CULTURAL LANDSCAPE REPORT • HISTORIC STRUCTURE REPORT

APOSTLE ISLANDS NATIONAL LAKESHORE

LIGHT STATIONS OF MICHIGAN ISLAND, OUTER ISLAND, DEVILS ISLAND, LONG ISLAND AND SAND ISLAND

VOLUME I

100% DRAFT
MARCH 2011

Apostle Islands National Lakeshore – Bayfield, Wisconsin

VOLUME I OF VI: INTRODUCTION AND OVERALL DEVELOPMENT HISTORY

CULTURAL LANDSCAPE REPORT, HISTORIC STRUCTURE REPORT AND ENVIRONMENTAL ASSESSMENT

APOSTLE ISLANDS NATIONAL LAKESHORE

BAYFIELD, WISCONSIN

LIGHT STATIONS OF MICHIGAN ISLAND, OUTER ISLAND, DEVILS ISLAND, LONG ISLAND AND SAND ISLAND

VOLUME I

100% DRAFT MARCH 2011
UNITED STATES DEPARTMENT OF THE INTERIOR

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Cover: View from Michigan Island's Second Tower (9/15/2009, A&A IMGP2782)

EXECUTIVE SUMMARY

In order to develop a comprehensive planning tool, the National Park Service (NPS or Park Service) has requested the creation of a Cultural Landscape Report (CLR) and a Historic Structure Report (HSR) for five of the light stations at Apostle Islands National Lakeshore (park). The two reports have been combined into one document as outlined in Chapter 2: Methodology.

The intent of this combined CLR/HSR is to guide treatment and use of the aboveground cultural resources associated with five light stations on Michigan, Outer, Devils, Long, and Sand islands. Documentation of historic significance and evaluation of integrity of the cultural landscapes provides the framework upon which treatment recommendations are based. An investigation and evaluation of the cultural landscape and their buildings has been conducted using NPS and National Register of Historic Places (NRHP or national register) guidelines and forms the body of this report. The report provides park managers with a comprehensive understanding of the physical evolution of the cultural landscape and guidance for the management of the cultural resources.

Apostle Islands National Lakeshore was established by Congress in 1970 and is "dedicated to the preservation and public enjoyment of significant historic, scenic, natural and recreational resources."[1] Located in Bayfield County, Wisconsin (location maps 02 and 03), the park consists of 21 islands and a 12-mile-long segment of the Wisconsin mainland. Within its boundaries are 69,372 acres, of which 27,323 acres are submerged lands in Lake Superior. The islands range in size from 3-acre Gull Island to 10,054-acre Stockton Island. In December 2004 80% of the park's land area was congressionally designated as the "Gaylord Nelson Wilderness" area.

The single largest collection of NRHP lighthouses and lighthouse complexes in the National Park System are located within the park, in part, attracting its nearly 170,000 visitors in 2009. Primary reasons for visiting include camping, boating, sea kayaking, fishing and visiting the lighthouses. The Park Service faces many challenges associated with the long-term management and maintenance of the light stations, including maintenance of cultural landscapes and historic structures. Today, due to encroaching vegetation, the landscapes of the light stations differ from those of the period of significance (1856 to 1978). NPS management practices, since the establishment of the park, have allowed natural reforestation in many areas. Areas that were once cleared as part of light station operations are now forested as a result of natural regeneration. These areas now provide wildlife habitat and, in a few cases, uncommon plant communities, however they compromise the integrity of the cultural landscapes.

The structures of the light stations are in varying need of repair to mitigate the conditions and deterioration that threaten their longevity. Remediation of hazardous materials is also an issue as is improving visitor access to the light stations and structures. If an informed, comprehensive plan for cultural landscape and historic structure treatments is not developed and implemented, the growing list of deferred maintenance may compromise the historic integrity of the resource over time, diminish the resources' interpretive value and deflate the visitor experience. There could also be damaging effects on natural resources and habitat if future rehabilitation efforts are implemented piecemeal without adequately considering cumulative environmental consequences. Similarly, the cultural landscape, if approached piecemeal, would also be compromised.

The CLR/HSR will be used in support of the park's General Management Plan (GMP), Comprehensive Long-range Interpretive Plan, and associated compliance as required by the National Historic Preservation Act (NHPA) of 1966, as amended, and by the National Environmental Policy Act (NEPA) of 1969, as amended. It will also be used to guide any additional landscape and structural treatments beyond the initial

[1] Apostle Islands National Lakeshore website: www.nps.gov/apis/planyourvisit/things2know.htm

treatments discussed in the CLR/HSR. Used in concert, the two documents will guide future management of the park's resources.

SUMMARY OF RESEARCH DONE

As outlined in Chapter 2: Methodology, all readily available park documentation was reviewed and a series of field investigations were conducted in the summer and fall of 2009. The reviewed sources, including historic drawings; historic photographs; and log books from the lighthouse keepers, the United States Coast Guard (Coast Guard) and NPS volunteers, were analyzed.

SUMMARY OF MAJOR RESEARCH FINDINGS

The light stations were built between 1856 and 1938. Their development coincided with the technological light station advances of the times. Research and field observations determined the following findings:

- The change from manned light stations to automated light stations reduced the level of care and maintenance of the landscapes and structures.
- Technological advances affected both the operations and the light station facilities, particularly in terms of the ancillary/utilitarian structures (e.g., fog signal, oil, and power buildings).
- The Coast Guard occupation of the light stations altered the historic fabric of the structures and landscapes.
- The NPS era brought a heightened appreciation for historic preservation.
- The extent of natural reforestation in the formerly cleared areas of the light stations has been significant.
- Materials sampling indicates a fair number of "hard" (cement-rich) mortars have been used for past repointing efforts. When used with softer masonry, this can accelerate deterioration.
- Proper ventilation within the towers and other historic structures is critical for long-term maintenance.

SUMMARY OF MANAGEMENT ISSUES

The following management issues were identified by the team (refer to "Chapter 5: Management Issues" for further explanation):

- Maintenance of Historic Resources
- Accessibility (ABAAS)
- Life Safety/Code Compliance (guardrails, handrails, exit paths)
- Hazardous materials
- Interpretation and Park Signage
- Boat Docks and Landings
- Wilderness and Reservation Boundaries
- Clearing Practices
- Shoreline Slope Stabilization
- Sustainability
- Evolving Projects/Changing Objectives
- Construction Logistics

SUMMARY OF RECOMMENDED TREATMENTS

The overarching treatment strategy for the light stations is rehabilitation, recognizing that with this approach, individual features or structures may warrant preservation (typically stabilization) or restoration. Likewise, assuming that treatments will be undertaken in phases, stabilization may become the first step. The CLR/HSR includes the following proposed uses and treatments:

- **Michigan Island: Rehabilitation** – Rehabilitate Old Michigan Island Lighthouse to a pre-1928 condition with self-guided visitor use at the quarters and guided tours to the tower. Rehabilitate the Keepers Quarters for visitors at the first floor and seasonal housing at the second. Rehabilitate the Second Tower for guided tours. Preserve the Assistant Keepers Quarters and Workshop, Power House, Shed and Privy primarily for NPS maintenance, with the possibility of providing visual access to visitors to the Shed and Privy. Rehabilitate the cultural landscape including selective clearing of trees; stabilizing the slope embankment; upgrading site accessibility; repairing the tram to a working condition; removing invasive vegetation; confining historic vegetation that might be invasive; and restoring historic plantings.
- **Outer Island: Rehabilitation** – Rehabilitate the tower for guided visitor use. Rehabilitate the Keepers Quarters for rustic seasonal staff housing. Rehabilitate the Fog Signal Building for possible visitor use. Preserve the Oil Storage and Privy for NPS storage. Rehabilitate the cultural landscape including clearing of trees; stabilizing the slope embankment; maintaining recent site drainage improvements; repairing the tramway to working order; removing noncontributing features; and maintaining small scale contributing features.
- **Devils Island: Rehabilitation** – Rehabilitate the tower, Keepers Quarters, Assistant Keepers Quarters, Oil House 2 and Fog Signal Building (remove noncontributing south addition) for varied levels of visitor use. Preserve Oil House 1, Tramway Engine Building and Boathouse for NPS storage. Rehabilitate the cultural landscape including clearing trees; repairing tram tracks; maintaining lawn areas; and retaining contributing small scale features.
- **Long Island: Rehabilitation** – Rehabilitate LaPointe Light Tower for guided visitor tours. Rehabilitate Chequamegon Point Tower (no visitor tours). Preserve the Triplex and the Oil Building. Rehabilitate the cultural landscape including investigating the extent of concrete walks; clearing trees; stabilizing ruins; constructing a new dock; and retaining contributing small scale features.
- **Sand Island: Restoration** – Restore the Light Station Tower and Quarters to pre-1921 conditions for visitor tours and possible overflow staff housing. Make the kitchen physically accessible and add interpretive program access for the remainder of the Light Station Tower and Quarters. Preserve the Oil Building and Privy for possible visitor visual access. Restore and rehabilitate the cultural landscape including clearing of trees; upgrading site accessibility; restoring missing fencing; and relocating and removing noncompatible small scale features.

NEXT STEPS

1. Implement revised Preferred Alternative of the second VA held in December 2010 for realization of pending construction projects.
2. Continue to seek funding to implement the treatment recommendations identified in the CLR/HSR.
3. Seek enhanced maintenance funding to protect the resources after implementation of the CLR/HSR treatment recommendations.

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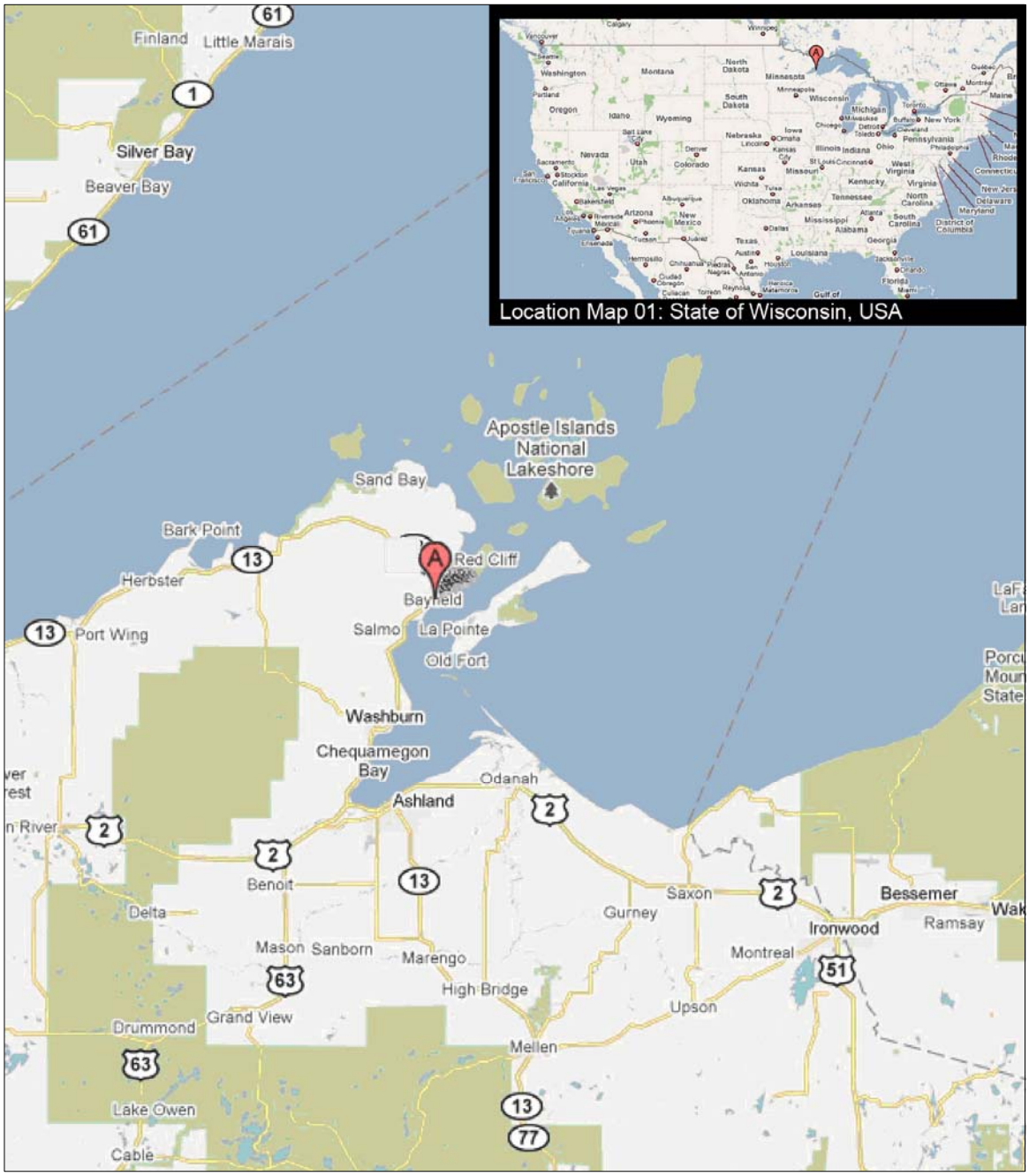
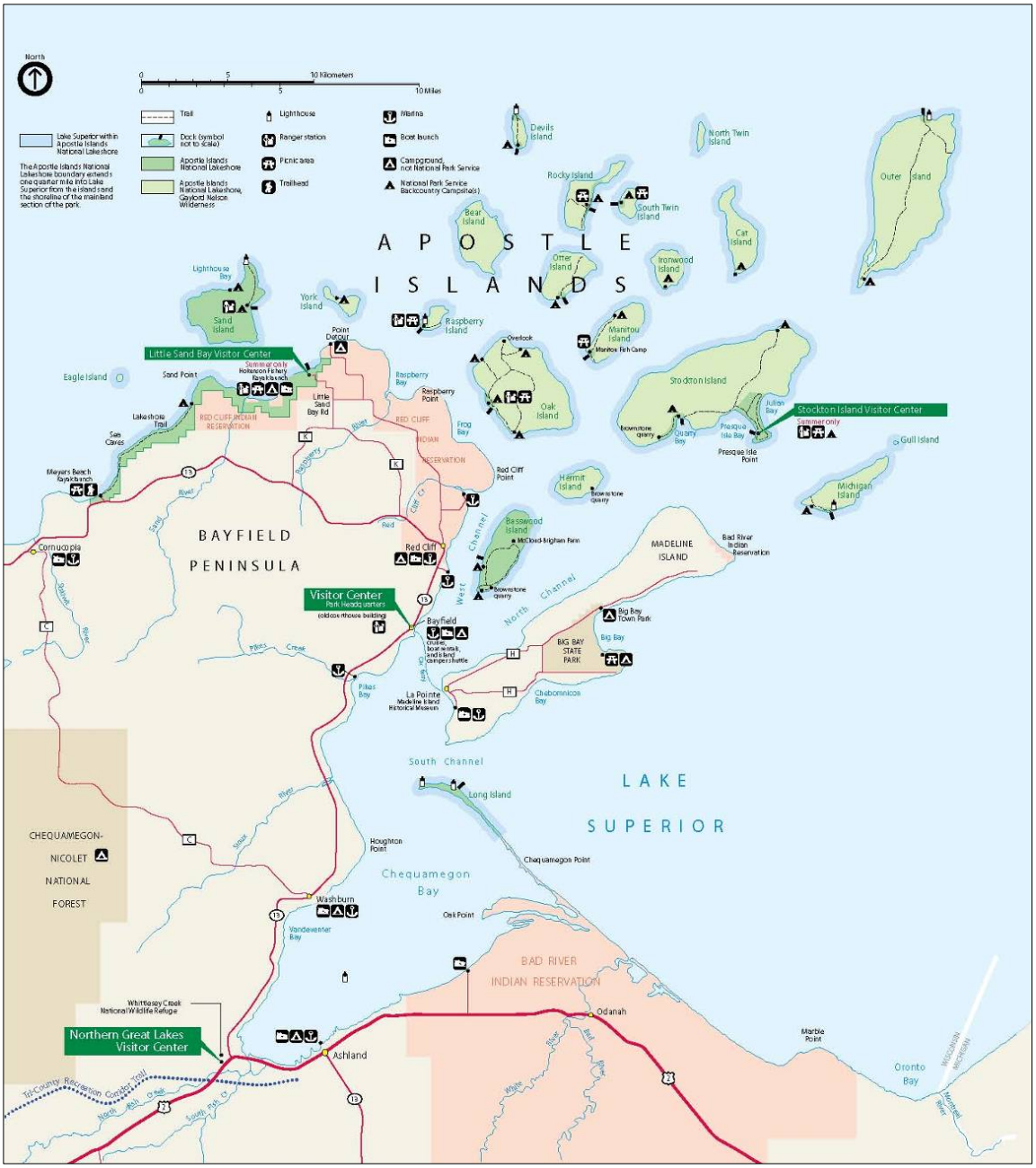


Location Maps 01 and 02: State of Wisconsin and City of Bayfield, Wisconsin



Location Map 03: Apostle Islands National Lakeshore, Bayfield

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CHAPTER 1: INTRODUCTION

OVERALL REPORT ORGANIZATION

The CLR and HSR were conducted concurrently and are presented as one cohesive document to assure coordination of the work. The combined document presents the CLR and HSR as peer documents and will result in a logical continuum of the integrity of the light stations from the broad scale of landscape treatments to the specifics of interior finishes. For ease of use by park staff, separate volumes were created. As such, the document is organized as follows:

- Volume I: Executive Summary, Introduction, Methodology, Context, Park Significance, Current Designations, Administrative Data, Management Issues, Proposed Treatment Criteria, Overall Apostle Islands History, Appendices including the Environmental Assessment, Glossary of Terms, Bibliography, and NPS Review Team
- Volume II: Michigan Island Light Station History, CLR, HSR, and Appendixes
- Volume III: Outer Island Light Station History, CLR, HSR, and Appendixes
- Volume IV: Devils Island Light Station History, CLR, HSR, and Appendixes
- Volume V: Long Island Light Station History, CLR, HSR, and Appendixes
- Volume VI: Sand Island Light Station History, CLR, HSR, and Appendixes

PURPOSE AND NEED OF THE CLR/HSR

Purpose

The purpose of the CLR/HSR is to research and record the history and existing condition of the historic light stations (landscapes and structures) on five islands in the park. The document will provide guidance for the future treatment and use of these landscapes and structures in ways consistent with the park's General Management Plan and other relevant laws, regulations, policies, and guidance. The document presents professional research and insight for NPS management that will inform decisions for appropriate treatment of significant cultural and natural resources, enhanced interpretation and an improved visitor experience.

