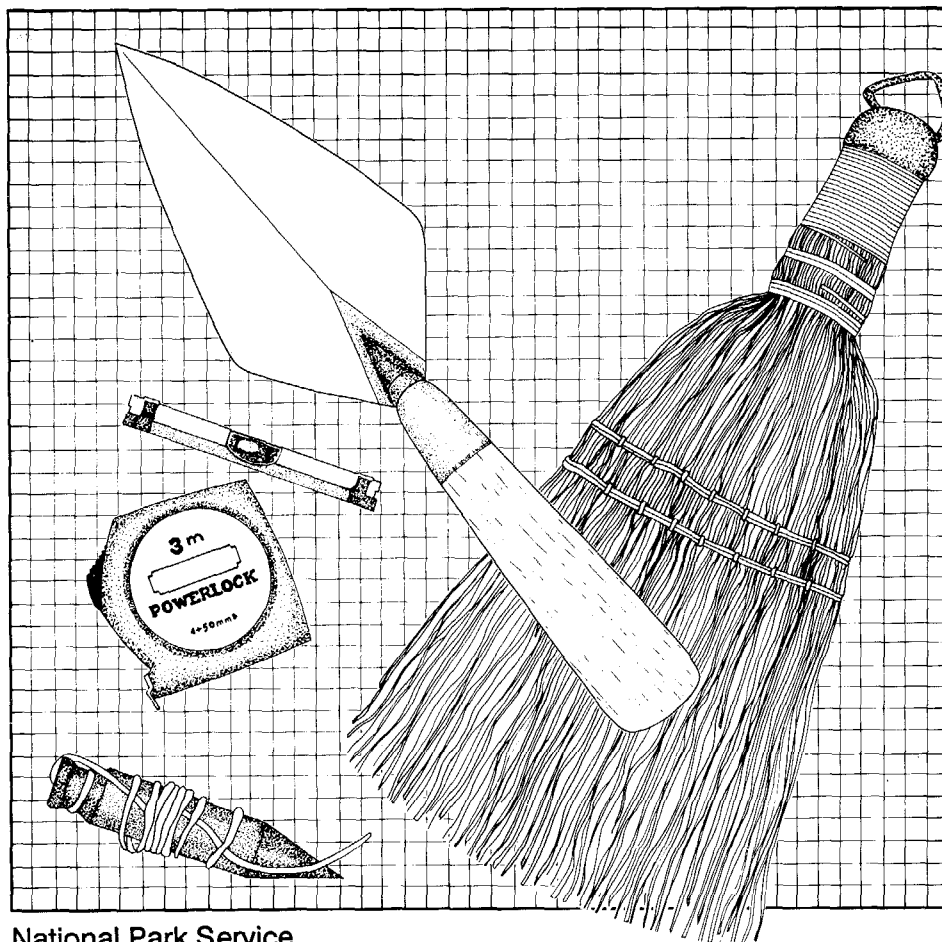


**The Archeological Investigation of
Four Lighthouse Complexes at the Western End of Lake Superior:
The 1988 Testing Program Within Apostle Islands National Lakeshore**



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THE ARCHEOLOGICAL INVESTIGATION
OF FOUR LIGHTHOUSE COMPLEXES AT
THE WESTERN END OF LAKE SUPERIOR:
THE 1988 TESTING PROGRAM WITHIN
APOSTLE ISLANDS NATIONAL LAKESHORE

By

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ABSTRACT

During June and July of 1988, archeologists from the Midwest Archeological Center performed limited testing at four historic lighthouse complexes within Apostle Islands National Lakeshore. The lighthouses, which still protect shipping at the western end of Lake Superior, were scheduled for exterior restoration work. Specifically, immediate plans called for the installation of drainage systems about certain structures on Sand Island, Michigan Island, Outer Island, and Devils Island to mitigate continuing ground water damage to their foundations.

Archeological investigations sought to assess the potential impacts to cultural resources in those areas of the light stations that would be disturbed by proposed developments. Shovel probes and controlled test excavations were used to examine the proposed drain alignments, as well as construction staging areas. No significant cultural resources were discovered during the five-week project that would warrant modification of the drainage systems or further archeological excavation prior to construction of these improvements. General recommendations concerning future research potential and cultural resources management at the four island complexes are offered.

ACKNOWLEDGMENTS

As in all archeological undertakings, numerous individuals contributed to the implementation and completion of this project. Among those at Apostle Islands National Lakeshore, Superintendent Jerry Banta deserves recognition for providing temporary crew housing on the islands and encouraging the full cooperation of his staff. Chief of Maintenance Jim Carlton, in particular, worked closely with the archeological team to coordinate inter-island travel arrangements, provide logistical support, and supply various other necessities. Historian Dave Snyder assisted the author in selecting appropriate historic photographs from the Lakeshore archives and provided useful comments on the draft of this report. We would also like to acknowledge with gratitude the very capable boat operators and radio dispatchers who made sure that we traveled to and from the islands safely.

Special thanks are also owed to the various park volunteers who were duty-stationed at the lighthouses during our field work. Probably the week-long presence of four archeologists was an intrusion on the serenity of their islands that they did not expect at summer's beginning. If so, all of them tolerated us admirably, and we appreciate their generous hospitality.

Special thanks are owed to Kenneth Pott, director of the Great Lakes Maritime Museum in Ludington, Michigan, and Patrick Labadie of the U.S. Army Corps of Engineers Canal Park Museum in Duluth, Minnesota. Both men kindly provided data pertaining to the incidence of shipping mishaps on the Great Lakes.

National Park Service personnel responsible for general oversight of the project include Regional Archeologist Mark Lynott and Regional Historical Architect Mark Chavez. In addition, Archeologist Jeffrey Richner, who in the past has worked extensively in the Apostle Islands, offered advice and assistance during field and laboratory phases of the research.

Much of the preliminary laboratory work performed on the archeological collections was accomplished by Forest Frost, Anastasia Steffen, and Paul Stormberg. Giselle Barrett compiled the artifact inventory tables. Carrol Moxham prepared the AutoCAD illustrations for the report, while Mary Johnson pasted up the figures. Judy Pace edited the draft manuscript before Marie Johnson and Nancy Sikora processed the text into its final production format.

Most important, however, was the work of my stalwart field crew: Caven Clark, Holly Houghten, and Hawk Tolson. Despite the occasionally adverse field conditions, as well as their weekly bewilderment concerning when (or if) the boat might come to get us, they performed their tasks admirably and accomplished all that could be asked of them. Thanks to them the job was finished in a timely manner, and our management needs were met.

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INTRODUCTION

Apostle Islands National Lakeshore (Figure 1), situated at the western end of Lake Superior in northernmost Wisconsin, is generally considered to be one of the most beautiful National Park Service units in the Midwest Region. Established in 1970, the Lakeshore now includes 21 of the 22 named Apostle Islands; the only exception is Madeline Island, largest of the group. Furthermore, in addition to the island units, the Lakeshore includes a narrow, 19-km-long (12-mi-long) mainland unit on the Bayfield Peninsula. The total management area of Apostle Islands National Lakeshore today stands at nearly 28,350 ha (70,000 acres), of which approximately 11,000 (27,000 acres) are submerged (federal jurisdiction extends a quarter-mile out from the shore of each island and the mainland unit).

The Lakeshore is remarkable for its geological formations and natural resources, but it also has a long and varied history of human occupation. It is apparent from the many prehistoric archeological sites scattered among the Apostle Islands that this archipelago was frequented seasonally for centuries before the European entrada. Further, the influences of French and British trading activities in the upper Great Lakes are evident at several important eighteenth-century sites. Later, during the nineteenth century, American interests in the islands focused on extractive commercial endeavors, such as logging and stone quarrying.

Perhaps the most important historical role of the Apostle Islands, however, was the part they played in the development of Great Lakes shipping. As shipping traffic increased at the western end of Lake Superior, the islands and shallows about them presented a dire hazard to navigation. Many a ship foundered off the Apostle Islands while making way to or from the ports of Bayfield, Duluth, and Ashland. Accordingly, beginning in 1857, one lighthouse after another was commissioned about the archipelago perimeter to safeguard the burgeoning commercial shipping industry.

Today, all light stations on the Great Lakes are automated, including those in the Apostle Islands. Nevertheless, the historic light stations still survive on six of the Apostles. Five of those are listed in the National Register of Historic Places as part of a thematic nomination approved and entered March 8, 1977; the La Pointe Light Station on Long Island was given National Register status in 1979. Many other elements of those complexes (e.g., separate keeper's quarters, tramways, fog signal stations, and oil houses) also stand in proximity to the primary structures. In addition, it is known that diverse archeological remains representing former structures, refuse dumps, abandoned privies, and a host of other features are associated with each of the historic lighthouses.

As part of its interpretive mission, the Apostle Islands National Lakeshore has begun a program to restore the lighthouses under its stewardship. Still primarily in the planning stages, it will be many years before restoration of the various structures is complete. Certain stopgap measures must be taken in the meantime, however, in order to stabilize the buildings and check their natural deterioration. This was part of the rationale behind the

so-called "moisture mitigation" project at the light stations on Sand Island, Michigan Island, Outer Island, and Devils Island.

During Fiscal Year 1988, final plans were made to install new drainage systems about certain structures at those four island complexes. Work was to begin first at Sand and Michigan, whereas work at Outer and Devils would begin during Fiscal Year 1989. All four developments, of course, would entail ground disturbance requiring archeological investigations prior to the onset of construction. Therefore, in order to make the most efficient use of personnel, time, and financial resources, it was deemed appropriate to conduct field excavations at all four of the subject light stations during the summer of 1988.

The archeological excavations proposed in conjunction with the drain installations were designed only to investigate those areas of the lighthouse complexes that would be impacted directly by construction activities (i.e., drainage trench alignments and staging areas for equipment and materials). Those limitations would lessen the chance that major refuse dumps might be discovered, since such features likely would be located at some distance from the residential structures. It was recognized, however, that in some instances, such as the Michigan Island complex, a subject structure was known to have been built long after initial historic occupation of the site. Therefore, an existing structure might have been superimposed over activity areas of an earlier time. Moreover, there was the seemingly remote possibility that prehistoric remains might occur on the grounds of any of the complexes. Finally, even those excavations placed immediately against a structure's foundations might yield information that would shed additional light on the original construction and subsequent evolution of the building.

During a five-week period beginning June 19, 1988, a team of three Archeological Technicians from the Midwest Archeological Center (MWAC) carried out investigations in the Apostle Islands under direction of the author. Excavations at Sand, Outer, and Devils were each completed in one week's time. The Michigan Island investigations, however, took a full two weeks for completion, owing to the greater amount of area there that would be disturbed by construction.

This report summarizes the methods and results of MWAC's 1988 archeological field project at Apostle Islands National Lakeshore. Background on the environment and history of this region, as well as information on previous research in the area, provides context for understanding the current investigations. A complete overview of the region's culture history, however, is not included in these pages. Those seeking a general summary of prehistoric chronology are referred to the works of Salzer and Overstreet (1976) or Richner (1987).

Following a discussion of field methods employed, the work performed at each island lighthouse complex is reviewed in turn. Excavation units and pertinent finds are described in terms of their informational value. In addition, more specific historical data are provided as necessary for a better understanding of each of the islands visited in 1988.

The concluding chapter attempts a comparative synthesis of the data derived from all four island lighthouse complexes. The conclusion also explores various research topics that might be addressed should future developments dictate the need for additional excavation at any of the island complexes. Since project-specific management recommendations were conveyed to planners immediately after completion of the 1988 field investigations, and since the drain installations have been completed for some time now, those points are not raised in this report. Some general recommendations are made, however, concerning the management of other cultural resources noted in the course of this field project.

The 1988 Apostle Islands archeological project resulted in a sizable artifact collection. Few of the materials recovered, however, are worthy of extended comment. Therefore, a narrative description of the assemblage was not prepared for publication. Certain diagnostic artifacts are discussed in the excavation descriptions, as deemed appropriate for the interpretation of particular cultural deposits and features. In addition, artifact frequency data are summarized in tabular format for each construction staging area and test unit collected in 1988.



ENVIRONMENT

Just as the archeology of Apostle Islands National Lakeshore cannot be understood except within a broad cultural context, it must also be viewed in the context of its natural surroundings. Accordingly, it is appropriate to consider such factors as the bedrock geology, soils, and ecology of the region. The Lakeshore, it should be noted, comprises both mainland and island environments. Emphasis for purposes of this study, however, is placed on the insular contexts, since all four sites investigated during the 1988 archeological field season occur on islands.

Geology and Soils

The bedrock formations that underlie this region, as well as the soils that have developed over them, are largely products of geological forces at work during and immediately after the last Ice Age. Those formations mainly consist of ancient Precambrian sandstones, but they were greatly modified by glacial scouring when an ice sheet last advanced through this area around 12,000 years ago. Bedrock outcrops are visible on many of the islands along beaches or where cliffs occur. Several of the islands also were exploited during the nineteenth century for sandstone building materials, and the abandoned quarry sites survive as mute reminders of what lies below the surface.

When the glaciers finally retreated some 500 years later, a great deal of depositional material was left behind. Today, most of the islands exhibit evidence of scouring at their northeastern extremes—the direction from which came the glaciers. Deposition of tills, on the other hand, is most evident at the southern reaches of various islands in the archipelago.

Glacial retreat from the region allowed inundation of the Lake Superior basin and initiated a long sequence of shifting lake levels. Immediately after deglaciation, water levels stood at 323-331 m (1,060-1,085 ft) above mean sea level (amsl), which is extremely high in contrast to an average 183 ± 0.6 m (600 ± 2 ft) amsl today. Following that initial lake stage, water levels dropped precipitously and then fluctuated dramatically. During occasional periods of relative aridity, elevation of the lake surface was at times much lower than it is today. Around 9,500 years ago, for example, the postglacial lake level reached a low of 137 m (450 ft) amsl, which was sufficient to connect all of the islands to the mainland as one large peninsula. Stabilization at current lake levels did not occur until sometime shortly before the onset of the Christian Era (Farrand 1969; Hough 1958; Saarnisto 1974).

All of the Apostle Islands may have been submerged when Lake Superior was first formed, since none exceeds Oak Island's maximum topographic relief of 330 m (1,081 ft). As postglacial lake levels fell or rose, however, various island landforms would have emerged periodically from the depths. At high-water stages, insular land areas would have been smaller and less numerous, whereas low-water stages would have exposed more land than is today available for occupation. In fact, during one period all of the present Apostle

Islands were joined as part of the Bayfield peninsula, and often the shallows between Sand Island and the mainland would have formed an isthmus when exposed by lower lake levels.

Isostatic rebound of the earth, which still gradually lifts northern land masses now free of the immense weight of glacial ice, also has influenced the relationship of land to water in the Lake Superior basin. Those alternating lake stages were largely responsible for creating the modern surficial appearance of the Apostle Islands. Testimony to the dynamic natural forces at work since glacial retreat is provided by the sea caves of Devils Island, the bogs of Bear Island, and the relict beach ridges perched above the modern shores on virtually every island in the group.

The actions of wind and water, as well as human forces, have continued to modify the shape and appearance of all the Apostle Islands over the last 2,000 years. Shifting currents and the terrible storms for which Lake Superior is famous combine to produce accretion or deposition of beach sands on some islands (Engstrom 1974). Modern developments, such as massive concrete docks and breakwaters, also have profound influences on the building or removal of island beaches. Farther from shore, erosion affects the stability of high bank faces on some islands, owing partly to deforestation of certain areas (Milfred and Valiga 1982; Mackey 1987). In two instances, Little Steamboat and Little Manitou, island landforms that were present only 100 years ago now have been eroded into virtual oblivion (Richner 1987:3).

Numerous soil studies have been performed within various units of the Apostle Islands National Lakeshore, particularly in regard to their suitability for recreational purposes (e.g., Kowalski 1976; Blank 1977; Milfred and Anderson 1985). It has been found that soils in the Apostle Islands are developed variously from sandstone bedrock, glacial tills, or lacustrine deposits. Accordingly, dominant soil types include sand, loam, and clay formations. Upper horizons are generally sandy and intermixed with cobbles and gravels. Where vegetation has taken root, however, the decay of organic material has produced dark topsoils. At many locations, particularly those in proximity to active beaches, buried organic zones represent former ground surfaces that have been covered by more recent deposition. Some of those paleosols may also yield cultural materials, indicating that they represent the living floors of former occupation sites.

It is worth noting that, unlike prehistoric occupations, historic period sites are not so closely tied to the natural environment. Whereas prehistoric site locations are largely determined by such factors as proximity to fresh water, the availability of reliable food sources, and the presence of level, well-drained ground, historic sites can range outside those environmental constraints. Wells and cisterns readily provide needed water, foodstuffs are domesticated or imported over great distances, and improved means of transportation permit access to normally remote areas, as well as interaction with a larger regional—or even global—community. Those and other modern amenities remove the natural limitations that affected site location choices in prehistoric times.

Light stations in the Apostle Islands present an excellent case in point. Those locations were determined entirely by the special function of the sites to safeguard shipping on the lake. Accordingly, sites were chosen with regard to their positions relative to major shipping lanes and hazards to navigation. In addition, each light was sited on a height of land sufficient for provision of the necessary focal plane to be seen at a critical distance. One other important factor in determining lighthouse locations, of course, was the political influence of powerful men and commercial interests. It should be apparent, then, that the criteria employed in selecting lighthouse sites differed markedly from those that would have ruled prehistoric settlement. Therefore, it seems rather unlikely that lighthouses often would have been superimposed over abandoned prehistoric occupations.

Nevertheless, the environment unquestionably played a significant role in the design of lighthouse construction once a location had been chosen. Environment also would have influenced the conduct of daily life at those locales, contributing both hardships and pleasures. Further, soil formations on which the lighthouses are sited doubtless affect the preservation of archeological remains in the ground and the structural condition of standing buildings. Indeed, if the soils were better drained at the four sites in question, artificial measures such as the proposed drainage systems might not be necessary.

Climate and Ecology

Climatic conditions in the Apostle Islands are typical of a boreal environment. The moderating effects of Lake Superior, however, make the climate of the islands somewhat less harsh than that of the mainland. For example, average temperatures do not range as widely in the islands as they do on the Bayfield Peninsula.

According to current meteorological data, the mean annual temperature in the Apostle Islands is approximately 4.9 degrees C (40.8 degrees F). Winters are cold, and summers are warm. January temperatures average approximately -10.5 degrees C (13.0 degrees F), whereas average July temperatures are approximately 19.4 degrees C (66.9 degrees F).

On the mainland, the average number of frost-free days per year is 116. That rather brief growing season typically falls between May 30 and September 23, though killing frosts have been recorded as late as June 23 and as early as August 27. Again, the lake effect works a moderating influence on this phenomenon, lengthening the insular frost-free season to about 140 days. As Salzer and Overstreet (1976:13) point out, that period is sufficient to make horticulture feasible in the islands, if not efficient. In support of this contention they refer to a documented case of aboriginal horticulture in 1669. It is also known, of course, that light keepers assigned to the Apostle Islands typically maintained small vegetable gardens for their personal use.

Mean annual precipitation in the Apostle Islands is approximately 71.22 cm (28.04 in), much of which falls as snow averaging 127.7 cm (49.5 in) per year. The warm season on average produces 26.57 cm (10.46 in) of rain each year, which greatly enhances the potential for a successful growing season.

The Apostle Islands lie well within what Dice (1943) has termed the Canadian biotic province. The insular environments, however, manifest characteristics that suggest a transitional ecotone. Because of their setting in the western waters of Lake Superior, the Apostle Islands are also capable of supporting species typical of both the Hudsonian biotic province, which lies to the north, and the more southerly Carolinian biotic province. Still, the majority of the plant and animal species native to the various islands conform to those of the mesic forest ecological community found on the mainland.

Beals and Cottam (1960) inventoried forest vegetation within the Apostle Islands during the mid-1950s. They found that a yellow birch-white cedar association dominated the various forest cover types. Furthermore, according to Anderson and Stowell (1985), that association is still the most prevalent, though its occurrence in the archipelago has diminished over the last 30 years.

Recent studies show that the yellow birch-white cedar association is present on at least nine of the Apostle Islands, covering approximately 1,257 ha (3,106 acres) or 14.65 percent of the total forest. Coverage today is less than that reported by Beals and Cottam (1960), perhaps owing to continued logging activities and the browsing of deer. Comparisons of data suggest that yellow birch and white cedar were replaced in certain areas by sugar maple, paper birch, balsam fir, and aspen. Those trees are not considered particularly palatable to deer, so they are likely to have had greater survivorship as second growth species after logging ceased. Where the 1956-1957 inventory identified 23 cover-types in the archipelago, more recent studies conducted by various authorities indicate that more than 69 cover-types can now be counted among the islands (Anderson and Stowell 1985:6-12).

Numerous inventories of the native fauna also have been carried out within what is now Apostle Islands National Lakeshore. As Anderson and Stowell (1985:14, 30) point out, however, for the most part those efforts produced little more than lists of species present. Their recent study was the first to relate the various species to vegetative habitats within the islands.

Initial population of the Apostle Islands with animal species dates from the postglacial low-water stage, which dates to approximately 9,500 years ago. At that time, when Lake Superior waters stood only about 137 m (450 ft) amsl, all of the islands were connected to one another and the mainland as part of a single, large peninsula. Those terrestrial species that subsequently established themselves on the peninsula were later isolated as individual islands formed with rising lake levels (Anderson and Stowell 1985:30).

Those animal populations, however, by no means have remained static. To the contrary, current distributions of terrestrial species probably differ markedly from the postglacial assemblages. Present conditions no doubt are owed to a great many factors, particularly the mobility of certain species by swimming the lake waters or crossing the winter ice. Some species, of course, may have been purposefully introduced by humans, whereas others first may have been brought to the islands inadvertently. It is certainly conceivable that small species could have been carried unknowingly in hay and other commodities that were transported to the islands for domestic and commercial purposes (Anderson and Stowell 1985:30).

At least 16 species of amphibians have been observed among the Apostle Islands, whereas only three reptilian species are known. Mammal varieties are more numerous, with some 25 species represented. It is not at all surprising, however, that avian fauna dominate the insular environments. Indeed, because of the greater diversity of vegetative cover, there are far more bird species on the islands than on the neighboring mainland. In all, 239 different varieties of bird are known to be present, including permanent and seasonal resident species. Transient birds, which are included in that number, account for a large proportion of the total avian assemblage, the Apostle Islands being situated along a major migration flyway (Anderson and Stowell 1985:30-45).

The numbers and varieties of both plant and animal species in the Apostle Islands provided an attractive seasonal subsistence base for aboriginal peoples. In addition, prehistoric populations exploited the bountiful aquatic resources of Lake Superior. During the Historic period, however, Euroamerican peoples did not rely nearly as much on the native flora and fauna for their own subsistence. Indeed, the importation of foodstuffs was a practical necessity in order for them to maintain a year-round presence. Rather, the resources that held the most interest for them were those that had the greatest commercial value: trees, sandstone, and fish.



REGIONAL CULTURE HISTORY

The region in which the Apostle Islands are located has a long and interesting past. It is well beyond the scope of this report, of course, to chronicle that past in any great detail. Such particulars, however, are provided for the entire upper Great Lakes in Mason's summary overview of the region (R. Mason 1981). Here, a broad outline of the regional prehistory and history will be offered in order to provide sufficient context for understanding the 1988 archeological investigations. In addition, this cursory overview will enable the reader to form a better appreciation for the Lakeshore's potential cultural resource base.

Prehistoric Era

Direct evidence regarding prehistoric cultural chronology in the Apostle Islands is rather limited. Although numerous archeological sites have been identified in the archipelago, only a scant few of those have been systematically excavated and reported. Further, most of the sites selected for more detailed investigation represent protohistoric and historic aboriginal occupations. Therefore, detailed knowledge of their full time-depth is lacking for the Apostles.

Despite any deficiencies in the available information, a culture sequence can be developed for the Apostle Islands using regional archeological data. From what is known of neighboring areas on the mainland about Lake Superior, it is possible to infer what kinds of archeological sites should be present within bounds of the National Lakeshore. There is also a wealth of comparative data on the entire range of human history from various sites in downstate Wisconsin (Green et al. 1986).

Paleoindian

Following glacial retreat at the close of the Pleistocene, approximately 11,000 years ago, the upper Great Lakes region again became habitable. If humans occupied the area prior to the final Valdres advance, all evidence was obliterated by that massive ice sheet. Since 11,000 B.P., however, most of the region has been open to occupation, with only occasional exceptions attributable to fluctuating lake levels.

The Paleoindian period is associated with periglacial environments throughout the boreal forest regions of North America. This basal period of human occupation is typified by the restricted wandering of small bands, probably consisting of closely related kin. Subsistence economy was based upon the hunting of large mammals, employing spears tipped with fluted points. In spite of similar evidence for big game hunting throughout North America during this period, there are notable regional differences in site content. For example, there is considerable stylistic variation in the execution of flaked stone points from region to region (Griffin 1978:55-58; R. Mason 1986).

Evidence for Paleoindian occupation of the western Lake Superior region spans a period dating from circa 11,000 B.P. to circa 7000 B.P. and derives chiefly from the Brohm site near Thunder Bay in Ontario, Canada (MacNeish 1952). That site and the nearby Cummins site appear to be associated with the Plano complex, a late Paleoindian expression typical of the High Plains. Along the north shore of Lake Superior, stone tools made from local taconite are common, as are waste products from their manufacture. Archeological features representing this period are rarely discovered in the region, owing to generally poor soil conditions for preservation. Some pit features and a cremation burial, however, have been reported in the region (Wright 1972:11-18).

In northern Wisconsin, Plano (or Late Paleoindian) peoples are believed to have been present by 10,000 B.P., continuing at least until 8000 B.P. and later in some areas (R. Mason 1986:192-193). The Old Birch Hill site associated with a glacial Lake Duluth beach ridge on Chequamegon Bay, however, appears to date from about 11,000 B.P. and is currently believed to be the earliest recorded archeological site near the Apostle Islands (Salzer and Overstreet 1976:30). Other Duluthian beach ridges are present in the islands, of course, and one on Oak Island is of particular interest for having yielded an isolated find of quartz debris (Bogin 1977). Such meager evidence, however, is insufficient to confirm a Paleoindian occupation within the National Lakeshore.

Archaic

As time passed, post-Pleistocene climates continued to moderate. With those climatic changes came important changes in human adaptations, signaling a new archeological period: the Archaic. Subsistence strategies now became more diffuse, with groups exploiting a wide range of smaller game animals and wild plant species. This generalized hunting and gathering existence, which began sometime between 8000 B.P. and 7000 B.P., was effected through seasonal scheduling of activities and cyclic movements of groups. The tool kits commonly employed by Archaic peoples also were more diverse than those of the Paleoindian period, consisting of many varieties of chipped and ground stone implements; ceramics were not yet produced. Further, the Late Archaic (circa 3200 B.P.-2000 B.P.) is remarkable for its regional burial ceremonialism, the dead often being interred in natural prominences such as knolls and glacial kames (Griffin 1978:58-62; Stoltman 1986).

Archaic period habitations are also rare in the western Lake Superior region, though evidence is not entirely absent from the Apostle Islands. The period is much better represented archeologically in the southern half of Wisconsin (Stoltman 1986). Several Archaic sites are also known in the border lakes region of Minnesota (Lynott et al. 1986) and on Isle Royale (Bastian 1963).

Archeological evidence for Archaic occupations in areas neighboring the Apostle Islands, as noted above, is rather sparse. The Squirrel Dam site, located in the North Lakes region southeast of the archipelago, appears to include an Early Archaic component dating to 7,000 years ago at the earliest (Salzer 1974:45). Other sites in that study area exhibit

Late Archaic manifestations typical of what is known as the Burnt-Rollways phase. Salzer (1974:47) estimates that those occupations range from 4000 B.P. to 3000 B.P., though some could be as recent as 2000 B.P.

The best evidence for Archaic period use of the Apostle Islands derives from the Ebob site (47AS38) on Stockton Island. Excavators found among other materials at the site a stemmed projectile point typical of the period (Salzer 1980a:24-25). Though the single diagnostic artifact hardly represents overwhelming evidence, it does strongly suggest a human presence in these islands during the Archaic.

Woodland

Although the Woodland period is usefully divided into three distinct subperiods throughout much of the Eastern Woodlands, the boreal forest environment about Lake Superior yields evidence of greater cultural continuity over time. Accordingly, it is sufficient to distinguish between Initial and Terminal stages, rather than Early, Middle, and Late Woodland (Lynott et al. 1986:23). In the more southerly reaches of Wisconsin, however, the standard tripartite periodization retains its utility (Boszhardt et al. 1986; Hurley 1986; Salzer 1986a and 1986b).

The Initial Woodland about Lake Superior is best known for its Laurel culture (circa 2000 B.P.-1300 B.P.). Archeological data indicate that Laurel peoples were hunter-gatherers who lived for the most part on fish, moose, caribou, and beaver. It is worth noting, however, that relatively few Laurel habitation sites have been excavated to date; most research in past years has focused on their burial mounds. Laurel sites occur as far west as east central Saskatchewan and as far east as the Upper Peninsula of Michigan. The "core area" of the culture, however, is located in the border lakes region of Minnesota.

Two important archeological cultures are associated with the Terminal Woodland in northwestern Wisconsin, namely, Blackduck and Sandy Lake. Both are also represented in the Apostle Islands, Blackduck and Sandy Lake sherds having been collected from the Morty site on Stockton Island (Salzer 1986b:309-310, Figs. 5D-6 and 5D-7).

Blackduck culture differs from Laurel in respect to its greater dependence on wild rice. Hunting and gathering of other native plant species continued to be important, but the intensive use of wild rice permitted a trend toward greater sedentism among Blackduck peoples. Of course, sites on Lake Superior also demonstrate a special reliance on fishing. Blackduck material culture exhibits a distinctive style of ceramic decoration and other observable differences in tool assemblage that readily set it apart from other prehistoric cultures. Some archeologists argue that Blackduck culture may be antecedent to the historic Cree, whereas others see possible relationships to the Chippewa (Ojibway). Regardless, it appears that some 500 years ago the hallmark Blackduck ceramics cease to be manufactured (Lynott et al. 1986:23; Salzer 1986b:309-311).

The Sandy Lake culture is less well known than Blackduck, owing to the fact that fewer Sandy Lake components have been excavated at archeological sites in the region. The culture was defined initially on the basis of ceramic sherds found on Minnesota's Big Sandy Lake, located west of Duluth. In their study of the ware type, Cooper and Johnson (1964:479) described its known distribution as extending "from the Wisconsin tributaries of the St. Croix River west across north-central Minnesota through the headwaters of the Mississippi River to the western prairie edge in northwestern Minnesota and on into Manitoba."

Sandy Lake materials are often found in association with Blackduck ceramics, indicating that they are roughly contemporaneous. It seems, however, that Sandy Lake wares continued to be used for a somewhat longer period of time, perhaps into the Historic Era. Although additional Sandy Lake components have been recognized in the past 25 years, the general distribution is not significantly different. Further, the culture is still described in recent literature as being "enigmatic" (Salzer 1986b:309).

Historic Era

It is obvious that a summary of events and chronologies for the Historic period has much greater direct relevance to the current study. Although it was conceivable at the outset that prehistoric cultural resources might coincide with the lighthouse complex locations, there was virtual certainty that archeological deposits related to those specialized historic complexes would be encountered. The only matters in question were the locations, extent, and potential significance of such remains.

It is important to bear in mind, however, that the Apostle Islands' Historic period neither begins nor ends in direct correspondence with the occupation of its lighthouses. Other earlier or later historic resources, potentially significant albeit unrelated to those navigation aids, might also be present at such localities. For that reason, it is proper to review in general terms the course of human events since historic records pertaining to the Apostle Islands region were first kept. That would carry our story back to the seventeenth-century fur trade.

