DEPARTMENT OF THE ARMY
DETROIT DISTRICT, CORPS OF ENGINEERS
BOX 1027
DETROIT, MICHIGAN 48231-1027

JAN 29 2010

IN REPLY REFER TO:

Planning Office

PUBLIC NOTICE

1. The U.S. Army Corps of Engineers, Detroit District (USACE), proposes to reconstruct the breakwater that once existed at Grand Marais. The original breakwater, constructed in the late 1800s, had deteriorated by the 1950s until only remnants remained. Loss of the breakwater left this designated Harbor of Refuge unprotected from storm waves, resulting in unsafe boating conditions. Additionally, sand has been filling in the harbor basin, significantly reducing basin depths. The reconstructed breakwater would restore the harbor of refuge function by blocking storm waves and would prevent further sand deposition in the harbor basin.

2. Breakwater reconstruction alternatives considered include 1) No Federal Action, 2) Original Breakwater Alignment, 3) Rotate Alignment 15 Degrees Landward, and 4) Rotate Alignment 55 Degrees Landward. All three of the breakwater reconstruction alternatives would attach to the inner end of the east entry pier and would extend in an east or southeasterly direction. The proposed action is Alternative 4, Rotate Alignment 55 Degrees Landward, which is the lowest cost of the three action alternatives because of its southeasterly orientation, which results in a shorter breakwater located in shallower water.

3. This Public Notice and the attached Environmental Assessment (EA)—*Pile Breakwater Reconstruction, Grand Marais Harbor, Alger County, Michigan*— are being issued for the purpose of providing information to various Government agencies and the general public and to solicit their comments and views relative to the proposed activity. The EA, which contains more detailed information about the proposed action and its potential impacts, is incorporated by reference into this Public Notice.

4. The EA includes a Section 404(b)(1) Evaluation, pursuant to the Clean Water Act, for fill placement into the waters of the United States is included as an attachment to the EA. The Section 404(b)(1) Evaluation addresses construction of the breakwater and associated work, including placement of excavated sand in the near shore area along the State-designated High Risk Erosion Area (HERA) to the east of Grand Marais. Any person who has an interest that may be affected by the proposed in-water placement of fill material may request a public hearing. The request must be submitted in writing within the comment period of this notice (as described below) and must clearly set forth the interest that may be affected and the manner in which the interest may be affected by this activity.

5. Environmental review of the proposed breakwater reconstruction indicates it would not result in significant adverse environmental effects. Nor would it be expected to result in any significant cumulative or long-term adverse effects. Adverse effects are minor, including short-term noise and air emissions from equipment operation; temporary turbidity from construction operations; temporary displacement of fish; destruction of any bottom-dwelling organisms in the immediate work area; and modification of shoreline habitat and associated effects on shorebirds, including the Federally listed piping plover and piping plover critical habitat. Adverse effects on piping plover and piping plover critical habitat are mitigated through habitat created along the new breakwater, and by special mitigative measures. The project would be beneficial in preventing further sand filling of the harbor basin and by providing shelter from storm waves for safe use of the harbor. A rock breakwater would provide aquatic habitat in place of the existing shifting sand substrate. Fish would return upon completion of construction and the breakwater would be colonized by aquatic organisms and would provide habitat for fish and other wildlife.

6. Much of the beach area in Grand Marais is Federally designated critical habitat for piping plover (Federally and State-listed as endangered); therefore, in accordance with the Federal Endangered Species Act a Biological Assessment (BA) of project effects on piping plover and piping plover critical habitat was prepared. The BA concluded that changes in shoreline dynamics attributable to the proposed breakwater project are likely to adversely affect piping plover and piping plover critical habitat, by accelerating the loss of habitat in West Bay (Carpenter Creek area) versus the no action alternative; however, over time the project is expected to result in as much, if not more, available nesting habitat than would be available without the project. In response, the U.S. Fish and Wildlife Service, prepared a Biological Opinion (BO), which includes some data interpretations and conclusions that differ from that of the BA. The BO concluded in a statement that the proposed breakwater reconstruction project would not jeopardize the Great Lakes population of piping plover and estimated an incidental take of 66 birds over a projected 30-year period. The BO provides mitigative measures required as a part of the incidental take.

7. The project is expected to have no adverse effects on the coastal zone, and would be "consistent to the maximum extent practicable" with the Coastal Zone Management Act, and the Michigan Coastal Program. A Section 401 (CWA) water quality certification, or waiver thereof, would be obtained from the state prior to the signing of a Finding of No Significant Impact (FONSI), if a FONSI is determined to be the appropriate document after completion of agency/public review of this EA.

8. Copies of this Public Notice and EA are being sent to the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, the State of Michigan and other Federal, state, and local agencies, interested groups, and individuals, including Grand Marais residents and property owners. Any comments on this proposed breakwater reconstruction project, Grand Marais, Michigan, should be made within thirty (30) days from the date of this notice; otherwise it will be assumed you have no comment. Please direct your comments to U.S. Army Engineer District, Detroit; ATTN: CELRE-PL-E (Les E. Weigum); P.O. Box 1027; Detroit, MI 48231-1027.

9. Following the comment period and a review of the comments received, the District Engineer will make a final decision regarding the necessity of preparing an Environmental Impact Statement (EIS) for the proposed breakwater reconstruction project, Grand Marais, Michigan. Based on the conclusions of this EA, it appears that preparation of an EIS will not be required.

Jim E. Galloway
Chief, Planning Office

Enclosure

ENVIRONMENTAL ASSESSMENT

Pile Breakwater Reconstruction
Grand Marais Harbor
Alger County, Michigan

January 2010

U.S. Army Engineer District, Detroit
Corps of Engineers, CELRE-PL-E
P.O. Box 1027
Detroit, Michigan 48231-1027
313-226-6752

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ENVIRONMENTAL ASSESSMENT

Pile Breakwater Reconstruction
Grand Marais Harbor
Alger County, Michigan

1.0 INTRODUCTION

1.1 The U.S. Army Corps of Engineers, Detroit District (USACE), proposes to construct a breakwater to replace the breakwater that once existed at Grand Marais. Grand Marais Harbor is a designated Harbor of Refuge on the south shore of Lake Superior in the eastern upper peninsula of Michigan (Figure 1). It is about 75 miles west of Sault Ste. Marie, Michigan, and about 1 mile east of the Pictured Rocks National Lakeshore. The nearest harbor to the west is Munising Harbor, which is about 55 miles by boat. The nearest harbor to the east is Little Lake Harbor, which is about 30 miles by boat.

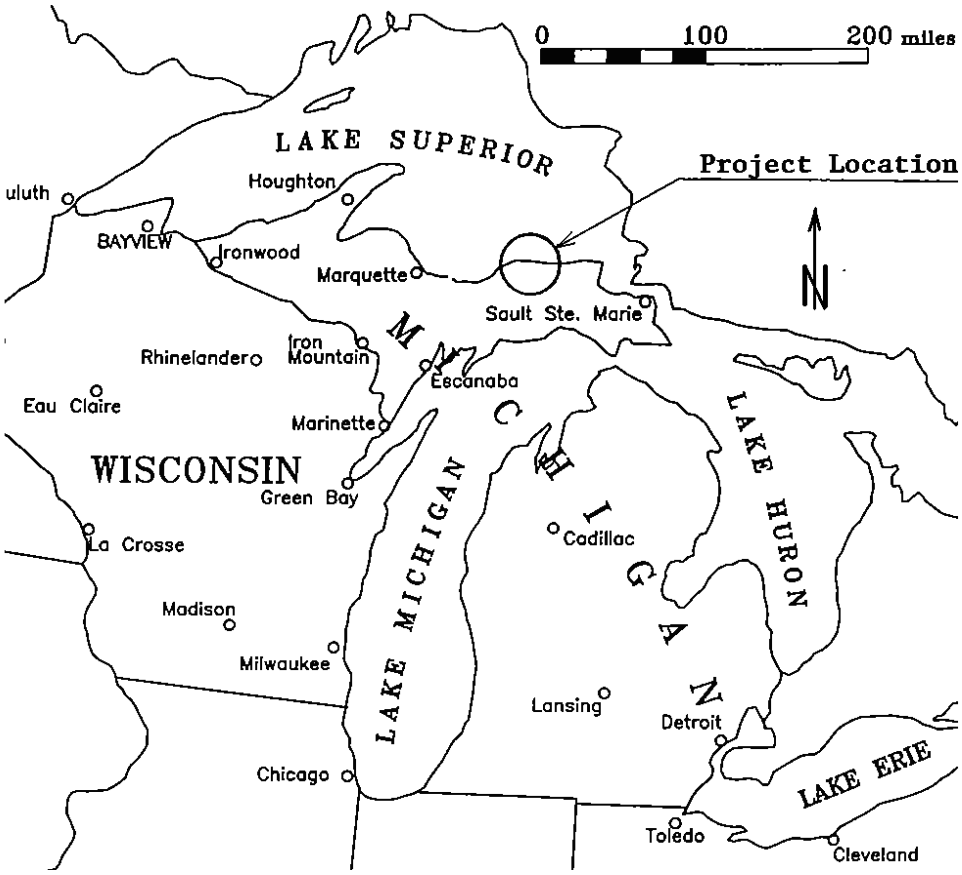


Figure 1. Grand Marais Harbor Location.

1.2 The function of a harbor of refuge for light-draft vessels is to provide shelter to vessels that are caught in unexpected storms and forced to seek refuge for the preservation of the vessel and the safety of crew and passengers. The greater part of the lake has a depth of 240' or more. Compared with the other Great Lakes, it is more irregular, has deeper and colder water, more fog, more ice and a large portion of rocky shores. Severe storms and squalls which may be encountered at any time, and the absence of adequately protected harbors of refuge in certain areas render navigation by small craft very dangerous during a large portion of the navigation season. As noted above, Grand Marais is the only harbor in an 85 mile stretch of shoreline between Munising Harbor to the west and Little Lake Harbor to the east.

1.3 Grand Marais Harbor is used primarily by recreational crafts of varying drafts, though commercial and tribal fishing vessels likely use the harbor. The harbor is intended to serve as a refuge from storms, but that function has been severely compromised by the lack of a breakwater, resulting in sand filling in the harbor basin and exposure of the harbor basin to storm waves. The original breakwater was constructed in the late 1800s but by the 1950s had deteriorated to the point that only remnants remain, leaving the harbor exposed to the lake. Breakwater reconstruction is needed to protect the harbor basin from storms and infilling with sand.

1.4 Direct benefits derived from harbors of refuge are increased safety to citizens and their property, including commercial fishermen, the development of the recreational boating industry and stimulation of the resort business. The intangible benefits include those resulting from the increased availability of recreational opportunities for the general public.

1.5 The Federal harbor project at Grand Marais is comprised of two jetties and an entrance channel at the tip of Coast Guard Point (Figures 2 and 3). The harbor entrance channel was maintained to depths of 17 feet below low water datum (-17 feet LWD) in the outer harbor, and -15 feet LWD in the inner harbor, but actual depths have been reduced from shoaling and a lack of funding for harbor maintenance. The original breakwater extended from the east jetty, eastward 5,770 feet to the former Lonesome Point, which was lost to erosion some time after the breakwater was destroyed.

2.0 PROJECT AUTHORIZATION

2.1 Grand Marais Harbor (including the entry channel, jetties, and the original breakwater, as well as operation, maintenance, and repair activities) is authorized under the River and Harbor Act of 1880. This authorization refers to Grand Marais Harbor as a "Harbor of Refuge."