Need

The CLR/HSR is needed to provide a comprehensive understanding of the historic development of these landscapes and structures; to evaluate their significance; understand their condition; and to provide treatment recommendations that respond appropriately to their historic character while accommodating current and future needs. The CLR/HSR is needed to guide the treatment and use of the aboveground resources associated with the significant cultural landscapes and structures of the light stations on Michigan, Outer, Devils, Long, and Sand islands. The park's GMP indicates the need to restore or rehabilitate structures for cultural resource preservation and interpretive opportunities. The GMP also identifies the need for additional efforts to preserve the exteriors of structures and to stabilize and preserve the cultural landscapes in the immediate vicinity of the light stations.

PROJECT OBJECTIVES OF THE CLR/HSR

The objectives for the combined CLR/HSR are as follows:

- Document the development and evolution of the cultural landscape and structures of the Michigan, Outer, Devils, Long, and Sand island light stations in the park.
- Document the existing condition of the cultural landscape and structures of the Michigan, Outer, Devils, Long, and Sand island light stations.
- Evaluate the significance and integrity of the cultural landscape and structures of the Michigan, Outer, Devils, Long, and Sand island light stations in the park.
- Provide treatment recommendations for managing the cultural landscape and structures within the Michigan, Outer, Devils, Long, and Sand island light stations in the park.
- Provide treatment recommendations for the cultural landscape and structures to address management needs identified by the Park Service in the Michigan, Outer, Devils, Long, and Sand island light stations.
- Provide management recommendations for specific cultural landscapes and structures within the Michigan, Outer, Devils, Long, and Sand island light stations that accommodate current and future needs while preserving the historic character and significant features.
- Provide necessary information and sufficient research and documentation required by a National Historic Landmark district nomination, and encompassing all of the light stations of the park as a system.
- Provide necessary information and education to NPS interpreters and site managers about the history and development of the light stations with the ultimate goal of enhancing the visitor's experience.
- Provide recommendations for efficiently managing the cultural landscapes and structures within the Michigan, Outer, Devils, Long, and Sand island light stations while taking into consideration budget constraints.

CHAPTER 2: METHODOLOGY

The following section describes the methodology associated with each aspect of the CLR/HSR. Because a CLR and HSR each have their own NPS required formats and standards, it should be noted that in the effort of coordination and to prevent duplication, liberties have been taken with the typical format to provide a cohesive document for park personnel.

CULTURAL LANDSCAPE REPORT METHODOLOGY

Report Methodology / Research Design

The CLR was conducted at a thorough level of investigation and documentation for Michigan Island and Long Island and at a limited level of investigation for Outer, Devils, and Sand islands. The work included historical research, existing condition assessment and landscape analysis.

The thorough level research methodology, as defined by the Park Service, focuses on the use of select documentation of known and presumed relevance, including primary and secondary sources that are easily available.[2] The thorough level of research and investigation did not include archeological techniques to locate buried ruins or artifacts.

The limited level research methodology, as defined by the Park Service, focuses on the use of available, select and published secondary sources and primary sources, if known.[3] The limited level of research and investigation did not include archeological techniques to locate buried ruins or artifacts.

The CLR also utilized other materials provided by the Park Service such as the Historical Records Survey (HRS), Geographic Information System (GIS) database, National Historic Landmark (NHL) nomination, the park GMP, historic photographs, planning documents, and natural resource studies.

Existing conditions investigations for all five of the islands were conducted according to best practices. Existing site information provided by the park, including the 1990 Historic American Building Survey drawings, and field work were utilized to document the cultural landscape of the light stations. Site surveys, conducted in summer and fall 2009, recorded the existing condition of the cultural landscape on each of the five islands. Documented features include spatial organization, topography, views and vistas, circulation, buildings, structures, and vegetation. This inventory was undertaken to understand the island's cultural landscape as a whole, and to document these features that contribute to its historic character.

Findings for all islands are presented in an illustrated narrative format that includes brief written text, matrices, photographs, and maps.

Descriptions of the cultural landscape features and their conditions at each island are presented in the Existing Condition Assessment and Landscape Analysis, organized by landscape characteristics. The following criteria were used to evaluate condition.

- **GOOD -** The features of the landscape do not require intervention; only minor or routine maintenance is needed at this time.
- **FAIR -** Some deterioration, decline, or damage is noticeable; the feature may require immediate intervention; if intervention is deferred, the feature will require extensive attention in a few years.

[2] *Page et al 1998:*
[3] *Page et al 1998:*

- **POOR -** Deterioration, decline, or damage is serious; the feature is seriously deteriorated or damaged, or presents a hazardous condition; due to the level of deterioration, damage, or danger the feature requires extensive and immediate attention.

Landscape Characteristics

Landscape characteristics have been identified for the Apostle Islands light stations using best practices that address the specific character and unique nature of each island's light station development.[4] A landscape characteristic is defined as the tangible and intangible characteristic of a landscape that individually and collectively gives the landscape its character and aids in understanding its cultural value.[5] The light stations' landscape characteristics provide a system for organizing and understanding the site history and existing condition. They assist in documenting the changes in the landscape over time.[6]

The appearance of a cultural landscape, both historically and at present day is a web of landscape characteristics that are the tangible evidence of the historic and current uses of the land. A landscape characteristic may also be referred to as a "*character defining feature*," which is a "*prominent or distinctive aspect, quality, or characteristic of a historic property that contributes significantly to its physical character*."[7]

Landscape characteristics and their associated character-defining features contribute to the overall integrity of location, design, materials, workmanship, setting, association, and feeling.

- Spatial Organization is the arrangement of elements creating the ground, vertical and overhead planes that define and create space, including the arrangement of topography and buildings.
- Topography is the three-dimension configuration of the landscape surface characterized by features and orientation, including bluffs, cliffs, slopes and drainages of the islands.
- Views and Vistas are features that create or allow a range of vision which can be natural or designed and controlled; these include views of the light stations from Lake Superior and views from the light towers and lighthouses.
- Circulation is spaces, features, and materials that constitute systems of movement.
- Buildings are either currently or were historically habitable structures. These are included in the Historic Structure Report.
- Structures are smaller nonhabitable buildings and significant features (now or historically) such as privies, tramways, and out buildings.
- Small scale Features are elements that provide detail and diversity combined with function and aesthetics; including paving; structural remnants; tram tracks; site walls; signs; and walls of building ruins.
- Vegetation is the indigenous or introduced trees, shrubs, vines, ground covers, and herbaceous materials on-site. Vegetation includes lawns and landscape garden areas.

Landscape Analysis

The analysis of the cultural landscape compares the site history of each light station with its existing condition to identify those landscape characteristics that retain integrity and contribute to the understanding of the significance and historical identity of the light stations.[8]

[4] Page et al 1998b section 3, Landscape Characteristics: 6-11
[5] Ibid., 11
[6] Ibid., 11
[7] US Department of the Interior, National Park Service
[8] Page et al 1998: 69

Each light station is comprised of a series of landscape characteristics that together give it a distinctive organization. The interrelationship of these characteristics has influenced the development of each island's cultural landscape as a whole. Each landscape characteristic is analyzed to determine those features that contribute to the significance of the cultural landscape and those that do not. Contributing and noncontributing features are presented by landscape characteristic (as presented above).

Contributing features are those physical attributes that add to the historical significance of the landscape by exhibiting the associations, qualities, or archeological values for which the light station is significant. A feature is considered contributing if all of the following are true: it was present during the period of significance; it relates to the documented significance of the property; it possesses historic integrity; it is capable of revealing information about the period; or it independently meets NRHP criteria.[9]

Noncontributing features are those that were not present during the period of significance or do not relate to the significance of the light station; no longer possess historic integrity; are not capable of yielding important information about the period; or do not independently meet NRHP criteria. Features added to the landscape that did not exist during the period of significance are also considered noncontributing. In the CLR, noncontributing features are analyzed for their impact to and compatibility with the cultural landscape, and are determined to be either compatible or noncompatible.

Compatible features are those that do not detract from the historic character of the landscape, and are of similar materials and scale to contributing features from the period of significance. Noncompatible features are visually incongruous with the cultural landscape, and conflict with the mass, scale, form, materials, texture or color of contributing historic features.[10]

HISTORIC STRUCTURE REPORT METHODOLOGY

The Historic Structure Report (HSR) presents documentary, graphic and physical information for each building within the light station. Historic documents (original drawings, rehabilitation drawings, historic photographs, keepers' logs, historic maps, and other historic documentation), Historic American Building Survey (HABS) drawings, park maintenance records, material testing and site investigations were utilized to compile the record of each structure's original development, historic alterations and current condition. Very limited destructive testing (paint and mortar sampling, primarily) was performed. The process required a multidisciplinary approach that included the review of architectural, mechanical, electrical and structural systems, and hazardous materials. These disciplines reflect the key areas and issues addressed within the body of the report.

Significant dates or periods of construction are established to document historic and nonhistoric/contributing and noncontributing buildings and features and to determine the relative significance of each feature to the building and of each building to the light station in which it resides. Where physical evidence does not support historic documentation and where historic records themselves are inconsistent, findings are documented to establish a baseline for future research.

[9] *National Register Bulletin 16a – How to Complete the National Register Registration Form* 1991
[10] US Department of the Interior, National Park Service 1997: 84

Physical Description

A brief physical description of each building precedes the section that describes individual building features and includes information such as massing, form, orientation, materiality and general plan layout. Field observations contributed to descriptions of each extant feature and attendant condition rating. In addition to field observations, over 200 material samples were obtained and tested to determine historic paint colors and mortar and plaster composition. Results are included in each island volume's appendixes. Features observed by discipline include the following:

Architecture: roof; gutters and downspouts; chimney(s); exterior walls; dormers (if applicable); windows; exterior doors; exterior trim; tower walk, railing, roof and finials/vents (if applicable); tower lantern (if applicable); interior doors; wall finishes; ceiling finishes; interior trim; floor; stairs; casework and accessibility

Structural: foundation; floor framing; roof framing; ceiling framing; wall framing; lateral system and load requirements

Mechanical: plumbing systems; HVAC and fire suppression

Electrical: system configuration; conductor insulation; overcurrent protection; lighting systems; telecommunications; fire alarm system and lightning protection

Hazardous Materials: asbestos; lead containing paint; lead duct; lead in soils and mold

A presentation of the Character Defining Features, those characteristics that embody each building's special and notable qualities, follow the description of physical features. Mass and form; layout of spaces; exterior materials; openings and interior materials are included where applicable.

Condition Assessment

Each building and building feature was evaluated and an attendant condition rating determined. A general building condition assessment is presented first, followed by the condition assessment and ratings of each feature or component. The condition rating system is as follows.

(Note: These terms are also applied to the overall structure/building.)

GOOD The feature is intact, structurally sound and performing its intended purpose. The feature needs no repair or rehabilitation, but only routine or preventive maintenance.

FAIR The feature is in fair condition if either of the following conditions is present:

- There are early signs of wear, failure or deterioration though the feature is generally structurally sound and performing its intended purpose – or –
- There is failure of a portion of the feature.

POOR The feature is in poor condition if any of the following conditions is present:

- The feature is no longer performing its intended purpose – or –
- Significant elements of the feature are missing – or –
- Deterioration or damage affects more than 25% of the feature – or –
- The feature shows signs of imminent failure or breakdown.

UNKNOWN Not enough information is available to make an evaluation.

Treatment and Use

Lastly, the treatment and use is discussed for each building. Of benefit to the CLR/HSR's development was the Value Analysis/Choosing by Advantages (VA/CBA) meeting, held in the park in May 2010. The purpose of the VA/CBA was to facilitate the project's scoping process and to identify appropriate treatments within the context of the park's current and future ability to perform the work. A preferred alternative was identified which allowed the Ultimate Treatment and Use section to be tailored to it specifically. The proposed use for each building and overall treatment recommendation guides the feature by feature work recommendation for specific materials. Treatment recommendations are developed based on the following criteria.

Severity Impact Level Definitions

For the purposes of the HSR, an "impact" is defined as a detectable result of an agent or series of agents having a negative effect on the significant characteristics or integrity of a feature or structure and for which some form of mitigation or preventative action is possible. The condition assessment includes only those impacts likely to affect the structure within the next five years.

The Level of Impact Severity and their definitions are given below. For all levels, except unknown, two criteria are given. At least one of the criteria must be met for the declared Level of Impact Severity.

SEVERE 1. The structure/feature will be significantly damaged or irretrievably lost if action is not taken within two (2) years.
2. There is an immediate and severe threat to visitor or staff safety.

MODERATE 1. The structure/feature will be significantly damaged or irretrievably lost if action is not taken within five (5) years.
2. The situation caused by the impact is potentially threatening to visitor or staff safety.

LOW 1. The continuing effect of the impact is known and will not result in significant damage to the structure/feature.
2. The impact and its effects are not a direct threat to visitor or staff safety.

UNKNOWN Not enough information is available to make an evaluation.

Compliance and requirements refer to Table 6-1 provided in Volume I, Chapter 6, Requirements for Treatment. Alternatives for Treatment are discussed as well as any adverse effects of the Recommended Treatments.

Appendixes for each island's HSR include a summary matrix of treatment recommendations, glossary of terms (repeated at each volume for ease of use for the park personnel), a summary of hazardous material findings, hazardous material analysis reports, and material composition testing data of paint, plaster, and mortar.

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CHAPTER 3: CONTEXT, CURRENT DESIGNATIONS, AND PARK SIGNIFICANCE

REGIONAL CONTEXT

The park is on the tip of the Bayfield Peninsula on the southern shore of Lake Superior. The light stations were originally built on this island chain to guide ships to the port in Ashland, and then later to guide ships around the archipelago and toward Duluth.

POLITICAL CONTEXT

The park is administered by the Midwest Regional Office (MWRO) of the Park Service. The park is within the state of Wisconsin and is included in the 7th Congressional District.

ENVIRONMENTAL CONDITIONS CONTEXT

Geography plays a major role in the general nature of the Apostle Islands' light stations. The isolation of the islands required that each light station contain all elements necessary for self-sufficiency. Dwellings had to be included, and a boat facility was essential. Except for Long Island, each light station is located at a considerable elevation above the water, reducing the necessary height of the light tower.

Except in the case of Devils Island, isolation has helped protect the light stations from extensive vandalism. Most deterioration to these remarkably intact buildings and structures has resulted from the extreme weather of Lake Superior. An almost universal change to all Lake Superior light stations is the loss of the original boat docks, usually as a result of a severe storm.

Administrative records indicate that many of the light stations had anywhere from 4 to 10 acres of land cleared to improve visibility of the light. Today, the light station grounds have an artificially determined boundary that is generally a much smaller area. Gardens, sheds, barns and other landscape features are missing.

Long Island has a unique situation among the Apostle Islands light stations as some of its buildings are now archeological remains. The remnants of the original lighthouse and the fog signal building are sufficient to suggest that additional meaningful information can be gained through archeological investigations.

CURRENT DESIGNATIONS

The NRHP nomination was submitted as two separate nominations. The first included light stations on Devils, Michigan, Outer, Sand, and Raspberry islands and was nominated as one 33.8-acre unit (but not as a district). The unit was listed on the national register on March 8, 1977 with a state level of significance in the areas of transportation and commerce, and with varying periods of significance from 1852 to 1929. The second nomination was for Long Island, which was included in the 1979 nomination prepared by the Coast Guard "Coast Guard Lighthouses and Light Stations on the Great Lakes," and placed on the national register on August 4, 1983. The Long Island light station was included amongst a larger collection. The listed period of significance for all of the stations in this nomination was 1832 to 1919.

SIGNIFICANCE AND CONTEXTS PER EXISTING DESIGNATIONS

Both the 1977 and the 1983 nomination forms emphasize the significance of the light stations under NRHP Criterion A for their contributions to our understanding of the broad patterns of our history related to navigation, shipping and commerce both on Lake Superior and in the nation. The nominations also address the significance of the light stations under Criterion C as examples of the trends and transitions in lighthouses related to architecture, operations and technologies between 1855 and 1929. The 1977 nomination notes the light stations have excellent integrity, particularly in comparison to other surviving historic light stations in the area.