Indeed, it is appropriate to begin such a chronicle even earlier, since trade goods entered the region through native intermediaries well before the arrival of Europeans on the scene. Such exotic and valued materials greatly influenced the lives of indigenous peoples many years prior to the advent of actual face-to-face contact between the two cultures. Unfortunately, relatively little is known of the proto-historic occupation of this region.

For purposes of this necessarily cursory overview, the Historic period will be separated into two subdivisions. The Early Historic (circa 1650-1820) is that period in which initial European exploration and settlement took place, the dominant economic

activity in the region at that time being the fur trade. The Late Historic period (1821-1910) is characterized by the growth of population and commerce in the region. Dominant extractive industries during this period include logging, fishing, quarrying, and mining. The modern era, which is here defined by the movement toward World War I, is not treated in this summary. However, a separate history of lighthouses on the Great Lakes is presented in brief.

Early Historic

Numerous sources outline the chronology of Early Historic period events in the region about the Apostle Islands (e.g., Birmingham and Salzer 1984; Salzer and Overstreet 1976; Quimby 1966); accordingly, it is not necessary to review that sequence in any detail here. Furthermore, much of the archeological research performed in Wisconsin and the upper Great Lakes on sites of the early Historic period has been reviewed separately by Carol Mason (1986) and her husband Ron Mason (1981). Nevertheless, it is essential that a brief overview be presented to provide context.

Prior to the arrival of Groseilliers and Radisson at Chequamegon Bay in 1659, the Apostle Islands were occupied by various native peoples. According to their observations as the first Europeans to visit this area, a band of Ottawa was settled in the immediate vicinity, and 18 other "nations" (probably kin groups) were located within a reasonable distance. Immigrant Huron and Petun groups, in flight from the Iroquois, also were in the area during the years 1658-1670. Father Claude Allouez reported two large Indian villages at Chequamegon in 1665, one of them Huron and the other Ottawa (Quimby 1966:114).

After 1670, and departure of the Huron and Ottawa, the Sioux and various Algonquian speakers competed for control of the Chequamegon Bay area. A proto-Chippewa band, called the Saulteurs by the French, established a trading relationship with the Sioux around 1679. At that time also, such bands were beginning to coalesce into larger village groups that ultimately formed the historic Chippewa by the end of the seventeenth century (Richner 1987:15).

In the wake of improved relations among native peoples, fur trading interests could become better established in the area. Toward that end, a post was sited at what is now known as Grant's Point on Madeline Island in 1693. Its service was short lived, however, as France abrogated the North American fur trade in response to excess supply at century's end. For that reason the post at Grant's Point was abandoned in 1698 (Richner 1987:15).

Trade resumed on the continent after 1715 when demand was again high. Consequently, the French established a new post at the present town of La Pointe in 1718; a large Chippewa village also grew up near the post. Middle Fort, as the post was known, served the area until 1762 and the decline of French hegemony in the upper Great Lakes. By that time the influence of the Chippewa as middlemen in the trade had long since passed, and many of their villages had broken up. The village at La Pointe, however,

continued to be a viable community through most of the eighteenth century (Richner 1987:15).

Native settlement in the Apostle Islands continued after 1760, but in a much reduced and dispersed form. Alexander Henry visited a village of 50 lodges at Chequamegon Bay in 1765 and observed that the natives were "near starvation" (Henry 1921, cited in Richner 1987:15). Those difficulties, however, apparently were resolved by 1793 when Michele Cadotte established his trading post on Madeline Island. That post was operated by several different trading concerns through the end of the century, ultimately coming under control of the American Fur Company, which continued the trade into the opening decades of the nineteenth century. During these latter years of the Early Historic period, the Chippewa remained the dominant native group in the Apostles (Richner 1987:15).

Late Historic

By the 1820s, significant changes were taking place in the region. The fur-bearing game that had driven the trade throughout the eighteenth century was now greatly depleted, and such activities had moved on to the northwestern interior of Canada. Accordingly, new commercial enterprises were developing to replace the fur trade locally.

Among the most important of these was commercial fishing, which began in earnest during the 1830s. Showing an admirable ability to adapt to changing conditions, the American Fur Company was one of the first major fishing concerns in the Apostle Islands. Headquartered at La Pointe on Madeline Island, the American Fur Company dominated commercial fishing in the area for several decades (Richner 1987:16).

The rising number of commercial transportation lines on Lake Superior during the 1840s naturally resulted in a marked influx of people. Moreover, the founding of the twin ports of Duluth and Superior tended to focus settlement at the western end of the lake. Not until the opening of the St. Mary's Falls Ship Canal (the Soo Locks) in 1855, however, did changes in population and commerce become dramatic. It was only two years later that the first lighthouse began operating in the Apostle Islands.

The town of Bayfield was established in the year 1856 and soon eclipsed La Pointe as a population center in the Apostle Islands. By 1870, logging and stone quarrying had joined commercial fishing in the regional economy. Those three extractive industries would continue to flourish into the 1890s.

The lumber industry grew exponentially during the latter part of the nineteenth century. Bayfield had only one sawmill in 1870, but that number expanded to 12 by 1885. In that year over 27 million board feet of lumber was processed at Bayfield, while large mills in Washburn and Ashland produced over twice that much lumber. Unlike interior regions, where logging generally was restricted to the winter months when ice roads could

be used, in the Apostle Islands timber could be loaded directly onto ships for transport or floated to mills for processing (Richner 1987:16).

The production of cordwood in the Apostle Islands was a specialized aspect of logging that also played an important role in the economy. The direct income from such efforts was much less than that generated by the lumber industry, but the influence on commercial shipping activities was considerable. During the period 1850-1870, the availability of cordwood was critical for the operation of increasing numbers of steam ships, and it is not surprising that a major fueling station was located within the Apostles at Oak Island (Richner 1987:17).

Owing to the quality of sandstone deposits on several of the Apostle Islands, as well as increasing construction needs as local communities grew, quarrying became another important industry after 1870. Often such activities were directly associated with logging and operated in sort of a symbiotic relationship, especially on Stockton and Basswood islands. Stone quarrying eventually went into decline by the 1890s, however, as the demand for sandstone diminished and the difficulty of exploiting the deposits increased (Richner 1987:17).

Logging activities dropped off soon after the turn of the century. Although the industry reached its zenith during the 1880s and 1890s, by 1900 depletion of pine stands in the region had greatly altered the character of local lumbering concerns. After that time, emphasis shifted to the exploitation of hardwoods on a more limited basis. This second phase of the lumbering industry, however, continued to be a viable undertaking on several of the Apostle Islands until creation of the National Lakeshore through federal acquisition in the 1970s (Richner 1987:17).

Other uses of the Apostle Islands developed in the second half of the nineteenth century also merit our attention, though their scope and impact was much less than those of the aforementioned commercial developments. The primary non-commercial use was domestic occupation in various forms. Homesteading occurred on several of the islands, though the harsh climate for the most part limited year-round residency. More typical of the islands, especially toward the turn of the century, were cabins frequented seasonally by wealthy landholders seeking relief from the summer heat. The few permanent residents, on the other hand, made attempts at farming, though it was not always a reliable undertaking. Of course, such persons might also complement their subsistence through independent fishing, as well as involvement with any of the commercial enterprises.

The presence of a sizeable native population throughout the nineteenth century also should be acknowledged. Although most of the local Chippewa lived within the Red Cliff Reservation (established by the Treaty of 1854) on the mainland, as they still do today, some continued to reside among the islands. Many worked in commercial fishing and logging, and others set up family fishing stations as independent entrepreneurs.

Light Stations of the Lakes

The United States Coast Guard, Ninth District, now maintains some 2,500 aids to navigation on the Great Lakes, among which are included hundreds of major and minor lights, fog signals, radio beacons, and buoys. Those stations and devices serve the multi-million-dollar shipping commerce on North America's Inland Sea, as well as the countless pleasure boaters who ply the lakes. Together with improved nautical charts and modern systems of communications, they have made travel on the Great Lakes a relatively safe and uneventful undertaking. Indeed, public reaction to the *Edmund Fitzgerald* sinking on November 11, 1975—a mixture of shock and fascination—points to the rarity of such events in our time.

This was not always true, of course. To the contrary, the Great Lakes are legendary for the large numbers of ships lost in their waters. Lake Superior, in particular, is infamous for the sudden severity of its storms and the many lives they have claimed. Various researchers have estimated that the total number of maritime accidents on the Great Lakes exceeds 6,000 and may be as high as 10,000 incidents. Most of those incidents, of course, did not result in loss of vessel (Kenneth Pott, personal communication, 1990). Conservative estimates place approximately 3,000 sunken ships in the five Great Lakes and associated waters, of which 350 wrecks are believed to be on the bottom of Lake Superior. The rather low count for Lake Superior can be explained by the fact that intensive maritime commerce began relatively late on this northernmost body, after many of the critical advances in navigation safety had been made. Further, the more substantial vessels employed in the transport of ore on Lake Superior were far more seaworthy than the early sailing vessels used in commerce on the lower lakes (Patrick Labadie, personal communication 1990).

The establishment of increasing numbers of lights at harbors, points, and shoals has helped assuage the dangers that have plagued mariners since earliest times. Such efforts, of course, began along the coasts of New England, the first American lighthouse having been put into service at Little Brewster Island in 1716. Built to guide ships through the waters of Boston Harbor, that light station was also host to the first fog signal employed on the North American continent. In 1719, a cannon was placed at the site "to answer Ships in a Fog" (Hyde 1986:11; Noble and O'Brien 1979:1).

When the First Congress assembled in 1789, there were only 12 lighthouses in existence among the United States. The ninth law enacted by that Congress, however, created the Lighthouse Establishment under the Treasury Department. That agency henceforth was to have authority over the erection, maintenance, and operation of all lighthouses in the United States. Before 1789, those responsibilities were borne by each state or colony, usually by charging user fees for ships at nearby ports-of-call (Hyde 1986:11; Noble and O'Brien 1979:1).

Early lighthouses in North America employed coal or candles in their lanterns, both of which required high maintenance to provide adequate illumination. In 1781, however,

a marked improvement over those light sources was developed. The Argand lamp, as it was called, burned a hollow wick fueled in most cases by oil from the sperm whale (after the 1850s, when sperm oil prices rose dramatically, other fuels such as colza oil and kerosene were used extensively). The new lamp provided a steady, reliable light that deposited relatively little soot on the lantern. Later, in 1810, Winslow Lewis patented a parabolic reflector for use with the Argand lamp. In combination, they significantly changed standard lighthouse operations and dependability. Consequently, the United States government bought the rights to Lewis's patent in 1812 and began systematically refitting lights already in service. These illuminating devices remained standard equipment until the widespread and rapid adoption of the Fresnel lens during the 1850s (Hyde 1986:13).

Developed in Europe by Augustin Fresnel around 1822, the lens that bears his name was a marked improvement over any system using a reflector. The lenticular (double-convex) apparatus, which resembles a glass barrel of prisms and bullseyes, magnified and refracted its inner light source into a single, bright beam. Accordingly, the Fresnel lens was capable of producing a steady light four times the intensity of a typical Argand lamp while using one-quarter of the fuel an Argand lamp required for the same period of time (Hyde 1986:17; Noble and O'Brien 1979:6; O'Brien 1976:18-19).

Eventually, burgeoning commerce on the Great Lakes demanded the establishment of aids to navigation on those interior waters. There remains controversy, however, concerning which of those early lights was first to be built. Coast Guard historian Michael O'Brien (1976:13-14) notes that the Presque Isle (originally Presqu'isle) and Buffalo lights, both on Lake Erie, have competing claims to that distinction. Incomplete records seem to indicate that the Presque Isle lighthouse first went into service in 1818, two years before the Buffalo light. There also exists tantalizing documentary evidence, however, to suggest that a light was established on Lake Ontario atop the Fort Niagara messhouse as early as 1813.

Two major influences on the establishment of aids to navigation on the Great Lakes were completion of the Erie Canal in 1825 and the Welland Canal in 1829. The Erie Canal provided linkage between New York's seaport and the lakes by way of the Hudson River, whereas the Welland enabled ships to cross the Niagara Escarpment and avoid the falls between Lake Ontario and Lake Erie. Consequently, traffic on the lower lakes increased dramatically during the second decade of the nineteenth century. Farm produce, lumber, and coal were transported to the East, while manufactured goods and thousands of immigrants were carried into the region.

One measure of the effects those canals had is the marked population rise in the Old Northwest in the first quarter of the century. Census figures indicate that there were only 50,000 people in the territory (today the states of Ohio, Michigan, Indiana, Illinois, and Wisconsin) in 1800, most of whom were settled in what is now Ohio. By 1820 the number had grown to 800,000, but after that time population growth was even more significant. Thus, in the next 40 years leading up to the Civil War, some nine million people—

approximately one-third of the total living in the United States—resided in the Old Northwest region (Hyde 1986:13-15).

The progression of lighthouses on the Great Lakes is summarized in Charles Hyde's recent book *The Northern Lights* (Hyde 1986:15-16). He points out that seven new lights were established during the period 1818-1822. Between 1825 and 1830, eight more lights were added, including the first on Lake Huron, and 32 lights were completed during the 1830s. Thirty-three additional lighthouses came into being through 1852, including the first six to be established on Lake Superior toward the end of that 12-year period. The lights at Whitefish Point and Copper Harbor, both constructed between 1847 and 1849, compete for the claim of being the first. It appears, however, that the Whitefish Point lighthouse entered service before the one at Copper Harbor.

It should be noted also that in the year 1851 Congress directed that Army engineer officers henceforth would supervise construction and renovation of lighthouses. A board also was appointed to examine the Lighthouse Establishment and make recommendations for reorganization to Congress. In 1852 a permanent Lighthouse Board was formed, and the country was redistricted. Twelve districts replaced the original eight established in 1838, though the Great Lakes were still divided between only two of those, specifically, the 11th and 12th districts (O'Brien 1976:14-16).

Completion of the St. Mary's Falls Ship Canal (Soo Locks) at Sault Ste. Marie in 1855 greatly increased shipping traffic on Lake Superior and spurred construction of lighthouses on the most remote of the Great Lakes. The passage to Lake Superior also significantly impacted commerce on the lower lakes. Within 25 years, the Great Lakes shipping trade far outstripped activities along major ports of the eastern seaboard. In the eight-month shipping season of 1880, for example, over 20,000 arrivals and departures were recorded at the port of Chicago, whereas 23,000 were recorded at New York City during the entire calendar year. Records also show that 8,832 vessels passed through the Soo Locks in that year, and 31,404 ships (6/hour) used the Detroit River. Approximately one-third of the tonnage carried by the entire American merchant fleet was carried on the Great Lakes (Hyde 1986:20).

The new waterway at Sault Ste. Marie also increased the amount of lumber being shipped on the lakes and enabled the addition of iron ore and copper to the commerce. In 1852, four million tons of cargo were transported on the Great Lakes, but in less than 60 years shipping tonnage had reached 80 million. Through the 1870s lumber and grain accounted for three-quarters of the tonnage. In 1910, however, it was only one-tenth, having been eclipsed by iron ore, which represented half the total Great Lakes tonnage (or 40 million tons). In fact Lake Superior shipping accounted for three-quarters of all the iron ore produced in America at that time (Hyde 1986:20).

Major developments during the last quarter of the nineteenth century include establishment of the first steam fog signal at South Manitou Island of Lake Michigan in

1875. Administrative changes also occurred with reorganization of the Great Lakes into three districts in 1886. After that time Lake Superior and Lake Huron were jointly administered as parts of the 11th District. Finally, in 1896, the United States Lighthouse Service was brought under the Pendleton Civil Service Act of 1883, which eliminated traditional patronage in government employment (O'Brien 1976:26).

By 1892, the Great Lakes included 219 major lights, 79 minor lights, four light ships, 56 fog signals, and 404 buoys. These numbers indicate the extent to which the use of aids to navigation had grown through the second half of the nineteenth century, and the expansion of services was by no means finished. To the contrary, at the turn of the century 334 major lights, 67 fog signals, and 563 buoys were in use on the lakes (Hyde 1986:20).

In 1910, a new Bureau of Lighthouses was created to replace the old Lighthouse Board. At about that same time the Lighthouse Service was experimenting with several innovations. Radio beacons were put into service as location finders in the early 1920s. Furthermore, gas and electricity were being tried as illuminates on a limited basis in the United States, as well as incandescent oil vapor lights. Not only were such lamps easier to maintain, as they deposited little or no soot on the lens, they also opened the door to automation in combination with electric timing devices (Noble and O'Brien 1979:8; O'Brien 1976:30).

Perhaps equally important was creation of the United States Coast Guard by order of President Wilson in 1915. Twenty-four years later, in 1939, responsibility for maintenance of aids to navigation throughout the United States was turned over to the Coast Guard. Almost immediately, that agency began the systematic conversion to complete automation. By 1965, only 80 manned lights and one lightship, the *Huron*, remained on the Great Lakes. Finally, in 1983, the last two manned light stations (Point Betsie, Michigan, and Sherwood Point, Wisconsin) were converted to automation (Hyde 1986:46).

Since the end of World War II, the U.S. Coast Guard has wrought many changes on the Great Lakes in response to changing technology and conditions. In earlier days shipping lanes hugged the lakeshores; today, modern satellite geographic positioning systems, radar, and radio communications enable ships to cross great distances of open water. Furthermore, many Great Lakes ports that once could be reached only by ship can now be supplied by road, rail, and air. Thus, while shipping traffic continues to increase, the necessity of some nautical safeguards has diminished. Accordingly, though the Coast Guard still maintains nearly 2,500 aids to navigation, using seven major tenders, dozens of light stations have been taken out of service (Hyde 1986:46).

Obviously, that is not the case in the Apostle Islands. Solar power and sophisticated sensors have replaced the keepers, but the lights are still in operation. Today, of course, they are more critical as navigation aids for pleasure boaters than commercial shipping. It

is clear, however, that they will continue to appear on charts of the Great Lakes for decades to come.

PREVIOUS ARCHEOLOGICAL RESEARCH

Although a good deal of archeological research has been performed in the Apostle Islands, both before and after its establishment as a National Lakeshore, the region is still relatively unknown in that regard. Two important prehistoric sites (Morty and P-Flat) have been the subjects of major excavations, and several others have had limited archeological testing performed upon them. In addition, an early twentieth-century logging camp on Stockton Island has received intensive study, with lesser archeological efforts undertaken at two other historic sites in recent years. Those sites that have received close scrutiny, however, represent but a small percentage of the known cultural resources and probably a lesser fraction of the total resource base.

At the present time more than 50 archeological sites have been formally recorded within the Lakeshore, most of which are prehistoric in age. Although there are many known historic sites among the islands, including farmsteads, logging camps, quarries, fishing stations, and cabins, few have been inventoried and evaluated expressly as archeological resources. It should also be noted that at least eight of the recorded sites are located within the Mainland Unit of the Lakeshore.

Most of the sites identified at insular locations are clustered on Stockton, Michigan, York, Oak, and Sand (Bogin 1977; Salzer and Overstreet 1974, 1976). Four other islands possess recorded archeological sites, but those are limited to only one or two sites each. Many of the Apostles are completely unknown archeologically. Known site distributions, of course, are simply reflections of where past survey efforts have been concentrated. Some islands have been subjected to intensive archeological survey, whereas others have not been visited by any research teams. Accordingly, our current knowledge of site distributions in the Apostle Islands is likely to be a misrepresentation of reality based on selective research biases.

It is interesting to note, for purposes of illustrating this point, that the highest number of inventoried archeological sites are located on Madeline Island. That large island, which is the only major archipelago component that is not part of the Lakeshore, had 19 recorded sites as of 1974 (Salzer and Overstreet 1974). That is more than twice the number inventoried on any other island in the Apostles group even today. Although it must be acknowledged that Madeline Island was heavily occupied by native peoples, especially during the early Historic period, its large site inventory is probably more a product of that island's relative accessibility and the intensity of past surveys. No doubt the high number of recorded sites on Madeline Island also reflects to some degree the personal interests of earlier researchers, many of whom were attempting to locate specific Historic period Indian occupation sites and cemeteries documented in contemporary sources.

The earliest investigations related to the archeology of the Apostles Islands were performed by Phillip A. Means in the early years of this century and reported under the aegis of the Smithsonian Institution (Means 1917). Means identified several historic Chippewa (Ojibway) occupation sites on Madeline Island (then known as La Pointe Island),

but apparently on the basis of interviews rather than actual site visits. Salzer and Overstreet (1974:28) point out that published maps are vague and generally poor in quality. One major Chippewa (Ojibway) village site reported by Means, when sought out by those researchers, proved to be the location of a large swamp. It is possible, of course, that a swamp could have developed on the village site over the 50 years since Means performed his survey. Nevertheless, no other sites identified by Means have been confirmed subsequently through archeological field checks, either.

George I. Quimby (1966:156-158), in his still important book, *Indian Culture and European Trade Goods*, describes an assemblage of fur-trade-era historic materials derived from Madeline Island. The artifacts, which were found or excavated over many years by enthusiast Al Galazen, represent one of the first collections from the Apostle Islands to be examined by a professional archeologist. Nevertheless, Quimby's 1961 and 1963 studies of the Galazen collection, as well as materials curated by the Madeline Island Museum, are summarized in a rather cursory fashion. Further, Salzer and Overstreet (1976:28), who it seems also inspected the same collections more recently, believe that some of the material predates the Historic period. Quimby attributed the Madeline Island collections to what he termed the Late Historic (1760-1820).

Although those collections provide a good, general characterization of early historic occupations on Madeline Island, their scientific value is limited. Since the artifacts were not systematically excavated and provenience information is not complete, they cannot provide data adequate for deriving an interpretation of the human condition at that time. In the early 1960s, however, the late Leland Cooper of Hamline University conducted excavations at the Cadotte site on Grant's Point of Madeline Island. That important site, which is believed to represent a historic Huron village, eventually should yield information that will illuminate the processes of acculturation that were at work during the Contact period. The unfortunate death of Professor Cooper, however, has delayed any reporting of the data. The research potential of the collections is apparent to those who have examined the materials (Salzer and Overstreet 1976:29), but it will be some years before the information will be disseminated. Robert A. Birmingham (personal communication, 1988), currently the State Archaeologist for Wisconsin, hopes that eventually he will be able to analyze and publish the Cadotte site data.

Archeological research at sites on the other islands in the archipelago has been sporadic. Many of the islands have had site surveys conducted on them over the years, with major research carried out in 1974 and 1975, but the methods and results have been highly variable (Salzer and Overstreet 1976). Where areal coverage has been greater, site inventories are proportionately higher. Accordingly, more sites are recorded on Stockton and Michigan islands, for example, than on either Otter or Basswood.

During the summer of 1975, archeologists from Beloit College conducted test excavations at ten separate localities within the Apostle Islands. The various sites examined were situated on five of the islands, namely, Sand, York, Stockton, Hermit, and Michigan.

Some of the sites were historic, and several of the prehistoric sites proved to have multiple occupation components (Salzer 1980a).

Eleven sites, several of which were first recorded by Beloit College researchers (Salzer and Overstreet 1976), were tested by National Park Service archeologists in 1979 and 1980 (Richner 1987). Those efforts sought to evaluate each site in terms of content, context, and condition with an eye toward determining age and function of particular resources. Such assessments were needed for purposes of managing the resources, some of which were then being threatened by erosional processes.

The site most endangered at that time by lakeshore erosion was Manitou Island's P-Flat site (Richner 1987:63-79). The aboriginal fishing camp, which was first surface collected in 1975 by a team of archeologists from Beloit College (Salzer 1980a) and later tested in 1977 (Birmingham 1979; Birmingham and Salzer 1980), is located on the southern shore of that island. Archeologists from MWAC tested at the site during both seasons of the 1979-1980 evaluative program. Further investigations were carried out by the National Park Service in 1984 in response to continued erosion of the site. Those excavations ascertained important new information on site function, seasonal occupation, and aboriginal subsistence practices (Richner 1989). The multicomponent site, which contains evidence of early and late historic occupations, is now entered in the National Register of Historic Places.

To date, archeological research on relatively recent historic sites in the Apostles has been minimal. Martin (1981) performed preliminary investigations at two such sites under contract to the National Park Service in 1980. One of those sites, the nineteenth-century McCloud/Bingham Homestead, is located on Basswood Island, whereas the other, Schroeder Logging Company Camp 5, is at the southeast end of Oak Island.

The only other excavations of any consequence undertaken at a historic Euroamerican site in the Apostle Islands took place at the Trout Point Logging Camp. That site, located on the north side of Stockton Island, was investigated by MWAC staff in 1982. The limited testing took place in a single week and resulted in the excavation of 12 sq m of the site. Data derived from the site ultimately will be used to interpret daily life at an early twentieth-century logging camp to the public (Richner 1986).

It should also be pointed out that the Submerged Cultural Resources Unit of the National Park Service has performed some important investigations on a shipwreck in the Apostle Islands. In the fall of 1984 a team of divers examined and recorded remains of a sunken historic vessel presumed to be the schooner barge *Noquebay*, built circa 1872. That wooden ship caught fire en route to Buffalo in 1905 and was beached in Julian Bay off Stockton Island. The study demonstrated that the wreck is in an excellent state of preservation with nearly 90 percent of the hull intact. Further, the report of investigations includes a summary of about 20 other submerged vessels believed to lie within the immediate vicinity of the National Lakeshore (Carrell 1985).



CURRENT RESEARCH

As stated in the Introduction to this report, MWAC archeological investigations at Apostle Islands National Lakeshore during the summer of 1988 sought to evaluate the potential cultural resource impacts of a proposed development plan. The plan, which is related to the systematic restoration of several historic lighthouse complexes managed by the National Park Service, called for the installation of new drainage systems about certain structures on four islands: Sand, Michigan, Outer, and Devils (Figure 2). It was hoped that the drains would help relieve ground water problems that threaten the structural integrity of those historic buildings. Some of the structures scheduled for improvements as part of this "moisture mitigation" project also would receive applications of waterproofing materials to their foundations. In those cases, each waterproofed structure would require a narrow trench to be excavated around its entire foundation perimeter.

In order to determine whether significant cultural resources might be damaged by the proposed developments, it was necessary to excavate test units at intervals along the drainage alignments. Those efforts allowed the subsurface examination of certain areas where ground-disturbing activities would occur during construction. Although complete inspection of the direct-impact zones was not possible, the placement of test units was designed to provide information that would be representative of the whole.

In addition to the defined areas where direct impacts would occur, development plans also identified nearby parcels of open ground that would be used as construction staging areas. Since it was feared that the movement of equipment and supplies might result in unplanned ground disturbance, those areas were also subject to archeological scrutiny.

Field Strategy

The 1988 archeological field investigations at Apostle Islands National Lakeshore began on June 20 and continued through July 22. The five-week project involved excavations at four of the Apostle Islands and entailed a great deal of complicated logistical maneuvering. Indeed, the long process of setting up and taking down field operations on each island robbed considerable time from the actual research effort.

Each week the archeological team was dropped at an island on Monday morning and picked up on Friday afternoon. Depending upon the distance from shore to the week's subject island, and other drops scheduled on that day's boat circuit, transport time might be reckoned in hours. Unloading equipment and supplies at the island, and then setting up a base of operations at the particular lighthouse complex, might take hours longer. Accordingly, the field crew generally lost at least half a working day at the beginning of each week. Furthermore, owing to the fact that pick-up times usually were left indefinite, on Fridays the crew had to be packed and ready for departure shortly after mid-day.

It was apparent, then, that even under optimum conditions the archeological crew could not expect more than four full days of field work out of each week. We were also mindful, of course, that the capricious Lake Superior weather could delay or cancel boat schedules and hamper field investigations unpredictably. Indeed, on one occasion high seas demanded that the field crew transport belongings and equipment to an alternate landing, and excavations were interrupted several times by persistent and torrential summer rains.

Therefore, it was essential that the field crew make the most productive use of the time available for investigation of each island complex. For that reason some of the methods normally employed in MWAC field work were not always used. Departures from that usual routine are described in the next section of this chapter.

Methods

The excavation methods employed in the 1988 Apostle Islands project varied in some respects from those routinely used by MWAC field personnel. The few departures from standard excavation protocol, however, were minor and do not affect the quality of data so derived.

Because of limits imposed by the time available for excavation at each lighthouse complex, the archeological team did not allow itself the privilege of working in a coordinate grid system. Although a surveying transit was used occasionally to check certain test unit locations against diagrammatic plan drawings of the proposed developments, most excavation units could be laid out by taping from obvious fixed points, such as the corner of a building. Some of the units, of course, were located directly against the foundations of some structures, which made their placement all the easier.

Since the test units were not arranged according to a formal excavation grid, no coordinate system was used to designate their relative positions. Rather, each unit excavated on a particular island was assigned a numeral designation in sequential order of its excavation. Units were plotted on project plan drawings as each was laid out for excavation.

All test units measured 1 m by 1 m and were excavated in arbitrary 10-cm levels with horizontal control reckoned in terms of centimeters below surface (cmbs). No remarkable cultural or natural stratification of soils was apparent that would dictate abandonment of the arbitrary vertical controls. The soil matrix from each level was shaken through quarter-inch hardware cloth in order to retrieve any cultural materials not collected in situ. At times, discrete areas within a level might be collected separately if soil color or texture suggested a distinctive, anomalous pattern that might prove significant. Feature designations were made only if a soil anomaly was interpretable.

Documentation of the excavations was achieved through selective photographic images, as well as measured plan drawings of each level. Unit excavations proceeded level by level until cultural materials and soil anomalies were no longer present. At that point, the test unit would be declared sterile, representative profiles drawn, and the hole backfilled.

All cultural materials collected during the Apostle Island investigations were conveyed from the field in bags bearing the applicable provenience information. Laboratory processing at the MWAC facility in Lincoln, Nebraska, began with preliminary cleaning and sorting of the artifact assemblage in the autumn of 1988. Artifacts were washed, allowed to dry, and then sorted by gross categories. Subsequent analysis of the materials entailed specific identification of items by type, as well as statistical compilation of artifact frequencies. Spatial analyses designed to elicit patterns of artifact distribution were not attempted, owing to acknowledged limitations of the data sets.

Each of the light station complexes investigated in 1988 is now entered in the Wisconsin archeological site inventory. The Devils Island complex is designated 47AS80, the Outer Island complex is 47AS81, and the Michigan Island complex is 47AS82. Those islands all lie within Ashland County of Wisconsin. Sand Island, however, lies within Bayfield County, and the light complex is designated 47BA72.

The artifact assemblages derived from these excavations are now curated, along with all pertinent field and laboratory records, at the MWAC facility. Materials are cataloged under MWAC Accession Number 293. They also are entered into the Automated National Catalogue System (ANCS), as required by National Park Service policy.



SAND ISLAND

The 1988 Apostle Islands archeological investigations began at the Sand Island lighthouse complex (Figure 3), since that was to be the first of the complexes improved. In fact, the Sand Island drainage system was scheduled for installation soon after completion of the excavation project. Accordingly, it was imperative to give this complex our highest field priority.

The Sand Island light lies farthest west of those that guard the Apostle Islands (Figure 2). Commissioned in 1882 to protect increased shipping traffic out of the ports of Duluth and Superior, the light was finished one year later at a cost of \$18,000 (Hyde 1986:189). It was the third major aid to navigation put into service among the Apostles.

The lighthouse structure itself is quite similar in form to lighthouses at Chambers Island (1868) and Eagle Bluff (1868) in Lake Michigan's Green Bay (cf. Hyde 1986:151-153), McGulpin's Point (1869) at the Straits of Mackinac (cf. Hyde 1986:103), the Eagle Harbor light (1871) on Lake Superior near the tip of Michigan's Keweenaw Peninsula, and the Passage Island light (1882) at the north end of Isle Royale (cf. Hyde 1986:176-177, 180-181). Only the lighthouse at Passage Island, however, is similarly executed in sandstone. The others that exhibit basic similarities of design are all brick structures.