3.0 PROJECT PURPOSE AND NEED

3.1 Since the loss of the breakwater in the mid 1900s, Grand Marais Harbor has experienced substantial infilling with sandy sediment. This process has reduced depths and restricts boating activity to the remaining deepwater area in the west half of the harbor. This area within Grand Marais harbor once had water depths to 50 feet, but because of the sand filling is much shallower with less than 12 foot water depths in many areas, restricting the size of vessel that can enter the

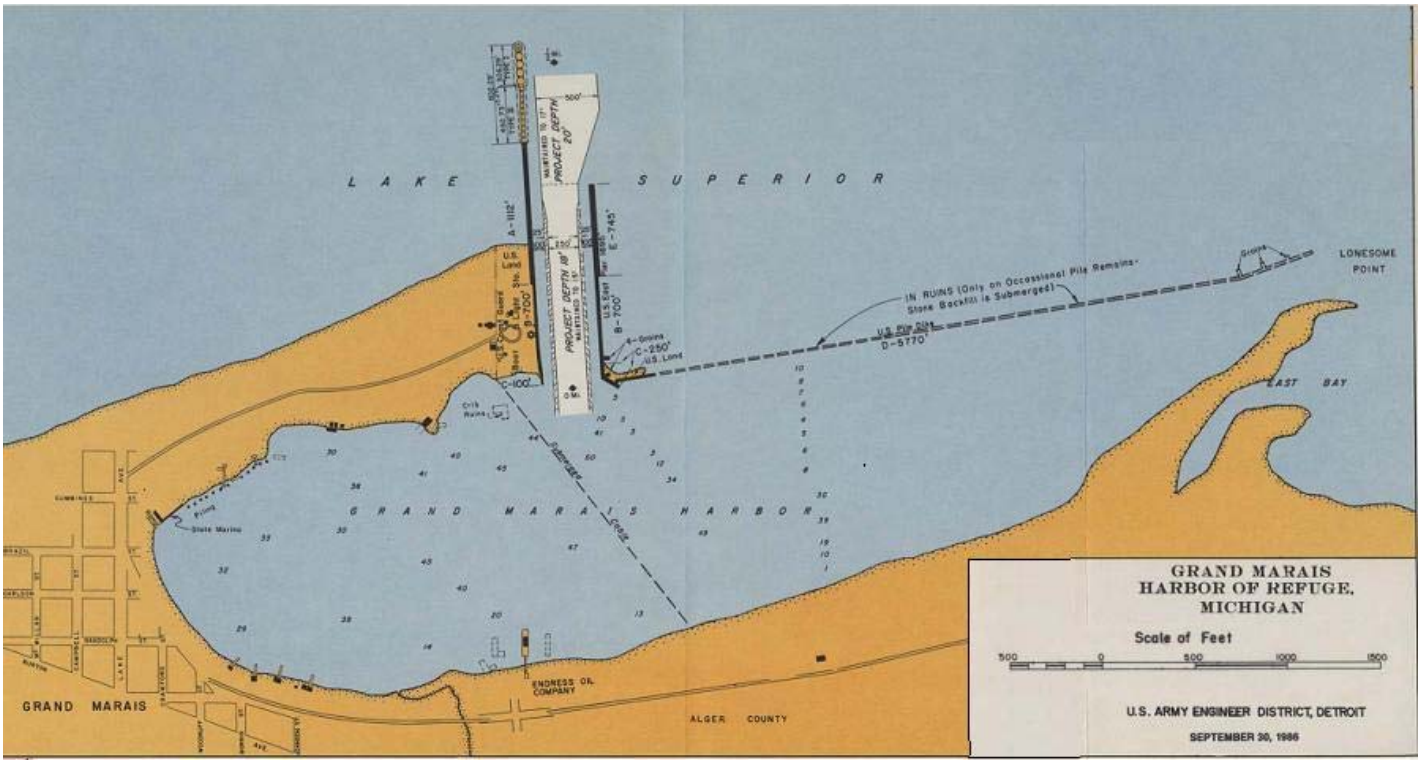


Figure 2. Grand Marais Harbor (1986 Map) showing original breakwater location.

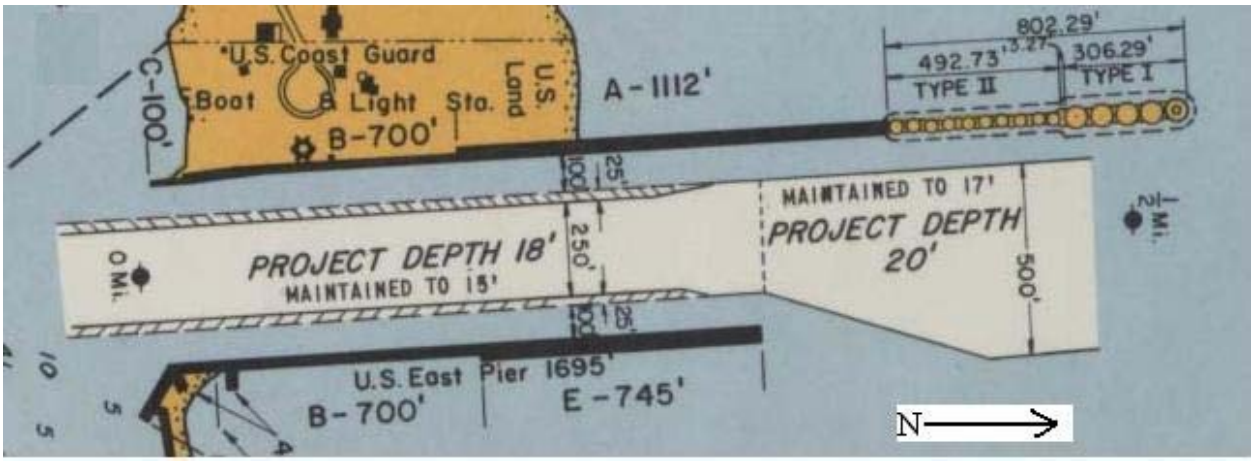


Figure 3. Harbor Entry (hachure area not constructed)

harbor. If this sedimentation continues, the sands will eventually eliminate most boating activity in the harbor.

3.2 Breakwater reconstruction is needed to prevent further infilling of the harbor basin and to shelter the harbor basin from storm waves. Storm waves entering the harbor compromise the refuge function of the harbor for those vessels that can still enter the harbor and the launching of rescue vessels to assist ships in distress.

4.0 ALTERNATIVES CONSIDERED

4.1 Breakwater reconstruction alternatives considered include 1) No Federal Action, 2) Original Breakwater Alignment, 3) Rotate Alignment 15 Degrees Landward, and 4) Rotate Alignment 55 Degrees Landward (Figure 4). All three of the breakwater reconstruction alternatives would attach to the inner end of the east entry pier and would be of rubble-mound construction. Rubblemound is proposed because is it similar to the original breakwater (timber pile and rubble), is durable, dissipates wave energy, and is much lower in cost than other breakwater construction methods such as steel sheet pile (SSP) cells or concrete. The proposed action is Alternative 4, Rotate Alignment 55 Degrees Landward, which is the lowest cost of the three action alternatives.

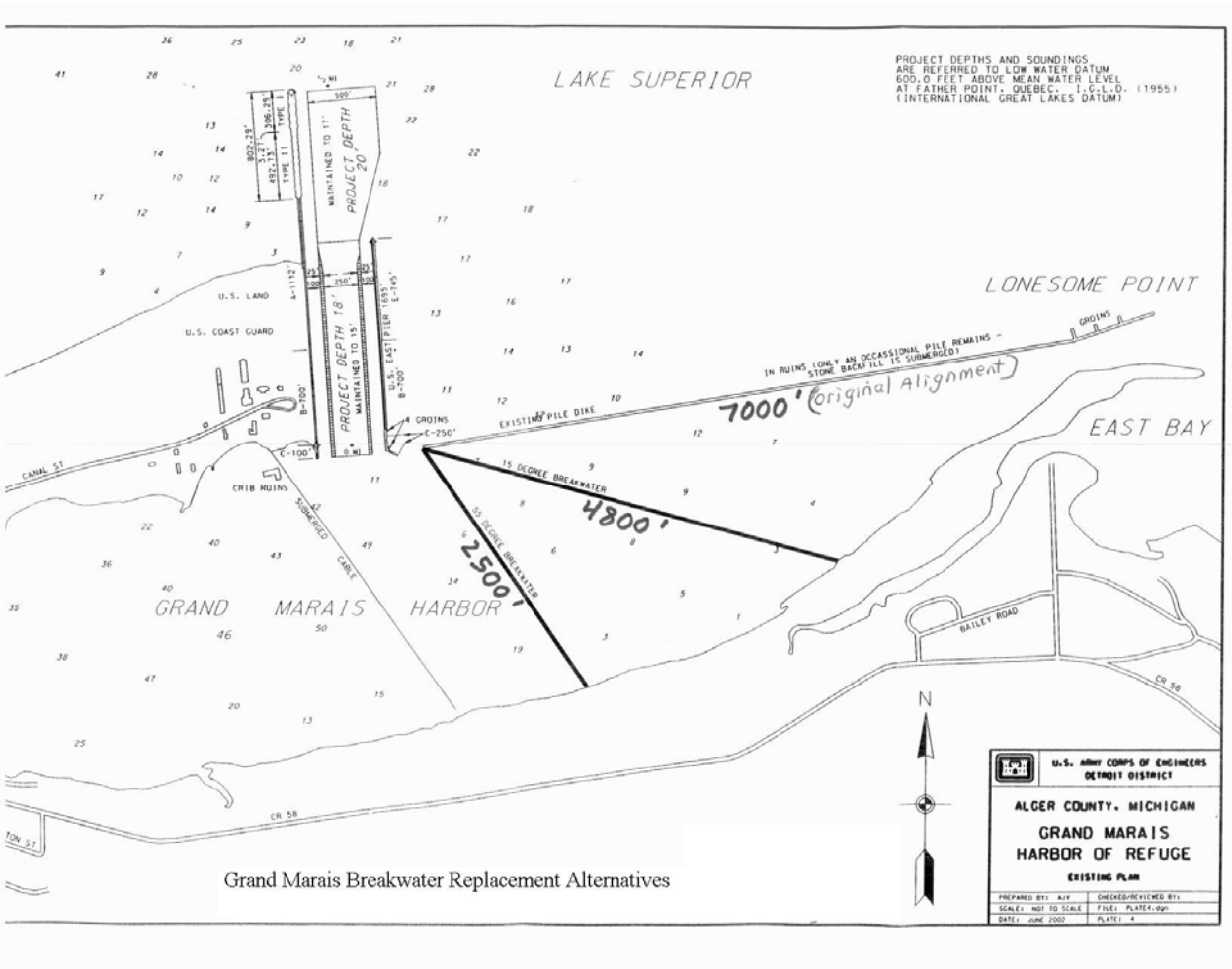


Figure 4. Alternative Breakwater Alignments Considered

4.2 Alternative 1, No Federal Action: Under this alternative, Grand Marais Harbor would remain without a protective breakwater. Dredging of the harbor basin could preserve draft for vessel access, but would not provide protection from storm waves. Dredging of the harbor basin is unlikely as the Federal project does not include the basin, but only the entrance channel (Figures 2 and 3).

4.3 Alternative 2, Original Breakwater Alignment: Under this alternative a breakwater would be constructed on the original breakwater alignment and would be approximately 7000 feet long. This is approximately 1,230 feet longer than the original breakwater because of shoreline erosion at the eastern terminus of the breakwater.

4.4 Alternative 3, Rotate Alignment 15 Degrees Landward: Under this alternative a breakwater would be constructed on an alignment rotated approximately 15 degrees landward and would be approximately 4800 feet long.

4.5 Alternative 4, Rotate Alignment 55 Degrees Landward: Under this alternative a breakwater would be constructed on an alignment rotated approximately 55 degrees landward and would be approximately 2500 feet long.

5.0 THE PROPOSED ACTION

5.1 The proposed action is Alternative 4, Rotate Alignment 55 Degrees Landward. This alternative was selected as the least costly, environmentally acceptable alternative. This is the lowest cost alternative because it is the shortest length and because of the shallower waters at its location. Any boating advantage of the larger protected area with the original alignment (Alternative 2) or the 15-degree alignment (Alternative 3) is limited to smaller craft, since considerable shoaling has already occurred in the area east of the harbor entrance channel.

5.2 Breakwater Design: The breakwater is designed to withstand expected storm and ice conditions for a minimum 50-year project life. The breakwater would be of a rubblemound design, constructed of quarried rock (limestone, gabbro, basalt, granite or similar durable rock) consisting of core stone (4-80 pounds), a layer of filter stone (0.5-1 ton), and with a layer of armor stone (6-12 tons, 75% > 7 tons) on the lake side and crest. The rock would be obtained from one or more commercial quarries, dependant upon rock specifications, availability and costs.