The 1977 NRHP nomination form indicates that all structures and buildings at each light station are "considered significant," except for certain buildings at Michigan and Devils islands. Specific boundaries for each light station or for each historic area are not provided. The 1929 buildings at Michigan Island, including the brick Power House, brick Keepers Quarters, and wood-framed Assistant Keepers Quarters and Workshop, would have been less than 50 years old at the time the nomination was prepared and were not deemed significant, probably because they had not yet met the NRHP 50-year age standard. The privy behind and associated with the older (1857) lighthouse was described on the form but was not included in the list of significant features. No explanation for the omission is provided.

At Devils Island, the Fog Signal Building was not deemed to be significant. This could be because the research for the nomination had not determined the age of the structure, or that in 1977 the Coast Guard was still operating radio equipment out of the Fog Signal Building. No explanation is provided. The two oil houses at Devils Island were not described, so they consequently have no recognition of their significance.

The Boathouse at Devils Island was also described but was omitted from the list of significant structures. It appears that the site boundaries defined in the nomination form for each of the light stations did not extend to the shore line and therefore did not include any boat houses, docks or piers. The nomination form states the tracks from the tram had been removed, however most tracks remain today.

Additional information has been gathered in the 32 years since the nomination was prepared. A related NRHP Multiple Property Documentation Form titled "Light Stations of the United States" was completed and approved in 2002. This comprehensive summary of the history of lighthouses in the United States includes discussions of administrative history, architecture and engineering, evolution of lighthouse optics and technology, and significant associated persons. The document includes extensive information that was not available to the 1977 and 1983 nominations.

The new information has been incorporated into the reconsideration of the significance of the contributing features and structures for this report.

A draft nomination for a National Historic Landmark District encompassing all of the Apostle Islands light stations has been developed and is on file at the park offices. The draft has received a preliminary review by the Park Service and requires revision and further development of the national context and national significance.

SIGNIFICANCE AND THE LIGHT STATION CONCEPT

The NRHP nomination form (1977) for the light stations describes the buildings and structures and states that all are significant with a few exceptions (see the Park Historic Designation section). New studies of lighthouses throughout the United States have been completed since that nomination was prepared.

The NRHP Multiple Property Documentation Form titled "Light Stations of the United States" was completed in 2002. It provides a comprehensive definition of light stations, along with suggested prioritization of features when considering whether a station has historical significance and integrity. This study adopts the concept of the light station, which evolved under the administration of the United States Lighthouse Board between 1852 and 1910. The early station typically included the light tower, a dwelling, a garden, a place to store oil, and livestock outbuildings such as a chicken coops or barns. As technologies developed, the station definition was expanded to include new features including fog signal buildings, additional dwellings for personnel to operate the new equipment, workshops, cisterns, storage buildings, garages, radio buildings, boathouses, and tramways. Automation and electrification led to removal of some of the older vacated buildings.

The most important aspect of the concept of the light station is that it is a combination of features and is not limited to either just the lighthouse or to the lighthouse and immediate grounds. While the boathouse or a garden may be far from the light tower, for example, they are still important elements and should be considered in the overall definition of the light station.

The concept of a light station also allows cultural landscape features, such as gardens, walks and even trash dumps, to be considered within the definition of the historic site. The relationship between the light station buildings and the setting are important in defining the light station. The 1977 nomination for the Apostle Islands light stations appeared to focus more on the immediate improvements around the light, which may explain why certain features were omitted.

RECOMMENDED PERIOD OF SIGNIFICANCE

The recommended period of significance for the Apostle Islands light stations recognizes the crucial role of the light at each island, and as a connected system as the navigational aid for Lake Superior. The most important feature of a light station is arguably the light. The physical aspects of the light are manifested in the built features that comprise the light station – the light itself, light towers, lighthouses, fog bells/signals, utilities (oil, kerosene, electricity, radio beacons, etc), boat docks and tramways, outbuildings, clearings for operation of the light, as well as residences, vegetation and site features constructed and modified for human habitation. The evolution of the light technology (Argand lamp and reflector system, and Fresnel lens) and the light station (its built features), illustrate the continuum of modifications and technological advances that were required to address the ongoing navigational needs of industrial shipping in Lake Superior for more than 120 years.

Historic District

A period of significance of 1852 to 1978 is recommended to recognize the continuum of historical significance of the role of the Apostle Islands light stations in navigation. The period begins with the first construction activities on the islands related to the light and navigation of Lake Superior, which was the construction of the Michigan Island Lighthouse and its site development. The period ends with the change from manned lights to automated lights, of which the last automation occurred at Devils Island. The 1978 date also corresponds with the departure of Coast Guard personnel.

Individual Light Stations

In addition to the overall period recommended for the light stations as a district, a recommended period of significance for each island is identified. This addresses the continuum of changes and modifications that occurred on that island within the District's period of significance. The same rationale used for determining the period of significance for the District is used to identify the beginning and end of each island's period of significance.

Michigan Island: 1856 – Old Michigan Island Lighthouse to **1943** – Second Tower light automated

Outer Island: 1874 – Lighthouse, Fog Signal Building and Privy to **1961** – automation

Devils Island: 1892 – wood light tower, Fog Signal Building, Tramway Engine Building, Boathouse and oil houses to **1978** – automation

Long Island: 1858 – original LaPointe Lighthouse to **1964** – LaPointe Tower automation

Sand Island: 1881 – Lighthouse to **1921** – automation

Raspberry Island: 1862 – Lighthouse (light arrived in 1864) to **1947** – automation

ARCHEOLOGICAL REVIEW

Archeological resources on the islands have received some attention since the properties became part of the park. Most of the documentation of archeological work has been archived at the Park Service Midwest Archeological Center.

Archeological studies specific to the light stations include a series of test trenches excavated at Devils, Michigan, Raspberry and Sand light stations to determine if proposed drainage improvements at these sites would impact subsurface cultural remains. This project was carried out in 1988 and found minimal cultural material within the small areas tested. The report emphasizes that the test areas included in the study are not representative of the potential for buried cultural material at each of the stations and stresses that a number of areas, such as dumps, privies, and building foundations, would probably yield extensive buried materials. The project is documented in the Midwest Archeological Center Technical Report No. 8, by Vergil E. Noble, titled "The Archeological Investigation of Four Lighthouse Complexes at the Western End of Lake Superior: The 1988 Testing Program within Apostle Islands National Lakeshore." (Published 1993)

An archeological survey of Long Island was conducted in 1992 to obtain basic data as to the nature of and potential for buried cultural resources. Due to the shifting sands on the island, archeologists supplemented the typical walking survey and surface observation techniques with the excavation of test trenches at regular intervals. The report said that the survey "...added no new sites to the relatively short list of known cultural resources on the island." The survey was successful, however, in terms of providing documentation of the existing cultural resources on the island as of 1992. The report noted that the ruins of the older, abandoned, Long Island Light Station have very great potential for future archeological research and interpretation in quite a different manner from the standing, intact light station structures on the other islands. Further archeological investigations are recommended. The survey report is Midwest Archeological Center Technical Report No. 47, "The 1992 Archeological Survey of Long Island, Lake Superior, Apostle Islands National Lakeshore," by Vergil E. Noble, published 1996.

RECOMMENDED ACTIONS

The first 1977 NRHP nomination should be updated to recognize the light stations as a district and to include Long Island. In addition, the more in-depth information provided by the CLR/HSR on the light stations and their cultural landscapes should be included in the update. The period of significance should also be updated so that it reflects the expanded period of time (1852 to 1978) that recognizes the continuum of modifications and technological advances that occurred on the light stations in response to ongoing navigational needs of industrial shipping in Lake Superior.

Given the park's goal to resubmit a revised National Historic Landmark application, revising the previous NRHP application to reflect the CLR/HSR findings would be another recommended action.

CHARACTER-DEFINING FEATURES AND STRUCTURES

Character defining features of a light station are prioritized in the "Light Stations of the United States" multiple property documentation form. The prioritized physical elements and a discussion of how these features are exhibited at the Apostle Islands light stations follows (please also refer to each building's character defining features list in each island's HSR chapter):

1. Tower – The light tower, which defines the function and purpose of the site, is the highest priority of character defining features on the site. The condition of the tower is considered in terms of if the lantern is in place, if the lens that was used during the period of significance is in place, if the tower's interior is intact, if mechanisms related to the operating the light are still there and if attached rooms remain.

Except for Long Island, all of the Apostle Islands' towers are in place with original or historically altered lanterns. Changes to the towers occurred within each island's period of significance. At Long Island, the first tower was remodeled into the Keepers Quarters in 1897 and the quarters were abandoned in 1939. The two replacement towers (built in 1897) on Long Island are in place; although the Chequamegon Tower was moved about 100' back from its original location in 1987. The towers retain original interior and attached features. The wood stairs in the Old Michigan Island Light Station were replaced with metal stairs, sometime before 1900 (see Volume II, Michigan Island History). The Devils Island Tower was remodeled in 1915 when additional structural braces were added. The additions occurred within the period of significance. Only Devils Island has the original lens in place. (This lens was removed for a short period and reinstalled.)

2. Keepers Quarters – The presence of the Keepers Quarters is the second most important feature. A quarters with good integrity is the best scenario, but altered quarters in their original location are also important.

Keepers quarters are present at all of the Apostle Islands light stations. All have very good to excellent exterior integrity. The Sand Island Light Station Quarters with attached light tower also has very good interior integrity because the light was automated in 1921 and very little effort was put into changing it after that time. The Old Michigan Island Lighthouse was remodeled, primarily on the inside of the residential area, to accommodate the changing numbers of keepers and assistant keepers. The alterations occurred within the period of significance. (See Chapter 3, Period of Significance section.) The Keepers Quarters at Devils Island have moderate exterior alterations. The windows have been replaced and a dormer was altered. These changes occurred during the period of significance. The 1938-1939 Public Works Administration-funded keepers' quarters, known as the Triplex, at Long Island are unchanged, but the original quarters are in ruins. As has been noted before, the ruins appear to have great potential for further information through archeological investigations.

3. Fog Signal Building – These buildings are deemed important just for their presence on the site, with less importance as to their historic integrity. The lighthouse documentation form notes that sound signal equipment is "extremely rare and, therefore, especially significant."

Standing fog signal buildings are on Devils Island and Outer Island. Both buildings were remodeled to accommodate other equipment, mostly radio or radio beacon equipment. The Outer Island Light Station has fog signal equipment in the building dating to the 1940s. The foundations of the Long Island building are visible and have archeological potential.

4. Oil house, generator house, fuel tanks, workshop, and other ancillary buildings related to the operation of the light – These elements are important to the understanding of how the light keeping function occurred.

Only Michigan Island lacks an oil house. It was demolished in 1929 as part of the installation of the metal tower and other buildings because the new electric light in the Second Tower did not require oil. The Power House was built as part of the 1929 additions to Michigan Island. The oil houses in the Apostle Islands light stations are all quite similar square buildings with pyramidal roofs. They were usually brick or metal. Generators at Devils and Outer islands are in the fog signal buildings.

5. Other subsidiary structures – These features usually related to daily life at the station and included privies, sheds, cisterns, boathouses, tramways and walkways.

Many of these features occur at the Apostle Islands light stations providing insight into domestic life. Unfortunately, none of the livestock pens or barns survived and the boat docks have been replaced multiple times.

6. Spatial organization – The spatial organization includes the arrangement of buildings, site elements, and cleared areas of the light station. This characteristic is important to understand how the light station functioned during the period of significance.

Each light station occupies a cleared area on a forested island with the exception of Long Island where the forest has developed as the island has evolved over time.

7. Views – Light stations were built as aids to navigation for ships on Lake Superior. Visibility of the lighthouses and light towers was critical to this function and is generally obscured today.

INTEGRITY OF THE STATIONS

All of the Apostle Islands light stations exhibit a high degree of integrity in terms of location, design, setting, workmanship, materials, feeling, and association. The stations are all in their original locations. Except for the Chequamegon Point Tower on Long Island, the character defining buildings are in their original locations and the physical relationships between the buildings are intact. The Chequamegon Point Tower has been moved about 100' back from its original site in response to an encroaching shoreline. The new location does not significantly change the light station.

The design integrity of the buildings remains very good, except that the original Fresnel lenses have been removed from all of the towers except for Devils Island. The setting has been protected because all of the stations are located within lighthouse reservations. Few alterations of the cultural landscape have occurred, with the exception of the encroachment of the adjacent forest into the historic cleared area of the light stations. Modern outhouses, installed by the Park Service, are typically placed away from the buildings in areas now forested and currently out of view. These cleared areas are much smaller than those that existed historically. The NPS vault toilet at Michigan Island is an exception in that it is at the edge of the current cleared area.

Materials and workmanship are clearly evident on the exteriors of the structures. Some of the interiors of the residences have newer materials and the interiors of the fog signal buildings have been altered to allow for installations of radio equipment and generators.

All of these features combine to create a very strong feeling of the historic light station and an association with the works of the federal lighthouse administrations that administered them including the Lighthouse Board, the Lighthouse Bureau, and the Coast Guard.

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CHAPTER 4: ADMINISTRATIVE DATA

NAMES, NUMBERS, AND LOCATION DATA

The 27 buildings included in the HSR along with additional landscape elements in this project with their corresponding names, numbers, and location data are in the following summary charts, which are divided by island. Since some of the buildings have served more than one purpose, alternative commonly used names are included in the charts. Use of the Facility Management System Software (FMSS) number, the List of Classified Structures identifying number (LCS ID), and the preferred structure name is the best means of identifying the building. The preferred structure name is used in the CLR/HSR document.

In addition to the buildings noted on the LCS, other features associated with the light stations have been identified as either historically contributing or significant to the state of Wisconsin. These are listed after the tables and are included in the CLR portion of this document.

Table 4-1: Michigan Island

NPS Struct. #	FMSS #	LCS Struct. #	LCS ID	Preferred Structure Name	LCS and Other Names (per 2009 reports)	Year Built	Current Use in 2009
MIB03	26572	23103A	006371	Old Michigan Island Lighthouse	Michigan Island Light Station First Tower and Keepers Quarters	1856	Vacant
MIB01	26766	23103G	006389	Keepers Quarters	Michigan Island Light Station New Keepers Quarters	1929	Seasonal Employee Housing, Exhibit Space
MIB06	26582	23104A	006372	Second Tower	Metal Light Tower/ Light Tower 1929/ New Tower	1880, 1929	Exhibit Space
MIB02	26589	23103F	006388	Asst. Keepers Quarters and Workshop	Michigan Island Light Station Maintenance Shed	1929	Storage and the NPS Workshop
MIB04	26574	23103D	006386	Power House	Michigan Island Light Station Generator House	1928	Storage
MIB07	26585	23103B	006373	Shed	Michigan Island Light Station Storage Shed	1869, 1929	Storage
MIB05	26577	23103C	006385	Privy	Michigan Island Light Station Privy	1929	Vacant

Table 4-2: Outer Island

NPS Struct. #	FMSS #	LCS Struct. #	LCS ID	Preferred Structure Name	LCS and Other Names (per 2009 reports)	Year Built	Current Use in 2009
OUB01	26768	22105A	006376	Outer Island Tower	Outer Island Light Station Light Tower/ Lighthouse and Quarters	1874	Vacant
OUB02	26768	22105B	101140	Keepers Quarters	Outer Island Light Station Lighthouse and Quarters	1874	Seasonal Employee Housing
OUB03	26770	22104B	006378	Fog Signal Building	Outer Island Light Station Fog Signal Building	1875	Storage and the NPS Workshop
OUB05	26772	22104C	006379	Oil Storage	Outer Island Light Station Oil House/ Outer Island Magazine	1874	Vacant
OUB04	26771	22104D	006380	Privy	Outer Island Light Station Brick Outhouse	1874	Vacant/ Interior Not Accessible at Time of Survey
	78484		006377	Dock*	Outer Island Light Station Dock	1958	NPS and small pleasure boats landing

Table 4-3: Devils Island

NPS Struct. #	FMSS #	LCS Struct. #	LCS ID	Preferred Structure Name	LCS and Other Names (per 2009 reports)	Year Built	Current Use in 2009
DEB01	25189	17103A	017081	Devils Island Light Station Tower	Devils Island Light Station Light Tower	1898	Vacant
DEB02	25191	17103B	017082	Keepers Quarters	Devils Island Light Station Keepers Quarters	1896	Seasonal Employee Housing, Small Exhibit in One Room
DEB03	25192	17103C	017083	Asst. Keepers Quarters	Devils Island Light Station First Assistant Keepers Quarters/Assistant Keepers House	1897	Vacant
DEB04	25196	17103D	017084	Fog Signal Building	Devils Island Light Station Fog Signal Building	1891	Storage and the NPS Workshop
DEB05	25197	17103E	017085	Oil House 1	Devils Island Light Station Magazine 1/ East Oil Storage Building	1892	Vacant
DEB06	25198	17103F	017086	Oil House 2	Devils Island Light Station Magazine 2/ West Oil Storage Building	1908-1913	Vacant
DEB08	25200	17104A	017094	Tramway Engine Bldg	Devils Island Tram House/ Hoisting Engine House	1901	Vacant
DEB09	25202	17106A	017098	Boathouse	Devils Island Boathouse	1891	Vacant
DEB 07	25199		017087	Pump House*	Devils Island Light Station Pump House	1940s	Vacant
	78499		017099	Dock*	Devils Island Light Station Dock	1947	NPS and small pleasure boats landing
	78621		017097	Cross-Island Trail*	Devils Island Light Station Roadway	1892; widened 1920s	NPS and visitor pedestrian trail

Table 4-4: Long Island

NPS Struct. #	FMSS #	LCS Struct. #	LCS ID	Preferred Structure Name	LCS and Other Names (per 2009 reports)	Year Built	Current Use in 2009
LOB01	25215	24102F	101643	LaPointe Light Tower (preferred name)	Long Island Light Station Tower	1890	Vacant
LOB05	25221	24102B	101656	Chequamegon Point Tower	Chequamegon Point Tower/ Chequamegon Light	1896	Vacant/ Interior Not Accessible at Time of Survey
LOB02	25217	24101A	101647	Triplex	Long Island Light Station Triplex/ Light Station Quarters	1938	Proposed Seasonal Employee Housing
LOB03	25219	24101B	101648	Oil Building	Long Island Light Station Yellow Oil House/ Paint Locker	1896	Vacant
LOB06	109881		101642	Fog Signal Building Foundation*	Long Island Light Station Fog Signal Building Foundation (Ruin)	1890	Vacant
LOB04	109620		101562	Original LaPointe Lighthouse Oil Building*	Long Island Light Station Old Oil House	1897	Vacant
LOB07	109621		101651	Original LaPointe Lighthouse*	Long Island Old Lighthouse	1858, 1896	Vacant

Table 4-5: Sand Island

NPS Struct. #	FMSS #	LCS Struct. #	LCS ID	Preferred Structure Name	LCS and Other Names (per 2009 reports)	Year Built	Current Use in 2009
SAB01	25154	06142A	006381	Light Station Quarters	Sand Island Light Station and Keepers Quarters/ Lighthouse and Quarters	1881	Seasonal Employee Housing, Exhibit Space
SAB05	36466	06142B	006382	Oil Building	Sand Island Light Station Oil House/ Sand Island Oil Storage Building	1901	Vacant
SAB06	25159	06142C	006383	Privy	Sand Island Light Station Privy/ Historic Lighthouse Privy	1881	Vacant

*Included in CLR only.