The light tower, which provides a focal plane 15.8 m (52 ft) above Lake Superior, emerges from the northwest corner of the keeper's quarters (Figures 4-5). It is square at the base, becoming octagonal above the second story. The 10-sided lantern house is surrounded by a cast-iron railing. The Sand Island station was the first of the Apostles lights to be automated, when a clock-driven acetylene lamp was installed in 1921. The lighthouse was taken out of service in 1933, and the U.S. Coast Guard erected a skeletal steel tower in front of the historic structure to support a new automated light (Rathbun 1988:73). More recently, installation of a solar-powered light atop the stone tower allowed removal of the intrusive 1933 replacement. Although modernized, the Sand Island light now shines out from its original lantern house.

The lighthouse complex (47BA72) is situated at the extreme north end of Sand Island on a bluff overlooking the lake. Two small historic structures associated with the lighthouse (a privy and an oil house) stand to the rear, though several others are now absent (cf. Figures 6-7). Other notable features still visible include the concrete footings that formerly supported the steel light tower and much smaller footings upon which an oil reservoir once rested next to the main building.

For the most part, the grounds immediately about Sand Island's lighthouse are level and lawn covered, which enabled the archeological team to examine the drainage alignments with relative ease. To the east of the main structure, however, lies a wild area of brush, weeds, and unmown grass. The field was identified as the construction staging

area on project plans (Figure 3). Accordingly, it was necessary to subject that parcel to systematic archeological investigation, as well.

The staging area parcel, as noted above, was badly overgrown with vegetation, precluding direct examination of the ground surface. For that reason, it was necessary to employ close-interval shovel probes taken systematically along paced transects separated by 10 m. With the exception of a few areas where large brush piles interrupted the sequence, shovel probes were excavated every 10 m. Despite those efforts, only meager amounts of cultural materials were observed in the staging area (Table 1). Finds were limited to 27 sherds of clear bottle glass, all from a single shovel probe and all apparently from the same vessel. The bottle bore indecipherable embossed lettering and was apparently manufactured in a cup bottom mold. Those attributes would suggest that the bottle dates from before the turn of the last century. One other shovel probe yielded eight sherds of whiteware ceramic and two small pieces of brick rubble.

In view of the paucity of materials revealed by systematic shovel probing, it seems unlikely that any archeological remains of consequence lie in the proposed staging area. Therefore, use of the open field east of the Sand Island light should present no threat to cultural resources.

The proposed interceptor drain at Sand Island was not to be situated directly against the lighthouse foundation. Rather, it was designed to be buried 3.8 m (12.5 ft) from the east, west, and south elevations; a distance of 4.4 m (14.5 ft) would be reserved between the drainage alignment and the north (front) elevation. In addition, a length of solid pipe was to run below grade from the northwest corner of the drainage system (immediately in front of the light tower) to an outlet in the bluff face.

The archeological team excavated two 1-m-x-1-m test units on each side of the lighthouse, totaling eight units in all (Figure 8). Their placement, as well as their number, was deemed sufficient to check for the presence of archeological deposits about the historic structure. The excavations, however, revealed little worthy of remark. All test units yielded at least a few materials, but only one contained an artifact that has any true interpretive significance. The findings from each unit are summarized in the following paragraphs.

Test Unit 1

Located off the northeast corner of the Sand Island lighthouse, Test Unit 1 was situated over the corresponding corner of the interceptor drain (Figure 8). A slight depression could be observed in the ground surface at that location. A soil anomaly apparent in the stratigraphic profile suggests that the depression resulted from the settling of loose backfill in a hole or trench of unknown age. In fact, it is probable that this depression indicates the path of a historic overflow drain associated with a cistern that once stored rainwater in the lighthouse cellar.

The unit was covered with a thin layer of sod to a depth of approximately 3 cm. Beneath that zone the dominant soil matrix was a grayish-brown silty sand with abundant, dense sandstone cobbles. The only exception was in the northwest corner of the unit, where an arc of lighter-colored loamy sand was encountered. That anomaly, which was no longer present in the unit floor at 30 cmbs, contained diffuse, water-worn pebbles, and chunks of sandstone, as well as four small brick fragments. The general soil matrix yielded only two pieces of clear bottle glass (probably modern), one clear flat glass with a slight bluish tint, three pieces of mortar, and two brick fragments (Table 2).

It is obvious that Test Unit 1 came down on the eastern edge of a much larger soil anomaly, and it is likely that the apparent fill extends to a depth greater than 30 cm. No attempt was made to explore for the rest of the disturbance. There is good reason to believe, however, that the anomaly represents a filled trench in which the historic cistern overflow outlet was laid. If so, the trench must extend from the northeast corner of the lighthouse to the bluff edge. The precise angle of the historic drain was not known at the time these investigations began, though it was apparent from a cursory examination of the lighthouse cellar that conduit pierced the foundation at its lowest interior point. That would place the trench base at approximately 1.8 m (6 ft) below grade.

The author returned alone to Sand Island during the last week of field work in the Apostles in order to investigate that historic outlet further. Planners for the "moisture mitigation" project were interested to know whether it might be possible to put the historic drain back into service as part of the new system. A small excavation adjacent to the lighthouse foundation confirmed that a drain emerged from the northeast corner about 1.8 m (6 ft) below the ground surface. It was not possible, of course, to examine the drain's condition along its entire length without initiating a major effort. It was clear, however, that the soils and any associated artifacts above the drain were all redeposited. Therefore, there likely would be no harm to intact cultural resources if the contractor were to expose the historic drain during construction.

Test Unit 2

This unit straddled the proposed drainage alignment on the east side of the lighthouse, approximately midway along that elevation (Figure 8). Test Unit 2 yielded a larger collection of artifacts than did Test Unit 1. Those materials, however, were no more informative. Further, no soil anomalies were noted that would indicate the presence of any cultural disturbances in this area.

Artifacts derived from Level 1 (0-10 cmbs) included numerous fragments of bottle glass, most of which appear to be rather recent (Table 3). At least nine sherds, however, represent an unknown number of clear panel bottles. In addition, there were 19 cut nails and 10 sherds of whiteware among the Level 1 materials. All three artifact types are typical

of the nineteenth century. Among the other items collected, however, were several twentieth-century wire nails, indicating that the deposits were mixed.

Levels 2 (10-20 cmbs) and 3 (20-30 cmbs) yielded fewer artifacts, but a more homogeneous collection. Although not all of the items are temporally diagnostic, those materials that can be approximately dated all appear to have been manufactured around the turn of the last century. It is not possible, however, to establish a narrow time frame for their possible deposition.

The stratigraphic column may indicate the presence of a buried humic zone approximately 20 cm below the present ground surface. At that depth a thin band of dark grayish brown-to-black silty sand is clearly evident. The two distinct soil layers above that zone, therefore, are likely to represent fill spread over the former ground surface during excavation of the lighthouse cellar. That interpretation of the evidence might also account for the somewhat surprising depth of early cultural materials in the test unit.

Test Unit 3

Located astride the proposed drainage alignment on the opposite side of the lighthouse, Test Unit 3 is directly west of the back door (Figure 8). It also lies a mere 20 cm west of the concrete walkway that parallels the structure's west elevation, near the point where a smaller walk branches off toward the oil house. Given its proximity to the back door, it was expected that this test unit would offer up a relatively large collection of cultural materials, which in fact proved to be the case (Table 4).

Most remarkable was the discovery of a metal shingle immediately below the sod layer. The pressed-tin roofing element appeared to be of considerable age, judging from its advanced state of deterioration. It could not be determined, however, whether the specimen was old enough to have been an original element of the lighthouse. Nevertheless, there should be no question that the roof at one time bore this type of shingle.

The specimen is of a sort often termed a "fish-scale" shingle, owing to its appearance when mounted in series upon a roof. This appearance is achieved through the use of pressed designs in the sheet metal that, when joined side by side, form connected parabolas. The same type currently graces several of the buildings at the Raspberry Island light complex, and roofers were attaching identical shingles to the Sand Island lighthouse while the archeological work was in progress. Its basic, overall shape is rectangular, measuring approximately 29.2 cm (11.5 in) x 23.5 cm (9.25 in), with the long axis oriented vertically when mounted. Its lateral dimension, however, is smaller when mounted, because of an offset in the sheet metal that allows close overlap and, thus, better protection for the roof. Effective width of the shingle is only 23 cm (9 in).

The other artifacts collected from Test Unit 3 comprise a wide range of materials, including bottle and window glass, porcelain, stoneware, and white earthenware ceramics, cut and wire nails, and brick fragments. In addition, Level 1 (0-10 cmbs) yielded a hat pin fragment, a bone utensil handle, and two perforated rubber fragments, one of which bears an embossed patent date of March 14, 1916. That date fits well with the general impression that this is a late nineteenth- to early twentieth-century artifact assemblage.

The stratigraphic profile exhibited by Test Unit 3 is unremarkable and need not be described in any detail here. No good indication of a buried humus was present at this location. This particular unit, however, was excavated to a greater depth than those previously described (four levels, or 40 cmbs). Thus, it was able to reveal the dense pack of large sandstone boulders and cobbles that underlies the subsoil in this area.

It is also worth noting that Test Unit 3 revealed that a modern plastic hose lies buried approximately 10 cm beneath the surface. That conduit, which was barely exposed at the unit's extreme southwest corner, appears to trend from the southwest corner of the lighthouse on a northwest bearing. When queried about the four-inch hose, Lakeshore maintenance personnel expressed the belief that it was connected to the kitchen sink drain.

Test Unit 4

This unit was located at the "Y" formed by intersection of the interceptor drain path and the outlet conduit that will extend toward the bluff face (Figure 8). In other words, it lay off the structure's northwest corner, near the light tower. The unit also was fairly close to the corner of a concrete walkway that leads to the rear of the lighthouse.

The ground surface at this location was very uneven, having a drop of some 20 cm from south to north. Beneath the sod layer a soil anomaly became apparent in the southeast corner of the unit. There a concentration of brickbats, brick rubble, and mortar formed an arc from the east profile to the south at approximately 15 cm below the surface. This would suggest the presence of a circular feature with its center located somewhere near but outside the southeast unit corner. The anomaly terminated at a depth of about 40 cm.

As in the case of Test Unit 2, a buried ground surface is suggested in the stratigraphic profile of Test Unit 4. Encountered at 55 cmbs at the southeast corner of the unit, the stratum consisted of a very dark brown loamy sand in which large cobbles of sandstone were scattered. Unlike the present ground surface, this buried humic zone seemed fairly level, exhibiting a small drop of approximately 5 cm from south to north. Dense sandstone boulders lay below that level.

Typical of test units on Sand Island, the artifacts contained in Test Unit 4 seem to represent a mixture of probable late nineteenth- and early twentieth-century materials

(Table 5). The only good temporally diagnostic specimens, however, were a few cut nails and four modern .22 caliber cartridge casings (three short and one long). Their presence together in the same deposits is some indication of the degree of disturbance here.

Test Unit 5

Located off the southwest corner of the lighthouse, this unit straddled the proposed line of the interceptor drain's south element (Figure 8). The unit was situated only a short distance east of where the drain would turn to the north. It also lay 20 cm west of a concrete sidewalk that leads from the lighthouse to its associated privy.

The only aspect of Test Unit 5 that merits particular attention is a deposit of cinders that lay in proximity to the concrete walkway. The fact that the cinder layer, which measured approximately 3-6 cm thick, seemed to emerge from underneath the walk can be interpreted in either of two ways. On one hand, the cinders could represent a base laid down before pouring the concrete; on the other, the deposit might have been part of an earlier cinder walkway that followed the same path as the existing concrete walk. Since the deposit extends a considerable distance outside the concrete limits, the latter interpretation seems more probable. Of course, the possibility remains that the linear concentration of cinders could represent an isolated refuse deposit fortuitously exposed by our excavations.

Artifacts derived from Test Unit 5 (Table 6) were almost entirely contained in the first two levels (0-20 cmbs). Level 3 (20-30 cmbs) yielded only one cut nail and an iron pin. Further, most of the items collected were of relatively recent manufacture. In fact, the only artifacts that might represent the late nineteenth century were cut nails, totaling five in all levels combined. Other items, such as bottle glass sherds, are more probably of the present century.

Test Unit 6

The sixth unit excavated on Sand Island in 1988 was located off the southeast corner of the lighthouse structure (Figure 8). It was laid out directly south of that corner, so the proposed drainage alignment bisected the unit. Test Unit 6 was virtually devoid of any cultural materials, but it did provide further evidence of a possible buried ground surface.

Soils removed from Test Unit 6 were much like those encountered elsewhere at the site. The dominant matrix here consisted of a gray-tan, fine-grained sand. At several locations in the unit, however, pockets of charcoal mottling were present. The meaning of those deposits is not clear.

The unit was all but sterile in terms of material culture (Table 7). Level 1 (0-10 cmbs) yielded only 12 cut nails. Level 2 (10-20 cmbs) contained but one cut nail and

a small piece of brick rubble. No other artifacts were found, though a third level was excavated to a depth of 30 cmbs.

Test Unit 7

Not far from Test Unit 6, Test Unit 7 was located east of the structure's southeast corner (Figure 8). The line of its south profile corresponds exactly with the extended line of the south (rear) lighthouse foundation.

Test Unit 7 revealed very little of consequence other than further evidence of a buried humus. Its soil profile indicates, however, that less fill was spread over this area of the site. A layer of brown loamy sand containing fine charcoal appeared at a depth of only 10 cmbs at the northeast corner of the unit.

As was the case with Test Unit 6, this unit contained very little in the way of artifacts (Table 8). The first level contained only two pieces of flat glass, four pieces of brick rubble, and two modern .22 caliber cartridge cases. Level 2 (10-20 cmbs) had only a single cut nail in its fill.

Test Unit 8

This unit, the last excavated on Sand Island during the 1988 field season, straddled the proposed drainage alignment on the west side of the lighthouse (Figure 8). Test Unit 8 was placed approximately midway along the structure's west elevation. Its northern profile measured 4 m from the northwest corner of the light tower. Like Test Unit 3, located a short distance south, Test Unit 8 lay in close proximity (20 cm) to a concrete walk skirting the lighthouse.

The excavation of this unit generated a greater volume of materials than was the norm for our excavations at Sand Island (Table 9). No doubt the higher density of artifacts here (and in Test Unit 3) is related to the fact that this side of the lighthouse would have seen more activity than any other. Few of the recovered materials, however, can be considered important for purposes of interpreting the site. Most are construction related items (brickbats and rubble, mortar, and cut nails) that, in fact, may have been lost or discarded when the lighthouse was erected in the 1880s. Certainly the incidence of cut nails is consistent with that possibility. They are the only artifacts, however, that provide even the most general inkling of temporal associations.

Summary

The 1988 investigations on Sand Island did not reveal any evidence of cultural resources that could be deemed significant enough to require modification of the development design or further archeological examination. Neither the interval shovel probing of the staging area nor the controlled excavation of eight test units about the lighthouse resulted in the discovery of important archeological deposits. The only find of any real consequence was a fragmentary sheet metal shingle that may be representative of the type used historically on the lighthouse roof.

This does not mean, however, that the Sand Island light station possesses no archeological research potential. To the contrary, it is likely that significant archeological remains lie hidden at other locations about the lighthouse. Historic photographs of the complex, for example, clearly show that several outbuildings formerly stood to the rear of the lighthouse (Figure 6). Furthermore, two historic refuse dumps are known from an earlier archeological survey to be associated with the light station complex.

In 1979, a Beloit College research team performed archeological testing at a historic site on Sand Island first recorded in 1974. They referred to it as the Lighthouse Midden site (Salzer 1980:118-135), owing to its relationship with the Sand Island light station. The site comprises two separate refuse areas that lie on either side of the main lighthouse structure. In fact, the eastern midden is situated immediately south of the proposed staging area investigated in 1988. Materials recovered from the two dumps in the testing program were interpreted as representing late nineteenth-century and early twentieth-century deposition.

It should be clear, then, that the Sand Island light station potentially holds much greater archeological interest than was indicated by the 1988 "moisture mitigation" survey. At present, however, our knowledge of the numbers and conditions of cultural resources associated with the complex is incomplete. For that reason, future work in the area should seek a more comprehensive understanding of the resource base in this area.

MICHIGAN ISLAND

Michigan Island, which lies northeast of Madeline Island, effectively represents the eastern limit of Apostle Islands National Lakeshore (Figure 2). It was the only island of the four examined in 1988 that required a full two weeks of field investigation, owing to the fact that essentially two separate lighthouse complexes required study (Figure 9). The first area examined lay about the original lighthouse structure built in 1857. The other drainage alignment would surround a keeper's dwelling built in 1930 to serve a replacement light that still operates from atop a skeletal steel tower.

The original 1857 lighthouse on Michigan Island (Figures 10-12) is similar in many respects to one built in 1855 at Rock Harbor on Isle Royale (cf. Hyde 1986:179-181). It consists of a conical stone light tower attached to a small gabled dwelling also made of stone. It is known, however, that the existing structure at Michigan Island includes certain features that are not original. Records show, for example, that the Lighthouse Board spent \$6,000 in 1869 for renovations, including addition of a woodshed still attached at the rear of the dwelling. Indeed, the term "relighting" used in that report strongly suggests that the lighthouse was out of service for a period of time (Hyde 1986:187).

An interesting historical sidelight concerning this point has been developed in a draft history of the Apostle Island light stations. Rathbun (1988:45-47) argues that the Michigan Island light was meant to be built on another island in the Apostles group. It seems to him that, in a bizarre case of mistaken identity or garbled communication, the lighthouse authorized for La Pointe in 1852 was built on Michigan Island by mistake. The structure at Michigan Island is virtually identical to the proposed La Pointe lighthouse as it was described in the commission. Further, no documents authorizing construction of a navigation aid on Michigan Island have come to light.

It is known that in 1857 the contractor defaulted for not having built the commissioned structure according to terms of the contract. Further, in that same year a conical stone tower with an attached dwelling at "La Pointe" first appears in the list of Lake Superior lights. The 1858 list, however, describes the La Pointe light as being made of wood and located on what is now known as Long Island. All subsequent documentation, as well as physical remains, confirm that the La Pointe light was raised of frame construction on Long Island.

The fact that a lighthouse is first recorded on Long Island in 1858 suggests the mistaken La Pointe siting was discovered soon after the Michigan Island light was completed. Apparently, that 1857 light was abandoned the same year and partially scavenged to build the Long Island structure. Construction of a wooden tower atop a frame dwelling also seems consistent with the conclusion that the Long Island light was built rather hastily to correct the error.

It is concluded from the above evidence, therefore, that the stone lighthouse at Michigan Island took essentially its present form in 1869. The original structure completed

in 1857 was somewhat smaller and was abandoned almost immediately thereafter. For approximately 12 years, until changes in shipping traffic merited its renovation for service, it remained dark. Sixty years later the lighthouse was replaced by a separate tower that is still in use.

That imposing steel tower, which is centrally located at the light station complex, was first erected at another Great Lakes location in the year 1880. It was dismantled and transported to Michigan Island in 1919, where it lay awaiting resurrection for 10 years. Then, in 1929, the tower finally was assembled some 30.5 m (100 ft) northwest of the old light (Rathbun 1988:68). The steel structure in its present form closely resembles a tower standing at Rawley Point, Wisconsin, which in 1894 replaced an earlier light at that Lake Michigan station (cf. Hyde 1986:142-143). While construction of the tower was still in progress, work began on a new keeper's dwelling, which was completed in 1930 (Figures 13-15).

The 31-meter (102-foot) tower provides a focal plane 52 m (170 ft) above the Lake Superior waters. The light is supported by an intricate web of steel lattice girders, trusses, and guy wires resting on six large foundation pedestals. A spiral stairway, mounted in a central cylinder, rises up to the light from within a small storage building. Unlike the structure at Rawley Point, the Michigan Island light tower has no watch room situated beneath the lantern.

The Michigan Island light station complex (47AS82) includes numerous elements in addition to the primary structures. Though others have been removed, two small outbuildings still stand to the rear of the original stone lighthouse, namely, a storage shed and a privy (Figure 16). The 1930 keeper's dwelling also has two associated structures, though they are much more substantial. One is a 1 1/2-story storage building and workshop, which is located immediately behind the dwelling. The other building, which lies in front of the dwelling at the bluff edge, is a winch house for the inclined tramway used both historically and currently to ferry equipment and supplies up the long stairway from the boat dock (Figure 17). Tracks for the tram also pass by the "new" quarters and turn east behind the light tower to meet the storage building at the rear of the old lighthouse.

Almost the entire lawn that lies between the tramway power house and the original light was identified on project plans as the contractor's staging area (Figure 9). Accordingly, it was necessary to investigate that open area for archeological deposits prior to the onset of construction activities. Systematic shovel probing revealed that historic artifacts were present across most of the proposed staging area. Artifact density was light, however, and there was no indication of concentrations or associated features. Further, most of the materials seemed to be relatively modern in age (Table 10).

Given the amount of activity that must have transpired on the site during erection of the steel light tower and other buildings during this century, it should be no surprise to find widely scattered artifact debris about the lighthouse complex. If anything, the number

of items recovered from the staging area is lower than might be expected. Therefore, in view of the few materials collected, it does not seem that use of this area for staging construction of the drainage system should pose any threat to cultural resources.

Controlled excavations about the two primary structures focused first upon the 1857 lighthouse. During the second week of investigations on Michigan Island, the archeological team concentrated on the keeper's quarters built in 1930. Six standard 1-m-x-1-m test units were excavated around the old lighthouse and six more around the new keeper's quarters, making a total of 12 units for the island.

Old Lighthouse

Proposed improvements about the old lighthouse included both the installation of an interceptor drain and the application of bentonite waterproofing to the foundation. As a result, ground disturbance here would be limited almost entirely to the immediate perimeter of the structure. The only other required trenching would be for installation of the solid outlet line that would run from the southeast corner of the lighthouse to the bluff edge. Five units were placed against the foundation, and one unit was placed over a section of the outlet alignment (Figure 18).

Test Unit 1

The first unit opened at Michigan Island was situated immediately south of the side (west) entrance to the lighthouse (Figure 18). Its northern profile was staked 20 cm away from the sidewalk leading to that doorway. Of course, since the unit lay against the lighthouse, the eastern profile was the structure's foundation.

Soils about the old Michigan Island lighthouse were far more organic than the soils on Sand Island. The excavation of Level 1 (0-10 cmbs) revealed a brown silty loam that subsequently graded to a reddish brown silty clay in Level 2 (10-20 cmbs). Sandstone cobbles, which were sparse in the upper levels, increased in frequency with greater depth.

One discovery made in Test Unit 1, though not archeological, has relevance to the development project. At a depth of slightly more than 40 cm excavators encountered an armored cable running parallel to the north profile at a distance of 10-20 cm. The cable, which passes through the lighthouse foundation, is probably the abandoned main electrical power conduit for the structure. Consequently, caution is advised whenever future excavations might take place in this general area.

Examination of the unit's south profile shows what may be the line of a builder's trench (Figure 19). Near the bottom of the test unit, which was excavated to a depth of 60 cmbs, a clear vertical break could be observed 60 cm west of the foundation wall. Toward the building was a matrix of reddish brown silty clay mottled with gray silt. Away

from that point, however, was a zone of distinctive red clay, also mottled with a gray silt. The angle of the interface between those two zones is consistent with what should be expected for the original cellar excavation.

Artifacts yielded by Test Unit 1 were fairly numerous, but unremarkable (Table 11). The upper levels of excavation comprised a mixed assemblage of late nineteenth-century (e.g., cut nails) and recent (e.g., wire nails) materials, indicating a high degree of depositional disturbance. Artifacts from Level 5 (40-50 cmbs) were more homogeneous, though one wire finishing nail was found in association with nine cut nails. Only in Level 6 (50-60 cmbs) were no wire nails present.

Test Unit 2

This test unit was placed against the west side of the conical light tower (Figure 18). Because of the tower's curvature at its base, the unit had to be laid out tangentially to the foundation. As a result, complete exposure of the tower foundation made the east profile concave rather than straight, with both the north and south profiles measuring 8 cm more than the standard meter in length.

Excavation of Level 1 (0-10 cmbs) in Test Unit 2 revealed a dominant matrix of brown silty loam containing abundant small pieces of lime mortar. Centrally located in the north half of the unit, however, was an ovoid deposit of reddish brown silty clay. That soil anomaly measured approximately 50 cm north-south and 40 cm east-west, diminishing in size with greater depth. At the base of Level 2 (10-20 cmbs), the football-shaped anomaly had dwindled to 30 cm x 20 cm. That level also brought forth the only artifact noted in the anomaly: a piece of modern plywood, which was not collected.

In the second level the dominant soil matrix graded into a light yellowish gray silty sand. That zone, which proved to be only about 4 cm thick, also contained small-to-medium-sized pieces of sandstone. Below that point, the soils shifted to a light gray coarse sand with scattered mortar; medium-to-large-sized pieces of sandstone also were increasingly abundant beyond a depth of 20 cmbs.

Unexpectedly, the soil anomaly that appeared to terminate in Level 3 (20-30 cmbs) again was noted in the floor of Level 4 (30-40 cmbs). At this level, its fill again consisted of a dark reddish brown silty clay, though now with numerous pebbles. Further, it now was nearly circular (with a diameter of about 20 cm) and situated among large rocks bearing traces of lime mortar. At the base of Level 5 (40-50 cmbs), the anomaly was approximately half its size in Level 4, consisting almost entirely of mortar with flecks of charcoal.

Before the base of Level 6 (50-60 cmbs) was reached the anomaly had terminated. In that level, however, separate screening of the anomaly fill yielded two small pieces of curved glass that were either heavily patinated or discolored by exposure to intense heat. The meaning of this apparent cultural feature cannot be determined with any confidence.

The glass sherds recovered from Level 6 of the anomaly are not temporally diagnostic, precluding the fixture of even a general date for its use. The plywood found in Level 2, of course, is clearly modern. But that single artifact could represent a relatively recent addition to a much older feature.

Nevertheless, the high incidence of mortar and, to a lesser degree, charcoal strongly suggests that the anomaly is somehow related to construction or repair of the lighthouse tower. The concentration of mortared rock about the anomaly also tends to support that interpretation. Owing to the lack of associated diagnostic materials, however, it is not possible to conclude whether the anomaly had its origin with the 1857 lighthouse construction or a later maintenance episode.

Although a few interesting artifacts turned up in Test Unit 2, none is particularly important for analytical purposes (Table 12). Level 1, for example, yielded a small iron key made for use in a ward lock. Upper levels of the unit, which was situated beneath one of the light tower windows, also contained numerous sherds of thin flat glass that probably represent one or more shattered panes. In addition, thick pieces of plate glass found in the unit no doubt derive from storm panes that once enclosed the lantern.

It should be noted that the first three levels excavated below ground surface contained mixed deposits. This is apparent from the presence of cut and wire nails together. From Level 4, however, deposits are more homogeneous and of greater apparent antiquity. Of course, the presence of cut nails in the lower half of Test Unit 2 does not necessarily mean that the deposits date from the late nineteenth century. Nor does the absence of any obviously modern materials in those levels demonstrate that they are not disturbed by more recent intrusions. The evidence does, however, strongly suggest that archeological integrity in this sector of the site is qualitatively better at a depth below the first 30 cm of disturbed fill.

Test Unit 3

The third test unit excavated about the old lighthouse was placed against the dwelling's east elevation (Figure 18). The north profile of the unit lay precisely 1 m from the northeast (rear) corner of the original 1857 structure. That reference point, however, should not be confused with the northeast corner of the woodshed addition built in 1869.

No cultural features or distinct soil anomalies were present in Test Unit 3. Nor was there any definite stratigraphic evidence of a buried sod zone below the present ground surface. Nevertheless, the general impression provided by an examination of the artifacts collected is one of discontinuity (Table 13). As in the case of Test Unit 2, the upper three levels here contain a mixture of early and late materials. Many items, particularly cut nails, are consistent with a late nineteenth-century context. Nevertheless, a discarded cigarette pack, which was not collected, was found immediately beneath the sod layer approximately 10 cm below grade. Other modern materials, such as galvanized wire roofing nails also

were present in Levels 1 (0-10 cmbs), 2 (20-30 cmbs), and 3 (20-30 cmbs). Therefore, it is clear that the integrity of those upper deposits has been compromised. Levels 4 (30-40 cmbs) and 5 (40-50 cmbs), however, contain nothing that can be considered unquestionably modern. Accordingly, it seems that the intrusive disturbances in the soil column are present but limited.

Test Unit 4

This unit was situated at the rear of the lighthouse against the north elevation of the 1869 woodshed addition (Figure 18). Test Unit 4 lay immediately east of the back doorway with its west profile line coincident with the edge of a concrete walk that connects the lighthouse to a small storage building. Of course, the south profile of the unit corresponded to the addition's foundation. Unlike the main keeper's dwelling, however, the woodshed has only a crawlspace beneath it. Therefore, its foundation is set at a relatively shallow depth.

Excavation of Test Unit 4 revealed a thin and weakly developed sod layer in a brown clayey loam. Immediately below the sod zone was a reddish brown clay containing small pieces of sandstone. That general matrix continued to the base of the excavated unit (40 cmbs). After the first level, however, the numbers of sandstone inclusions diminished markedly and flecks of charcoal were diffusely distributed throughout the square-meter parcel.

The excavation of Level 1 (0-10 cmbs) provided abundant sherds of vessel and window glass (a total of 354 combined), as well as numerous construction related materials (Table 14). The high incidence of artifacts at this location, however, is not at all surprising. Test Unit 4, after all, lies in what can be termed the "toss zone" of the back door, or the area wherein household refuse could be most conveniently discarded from within the building.

It also comes as no surprise, in light of other observations about the old lighthouse, that the artifact assemblage is a mixture of early and late materials. Cut nails, for example, occur along with galvanized wire roofing nails. Furthermore, one clear bottle base is embossed with an Owens-Illinois Company mark that can be dated precisely to the year 1930 (Toulouse 1971:403). Although the fragmented bottle could have been discarded almost any time after 1930, that particular date is of no small consequence. In that year workers completed construction of the new keeper's dwelling. Accordingly, even though the old lighthouse subsequently was used as the Assistant Keeper's quarters, it is possible that house cleaning activities associated with the move resulted in formation of the back yard deposits partially excavated in 1988.

Supporting that interpretation to some degree is the fact that almost all of the artifacts recovered from Test Unit 4 were found in the first level. Level 2 (10-20 cmbs) contained only two window glass sherds, 36 cut nails and cut nail fragments, a single wire

nail, and a piece of baling wire. Six cut nails and nothing else were the yield from Level 3 (20-30 cmbs), which was the last excavation level to contain any cultural materials. Once again, greater homogeneity is apparent among the artifact assemblages derived from lower levels.

It should also be noted that Test Unit 4 revealed a spread footing that extends approximately 10 cm out from the base of the 1869 woodshed addition. Because this room has no cellar beneath it, the foundation supporting its walls is quite shallow in relation to foundations about the rest of the building. In fact, the top of the spread footing was exposed at a depth of only 13 cm (5 in) below grade. The four other test units excavated against the lighthouse offered no evidence bearing on the presence or absence of spread footings under the original 1859 foundations, since none of them reached a depth equal to the six-foot cellar.

Test Unit 5

This unit was the only one excavated about the old lighthouse that was not adjacent to its foundation (Figure 18). Placement of Test Unit 5 was designed to examine a section of the outlet alignment that would run from the perimeter drain to the bluff edge. The 1-m-x-1-m square lay approximately 4 m southeast of the lighthouse, near the base of the sloping bank that surrounds the tower.