5.3 The breakwater would extend approximately 2,200 feet from the inner end of the east entrance jetty to within approximately 200 feet of shore (Figures 5 through 7). A 200-foot long dog leg on the breakwater extends eastward parallel to the shore. The gap between the breakwater and the shore would fill in with sand over time and the presence of the dog leg will accelerate the filling in process to help minimize further sand filling into the harbor basin. Crest height of the breakwater would be 8 feet above LWD. A total in-water area of approximately 5.5 acres would be occupied by the new breakwater.

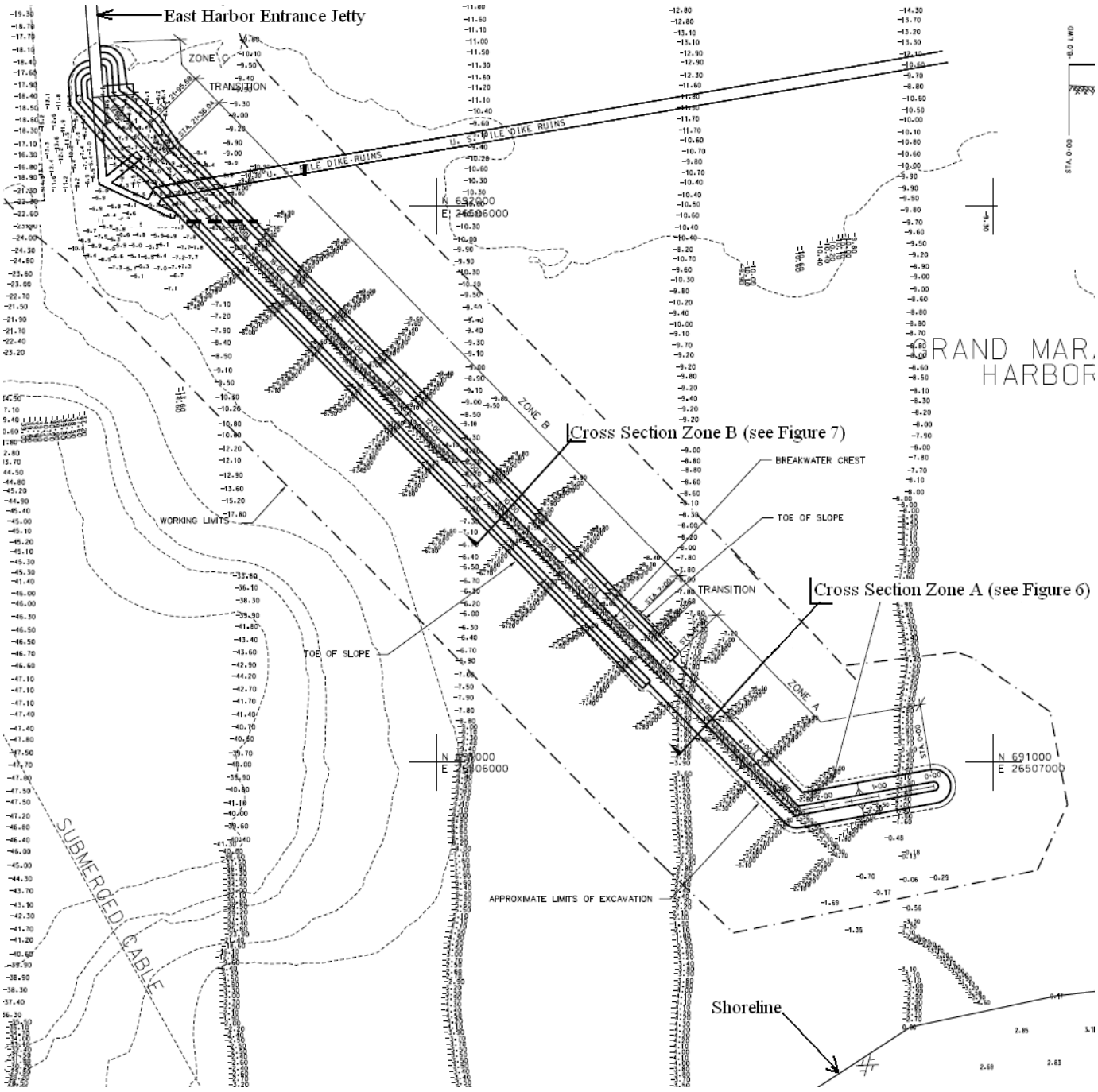


Figure 5. Proposed Breakwater Reconstruction, Rotated 55 Degrees Landward from Original Alignment.

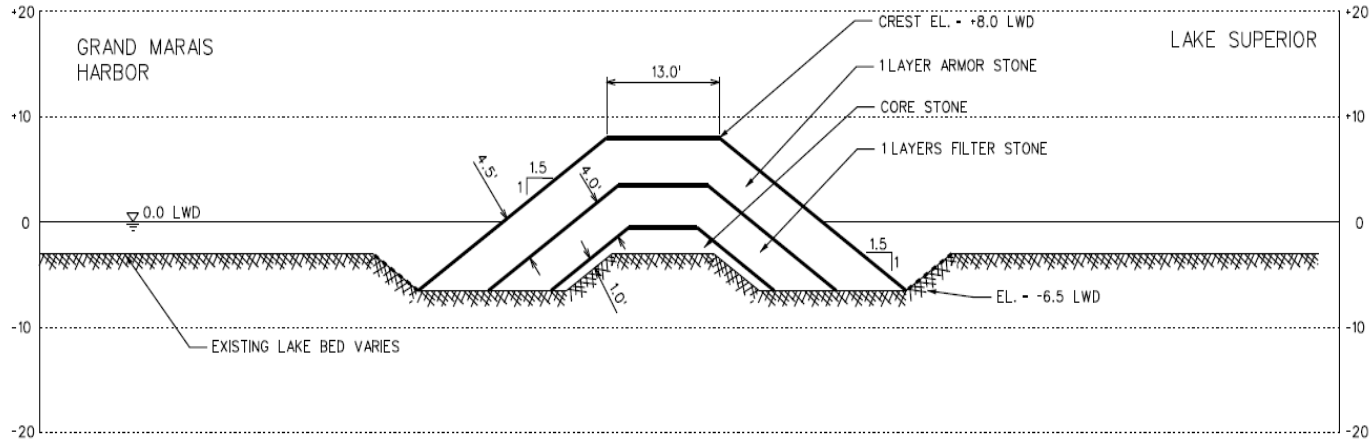


Figure 6. Representative Cross Section, Zone A (Shoreward 700 feet including dog leg) of Breakwater (Excavation Required).

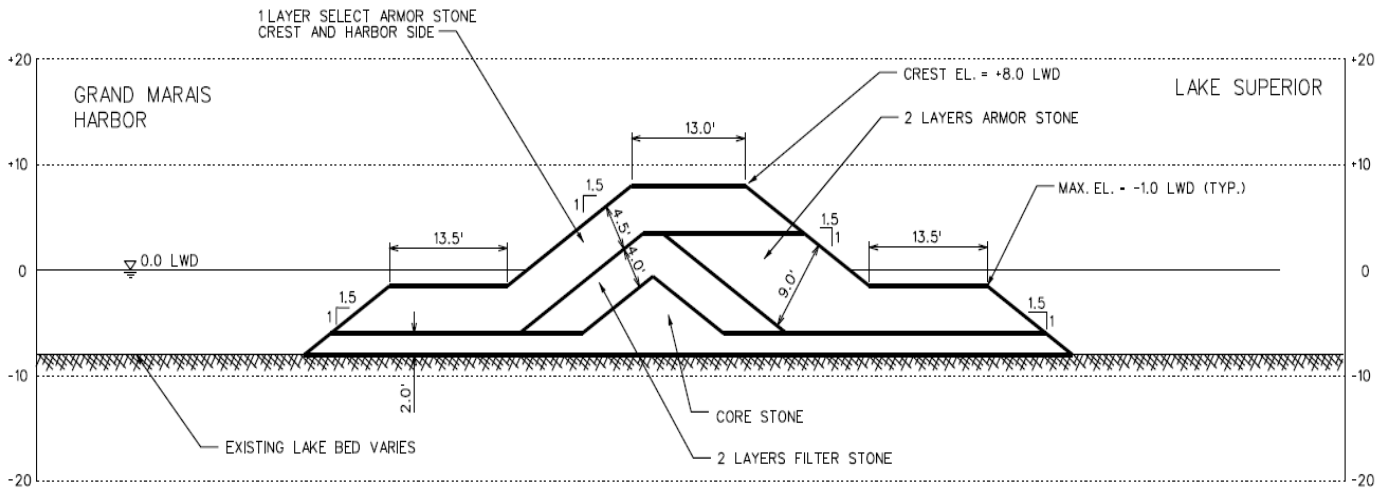


Figure 7. Representative Cross Section Zone B of Breakwater

5.4 The breakwater is designed to a 50 year project life. Over a 20 to 30 year period, a large sandy beach would form adjacent to the east side of the breakwater. Considering the rubblemound breakwater design, and the buffering effect of the large sandy beach, required maintenance and repair requirements for the breakwater are likely to be minimal.

5.5 Construction: Construction would likely occur between May 1 and October 31. No work would occur within 250 feet of the piping plover critical habitat shoreline from April 15 through September 1 to minimize the potential for construction activities to affect piping plover, which nest along the Grand Marais shoreline. The goal is to construct the project in a single

construction season, beginning at the east entry jetty and building landward so that the last part of the breakwater would be constructed late in the season after September 1 to avoid disturbances to piping plover. However, depending of the time frame of the construction contract award, availability of material, and weather conditions in the northern climate, the construction may carry over into a second construction season.

5.6 The proposed breakwater will be constructed from the water. It is not possible to indicate exactly how the breakwater will be built, as equipment and methods vary between different construction contractors. However, project construction would be water based, using construction equipment towed to the site on barges. Typically, stone is placed using a crane and a rock supply barge. Construction typically involves the crane taking stone from the supply barge, swinging the load of stone around to the breakwater alignment and placing the stone in the required position. Some equipment would likely operate on top of the placed stone.

5.7 The designated land based work and storage area will be a portion of the government owned lot adjacent to the southern end of the west pier, inside the harbor, which is away from piping plover habitat. This will consist of an area approximately 300 feet by 300 feet and the adjacent parking lot at the U.S. Coast Guard Station (Shown on Figure 3). The public boat ramp located within the harbor may be used by the contractor to launch small work barges and vessels. The proposed action may require the establishment of a temporary mooring area within the harbor; this also would be greater than 250 feet from any piping plover critical habitat shoreline.