For clarification, according to the List of Classified Structures (LCS), other elements on the islands in the study have been identified as either historically contributing or significant to the state of Wisconsin. These elements are:

Michigan Island Light Station:

- Concrete Walks – Contributing
- Steps/Tramway – State of Wisconsin
- Gull Island Lighthouse – State of Wisconsin
- Radio Beacons – Contributing

Outer Island Light Station:

- Steps/Tramway – Contributing
- Oil Tank Cradles – Contributing
- Concrete Walks – Contributing
- Flagpole – Contributing
- Concrete Cradle Underground Storage – Contributing

Devils Island Light Station:

- Concrete Walks– Contributing
- Cistern – Contributing
- Stone Retaining Wall – Contributing
- Hoist and Derrick Pier – Contributing
- Flagpole – State of Wisconsin
- Tramway – State of Wisconsin
- Tramway Cart – State of Wisconsin
- Outer Crib – State of Wisconsin
- Radio Tower – Contributing
- Oil Storage Tank Complex – Contributing
- Oil Tank Cradles – Contributing

Long Island Light Station:

- Power Lines – Contributing
- Cistern – Contributing
- Concrete Walks – Contributing
- Concrete Foundation Piers – Contributing
- Radio Tower Pier Foundation – Contributing

Sand Island Light Station:

- Concrete Walks – Contributing

Park Methodology for Monitoring the Future Needs of Structures

(Per Randy Ross, Facility Manager of Apostle Islands National Lakeshore, as of 2/16/2010)
The park will continue to use the Facility Management Software System (FMSS) to monitor needs and create projects. It will do this by performing Annual and/or Comprehensive Condition Assessments that will recognize the deficiencies. The Annual Assessments are quick inspections that catch the obvious problems. The Comprehensive Assessments are more detailed in-depth inspections that find the nonobvious problems. The deficiencies will then be entered as work orders. Like work orders will be bundled to form projects. Work orders to replace features that are determined to be at the end of their life cycle (painting siding, roof replacement) are considered Component Renewal (CR). Once features go beyond their life cycle the work orders become Deferred Maintenance (DM).

The priorities of the structures are determined by each structure having an Asset Priority Index (API) this number ranges from 100 to 0 (an API of 100 means that it is the most important structure in the park). The API is determined by park staff in regards to its importance to natural and cultural resource preservation, visitor use, park operations and substitutability.

There is a Current Replacement Value (CRV) given to each structure. This value is basically what it would cost to replace if the structure was destroyed. This is a difficult figure to determine with historic structures especially with some of the fine detail and materials that are no longer available.

The condition of structures is determined by the Facility Condition Index (FCI). This figure is determined by the Deferred Maintenance divided by the Current Replacement Value (FCI=DM/CRV).

FCI	*Condition*
0.00 – 0.10	*Good*
0.10 – 0.15	*Fair*
Greater than 0.15	*Poor*

The overall goal of the park is to have all structures in good condition.

RELATED STUDIES

Several studies provide considerable background material on the Apostle Islands light stations, and include the following. All of the data reviewed as part of the CLR/HSR is listed in the bibliography.

The National Historic Landmark nomination and the List of Classified Structures provide a synopsis of each building's history and importance to its specific island. Dates of rehabilitation and alterations are also listed in the LCS and provide a concise chronology of important structural modifications to the buildings.

"People and Places: A Human History of the Apostle Islands," is a historic resource study written by Jane C. Busch for the Park Service in 2008. It is an in-depth history of the Apostle Islands and its greater importance to Lake Superior, focusing mainly on the economy and trade of the region. Each island is highlighted as is the whole archipelago with emphasis on the importance of trade to the area and how it affected the islands and their structures. The social history of the area is also provided in Jane Busch's study.

Previous studies for Raspberry Island also informed the current CLR/HSR. The HSR for Raspberry Island was completed in 2000; the CLR in 2004. Reflection and analysis of the previous work on Raspberry Island has also informed the team on how best to proceed for the remaining five islands.

Additional documentation was provided by the Historic Structure Preservation and Utilities Team for Apostle Islands, led by Doug Pratt. These include an account of work accomplished at the light stations in the last 11 years (1998-2009); a matrix of each structure noting when they were reroofed and with what material, a 20-year cyclical reroof program backlog chart; and recommendations on which roofs need replacing.

Newspaper articles, books, and firsthand letters, descriptions, and photographs from the Apostle Islands archives located in Bayfield, Wisconsin were also reviewed.

The Historic American Buildings Survey (HABS) of the Apostle Islands light stations, completed in 1990, surveyed the primary structures and sites and documented their existing condition. HABS is administered by the Heritage Documentation Program and is the nation's first federal preservation program. Beginning

in 1933, HABS employees have documented the architectural heritage of America and compiled this information in the Library of Congress. Today, the Library of Congress houses nearly 40,000 records, including HABS, HAER (Historic American Engineering Record) and HALS (Historic American Landscapes Survey) records. The HABS plans, sections and elevations drawn for most of the islands' structures note the dimensions and details of the buildings and have been used as the existing condition plans. The plans for the sites note many of the features and have been used as the basis for the CLR plans.

Copies of original plans and early photos of the islands and the buildings were researched at the Apostle Islands archives in the Park Service Headquarters and Visitor Center in Bayfield, Wisconsin. Duplicates of other plans, details, aerials, and historic documents relating to the Apostle Islands light stations were obtained from the NPS Technical Information Center (TIC) in Denver, Colorado.

A number of related studies on the Apostle Islands as an archipelago of historic importance relating to trade, technological development, and recreational activities were also reviewed.

The General Management Plan/Wilderness Management Plan was released to the public in July 2009. The preferred alternative states that at least two additional lighthouses (choosing from Sand, Outer and Michigan Island) will be rehabilitated. The Long-Range Interpretive Plan for Apostle Islands was published in June of 2002, and, like the GMP, provides information about the NPS plans and goals for development. Summaries of this plan and the GMP are listed below.

Draft General Management Plan/Wilderness Management Plan/ Environmental Impact Statement (GMP/EIS)
Released July 2009

The preferred alternative will serve as the management plan for the Apostle Islands for the next 15 to 20 years. The previous GMP was enacted in 1989. The July 2009 GMP/EIS was open to the public for comments until October 23, 2009. Below is a summary of the GMP/EIS 2009: Alternative 2. (The Preferred Alternative) Focus on bringing more people to the islands:

- Two additional light stations would be restored or rehabilitated, similar to Raspberry Island light station. Part of Long Island light station would be rehabilitated for park staff housing
- Additional transportation opportunities to encourage more visitors to come to Sand, Basswood, and Oak islands
- Manitou Island Fish Camp would be preserved and stabilized, the cultural landscape partially rehabilitated
- No change in the number of the docks, but some docks would be relocated, improved, or expanded
- Bayfield Visitor Center would be built in a new location closer to the water to improve contact with visitors and to be located with an operations center; Park HQ would remain in Old Bayfield County Courthouse; the Little Sand Bay Visitor Center would be replaced with visitor contact station
- New ranger station and accessible beach ramp developed at Meyers Beach, which is on the mainland
- Compared to Alt. 1, most of adverse impacts would be long-term negligible to minor; increased visitor use on some islands would result in minor to moderate long-term adverse effects on vegetation, shorelines, and sandscapes
- Minor to major long-term beneficial impacts would occur due to improved access and experiences to visitors, improved facilities, decreased staff fragmentation, increased staffing levels, increased spending by visitors; none of these impacts considered unacceptable.

The 2009 GMP/EIS addresses the NPS goals for future accessibility in the following statements.

"Visitor Use and Experience: Strategies," page 37:

- "All of Apostle Islands National Lakeshore's programs and facilities will be evaluated on a regular basis to ensure that they are accessible to the extent feasible."

"Accessibility for Persons with Disabilities," page 91-92:

- "Few additional facilities are anticipated during the life of this plan, and those that are constructed will only be added if they provide essential environmental protection and are appropriate to the setting. In those cases, the facility design will be accessible consistent with federal law and NPS policy. Whenever feasible, the National Park Service will go beyond the legal requirements and make the facilities as accessible as possible using a wilderness-appropriate primitive design."

"NPS Preferred Alternative: Mainland Unit," page 124:

- "A ramp would be installed at Meyers Beach, which would provide access to the beach for visitors with disabilities."

Long-Range Interpretive Plan: Apostle Islands National Lakeshore,
Published June 2002

The Interpretive Plan has set goals for the future of the park's outreach and education for visitors. This plan is formed around seven themes that encourage discussion, imagination, and further investigation of the Apostle Islands. The themes are:

1- "At the center of the continent, Lake Superior has long served as a highway of commerce connecting the Apostle Islands region to a global economy, thereby transforming the landscape and its people."
2- "The Stories of Apostle Islands National Lakeshore reveal themselves along edges where water meets land and sky, field meets forest, culture meets culture, and past meets future."
3- "After being altered by centuries of exploitation, the Apostle Islands' environment is restoring itself and regaining its wilderness characteristics."
4- "The Apostle Islands have long attracted people to Lake Superior's shore to enjoy world-class opportunities for a variety of recreational experiences."
5- "The Apostle Islands' protected plant and animal communities, remote yet not removed from outside influences, serve as indicators to help measure the pulse of the planet."
6- "Lake Superior defines the Apostle Islands, shapes its ecosystems, and sustains life in the region."
7- "Dynamic and uncontrollable, Lake Superior is a force to be encountered on its own terms."

Source: *Long-Range Interpretive Plan: Apostle Islands National Lakeshore*, NPS June 2002, p 28-34

A variety of methods are used to communicate the park's primary interpretive themes and facilitate public understanding of the park's meaning and significance. These include such personal interpretive services as informal visitor contacts, interpretive talks, illustrated programs, conducted activities, and curriculum-based education programs. Interpretive media such as publications, audio-visual programs, wayside exhibits, visitor center exhibits, and the park's website are also important in communicating this information to the public.

DOCUMENTATION RECOMMENDATIONS AND FUTURE STUDIES

The Apostle Islands archives in Bayfield, Wisconsin and the NPS Technical Information Center (TIC) in Denver, Colorado are appropriate locations for the archival materials related to the buildings in this study. TIC will receive copies of the information recovered by this document as will the Apostle Islands archives.

The following future studies are necessary planning tools for the future of the light stations.

- Develop an Interpretative Plan for each island to further refine the information to be presented to the visitors.
- Develop an Archeology Investigative Approach Plan to inform investigations and future improvements, so that archeological resources are protected.
- Develop an Underwater Resource Plan to inform how to handle extant resources (such as the docks) in the future.
- Continue to develop an overall Park Accessibility Plan, using the recommendations of June 2010 as a basis and include non-mobility related disabilities (Appendix B).
- Develop an overall Park Hazardous Material Mitigation Plan to identify and prioritize future remediation efforts.
- Develop an overall park Integrated Pest Management (IPM) Program.

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CHAPTER 5: MANAGEMENT ISSUES

The following topics have been identified as management concerns that are integrally related to the work in the CLR/HSR and are common to several or all of the light stations in the Apostle Islands. These issues are discussed to provide an overview of the particular concern as it relates to potential treatment recommendations for the cultural landscape and historic structures of the light stations.

MAINTENANCE OF HISTORIC RESOURCES

Current and previous management practices including deferred maintenance, and lack of funding, have resulted in loss and/or deterioration of character defining features. As these actions continue, individual features are compromised and/or lost or removed, resulting in an overall loss of historic character.

ACCESSIBILITY (ABAAS)

The NPS will provide persons with disabilities the highest feasible level of physical access to historic properties that is reasonable, consistent with the preservation of each property's significant historical features.

The Park Service has undertaken an accessibility analysis, separate from the CLR/HSR, to determine an accessibility plan for the six light stations in the Apostle Islands: Raspberry, Michigan, Outer, Devils, Long, and Sand islands. This work was intended to address the light station system as a whole and the accessibility requirements to be achieved at each individual light station and only addresses physical access. The report is included in Appendix B. It should be noted that each of the light stations included in this study (Michigan, Outer, Devils, Long, and Sand) may be reached by pleasure boats and small vessels at docks or landings near the light stations. Access by larger public cruise boats is limited to Raspberry and Stockton islands. An overall park wide accessibility plan to address visitors with non-mobility related disabilities will still need to be generated by the park. The CLR/HSR incorporates the recommendations into each of the light station's plans. In summary the recommendations are as follows:

For the Michigan Island Light Station the recommendations included the following measures:

- Provide a new accessible restroom (Vault Toilet) with an accessible path
- Provide an accessible route from the top of the tramway to the Keepers Quarters and Old Michigan Island Light Station
- Provide an accessible route to the west entry door of Old Michigan Island Lighthouse and through the entire first floor, including enlarging the west entry door and installing a freestanding ramp with guardrails

For the Outer Island Light Station the recommendations included the following measures:

- Provide a new accessible restroom (Vault Toilet) with an accessible path

For the Devils Island Light Station the recommendations included the following measures:

- Provide a new accessible restroom (Vault Toilet) with an accessible path

For the Long Island Light Station the recommendations included the following measures:

- Provide a new accessible restroom (Vault Toilet) at the LaPointe Light Station with an accessible path

For the Sand Island Light Station the recommendations included the following measures:

- Provide a new accessible restroom (Vault Toilet) with an accessible path
- Provide an accessible trail, including boardwalks from the East Bay boat landing to the light station
- Provide an accessible route to the kitchen level of the Light Station Quarters

The NPS must ensure that all interpretive programs, services and opportunities are provided in such a way as to ensure that they are accessible to all individuals with disabilities and meet the requirements of Section 504 of the Rehabilitation Act of 1973. The unique stories of each light station should be made available to visitors and staff through accessible interpretive programs at the APIS Visitor Center in Bayfield, WI.

LIFE SAFETY/CODE COMPLIANCE

Safety is paramount to visitor and employee use of the buildings. Code compliant handrails and guardrails were noted as a critical item; however, their installation without becoming visually disruptive to the historic fabric will be a challenge. Further, as projects commence design, full code studies utilizing the International Existing Building Codes (IEBC) will be required to determine the level at which code compliance is attainable at these remote sites.

HAZARDOUS MATERIALS

Although further sampling and testing is needed, hazardous materials of lead paint, asbestos containing materials, petroleum, guano and mold were identified. An analysis of employee and visitor safety versus mitigation costs will be required.

INTERPRETATION AND PARK SIGNAGE

Interpretation and educational programs are primarily the responsibility of the park through its rangers, programs, and exhibits. *The Long-Range Interpretive Plan*, 2002 guides interpretive efforts in the park. Information and interpretation include interpretive signs on the light stations and collections housed within various buildings. APIS is developing a system-wide interpretation plan that includes the six sight stations: Raspberry, Michigan, Outer, Devils, Longs, and Sand. Park signs are closely tied to interpretation and will be addressed by the park as part of the interpretation plan. Recommendations for interpretation programs and facilities are not included in the CLR/HSR but will be developed in the interpretive plan by the park.

BOAT DOCKS AND LANDINGS

The CLR/HSR has addressed the individual boat docks at the light stations with regard to location, configuration and basic materials of docks and how this relates to the historic character of the cultural landscape. Details of the physical condition, materials and engineering have not been included in the CLR/HSR. Boat dock planning work is currently under study by the Park Service under separate but related projects, including the Great Lakes Restoration Initiative.