Owing to the fact that Test Unit 5 was situated on a gentle berm, soil deposits exposed in the unit sloped downward from north to south. It is apparent from the stratification that the berm is not natural. Rather, it was probably created by mounding earth removed during construction of the light tower foundations and excavation of the dwelling's cellar.

No distinct soil anomalies were noted in Test Unit 5. For the most part, the general soil matrix consisted of a brown sandy loam overlaying a light grayish brown clayey silt. Furthermore, the artifacts derived from this unit were sparse and rather unremarkable (Table 15).

Test Unit 6

This was the last test unit excavated in conjunction with the old lighthouse drainage system. It was placed against the west foundation at the junction of the original northwest corner and the rear shed addition (Figure 18). Because the addition is offset slightly from the original west foundation line, the unit does not form a perfect square. The unit's north and west profiles are both 1 m long, but the other profiles are somewhat shorter where the dwelling corner intrudes.

The first two levels excavated from Test Unit 6 contained a dense concentration of late historic artifacts (Table 16). Most of the items recovered from those upper levels were

sherds of bottle and window glass. One clear bottle base exhibited the Owens-Illinois Company mark with a date code indicating its manufacture in the year 1930 (Toulouse 1971:403). As in the case of Test Unit 4, which yielded a similar bottle fragment, it seems probable that these deposits represent behaviors associated with abandonment of the original lighthouse after the skeletal steel tower was erected.

The remaining two levels that were subsequently excavated gave up far fewer artifacts. Further, the proportion of possible nineteenth-century materials was greater, suggesting a limited degree of disturbance. Cut nails outnumbered wire nails in Level 3 (20-30 cmbs) and Level 4 (30-40 cmbs) combined, for example, at a ratio of 9:2.

Excavation of Test Unit 6 exposed part of an abandoned downspout drainage line at the point where the shed addition meets with the original north foundation. This consisted of a vertical ceramic pipe, into which the downspout would have entered, and a horizontal iron pipe that once conveyed rainwater away from the building. It could not be determined when the drain might have been installed. It is probable, however, that it postdates the shed addition.

New Keeper's Quarters

The proposed drainage improvements at Michigan Island included a separate system for the brick keeper's dwelling built in 1930 to serve the skeletal steel light tower. Efforts to mitigate the ground water problems here would take two forms: the application of bentonite waterproofing to major sections of the foundation and installation of an elaborate interceptor drain. Owing to certain logistical difficulties, only the north and west elements of the perforated conduit could be placed adjacent to the structure; the south and east elements were designed well away from the building. In addition, a lengthy segment of solid conduit was to run nearly parallel with the structure's west elevation in order to carry surface water from an inlet behind the dwelling to the bluff edge. It would also connect with the perforated interceptor drain near the dwelling's southwest corner and convey its ground water to the same outlet.

Archeological investigations associated with this structure were performed during the second week of testing on Michigan Island. Six 1-m-x-1-m units were collected, bringing the total for this island to 12 (Figure 20). Two test units were positioned directly against the dwelling, whereas the other four straddled the alignments that were to be located at a distance from the structure.

Test Unit 7

This unit was the first to be excavated about the keeper's dwelling. It was laid out over the east interceptor element approximately midway along its proposed length

(Figure 20). As a result, the unit lay between a concrete walk leading to the dwelling's back door and a set of narrow gauge tracks for the tramway.

Although five levels were excavated in Test Unit 7, most of the artifacts collected at this location were essentially modern in age; only one cut nail was present out of a dozen nails in all (Table 17). This should not be terribly surprising, however, in light of the fact that the dwelling was constructed only 60 years ago in 1930, and there is no documented use of this area prior to that time.

Most of the materials, furthermore, were related to construction activities: mortar and brick rubble, concrete, nails, asbestos tiles, and the like. There seems little doubt that the deposits are associated with the period when the building was erected. No artifacts suggested any earlier use of the area, nor did the soil characteristics suggest anything of that sort. Along the east profile of the test unit, however, appeared the clear indication of trench fill. Continued excavation revealed that this held a pipe of small diameter, which may have carried water into the house at one time.

Test Unit 8

The second unit excavated near the keeper's quarters was located where the proposed south and west elements of the interceptor drain were to join (Figure 20). Consequently, the unit fell a short distance off of the southwest corner of the front porch (1 m south of the porch and 4 m west of the front steps).

Test Unit 8 was remarkable for its paucity of artifacts, yielding only six wire nails of various types, a wood screw, a small sheet of cuprous metal, and a broken iron file (Table 18). Further, the brown silty loam was entirely devoid of cultural materials after Level 2 (10-20 cmbs). Accordingly, the unit was abandoned upon completion of the third excavation level (20-30 cmbs).

Test Unit 9

Located against the west elevation of the keeper's quarters, the south edge of Test Unit 9 lay exactly 1 m from the southwest corner of the foundation (Figure 20). The east profile of the unit, of course, corresponded to the structure's foundation. The excavation, however, was not pursued all the way to the base of that wall.

Removal of the sod layer revealed the presence of a metal pipe driven into the earth slightly less than 10 cm from the foundation wall. The 2-cm-diameter pipe was still firmly embedded in the ground at a depth of 50 cmbs, at which point excavation efforts in Test Unit 9 were discontinued. It is probable that the artifact represents a grounding rod formerly connected to a lightning protection system.

Excavation of Level 2 (10-20 cmbs) resulted in the delineation of three distinct soil zones in the unit floor that continued to hold the same basic configuration through the remaining three levels. The significance of the zones could not be determined with any certainty, though it is clear that they must be associated with rather recent disturbances (Level 2 yielded a modern cigarette filter among other items). One possible interpretation is that the zones adjacent to the foundation represent backfill on the exterior side of the wall after it was laid up within the cellar excavation.

Although the artifact tally from Test Unit 9 is not small, the materials collected are not terribly interesting (Table 19). Wire nail variants outnumber cut nails by a factor of four, and the single sherd of window glass appears to be modern. No other item, excepting the cigarette filter from Level 2, can be considered even remotely diagnostic.

Test Unit 10

This unit was located near the south end of the solid conduit alignment, approximately 3 m from its proposed outlet at the bluff edge (Figure 20). As a result, the unit is the most remote of those excavated about the keeper's quarters.

A single sherd of clear bottle glass, perhaps from a modern panel bottle, was collected from Level 1 (0-10 cmbs) of Test Unit 10. That proved to be the only artifact associated with the test unit, as the other two levels excavated were entirely devoid of any cultural materials. The unit was declared sterile and then backfilled after completion of Level 3 (20-30 cmbs).

The strata observed in Test Unit 10 showed no indication of human disturbance. Rather, the soil column appeared to be the result of natural development and may be considered typical for this part of Michigan Island. The weakly developed sod zone, however, suggests that it is a relatively recent product. Perhaps the surface was graded off when the land was cleared.

Test Unit 11

This test unit also straddled the solid conduit that skirts the west side of the keeper's quarters. Test Unit 11, however, was situated toward the north end of that element's proposed alignment (Figure 20). It was laid out 2 m west of the dwelling's northwest corner.

Although Test Unit 11 was not completely sterile, the yield of cultural materials was extremely slight (Table 20). Only the first two levels held any artifacts, and the soils revealed no anomalies of any consequence. Almost half of the artifacts collected were wire roofing nails, no doubt distributed liberally about the grounds during various repairs to the structure. The soil column here bears a striking similarity to that in Test Unit 10, suggesting little or no human disturbance of the area.

Test Unit 12

The last unit excavated on Michigan Island, Test Unit 12, was sited against the dwelling's north elevation. More specifically, the unit lay directly behind the rear entry vestibule (Figure 20). Accordingly, both the east and south profiles of the unit correspond with foundation walls of the structure.

Test Unit 12 offered up a relatively large number of artifacts, all of which were retrieved from the first two levels of excavation (Table 21). Further, at the northwest corner of the unit there was an indication of a shallow trash deposit, as represented by a concentration of materials in a 20 cm radius. The full extent of the apparent refuse pit, however, is not known.

Most of the materials collected from Test Unit 12 were sherds of window glass. This is not at all surprising, however, since the unit lay near two windows. Other artifacts for the most part consisted of construction materials, particularly wire nails. Five sherds of a decal decorated whiteware, however, also were recovered.

Summary

Archeological investigations at the Michigan Island complex focused on both the original lighthouse structure and the later keeper's quarters that still accompany the replacement skeletal steel light tower. Excavations about the two buildings garnered little evidence that can be considered remarkable. Although deposits at the rear of the old lighthouse appear to reflect site abandonment behavior, the integrity of those deposits is dubious. A few artifacts collected about that structure may in fact date from the early years of its operation and, therefore, may have some interpretive value for museum exhibition. Their archeological contexts, however, are poor, owing to postdepositional disturbances. Accordingly, the artifacts have only limited potential for contributing to our understanding of historic activities at the light station.

Examination of the proposed construction staging area indicated that debris is distributed generally about the entire parcel. It does not appear, however, that any artifact concentrations are present that would suggest discrete activity areas or cultural features. Further, in view of the considerable ground disturbance that would have been associated with construction of the new keeper's quarters and light tower in 1929-1930, it should be no surprise that materials are widely scattered about the light station complex.

Nothing was discovered during the 1988 field project that would necessitate modification of the proposed drainage system or require further archeological investigation. It should be underscored, however, that the areas examined were quite confined and can by no means be considered a thorough survey of the Michigan Island complex. For that reason, any future development projects that may be contemplated at the light station

should be reviewed in the initial stages to determine whether additional archeological study is warranted prior to construction.

OUTER ISLAND

At the northeastern extreme of the Apostles lies Outer Island, third largest of the group after Madeline and Stockton islands (Figure 2). Shipping magnates requested a light at that location in response to the increased lake traffic in and out of Duluth-Superior during the 1870s. Accordingly, the Outer Island light was established in 1874 at a cost of \$40,000 (Hyde 1986:187-188). The island complex also supported a fog signal on its northern bluff as well as other outbuildings, several of which still survive (Figure 21).

The light tower is an impressive looking structure, conical in shape and 24.4 m (80 ft) in height. In combination with the bluff elevation, the tower creates a lantern focal plane of 39.6 m (130 ft) above the lake. That height enables the light to be seen reliably at a distance of 17.7 km (11 mi).

The brick tower is connected by a short passageway of frame construction to the two-story keeper's dwelling, which is also built of brick (Figures 22-25). The tower and dwelling are both virtually identical to those featured at the Au Sable Point light on the Lake Superior shore of Michigan's Upper Peninsula within Pictured Rocks National Lakeshore (cf. Hyde 1986:163-164). However, that light, also completed in 1874, is essentially a mirror image of the Outer Island light. Au Sable's dwelling is situated in front of its tower, toward the lakeshore, whereas the Outer Island domicile is behind its tower on the landward side. The Outer Island light tower also bears a striking resemblance to one at Lake Michigan's Wind Point (1880) near Racine, Wisconsin (cf. Hyde 1986:136-137), as well as those at Seul Choix Point (1892) and South Manitou Island (1872), both of which lie near the western approach to the Straits of Mackinac on Lake Michigan (cf. Hyde 1986:109-110, 112).

The Outer Island lighthouse complex (47AS81) is perhaps the most interesting of those examined in 1988. Not only does it cover a large amount of contiguous area, it possesses a diverse array of standing structures and visible ruins. In addition to the lighthouse itself, the complex includes an old privy, a small vault or oil house, several large fuel barrels on standards, and a generator building that provides power for the inclined tramway. At one time the generator building also housed a fog signal, but it is no longer in operation. In addition, the foundation ruins of an earlier fog signal building (the second built on Outer Island) can still be seen near the western bluff edge (Figure 26). The remains of a deep well and a large downslope refuse dump are also discernible in the bluff face where recent soil erosion has exposed them (Figure 27).

The first fog signal at Outer Island was situated on the shoreline below the bluff, not far from the existing boat landing. A violent storm, however, wiped out the structure during its first year of operation, and the replacement fog signal was built out of harm's way atop the bluff. Interestingly, the boiler that generated steam for that first fog signal can still be seen beneath the waters of Lake Superior near the present dock.

The area identified for the contractor's construction staging at Outer Island was a large expanse between the lighthouse and the bluff edge to the north (Figure 21). Systematic shovel probing of the staging area revealed no archeological deposits or isolated finds of any consequence (Table 22). The routine examination protocol, however, did confirm the presence of what appeared to be a buried electrical cable paralleling the north side of the concrete walk that connects the generator building and the lighthouse.

Although numerous standing structures are present at the Outer Island complex, only the lighthouse itself was to be a beneficiary of the proposed drainage improvements. Modifications here would include the application of bentonite waterproofing to all foundation walls and installation of a perimeter interceptor drain. Plans also provided for a solid length of pipe to run from the northeast corner of the dwelling to an outlet at the bluff edge. In all, seven 1-m-x-1-m test units were excavated alongside the Outer Island lighthouse (Figure 28), none of which revealed any deposits that could be deemed archeologically significant.

Test Unit 1

The first test unit excavated adjacent to the Outer Island lighthouse was situated midway along the east elevation of the dwelling (Figure 28). That side of the structure is paralleled by a concrete walk, which lies slightly more than a meter distant from the structure. Accordingly, only 5 cm separate the west profile of Test Unit 1 from the edge of the sidewalk.

Two aspects of the test unit are worthy of brief remark. The first is a linear zone of very dark brown sandy loam containing abundant pebbles. Centered approximately 30 cm from the foundation wall, the zone measured nearly 20 cm wide in the floors of Level 1 (0-10 cmbs) and Level 2 (10-20 cmbs). It was obvious from its location and characteristics that this anomaly represents a drip line beneath the dwelling's eaves.

The other zone that stood in marked contrast to the general matrix of yellowish brown coarse sand ran parallel to the east profile of the unit. Consisting of a dense concentration of coarse sand and gravel, the anomaly formed a straight line 15 cm from that profile and some 20 cm from the edge of the sidewalk at Level 1. At the floor of Level 2, however, the anomaly had receded further toward the profile while retaining its linear relationship to the sidewalk. There seems little doubt that the anomaly is a deposit laid as a base prior to pouring of the concrete.

Six levels were excavated in Test Unit 1, attaining a final depth of 60 cmbs. Although no other soil anomalies became apparent in the course of this test excavation, Test Unit 1 continued to yield artifacts through Level 6 (50-60 cmbs). The upper levels contained large numbers of modern materials, the proportion decreasing relative to probable nineteenth-century items with greater depth (Table 23). Almost all of the

artifacts, regardless of apparent age, seemed to be related to a structural context of utilization and were likely associated with construction or repair of the lighthouse.

Test Unit 2

This unit was placed against the east side of the passageway connecting the light tower to the quarters (Figure 28). Located about midway along that elevation, the unit's south profile wall lay 1 m from the point where the passageway meets the residential structure.

Other than a small concentration of ash and cinders in the unit's northeast corner, there was but one soil anomaly of note revealed through the excavation of Test Unit 2. In the floor of Level 4 (30-40 cmbs) a distinct zone of light brown compacted sand became evident along the unit's east profile. The deposit continued to be present in Level 5 (40-50 cmbs), though it was no longer continuous at that depth, and at Level 6 (50-60 cmbs) it had become even more broken. At that final level, however, a large amount of lime mortar was mixed in with the compacted sand. This fact suggests that the anomaly may represent the edge of a slaking pit used for mixing mortar during construction of the lighthouse.

Quite a few historic artifacts were recovered, however, especially window glass and nails (Table 24). Many of the glass sherds, in fact, were much thicker than the thickness of a normal window pane and probably derive from the lantern enclosure atop the light tower. As in the case of Test Unit 1, levels collected subsequent to the first yielded much higher proportions of items that could be tentatively attributed to the nineteenth century.

Test Unit 3

Located near the rear of the keeper's quarters, Test Unit 3 also examined the east side of the lighthouse structure. It was placed in the small offset that corresponds to the north edge of the kitchen (Figure 28). In order that the drainage alignment would run straight, that southeast corner of the building is the only place where the interceptor drain was designed away from the foundation perimeter.

A short distance below the surface, just above the floor of Level 1 (0-10 cmbs), a length of copper tubing was found to skirt past the corner formed by the kitchen offset. This apparent gas pipe had an outside diameter of 1.5 cm (0.5 in) and exhibited the same general characteristics as pipes connected to the liquid propane tanks at the rear of the keeper's quarters. In fact, the angle of orientation for this pipe suggests that it bends around the southeast corner of the building toward those tanks. It is likely that the pipe represents an abandoned gas line that is no longer connected. Nevertheless, caution should be used if any other excavations are ever carried out in this general area.

At a depth of 21 cmbs the broken end of a ceramic drain tile emerged from the north unit profile. In fact, it lay immediately against the east foundation of the keeper's quarters. Soils in the eastern part of the unit also differed from those within the kitchen offset, suggesting that the conduit had been laid in a trench. Furthermore, it soon became clear that a second conduit line passed through this same general area.

During excavation of Level 4 (30-40 cmbs), a length of galvanized steel pipe, rectangular in cross section, was discovered running parallel with the east foundation. The pipe is identical in every way to a standard eaves downspout and lies directly alongside the ceramic conduit, though buried somewhat deeper in the ground. Interestingly, the south end of the pipe is set 5 cm deeper than its north end, providing a gentle pitch that would enable water to flow readily from north to south. It is quite probable, then, that the metal pipe once served a cistern at the rear of the building. Further, it is likely that the ceramic pipe represents part of an earlier system that was replaced at some point by the more durable metal conduit.

Artifacts deriving from Test Unit 3, for the most part, consisted of nails, window glass, and bottle glass (Table 25). In regard to nails, both cut and wire varieties occurred in each of the six levels excavated. Cut nails were more numerous in proportion to wire nails, however, in the lower levels.

Two artifacts are worthy of additional comment. One is a small iron pintle fragment, which may have been part of a shutter hinge. The other is apparently a carved piece of hardened beeswax (in two fragments), rectangular in shape and incised on one surface with cross-hatching. The artifact is also centrally perforated with a small-diameter hole (approximately 1 mm). Its precise function is not known.

Test Unit 4

Also placed against the east elevation of the lighthouse, Test Unit 4 lay at the northeast corner of the keeper's quarters (Figure 28). That corner of the structure was also the point from which the outlet conduit would depart the interceptor drain for the bluff edge. Further, the south profile of the unit was located 50 cm from a basement window.

The soils exposed in Test Unit 4 were not homogeneous, though no discrete anomalies that could be interpreted culturally were noted. The mixed artifact assemblage, furthermore, indicates that the fill here is disturbed to some degree. In addition, the material content is rather unusual in terms of frequency of certain artifact types (Table 26).

Level 1 (0-10 cmbs) yielded a considerable number of glass sherds deriving from a thick pane. Like those found in Test Unit 2, these plate glass fragments probably represent pieces of a shattered section of the lantern enclosure. A few pieces of such glass also occurred in Level 2 (10-20 cmbs).

Level 2 was more remarkable, however, for its extremely high incidence of nails. The first level yielded only nine cut nails and four wire nails, whereas the second possessed 10 times that total number. No fewer than 138 cut nails, eight cut nail fragments, and 12 wire nails came out of Level 2. The outstanding character of this particular level is underscored by the fact that the remaining four levels excavated in Test Unit 4 gave up a combined total of only 23 nails.

The reason for the aberrant frequency of nails in Level 2 is not clear. It is a safe assumption, of course, that they might have been lost or discarded during construction of the lighthouse. Why there should be such a concentration of nails at this particular location, however, is open to speculation. Perhaps the best explanation is as simple and unpredictable as the chance spill of nails from a keg.

Test Unit 5

This 1-m-x-1-m unit was situated against the most forward point of the light tower (Figure 28). To accommodate the curvature of the tower foundation, this unit was laid out on a tangent to the arc. Accordingly, the only point of contact with the tower's foundation was at the middle of the unit's south profile.

The only interpretable soil anomaly in Test Unit 5 was clearly related to construction of the light tower. Along the south profile of the unit a clear line of fill shadowed the arc of the tower foundation. In the first level this appeared as an area of gray sand. By Level 2 (10-20 cmbs), however, the zone had become a deposit of coarse yellowish brown loamy sand containing abundant gravels. Beyond that point, the deposit turned increasingly more red in color as excavation continued.

The anomaly showed most clearly in Level 2, where it extended approximately 30 cm out from the edge of the stone foundation supporting the light tower. The fill area seemed to extend out as far as 40 cm from the tower, however, in Level 3 (20-30 cmbs). The distinctive soil here doubtless represents backfill placed in the excavated construction trench upon completion of the light tower's foundation. Unfortunately, no temporally diagnostic artifacts were recovered from the fill that would tend to confirm the feature's association with that event, though all of the collections made after Level 4 (30-40 cmbs) derived from that area.

The artifacts recovered from Test Unit 5 are not out of the ordinary for Outer Island (Table 27). They are a mixture of modern and possible nineteenth-century debris, primarily related to construction activities. In addition to the nails, window glass, and lime mortar, several sherds of bottle glass and a piece of earthenware ceramic were found. Other items, such as small-bore rifle cartridges, also were among the materials collected.

Test Unit 6

This unit was located against the west elevation of the keeper's quarters, specifically, at a slight (22 cm) offset where the narrow frame passageway leading to the light tower joins the dwelling (Figure 28). Like the first test unit excavated at the Outer Island complex, Test Unit 6 lay between the building foundation and a concrete walk that runs along the west side of the lighthouse. Because of the offset, however, the west profile of Test Unit 6 was farther removed from the sidewalk. This test unit also was located a short distance from a doorway in the passage, which is approached by a minor branch of the sidewalk.

Excavation of Test Unit 6 revealed no distinctive soil anomalies in plan. Examination of the south profile upon completion of the unit, however, showed subtle indications of a narrow construction trench alongside the foundation of the keeper's quarters. That apparent trench, filled with a dark brown sandy loam mottled with a yellowish brown sand, extended approximately 17 cm out from the foundation wall.

Artifacts deriving from Test Unit 6 are unremarkable (Table 28). Further, they demonstrate that disturbance of the fill is quite deep at this location. Deposits were highly mixed through Level 4 (30-40 cmbs), at which depth wire nails and a modern .22 caliber cartridge were present along with cut nails. That was the only level in the test unit, however, that afforded materials in number. Level 5 (40-50 cmbs) contained only a piece of wood and a brick fragment, whereas Level 6 (50-60 cmbs) contained a single large brickbat.

Test Unit 7

The last unit excavated at the Outer Island lighthouse complex in 1988 was Test Unit 7. Located against the east side of the light tower, it was the second unit designed to examine that element of the structure (Figure 28). As in the case of Test Unit 5, the 1-m-x-1-m square was laid out on a tangent to the foundation, so that its west profile came in contact with the building only at one point.

The soils at this location showed marked correspondence with those that were revealed through excavation of the other light tower test unit. Here there was also a trench fill deposit alongside the tower foundation that was used during construction. In addition, a narrow, linear trench was noted in the east half of the unit. This proved to contain a 4-cm-diameter (1.5-in-diameter) metal pipe trending in a north-south direction at a depth of approximately 20 cm. The function of that pipe is not known.

It was only necessary to excavate three levels in Test Unit 7 in order to reach culturally sterile soil. Artifacts were few and typical of the island complex (Table 29). Aside from the presence of thick plate glass that may derive from the lantern enclosure, the

single fact worthy of mention concerns the unit's unusually small nail count. Only one nail, a common wire nail found in Level 2 (10-20 cmbs), was recovered from the test unit.

Summary

Investigations at the Outer Island light station revealed no archeological deposits of any consequence within the defined development zones. Excavations placed over the proposed drainage alignment, for the most part, confirmed that deposits in close proximity to the lighthouse were already disturbed. Furthermore, the area set aside for construction staging proved to be virtually devoid of cultural materials.

It is worth noting, however, that informal observation of other areas about the light station resulted in the discovery of several archeological features that may be of considerable importance. These include three features along the western bluff edge that have already been partially lost to erosion. Further, it appears that natural processes will continue to work on these features, perhaps resulting in their total loss over the next few years.

One can readily observe sections of a brick foundation representing an earlier fog signal building in the bluff face (Figure 26). Nearby, the east half of a brick-lined well shaft is also exposed in almost perfect cross section, the other half having spalled away with the bluff (Figure 27). It is apparent from historic records that these features were functionally related, the well providing water for the steam-powered fog signal. An entry from the first keeper's journal made on Saturday, October 17, 1874, three days before the Outer Island light was put into service, reads in part: "...the men finished digging [sic] well for the fog whistle today, going down 30 feet" (National Archives, Record Group 26, cited in Rathbun 1988:140).

Furthermore, a downslope trash dump is apparent in this same general area. Numerous bottles, cans, and other items of domestic refuse are scattered about the slumping ground surface of the bluff edge. It was impossible to reach the artifact concentration safely, owing to its precarious position. The materials viewed at a distance, however, appeared to date from the early decades of this century.



DEVILS ISLAND

The Devils Island light complex (47AS80) is the most northern, as well as the most prominent, of those in the Apostle Islands (Figure 2). Dating initially from 1891, the light at Devils Island was the last major aid to navigation established in the archipelago. It also was the last of this group to be fully automated. Not only does the complex possess the most powerful light in the Apostles, visible at a range of 37 km (23 mi), the island also is home to a fog signal and radio beacon. Those three navigational aids combine to make Devils Island one of the most important complexes in all of Lake Superior.

This complex differs significantly from the other Apostle Island stations in its spatial arrangement (Figure 29). Here the light tower stands isolated at a considerable distance from the residential compound. Further, there are two separate keeper's dwellings in the complex, a second quarters having been built for the assistant. A third structure is known to have stood farther east of the two remaining quarters, but any extant remains of that other domicile would lie well outside the current development zone (Figures 30-34).

In addition to the main residential structures, several associated outbuildings once stood in the compound. Photographs dating from around the turn of the century, for example, show two separate privies, one behind each of the extant keeper's dwellings. A small storage building still stands alongside the narrow gauge tramway to the north of the dwellings, but any others that may have been present are no longer standing.

The Devils Island complex is also different from the others investigated in terms of its planned improvements. Unlike the other lighthouse complexes, no interceptor drains would be installed at Devils. Rather, the major efforts here would involve making adjustments to the grade about both standing structures after the application of bentonite waterproofing to their foundations. Additionally, much of the basement floor in the west keeper's quarters would be removed and replaced with new concrete. Those interior improvements, however, were not addressed by our 1988 investigations.

As in the case of each island lighthouse complex surveyed in 1988, the Devils Island plans included a parcel identified as the contractor's staging area (Figure 29). Located directly south of the two keeper's dwellings, that parcel encompasses the same ground that would have contained the two documented historic privies. Systematic shovel probing of the proposed staging area produced a small collection of artifacts (Table 30), but did not confirm the presence of remains representing the privies or any other cultural feature. That failure, however, is not surprising in view of the transect intervals employed, and the negative evidence should not be construed as indicating that no historic features remain in the proposed staging area. Accordingly, extreme caution should be exercised when this project, or any other development, is initiated in the area.

West Keeper's Quarters

Controlled excavations at the Devils Island compound were split evenly between the two residential structures. Four test units were placed against the foundation walls of each building, making a total of eight for the week's effort. Each primary elevation of the structures was examined with a 1-m-x-1-m test unit (Figure 35). In addition, a soil auger was employed to examine the stratigraphic column at other locations about the buildings.

Work began with the west keeper's quarters, which stood abandoned at the time of these investigations. The smaller of the two standing structures, this building originally housed the Assistant Keeper and his family. At that time it also had its own privy at the rear and perhaps other associated outbuildings.

Test Unit 1

The first test unit excavated on Devils Island was sited at the northeast corner of the smaller surviving residential structure. The unit was located immediately around the corner from the front porch and within a few centimeters of a side entrance to the cellar (Figure 35).

Almost all of the artifacts recovered from Test Unit 1 derive from the first level excavated (Table 31). Among the items collected from Level 1 (0-10 cmbs) were 14 wire nails, three cut nails, a two-hole plastic button, and a plastic utensil handle fragment. The association of those items together in the same level, of course, clearly shows that the soils are either disturbed or redeposited.

The only remarkable soil anomaly in Test Unit 1 was a linear deposit of fine reddish brown sand containing numerous small pebbles. This stood in marked contrast to the coarse dark brown sandy loam that typified the unit floor in Level 1 (0-10 cmbs). The general matrix also contained a large amount of coal and cinder debris.

At first the soil anomaly was believed to represent a drip line, and to some extent the deposit may indeed reflect such a cause. Excavation of Level 4 (30-40 cmbs), however, revealed the presence of glazed clay drainage tiles linked in series along that same alignment. The conduit may have led south to a cistern long since abandoned.

The floor of Level 4 also contained a large number of brick fragments. Although randomly distributed and therefore not indicative of any particular feature, their presence at this depth provides a measure of the amount of disturbance about the structure. Further, it is probable that the materials represent waste from construction of the building.

Test Unit 2

This unit was placed against the south elevation of the west keeper's quarters, midway along the foundation wall (Figure 35). At one time a rear door emerged from this elevation, and a stairway stood approximately where the test unit was placed. The stairs were removed years ago, however, and the doorway partially filled with brick to create a small window.

Given its location, it should be no surprise that Test Unit 2 gave up a rather large collection of artifacts (Table 32). By the same token, it should not be remarkable that window glass was the most frequent item in the assemblage of materials. It is worth noting, however, that many of the sherds derive from one or more panes of frosted privacy glass, indicating that they probably represent a relatively modern bathroom window. The second most frequent items were nails, particularly, wire nails. A few cut nails did occur in the unit, but they represent only about five percent of the total identifiable nails.

Nothing of particular consequence was evident in the soils of Test Unit 2 before Level 3 (20-30 cmbs) was completed. Several large sandstone cobbles appeared in the floor of that level, which consisted of a dark brown sandy silt mottled with patches of yellowish brown sand. In addition, concentrations of cinder and ash appeared occasionally in the course of excavating Level 3. One such deposit, centered against the south unit profile, persisted at the floor of this level and contained most of the artifacts.

It should also be noted that Level 3 revealed the presence of a small pipe running parallel to the foundation wall at a distance of approximately 20 cm. The pipe, which measures about 3.5 cm (1.5 in) in diameter, appeared to be made of a base metal. The function of this pipe is not known, though it probably was a conduit for fresh water.

Excavation of Level 4 (30-40 cmbs) yielded a large number of historic artifacts and construction debris. Again, as in Level 3, the cinder and ash deposit along the south profile yielded virtually all of the artifacts. In Level 4, however, that deposit terminated above a dense mass of sandstone cobbles. Therefore, Test Unit 2 was declared culturally sterile at that point and abandoned after appropriate documentation.

Test Unit 3

The third unit excavated against the west keeper's quarters was placed along the north foundation wall, 2 m from the building's northwest corner (Figure 35). The test unit lay approximately the same distance west of that structure's front porch.

Excavation of Level 1 (0-10 cmbs) yielded primarily window glass sherds and wire nails (Table 33), an entirely predictable result in view of the fact that Test Unit 3 was situated beneath a bank of windows offering a view of the lake. Along the south unit

profile a zone of fine brown sandy loam shadowed the foundation precisely. No doubt a part of the construction trench, the fill extended 20 cm out from the wall.

Although the presence of a builder's trench could be expected, another soil anomaly in Level 1 of Test Unit 3 was somewhat surprising. The deposit, which took up almost the entire west half of the unit floor, consisted of a very dark brown loamy sand containing a dense concentration of coal fragments. Judging from the deposit's partial exposure in the unit, it would appear that the anomaly was basically ovoid in shape and perhaps as large as 50 cm x 100 cm.

In the course of excavating Level 2 (10-20 cmbs), the anomaly noted in Level 1 terminated. A second, smaller deposit of cinders and coal, however, appeared in the northeast corner of the unit. At the same time, the builder's trench against the foundation diminished to a narrow line approximately 4 cm wide.