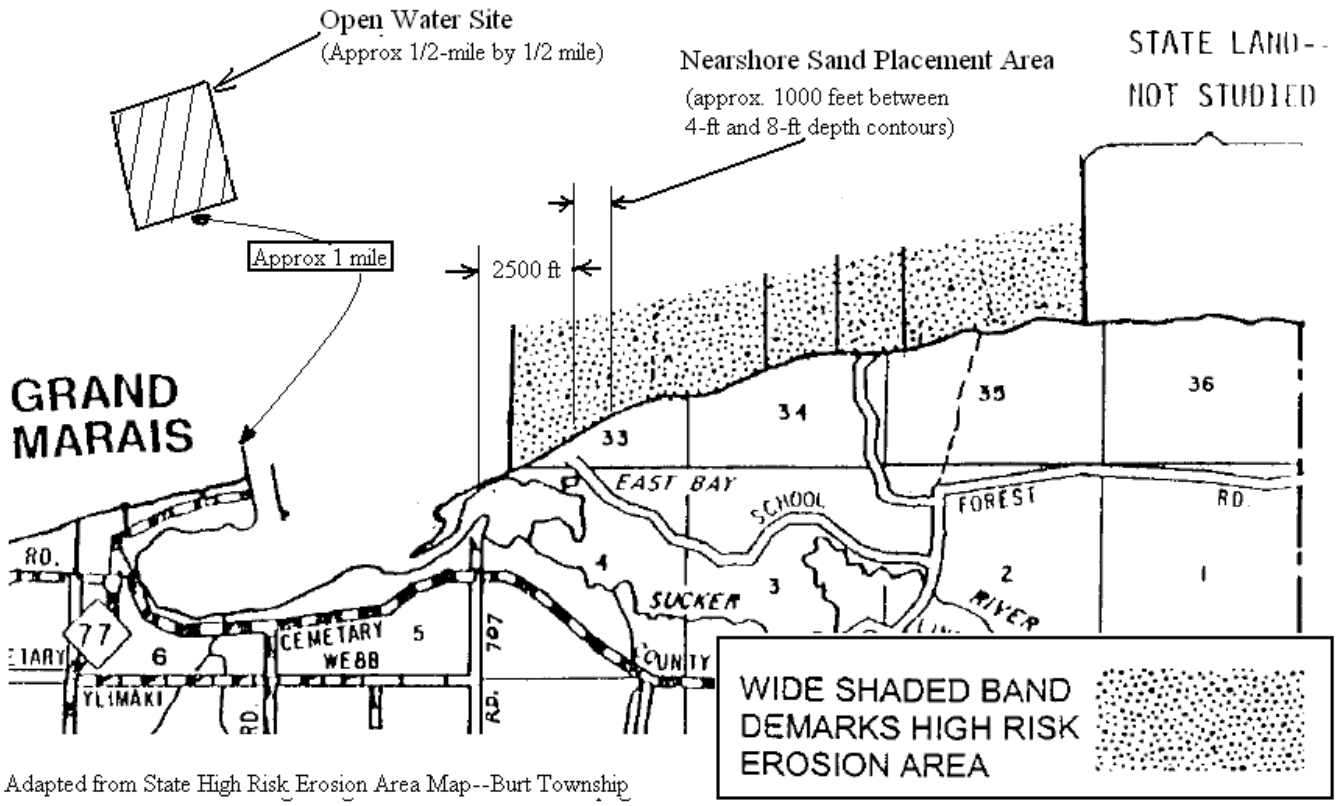
5.8 Construction activities would include mobilization of trailers, equipment, and may include storage of material in the staging area; loading of stone barges that shuttle to and from the construction site; movement of supply vessels in and out of the harbor; movement of supply and equipment barges by tugs; ferrying staff to the working vessels; demolition and disposal of the existing timber crib and stone where the reconstructed breakwater would join the east jetty; placing of rock using a crane or backhoe positioned on a barge; and anchorage of construction vessels in the harbor during non-working hours.

5.9 The rubble mound breakwater will be connected to the east pier. Approximately 165 ft of stone filled wood cribs covered with cap stone will be removed from the east pier to allow the breakwater connection to the east pier. The remnants of the old pile dike and wood groins in the vicinity of the east pier will also be removed to allow for the breakwater connection. The material from the demolition will be disposed off site in accordance with federal, state and local laws and regulations.

5.10 Excavation is required to construct the breakwater for approximately the inner (shoreward) 700 feet of the breakwater because of the shallow conditions in this area. Excavation would be to 6.5 feet below LWD. Approximately 4,300 CY of sandy material beneath the breakwater will be excavated. Because of shallow water depths, construction of the landward third of the rubblemound breakwater may also require the contractor to excavate additional sandy material adjacent to the breakwater to provide sufficient depth for the water based equipment access. Any access channel excavated alongside the inner 450 feet of the breakwater (including the dogleg) would include stockpiling of the excavated sand on the adjacent lake bottom and refilling the access channel upon completion of construction. Depending on the construction

contractor and the type of equipment available, it may be feasible to use the excavation for breakwater construction also as an access channel.

5.11 Excess material removed from the site would be disposed of in accordance with applicable laws and regulations, including materials recycling. Suitable excavated sandy material could be beneficially placed at one of the following locations in the near shore waters (between the 4-foot and the 8-foot depth contours) at the State-designated High Risk Erosion Area (HREA) located approximately 1.3 miles east of the harbor (Figure 8). Alternately the material may be placed at the existing open water disposal site ½-mile by ½-mile square, located 1 mile due north from the west pier light or at an upland site (Figure 8).



Adapted from State High Risk Erosion Area Map--Burt Township

Figure 8. Grand Marais Harbor Area Showing In-Water Sand Placement Sites.

5.12 Any material unsuitable for placement in the water would be placed at an upland site. Special materials handling is not anticipated, as the potential for hazardous and toxic wastes is not indicated at the project sites. Appropriate erosion control measures would be taken on the upland storage areas to minimize erosion and sedimentation during and after construction until natural erosion control is established.

5.13 Project Variations: Some variation from the project as described may occur with respect to sequence of activities, method of operation, or design details as a result of unanticipated design

improvements, site conditions, or cost-saving measures. Because of the presence of Federally listed species at the harbor, variations that may affect listed species would be coordinated with the U.S. Fish and Wildlife Service (USFWS) before being implemented. Any variations that result in significant changes to either the overall project design or environmental impact would require further evaluation under the National Environmental Policy Act and other applicable laws and regulations.

6.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

6.1 Review of the proposed rubble-mound breakwater reconstruction indicates it would not result in significant adverse environmental effects. Nor would it be expected to result in any significant cumulative or long-term adverse effects. Adverse effects are minor, including short-term noise and air emissions from equipment operation; temporary turbidity from construction operations; temporary displacement of fish; destruction of any bottom-dwelling organisms in the immediate work area; and modification of shoreline habitat and associated effects on shorebirds, including the Federally listed piping plover and piping plover critical habitat. Adverse effects on piping plover and piping plover critical habitat are mitigated through habitat created along the new breakwater, and by special mitigative measures. The project would be beneficial in preventing further sand filling of the harbor basin and by providing shelter from storm waves for safe use of the harbor. A rock breakwater would provide aquatic habitat in place of the existing shifting sand substrate. Fish would return upon completion of construction and the breakwater would be colonized by aquatic organisms and would provide habitat for fish and other wildlife.

Geographic Setting

6.2 The Lake Superior shoreline at Grand Marais is a low sandy plain about 3 miles wide, bracketed on either side by high sandy bluffs. The bluffs to the west include the Grand Sable Dunes perched atop the 300-foot high Grand Sable Banks at the eastern end of the Pictured Rocks National Lakeshore.

6.3 The land cover in the Grand Marais area is predominantly post-logging-era hardwood conifer forest. The western third of the harbor area and the Superior beach area are predominantly residential with commercial developments interspersed (Figure 9). Permanent and seasonal homes follow the shoreline eastward.

6.4 The major waterway entering Lake Superior in the immediate Grand Marais vicinity is the Sucker River (Figure 9), which enters at the east end of the harbor area and drains an area of over 66 square miles. The next largest waterway is Carpenter Creek in the west harbor basin, which drains an area of approximately 1 square mile. An intermittent stream enters the harbor just east of Carpenter Creek. Between Carpenter Creek and the Sucker River is Chipmunk Creek and Chipmunk Falls, a very small drainage, probably no more than 1/4 square mile.

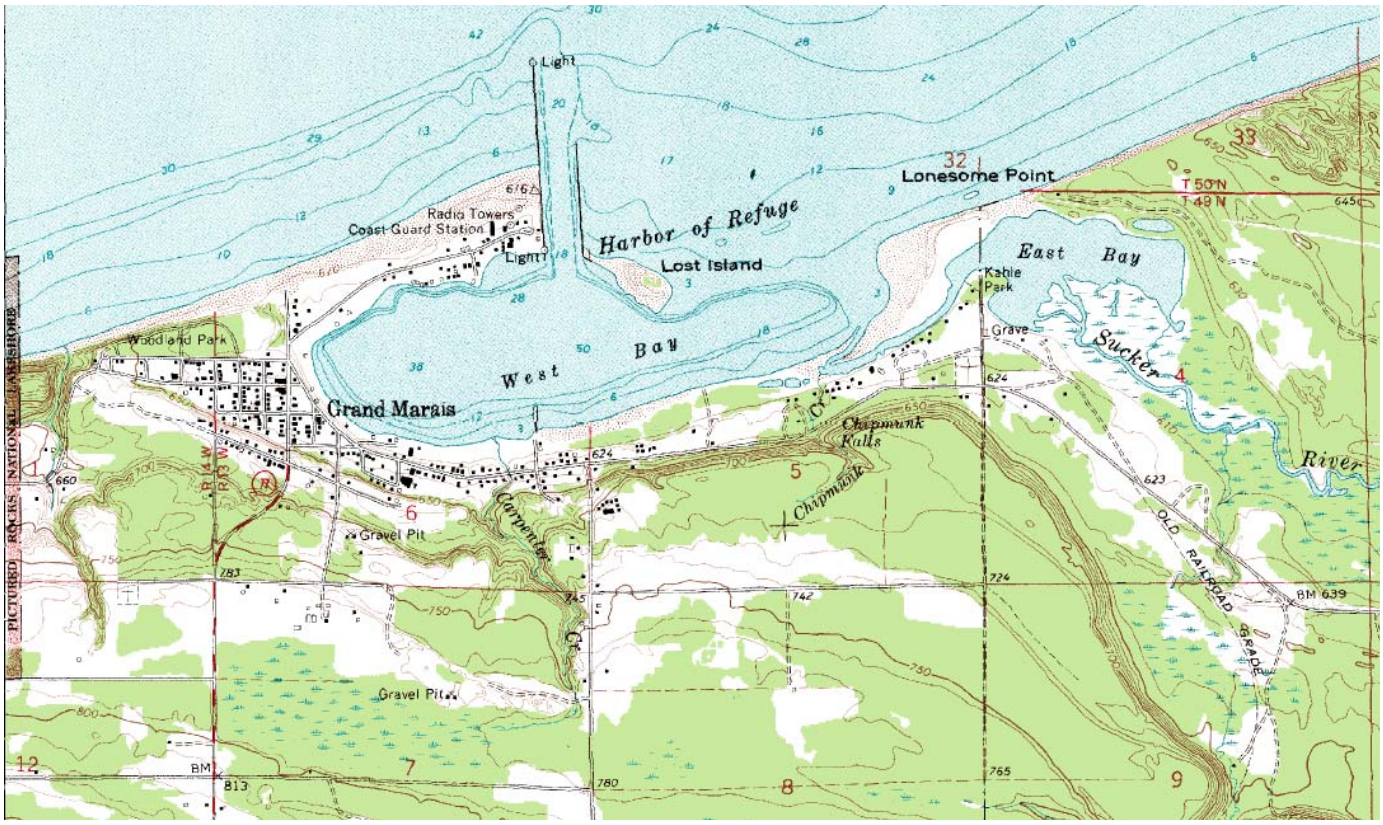


Figure 9. 1968 USGS Map of Grand Marais Harbor. Note "Lost Island" is gone and Lonesome Point has eroded (Reference Figure 10).

Figure 10. Recent Aerial Photograph of Grand Marais. Note absence of Lost Island and Lonesome Point (Reference Figure 9).

Shoreline Evaluation

6.5 The discussion in this section is based on intensive modeling of the shoreline in the Grand Marais area for the periods of 5, 10, 15, and 30 years into the future[1].

6.6 Historical Overview and Existing Conditions: Historically, Grand Marais Harbor was deeper and approximately twice its current size. The original breakwater was constructed in the 1880's on a series of low barrier islands from the east jetty to Lonesome Beach. These islands probably represented the former north shore of an inland lake. Erosion by Lake Superior currents breached the narrow isthmus separating the inland lake from Lake Superior sometime after 1939. This timber pile breakwater failed sometime between 1939 and 1953. By 1953 a series of low, disconnected islands were present, all of which disappeared shortly thereafter.

6.7 Since 1943, the current breakwater has deteriorated to the point where little, if any, portion of the structure remains. The consequence of the demise of the breakwater has been that Grand Marais Harbor has experienced substantial infilling with sandy sediment and is no longer protected from wave energy, which compromises the harbor's function as a harbor of refuge. With the ongoing infilling of the basin, more and more sediment is now encroaching to the west to fill the remaining part of the basin, the navigation channel of the harbor, and southwest shores of the West Bay. Eventually the infilling will stabilize leaving a shallow harbor basin, perhaps only 6 to 8 feet deep, useable only by smaller watercraft.

6.8 Superior Beach had reached its capacity for trapping sediment by 1939, allowing any incoming sediment to bypass the harbor (and fill the channel or reach the down drift shores). Extension of the west jetty in the 1960's resulted in further trapping of sediment by the jetty and the subsequent growth of the Superior Beach to its present size. Sediment west of Superior Beach currently bypasses the jetties to the down drift shores via a bypassing path connecting the west jetty tip to the shoreline in the vicinity of the Lonesome Point.