WILDERNESS AND RESERVATION BOUNDARIES

A large portion of the park is designated as the Gaylord Nelson Wilderness, established on December 8, 2004, and includes 80% of the land area of the park (approximately 33,500 acres of the park's 42,160-acre

land base).[11] The wilderness designation includes large portions of Michigan, Outer, and Devils islands. No parts of Sand, Basswood, and Long islands are included in the wilderness designation. Specific areas on Michigan, Outer, and Devils islands were set aside as light station reservations and are outside the wilderness boundary. Sand and Long islands also contain light station reservations, as does Raspberry Island, which is not included in this study.

Beginning in the mid-1800s the United States Lighthouse Board began reserving lands for the development of light stations in the Apostle Islands. The reservations varied in size and configuration from entire islands such as Devils and Raspberry islands, to small portions of land on Michigan, Outer, Long, and Sand islands. The reservations remain in place today as a part of the park. Some adjustments to boundaries were made in 1939 when the Coast Guard assumed authority of the light stations in the Apostle Islands.

CLEARING PRACTICES

Maintenance of the historic cleared areas of the light stations is an ongoing maintenance practice that the park has implemented since the park's inception in 1970. Restoring and maintaining the historic cleared areas of each light station is important to maintaining the integrity of each individual light stations and the system of light stations as a whole. Best management practices for the clearing of trees and shrubs to reduce forest encroachment have been considered in developing treatment recommendations for the light stations. In general applicable clearing best management practices include the following methods:

- Remove large trees by standard felling practices. A small number of trees and trunks can be moved into the forest and remain as felled wood. Larger numbers of tree trunks will need to be bucked and removed from the island.
- Brush removal will most likely be a combination of practices that include: stack and burn on site in slash piles; wide scattering of materials in adjacent forest; chip and place on-site foot trails (small amount of initial removals). The movement of brush and wood to mainland or other islands is prohibited by the park.

SHORELINE SLOPE STABILIZATION

Due to the nature of the topography and geology shoreline bank erosion is an ongoing process and concern in the Apostle Islands, specifically at the Raspberry, Outer, and Michigan Island light stations. These light stations are most susceptible to shoreline erosion that could impact light station buildings and structures. Slope stabilization projects have been implemented at Raspberry and Outer islands but none have been initiated at Michigan Island. The park has established a program of slope stabilization monitoring and a proposed series of best management practices primarily to prevent erosion from potentially damaging the light stations and structures.

Because of the high erosion potential clearing work along the shoreline banks must be done carefully and selectively, and care should be taken not to initiate erosion by overworking slopes. Only through careful planning and management action will these banks be kept stable. This work may best be accomplished in an incremental manner with a sound erosion monitoring program in place and a plan for biostabilization of the banks.

[11] *Draft General Management Plan/Wilderness Management Plan/Environmental Impact Statement* (GMP/EIS). 2009. Page 15

The recommendations for select clearing along the shoreline banks at Michigan and Outer islands and strategies for maintaining stable shoreline slopes are included in the individual light station cultural landscape reports.

SUSTAINABILITY

Due to environmental, operational and safety concerns, the park is dedicated to reducing (eliminating) the use of carbon fuel within the park. This includes maximizing pv (photo-voltaic), minimizing the use of propane and reducing the quantity of boat trips per light station required for maintenance.

EVOLVING PROJECTS/CHANGING OBJECTIVES

It is understood that the CLR/HSR is a management tool for the Park Service. As such, it is a static document whereas the management of the park is dynamic and driven by environmental, programmatic, and budgetary forces. Therefore, while specific treatment recommendations have been identified in the CLR/HSR, it is understood that changing objectives in future management may prompt differing treatments.

CONSTRUCTION LOGISTICS

Construction projects on the islands of Lake Superior are difficult. Rapidly changing weather can limit boat access to the islands. Depending on the dock used, boat size and speed, travel to each island (and between islands) can vary from a half hour to an hour. Seasonal shifts further limit boat access to the islands as portions of the lake can freeze from mid-October (in extreme years) to April. All of these factors will contribute to higher construction costs for the park.

INTEGRATED PEST MANAGEMENT (IPM) PROGRAM

All buildings can be a risk for pest infestation. To date, the Old Michigan Lighthouse and the Triplex at Long Island have been identified as having bat infestations. The park should develop an overall program to guide policy on mitigation techniques.

CHAPTER 6: PROPOSED TREATMENT CRITERIA

This chapter includes a synopsis of the treatment recommendations as well as the process by which the preferred alternative was selected.

SUMMARY OF TREATMENT RECOMMENDATIONS

The overarching treatment strategy for the light stations is rehabilitation, recognizing that with this approach, individual features or structures may warrant preservation (typically stabilization) or restoration. Likewise, assuming that treatments will be undertaken in phases, stabilization may become the first step. The CLR/HSR includes the following proposed uses and treatments:

- **Michigan Island: Rehabilitation** – Rehabilitate Old Michigan Island Lighthouse to a pre-1928 condition with self-guided visitor use at the quarters and guided tours to the tower. Rehabilitate the Keepers Quarters for visitors at the first floor and seasonal housing at the second. Rehabilitate the Second Tower for guided tours. Preserve the Assistant Keepers Quarters and Workshop, Power House, Shed and Privy primarily for NPS maintenance with the possibility of providing visual access to visitors to the Shed and Privy. Rehabilitate the cultural landscape including selective clearing of trees; stabilizing the slope embankment; upgrading site accessibility; repairing the tram to working condition; removing invasive vegetation; and restoring historic plantings.
- **Outer Island: Rehabilitation** – Rehabilitate the Tower for guided visitor use. Rehabilitate the Keepers Quarters for rustic seasonal staff housing. Rehabilitate the Fog Signal Building for possible visitor use. Preserve the Oil Storage and Privy for NPS storage. Rehabilitate the cultural landscape including clearing of trees; stabilizing the slope embankment; maintaining recent site drainage improvements; repairing the tramway to a working order; removing noncontributing features; and maintaining small scale contributing features.
- **Devils Island: Rehabilitation** – Rehabilitate the Tower, Keepers Quarters, Assistant Keepers Quarters, Oil House 2 and Fog Signal Building (replace noncontributing south addition) for varied levels of visitor use. Preserve Oil House 1, Tramway Engine Building and Boathouse for NPS storage. Rehabilitate the cultural landscape including clearing trees; repairing tram tracks; and maintaining lawn areas and contributing small scale features.
- **Long Island: Rehabilitation** – Rehabilitate the LaPointe Light Tower for guided visitor tours. Rehabilitate Chequamegon Point Tower (no visitor tours). Preserve the Triplex and Oil Building. Rehabilitate the cultural landscape including investigating the extent of concrete walks; clearing trees; stabilizing remnants; constructing a new dock; and maintaining contributing small scale features.
- **Sand Island: Restoration** – Restore the Light Station Tower and Quarters to pre-1921 condition for visitor tours and possible overflow staff housing. Make the kitchen level physically accessible and add interpretive program access for the remainder of the Light Station Tower and Quarters. Preserve the Oil Building and Privy for possible visitor visual access. Restore and rehabilitate the cultural landscape including clearing trees; upgrading site accessibility; restoring missing fencing; and relocating and removing noncompatible small scale features.

SUMMARY OF VALUE ANALYSIS/CHOOSING BY ADVANTAGE

In the midst of the CLR/HSR project, a Value Analysis/Choosing by Advantages (VA/CBA) process was integrated into the project in May of 2010. It was determined by the team that the future construction projects potentially being determined by the CLR/HSR was worthy of the VA/CBA process to ensure that the decisions being made were objectively meeting the NPS criteria. Of the three alternatives evaluated, alternative 2, with minor modifications, was selected due to its greatest value to the Park Service. (Refer to separate VA/CBA report.)

The VA/CBA was primarily a project scoping exercise to evaluate the range of opportunities. The Class C Cost Estimate (appendix A) exceeds the current available construction funding. However, as a CLR/HSR, it was agreed by the team that the short term funding limitations should not necessarily limit the longer term vision and goals typically generated in a CLR/HSR. Therefore, the long-term plan will be funded by a variety of funding sources over many years in order to achieve full implementation.

The following sections are general information pertaining to the proposed use and recommended treatments contained within the HSR treatment recommendations per building:

REQUIREMENTS FOR TREATMENT (HSR)

NPS 28, Chapter 8 instructs that the Requirements for Treatment section will identify laws, regulations, and functional requirements that apply to the historic structure. This calls for specific attention to issues of life safety, fire protection, energy conservation, abatement of hazardous materials, and accessibility. In addition to the issues as called for by NPS 28, this section includes cultural resource protection and management.

Table 6-1 lists the issues, relevant policies, laws, codes, and standards that outline potential impacts that shape treatments of the buildings recommended in this HSR. Although not necessarily all inclusive, the matrix should be considered a starting checklist for design of treatments and management of the resources. Further guidance and a listing of related regulations may be found at: http://www.nps.gov/dscw/laws-pol.htm. Although regulations may appear prescriptive, their application to historic buildings and structures always requires careful consideration of the resource's historic character and integrity along with interpretation and/or alternative means of fulfilling regulatory requirements.

Table 6-1: Relevant Policies, Laws, Codes, and Standards

Topic	Code/Policy/Law	Comments
Life Safety	National Fire Protection Association - NFPA 101 International Building Code (IBC) 2009 Executive Order (EO) 12941 ASCE7 International Existing Building Code (IEBC) 2009 Amendment to Public Buildings Act 1988 NFPA 70 National Electrical Code	Life safety issues are those that relate to fire, storm, collapse, crowd behavior, and other related considerations. See individual building reports for specific life safety deficiencies. It is important to note that even though a feature's condition may be "poor," it does not necessarily mean it poses a life safety threat. For instance, exterior trim, in some cases, is severely deteriorated, but this condition does not constitute a life safety issue. <u>Life Safety Issues:</u> * Lack of code compliant hand rails or guardrails at stairs. * Lack of code complaint guardrails at several towers. * Damaged porch framing which is the exit path (Devils Island Keepers and Assistant Keepers Quarters) * Trip hazards on exit routes Several buildings have entry doors that lack a code-compliant landing on both sides of the door. Specific impacts for each building should be identified upon development of schematic rehabilitation design for the ultimate use. * With regard to the buildings' ability to resist seismic events (see EO 12941), evaluation of seismic capacity was beyond the scope of this report.
Fire	NPS Director's Order (DO)-58: *Structural Fire Management*	To establish fire performance requirements for the islands and for this report, the mechanical engineer communicated with Brian Olson of the DSC. They concluded that the introduction of fire suppression systems was not recommended for the buildings based on their current use and limited water supply. Please refer to Appendix C.
Protection	Various NFPA Standards DO-28 – NPS 28 NPS *Management Policies 2006*, 5.3.1.2. Fire Detection, Suppression and Post Fire Rehabilitation NPS *Management Policies 2006*, 9.1.8, Structural Fire Protection and Suppression IEBC 2009 ASCE7 IEBC 2009 Integrated Pest Management (IPM) Program NPS Management Policies 2006, Section 4.4.52	

Topic	Code/Policy/Law	Comments
Energy Conservation	Guiding Principles of Sustainable Design Greening Federal Facilities, An Energy, Environmental and Economic Resource Guide for Federal Facility Managers and Designers IESNA 9th Edition ASHRAE/IESNA 90.1 International Mechanical Code 2009	This report does not address this topic in depth. It is understood that the park's goal is to eliminate dependency on fossil fuels. With regard to thermal insulation energy concerns in buildings that are unconditioned that are likely to remain in this or similar use, the topic of energy conservation is not relevant, other than electrical supply. For the other buildings, impacts to the building relative to this topic depend on ultimate use of the buildings. Specific impacts for each building would be identified upon development of schematic rehabilitation design for the determined use.
Hazardous Material Abatement	Resource Conservation and Recovery Act Environmental Protection Agency Regulations Occupational Safety and Health Administration Regulations Arizona Department of Health Services	Generally all painted surfaces are suspect as having lead-based paint in underlying coats. Future treatment (rehabilitation) would not result in direct impact to the building but would trigger construction personnel protection requirements during preparation of surfaces for repainting. Specific impacts to each building should be identified and evaluated once qualified personnel have completed a hazardous material survey/ testing.
Accessibility	General Administration Services (GSA), Architectural Barriers Act Accessibility Standards (ABAAS) DO-28 – NPS 28	Park and DSC staff and a local accessibility consultant met on-site in 6/2010 to discuss the overall accessibility of the park. This report has been included in Appendix B. Note that a report on non-mobility related disabilities still needs to be generated by the park.
Cultural Resource Protection and Management	DO-28 and NPS 28 Cultural Resource Management The Secretary of the Interior's Standards and Guidelines for Rehabilitating Historic Buildings 1995 Archeological and Historic Preservation Act 1974 EO 11593, "Protection and Enhancement of the Cultural Environment" Programmatic Memorandum of Agreement among the Park Service, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Office (1995) National Historic Preservation Act of 1966 as amended, Section 106, and Section 110 Advisory Council on Historic Preservation's regulations, *Protection of Historic Properties* 36 CFR 800	All these buildings have significance related to the history of the nation. The rehabilitation designs will undergo strict scrutiny to ensure that every reasonable effort to retain historic character and integrity has been addressed. Rehabilitation design and construction that conforms to the Secretary of Interior's Standards and Guidelines for Rehabilitation will facilitate avoiding adverse effect determinations.
Integrated Pest Management (IPM)		Important in relation to maintenance, preservation and restoration work. It impacts employee and visitor safety and health. Should be further investigated as projects are scoped.

ALTERNATIVES FOR TREATMENT (HSR)

Physically, the buildings addressed in this HSR should be treated as viable and active structures. The uses of the buildings range from preservation/mothballing, to NPS utilitarian use and from moderate to full visitor access and use. These buildings warrant sensitive preservation of intact features, restoration of deteriorated or missing fabric, and rehabilitation to adopt a change in use.

Through the design phases for specific projects and as individual buildings are preserved, restored, or rehabilitated, refinement to the alternatives will occur. Because of severe deterioration, on and in several of the buildings, in-kind replacement of historic materials where needed will be required. Care should be taken to avoid attempting to make the buildings look as if new. Development of plans for each island will lead to funded construction projects, some requiring conversion of structures for new uses. Rehabilitation is the process of making possible a compatible new use for a property through repair, alterations and additions while preserving those portions of features which convey its historical, cultural, and architectural values. The emphasis remains on retention and repair of historic materials. Character defining spaces and features must be protected. Preservation and restoration sensitivity are intentional outcomes of a rehabilitation approach. Upgraded engineering systems for contemporary comfort, convenience and safety, meeting program needs and codes, are tailored changes to a rehabilitated structure. Throughout, the Secretary of the Interior's Standards shall be used.

Please refer to the HSR volumes for discussions of alternatives specific to each building.

ASSESSMENT OF EFFECT FOR RECOMMENDED TREATMENTS (HSR)

Adverse effects can be evaluated as impacts which diminish the historical integrity of the property, such that the distinguishing characteristics of the building that qualified it as contributing to a historic district, are irreversibly changed or lost. Adverse impacts can include loss of historic fabric and character defining features, alteration of historic finishes, loss of spatial relationships, and inappropriate alterations/additions. It is the opinion of the authors of this report that the recommended treatments may be accomplished without diminishing a building's individual or the site's collective characteristics (location, design, setting, workmanship, materials, feeling, and association) that qualify these properties for inclusion on the national register and designation as contributing structures to the pending Apostle Islands National Lakeshore Historic Landmark District application.

Please refer to the HSR volumes for discussion of effects for recommended treatments.

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CHAPTER 7: OVERALL APOSTLE ISLANDS HISTORY

The Great Lakes extend more than 1,000 miles across the northern United States. Rich and diverse natural resources, both in and surrounding the lakes, have attracted explorers and settlers from prehistoric times to the present. The water provided an efficient means of transportation for early travelers and traders, but required risky navigation around unmarked hazards. As commerce developed on the Great Lakes, freighters relied on navigational markers for safe passage. The federal government's lighthouses, buoys, and lightships not only paralleled the growth in commerce, but were vital prerequisites for its development.

The remarkably intact light stations in the Apostle Islands illustrate the development and interdependence of commerce, community and the role of the federal government's lighthouse service. While each station was developed separately to address specific navigational needs, the collection of stations illustrates the evolution of lighthouses, the settlement and development of the Chequamegon Bay and Lake Superior, and the role of lighthouses in American commerce.

Six of the Apostle Islands light stations are within the boundaries of the park. Five of these stations are addressed in detail in this document. The sixth station at Raspberry Island is documented in previous studies *(Historic Structure Report Raspberry Island Lighthouse*, December 2000 and Cultural Landscape Report Raspberry Island Lighthouse. November 2004). The other major Chequamegon Bay light, the Ashland Breakwater light, guides ships into Ashland harbor and is outside of the park.

All seven light stations are still functioning navigational aids. Using modern illumination techniques, the light stations guide today's marine traffic, as they have for more than 150 years.