It is odd that there was no indication in Level 2 of the drainage pipe that was exposed in Level 3 (20-30 cmbs). That ceramic conduit, which runs east and west approximately 40 cm from the foundation, is a substantial object that must have been laid in a trench. No such trench is evident, however, in the floor of any level.

Level 3 also revealed several large sandstone cobbles and a concentration of brick rubble. The latter appeared in the northeast quarter of the unit, a few centimeters away from the drain tile. The significance of that deposit, unfortunately, cannot be divined.

Artifacts deriving from Test Unit 3, by and large, were unremarkable. The most common items included window glass, wire nails, brick rubble, and fragments of clay conduit. A single white clay pipestem was found in Level 4, but that is the only artifact that would suggest any time depth at all for the unit.

Test Unit 4

The last test unit excavated about the west keeper's quarters was set against the structure's west foundation, 6 m from the structure's southwest corner (Figure 35). Several windows were present on that side of the building, but there was no indication of any removed structural elements.

Excavation of Test Unit 4 revealed a featureless matrix of light yellowish brown sand beneath the loamy humus layer. Abundant charcoal was present in the sandy loam, but it did not continue past the sand interface. Artifacts retrieved from the unit all appear to be modern, consisting primarily of common wire nails, galvanized roofing nails, window glass, and bottle glass (Table 34).

In all, four 10-cm levels were excavated in the test unit. At the floor of Level 4 (30-40 cmbs) there was evidence that a drainage line associated with a nearby downspout

might be buried next to the foundation wall. Consequently, a small section of the unit was taken deeper, confirming the presence of an unglazed ceramic pipe at a depth of 46 cmbs.

East Keeper's Quarters

Excavations at Devils Island shifted focus to the east keeper's quarters upon completion of work at the west. That particular structure was being actively used as the visitor contact station and radio base station in the summer of 1988, as it had for many years before that time. The more spacious east keeper's quarters originally served as the domicile for the Devils Island Keeper. As in the case of the Assistant Keeper's quarters, this building at one time had its own privy and other service buildings. An archeological test unit was placed against each of this structure's primary elevations in the same manner as the previous case (Figure 35).

Test Unit 5

This unit was the first to be excavated about the building referred to as the east keeper's quarters. Situated against the north foundation wall, Test Unit 5 lay at the structure's northwest corner, a short distance west of the front porch (Figure 35).

Removal of the sod layer immediately exposed a fuel line that connects to a holding tank in the basement. The line emerged from the foundation beneath the unit's east profile line. It ran perpendicular to the foundation for a distance of approximately 0.5 m, at which point it turned west. From that point, the line angled across the unit toward its northwest corner.

The project construction plans indicate the presence of a buried fuel pipe running toward the east keeper's quarters off its northwest corner. Unfortunately, the plans do not show where that line passes inside the perimeter sidewalk, nor where it connects to the building. Given the angle of the pipe observed in Test Unit 5, however, it is unlikely that the path of the fuel pipe is depicted accurately in the plans.

Only two levels needed to be excavated in Test Unit 5 before sterile soils appeared. Level 1 (0-10 cmbs) yielded a rather large number of artifacts, including a sherd of glass from a lamp chimney and several cut nails (Table 35). Other materials in the level, however, were clearly modern. By contrast, Level 2 (10-20 cmbs) contained only two cut nails, one wire nail, and a piece of clear bottle glass.

It also deserves mention that Level 2 contained a dense concentration of sandstone cobbles. Indeed, in the southern part of the unit, along the foundation wall, there was hardly any soil among the jumbled rocks. Elsewhere a light brown sand dominated the soil matrix.

Test Unit 6

The second unit opened at the east keeper's quarters was located on the west side of the building (Figure 35). It was nestled against the south edge of the basement entry bulkhead. Thus, its east profile corresponded to the structure's foundation wall, while its north profile corresponded to the cheek of the exterior basement stairway.

Immediately below the sod zone a section of black plastic pipe was revealed in the southwest corner of the unit. The conduit, which may carry electrical lines, lay at an angle suggesting that it skirts the southwest corner of the stairway. No attempt was made, however, to ascertain where the line connects with the building.

No soil anomalies appeared in the unit other than what might reasonably be expected to result from construction of the two adjacent walls. Typically, the soil matrix was a dark brown loamy sand with abundant sandstone pebbles and angular cobbles. Cultural materials yielded were numerous (Table 36) and mainly consisted of construction materials (e.g., brick fragments, mortar, nails, and tarpaper). Of those materials recovered, only the nails can be considered temporally diagnostic. The fact that both cut and wire nails occur in some excavation levels, however, indicates that the depositional contexts are mixed.

Test Unit 7

Located against the east elevation of the east keeper's quarters, this unit was placed at the extreme northeast corner of the structure (Figure 35). As a result, Test Unit 7 lay in close proximity to the front porch. It also lay immediately north of a large radio antenna support.

Excavation of Level 1 (0-10 cmbs) in Test Unit 7 revealed a fine brown loamy sand containing small-to-large sandstone pieces in abundance. Artifacts from the first level included near equal numbers of cut and wire nails (18 and 17, respectively) and four modern-appearing .22 caliber cartridge cases (Table 37). Aside from those items, however, the yield of cultural materials from Level 1 was slight.

Artifact frequencies dropped off precipitously in Level 2 (10-20 cmbs). The number of cut and wire nails at this level were precisely equal (four each), but their totals were less than a quarter of the Level 1 yield. No bullet casings were found in Level 2 and, once again, other artifact types were minimal.

The nail yield continued its decline in Level 3 (20-30 cmbs) at the same rate evident in the previous level. In other words, a single cut nail and a single wire nail were recovered from Level 3, representing one-fourth of the Level 2 total. In fact, those were the only identifiable artifacts collected at that level, the other materials being limited to three scraps of sheet metal (a few pieces of brick rubble were observed but not sampled). Level 3 was

also remarkable for the fact that it contained very little soil. Instead, most of the excavated matrix consisted of sandstone cobbles.

Level 4 (30-40 cmbs) proved to be almost sterile, containing only three wire nail fragments. A small bit of brick rubble also was noted, though not collected. As in the case of Level 3, soil was virtually absent in Level 4; jumbled sandstone with air in the interstices predominated.

The fact that so little soil was present in the lower two levels of Test Unit 7 suggests that this area was previously excavated and backfilled. It seems improbable that the interstices between the jumbled rocks would not have become filled with soil over time under natural conditions. That indeed would be the case, however, if the angular sandstone had been thrown into an open excavation as backfill in recent years.

Test Unit 8

The last test unit excavated on Devils Island in 1988 was located on the south side of the east keeper's quarters. Test Unit 8 extended from the southeast corner of the structure to a point 1 m west of that corner (Figure 35). This placed it only a short distance east of the back door vestibule.

The soil matrix in Level 1 (0-10 cmbs) consisted of a brown sandy loam with moderate amounts of sandstone distributed throughout. Artifacts recovered in the first level were atypically numerous, perhaps owing in part to the proximity of Test Unit 8 to the back door (Table 38). Many of the artifacts, however, were related to construction and probably derive from building repairs, such as reshingling the roof. The Level 1 assemblage also includes a mixture of apparent nineteenth-century and modern materials, indicating either disturbance or long-term depositional accumulation.

Excavation of Level 2 (10-20 cmbs) revealed a dramatic decline in artifact frequency; only 29 items were recovered from the second level, as opposed to 172 in the first. Nevertheless, the artifact assemblage in Level 2 was much more homogenous in terms of probable age. All of the identifiable nails recovered are cut and appear to date from the late nineteenth century. Further, a celluloid hair pin collected from Level 2 is likely to be a turn-of-the-century specimen.

The size and number of sandstone cobbles increased in Level 2, and that trend continued through Level 3 (20-30 cmbs) and Level 4 (30-40 cmbs). In fact, the fourth and last level excavated was virtually all rock with very little soil. As in the case of Test Unit 7, the angular sandstone cobbles lay in random disorder with air filling the spaces between them. Again, this would strongly suggest that the test unit was excavated in backfill, deposited when the building was constructed.

Artifacts in the lower two levels were few in number and, for the most part, unremarkable. Since cut and wire nails both were recovered from Level 4, it is clear that the deposits are still mixed at that depth. Therefore, the homogeneity evident in Level 2 is more apparent than real.

Summary

Controlled excavations at the Devils Island light station were limited to a single 1-m-x-1-m test unit against each primary elevation of the two subject structures, totalling eight test units for the complex. None of the units encountered anything that might be considered archeologically significant. This is not to say that nothing was found in the excavations, for the artifact yield at this site was relatively high. Nevertheless, the mixed depositional contexts at Devils Island diminish the research potential of those areas examined in 1988.

The proposed construction staging area, located to the rear of the existing keeper's quarters, similarly offered scant physical evidence of significant archeological deposits when examined with interval shovel probes. There is ample reason, however, to believe that remains of at least two privies are present within the parcel. Although their precise locations were not defined during the 1988 field project, it is unlikely that the storage of construction equipment and supplies in this area could do great harm to such typically deep features. Nevertheless, caution should be exercised whenever work is undertaken in this locality.

It should also be kept in mind that a third major residential structure once stood to the east of the extant quarters, and other outbuildings were doubtless removed from the complex over the course of its operation. Therefore, it is likely that numerous archeological features are still distributed about the light station awaiting discovery.

CONCLUSION

The archeological investigations carried out at Apostle Islands National Lakeshore in 1988 were designed to examine proposed areas of development at four historic light station complexes. To be more precise, the 1988 excavations were associated with efforts to improve ground water drainage about certain buildings and thereby inhibit one specific cause of their structural deterioration. Except for each of the large parcels identified on project plans for construction staging, however, direct ground disturbance would be confined to narrow, linear areas in close proximity to the subject structures. Accordingly, since the scope of our investigations was limited to those areas where ground-disturbing activities would occur, the likelihood of encountering significant archeological deposits under such conditions was relatively slight.

As expected, excavations on the four islands revealed little of consequence within the various development zones. Although archeological deposits were encountered in each case, for the most part they were found to be already highly disturbed from activities associated with construction and maintenance of the light stations. This was especially true of the upper soil levels (approximately 0-30 cmbs) in most every test unit excavated, where modern materials typically were found mixed with probable nineteenth-century artifacts. Deeper deposits tended to be more homogeneous in terms of their artifact assemblages, but materials diagnostic of discrete time periods were extremely few in number. Furthermore, recognizable cultural features were not defined in any test unit of any island.

The staging areas for each island, on the other hand, presented an opportunity to examine larger parcels for the presence of cultural resources. Systematic shovel probing of those plots, however, did not result in the discovery of any archeological sites or cultural features. This negative evidence comes in spite of the fact that the Devils Island construction staging area apparently should have contained evidence of several outbuildings associated with operation of the light station. Two privies that served the existing dwellings, for example, can be documented from historic photographs as having stood in that general area. The remains of such features, of course, could be readily missed using routine survey techniques, owing to the small size of data points employed (approximately 0.1 sq m) and the large intervals (10 m) between them.

Although remains of those privies were not detected during the 1988 survey, planners were advised to assume that the features were indeed present and to employ due caution in the Devils Island staging area. The fact that documented features could elude discovery in this particular instance, moreover, underscores the need for continued vigilance during the course of all construction activities, even in surveyed development areas. Planners and project supervisors must be ever mindful of the potential to encounter unknown archeological resources.

In this same vein, it bears repeating that only certain confined areas of the light stations were investigated during the 1988 field project. Accordingly, it is not correct to assume that no further archeological work will be called for at the light stations in response

to any future developments. To the contrary, it is almost certainly demonstrable that significant archeological deposits lie in association with each of the four island complexes addressed in this report. At the very least, it is probable that each light station includes such archeological features as privies, wells, and refuse dumps among their inventories of extant cultural resources. Therefore, any additional ground-disturbing activities that may be proposed about these historic structures should be reviewed well in advance of scheduled construction to determine the necessity for archeological investigation prior to the undertakings.

Even in the absence of specific developments, it would be prudent to perform more comprehensive cultural resource surveys at each light station complex. Informal observations made during the course of the 1988 field project revealed many peripheral archeological features associated with historic light station operations. Refuse dumps, for example, were noted outside the identified development zones during casual hiking about several of the islands visited in 1988.

The Outer Island case presents a compelling argument for the systematic inventory and recordation of cultural resources for management purposes. On that island alone the research team identified three potentially significant archeological features that are currently being lost to natural geological processes. Moreover, several other former components of that light station are submerged in shallow waters off shore and subject to damage from constant wave action.

It should be clear that important cultural resources of the Apostle Islands are in immediate danger of being lost. Accordingly, steps should be taken to inventory and evaluate the significance of archeological elements at each of the light stations. Such preliminary actions should then be followed with assessments of the impacts that are being sustained by those resources and the development of recommendations for the mitigation of those adverse effects.

In conclusion, it is appropriate to point out that the historic light station complexes such as those found in the Apostle Islands have considerable archeological research potential. If site integrity is found to be good and cultural features are intact, their investigation could contribute significant new information on undocumented aspects of lighthouse operations, especially in regard to the human element.

Although it was standard practice for light station personnel to keep a daily log throughout their service, entries are typically brief. Further, they almost exclusively deal with official duties and remarkable events (e.g., the occurrence of a severe storm or the sighting of a ship). Archival collections at Apostle Islands National Lakeshore contain microfilm copies of such logs from the Outer Island, Raspberry Island, Sand Island, and La Pointe light stations, ranging in time from as early as 1872 to as late as the 1940s. They provide a wealth of material on operations at those locales, and those documents even contain a surprising amount of anecdotal information on other activities. Nevertheless, all

too often the keeper's logs here and elsewhere in North America offer little more than tantalizing tidbits on day-to-day life at a lighthouse.

The romanticized image in popular literature of a solitary lighthouse keeper standing vigil through the night for a foundering vessel certainly has some basis in fact, but it is only a small part of the truth. Lighthouses, especially in the Apostle Islands, were elements of an extended community. Most pivotal, of course, was the nuclear community, comprising the keeper, the assistant keeper, and their respective families. But there also was a great deal of critical interaction among the keepers and residents of the several islands, and with the mainland community. Moreover, improvements in transportation and communications over time facilitated contact with even broader geographic areas. Examination of the extent to which each individual Apostle Island light station was integrated into ever increasing spheres of interaction will help us put the "lonely lighthouse keeper" into his proper place in American history.



REFERENCES CITED

Anderson, R. K., and L. R. Stowell

1985 Wildlife Management Plan for Select Habitats and Species of the Apostle Islands National Lakeshore. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Bastian, T.

1963 Archaeological Survey of Isle Royale National Park, Michigan, 1960-1962. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Beals, E. W., and G. Cottam

1960 The Forest Vegetation of the Apostle Islands, Wisconsin. *Ecology* 41:785-790.

Birmingham, R. A.

1979 Preliminary Report on Testing Operations at the P-Flat Site, 47As47, Manitou Island. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Birmingham, R. A., and R. J. Salzer

1980 Test Excavations at the P-Flat Site. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Blank, L. G.

1977 Raspberry Island, York Island, and Rocky Island soil maps. Maps on file, National Park Service, Apostle Islands National Lakeshore, Bayfield, Wisconsin.

Bogin, J. M.

1977 An Archeological Survey of Oak Island, Apostle Islands National Lakeshore, Wisconsin. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Boszhardt, R. F., J. L. Theler, and T. F. Kehoe

1986 The Early Woodland Stage. *The Wisconsin Archeologist* 67(3-4):243-262.

Carrell, T.

1985 *Submerged Cultural Resources Site Report: NOQUEBAY, Apostle Islands National Lakeshore*. Southwest Cultural Resources Center Professional Papers No. 7. National Park Service, Submerged Cultural Resources Unit, Santa Fe, New Mexico.

CCRG (Commonwealth Cultural Resources Group)

1989 1988 Cultural Resource Survey, Hiawatha National Forest. Report submitted to United States Department of Agriculture-Forest Service, Escanaba, Michigan.

Cooper L. R., and E. Johnson

1964 Sandy Lake Ware and Its Distribution. *American Antiquity* 29(4):474-479.

Dice, L. R.

1943 *The Biotic Provinces of North America*. The University of Michigan Press, Ann Arbor.

Engstrom, W. N.

1974 Beach Foreshore Sedimentology and Morphology in the Apostle Islands of Northern Wisconsin. *Journal of Sedimentary Petrology* 44(1):190-206.

Farrand, W.

1969 The Quaternary History of Lake Superior. *Great Lakes Research: 1969 Proceedings*, pp. 181-197. International Great Lakes Research, 12th Conference.

Green, W., J. B. Stoltman, and A. B. Kehoe (editors)

1986 Introduction to Wisconsin Archaeology: Background for Cultural Resource Planning. *The Wisconsin Archeologist* 67(3-4).

Griffin, J. B.

1978 Eastern United States. In *Chronologies in New World Archaeology*, edited by R. E. Taylor and C. W. Meighan, pp. 51-70. Academic Press, New York.

Henry, A.

1921 *Travels and Adventures*, M. Quaif, editor. Lakeside Classics, Chicago.

Hough, J. L.

1958 *Geology of the Great Lakes*. The University of Illinois Press, Urbana.

Hurley, W. M.

1986 The Late Woodland Stage: Effigy Mound Culture. *The Wisconsin Archeologist* 67(3-4):283-301.

Hyde, C. K.

1986 *The Northern Lights: Lighthouses of the Upper Great Lakes*. TwoPeninsula Press, Lansing, Michigan.

Kowalski, W. L.

1976 Geology, Soils, and Recreational Limitations of Bear Island, Wisconsin, Apostle Islands National Lakeshore. Manuscript on file, National Park Service, Apostle Islands National Lakeshore, Bayfield, Wisconsin.

Lynott, M. J., J. J. Richner, and M. Thompson

1986 *Archeological Investigations at Voyageurs National Park: 1979 and 1980*. Occasional Studies in Anthropology No. 16. National Park Service, Midwest Archeological Center, Lincoln.

MacNeish, R. S.

1952 *A Possible Early Site in the Thunder Bay District, Ontario*. Anthropological Series 32, National Museum of Canada Bulletin 126:23-47. Ottawa.

Mackey, M.

1987 Reassessment of Shoreline Erosion on Michigan and Raspberry Islands. Paper presented at the Ninth Research Conference, Apostle Islands National Lakeshore, Bayfield, Wisconsin.

Martin, P. E.

1981 An Archaeological Evaluation of Two Sites in the Apostle Islands National Lakeshore. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Mason, C. I.

1986 The Historic Period in Wisconsin Archaeology. *The Wisconsin Archeologist* 67(3-4):370-392.

Mason, R. J.

1981 *Great Lakes Archaeology*. Academic Press, New York.

1986 The Paleo-Indian Tradition. *The Wisconsin Archeologist* 67(3-4):181-206.

Means, P. A.

1917 *Preliminary Survey of the Remains of the Chippewa Settlements on La Pointe Island, Wisconsin*. Smithsonian Miscellaneous Collections Vol. 66, No. 14. Smithsonian Institution, Washington D.C.

Milfred, C. J., and R. K. Anderson

1985 Soil Resources of the Mainland Unit of Apostle Islands National Lakeshore and Their Suitability for Recreational Uses. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Milfred, C. J., and J. Valiga

1982 Shoreline Erosion in the Apostle Islands National Lakeshore: Identify Areas of Active Erosion and Develop Methods to Quantify Rates. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Noble, D. L., and T. M. O'Brien

1979 *Sentinels of the Rocks: From "Graveyard Coast" to National Lakeshore.*
Northern Michigan University Press, Marquette.

O'Brien, T. M.

1976 *Guardians of the Eighth Sea: A History of the U.S. Coast Guard on the Great Lakes.* Ninth Coast Guard District, Cleveland, Ohio.

Quimby, G. I.

1966 *Indian Culture and European Trade Goods.* The University of Wisconsin Press, Madison.

Rathbun, P. A.

1988 *Special History Study Light Stations of the Apostle Islands National Lakeshore.* Prepared by Rathbun Associates, Springfield, Illinois, and Hollandale, Wisconsin, for the National Park Service, Midwest Regional Office, under Contract No. CX6000-5-0056.

Richner, J. J.

1986 *An Archeological Evaluation of the Trout Point Logging Camp.* Occasional Studies in Anthropology No. 17. National Park Service, Midwest Archeological Center, Lincoln.

1987 *Archeological Investigations at Apostle Islands National Lakeshore, 1979-1980.* Report on file, National Park Service, Midwest Archeological Center, Lincoln.

1989 *1984 Excavations at Site 47AS47, A Fishing Camp on Manitou Island, Wisconsin.* Report on file, National Park Service, Midwest Archeological Center, Lincoln.

Saarnisto, M.

1974 The deglaciation history of the Lake Superior region and its climatic implication. *Quaternary Research* 4:316-339.

Salzer, R. J.

1980a *Archaeological Testing in the Apostle Islands National Lakeshore.* Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

1980b *The Morty Site.* Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

1986a *The Middle Woodland Stage.* *The Wisconsin Archeologist* 67(3-4):263-282.

1986b Other Late Woodland Developments. *The Wisconsin Archeologist* 67(3-4):302-313.

Salzer, R. J., and D. F. Overstreet

1974 Summary Report: Archeological Survey of Madeline Island. Report submitted to the Wisconsin State Historical Society, Madison.

1976 Summary Report: Apostle Islands Project, Inventory and Evaluation of Cultural Resources within Apostle Islands National Lakeshore, Wisconsin. Manuscript on file, National Park Service, Midwest Archeological Center, Lincoln.

Stoltman, J. B.

1986 The Archaic Tradition. *The Wisconsin Archeologist* 67(3-4):207-238.

Toulouse, J. H.

1971 *Bottle Makers and Their Marks*. Thomas Nelson, New York.

Wright, J. V.

1972 *Ontario Prehistory*. National Museums of Canada. Ottawa.



Table 1. Artifacts from Sand Island shovel probes.

Description	Shovel Probe		Total
	5/4	6/1	
Bottle glass, clear	27	-	27
Whiteware	-	8	8
Brick rubble	-	2	2
Total	27	10	37

Table 2. Artifacts from Sand Island Test Unit 1.

Description	Level		Total
	1	2	
Bottle glass, clear	2	-	2
Window glass, clear	1	-	1
Brick fragment	1	4	5
Brick rubble	-	1	1
Mortar	2	1	3
Total	6	6	12

Table 3. Artifacts from Sand Island Test Unit 2.

Description	Level			Total
	1	2	3	
Bottle glass, brown	2	-	-	2
Bottle glass, clear	36	2	1	39
Window glass, clear	1	-	-	1
Whiteware	14	10	-	24
Cut nail	19	1	-	20
Wire nail	3	-	-	3
Roofing nail	2	-	-	2
Cut sheet metal	1	-	-	1
Brick fragment	-	-	1	1
Brick rubble	9	12	-	21
Mortar	3	1	-	4
Slag	5	-	-	5
Total	95	26	2	123

Table 4. Artifacts from Sand Island Test Unit 3.

Description	Level				Total
	1	2	3	4	
Bottle glass, clear	1	-	-	-	1
Drinking glass, clear	-	-	1	-	1
Window glass, clear	-	2	3	-	5
Milkglass	1	-	-	-	1
Porcelain knob fragment	1	-	-	-	1
Porcelain figurine fragment	-	1	-	-	1
Cut nail	18	27	11	1	57
Wire nail	13	-	-	-	13
Metal, assorted	7	-	-	-	7
Scrap and rust	-	22	12	-	34
Pin	1	-	-	-	1
Brick rubble	5	13	41	6	65
Mortar	6	-	-	-	6
Slag	1	-	-	-	1
Coal	3	2	-	-	5
Cinder	1	-	-	-	1
Hat pin	1	-	-	-	1
Pencil ferrule	1	-	-	-	1
Pencil lead	1	-	-	-	1
Bone utensil handle	1	-	-	-	1
Leather backed vinyl	5	-	-	-	5
Rubber, perforated	2	-	-	-	2
Cartridge case, .22 cal.	-	1	-	-	1
Arrow point, metal	1	-	-	-	1
Total	70	68	68	7	213

Table 5. Artifacts from Sand Island Test Unit 4.

Description	Level				Total
	1	2	3	4	
Drinking glass, clear	1	1	-	1	3
Window glass, clear	-	1	-	-	1
Milkglass	1	-	-	-	1
Cut nail	1	8	11	-	20
Wood screw	-	-	1	-	1
Brick rubble	1	4	5	10	20
Brickbat	1	1	1	4	5
Mortar	1	1	1	1	1
Coal	1	-	-	-	1
Cartridge case, .22 cal.	4	-	-	-	4
Pencil lead	-	-	2	-	2
Total	9	15	20	15	59

Table 6. Artifacts from Sand Island Test Unit 5.

Description	Level			Total
	1	2	3	
Bottle glass, clear	1	9	-	10
Window glass, clear	-	1	-	1
Whiteware	-	1	-	1
Cut nail	1	3	1	5
Wire nail	3	7	-	10
Finishing nail	1	1	-	2
Roofing nail	-	1	-	1
Nail, unidentified	5	5	-	10
Lump of metal	-	1	-	1
Iron pin	-	-	1	1
Wood, painted green	1	-	-	1
Brick rubble	12	11	-	23
Coal	3	2	-	5
Red plastic	1	-	-	1
Total	28	42	2	72

Table 7. Artifacts from Sand Island Test Unit 6.

Description	Level		Total
	1	2	
Cut nail	12	1	13
Brick rubble	-	1	1
Total	12	2	14

Table 8. Artifacts from Sand Island Test Unit 7.

Description	Level		Total
	1	2	
Window glass, clear	2	-	2
Cut nail	-	1	1
Cartridge case, .22 cal.	2	-	2
Brick rubble	4	-	4
Total	8	1	9

Table 9. Artifacts from Sand Island Test Unit 8.

Description	Level				Total
	1	2	3	4	
Bottle glass, clear	1	-	-	-	1
Drinking glass, clear	1	-	-	-	1
Window glass, clear	1	-	-	-	1
Cut nail	7	33	2	-	42
Lead sheet scrap	1	-	-	-	1
Brick rubble	54	68	4	4	130
Brick rubble/mortar	-	2	-	-	2
Brickbat	5	2	2	-	9
Mortar	6	-	6	-	12
Coal	5	1	-	-	6
Rock	1	-	-	-	1
Total	82	106	14	4	206

Table 10. Artifacts from Michigan Island shovel probes.

Description	Shovel Probe					Total
	1	2	4	7	8	
Plate glass, clear	6	-	-	1	-	7
Bottle glass, clear	-	2	-	-	-	2
Window glass, clear	-	-	2	-	-	2
Cut nail	-	-	-	1	-	1
Wire, iron	-	-	-	-	1	1
B-B shot	-	1	-	-	-	1
Mortar	-	-	1	-	-	1
Total	6	3	3	2	1	15

Table 11. Artifacts from Michigan Island Test Unit 1.

Description	Level						Total
	1	2	3	4	5	6	
Pressed glass, blue	2	1	-	-	-	-	3
Bottle glass, green	1	-	-	-	-	-	1
Bottle glass, clear	-	2	-	1	1	-	4
Light bulb glass	3	3	-	1	1	-	8
Amber glass chip	-	-	-	-	1	-	1
Light bulb stem press	-	1	-	-	-	-	1
Window glass, clear	2	2	-	-	-	-	4
Plate glass, green	1	1	-	-	-	-	2
Porcelain figure fr	-	2	-	-	-	-	2
Earthenware, unid	-	-	1	-	-	-	1
Cut nail	2	14	16	32	9	2	75
Wire nail	10	7	4	1	-	-	22
Finishing nail	1	-	-	2	1	-	4
Roofing nail	10	2	-	2	-	-	14
Possible nail	-	-	-	3	-	-	3
Gutter nail	-	-	-	1	-	-	1
Flush wood screw	1	2	-	-	-	-	3
Scrap iron	-	-	-	4	3	-	7
Sheet iron	-	-	-	-	1	-	1
Lead scrap	-	-	1	-	-	-	1
Hacksaw blade	1	-	-	-	-	-	1
Bale wire	1	1	-	4	-	-	6
Wood with nail	1	-	-	-	-	-	1
Wood, sawn	-	2	-	-	-	-	2
Wood	-	-	4	1	-	4	9
Brick rubble	-	1	-	-	-	-	1
Mortar	3	2	3	3	1	3	15
Shingle, tar	-	-	-	24	-	-	24
Tar and plaster	-	4	-	-	-	-	4
Plaster	-	-	2	-	-	-	2
Coal	1	4	2	5	-	-	12
Asbestos tile	2	3	-	5	-	-	10
Slate	-	-	1	-	-	-	1
Bone	-	1	-	-	1	-	2
Cartridge case, .22 cal.	-	2	1	1	-	-	4
Pen nib	-	1	-	-	-	-	1
Pull tab	-	1	-	-	-	-	1
Marble, amber glass	-	1	-	-	-	-	1
Knife blade tip	-	-	1	-	-	-	1
3-pc button, glass set	-	-	-	-	1	-	1
Total	42	60	36	90	20	9	257

Table 12. Artifacts from Michigan Island Test Unit 2.

Description	Level					Total
	1	2	4	5	6	
Bottle glass, clear	-	-	1	1	2	4
Window glass, clear	38	10	-	-	-	48
Plate glass, clear	23	-	-	-	-	23
Plate glass, yellow	17	4	-	-	-	21
Cut nail	1	2	1	13	-	17
Finishing nail	1	-	-	-	-	1
Roofing nail	1	2	-	-	-	3
Nut & bolt w/ mortar	-	-	-	1	-	1
Bolt fragment	1	-	-	-	-	1
Galvanized metal	-	1	-	-	-	1
Mortar	4	3	-	-	-	7
Wood with mortar	-	-	-	-	2	2
Plaster	1	-	-	-	-	1
Asbestos tile	-	6	-	-	-	6
Ward lock key, small	1	-	-	-	-	1
Fiber glass	-	1	-	-	-	1
Total	88	29	2	15	4	138

Table 13. Artifacts from Michigan Island Test Unit 3.

Description	Level					Total
	1	2	3	4	5	
Window glass, clear	128	43	5	-	-	176
Plate glass, clear	1	-	-	-	-	1
Drinking glass, clear	1	-	-	-	-	1
Bottle glass, clear	-	-	-	-	2	2
Drain tile	-	-	1	-	-	1
Cut nail	2	22	16	13	5	58
Wire nail	4	14	8	-	-	26
Roofing nail	10	-	1	-	-	11
Roofing disk	-	3	-	-	-	3
Tobacco tin frag	7	-	-	-	-	7
Eye-screw w/ring	1	-	-	-	-	1
Leaf hinge element, cuprous	-	1	-	-	-	1
Scrap iron	-	-	-	-	1	1
Brick rubble	6	4	5	-	13	28
Cut limestone	-	1	-	-	-	1
Mortar	1	5	2	-	2	10
Plaster	2	-	1	5	3	11
Asbestos tile	4	3	4	-	-	11
Tar	1	-	-	-	-	1
Shingle, tar	-	-	1	-	-	1
Tar paper	-	4	-	-	-	4
Wood & plaster	1	-	-	-	-	1
Bone	1	1	-	-	-	2
2-hole button, white metal	-	1	-	-	-	1
Total	170	102	44	18	26	360

Table 14. Artifacts from Michigan Island Test Unit 4.