6.9 Along the south shore of West Bay the shoreline has been gradually extending both a lakeward and westward direction from wave action that was historically blocked by the old timber pile breakwater. The north shoreline of the West Bay area has been relatively stable and features vegetation to the water's edge, owing to the sheltering from waves. Across the west end of the West Bay sediment accumulated lakeward forming Town Beach. Around the southwest corner of West Bay the shoreline has been extending in both lakeward and westward directions.

6.10 The greatest area of complexity and shoreline dynamics is between Lonesome Point and the Sucker River mouth. The complexity in this area is a result of the variable position of the Sucker River mouth and the ongoing erosion of the bluffs to the east of Lonesome Point with the corresponding supply of sediment from the east. Since 1993, with a decline in water levels and the resumed sand bypassing (from the west), the wide river mouth area filled with sediment and

1 Baird & Associates, Inc. 2006. Grand Marais shoreline evaluation modeling report. Prepared for the US Army Corps of Engineers, Detroit District, July 11, 2006.

a straight shoreline was created by 1999 (Figure 10 versus Figure 9). Once the shoreline had been rendered relatively straight, the river mouth began to migrate towards the west. The bluffs to the east of Lonesome Point are eroding at a long-term average rate of 10 to 13 ft per year. Bluffs in this area provide sand and gravel via waves from the north and northeast directions then the sediment is transported towards the west where it is trapped in the Grand Marais Bay area.

6.11 Shoreline Impacts—Grand Marais Harbor: Figure 11 shows the predicted shorelines for the No Project (Alternative 1) condition and for the 15-degree (Alternative 3) and 55-degree (Alternative 4) breakwater alignments. The shoreline for reconstruction on the original alignment is not shown, nor was it modeled, as the entire south shoreline (over to the eroding bluffs) becomes protected and there would be no further shoreline accretion along the south harbor shore. Reconstruction on the original alignment would significantly reduce the rate of river mouth migration for Sucker River.

6.12 The Without Project condition maintains the historic trend of lakeward and westward advancement of shorelines, with continued infilling of the West Bay basin, and formation of a point or peninsula extending towards the east harbor entrance jetty.

6.13 With Reconstruction on 15-Degree or 55-Degree Alignments the main area of accumulation would be offshore and to the east of the new breakwater structure. Under the 15-Degree alignment, the created shoreline extends farther lakeward than under the 55-Degree Alignment. Both shoreline scenarios extend farther lakeward than the shoreline would under the No Action alternative. The 15-Degree and 55-Degree breakwater alternatives both protect the southwest shoreline from wave attack. As a result, the beach in the West Basin will become less dynamic and will eventually be covered with vegetation closer to the shore; this effect happens to a lesser degree and more slowly under the No Action alternative, because of the ongoing accretion forming a peninsula extending towards the east jetty and partly blocks wave energy from the West Basin.

6.14 Sand accretion alongside the 55-Degree breakwater likely would reduce the extent of westward migration of the Sucker River mouth (although to a lesser degree than would the 15-Degree breakwater) as compared to the No Action alternative. After sufficient accretion has occurred, the Sucker River mouth migration may extend farther west into the newer beach area alongside the breakwater. The Corps has concluded that it is very unlikely, once the breakwater is constructed, that the Sucker River mouth would bypass the breakwater and exit within the enclosed harbor basin.

6.15 Shoreline Impacts—Adjacent Areas: The littoral drift (alongshore sand movement) pattern at Grand Marias is mainly from west to east. Superior Beach is believed to be close to its capacity, thus bypassing most sand to down drift shores to the east. Since the loss of the original breakwater, sand that would normally move farther east has been infilling the harbor.

Figure 11. Predicted Shorelines for Alternatives 1 (No Action), 3 (Rotated 15 Degrees Landward), and 4 (Rotated 55 Degrees Landward).

6.16 By reconstructing the breakwater sand infilling will be limited to along the breakwater and will reach an equilibrium sooner than under the No Action alternative where it would continue infilling West Bay. Once the sand reaches equilibrium, more sand will again pass farther east, possibly into the State-designated High Risk Erosion Area (HREA) located approximately 1.3 miles east of the harbor; these effects are likely negligible, but would be positive in association with additional sand being passed farther east of the harbor.

Water and Sediment Quality

6.17 Water quality along the Michigan shoreline of Lake Superior is generally considered excellent. The lake bed in the proposed rubble-mound construction area are predominately very fine sands. Construction operations would cause temporary turbidity from excavation and setting the rock for breakwater construction. Turbidity effects would dissipate in a short time and distance from the work area and would not have significant long-term effects. Since the sediments are sandy and clean, there would be no adverse effects. Construction induced turbidity would be similar to storm induced turbidity but on a far smaller scale and to a limited area extent. Placement of excavated sand in-water, either beneficially in the near shore waters of the State-designated High Risk Erosion Area (HERA), or into the existing open water site, would have similar, short term turbidity effects.

6.18 Precautions would be taken to avoid pollution of the waterway by construction equipment and from construction debris. Any timbers, demolition debris, and other material not suitable for use in the repairs that is generated from the construction or found within the construction area, would be removed and properly disposed of in compliance with Federal, State, and local requirements.

6.19 Pursuant to the Clean Water Act (CWA), a Section 404(b)(1) evaluation of the environmental effects of the discharge of fill material into waters of the U.S. has been prepared (Attachment 1). The Section 404(b)(1) Evaluation, which addresses both the breakwater construction and in-water placement of sandy material as described above, concludes with the determination that "the proposed action is in compliance with Section 404 of the Clean Water Act." A Section 401 (CWA) water quality certification, or waiver thereof, would be obtained from the state prior to signing a Statement of Findings/Finding of No Significant Impact.

Wetlands

6.20 According to the 1968 USGS topographic map, wetlands exist in the headwaters of Carpenter Creek about one mile inland and along the lower reaches of the Sucker River and upstream areas. There are no wetlands indicated in the immediate project area and the project would not impact wetlands.

Fish and Wildlife

6.21 The forest cover within Alger County is typical of northern Michigan forests consisting of upland and lowland hardwoods with spruce-fir, aspen-birch, beech-maple-oak being the major forest types. The area has been previously logged. The county has extensive areas of land in state and Federal ownership including Pictured Rocks National Lakeshore and Seney Wildlife Refuge. Typical wildlife include small mammals such as cottontail rabbits, snowshoe hares, red and fox squirrels, muskrat, mink, beaver, weasel, raccoon, skunk, opossum, coyote and fox. Deer and an occasional moose are seen within the county. Bird species include ducks, geese, crows, grouse, woodcock and song birds. The area experiences a heavy spring and fall migration of raptors passing through the Whitefish Point area to the east.

6.22 The major river discharging into the Grand Marais Harbor is the Sucker River. Fish species found in the harbor at certain times of the year include lake trout, brown trout, lake herring, whitefish, suckers, northern pike, walleye, perch, smelt, members of the sunfish family and forage species. Steelhead, suckers, and smelt are known to spawn in the Sucker River in the spring from ice-out through April to mid-May, and brook trout and coho salmon during the fall. Lake trout and whitefish may use the rock breakwater for spawning in the fall but the viability of this spawning has not been established.

6.23 The harbor area provides a recreational fishery at certain times of the year for lake trout, whitefish, menominee, steelhead, and coho salmon. The harbor is not heavily used for fishing because of its great distance from large population centers. However, the late spring to early summer whitefish fishery is well attended and is one of the best in the United States portion of Lake Superior (Personal communication, November 2009 with James Waybrant, MDNR Fisheries Division).

6.24 A variety of shorebirds, amphibians, reptiles, and other wildlife occur in the Grand Marais area; however, none of these species likely occur in significant numbers in the open waters comprising the project area. There are no emergent wetlands present at the project construction site, work and storage area, or access route.

6.25 The most important species in the Grand Marais area that would be affected by the project is the piping plover which nests along the beaches of Grand Marais and is Federally listed under the Endangered Species Act along with substantial areas of Federally designated piping plover critical habitat. A detailed discussion of piping plover and effects of the project on piping plover is included below in the section on Federally Listed Species.

6.26 The breakwater reconstruction project would not result in significant adverse effects on fish and aquatic habitat. The rock mattress stone will cover existing sandy lake bed and replace the shifting, wave washed sands with hard structure suitable for colonization by other benthic species. The rock breakwater will provide hard substrate with numerous crevices and interstitial spaces for fish and aquatic invertebrates. Cover stone on the breakwater would provide some habitat for small mammals and resting habitat for birds, which likely would feed on fish using nearby habitat. The proposed 2,500 foot rubble mound breakwater would include an area of

submerged stone for aquatic habitat; a zone of rock inundated by water during storms and from lake level fluctuation on the side slope of the breakwater; and bird resting areas on the stone located above the water line.

6.27 No long-term adverse effects to fisheries and aquatic species are expected. Construction activities would disrupt existing habitat along the lakebed where the 2,500 foot rubble-mound breakwater would be constructed; this habitat is likely minimal because of ongoing sand deposition in this area. Bottom dwelling (benthic) macro-invertebrates within the proposed rubble mound breakwater construction area would be destroyed, but the rubble mound would be colonized by invertebrates from adjacent areas and create habitat variety for a potentially more diverse fauna than currently exists at the site.

6.28 Project generated turbidity would be mostly sand, which settles quickly, and is not likely to disturb fish and other aquatic organisms, which already would be accustomed to the naturally high turbidity from wave wash in the near shore waters during storm events. Some incidental mortality of fish or mobile macro-invertebrates may occur; however, since these organisms are mobile, a percentage of the organisms would avoid the area during construction. Displaced fish would find temporary habitat in nearby waters and would be expected to return after completion of construction.

6.29 Project effects on shorebirds would be gradual over time and are comprised of creation of a quiet water area within the West Basin which would benefit some species of shorebirds over others. Shorebirds would have ample time to adjust to the long term changes brought about by the project, and would not suffer significant adverse impacts.

Exotic Species

6.30 A variety of invasive exotic species have entered the Great Lakes. A number of invasive exotic plant species have become established in Michigan along the Lake Superior shoreline and St. Mary's River, in some cases displacing native plant species and resulting in diminished wildlife habitat values. Some of the more aggressive invasive species include giant reed grass, reed canary grass, purple loosestrife, Eurasian milfoil, and glossy buckthorn. Rocky shorelines and breakwaters provide habitat for the invasive exotic zebra and quagga mussels, the round goby, and the Eurasian ruffe. The spiny water flea is found in open and protected waters. The impact of these exotic animal species in the colder waters of Lake Superior has been limited to date.

6.31 Zebra mussel, quagga mussel, ruffe and round goby may use the rock breakwater for habitat; however, wave energy against the outer perimeter may limit the habitat suitability of the breakwater, thereby restricting it's colonization by exotics as well as desirable species. To the extent this occurs, it would reduce the secondary benefits of the breakwater but would not be expected to result in negative impacts to the ecosystem. Eurasian milfoil is not anticipated to develop within the harbor in the relatively nutrient poor environment. The remaining exotic plant species are usually found in areas with saturated soil conditions above the normal water levels and would not be expected to grow in the open water areas of the harbor, adjacent the harbor breakwater or newly deposited sand rich environments.

Federally Listed Species

6.32 The following federal listings are for Alger County, Michigan:

SPECIES	STATUS
Canada lynx (*Lynx canadensis*)	Threatened
Gray wolf (*Canis lupus*)	Endangered
Pitcher's thistle (*Cirsium pitcheri*)	Threatened
Piping plover (*Charadrius melodus*)	Endangered
Piping plover	Critical Habitat

These species and critical habitat are discussed in the following sections and include effect determinations pursuant to Section 7 of the Endangered Species Act:

6.33 Canada Lynx and Gray Wolf: The Canada lynx and gray wolf have not been documented in Grand Marais. No gray wolf or Canada lynx habitat is found within the project area. Both species are known to avoid populated areas. Large natural areas of suitable habitat exist for them nearby outside the project area; these species are unlikely to enter the harbor area and its vicinity and would not be affected by construction of the breakwater.