THE GREAT LAKES NETWORK

Light stations played a vital role as the Great Lakes developed into an integrated network of commerce, shipping and community development. The first boats on the lakes could take advantage of the relatively calm waters connecting Lakes Michigan, Huron and Erie, but the rough rapids in the river connecting to Lake Ontario and to Lake Superior threatened lives and cargo. In the 1600s and 1700s, French fur traders first freighted their cargo east across Lake Superior via canoes and struggled to portage around the rapids in the waterway that connected to Lake Huron. The French and later the English launched vessels for use on Lake Superior, but still faced an arduous overland transport of goods to the next waterway.[12]

The United States began to establish a presence in the area after the War of 1812. In 1825, their 300-mile man-made waterway- the Erie Canal- bypassed Lake Ontario by connecting Lake Erie at Buffalo with Albany. At Albany, the canal connected with the Hudson River to carry goods to New York City and its international ports. In 1829 Canadian developers completed the Welland Canal that avoided Niagara Falls and connected Lake Erie to Lake Ontario. The critical link to Lake Superior required navigation of the rapids in the 21-foot drop on the Saint Mary's River between Lakes Superior and Huron. Congress recognized the importance of the connection and granted land to the State of Michigan in 1852 to develop the Saint Mary's Falls Ship Canal at Sault St. Marie. The canal system, also known as the Soo Locks, opened in 1855, completing the final western link in the Great Lakes network.

[12] Faltinson, Brian J. "Split Rock Light Station," National Historic Landmark Nomination. Washington, D.C.: National Park Service, 2008. Page 21.

The vast interconnected lake system boosted the American economy via easier transport of goods and greater access to natural resources. In 1855 $600 million worth of goods passed through the Great Lakes, constituting more than the total value of all of America's foreign trade for that year.[13]

EARLY LIGHTHOUSE ADMINISTRATION AND THE LIGHTHOUSE BOARD

Lighthouses were federal projects. They were part of the first public works administration program established in the United States. President George Washington signed the ninth act of Congress, known as the Lighthouse Act, on August 7, 1789, establishing the federal government's jurisdiction over lighthouses. Secretary of the Treasury, Alexander Hamilton directly supervised the new U.S. Lighthouse Establishment.

Stephen Pleasonton, the Fifth Auditor of the Treasury, oversaw the Establishment beginning in 1820. He held the position until 1852. Under Pleasonton, the nation's lighthouses and their lighting systems declined until they became enormously inferior to those used by other maritime powers. In 1838, Congress attempted to address the deficiencies and divided the Lighthouse Establishment into eight districts with an appointed naval officer to inspect each district.

The attempts to improve the Establishment had little effect. Criticisms of the lighthouse system increased, inspiring Congress in 1851 to appoint an investigative panel of scientists and military officers. The panel's findings of faults, provided in their 760-page January 1, 1852 report, were derogatory and numerous.

Following the examples of the respected lighthouse organizations in England, Scotland, Ireland, and France, the report recommended a nine-member board to oversee daily operations. Pleasonton was promptly replaced by this new Lighthouse Board, which consisted of two Navy officers, two members from the Army Corps of Engineers, two civilians of "high scientific achievement," a Navy Secretary and an Army Secretary. The Secretary of the Treasury was the ex-officio president. The new board began work on October 9, 1852. The stated main mission of the Lighthouse Board was to upgrade the embarrassingly shabby facilities, to build new lighthouses, and to support safe water travel. The Board operated for 58 years from 1852 to 1910.

Lighthouse historian F. Ross Holland Jr. called 1852 "the single most important year in the history of this nation's aids to navigation." In assessing the impact of the Lighthouse Board, Holland wrote, "The board raised the reputation of the United States' lighthouses from the bottom of the heap to the top, and set the establishment on the road along which it has since led the world…"[14]

The Lighthouse Board led a multifaceted transition in technology, professional conduct and facilities. Its work addressed various forms of maritime navigational aids including buoys, light ships, fog signals and harbor lights. Joseph Henry, the first secretary of the Smithsonian Institution (1847-1878), and a member of the Lighthouse Board, chaired the Board's Committee on Experiments. Henry was America's preeminent scientist with a distinguished career as an inventor and professor at Princeton. His pioneering work in electricity and magnetism helped bring about the invention of the telegraph, electric motor, and telephone. Henry's influence was clear in the technical advances implemented at the lighthouses.

The Board immediately set out to replace the inferior Argand lamp and reflector systems in American lighthouses with new Fresnel lenses. A young French physicist named Augustin Fresnel invented the lens in 1822. The Frenchman devised a series of glass prisms surrounding the lamp and arranged in a

[13] Hyde, Charles K. *The Northern Lights: Lighthouses of the Upper Great Lakes.* Lansing, Michigan: Two Peninsula Press, 1986.Page 15.

[14]Holland Jr., Francis Ross. *America's Lighthouses, An Illustrated History*. New York: Dover Publications, 1988 reprint of 1972 publication. Page ix and Page 37. See also Noble, Dennis Page 87 and Hyde page 31.

configuration resembling a beehive. The lens used only a quarter of the amount of fuel required by the old Argand lamp system and produced a bright beam that easily doubled the 5- to 7-mile visibility range of most of the lighthouses.

Fresnel lenses are classified into seven orders based on focal length. The first order is the largest and has the longest focal length, and is exclusively used on sea coasts. The smallest, or sixth order, is used on pier or breakwater lights. A third and a half order lens was also developed, resulting in seven orders. Three Gulf Coast light towers had third and a half order lenses, but the others in this size category were used only on the Great Lakes on coast and harbor lights.

After 1854, all new light stations used Fresnel lenses. Between 1854 and 1857 the Lighthouse Board refitted 75 existing lights with Fresnel lenses. Five stations on the Great Lakes used the second order. The only second order lens on Lake Superior was installed at the Rock of Ages Lighthouse at Isle Royale. All of the lens manufacturers were French, including Henri (or Henry) LaPaute; Barbier & Fenestre; and Sautter, Lemonier & Cie. Mechanical devices were developed in the 1870s to create the appearance of a flashing light. Charles Hyde noted in a 1986 publication that there were still about 100 Fresnel lenses in use on the Great Lakes.

When the price of sperm whale oil soared in the mid-1800s, the Committee on Experiments tested a number of alternative fuels to power the lights. The Lighthouse Board decided to use whale lard beginning in about 1860. The Board also considered kerosene, but the volatile fluid was not immediately adopted. An 1899 history of the Great Lakes relayed this cautionary tale:

> The great danger attending the use of mineral oils has been known ever since they have been used, and hence their use as an illuminant for lighthouses has been adopted only in recent times, and with great caution. In 1864 the keeper of a lighthouse on Lake Michigan substituted a lamp burning kerosene oil for one burning lard oil. Soon after commencing its use he attempted to extinguish the light by blowing down the chimney; an explosion occurred, and set his clothing on fire. He had scarcely reached the bottom of the stairs when another explosion took place which blew the entire lantern from the tower and destroyed the lenticular apparatus.[15]

After new studies with kerosene, the Board converted to this fuel in 1877. Kerosene required adjustments to the lamp and new storage arrangements to remove the combustible fuel from the designated storage areas in the lighthouse keeper's home, where the lard oil had previously been stored. Lamps were redesigned in the late 1870s and 1880s to burn kerosene. The Board systematically constructed separate oil storage houses at the stations.

Another successful product from France, the incandescent oil vapor lamp, was introduced in 1898. The vapor lamp operates with pressurized kerosene, similar to a Coleman® stove apparatus. It generated brighter lights with no increase in fuel consumption. The first incandescent lamp in America lit the North Hook light in New Jersey in 1904. The Lighthouse Board experimented with electricity but did not adopt it.

Acetylene gas was introduced to power winter lights, smaller beacons and lighted buoys. The gas tank connected to a temperature sensitive valve that closed in the warmth of the day and opened in cold night time temperatures.

[15] J. B. Mansfield, ed., *History of the Great Lakes. Volume I*, Chicago: J. H. Beers & Co., 1899 accessed at www.maritimehistoryofthegreatlakes.ca/GreatLakes

The earliest attempts to warn mariners on foggy days come from booming canons and hand struck bells. Fog signal technology had progressed by 1851 to mechanized fog bells and steam powered whistles – no doubt to the relief of the ears of the lighthouse keepers!

The Committee on Experiments, which worked under the Lighthouse Board, tested steam whistles in the 1860s and settled on a steam locomotive whistle. Coal fired boilers provided the steam, causing a logistics problem. The keeper had to quickly build a large enough fire to generate adequate heat in time to build steam pressure to blow the whistle during a foggy day. Sometimes the fog would be gone before the whistle could blow.

The Great Lakes light keepers faced an additional challenge of sending out fog warnings in smoke laden air. Chicago's calamitous fire in October of 1871 contributed to the dense smoke from frequent fires, mostly logging-related, in the forests of Wisconsin, Michigan and Ontario. Navigation was exceedingly hazardous in the fall of that year. Smoke-choked air plagued the Great Lakes between 1870 and 1918, creating numerous navigational perils.[16] By 1892, the Great Lakes had 56 fog signals including 16 bells and 46 steam whistles.

The Lighthouse Board divided the country into 12 districts with an Army officer as the district engineer and a Navy officer as the inspector. The engineer supervised construction and repair. The inspector oversaw operations, salaries, supplies and personnel. Many of the military officers were seasoned veterans from the Civil War. The Board rearranged the districts into 16 entities in 1886, placing Lake Superior in District 11 along with the Detroit River, Lake St. Clair, the St. Clair River, Lake Huron and the St. Mary's River.

The increasing technological demands required a well-trained crew of lighthouse keepers. The old patronage system of appointment gave way to independent hiring. The Board emphasized the professional status of the keeper's position and produced prolific written instructions for keepers. In 1885 the Board introduced uniforms for male keepers.

The "Light List," an informative annual summary of lights was published for mariners, standardized color schemes for buoys were developed and other consistent standards were adopted to ease the navigational challenges of the mariner.

The Lighthouse Board assumed design, construction, and maintenance duties for their facilities, a function that had previously been contracted out. As part of their new responsibilities, the Board purchased the *Challenge* in 1856 for $6,250. The first federally owned tender on the Great Lakes, the 120-ton schooner wrecked in 1857 near Isle Royale, was repaired and returned to service as the *Lamplighter.*

The *Amaranth* (commissioned in 1891 and serving until 1945) and the Superintendent's tender *Marigold* (commissioned 1890 and serving until 1945) were the Board's regular tenders in the Apostle Islands.

New lighthouse designs were developed, reviewed and approved by the Board. The earliest simple buildings with attached towers were constructed of wood, stone, or brick. They gave way to more elaborate keepers quarters and detached taller towers. Successful designs were repeated at various locations. In the 1870s a number of tower designs incorporated decorative architectural elements, such as arched windows, corbels and window trim, suggesting a sort of Italianate aesthetic. Many of these towers were designed while Major Orlando Poe served in administrative posts for the Board. Poe is credited with introducing the

[16] Mannikko, Nancy Farm and Robert W. Mackreth. "Apostle Islands Light Stations," National Historic Landmark Nomination—Draft. N.D.

concept of the lighthouse as a stately governmental structure representing more than just a utilitarian function.[17]

Under the stewardship of the Lighthouse Board (1852–1910), America's lighthouse inventory grew from 331 to about 4,000. In 1852 there were 76 lighthouses on the Great Lakes. By 1900 there were 334. Lake Superior did not have a lighthouse until Whitefish Point and Copper Harbor were completed in 1848-1849. That was soon to change.

SETTLING WESTERN LAKE SUPERIOR

In 1855, the Soo Locks opened access to Lake Superior, and to the incredibly rich bounty of natural resources on the lands around the lake. While the fur trade had waned in the 1830s, mineral survey reports in 1841 confirmed common knowledge about the potential for copper and iron mining, followed by discoveries of iron deposits in 1844. Enterprising mining companies tried to function without the passage out of the Lake. In 1845 the *Independence* was portaged around the St. Mary's River falls to be used on Lake Superior to ship copper. Eight years later the Cleveland Iron Mining Company portaged their first 152 tons of iron ore the opposite direction on its way to Pennsylvania.[18]

The potential mineral development spurred on federal actions to gain control of the land around Lake Superior. Treaties negotiated with the Ojibwe in 1837, 1842 and 1854 pushed the Ojibwe population west. Many moved to the Bad River and Red Cliff reservations. Wisconsin became a state in 1848.

Well before the locks opened, speculators raced to locate Lake Superior's western port. It was clear that the powerful network of commerce and shipping on the Great Lakes would extend west to the newly developing areas of the United States. The new port would link rail and water transportation systems and provide great development opportunities. An enterprising developer could buy government land at $1.25 an acre and subdivide and resell for fabulous returns.[19] The risk was in predicting where the successful town would be. The speculators rushed to the two natural port locations with the greatest potential. One location incorporated St. Louis and Superior Bays, which were protected by an offshore bar. The Superior Bays site was the ideal point for a railroad connection from and to the west.

The other likely port was in Chequamegon Bay, which was sheltered by the Apostle Islands. Chequamegon Bay had three suitable locations for a port at the present locations of Ashland, Washburn, and Bayfield. The future Ashland location had some topographic constraints but was close to the known iron ore sources in the Penokee Range. The site that would be Bayfield offered deep water, a desirable feature for large boats. The Washburn harbor site was deep, sheltered, and with ample level land. Chequamegon Bay also already had the thriving small community of La Pointe.

Investors scrambled to establish their claims. The town of Superior somehow emerged first, in 1853, in spite of the battles between three hastily formed investor groups who were all fighting to claim the first and best town site. The three warring factions included 18 men of which seven were members of Congress and the others were wealthy politicians and lawyers from Washington, D.C. The town of Oneota followed in 1854. Oneota eventually consolidated with several other small towns into the city of Duluth. At the same time, two separate partnerships platted two towns on Chequamegon Bay. Whittlsey and Bay City (which

[17] Mannikko, Nancy Farm and Robert W. Mackreth. "Apostle Islands Light Stations," National Historic Landmark Nomination—Draft. Bayfield, WI.: Apostle Islands National Lakeshore, n.d.
[18] Portage information from Faltinson, Brian J. "Split Rock Light Station," National Historic Landmark Nomination. Washington, D.C.: National Park Service, 2008.Pages 24-25.
[19] Larson, Lars. "Chequamegon Bay and its Communities; Ashland Bayfield LaPointe; A Brief History 1659-1883." Whitewater, Wisconsin: University of Wisconsin, 2005. Page 82.

would merge to become Ashland) were located about 1 mile apart. Minnesota Senator Henry Rice, who was involved with the gang of 18 who established Superior, organized another group of east coast investors to plat and create Bayfield in 1856.

In three short years at least five communities had formed to vie for the coveted western port of Lake Superior. Although La Pointe was an established community with historic roots in the French, English, and American fur industry, it was on an island (Madeline Island) and lacked access to overland connections and to the extensive natural resources on the mainland. It lost out in the speculative town boom, but bustled as the supply center for the three fledgling communities in Chequamegon Bay.

On February 8, 1851, Wisconsin Senator Orasmus Cole requested and received a Congressional appropriation of $5,000 to build a lighthouse at La Pointe on Madeline Island.[20] The Congressman could hardly have known his request was the first in a series of navigational aids that would guide traffic through and around the Apostle Islands on the way into Chequamegon Bay.

By 1853 a survey and the related title work had been initiated for the lighthouse site, but the Lighthouse Board's District Inspector, Captain Lorenzo Sitgreaves, nixed the La Pointe location in favor of a position on nearby Long Island. A series of mix-ups ensued and the first lighthouse in the Apostle Islands ended up on Michigan Island. The light station included the keeper's quarters with an attached tower, a privy, and a woodshed. The Michigan Island light operated during 1857, before it was replaced by a new station constructed where Sitgreaves required on Long Island.

The Long Island lighthouse (known as the LaPointe lighthouse) was lit in 1858. It was a wood-framed house with a square wood tower projecting from the roof. Another lighthouse was proposed in 1859 for Raspberry Island. This light would guide westbound vessels passing Bayfield, and eastbound vessels searching for the safe route between Bear and York islands as they headed into the channel around the mainland to Bayfield. The Raspberry Light Station was placed in service in 1863. Neither light station saw much traffic in its first years. The national financial panic of 1857, followed by the Civil War, drained the region of its population. By 1863, only one family lived in the Bay City-Ashland (newly renamed from Whittlsey) area. There were 250 people living in Bayfield in 1865.[21]

People returned to the bay after the Civil War. In some ways, they picked up right where they left off, banking on the expectation that the area's rich natural resources would soon create a boom. Railroads had not yet reached northern Wisconsin, so exports were primarily products located close to the water, including locally quarried brownstone and timber. Fish were also a major commodity. As other commerce on the lake developed and exports grew, increasing ship traffic from the east prompted a request in 1868 for a new navigational aid on Outer Island and for the relighting of the Michigan Island light in 1869.

Boats traveling in and out of Duluth passed north of the Apostle Islands. Outer Island marked a turning point for this major shipping route and also presented a potentially dangerous complication caused by the shallow Outer Island shoal. The shoal extended more than 1 mile north of the island and could ground the ship of an inattentive captain. The Wisconsin Legislature first requested a lighthouse on Outer Island in 1868 noting "This *(island)* is the easternmost of a dangerous group of islands lying off a point right on the course of vessels bound in and out of the important and much frequented harbor of Superior…" Their request was made more urgent when a rail line was completed from St. Paul to Duluth in 1870, connecting inland freight and passengers to the lake. District Engineer Orlando Poe added to the argument in an 1871 letter requesting the lighthouse.

[20] Pepper, Terry. Lighthouses of Lake Superior website www.terrypepper.com/lights/superior

[21] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Pages 18-19.