Description	Level			Total
	1	2	3	
Bottle glass, clear	159	-	-	159
Bottle glass, brown	40	-	-	40
Jar glass, clear	93	-	-	93
Window glass, clear	42	2	-	44
Plate glass, clear	1	-	-	1
Light bulb glass	22	-	-	22
Cut nail	16	36	6	58
Wire nail	11	1	-	12
Finishing nail	2	-	-	2
Roofing nail	3	-	-	3
Wood screw	1	-	-	1
Sheet metal	3	-	-	3
Bale wire	-	1	-	1
Mortar	11	-	-	11
Brick rubble	10	-	-	10
Brickbat	7	-	-	7
Tar shingle	7	-	-	7
Coal	3	-	-	3
Wood	2	-	-	2
Asbestos tile	5	-	-	5
Cartridge case, .22 cal.	1	-	-	1
Bottle cap, screw type	1	-	-	1
Shovel blade, toy	1	-	-	1
Tin can key	1	-	-	1
Light bulb base	1	-	-	1
Bird bone	1	-	-	1
Total	444	40	6	490

Table 15. Artifacts from Michigan Island Test Unit 5.

Description	Level			Total
	1	2	3	
Window glass, clear	1	2	-	3
Tumbler glass	-	4	4	8
Bottle glass, clear	-	3	-	3
Whiteware	-	1	-	1
Cut nail	-	3	-	3
Total	1	13	4	18

Table 16. Artifacts from Michigan Island Test Unit 6.

Description	Level				Total
	1	2	3	4	
Bottle glass, clear	24	24	-	-	48
Bottle glass, mold-blown	-	3	3	-	6
Bottle glass, brown	23	8	2	-	33
Pressed glass, blue	1	8	-	-	9
Window glass, clear	11	9	-	-	20
Light bulb glass	1	-	-	-	1
Whiteware	-	2	-	-	2
Drain tile	2	1	6	1	10
Cut nail	1	16	4	3	24
Wire nail	-	4	-	-	4
Gutter spike	1	-	-	-	1
Roofing nail	8	4	1	1	14
U-shaped staple	-	1	-	-	1
Stove bolt	-	1	-	-	1
Suspender guide	-	1	-	-	1
Hammered lead	-	1	-	-	1
Brickbat	-	1	-	-	1
Asbestos tile	11	3	1	-	15
Mortar	3	5	5	2	15
Plaster	-	9	3	1	13
Tar shingle	1	-	-	-	1
Charcoal	-	1	-	-	1
Coal	-	1	-	-	1
Tar	-	1	-	-	1
Total	87	104	25	8	224

Table 17. Artifacts from Michigan Island Test Unit 7.

Description	Level					Total
	1	2	3	4	5	
Towel rod, milkglass	6	-	-	-	-	6
Cut nail	-	1	-	-	-	1
Wire nail	5	1	2	2	-	10
Finishing nail	-	-	-	-	1	1
Brick rubble	10	11	-	-	3	24
Mortar	3	2	-	-	1	6
Coal	11	2	-	-	-	13
Cinder	1	-	-	-	-	1
Asbestos tile	-	5	2	-	1	8
Coarse concrete	-	1	-	-	-	1
Total	36	23	4	2	6	71

Table 18. Artifacts from Michigan Island Test Unit 8.

Description	Level		Total
	1	2	
Wire nail	1	2	3
Finishing nail	1	1	2
Roofing nail	1	-	1
Wood screw	1	-	1
Sheet metal, cuprous	1	-	1
Triangular file	-	1	1
Total	5	4	9

Table 19. Artifacts from Michigan Island Test Unit 9.

Description	Level					Total
	1	2	3	4	5	
Window glass, clear	1	-	-	-	-	1
Cut nail	4	-	1	5	3	13
Wire nail	2	22	10	9	3	46
Scaffolding nail	1	-	-	-	-	1
Roofing nail	-	3	-	-	-	3
Finishing nail	-	-	2	-	-	2
Possible nail	-	-	-	4	-	4
Sheet metal, cuprous	1	-	-	-	-	1
Corrugated metal strap	-	-	1	-	1	2
Wire, cuprous	1	-	-	-	-	1
Drain tile	2	2	4	2	-	10
Brick rubble	2	2	21	4	-	29
Mortar	5	1	2	12	-	20
Coal	1	-	-	-	-	1
Asbestos tile	1	-	1	2	-	4
Cigarette filter	-	1	-	-	-	1
Lithic, unidentified	-	-	3	-	-	3
Wood	-	-	3	3	1	7
Total	21	31	48	41	8	149

Table 20. Artifacts from Michigan Island Test Unit 11.

Description	Level		Total
	1	2	
Cut nail	-	1	1
Wire nail	2	-	2
Finishing nail	1	-	1
Roofing nail	15	-	15
Brick rubble	3	2	5
Asbestos tile	8	1	9
Wood	1	-	1
Total	30	4	34

Table 21. Artifacts from Michigan Island Test Unit 12.

Description	Level		Total
	1	2	
Window glass, clear	9	50	59
Whiteware, decalcomania	2	3	5
Cut nail	1	1	2
Wire nail	2	10	12
Roofing nail	7	-	7
Spike (tramway)	1	-	1
Tack	-	1	1
Scrap iron	-	1	1
Brick rubble	6	6	12
Coal	1	-	1
Plaster	4	17	21
Mortar	3	3	6
Asbestos tile	8	1	9
Total	44	93	137

Table 22. Artifacts from Outer Island shovel probes.

Description	Shovel Probe						Total
	1/1	2/1	2/4	3/2	3/4	4/2	
Bottle glass, amber	-	-	-	-	-	3	3
Drinking glass, clear	-	-	-	2	-	-	2
Cut nail	2	-	-	-	-	-	2
Wire nail	1	-	-	-	-	-	1
Spike, iron	-	1	-	-	-	-	1
Can lid, round, iron	-	-	-	-	-	1	1
Cartridge case, .22 cal.	1	-	-	-	-	-	1
Bone	1	-	-	-	-	-	1
Coal	3	-	-	-	-	-	3
Plastic	-	-	3	-	-	-	3
Brick rubble	-	-	-	-	1	-	1
Total	8	1	3	2	1	4	19

Table 23. Artifacts from Outer Island Test Unit 1.

Description	Level						Total
	1	2	3	4	5	6	
Window glass, clear	17	3	-	-	-	-	20
Drinking glass, clear	-	1	-	-	-	-	1
Pressed glass, solar	1	-	-	-	-	-	1
Cut nail	8	9	6	5	2	8	38
Wire nail	10	4	3	1	1	-	19
Finishing nail	2	-	-	-	-	-	2
Roofing nail	2	-	-	-	-	-	2
Bone	1	-	-	-	-	-	1
Mortar	1	2	2	-	1	3	9
Plaster	-	2	-	-	-	-	2
Brick rubble	-	2	3	3	2	3	13
Brickbat	-	-	-	1	-	-	1
Tar shingle	-	1	-	-	-	-	1
Caulk	1	1	-	-	-	-	2
Metal punch, iron	1	-	-	-	-	-	1
Corner bracket, iron	1	-	-	-	-	-	1
Wing latch	1	1	-	-	-	-	2
Cartridge case, .22 cal.	-	1	-	-	-	-	1
Wood screw	1	-	-	-	-	-	1
Cord pull	1	-	-	-	-	-	1
Peach pit fragment	-	2	-	-	-	-	2
Razor blade, single-edge	-	1	-	-	-	-	1
Wood	-	-	17	-	1	1	19
Coal	-	-	-	-	-	1	1
Total	48	30	31	10	7	16	142

Table 24. Artifacts from Outer Island Test Unit 2.

Description	Level						Total
	1	2	3	4	5	6	
Plate glass, clear	35	-	-	-	-	-	35
Window glass, clear	30	7	5	4	1	-	47
Bottle glass, solarized	5	-	-	-	-	-	5
Bottle glass, clear	1	-	-	-	-	-	1
Panel bottle, clear	-	4	-	-	-	-	4
Milkglass	1	-	-	-	-	-	1
Porcelain rim	1	-	-	-	-	-	1
Cut nail	17	17	11	21	20	25	111
Wire nail	6	-	1	-	-	-	7
Roofing nail	1	-	-	-	-	-	1
Pintle fragment, iron	-	1	-	-	-	-	1
Cast brass	1	-	-	-	-	-	1
Lead cutting	1	-	-	-	-	-	1
Cartridge case, .44 cal.	1	-	-	-	-	-	1
Brick rubble	1	6	4	4	4	1	20
Dressed stone	-	-	-	1	-	-	1
Mortar	1	1	8	2	1	4	17
Caulk	2	-	-	-	-	-	2
Rock	-	-	-	1	-	-	1
Coal	2	1	-	-	-	-	3
Total	106	37	29	33	26	30	261

Table 25. Artifacts from Outer Island Test Unit 3.

Description	Level						Total
	1	2	3	4	5	6	
Window glass, clear	20	7	6	6	5	-	44
Bottle glass, clear	13	14	4	-	3	1	35
Bottle glass, solar	-	-	1	1	-	-	2
Drinking glass, clear	1	-	-	-	-	-	1
Stoneware, bristol	3	1	-	-	-	-	4
Whiteware	-	1	1	-	-	-	2
Drain tile	-	2	2	-	-	1	5
Pintle frag, iron	1	-	-	-	-	-	1
Hinge pin, iron	1	-	-	-	-	-	1
Cut nail	2	35	27	28	26	7	125
Wire nail	4	7	7	4	4	6	32
Lead cutting	1	-	-	-	-	-	1
Lead sheet, perforated	-	-	-	1	-	-	1
Scrap iron	-	-	-	-	-	1	1
Wood screw	2	-	-	-	-	-	2
Washer	1	1	-	-	-	-	2
Shingle, metal	-	-	13	-	-	-	13
Snail shell	1	-	-	-	-	-	1
Bone	2	1	3	-	-	-	6
Brickbat	1	-	-	1	-	-	2
Brick rubble	4	4	3	-	2	2	15
Mortar	7	1	6	3	1	6	24
Shingle, tar	1	-	-	-	-	-	1
Tar/rubber	1	-	-	-	-	-	1
Rubber	1	-	-	-	-	-	1
Coal	2	-	2	1	-	1	6
Slag	-	-	-	1	1	-	2
Caulk	1	-	-	-	-	-	1
Paint chip	1	-	-	-	-	-	1
Beeswax, worked	2	-	-	-	-	-	2
Chert	-	1	-	-	-	-	1
Shale	-	1	1	-	-	-	2
Total	73	76	76	46	42	25	338

Table 26. Artifacts from Outer Island Test Unit 4.

Description	Level						Total
	1	2	3	4	5	6	
Bottle glass, clear	-	2	-	-	-	-	2
Plate glass, clear	31	2	-	-	-	-	33
Window glass, clear	3	14	1	-	-	2	20
Drinking glass, clear	-	-	1	1	-	-	2
Cut nail	9	146	1	4	5	6	171
Wire nail	2	12	-	2	-	-	16
Roofing nail	1	-	-	-	-	-	1
Finishing nail	1	-	-	-	-	-	1
Cast iron, unidentified	-	2	-	-	-	-	2
Unidentified iron, perforated	-	-	-	-	-	1	1
Cartridge case, .22 cal.	1	-	-	-	-	-	1
Shotgun shell, 12-gauge	-	1	-	-	-	-	1
Brick rubble	-	3	1	-	-	-	4
Mortar	-	-	1	-	-	-	1
Coal	5	4	-	-	-	-	9
Caulk	3	-	-	-	-	-	3
Tar shingle	1	1	-	-	-	-	2
Bone	1	3	-	-	-	-	4
Pen nib	-	1	-	-	-	-	1
2-hole button, iron	-	1	-	-	-	-	1
Total	58	192	5	7	5	9	276

Table 27. Artifacts from Outer Island Test Unit 5.

Description	Level					Total
	1	2	3	4	5	
Light bulb glass	5	-	-	-	-	5
Bottle glass, clear	4	6	-	-	-	10
Bottle lip, solarized	-	1	-	-	-	1
Bottle glass, green	-	1	-	-	-	1
Window glass, clear	1	11	-	-	-	12
Whiteware	-	1	-	-	-	1
Cut nail	-	4	2	4	8	18
Wire nail	-	5	1	-	-	6
Gutter spike	-	2	-	-	-	2
Sheet metal scrap	1	-	-	-	-	1
Bone	1	2	-	-	-	3
Window latch	1	1	-	-	-	2
Cartridge case, .22 cal.	1	3	-	-	-	4
Mortar	4	5	1	-	2	12
Brick rubble	-	-	1	2	4	7
Dressed stone	-	-	-	-	4	4
Wood	-	-	-	2	7	9
Total	18	42	5	8	25	98

Table 28. Artifacts from Outer Island Test Unit 6.

Description	Level						Total
	1	2	3	4	5	6	
Window glass, clear	30	9	2	2	-	-	43
Bottle glass, clear	2	2	1	1	-	-	6
Whiteware	1	-	1	-	-	-	2
Porcelain	-	-	1	-	-	-	1
Cut nail	9	11	9	3	-	-	32
Wire nail	38	9	1	5	-	-	53
Roofing nail	25	1	-	-	-	-	26
Finishing nail	3	2	-	-	-	-	5
Staple	-	1	-	-	-	-	1
Fish hook	-	-	2	-	-	-	2
Bale wire	-	1	-	-	-	-	1
Washer, aluminum	-	1	-	-	-	-	1
Bullet, .22 cal.	3	-	-	-	-	-	3
Slug, .22 cal.	1	-	-	-	-	-	1
Cartridge case, .22 cal.	6	-	-	1	-	-	7
Scrap iron	1	-	-	-	-	-	1
Cast iron	2	-	-	-	-	-	2
Metal ring	1	-	-	-	-	-	1
Sheet metal	2	-	6	2	-	-	10
Brick rubble	-	-	-	-	1	-	1
Brickbat	1	1	-	-	-	1	3
Caulk	-	1	-	-	-	-	1
Shale	1	-	-	-	-	-	1
Chert	1	-	-	-	-	-	1
Wood	1	-	-	-	1	-	2
Snail shell	1	-	-	-	-	-	1
Crown cap bottle top	3	-	-	-	-	-	3
Bone	-	-	1	-	-	-	1
Concretion	-	-	1	-	-	-	1
Total	132	39	25	14	2	1	213

Table 29. Artifacts from Outer Island Test Unit 7.

Description	Level			Total
	1	2	3	
Plate glass, clear	11	-	-	11
Pressed glass, clear	3	1	-	4
Bottle glass, clear	-	1	-	1
Drinking glass, clear	-	10	-	10
Window glass, clear	-	7	3	10
Unidentified glass	-	1	-	1
Wire nail	-	1	-	1
Cartridge case, .22 cal.	2	1	-	3
Mortar	4	8	8	20
Brick rubble	1	2	-	3
Plaster	6	-	-	6
Paint chip	-	3	-	3
Coal	-	-	1	1
Total	27	35	12	74

Table 30. Artifacts from Devils Island shovel probes.

Description	Shovel Probe								Total
	1/1	1/2	2/1	2/2	2/3	2/4	3/2	4/1	
Window glass, clear	2	-	-	-	1	1	-	127	131
Window glass, red	-	2	-	-	-	-	-	-	2
Bottle glass, clear	1	1	1	-	-	-	-	1	4
Bottle glass, solarized	-	-	2	-	-	-	-	-	2
Whiteware	-	1	-	-	-	-	-	-	1
Cut nail	3	-	-	-	-	-	-	-	3
Wire nail	-	-	-	-	-	-	2	1	3
Roofing nail	7	-	-	-	-	-	-	-	7
Asbestos tile	2	-	-	-	-	-	-	-	2
Mortar	-	-	-	-	-	-	-	1	1
Brick	-	-	-	2	-	-	-	-	2
Brick rubble	-	1	-	-	-	-	-	-	1
Coal	1	-	-	9	-	-	2	11	23
Slag	-	-	-	1	-	-	-	-	1
Bone	-	2	-	-	-	-	-	-	2
Rubber heel	-	-	-	-	-	-	-	1	1
Total	16	7	3	12	1	1	4	142	186

Table 31. Artifacts from Devils Island Test Unit 1.

Description	Level					Total
	1	2	3	4	5	
Drinking glass, clear	3	1	-	-	-	4
Window glass, red film	1	-	-	-	-	1
Molten glass, clear	1	1	-	-	-	2
Cut nail	3	-	-	-	-	3
Wire nail	7	2	1	6	1	17
Roofing nail	1	-	-	-	-	1
Finishing nail	6	-	-	-	-	6
Washer	1	-	-	-	-	1
Mortar	1	-	-	-	-	1
Bone	1	1	-	-	-	2
Coal	1	-	-	-	-	1
Slag	1	-	-	-	-	1
Burnt coal	1	-	-	-	-	1
Peach pit	2	-	-	-	-	2
2-hole plastic button	1	-	-	-	-	1
Plastic handle fragment	1	-	-	-	-	1
Brick rubble	-	-	1	-	-	1
Total	32	5	2	6	1	46

Table 32. Artifacts from Devils Island Test Unit 2.

Description	Level				Total
	1	2	3	4	
Window glass, clear	58	15	-	-	73
Window glass, privacy	67	6	-	-	73
Window glass, red film	-	-	2	-	2
Bottle glass, clear	-	-	13	2	15
Bottle glass, green	-	62	-	-	62
Drinking glass, clear	6	5	-	1	12
Bottle glass, amber	-	1	-	-	1
Bottle glass, cobalt	-	1	3	-	4
Bottle glass, solarized	-	-	1	-	1
Glass towel rod, green	-	-	-	1	1
Whiteware	-	6	9	-	15
Drain tile	2	2	2	1	7
Cut nail	1	-	5	-	6
Wire nail	8	32	38	23	101
Roofing nail	14	2	2	-	18
Finishing nail	1	5	1	-	7
Unidentified nail	-	5	1	-	6
Spike	-	-	-	1	1
Sheet iron	-	-	-	14	14
Scrap iron	-	1	-	-	1
Lead scrap	-	-	1	1	2
Aluminum scrap	-	-	1	-	1
Wire, cuprous	-	2	-	-	2
Wire, cuprous w/rubber insul.	-	1	-	-	1
Bale wire	-	2	-	-	2
Wood screw	-	-	2	-	2
Bucket rim	-	-	3	-	3
Whole brick	1	-	-	-	1
Brickbat	-	-	-	1	1
Brick rubble	1	5	3	-	9
Mortar	-	-	1	-	1
Mortar/brick	-	1	1	1	3
Slag	-	4	2	1	7
Coal	1	2	2	-	5
Burned coal	-	-	5	-	5
Shingle, tar	8	-	-	-	8
Duct tape	1	-	-	-	1
Wood, painted yellow	1	-	-	-	1
Wood	-	4	-	2	6
Paper clip, wing type	1	-	-	-	1
Bone	-	5	11	9	25
Rubber	-	1	-	-	1
Paint chip?	-	2	-	-	2
Foil	-	6	-	-	6
Plastic, red	-	2	-	-	2
Hacksaw blade	-	1	-	-	1
Can key	-	1	1	-	2
Can fragment	-	-	2	1	3
Can lid, sliding closure	-	2	-	3	5
Cog, brass	-	1	-	-	1

Table 32. Concluded.

Description	Level				Total
	1	2	3	4	
Spring, ferrous	-	-	4	-	4
Gas refrigerator reg, cu	-	1	-	-	1
Cartridge case, .22 cal.	2	3	-	-	5
Mop head element	-	3	-	-	3
Peach pit	-	-	2	1	3
Twisted iron	-	-	-	1	1
Shoe leather	-	-	-	1	1
Peanut shell	-	-	-	1	1
Plastic	-	-	-	1	1
Total	173	191	121	67	552

Table 33. Artifacts from Devils Island Test Unit 3.

Description	Level				Total
	1	2	3	4	
Window glass, blue-green	23	-	-	-	23
Pipestem, white clay	-	-	-	1	1
Drain tile, glazed	-	-	-	3	3
Drain tile, unglazed	-	2	3	4	9
Wire nail	8	4	2	14	28
Ring, brass	1	-	-	-	1
Cylindrical iron	1	-	-	-	1
Gas line coupling, cuprous	-	1	-	-	1
Braided wire, cuprous w/ insul.	1	-	-	-	1
Mortar	-	-	-	1	1
Jewelry chain, gold	1	-	-	-	1
Brick fragment	-	-	1	-	1
Mortar/brick	1	-	-	-	1
Fibrous material	1	-	-	-	1
Total	37	8	5	23	73

Table 34. Artifacts from Devils Island Test Unit 4.

Description	Level				Total
	1	2	3	4	
Bottle glass, clear panel	1	-	-	-	1
Window glass, clear	1	-	-	-	1
Cut nail	-	1	2	-	3
Wire nail	2	-	-	-	2
Roofing nail	3	-	-	-	3
Lead sheet	1	-	-	-	1
Scrap iron	-	-	-	3	3
Brick rubble	-	1	1	-	2
Brick, whole	-	-	-	1	1
Mortar	-	-	-	2	2
Coal	2	-	-	-	2
Slag	2	3	3	-	8
Wood	-	2	-	-	2
Charcoal	-	-	-	13	13
Shingle, tar	1	2	-	-	3
Total	13	9	6	19	47

Table 35. Artifacts from Devils Island Test Unit 5.

Description	Level		Total
	1	2	
Lamp chimney fragment	1	-	1
Bottle glass, clear	6	1	7
Bottle glass, green molded	1	-	1
Window glass, clear	5	-	5
Earthenware	1	-	1
Cut nail	9	2	11
Wire nail	21	1	22
Roofing nail	9	-	9
Scrap iron	1	-	1
Brick rubble	1	-	1
Slag	2	-	2
Asbestos tile	1	-	1
Total	58	4	62

Table 36. Artifacts from Devils Island Test Unit 6.

Description	Level				Total
	1	2	3	4	
Bottle glass, clear	1	-	-	-	1
Window glass, blue	5	-	-	-	5
Cut nail	15	1	4	2	22
Wire nail	14	3	2	-	19
Roofing nail	8	1	-	-	9
Finishing nail	1	-	-	-	1
Tar paper nail	2	-	-	-	2
Wood screw	6	-	2	-	8
Metal screw, flush	1	-	-	-	1
Washer	1	-	-	-	1
Scrap iron	-	-	11	-	11
Unidentified iron	-	1	-	-	1
Brick rubble	2	-	-	-	2
Brickbat	-	1	-	1	2
Brick, whole	-	-	1	-	1
Mortar	1	1	2	-	4
Wood	2	-	3	-	5
Wood screen frame	-	1	-	-	1
Bone	-	1	-	-	1
Coal	1	2	-	-	3
Slag	2	-	-	-	2
Burnt coal	-	1	1	-	2
Tar shingle	1	-	-	-	1
Shale	-	-	2	-	2
Sandstone	-	1	-	-	1
Asbestos tile	1	-	-	-	1
Leather	1	-	-	-	1
Peach pit	-	-	1	-	1
Total	65	14	29	3	111

Table 37. Artifacts from Devils Island Test Unit 7.

Description	Level				Total
	1	2	3	4	
Cut nail	18	4	1	-	23
Wire nail	8	3	1	3	15
Roofing nail	9	1	-	-	10
Lead sheet scrap	-	1	-	-	1
Scrap sheet metal	-	-	3	-	3
Copper sheet scrap	1	-	-	-	1
Bale wire	1	-	-	-	1
Cartridge case, .22 cal.	4	-	-	-	4
Brick rubble	-	1	-	-	1
Total	41	10	5	3	59

Table 38. Artifacts from Devils Island Test Unit 8.

Description	Level				Total
	1	2	3	4	
Bottle glass, clear	5	4	2	-	11
Bottle glass, solar	2	-	-	-	2
Window glass, clear	12	-	-	-	12
Milkglass	1	-	-	-	1
Whiteware	2	-	-	-	2
Cut nail	24	19	1	2	46
Wire nail	24	-	-	1	25
Roofing nail	50	-	-	-	50
Unidentified nail	-	1	-	-	1
Finishing nail	1	-	-	-	1
Tar paper nail w/disk	4	-	-	-	4
Screw eye	1	-	-	-	1
Metal, unidentified	11	-	-	-	11
Cog, cast iron	1	-	-	-	1
Cast iron	1	-	-	-	1
Lead scrap	1	-	-	-	1
Lead rivet	1	-	-	-	1
Brick	2	-	-	-	2
Brick rubble	-	1	-	1	2
Mortar	2	-	-	-	2
Wood	9	-	-	-	9
Bone	3	-	-	-	3
Coal	4	2	-	-	6
Slag	1	1	-	-	2
Tar shingle	2	-	-	-	2
Cartridge case, .22 cal.	3	-	-	-	3
4-hole button, milkglass	1	-	-	-	1
Hairpin, celluloid	-	1	-	-	1
Drinking straw, plastic	1	-	-	-	1
Chert flake	3	-	-	-	3
Total	172	29	3	4	208

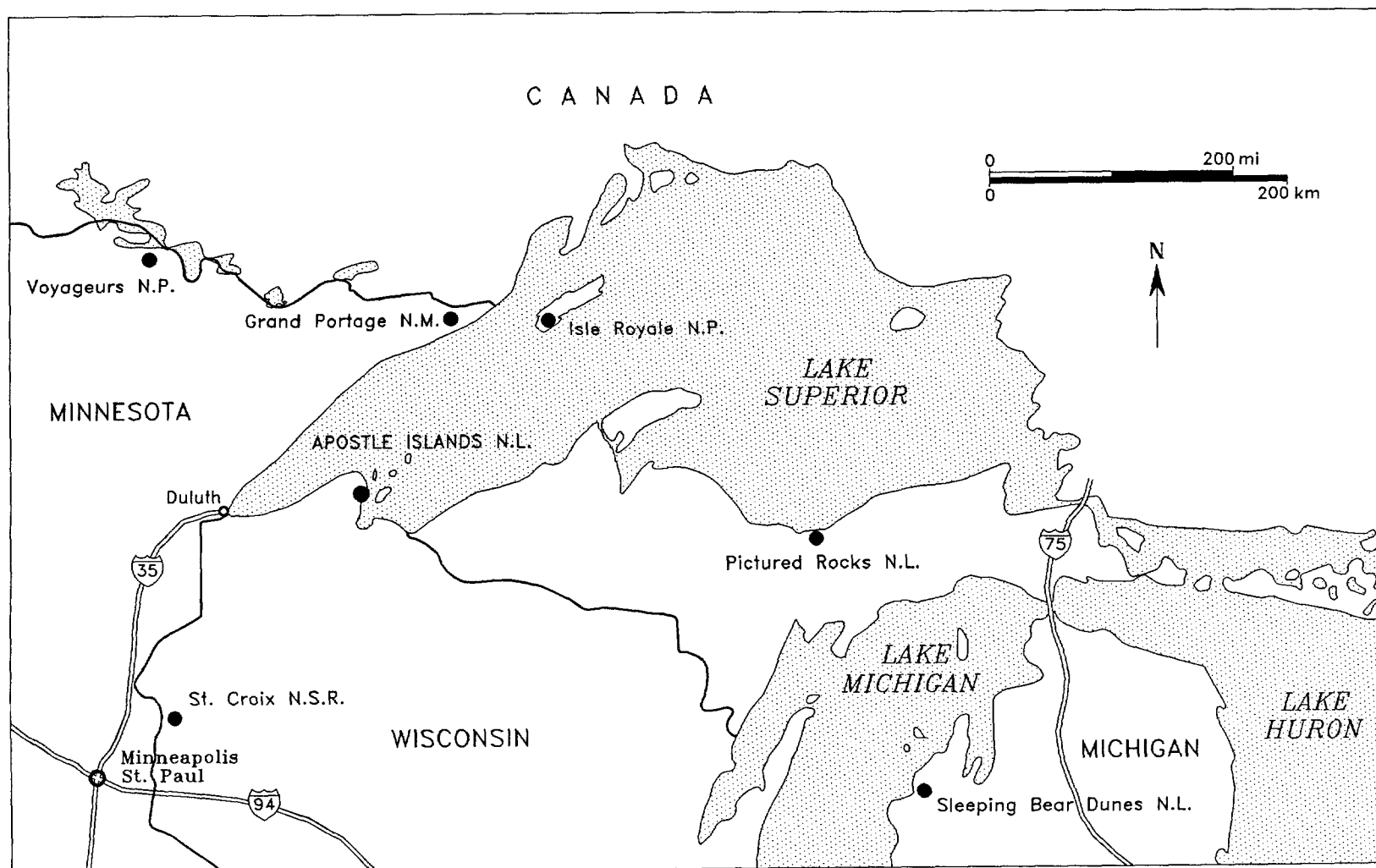


Figure 1. Location of Apostle Islands National Lakeshore.

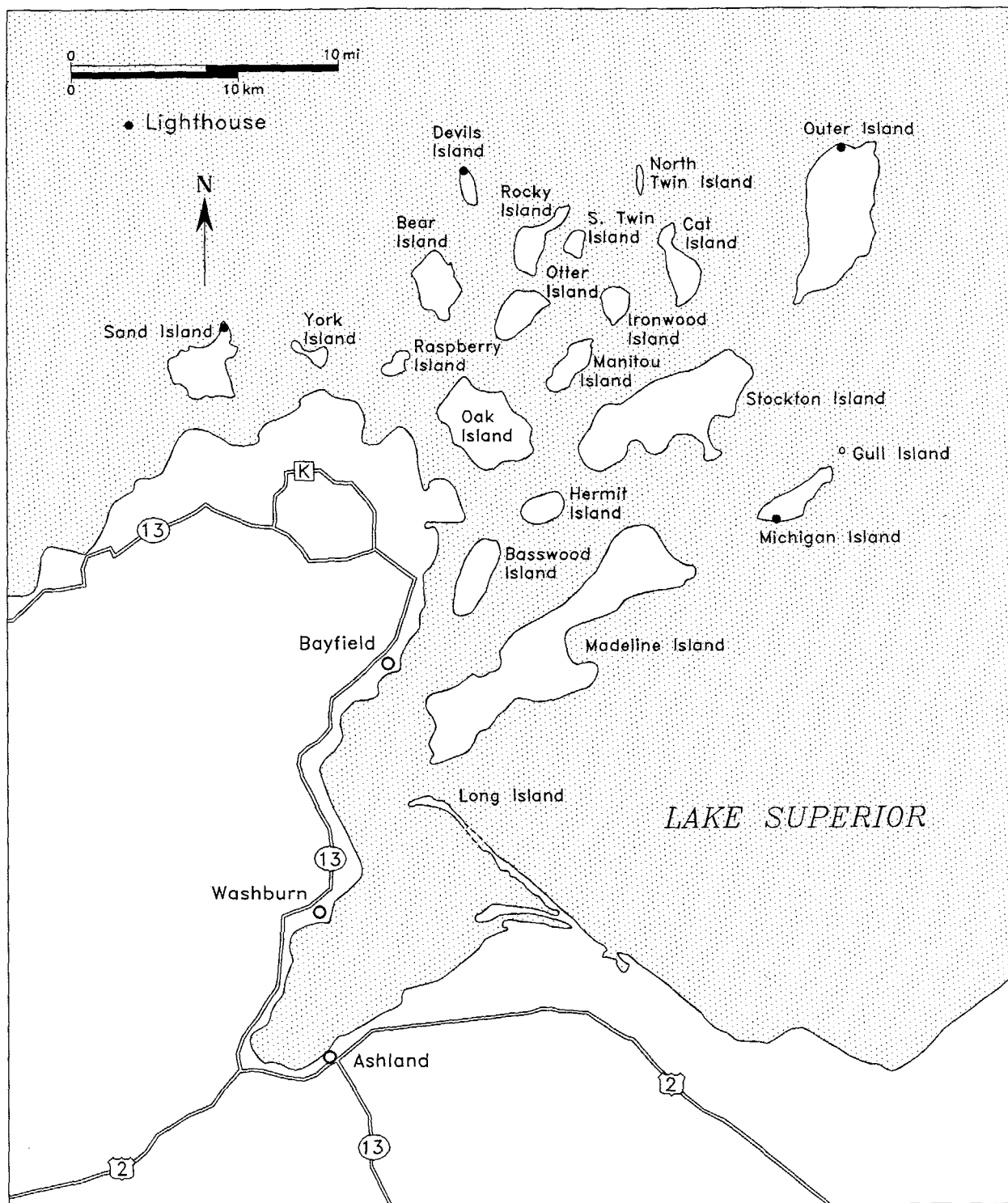


Figure 2. Project location map.