6.34 Section 7 Determination: Therefore the project would have no effect on Canada lynx or gray wolf.[2]

6.35 Pitcher's Thistle: Pitcher's thistle (also state-listed as "threatened") occurs on sandy dunes, dry interdunal areas, and cobble shores on dry micro-sites. It flowers at 4 to 8 years of age, sets seed, and then dies. Due to this life-cycle, semi-isolated populations may become extinct but these sites may be colonized thereafter by plants from other sites[3]. Pitcher's thistle was first observed on Superior Beach by C. Jolls before 1995 as reported by Wemmer[4]. Pitcher's thistle has not been observed inside Grand Marais Harbor. Superior Beach will not be affected either directly or indirectly by the Preferred Alternative. As sand accumulates along the reconstructed breakwater east of Grand Marais Harbor, dune habitat will be created and areas of beach grass dunes will increase. This will create potential habitat for Pitcher's thistle in stable and eroding dunes associated with beach grass. Colonization will depend on seed being transported from Superior Beach southeastward to the new habitat created by the breakwater. A large population of Pitcher's thistle exists at Grand Marais dunes in Pictured Rocks National Lakeshore, located a few miles west, and this large population may be the source of propagules that periodically colonize the Grand Marais Harbor. In summary, the existing small Pitcher's thistle population

2 A statement of concurrence from the USFWS is not required for a "no effect" determination.

3 Pavlovik, N.B., M.L. Bowles, S.R. Crispin, T.C. Gibson, K.D. Herman, R.T. Kavetsky, A.K. McEachern and M.R. Penskar. 2002. Recovery plan for the Pitcher's thistle (Cirsium pitcheri). US Fish and Wildlife Service, Region 3, Fort Snelling, Minnesota.

4 Wemmer, L.C., U. Özesmi and F.J. Cuthbert. 2001. A Habitat-Based Model for the Great Lakes Population of the Piping Plover (Charadrius melodus). Biological Conservation 99:169-181.

will not be directly or indirectly harmed by the Preferred Alternative but may benefit from the creation of new dune habitat.

6.36 Section 7 Determination: Therefore, the project may affect, but is unlikely to adversely affect Pitcher's thistle. The U.S. Fish and Wildlife Service concurred with this determination (correspondence of January 14, 2010).

6.37 Piping Plover: Piping plover (also state-listed as "endangered") is well documented as occurring at Grand Marais Harbor and the piping plover critical habitat designation includes much of the beach area at the harbor. The reconstructed breakwater will effect shoreline changes to designated piping plover critical habitat, including the loss of some habitat and the generation of new habitat.

6.38 Section 7 Determination: A Biological Assessment analysis of project effects on piping plover and piping plover critical habitat was prepared pursuant to the Endangered Species Act[5]. Project effects on piping plover and piping plover critical habitat are summarized in the following section which concludes with the Corps determination that the proposed action may affect, and is likely to adversely affect, piping plover and piping plover critical habitat.[6] The USFWS concurred in this determination and completed a Biological Opinion, which is discussed in the section following the piping plover discussion below. The Biological Opinion and the Biological Assessment are available at Corps, Detroit District web page at (www.lre.usace.army.mil/grandmaraisdocuments/).

Piping Plover and Piping Plover Critical Habitat[7]

6.39 In the late 1800's the Great Lakes population of piping plover may have been 492-682 breeding pairs in eight states and Ontario, Canada (USFWS 2003)8 Hunting, egg and feather collecting, and development and disturbance of sand dune and shoreline habitats caused the elimination of piping plovers at all locations except eight or nine Michigan nesting areas (USFWS 2003). The Great Lakes population of piping plovers was listed as a federal endangered species in 1985 when there were 19 pairs left. The Great Lakes piping plover population fluctuated at low levels in the 1980's and 1990's. The population reached a low of 23 birds in 1990 and fledged only 11 birds in 1992. However, because of a comprehensive nest protection program beginning in the 1980's, piping plover numbers in the Great Lakes have

5 Revised Biological Assessment for Pile Breakwater Reconstruction, Grand Marais, Alger County, Michigan. U.S. Army Corps of Engineers, Detroit District. November 2009. www.lre.usace.army.mil/grandmaraisdocuments

6 Adverse effects on piping plover and piping plover critical habitat are mitigated through habitat created along the new breakwater, and by special mitigative measures discussed in this Environmental Assessment.

7 The discussion in this section is derived from the Biological Assessment.

8 U.S. Fish and Wildlife Service. 2003. Recovery plan for the Great Lakes piping plover (Charadrius melodus). Fort Snelling, Minnesota, USA.

Table 1. Historic Piping Plover Nesting at Grand Marais, Michigan.

Year	Superior Beach	South Beach-Carpenter Creek	South Beach-Sucker River	Lonesome Beach	Total[1]	MNFI Data[2]
1954					N/A	2
1955					N/A	4
1956					N/A	1
1979					N/A	3
1981					N/A	2
1982					N/A	2
1983					N/A	4
1984					N/A	2?
1985					N/A	2?
1986					N/A	2
1987					N/A	4
1988					N/A	3
1989					N/A	3
1990					N/A	2
1991					N/A	4
Total 1954-1991					N/A	40
1992	0	1	0	2	3	4
1993	1	0	1	1	3	3
1994	0	0	1	2	3	2
1995	1	0	0	2	3	3
1996	0	0	0	3	3	3
1997	1	0	0	3	4	4
1998	2	0	0	2	4	4
1999	2	0	0	1	3	3
2000	1	0	0	1	2	2
2001	0	0	0	1	1	1
2002	0	0	0	2	2	N/A
2003	0	2	1	1	3	2
2004	0	0	1	1	2	2
2005	0	0	0	1	1	1
2006	0	0	0	1	1	N/A
2007	2	0	0	1	3	1
2008	2	1	0	1	4	N/A
2009	3	1	1	1	6	N/A
Total 1992-2009	***15***	***5***	***5***	***27***	***51***	***35***

[1] Data from 1992-2009 were acquired from Francie Cuthbert (University of Minnesota) and based on banding data. All nests on Superior Beach, South Beach-Sucker River, and Lonesome Beach were confirmed by either eggs or egg shells. Some nests on South Beach-Carpenter Creek were not confirmed by eggs or egg shells. Nest location data were not available prior to 1992 when banding began.

[2] Data from 1954-1991 were obtained from the Michigan Natural Features Inventory database. Data were not from banded birds, and may not have been confirmed by eggs or egg shells.

steadily increased. In 2005 there were over 50 piping plover nesting pairs (Cuthbert 2006)[9], and by 2009 70 breeding pairs (USFWS 2009).[10] In 2009 breeding of Great Lakes piping plover outside Michigan occurred in the Apostle Islands, Wisconsin, and in Canada; plovers also attempted to nest in northeastern Illinois but abandoned the nest prior to egg hatching.

Historic and Current Piping Plover Usage at Grand Marais:

6.40 Historic piping plover use of the beaches at Grand Marais is summarized in Table 1. Michigan Natural Features Inventory (MNFI) historic records of piping plover usage of the beaches at Grand Marais date back to the mid 1950s. It can be assumed that piping plovers have been using these beaches for as long as they have met their habitat requirements. The piping plover population suffered historic lows in the 1980s-1990s when the numbers in the Great Lakes ranged from 12-24 individuals (Cuthbert 2006). At this time Grand Marais had 1-3 nesting pairs per year which fledged an average of 1-2 chicks each.[11] Since that time piping plover populations both on the Great Lakes and at Grand Marais have increased significantly. The 2009 Great Lakes population included 71 nesting pairs with 6 at Grand Marais.

6.41 Piping plover have historically nested at four different locations on the beaches of Grand Marais: Lonesome Beach, Superior Beach, South Beach near Carpenter Creek and South Beach at the Sucker River mouth. These four beach areas were all used for nesting in 2009 (see Table 1 for more detail).

6.42 Piping Plover Critical Habitat: The beach areas at Grand Marais, except for Town Beach, were designated as critical habitat by the USFWS (USFWS 2001). The habitat here is part of unit MI-1 and consists of 14.3km of shoreline in an 80km stretch between Whitefish Point and Grand Marais.

6.43 Critical habitat for piping plover is discussed on the basis of primary constituent elements. These constituent elements identified by the USFWS include[12]: 1) the presence of open sand areas; 2) shoreline length of 0.2km or more; 3) sand beach area of 2ha or more; 4) beach width of a minimum of 50m for 7m or more; 5) distance from normal high water line to tree line of 50m or more; 6) a gently sloping sparsely vegetated beach with 50% or less vegetative cover; 7) protective cover for nests and chicks; 8) low level of disturbance from human activities and domestic animals; 9) dynamic environmental processes that create and maintain piping plover

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9 Cuthbert, F.J. 2006. Personal communication by Applied Ecological Services of data on banded piping plovers (1993-2005).

10 U.S. Fish and Wildlife Service. 2009. Endangered piping plover chicks make history. News release Accessed August 2009.

11 Wemmer, L.C. 2000. Conservation of the Piping plover (*Charadrius melodus*) in the Great Lakes region: A landscape-ecosystem approach. Dissertation, University of Minnesota, St. Paul, Minnesota, USA

12 U.S. Fish and Wildlife Service. 2001. Endangered and threatened wildlife and plants: Final determination of critical habitat for the Great Lakes breeding population of the piping plover, Final rule (Federal register/Vol 66, No 88/ Monday, May 7, 2001/50 CFR Part 17 of Rules and Regulations).

habitat. To this should be added 10) feeding habitat. All four beaches contain the primary constituent elements, but vary in their degree above the minimum thresholds identified by the USFWS.

6.44 Lonesome Beach currently provides the best and the most successful nesting habitat, and has the most dynamic beach environment. The beach has excellent cobble for nesting, more than adequate distance from the tree line, exceptional feeding territories at the Sucker River and additional areas along the shoreline, and has the lowest level of human disturbance of any of the beaches at Grand Marais. However the beach here is maturing with sand dunes and by beach grass encroaching with an increasing accumulation of driftwood. It is also expected that the shoreline of the Lonesome Beach nesting area will erode gradually due to existing lake currents and within 30 years recent and current nesting areas will be under water. The nesting territory here has moved westward over time and will continue to move west in order to avoid the maturing and eroding beach.

6.45 Superior Beach has very good piping plover habitat, is the second most heavily utilized beach by piping plovers at Grand Marais and is expected to be relatively stable over time. It experiences much heavier visitation by people and dogs than Lonesome Beach.

6.46 South Beach-Sucker River also has good piping plover habitat, but with less well developed cobble than at Lonesome Beach and a greater distance from the Sucker River feeding area. Critical habitat is expected to change little here over the next 30 years, although the nesting habitat will probably follow the accreting beach to the north and west as a peninsula develops along the shoreline. It will also respond to changes in Sucker River mouth location.

6.47 South Beach-Carpenter Creek has good piping plover habitat, but it is closer to the tree line and has fewer cobbles than Lonesome Beach. Feeding areas are provided at the mouth of Carpenter Creek, in sand flats of old Carpenter Creek channels (although these are becoming vegetated), at a small unnamed creek, and in pools near this creek's mouth. A sand peninsula is expected to develop which will shelter the nesting and feeding areas here. As a result, sand deposition here will decrease and the beach will be much more sheltered from storms. It is expected that this will produce a much more stable beach environment, decreasing the quality of nesting territories and feeding areas.

<u>6.48 Effects of Proposed Breakwater Reconstruction on Shoreline</u>: The shoreline environment is dynamic and will not remain stable whether or not the proposed breakwater is built. Without the breakwater it can be expected that Grand Marais harbor will continue to infill for at least 30 years. A sand peninsula will develop between the South Beach-Sucker River and the South Beach-Carpenter Creek locations. In 30 years this peninsula is expected to reach 45% of the way to Coast Guard Point. This will cause the South Beach-Carpenter Creek nesting area to be protected from further sediment deposits and storm erosion, resulting in a more stable and vegetated beach area with an open beach width of <50m. The Lonesome Beach area is expected to erode and after 30 years many of the nesting locations from the past ten years will have been eliminated. The Sucker River is expected to continue to move the location of its mouth along the shoreline creating new wet sand flats in old river channels. Superior Beach is expected to remain relatively unchanged over this time period.