Congress would not be convinced until 1873 when it provided the appropriation and construction began. Work was completed in the fall of 1874. Construction was plagued by mistakes and bad weather. Eight days after the first lighting of the lamp, a storm washed the boat dock away. Two days later, another storm washed the bank away and the new shoreline came within 8' of the new fog signal building. This first fog signal building in the Apostle Islands went down in a landslide in November within weeks of the first whistle blast. A new signal building went up the next year. Six years later – on October 16 and 17, 1880 – the lighthouse keeper wrote in his log of the fiercest storm he had ever seen on the lake. The light tower "…swayed like the top of a tree," and the boat dock was entirely washed away again.

The light proved its worth for the steadily increasing lake traffic. In 1878 Ashland counted 405 steam and sail boat visits. The 1870s and 1880s were accelerated growth years for the Chequamegon Bay, instigated by the long awaited arrival of the railroads. The Wisconsin Central Railroad connected to Ashland in 1877, followed by two other railroads in 1884 and 1885. Bayfield finally got a railroad connection in 1883, but only after the Chicago, St. Paul, Minneapolis & Omaha Railroad founded the town of Washburn 20 miles away and built its terminal there. Bayfield could only watch as Washburn soon acquired a grain elevator, coal dock, merchandise dock, and three sawmills. On the water, during the 1880s, another kind of "iron horse," the steam driven steel-hulled ship, gradually replaced the older wood and iron steamers and sailing vessels.

Historian Jane Busch provides an illustration of the activity in the Chequamegon Bay at the time.

> Travel between the towns, light stations, logging camps, and quarry camps of the Apostle Islands and Chequamegon Bay was mainly by water. There was no choice, of course, for travel to the islands, but people also preferred to travel by boat between Ashland and Bayfield in lieu of a slow and bumpy wagon ride. Small sailboats known as Mackinaw boats were the most common local watercraft, and they provided transportation service until steam-powered tugboats arrived in the 1870s. Steam tugs were faster, more reliable, and more powerful than sailboats, able to tow a barge of brownstone or a raft of logs as well as carry passengers...there were several steam tugs operating on the bay, providing regular ferry and freight service between Bayfield and Ashland and somewhat less regular service to La Pointe…In 1884 and 1885 two more railroad lines were completed to Ashland… By then there were five sawmills operating in Ashland, which rivaled Duluth-Superior as the leading port on Lake Superior.[22]

The statistics are impressive. In 1883 the Chequamegon Bay ports shipped out more than 63 million board feet of lumber.[23] Bayfield, the leading fishing port on Lake Superior, welcomed A. Booth and Sons of Chicago in 1885 when Bayfield and Ashland's combined catch for the year was 3,159,500 pounds. That total was 35.7% of the 8,825,980 pounds caught that year on Lake Superior.[24]

An attractive reddish-brown brownstone, known as brownstone, was quarried on the islands and the mainland. About 70 quarry companies operated in the Lake Superior region between the 1880s and the early 1900s.[25] Tourists flocked to the resorts along the bay and in the Apostle Islands. Madeline Island's economy benefited from tourism and from newcomers building vacation cottages and resorts.

As more and more ships entered Lake Superior concern mounted over the safety of the route around Sand Island and near the very shallow waters created by a ridge extending south of the island. In 1871, the

[22] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Page 20.
[23]Larson, Lars. "Chequamegon Bay and its Communities; Ashland Bayfield LaPointe; A Brief History 1659-1883." Whitewater, Wisconsin: University of Wisconsin, 2005.Page 186.
[24]Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Pages 20, 165 and 177.
[25] Eckert, Kathryn Bishop. *The Sandstone Architecture of the Lake Superior Region.* Detroit: Wayne State University Press, 2000. Pages 12-13.

Lighthouse Board, upon recommendation from Major Orlando Poe, requested a new light on the north tip of the island to guide traffic away from the danger. It took nine years for the Board to convince Congress of the need for the appropriation, but the lighthouse was finally built in 1881. The Board selected a popular design already used at other brick lighthouses on the Great Lakes. Instead of constructing the house of brick; however, the builders employed brownstone quarried on the island, resulting in an unusual, cost-effective, and very attractive variant of the design.

Devils Island, located at the northernmost extent of the Apostle Islands was another important navigational point. The influential Cleveland Vessel Owners Association requested a lighthouse at this critical navigation point marking the northwestern edge of the Apostle Islands, and the Lighthouse Board fully agreed. Congress approved the requested appropriation in 1889, and added $5,500 for a fog signal the next year. The Lighthouse Board quickly realized it had sorely underestimated the costs to build on such a distant island with difficult landing and site conditions. The Board ended up constructing the station in phases, installing a temporary wood tower until funds could be appropriated to build an iron one. The light in the wood tower was lit in 1891. The permanent iron tower was lit in 1901.

In the 1890s, Ashland's port rose to prominence. It was in the top three shipping ports on Lake Superior in the early 1890s.[26] The other Chequamegon communities saw heavy shipping traffic too. In 1892-1893, the Bayfield area had more than 19 logging companies that cut more than 108 million board feet.[27]

The following list of shipments from Ashfield in 1892 provides an idea of the nature and quantities of exports pouring from the area:

Iron Ore	2,227,407 tons
Lumber	285,000,000 board feet
Brownstone	460,000 tons
Pig Iron	40,000 tons
Grain and Flour	200,000 barrels
General Merchandise	10,000 tons
Brick	1,500,000 units

The same year, *The Ashland Daily Press* reported 7,104 arrivals and departures from the docks, a 41% increase over the 1891 totals. The numbers are particularly impressive considering there was no shipping traffic for the three to four months in each year when the lake is frozen.

Iron ore soon quickly became a major component of the local shipping economy. The iron ores in the Gogebic Range were first mined in 1884. Once the railroad arrived, the iron mines began transporting huge quantities of iron ore that unloaded onto waiting ships at the enormous ore docks in Ashland. The first rail shipments to Ashland in 1885 totaled an unremarkable 119,563 tons, but output quickly increased to a little less than two and a quarter million tons in 1892 or 26% of all iron ore shipped from Lake Superior's ports for that year.[28] With little to no charcoal available to smelt and reduce the ore at the mine site, the raw material required maximum capacity freighters for transport. The ore docks were also sized to accommodate large loads. In 1889 the U.S. Army Corps of Engineers constructed a massive breakwater to protect the docks. Over the years, it became clear to the Lighthouse Board that the boats negotiating Madeline, Stockton, and Michigan islands en route to Ashland could barely see the light from the

[26] *Ashland Daily Press* 1892 annual report on commerce; see also M Mansfield, J.B. ed. *History of the Great Lakes. Volume I.* Chicago: J. H. Beers & Co., 1899. Accessed at www.maritimehistoryofthegreatlakes.ca/GreatLakes.; and Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008.
[27] Bayfield Heritage Association exhibit material. September 2009.
[28] M Mansfield, J.B. ed. *History of the Great Lakes. Volume I.* Chicago: J. H. Beers & Co., 1899. Accessed at www.maritimehistoryofthegreatlakes.ca/GreatLakes.

diminutive tower on Long Island. The Lighthouse Board made plans to replace the tower with lights at the east and west ends of the island. The eastern light was known as the LaPointe Light Tower, named after the first lighthouse request made more than 40 years earlier. The Lighthouse Board lobbied for five years from 1890 to 1895 until Congress finally agreed to fund the new lights. Both lights went into service in the fall of 1897. The old wood lighthouse was remodeled to remove the tower and expand the interior. It continued to serve as a keeper's quarters.

The new navigational aids marked the beginning of economic changes in the early 1900s. After about 75 years of logging, the mainland was exhausted of stands of pine and logging shifted to hemlock and hardwoods. Many large logging corporations moved away to other regions. Local smaller scale producers worked around Bayfield and on some of the Apostle Islands. The Schroeder Lumber Company of Milwaukee was one of the larger scale logging companies. The company established a logging operation on Outer Island. The lumber company purchased the timber rights in 1920, and logging began in 1924. The last year the company worked on the island was 1930, when 225 men cut six million board feet of timber.[29] Schroeder purchased land on Michigan Island, and logged from 1919 to 1923.

Popular tastes in architecture shifted away from the styles that had incorporated the local brownstone, and the demand withered away. Most of the brownstone quarries were closed by 1900.

Fishing, however, maintained a strong place in the local economy and in the economy of Lake Superior. The Bayfield and Ashland combined fishing total for 1903 was 4,783,566 pounds which was 36% of the total amount produced in the United States from Lake Superior that year.[30]

Iron ore increased its dominance at the ports as other natural resource production declined. Ore from the Gogebic and Penokee ranges was sent east from Ashland to supply American industry. Large quantities of iron ore from the Mesabi Range were shipped from Duluth and Superior. In 1910 the iron shipped across Lake Superior accounted for 70% of the United States iron production, and all of it was transported by boat.[31] While Ashland never reached the primary port status of Duluth, it remained a busy and integral port with vital connections to the iron mines. By 1906, Ashland recorded over 2,000 arrivals and departures in one year, averaging more than eight vessels a day during the shipping season.

In 1915, the Ashland Breakwater Light was installed to guide the ore ships around the breakwater structures. This light was one of the early projects of the newly reorganized federal lighthouse administration.

[29] Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Page 229.
[30] All fishing statistics in this section from Busch, Jane C. "People and Places: A Human History of the Apostle Islands; Historic Resource Study of Apostle Islands National Lakeshore" Bayfield: Apostle Islands National Lakeshore. 2008. Pages 176-178.
[31] Hyde, Charles K. . United States Coast Guard Lighthouses and Light Stations on the Great Lakes. National Historic Landmark Nomination. Washington, D.C.: National Park Service, 1979. Item 8 page 1.

Photograph courtesy of Jack Armstrong
Trains dumped their load into chutes that loaded into waiting freighters at the Ashland ore docks. The first ore docks were installed in 1885. These are the third docks and were constructed in 1915-1917. Over a billion tons of iron ore was shipped from this dock during World War II. The last iron ore shipment was in 1965. The docks are scheduled for demolition.

THE LIGHTHOUSE BUREAU TAKES CONTROL

By the end of the 19th century, the Lighthouse Board had turned a marginally adequate public works administration into an advanced, professional system. The system, however, grew beyond its capacity and began to experience administrative problems. In 1910 the nine-member Board was replaced by an administrative department called the Bureau of Lighthouses and placed under the new (created in 1903) Commerce Department. A civil engineer named George R. Putnam was hired as the first director. Putnam substantially increased civilian personnel and improved their working conditions. In 1916 there were 92 lighthouse service employees over the age of 70, and 24 employees with more than 40 years of service. Putnam implemented the first pension program for lighthouse keepers in 1918. He also oversaw a barrage of technical improvements. Under Putnam, in 1924, the U.S. lighthouse system would become the largest in the world with more than 16,800 aids to navigation.[32]

An officer from the Army Corps of Engineers continued to advise each district, but the character of the new bureau changed from military to civilian. The extensive technological changes eventually led to automation and eliminated the need for the people for whom Putnam had so prudently developed a pension program.

In about 1900, a Canadian company developed the diaphone signal in which diesel powered engines drove air compressors that emitted a loud single or two tone "wahhh." The Bureau bought the rights to manufacture the diaphones in the United States in 1914 and built them in New Jersey. By 1925, 104 of the 127 fog signals on the Great Lakes were gasoline or diesel powered. Most of the others were bells. In 1929

[32] Hyde, Charles K. *The Northern Lights: Lighthouses of the Upper Great Lakes.* Lansing, Michigan: Two Peninsula Press, 1986. Page 31.

the Bureau developed a "diaphragm signal" that sounded like a diaphone but was cheaper to build and repair.

A more sophisticated "blind" signal, the radio beacon was introduced to lighthouses in 1921. The beacon sent out an identification signal in Morse code alerting ships of the beacon's location. Of course the ships also had to be modernized to be equipped with radio receivers. An experimental radio beacon was installed in a lighthouse in 1917. After further tests, radio beacons were installed, beginning in 1921.[33] The first radio beacon on the Great Lakes was on a light ship on Lake Huron (commissioned June 12, 1925) at which time there were 12 others in use in the United States. A second radio beacon quickly followed that same year at Devils Island. About 200 radio beacons operated in the late 1920s and into the 1930s. The radio beacon helped improve America's ranking from sixth to second in shipping safety from 1920 to 1935. Only the Netherlands had a better safety record.[34]

New innovations moved the lighthouses toward an inevitable automation. Two power sources, gas and electricity, provided the tools. The Bureau expanded on the acetylene gas systems introduced under the Lighthouse Board. Writing in his 1917 book, Putnam said that in the Great Lakes, "…automatic lights are now left burning at certain of the stations when the keepers are taken off about December 10, with sufficient gas supply so that the lights will burn two weeks."[35] This system was particularly applicable to the light stations of the Apostle Islands where the keepers left in December just before the lake froze over.

Electricity took a little longer to get established. Although electricity was used to light the torch of the Statue of Liberty in 1886, the light was not considered satisfactory and the concept of electric light remained unchampioned until sometime between 1915 and 1920. Power lines were more widespread after 1920 rendering it easier and less expensive to use electric lighting. Most of the remote lighthouses used generators in the 1920s and 1930s.

Timers for the lights and a rotary lamp changer that held two 1,000-watt lamps (bulbs) reduced the need for a constant keeper's vigil at the lighthouse. By the 1930s, fog signals driven by electricity and activated by remote control eliminated another excuse to employ a full-time keeper. On the Great Lakes, 68 major and 45 minor lights had electricity in 1925.

New lenses were designed for the electric powered lamp. While the older Fresnel lenses could be and were adapted to electricity, new lenses were installed beginning in the early 1920s. One of the more common designs encased the electric lamp in a glass lens, which also served as the lantern. Another design mimicked those used on train locomotives. On the Great Lakes, by 1925, there were 276 of these newer lenses and 193 Fresnel lenses.

One final major light station installation occurred in the Apostle Islands under the Lighthouse Bureau, but the Lighthouse Board had started the plans for the station well before the reorganization. The Lighthouse Board saw the increasing need to update the dated navigational aids at Michigan Island. The practically antique 1857 vintage light tower and the lack of a fog signal led the Board to lobby for new equipment and technology. The Board began a campaign in 1908, noting the 65-foot-tall light tower on Michigan Island was not visible to the lake traffic to the north. Charles Keller, the Lighthouse District Engineer, recommended a new light and fog signal be built at a new location on the island. The local *Bayfield County Press* repeated this desire in a 1908 article.

[33] Hyde, Charles K. *The Northern Lights: Lighthouses of the Upper Great Lakes.* Lansing, Michigan: Two Peninsula Press, 1986. Page 44.
[34] Clifford, Candace, ed. "Light Stations of the United States" National Register Multiple Property Documentation Form. Washington, D.C.: Department of the Interior, 2002. Page 12.
[35] Putnam, George R. *Lighthouses and Lightships of the United States.* Boston: Houghton Mifflin Company, 1917. Page 134.

The Lighthouse Board deliberated over placing a tower on nearby Gull Island, and eventually settled on a plan to build a new station on Michigan Island at an estimated cost of $100,000. It took 20 years of annual requests before Congress finally appropriated enough money for a new station. The Lighthouse Bureau took over the crusade in 1910. In 1918, the Bureau acquired the 112-foot-tall cast iron skeletal tower from Schooner Ledge on the Delaware River. Drawing on the newest emerging technology, the Bureau incorporated the tower into a revised proposal to install a radio beacon on Michigan Island and an unmanned acetylene powered light on Gull Island in lieu of the original scheme.

The radio beacon at Michigan Island would be the third one in the Apostle Islands, following the installation at Devils Island and another installation at Long Island in 1927. The acetylene gas light had been in use with limited applications since about 1915. One was installed at the Sand Island station in 1921. Seven years later a second acetylene powered winter light was lit, this time on Devils Island.

The revised estimated costs for the new Michigan Island plan came to $85,000 for the light tower, beacons and support buildings for the light station. Congress approved the revised plan and construction officially began in 1928. However, based on the keeper's logs, the wood-framed Assistant Keepers Quarters and Workshop was built in 1927, two years before the recycled Schooner Ledge Light Tower was moved from storage on the island and installed at the station. At 112' tall, this tower is the tallest in the Apostle Islands. A new brick Power House that also housed the radio beacon equipment was also constructed in 1929. A new brick Keepers Quarters completed the 1929 additions in spite of what appeared to be a trend toward automation.

In the 1920s lighthouse technology was in a state of flux, as new technologies slowly replaced older ones. In addition to the acetylene and radio beacon devices, new diaphones replaced the old steam powered fog signal whistles at the Long Island light station in 1925, followed the next year at Devils Island. Outer Island, the site of the oldest fog signal in the Bay, replaced its steam whistle with a diaphone in 1929.

Radio communications between the Apostle Islands light stations improved in the 1930s with the development of an intra-island radio system and radio telephones. Electricity was very late in coming to the remote light stations. A diesel powered generator was installed on Devils Island in 1928. Michigan Island had power generated from the new 1929 power building. The Lighthouse Bureau tried out a battery powered winter light on the LaPointe Light Tower in 1934. In 1937, electric lights were installed in both of the Long Island towers. Outer Island electrified the rotating mechanism for the light in 1939 and electrified the light and fog signal system in 1942.

Many of these technological changes occurred in spite of the economic hardships of the Great Depression. The local economy, which had relied so much on demands for the natural resources of the region, declined. Local community leaders sought new ways to boost the economy, including a plan to develop a national park in the Apostle Islands. Harlan Kelsey visited the area on assignment for the Park Service in 1930 to assess the potential for a park. Kelsey's report described depleted lands desecrated by logging and forest fire and recommended against establishing a park. The Park Service closed the investigation.