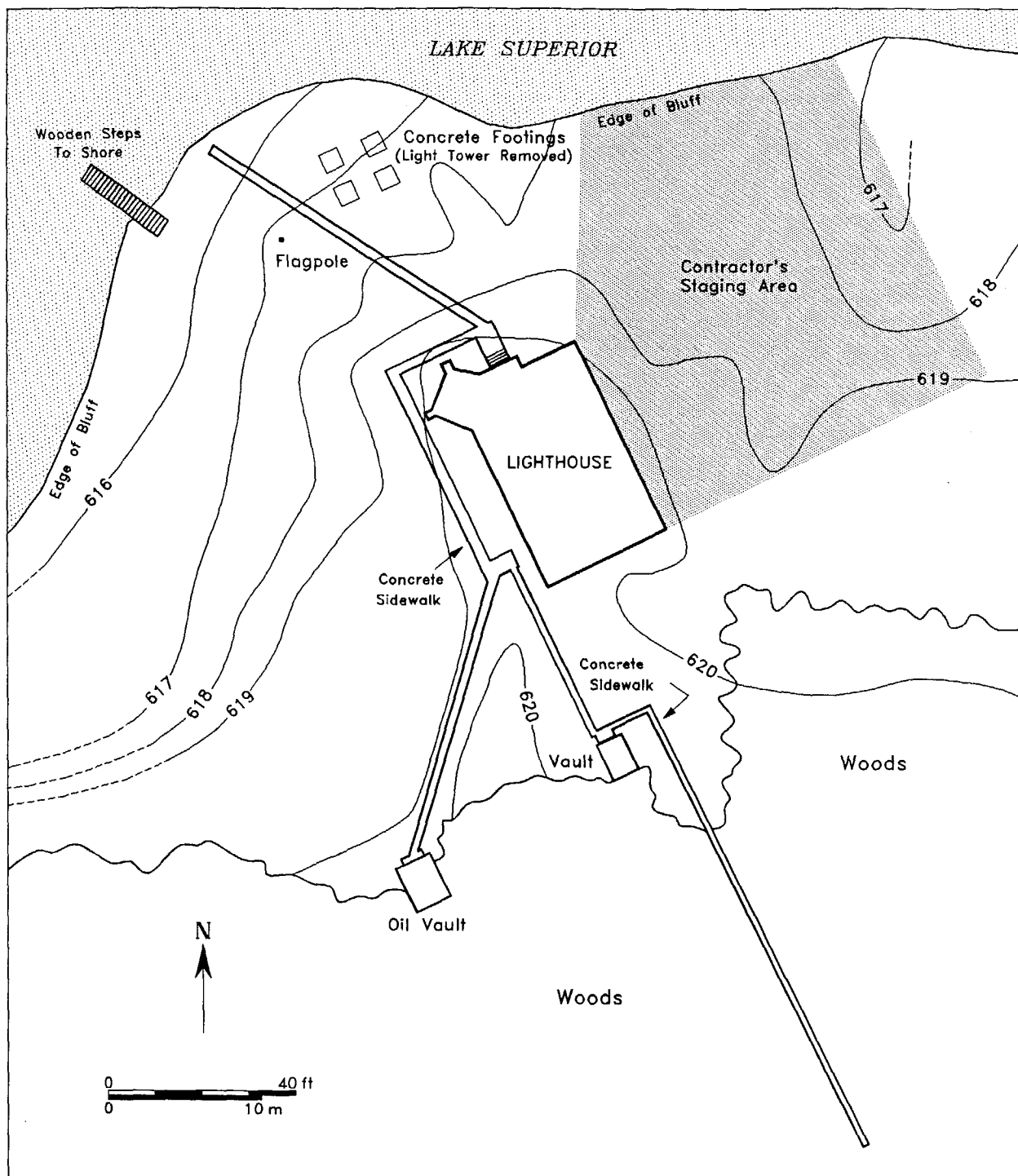


Figure 3. Sand Island project area.



Figure 4. Sand Island lighthouse, circa 1890.



Figure 5. Sand Island lighthouse, 1988.



Figure 6. Sand Island complex, circa 1890.



Figure 7. Sand Island complex, 1988.

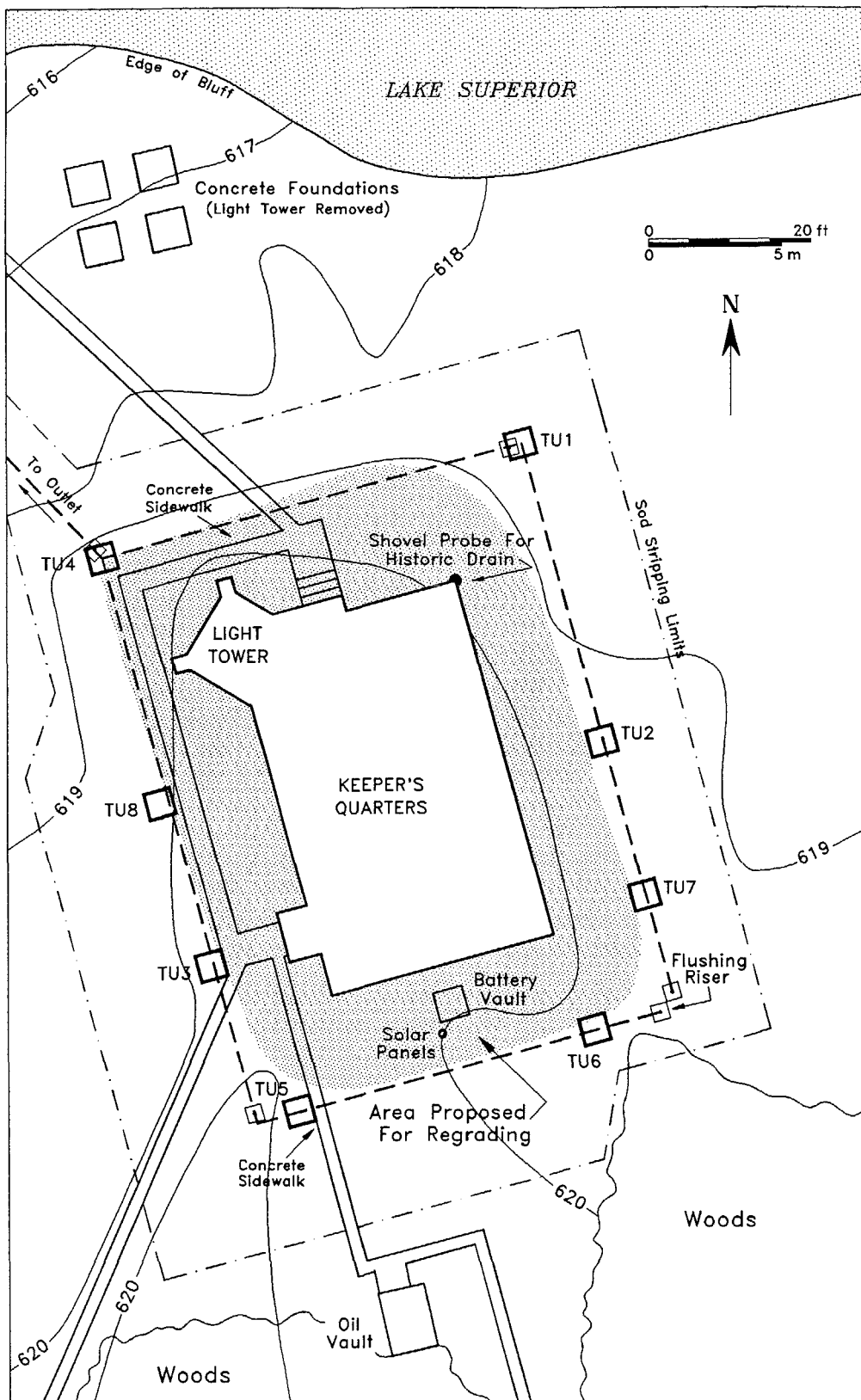


Figure 8. Sand Island test unit locations.

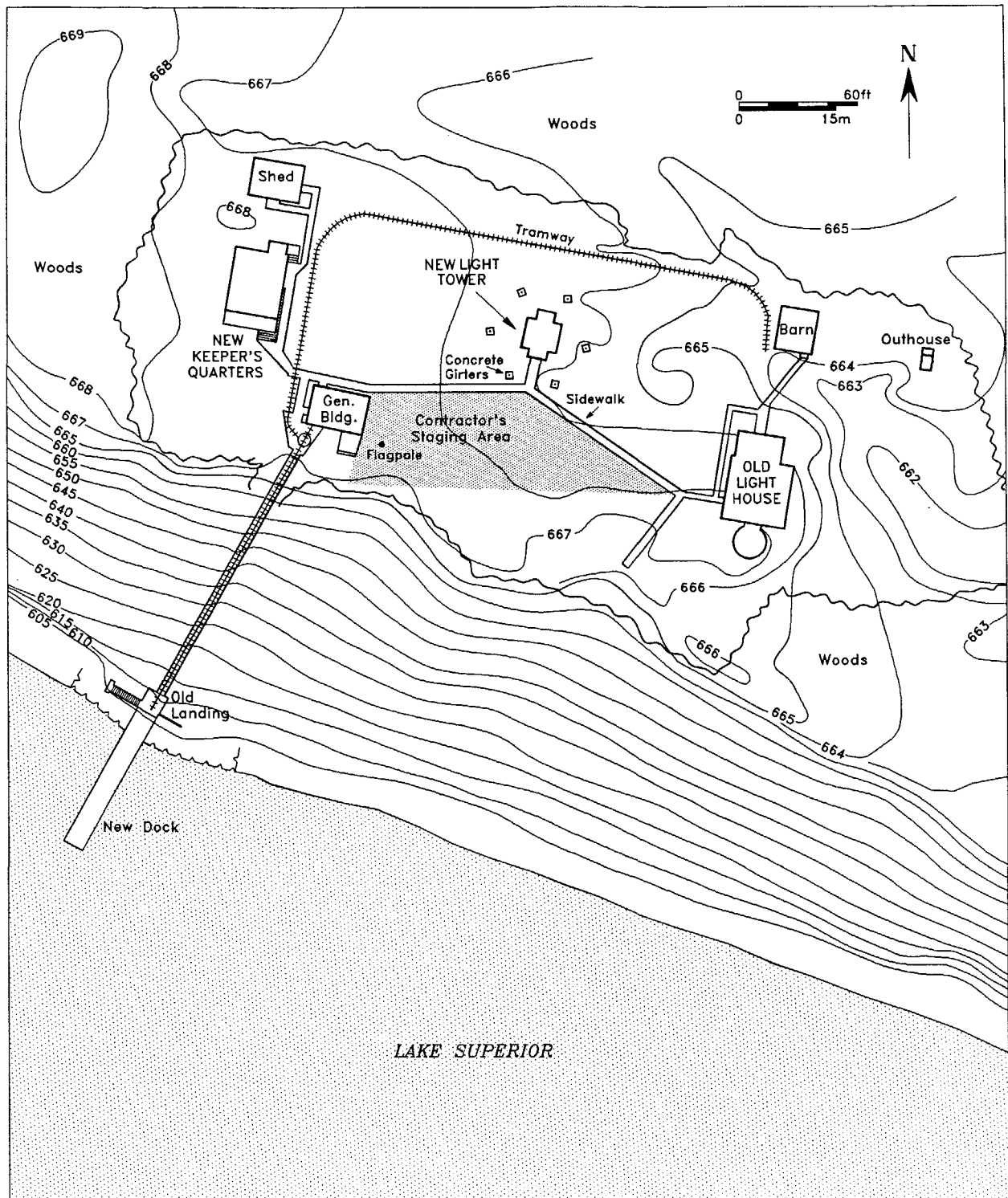


Figure 9. Michigan Island project area.

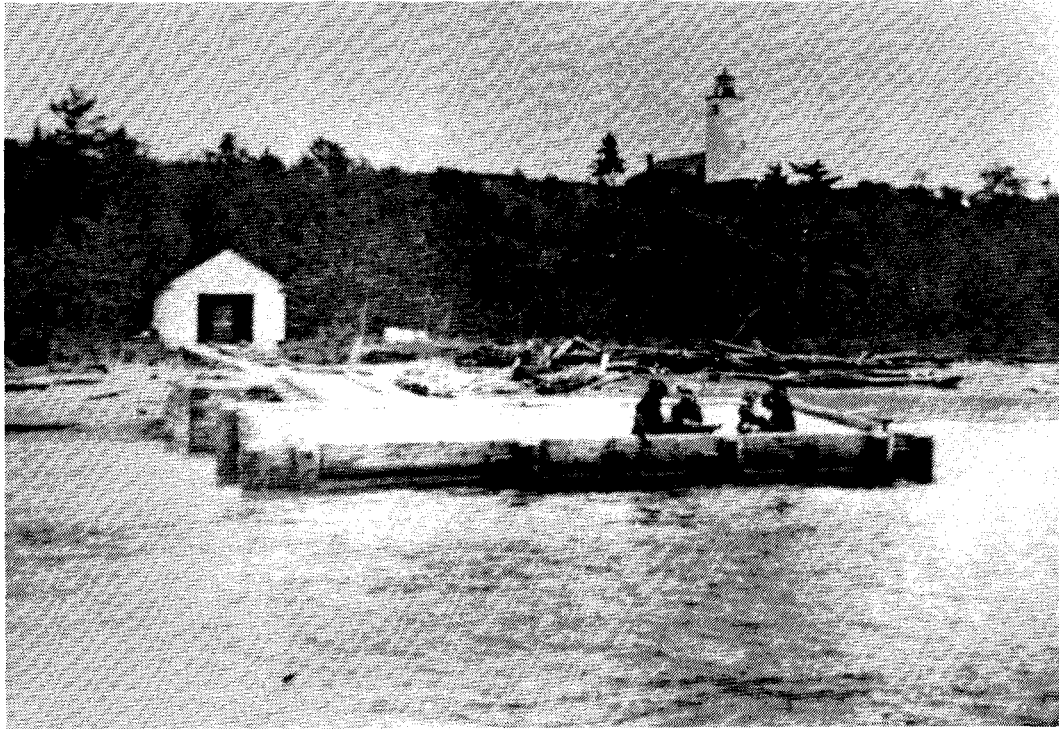


Figure 10. Old Michigan Island lighthouse from the lake, late nineteenth century.



Figure 11. Old Michigan Island lighthouse in use, late nineteenth century.



Figure 12. Old Michigan Island lighthouse, 1988.

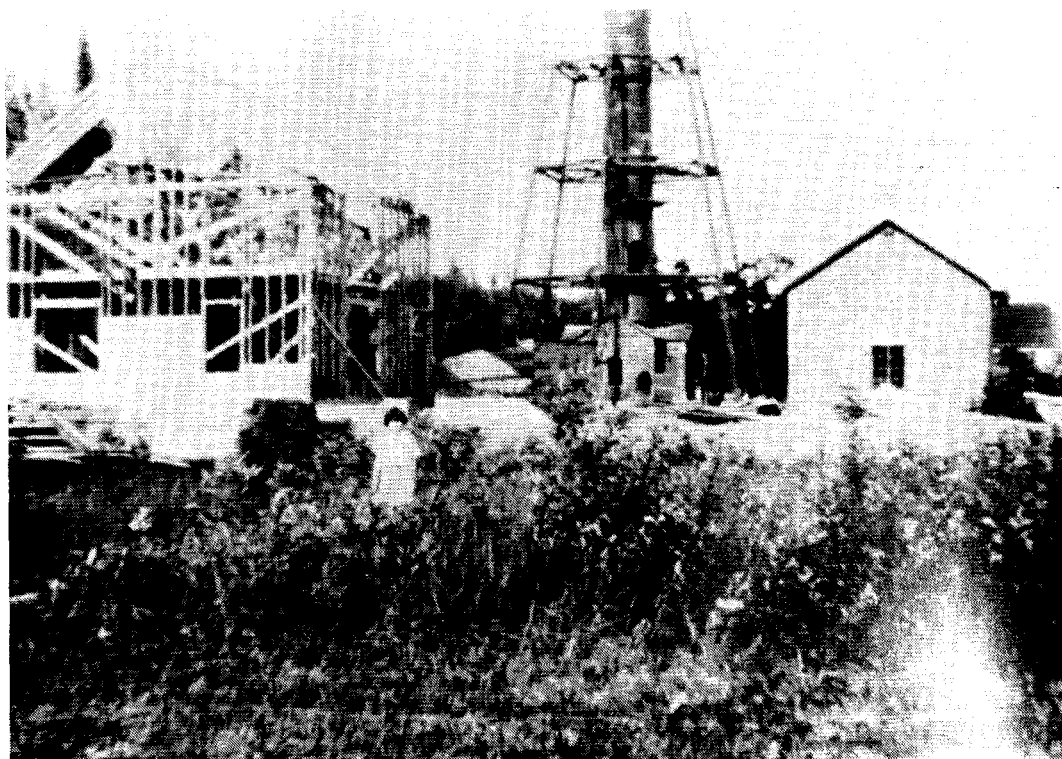


Figure 13. Construction of Michigan Island tower and new quarters, 1929.

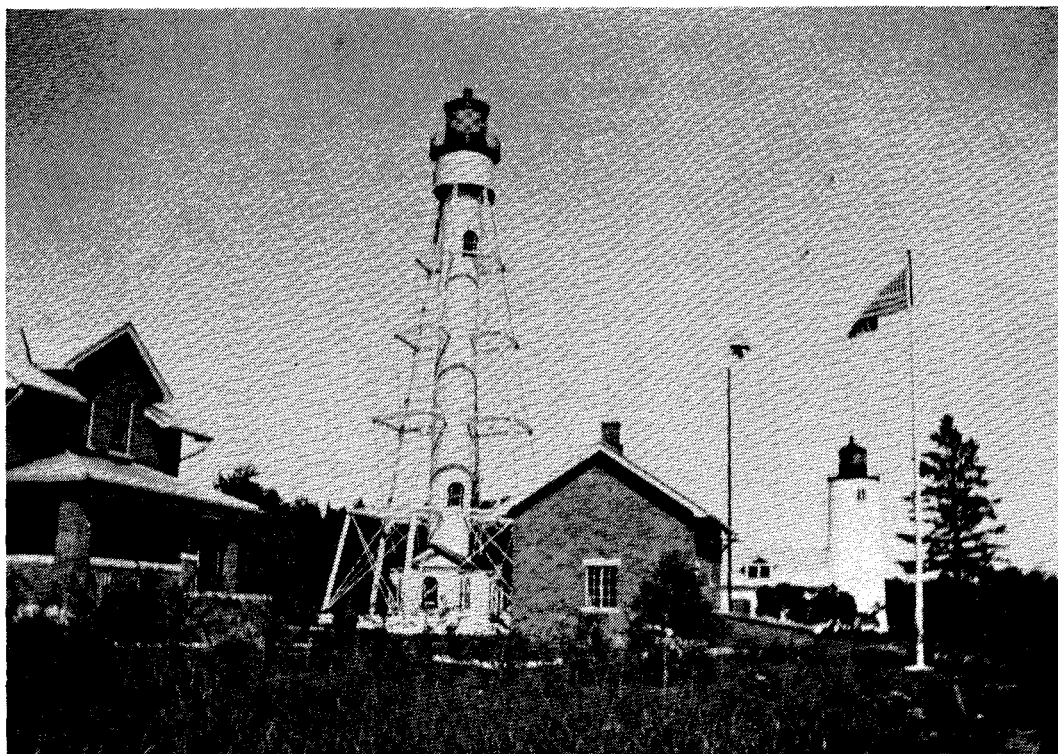


Figure 14. Michigan Island tower and quarters shortly after completion.

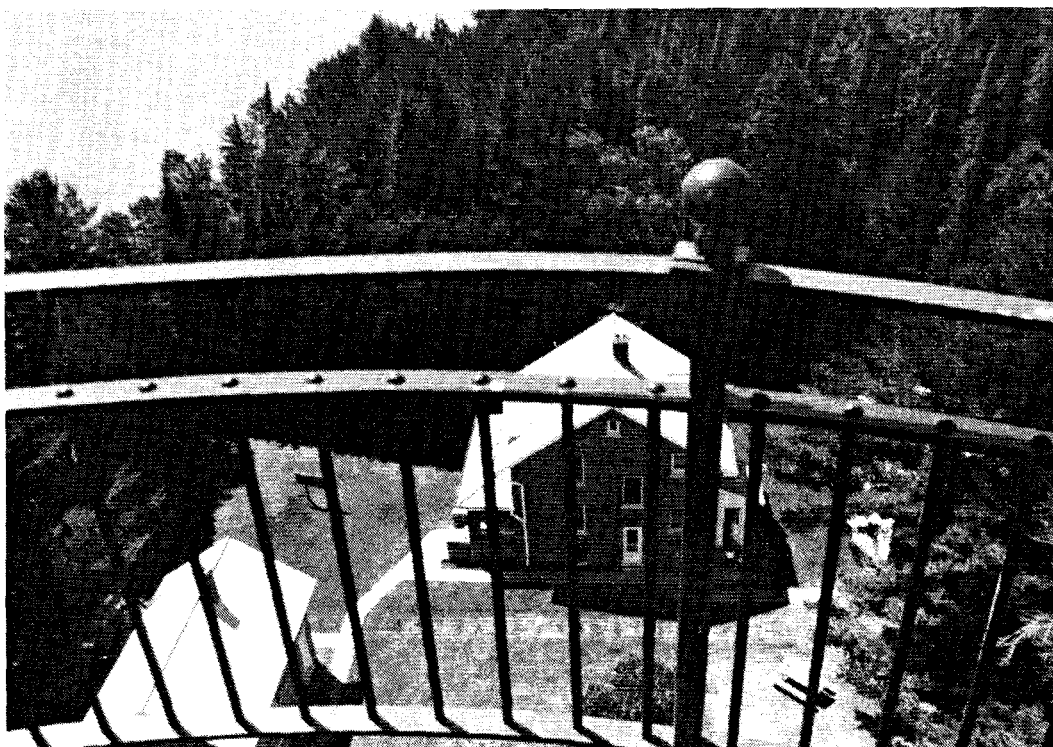


Figure 15. Michigan Island new keeper's quarters from skeletal steel tower, 1988.

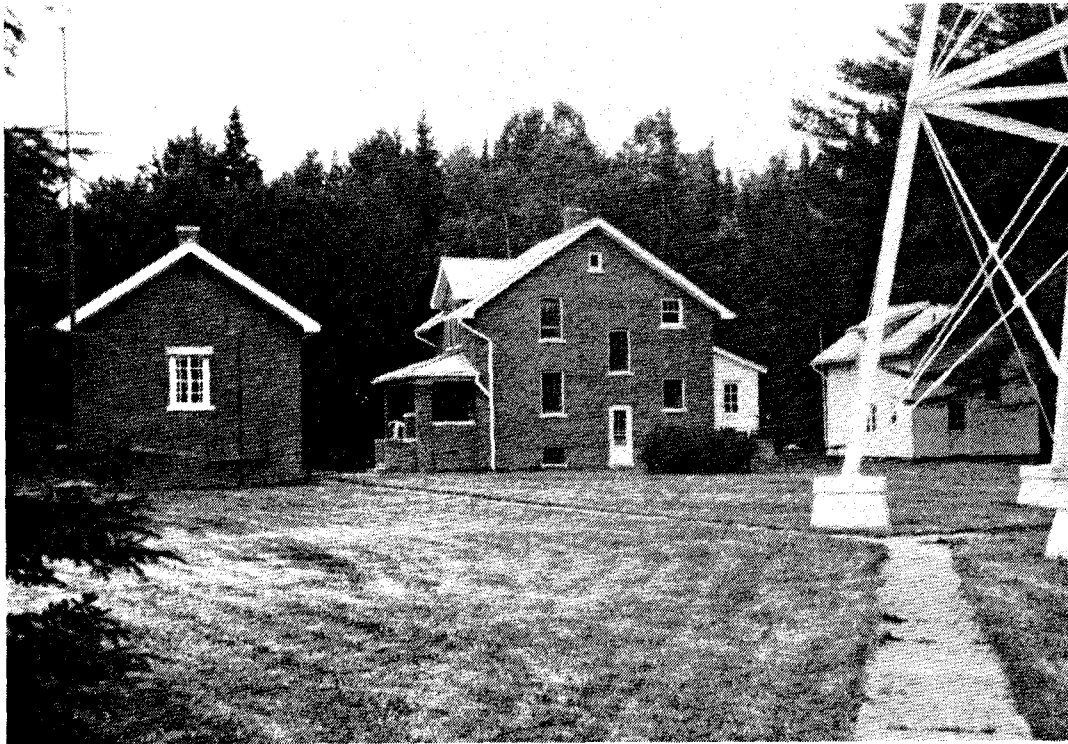


Figure 16. Michigan Island new keeper's quarters and dependencies, 1988.



Figure 17. Michigan Island old lighthouse shed addition and outbuildings, 1988.

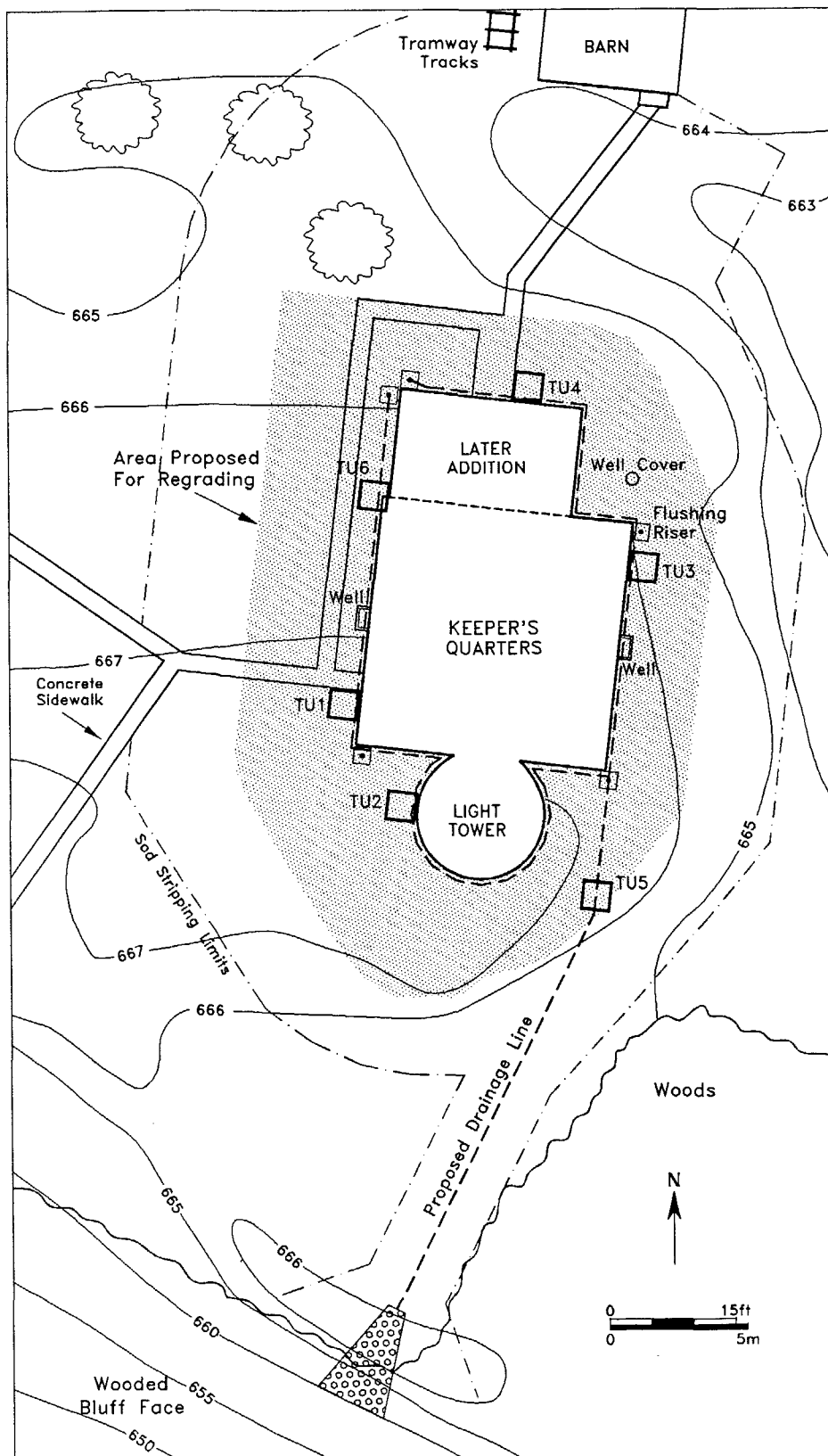
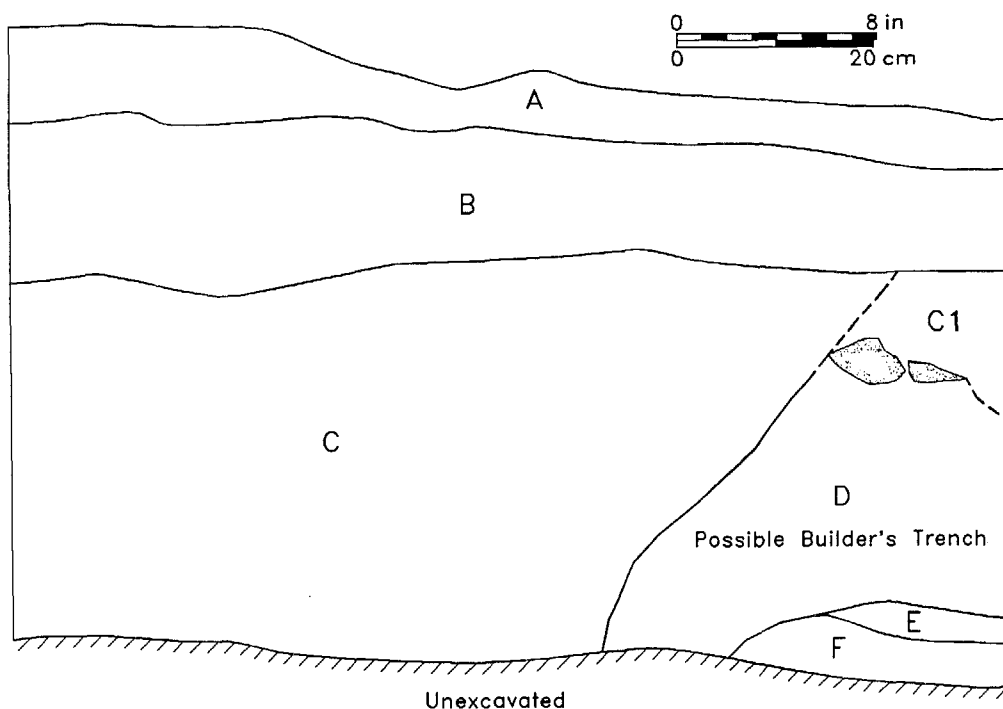


Figure 18. Michigan Island test unit locations, old lighthouse.



Sandstone Cobble

Zone A—Sod Layer, Brown Silty Loam

Zone B—Brown Silty Loam

Zone C—Red and Brown Silty Clay with Gray Silt Mottling

Zone C1—Mixture of C and D

Zone D—Red Clay with Gray Silt Mottling

Zone E—Brown Silty Clay Containing Blackened Wood

Zone F—Light Brown Silt

Figure 19. Michigan Island, Test Unit 1, south profile.

