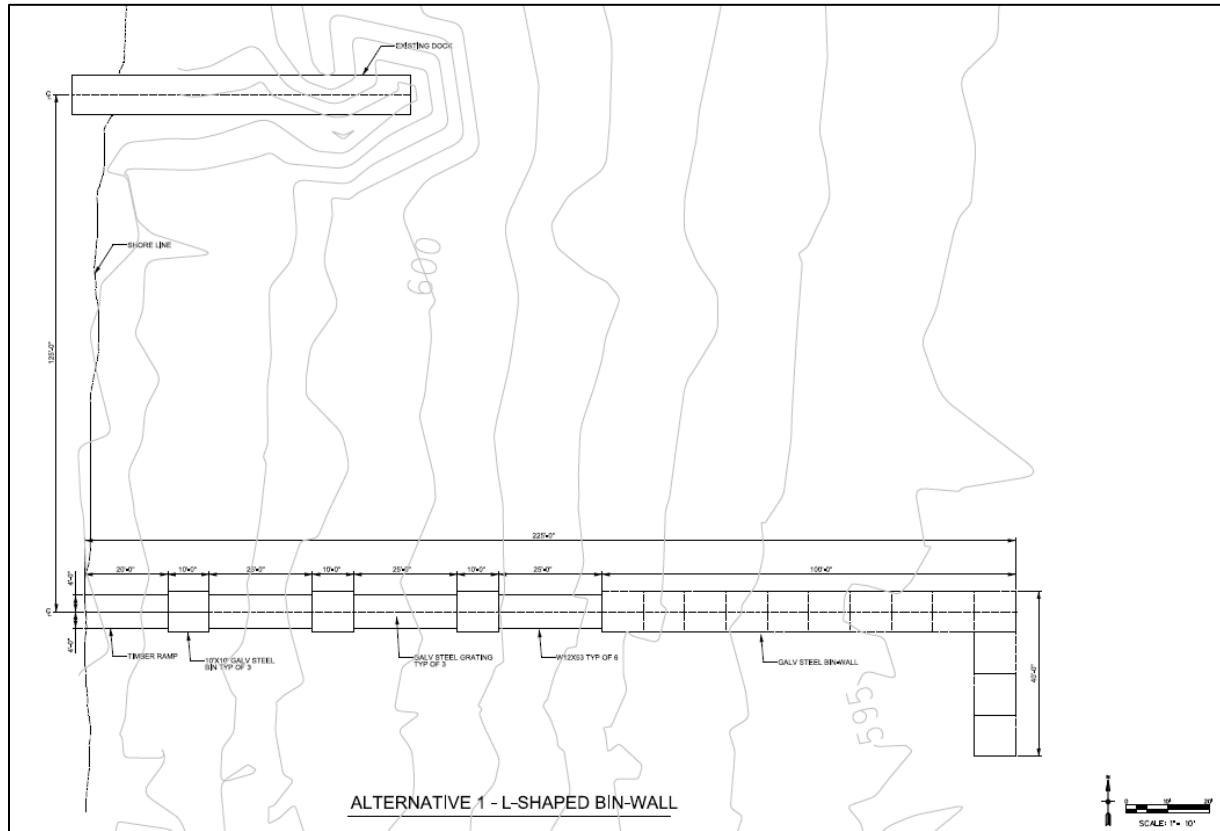
If H piles are used, they would be placed 25' apart and the length of the open section would be approximately 125' from the start of the dock to the solid portion of the dock. Similar to steel bins, the H-piles would act as a support for the steel joists, however, the H-piles have a considerably smaller cross-section than the steel bins, which would allow for more longshore currents and associated longshore sediment transport. The lakeward portion of the dock would be formed by solid sheet pile (SSP) and would be connect to the open section and be approximately 75' in length for a total dock length of 200'.

Alternatives C and D – L shaped dock (125' flow through; 100' solid with 40'L)

This alternative consists of constructing a replacement dock that is supported by steel bins or H piles, depending on depth to bedrock. The replacement dock would consist of two zones and would be approximately 225-feet in total length and would accommodate mooring for six 25-foot long vessels. The nearshore zone would be open, or in other words it would allow flow through so that waves and sediment can pass under the structure.

If steel bins are used, they would be 10-feet wide, be placed 25-feet apart and act as supports for the steel joists; the total length of open sections would be 125-feet. The second component would consist of a closed cell structure—a group of solid steel bins placed together that allow no flow through—in the form a L-shaped end. The long leg of the solid section of the “L” would be perpendicular to the shore and would be approximately 100-feet long, while the short segment of the “L” would be parallel with the shore and approximately 40-feet long. This solid section of the “L” would provide shelter from the easterly waves that are the strongest and most common in the East Bay, which would allow vessels to be moored without being subjected to constant wave action. See Figure 10.

Figure 10. L Shaped Dock with Steel Bins



If H piles are used, they would be placed 25' apart and the length of the open section would be approximately 125' from the start of the dock to the solid portion of the dock. Similar to steel bins, the H-piles would act as a support for the steel joists, however, the H-piles have a considerably smaller cross-section than the steel bins, which would allow for more longshore currents and associated longshore sediment transport. The lakeward component of the structure would consist of a solid steel sheet pile (SSP) wall configured to form an L-shaped end. The solid structure formed by the SSP will be approximately 100-feet in length before the formation of the end of the dock. The end which is parallel to the shore forms the L-shape will be approximately 40-feet long. See Figure 11.

Figure 11. L-shaped Dock using H piles and Solid Steel Sheet Pile