6.49 If the proposed breakwater is built, sand will accumulate east of the breakwater instead of farther west along South Beach and in Grand Marais Harbor. As a result a long exposed beach will develop between the existing shoreline and the east jetty at the harbor entrance. The new breakwater will immediately protect the South Beach-Carpenter Creek nesting area from further sediment deposits and storm erosion, resulting in a more stable and more vegetated beach area sooner and to a greater degree than without the proposed breakwater. Erosion at Lonesome Beach, elimination of nesting locations there, switching of the Sucker River, and creation of new sand flats in old channels of the river will occur as it would with no breakwater; however, the breakwater will reduce the overall extent of future erosion at Lonesome Beach and migration of the Sucker River mouth westward would be limited by the presence of the breakwater. The breakwater would not impact beach dynamics at Superior Beach.

6.50 Effects On Piping Plover and Piping Plover Critical Habitat: During construction of the breakwater, no direct effects are expected on piping plover or piping plover habitat at Grand Marais because breakwater construction will take place from the water and outside designated critical habitat. The breakwater will not indirectly impact piping plover critical habitat on Superior Beach.

6.51 Indirect effects on piping plovers and piping plover critical habitat will be the result of changes to shoreline dynamics as a result of the breakwater construction. Once the breakwater is created sand will begin to accumulate along the breakwater, forming new habitat suitable for piping plover on a long beach extending to the east jetty at the harbor entrance. The South Beach-Carpenter Creek nesting habitat will immediately be sheltered from sand accumulation and northeast storms. This will produce a stable environment earlier and to a greater degree than would occur without the breakwater, with a decreased likelihood that Carpenter Creek will in the short term switch back to the west and create open sand flats for feeding. Over 30 years the sheltering and stabilization of this area will occur with or without breakwater construction, but to a greater degree with the breakwater; the probability that Carpenter Creek would switch west may be slightly better without the breakwater.

6.52 As a result of the changes at all beach nesting areas, the piping plover population is expected to resemble the population that would occur without the breakwater. Based on the shoreline model and estimates of the location of nesting habitat, it might be expected that at 5 years post-construction some 13 more acres of habitat may exist under the Preferred Alternative versus Baseline (63 acres versus 50 acres). At 30 years post-construction, there may be 16 more acres of habitat under the Preferred Alternative than Baseline (39 acres versus 23 acres). At 30 years there is a potential for more good quality nesting habitat at the new beach east of the breakwater than would exist without the breakwater because of the greater habitat acreage and because nesting habitat west of the naturally-formed peninsula is expected to be poor. Impacts to the piping plover population will occur as a result of potential development on the newly accreted land at South Beach. With or without breakwater construction new land will accrete along South Beach. If there is any development on this land, the type and extend of such development will depend on local ordinances and the degree to which these ordinances are successfully enforced. If development is limited to existing developable areas, the increased distance from homes to the new beach at the breakwater may result in lower levels of human

disturbance. If development is allowed to move beyond existing developable areas, disturbance to plovers on the new beach area may increase.

6.53 Due to changes in shoreline dynamics the proposed breakwater project is likely to adversely affect piping plover and piping plover critical habitat, by accelerating the loss of habitat in West Bay (Carpenter Creek area) over that which would occur without the project. However, the project is expected to result in as much, if not more, available nesting habitat than would be available without the project.

6.54 The following conservation measures are listed in the Biological Assessment (and USFWS Biological Opinion—see next section) and would be implemented as part of the proposed action to reduce project effects on piping plover and piping plover critical habitat:

1. require water-based construction;

2. establish a staging area at the end of Superior Beach, associated with the existing parking lot, with no modification of critical habitat;

3. prohibit construction or excavation within 250 feet of the critical habitat lakeshore from April 15 to September 1;

4. allow the Service, MDNR, or other conservation partners to place piping plover educational signs immediately adjacent to the breakwater, with the recommendation to remove the signs each winter to prevent winter ice damage;

5. incorporate an oil spill response plan (with specific measures to protect piping plover/shoreline) in the contract for services;

6. inform contractors of the presence of piping plover and the conservation measures to reduce the potential for disturbance and require contractors to attend a one hour training session by local Service personnel to familiarize the contractors with the piping plover;

7. monitor nesting piping plovers in the action area, with an emphasis on the harbor shoreline, during construction to ensure early detection of disturbance or harassment;

8. provide six signs, utilizing the Service's layout and graphics, to educate beach users about the piping plover; and

9. work with local governments to develop an ordinance to address use of the accreted land.

U.S. Fish and Wildlife Service—Biological Opinion

6.55 The U. S. Fish and Wildlife Service has reviewed the Biological Assessment and produced a detailed Biological Opinion (BO) of the effects of the project on piping plover and piping plover critical habitat[13]. Select summary sections of the BO are quoted below:

Jeopardy Analysis

A. "After reviewing the current status of the Great Lakes piping plover, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Great Lakes piping plover.

B. "Adverse effects are likely for the Great Lakes piping plover in the action area as a result of the proposed action. We expect adverse effects in the form of reduced numbers of breeding pairs and a reduction in reproductive success of remaining breeding pairs. To assess whether such effects are likely to jeopardize the continued existence of the Great Lakes piping plover, we evaluated how the action area impacts affect the reproduction, numbers, and distribution of the piping plover population in the Great Lakes.

C. "We do not expect the loss of breeding habitat for up to two adult piping plover pairs over time to reduce adult survival or the total number of breeding pairs in the Great Lakes population because the affected piping plovers are likely to find suitable nesting habitat elsewhere within the critical habitat unit MI-1. Thus, we do not believe that the anticipated loss of breeding habitat within the action area will reduce the likelihood of achieving the current recovery goal of 150 breeding pairs.

D. "As described in the Effects section, we anticipate a reduction in the fledging rate of 0.4 chicks per pair in the action area as a result of increased exposure to predation, storm events, and human disturbance. Because the numbers of pairs affected are so few, this reduction in fledging rate at the action area level will not detectably reduce the overall reproductive success rate of the Great Lakes population; therefore, this reduction in fledging rate will not appreciably reduce the likelihood of achieving the current recovery goal of a five-year average fecundity rate of 1.5-2.0 fledglings per pair per year in the Great Lakes population. For these reasons, we conclude that the proposed action, taken together with cumulative effects, would not directly or indirectly reduce the likelihood of both the survival and recovery of the Great Lakes piping plover by reducing the species' reproduction, numbers, or distribution.

Analysis of Destruction or Adverse Modification of Critical Habitat

E. "After reviewing the current status of the Great Lake piping plover, designated critical habitat unit MI-1, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the project, as

13 December 2009. Biological Opinion on the Effects of the Grand Marais Breakwater Project on the Great Lakes Piping Plover (*Charadrius melodus*). U.S. Fish and Wildlife Service, East Lansing Field Office, East Lansing, Michigan.

proposed, is not likely to destroy or adversely modify designated Great Lakes piping plover critical habitat.

F. "As described in the Environmental Baseline section, the action area lies within critical habitat unit MI-1. The action area is one of the most productive sites and currently supports the highest number of breeding pairs within the critical habitat unit. The proposed action will adversely affect both the quality and quantity of critical habitat within the action area.

G. "Following implementation of the proposed action, approximately 3,800 feet of MI-1 will be lost over 30 years; this loss equates to 1.4 % of the MI-1 unit. As explained in the Effects of the Action on Piping Plover Critical Habitat section, we anticipate that the impacts to critical habitat will reduce the number of breeding pairs and productivity within the action area, particularly in areas west of the future breakwater. Losses within this area, however, are likely to result in only minor reductions in the total value of the critical habitat unit, as other unoccupied areas will compensate for this loss. Areas west of the proposed breakwater have also been less productive, compared to the other breeding sites in the action area. Lakeward accretion of sand will maintain the extent of piping plover habitat on the east side of the breakwater where historically productivity has been highest. These areas, along with the remaining unoccupied portions of critical habitat within MI-1, will provide suitable habitat for successful nesting such that the impacts within the action area will not noticeably affect the current and future breeding potential of the critical habitat unit. For this reason, we believe the proposed project will not appreciably reduce the overall conservation value of the critical habitat unit, and thus, is not likely to adversely modify or destroy critical habitat.

Amount or Extent of Take

H. "We expect incidental take of up to 66 piping plover chicks in the form of death as a result of increased exposure to storm events, gull predation, and ATV disturbances over the life of the project (Table 3). From ten to 30 years post construction, we expect the loss of up to seven nests at Lonesome Beach (habitat east of the breakwater) due to storm events. With an average 1.5 fledglings per pair, the loss of seven nests is equivalent to a loss of approximately ten fledglings. Additionally, starting at five years post construction, we anticipate annual chick mortality from gull predation at both Lonesome Beach and Superior Beach. This will result in the loss of 27 chicks from both sites or a reduction in fledging rate of 0.3 fledglings per nest. From 10 – 30 years post construction, both gull predation and ATV disturbance will result in take of up to 29 fledglings at Lonesome Beach (reduction of 0.55 fledglings per pair).

Effect of Take

I. "In the accompanying Opinion, we determined that the anticipated reduction in chicks is not likely to detectably affect the overall fledging success of the Great Lakes piping plover. Hence, the proposed action will not appreciably reduce the likelihood of recovery or survival of the Great Lakes population of piping plover. Therefore, we believe that the level of anticipated incidental take associated with construction of the proposed breakwater

in Grand Marais is not likely to jeopardize the species.

Reasonable and Prudent Measures

J. "The following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize incidental take of Great Lakes piping plover:

> "1. Ensure proper implementation of the conservation measures as described in Description of the Proposed Action. Inappropriate execution of these measures would result in a higher level of incidental take than we considered in our jeopardy analysis; therefore, proper implementation is necessary to avoid potential take associated with construction activities and with monitoring breeding piping plovers during construction. The Terms and Conditions for this RPM provide details regarding proper implementation of the conservation measures.
>
> "2. Implement measures that will minimize the incidental take of Great Lakes piping plovers as a result of increased predation and recreational uses of piping plover nesting habitat, pursuant to 50 CFR 402.14(i)(1)(ii). The breakwater project will result in increased predation and increased disturbance from recreational use; therefore, this RPM is necessary to minimize this take to the extent practicable.
>
> "3. Report on the progress of breakwater construction and its impact on the species, as required pursuant to 50 CFR 402.14(i)(3).

Terms and Conditions

K. "Exemption from the prohibitions of section 9 of the ESA requires the Corps to comply with the following terms and conditions, which implement the RPMs described above and outline required reporting and monitoring requirements. Terms and conditions are non-discretionary.

L. "The following terms and conditions implement the first RPM:

> "1.1 The Corps will notify all staff and breakwater contractors of the conservation measures described on pages 13 and 14 of this Opinion and ensure compliance with these measures.
>
> "1.2 The Corps will implement conservation measure #7 (Monitor piping plover during construction to detect disturbance or harassment associated with construction) in adherence to the following:
>
>> "a. Piping plover monitors (Corps personnel or hired contractors) must have an educational background and experience in wildlife biology.
>>
>> "b. Piping plover monitors will attend a one-day training session on piping plover conservation, hosted by the Service or Service-approved partner.

"c. Piping plover monitors will follow Service protocols, provided during the training session, related to monitoring piping plover during the breeding season (April 15 – September 1).

"d. Monitoring will include the documentation of locations of territorial or courting plovers, nest locations, and areas used by adults and chicks for foraging in the vicinity (0.25 mile) of construction.

"e. Monitors will record observations of any response of incubating piping plovers to construction-related disturbances (such as noise, heavy equipment usage, etc.) in the vicinity of the project site.

"f. Contact the Service immediately upon observation of changes to normal piping plover breeding behavior related to the aforementioned construction-related disturbances. Contact staff at the East Lansing Field Office (517) 351-2555 or Upper Peninsula Sub-Office (906) 226-1240.

"1.3 The Corps will immediately halt construction activities that are observed to disrupt normal piping plover breeding behavior.

"1.4 The Corps will ensure that contractors have a spill response plan and spill containment materials on site during construction. Contractors will have sufficient training to implement the response plan and will do so in the event of a spill.

"1.5 The Corps will submit a report to our office within 60 days of completing breakwater construction. This report will describe the actions taken to implement each of the above terms and conditions and include the dates of actual construction activities.

M. "The following terms and conditions implement the second RPM:

"2.1 The Corps will install, or fund the installation of, a permanent ATV/off-road vehicle barrier at the end of Cemetery Road in Grand Marais. Construction of the barrier will occur within two years after construction of the breakwater and upon obtaining all required state or local approvals.