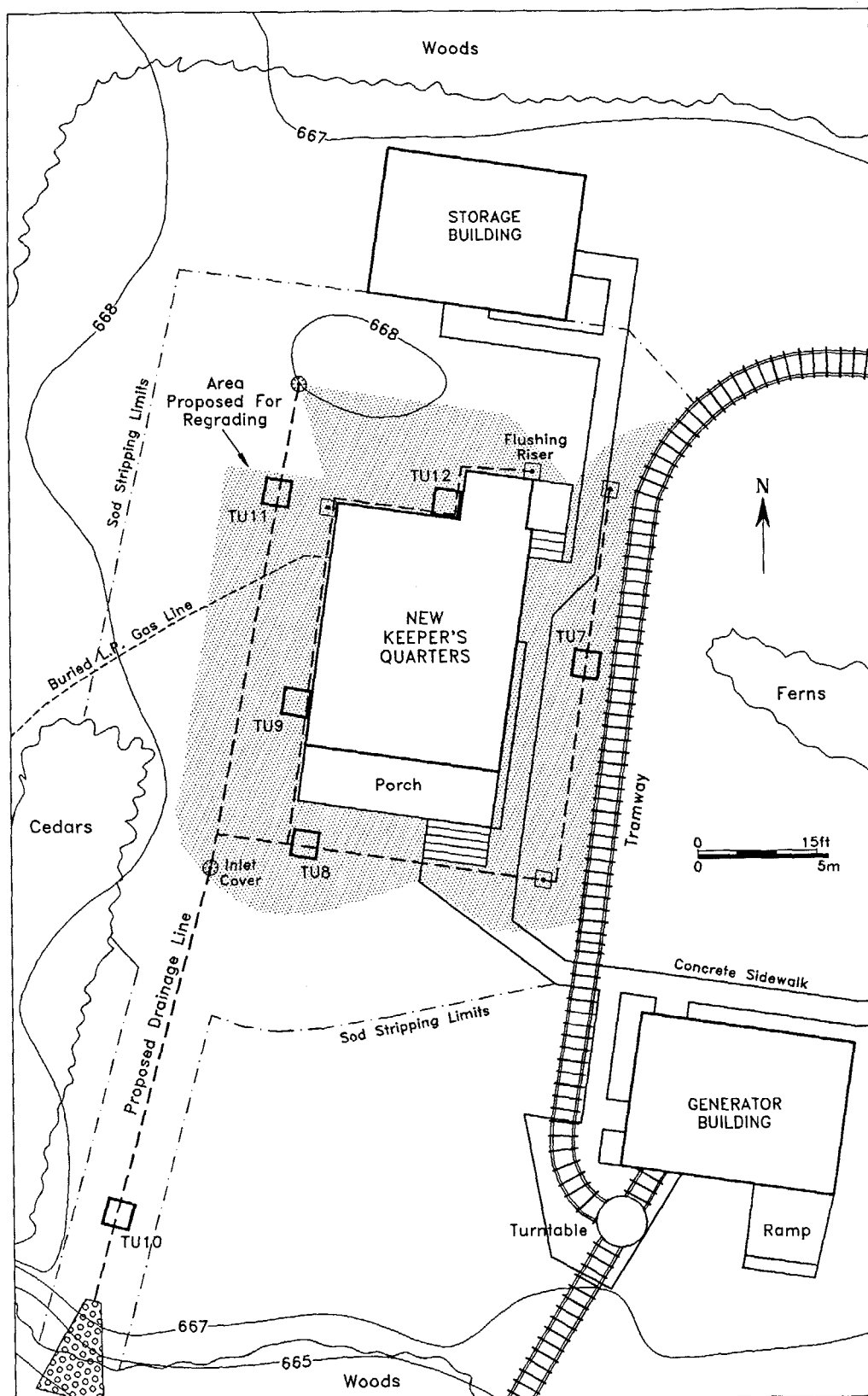


Figure 20. Michigan Island test unit locations, new keeper's quarters.

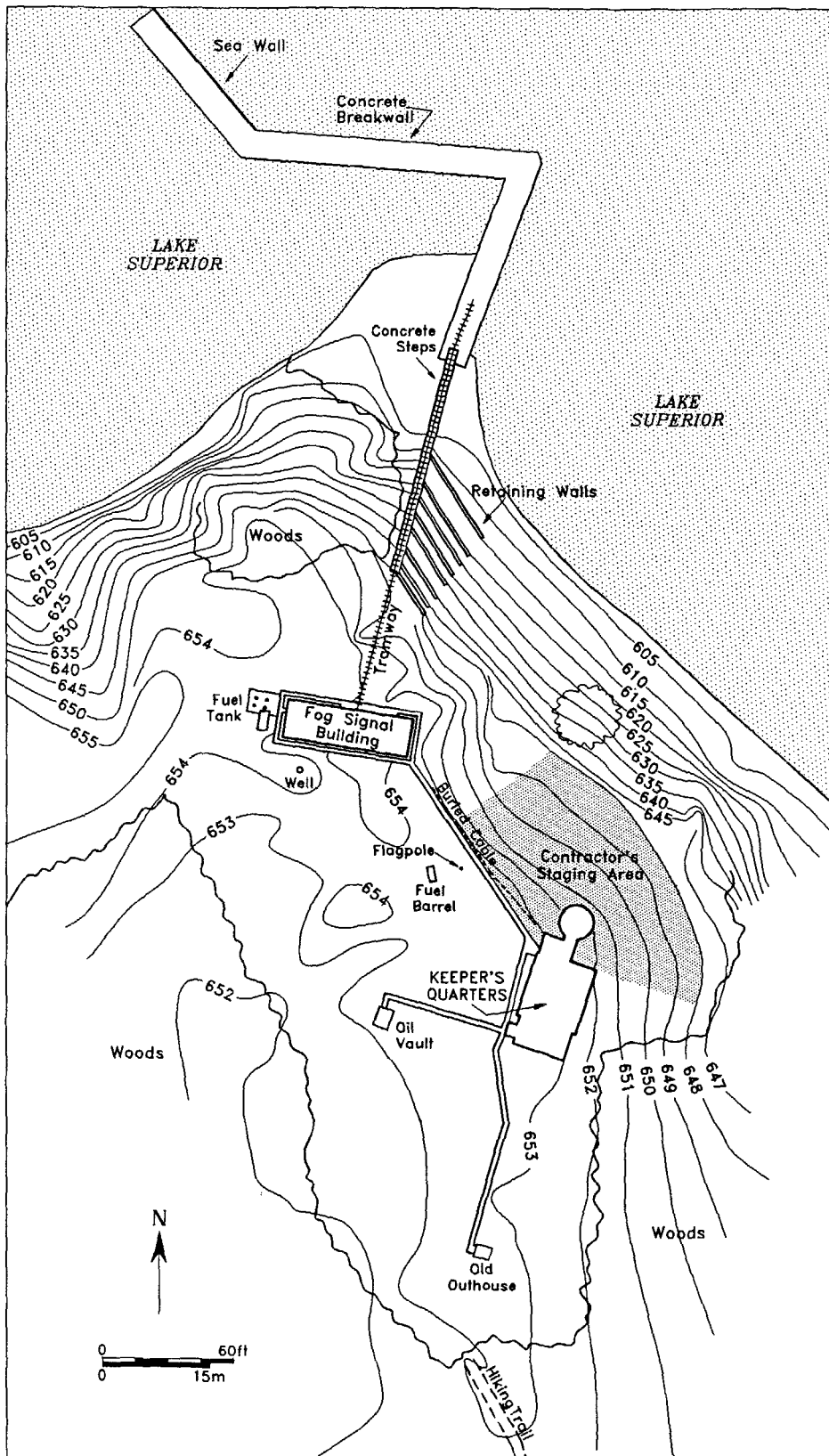


Figure 21. Outer Island project area.



Figure 22. Outer Island lighthouse, circa 1890.

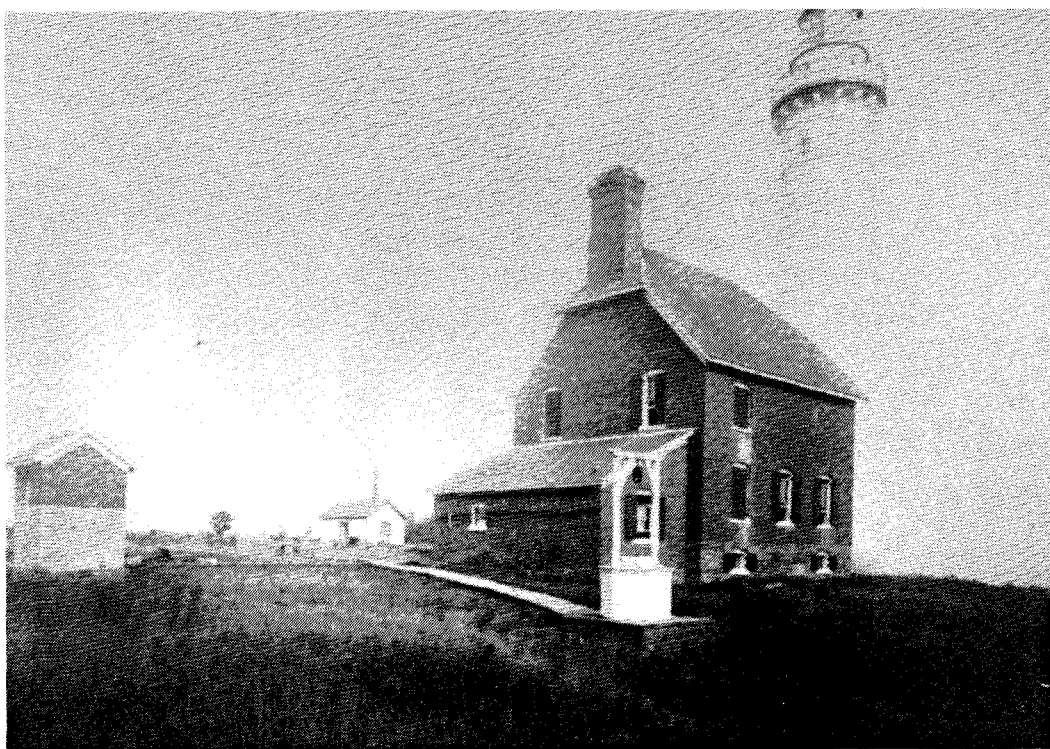


Figure 23. Outer Island lighthouse, circa 1890.



Figure 24. Outer Island lighthouse, 1988.



Figure 25. Outer Island light station complex, 1988.



Figure 26. Fog signal foundation remnant, Outer Island.



Figure 27. Well ruin in eroding bluff face, Outer Island.

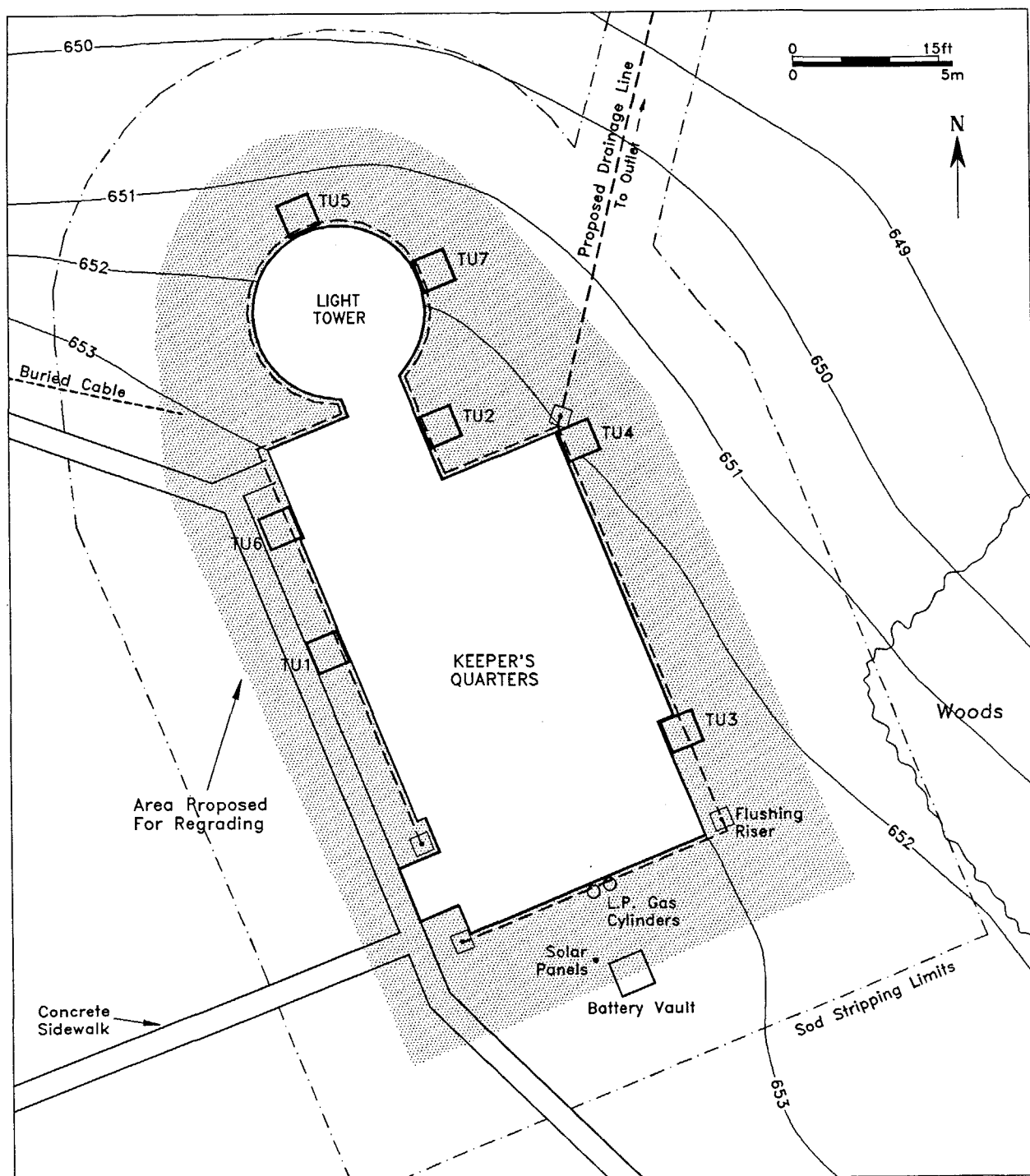


Figure 28. Outer Island test unit locations.

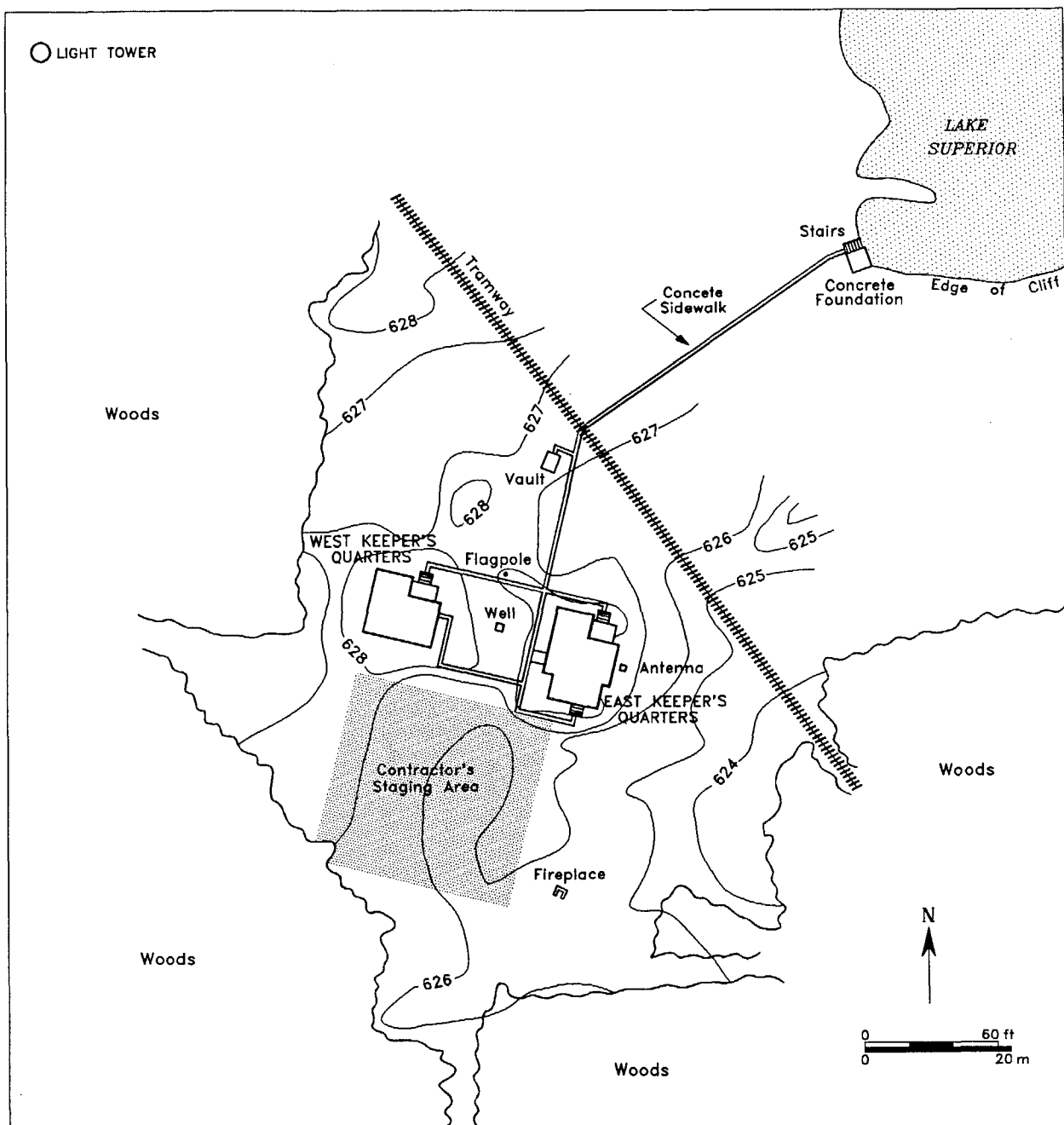


Figure 29. Devils Island project area.



Figure 30. Devils Island east keeper's quarters and original tower shortly after construction.

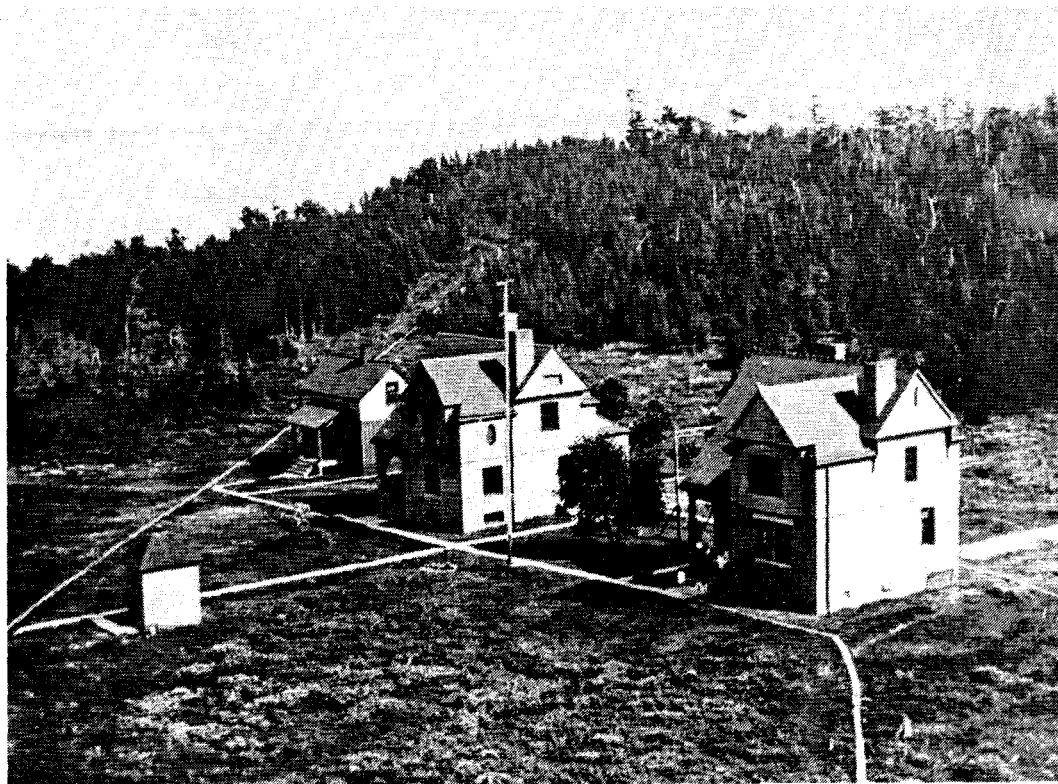


Figure 31. Devils Island dwelling complex, circa 1900.

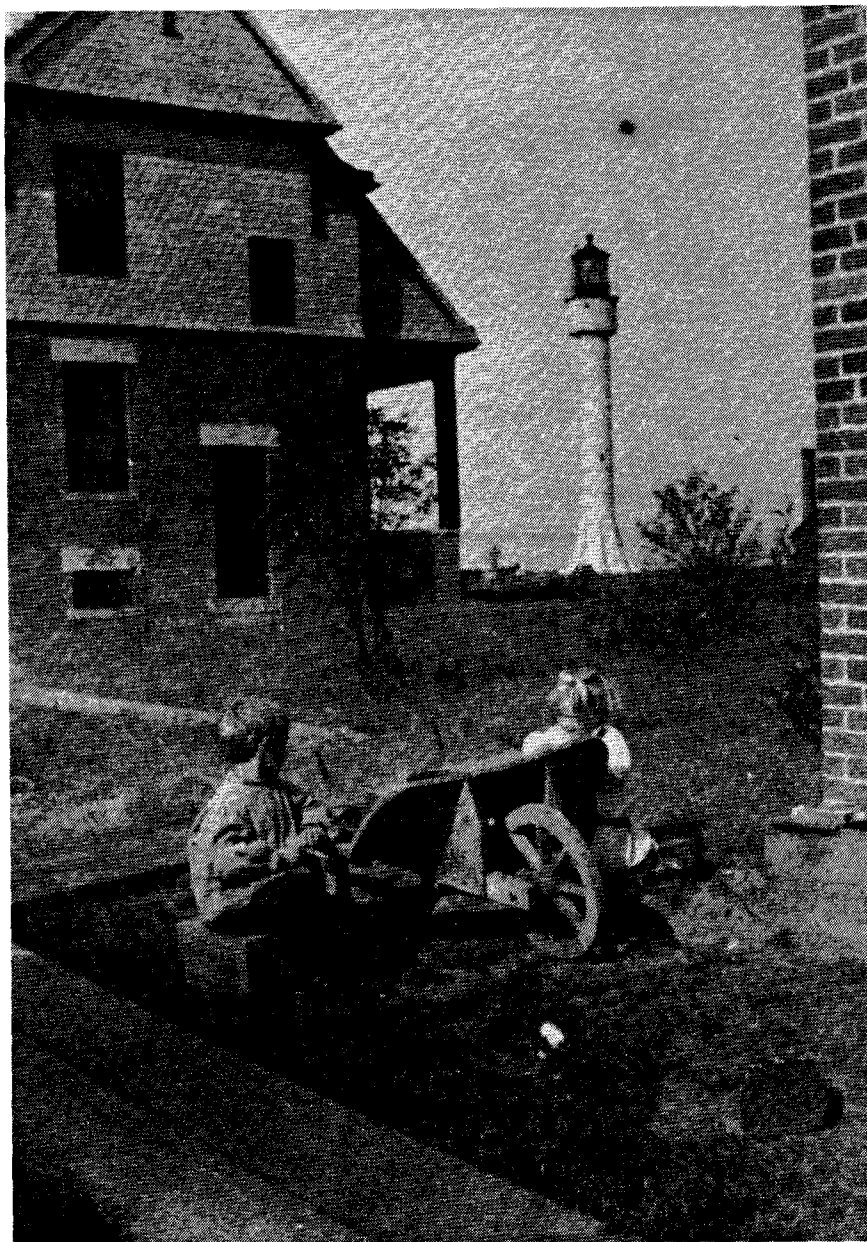


Figure 32. Devils Island replacement tower from quarters, circa 1900.

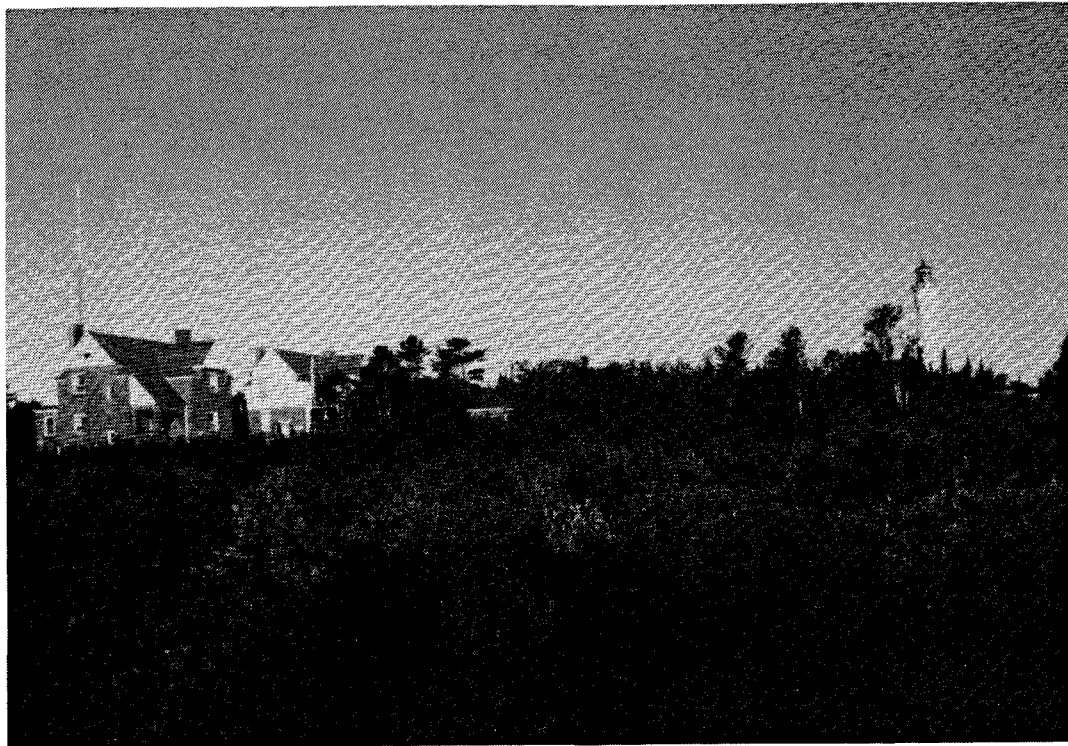


Figure 33. Devils Island light station, 1988.



Figure 34. Devils Island dwelling complex, 1988.

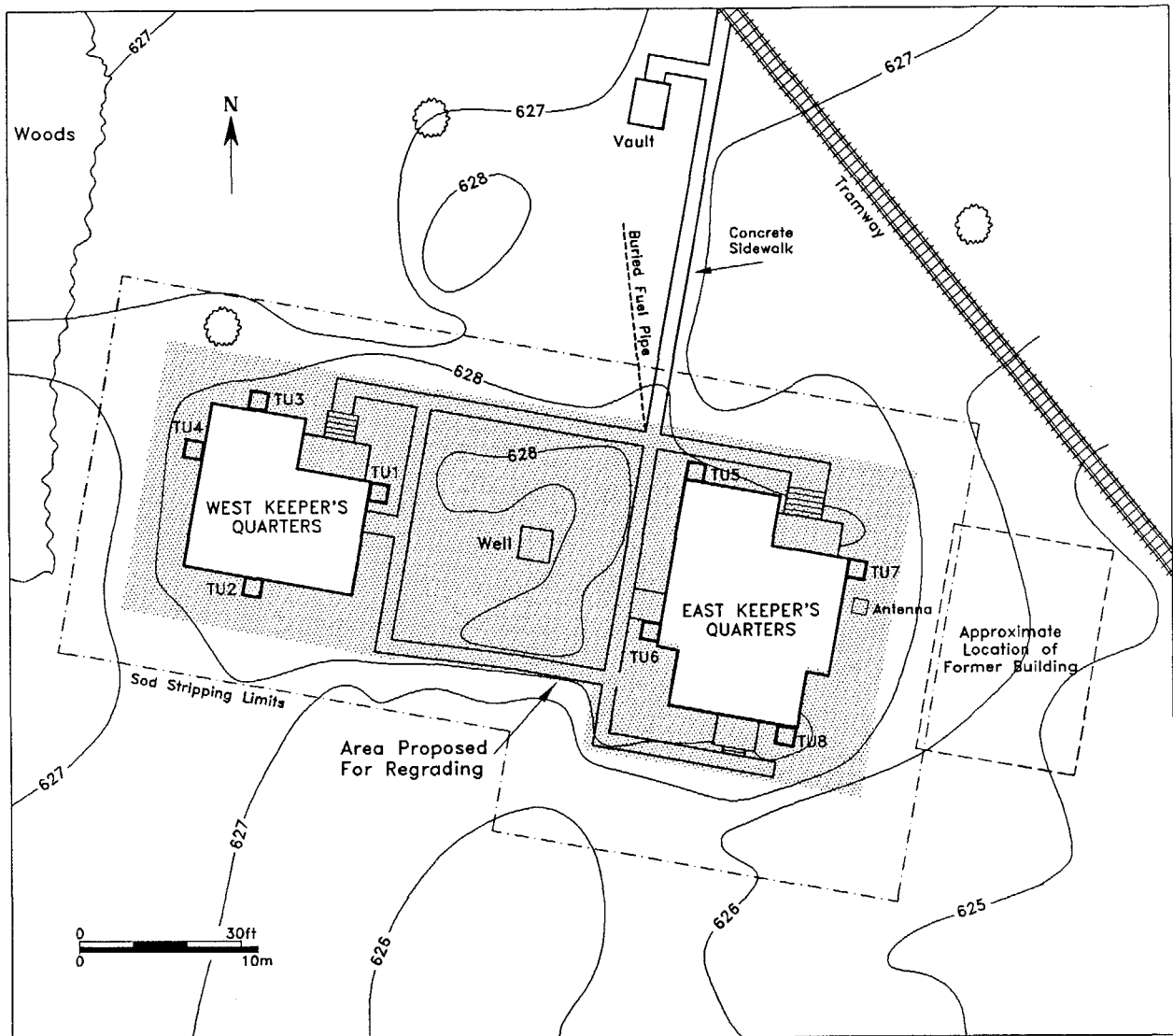
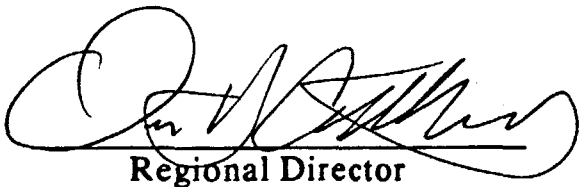


Figure 35. Devils Island test unit locations.

REPORT CERTIFICATION

I certify that "The Archeological Investigation Of Four Lighthouse Complexes At The Western End Of Lake Superior: The 1988 Testing Program Within Apostle Islands National Lakeshore" by Vergil E. Noble

has been reviewed against the criteria contained in 43 CFR Part 7(a)(1) and upon recommendation of the Regional Archeologist has been classified as available.



Regional Director

2/4/93

Date

Classification Key Words:

"Available"--Making the report available to the public meets the criteria of 43 CFR 7.18(a)(1).

"Available (deletions)"--Making the report available with selected information on site locations and/or site characteristics deleted meets the criteria of 43 CFR 7.18 (a)(1). A list of pages, maps, paragraphs, etc. that must be deleted for each report in this category is attached.

"Not Available"--Making the report available does not meet the criteria of 43 CFR (a)(1).