THE COAST GUARD AND A RETURN TO THE TREASURY

As part of President Franklin D. Roosevelt's Reorganization Act of 1939, the Lighthouse Bureau duties were transferred to the Coast Guard. The Coast Guard operated under the Treasury Department, so after 36 years under the Commerce Department the administration of lighthouses returned to its original designation under the Treasury. The Coast Guard inherited a New Deal project begun under the Lighthouse Bureau on Long Island. The Public Works Administration funded a new Keepers Quarters (a triplex) and a boat dock, built between 1938 and 1941. The old Keepers Quarters was abandoned.

After a brief absorption into the Navy during World War II, the Coast Guard returned to the Treasury. The Great Lakes became the Ninth Coast Guard District. The Coast Guard worked to modernize and automate stations, including the Chequamegon Bay light stations. Sand Island had already been automated in 1921. Michigan Island was next in 1943. Outer Island was automated in 1961, followed three years later by the LaPointe Light Tower at Long Island. Devils Island served as the work center for the Coast Guard, so it was the last light station in Chequamegon Bay to be automated in 1978. By 1965, only 80 manned light stations remained in the Great Lakes. The last manned stations on the Great Lakes were Point Betsie, Michigan and Sherwood Point, Wisconsin. These stations were fully automated in 1983.

The only remaining lighthouse with official keepers is the Boston Harbor Light Station. Reflecting America's strong ties to its lighthouse history, Congress passed an act stating that this station, the oldest light station in the country, would be permanently staffed.

Except for iron mining, the Chequamegon Bay's natural resource extraction and shipping-based economy was gradually replaced by commercial fishing and tourism, supplemented by agriculture. Lake Superior iron mines produced as much as a third of American iron production up to World War II. The last shipment of ore left the Ashland ore docks in 1965. Fishing remained important to the economy until the sea lamprey, an exotic species, destroyed the Lake Superior fishing industry in the 1950s. The fishery is still in recovery.

Tourism and outdoor recreation advocates for the Apostle Islands joined conservationists to help raise awareness of the unique qualities of Chequamegon Bay. On September 26, 1970, President Richard Nixon signed a bill establishing the Apostle Islands National Lakeshore. Long Island, which had been left out of the original boundaries, was included by a bill signed by President Ronald Reagan on October 17, 1986.

Although they are automated, the light stations are all still in use, mostly using solar powered optics. The frequency of the traffic that they guide is much reduced and changed in character as natural resource extraction has been replaced by tourism. Today's boat traffic includes motorized craft, sailboats and kayaks accommodating recreationalists and fishermen and women.

The lighthouses of the Great Lakes sparked joy for lighthouse historian F. Ross Holland. "I was continually surprised," he wrote in *Great American Lighthouses*. "What a unique treasure trove of lighthouses the region has." The lighthouses served a vital function. We are fortunate to still see their lights today.

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GLOSSARY OF TERMS

PRIMARY TREATMENT APPROACH – PRESERVATION

Preservation standards include measures necessary to sustain the existing form, integrity, and materials of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. Preservation requires the retention of the greatest amount of historic fabric, including the landscape's historic form, features, and details as they have evolved over time. Limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work is permitted.

HOW TERMINOLOGY IS USED IN THE PRESERVATION APPROACH

Maintain – are those standard maintenance practices that are necessary to retain the features of a property as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included. Limited and sensitive upgrading of building systems (mechanical, electrical, plumbing) and other code related work is appropriate.

Plant – the removal and replanting of landscape plantings and vegetation as part of maintenance activities

Protect – short term and minimal measures used to stabilize and protect features, such as fencing around landscape features

Relocate – the removal and resetting of noncontributing features

Remove – the removal of nonhistoric features

Repair – features, components of features and materials that require additional work. These may include declining building features (e.g., roofing, foundation, mechanical systems) structures, small scale features (e.g., repair of a railing) or landscape plantings (e.g., repair mass planting by adding infill plantings). Features that are repaired will match the old in design, color, texture, and if possible, material. Distinctive features that are repaired will match the old in design, color, texture, and if possible, material.

Retain – are those actions that are necessary to allow for a feature (contributing or noncontributing) to remain in place in its contributing current configuration and condition.

Stabilize – immediate measures (more than standard maintenance practices) are needed to prevent deterioration, failure, or loss of features.

PRIMARY TREATMENT APPROACH – REHABILITATION

Rehabilitation in intended to return a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values. Rehabilitation allows for repairs, alterations, restoration of missing features, and additions necessary to enable a compatible use for a property as long as the portions or features which convey the historical, cultural, or architectural values are preserved. Limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work is permitted.

HOW TERMINOLOGY IS USED IN THE REHABILITATION APPROACH

Maintain – are those standard maintenance practices that are necessary to retain the features of a property as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included. Limited and sensitive upgrading of building systems (mechanical, electrical, plumbing) and other code related work is appropriate.

Plant – the removal and replanting of landscape plantings and vegetation as part of maintenance activities or the restoration of missing features.

Reestablish – are those measures necessary to depict a landscape feature as it occurred historically. Reestablishment may include the replacement of missing landscape features such as views, planting patterns, spatial relationships, or small scale features.

Relocate – remove and reset noncontributing features

Remove – removal of nonhistoric features

Repair – features, components of features and materials that require additional work. These may include declining building features (e.g., roofing, foundation, mechanical systems) structures, small scale features (e.g., repair of a railing) or landscape plantings (e.g., repair mass planting by adding infill plantings). Features that are repaired will match the old in design, color, texture, and if possible, material. Distinctive features that are repaired will match the old in design, color, texture, and if possible, material.

Restore – are those measures necessary to depict a feature or area as it occurred historically. Restoration may include repair of a feature so that it appears as it did historically or it may include replacement of missing features or qualities.

Retain –are those actions that are necessary to allow for a feature (contributing or noncontributing) to remain in place in its contributing current configuration and condition.

Stabilize – immediate, more extensive measures (more than standard maintenance practices) are needed to prevent deterioration, failure, or loss of features.

PRIMARY TREATMENT APPROACH – RESTORATION

Restoration standards allow for the accurate depiction of a property as it appeared at a particular time in its history by means of the removal of features from other periods in its history and reconstruction of missing features from the period of significance. The limited and sensitive upgrading of systems (mechanical, electrical, plumbing) and other code related work is appropriate.

HOW TERMINOLOGY IS USED IN THE RESTORATION APPROACH

Maintain – are those standard maintenance practices that are necessary to retain the features of a property as a contributing resource. Maintenance activities are usually not classified as repair, however minor repair such as replacement of posts or railings or segments of paving are included. Limited and sensitive upgrading of building systems (mechanical, electrical, plumbing) and other code related work is appropriate.

Plant – the removal and replanting of landscape plantings and vegetation as part of maintenance activities or the restoration of missing features

Relocate – remove and reset noncontributing features

Remove – removal of nonhistoric features

Reestablish – are those measures necessary to depict a landscape feature as it occurred historically. Reestablishment may include the replacement of missing landscape features such as views, planting patterns, spatial relationships, or small scale features.

Repair – features, components of features and materials that require additional work. These may include declining building features (e.g., roofing, foundation, mechanical systems) structures, small scale features (e.g., repair of a railing) or landscape plantings (e.g., repair mass planting by adding infill plantings). Features that are repaired will match the old in design, color, texture, and if possible, material. Distinctive features that are repaired will match the old in design, color, texture, and if possible, material.

Restore – are those measures necessary to depict a feature or area as it occurred historically. Restoration may include repair of a feature so that it appears as it did historically or it may include replacement of missing features or qualities.

Retain –are those actions that are necessary to allow for a feature (contributing or noncontributing) to remain in place in its contributing current configuration and condition.

Stabilize – immediate, more extensive measures (more than standard maintenance practices) are needed to prevent deterioration, failure, or loss of features.

CONDITION ASSESSMENT DESCRIPTION LEVELS

Feature Condition Definitions

(Note: These terms are also applied to the overall structure/building.)

GOOD The feature is intact, structurally sound and performing its intended purpose. The feature needs no repair or rehabilitation, but only routine or preventive maintenance.

FAIR The feature is in fair condition if either of the following conditions is present:

- There are early signs of wear, failure or deterioration though the feature is generally structurally sound and performing its intended purpose – or –
- There is failure of a portion of the feature.

POOR The feature is in poor condition if any of the following conditions is present:

- The feature is no longer performing its intended purpose – or –
- Significant elements of the feature are missing – or –
- Deterioration or damage affects more than 25% of the feature – or –
- The feature shows signs of imminent failure or breakdown.

UNKNOWN Not enough information is available to make an evaluation.

RATINGS OF TREATMENT SEVERITY

An impact is a detectable result of an agent or series of agents having a negative effect on the significant characteristics or integrity of a structure and for which some form of mitigation or preventative action is

possible. The assessment should include only those impacts likely to affect the structure within the next five years.

The Level of Impact Severity and their definitions are given below. For all levels, except UNKNOWN, two criteria are given. At least one of the criteria must be met for the declared Level of Impact Severity.

SEVERE	1. The structure/feature will be significantly damaged or irretrievably lost if action is not taken within two (2) years. 2. There is an immediate and severe threat to visitor or staff safety.
MODERATE	1. The structure/feature will be significantly damaged or irretrievably lost if action is not taken within five (5) years. 2. The situation caused by the impact is potentially threatening to visitor or staff safety.
LOW	1. The continuing effect of the impact is known and will not result in significant damage to the structure/feature. 2. The impact and its effects are not a direct threat to visitor or staff safety.
UNKNOWN	Not enough information is available to make an evaluation.

DEFINITIONS OF TERMS

A

AAS: Atomic Absorption Spectroscopy

AC: Alternating current; the movement of current through an electrical circuit that periodically reverses direction. Alternating current is the form of electric power that is delivered to businesses and residences.

ACM: Asbestos-Containing Material

Accessibility: a term used to describe facilities or amenities to assist people with disabilities and can extend to Braille signage, wheelchair ramps, elevators/lifts, walkway contours, reading accessibility, etc. According to its website, the Park Service is "committed to making all practicable efforts to make NPS facilities, programs, services, employment, and meaningful work opportunities accessible and usable by all people, including those with disabilities. This policy reflects the commitment to provide access to the widest cross section of the public and to ensure compliance with the Architectural Barriers Act of 1968, the Rehabilitation Act of 1973, the Equal Employment Opportunity Act of 1972, and the Americans with Disabilities Act of 1990. The Park Service will also comply with section 507 of the Americans with Disabilities Act (42 USC 12207), which relates specifically to the operation and management of federal wilderness areas. The accessibility of commercial services within national parks are also covered under all applicable federal, state and local laws." (Source: http://www.nps.gov/aboutus/eeo.htm)

AES-ICP: Atomic Emission Spectroscopy – Inductively Coupled Plasma

AIHA: American Industrial Hygiene Association

Air Terminal: A rod that extends above a surface to attract lightning strikes.

AL: Action Level

B

Beam*:* a structural member, usually horizontal, with a main function to carry loads cross-ways to its longitudinal axis.

Branch Circuit: Insulated conductors used to carry electricity to an associated device or devices that originate from a single circuit breaker.

BTUH: British Thermal Unit per Hour; A traditional unit of energy.

BX Cable: Cable with flexible steel armored outer tube with individual copper conductors insulated with rubber and covered with a cotton braided sheath.

C

Cantilever: refers to the part of a member that extends freely over a beam or wall, which is not supported at its end.

Cast Iron: a large group of ferrous alloys that are easily cast. Cast iron tends to be brittle and is resistant to destruction and weakening by oxidation. The amount of carbon in cast irons is 2.1 to 4 wt%.

CFR: Code of Federal Regulation

Cistern: An underground receptacle for storage of liquids, usually water.

Clay Sewer: Sewer pipe made from vitrified clay that is highly resistant to corrosion.

Column: a main vertical member that carries axial loads from beams or girders to the foundation parallel to its longitudinal axis.

D

DC: Direct current; the unidirectional flow of current through an electrical circuit. Direct current is produced through such sources as batteries, thermocouples, or photovoltaic solar cells.

Dead Load: describes the loads from the weight of the permanent components of the structure.

Deflection: the displacement of a structural member or system under a load.

DRO: Diesel-Range Organics

E

ELPAT: Environmental Lead Proficiency Analytical Testing

EMT: Electro-metallic tubing; A metallic tube raceway that is used to carry and protect current carrying conductors or cables.

EPA: Environmental Protection Agency

F

Flue Vent: A duct or pipe conveying combustion by-products from a heater or furnace.

Fluorescent: A source of light that emits light radiation at longer wavelengths and lower energy.

Footing: a slab of concrete or an assortment of stones under a column, wall, or other structural member to transfer the loads of the member into the surrounding soil.

Foundation*:* supports a building or structure.

FRP: Fiberglass reinforced plastic

Full Sawn (FS): Lumber cut, in the rough, to its full nominal size.

G

Gable: located above the elevation of the eave line of a double-sloped roof.

Galvanized Steel: Steel coated with zinc carbonate to resist corrosion.

GPM: Gallon per minute; a standard unit of volumetric liquid flow rate.

Grade: the ground elevation of the soil.

Gravity Vent: Openings in a roof intended to vent hot air by the action of convection.

Gray Water: Wastewater generated from domestic washing activities and not containing human waste.

GRO: Gasoline Range Organics

H

Header: a member that carries joists, rafters or beams and is placed between other joists, rafters or beams.

Hip Roof: a roof sloping from all four sides of a building.

HUD: Housing and Urban Development

HVAC: Heating, Ventilation, and Air Conditioning.

I

IAQ: Indoor Air Quality

IEUBK: Integrated Exposure Uptake Biokinetic

Incandescent: A source of light that works by incandescence, or works by a heat-driven light emission through black-body radiation.

Inverter: A device that converts electrical direct current (DC) to electrical alternating current (AC).

J

Joist: a horizontal structural load-carrying member which supports floors and ceilings.

K

kVA: Kilovolt-ampere equal to one thousand volt-amperes. kVA is a unit to express the apparent power consumed in an electrical circuit or electrical device.

kW: Kilowatt equal to one thousand watts. A kilowatt is typically used to express the output power consumption of large devices or electrical systems.

L

LBP: Lead-Based Paint

LCP: Lead-Containing Paint

LCS: Lead-Contaminated Soils

Leach Field: A drain field used to remove contaminants and impurities from liquid that emerges from a septic tank.

LED: Light emitting diode; a semiconductor light source that can emit light in various colors and brightness.

Live Load: nonpermanent loads on a structure created by the use of the structure.

Load: an outside force that affects the structure or its members.

Louver: An opening with horizontal slats angled to allow passage of air while keeping out rain and snow.

M

Mg/kg: Milligrams per Kilogram

N

NEC: National Electric Code.

NESHAP: National Emission Standards for Hazardous Air Pollutants

Nonpotable Water: Water that has not been approved for safe human consumption.

NVLAP: National Voluntary Laboratory Accreditation Program

O

OSHA: Occupational Safety and Health Administration

Overcurrent Protection: A fuse, circuit breaker or relay that will open the electrical circuit when the downstream electrical current exceeds the stated current rating.

P

Passive Ventilation: Ventilation of a building without the use of a fan or other mechanical system.

Pitch: the slope of a member defined as the ratio of the total rise to the total run.

PLM: Polarized Light Microscopy

PV: Photovoltaic; An array of solar modules or cells that collect solar energy and convert the energy into direct current electricity.

PVC: Polyvinyl Chloride; A biologically and chemically resistant plastic widely used for household sewage pipe.

R

Rafter: a sloped structural load-carrying member which supports the roof.

RBM: Regulated/Hazardous Material

Reaction: the force or moment developed at the points of a support.

RLM: Industrial stem mounted reflector.

Romex: Wiring with rubber insulated conductors in an overall sheath of braided cotton fiber.

S

Seismic Load: loads produced during the seismic movements of an earthquake.

Septic Tank: A sewage tank containing anaerobic bacteria which decomposed waste discharged into the tank.

Shear: forces resulting in two touching parts of a material to slide in opposite directions parallel to their plane of contact.

Snow Load: loads produced from the accumulation of snow.

Span: the distance between supports.

Step-down Transformer: A device that converts a high voltage down to a lower voltage through a series of winding coils.

Structural Steel**:** an iron alloy with a carbon content of 0.16% to 0.29%. Steel is malleable, and easily welded.

Strut: a structural brace that resists axial forces.

Stud: a vertical wall member used to construct partitions and walls.

T

Thermal Expansion Tank: A tank used in a closed water heating system to absorb excess water pressure caused by thermal expansion.

TSI: Thermal System Insulation

Turbine Vent: Vents utilizing rotating wind vanes to create air flow.

V

Vent Stack: A vertical pipe proving ventilation.

W

WAC: Wisconsin Administrative Code

WDNR: Wisconsin Department of Natural Resources

Wrought Iron: an iron alloy with very low carbon content, in comparison to steel. Wrought iron is tough, malleable, ductile and easily welded.

X

XRF: X-ray fluorescence analyzer

Other

30 µg/m3: 30 micrograms per cubic meter

µg/SF: Micrograms of Lead Dust per Square Foot of Floor Space

1x: Piece of dimensional lumber 1" (nominal) / ¾" (actual) thick

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