"2.2 The Corps will assess the number of gull nests on the breakwater at five, ten, and 15 years following construction. If more than 50 nests are found during the breeding season, the Corps or its agent will implement measures to reduce gull numbers. This may include lethal or non-lethal measures, such as hazing or placement of permanent gull nest deterrents.

"2.3 The Corps will submit a report to our office within 60 days of completion of each of the terms and conditions described above under the second RPM. This report will describe the actions taken to implement the terms and conditions and

include the dates of activities.

N. "The following terms and conditions implement the third RPM:

"3.1 The Corps or its agent will determine the average annual number of piping plover nests and the number of chicks fledged per pair as measures of incidental take within the action area at ten and 15 years post construction. Such a determination will require ten years of consecutive monitoring from five to 15 years post construction. To assist in meeting this requirement, we encourage the Corps to:

"a. Coordinate with the Service by February 1 each year to determine if such information will be collected during the course of regular recovery program activities within the Great Lakes. If no such efforts are occurring in any given year within the action area, the Corps will be responsible for collecting the required information.

"b. Secure an agreement with an entity, such as the National Fish and Wildlife Foundation, to facilitate long-term funding of monitoring.

"3.2 The Corps will ensure that personnel or contractors monitoring piping plover under 3.1 will:

"a. Possess an educational background and experience in wildlife biology.

"b. Attend a one-day training session, annually, on piping plover conservation, hosted by the Service or Service-approved partner.

"c. Follow Service protocols, provided during the training session, related to monitoring piping plover during the breeding season.

"d. Document nest location, nest loss, and chicks fledged per nest east of the breakwater, west of the breakwater, and at Superior Beach.

"e. Prepare and submit to the Service an annual report by December 31 of each year.

"3.3 The Corps or project contractors shall immediately notify the Service upon locating an injured or dead piping plover or detecting the loss or abandonment of a piping plover nest. Report the discovery of a dead piping plover and/or an abandoned nest or non-viable egg specimen within 24 hours (48 hours if discovered on a Saturday) to the East Lansing Field Office (517) 351-2555 or Upper Peninsula Sub-Office (906) 226-1240."

6.56 The Corps of Engineers intends to abide by all of the RPMs, including the terms and conditions, and will be setting aside project funds to be used for future monitoring of the piping plover in accordance with the RPMs.

6.57 In conclusion, while the project is expected to have an adverse effect on piping plover, the Corps expects that effect to be offset by the creation of new piping plover habitat as a result of the proposed action. As such, and with the incorporation of the aforementioned conservation measures and the above listed reasonable and prudent measures, it is the Corps determination that the proposed reconstruction of a breakwater at Grand Marais Harbor, Michigan, would not have a significant adverse effect (short-term, long-term, or cumulative) on the Great Lakes population of piping plover or piping plover critical habitat.

Floodplains

6.58 The breakwater reconstruction would occur within the waters of Lake Superior which is defined as being located within the 100-year floodplain. However, the breakwater development within the lake does not cause a harmful interference to flood flows and does not create a stage increase or harmful backwater. The proposed breakwater construction complies with the Federal Executive Order on Flood Plain Management (E.O. 11988) because there is no practicable alternative to construction in the floodplain, the breakwater would have no adverse effect on the floodplain, and the breakwater would not promote development in the floodplain.

Air Quality

6.59 Construction air quality effects would be short term and minor, consisting primarily of exhaust emissions from tugs, vessels and construction equipment. The contractor is required to prevent fugitive dust from leaving the construction sites. Construction impacts are considered short term. Thus, the project impacts are exempt as *de minimis* (Latin for 'of minimal importance') and meet the Conformity Requirements under Section 176 (c) of the Clean Air Act and 40 C.F.R. 93.153.

Recreation, Noise and Aesthetics

6.60 Recreation and tourism are a large part of the local economy in the Grand Marais area. A variety of parks, campgrounds, winter sports areas, and historic and scenic sites are available in the Grand Marais vicinity, which is comprised mostly of forested lands. The most prominent recreational feature in the project vicinity is the Pictured Rocks National Lakeshore, which begins immediately west of Grand Marais and extends about 30 miles along the shore, nearly to Munising. Within Grand Marias Harbor the main recreational features are Town Beach and parts of Superior Beach that are open to the public. Otherwise, much of the riparian waterfront land in the harbor is privately owned.

6.61 Project activities within the water would not have significant adverse effects on recreation. The breakwater will make the harbor safer and more useable for recreational activities, including fishing.

6.62 Noise and other aesthetic impacts from the proposed construction activity would be temporary and minor, other than the permanent inclusion of the stone breakwater in the harbor, which would be present in various views of the lake from shore. The low profile of the

breakwater in the water limits the aesthetic effects and would only block views of the lake for viewers immediately behind the breakwater who are low enough to be below the breakwater crest. This would typically occur for viewers in a boat inside the harbor.

Cultural Resources

6.63 The Village of Grand Marais enjoys a rich history dating back to the 1800's. The first permanent trading post was established in 1861 at Grand Marais. By the late 1800's cargoes of lumber and fish were shipped from the harbor. A Coast Guard Life Saving Station was established in the harbor in 1899, later replaced by a US Coast Guard Station in 1940. The National Register of Historic Places and available shipwreck maps have been reviewed. No historic properties, items, sites, or shipwrecks are documented in the area under consideration for breakwater rehabilitation. A number of shipwrecks are noted as having sunk outside Grand Marias Harbor, though it appears that none sank along the breakwater. The breakwater could be eligible for inclusion in the National Register of Historic Places solely based on its construction date (1895-1907); however, the massive deterioration that has occurred has left little of the original structure. The breakwater no longer retains integrity because of its dilapidated condition.

6.64 The Corps has determined that the current proposal to reconstruct the rubble-mound breakwater at an angle of 55 degrees from the original alignment would not result in an adverse effect on cultural resources. This determination was coordinated with the State Historic Preservation Office (SHPO) in 2002. The SHPO stated in a letter of July 16, 2002, their opinion that "**no historic properties** are affected within the area of potential effects of this undertaking." They also noted, however, that the project site is an area of high archeological sensitivity and that it is possible that unrecorded shipwreck remains may be present near the former breakwater. Since the reconstruction breakwater will be in an area of relatively recent sand deposition and away from the original breakwater location (except where it attaches to the east jetty), it is unlikely that a ship wreck would be discovered during construction.

6.65 As a precaution, contract specifications will state that, if during construction the contractor observes unusual items that might have historical, archaeological, or cultural value, the contractor shall protect those items and immediately report the find to the Contracting Officer so that the District Archaeologist (USACE) may notify the State Historic Preservation Office.

Traffic and Safety

6.66 Materials and equipment may be transported to the project site by boat or by truck. Operators of equipment used during the proposed project are required to obey all applicable federal, state, and local laws, construction ordinances, and city-imposed hauling/unloading time restrictions and to obtain appropriate permits. The contractor would be required to comply with U.S. Coast Guard (USCG) regulations applicable to marine work. Project operations would be conducted to minimize interference with boat traffic, but at times may result in some congestion and temporary vessel delays; however, the completed project would provide a safe harbor of refuge.

Coastal Zone Management

6.67 The project is within the coastal zone as defined by the Michigan Coastal Management Program. The rock breakwater would protect vessels within the harbor of refuge, comply with state water quality standards, and would not cause a significant adverse environmental effect. As discussed under Shoreline Processes (beginning at paragraph 6.6 above), the project would not have adverse effects on the lakeshore and would not cause erosion of adjacent shorelines. Since the project has no adverse effects on the coastal zone, it would be "consistent to the maximum extent practicable" with the Coastal Zone Management Act, and the Michigan Coastal Program.

Cumulative Impacts

6.68 No significant cumulative impacts are expected to occur between the proposed breakwater reconstruction and other projects and actions in the area. Cumulative impacts of construction of the breakwater are minor and include fuel use and air emissions from equipment, localized noise from heavy equipment operations in dredging and setting the rock for breakwater construction and increased barge traffic within the harbor during the construction period. The project will restore the function of the harbor as a harbor of refuge and will provide safe conditions for recreational users.

6.69 Piping plover critical habitat unit MI-1 extends from the eastern boundary of Pictured Rocks National Park located west of Grand Marais to the south line of Section 6 south of Whitefish Point to the east, a total length of approximately 53 miles. Within this area are three Federal navigation projects: Grand Marais, Little Lake Harbor and Whitefish Point. There are no plans for breakwater reconstruction projects at Little Lake or Whitefish Point harbors. As such the only Federal operations outside the Grand Marais breakwater reconstruction project would be periodic dredging of the navigation channels at these three harbors. Since the navigation channels are not within piping plover critical habitat and dredged material placement in the near shore waters would not have adverse effects on piping plover if done when plover are not present on the subject beaches, there would be no effect on piping plover due to these dredging operations, which are coordinated with the U.S. Fish and Wildlife Service pursuant to the Endangered Species Act prior to dredging activities.

Other Resources

6.70 The breakwater reconstruction project would not have a significant adverse impact on community cohesion, desirable community growth, tax revenues, property values, public facilities, public services, regional growth, employment or the labor force, business and industrial activity, farmland, or man-made resources, nor would it cause displacement of people. The breakwater will restore the refuge function of the harbor, providing safer boating. Maintenance requirements of the breakwater are negligible and would not have significant effect on local taxes. The breakwater represents improved public services at Grand Marais and may have minor positive benefits in many of the areas listed above.

7.0 AGENCY AND TRIBAL ADVANCE COMMENTS

7.1 Coordination with the U.S. Fish and Wildlife Service (USFWS) has been ongoing since 2002 and culminated in the production of the USFWS Biological Opinion (December 2009) regarding piping plover and piping plover critical habitat, and in a Planning Aid Letter (September 2009) to address the other fish and wildlife resources of Grand Marais.

7.2 Coordination letters were also sent to the State Historic Preservation Office (May 7, 2002), two Indian tribes and several tribal interests (October 9, 2009), the U.S. Environmental Protection Agency and the Michigan Department of Environmental Quality (MDEQ) (November 4, 2009), and the National Park Service at the Pictured Rocks National Lakeshore (November 17, 2009). Comments received are discussed below.

7.3 State Historic Preservation Office: The SHPO reviewed the proposed breakwater on a 55 degree rotation and determined that "**no historic properties are affected** within the area of potential effects of this undertaking" (July 16, 2002). They also noted that documentation regarding this project must be made available to the public and interested parties, including making a good faith effort to identify interested Native American Indian interested parties.

7.4 Response: This EA provides documentation of the project for public review and specific coordination was sent to interested Indian tribes and groups.

7.5 Michigan Department of Environmental Quality: The MDEQ noted by phone (October 15, 2009) that they are not aware of any issues with the breakwater reconstruction using the 55 degree alignment, but would route the Corps' coordination package to various state entities for comment.

7.6 Response: Comments were received from the Michigan Department of Natural Resources, Wildlife Division, and are addressed below.

7.7 Michigan Department of Natural Resources, Wildlife Division: The MDNR Wildlife Division provided comments (December 4, 2009) regarding state listed rare species and unique natural features. They provided a summary of the state database for the project site (Alger County, Section 5, T49N, R13W), which included two listings: piping plover critical habitat (state/federally endangered) and common loon (state threatened). Coordination with the USFWS was recommended regarding the piping plover. For common loon, they recommend avoiding loon nests (keep human and water related activity 500 feet away from any nest sites) during the nesting /rearing season of approximately (April 15 to August 15).

7.8 Response: The project has been fully coordinated with USFWS regarding the piping plover and piping plover critical habitat pursuant to Section 7 of the Endangered Species act, including the preparation of a Biological Assessment and the USFWS Biological Opinion, which are discussed in this EA and are available on the Corps, Detroit District, webpage (www.lre.usace.army.mil/grandmaraisdocuments). Habitat in the project construction area is not suitable for loon nesting; therefore, no impacts on loons are expected.

7.9 National Park Service: The National Park Service (NPS) office at Pictured Rocks National Lakeshore indicated their concerns have been addressed in that the shoreline analysis indicates there would be no project effects upon Superior Beach and the Grand Sable Dunes west of the project area (Correspondence of January 6, 2010).

7.10 U.S. Fish and Wildlife Service Planning Aid Letter: The USFWS produced a Planning Aid Letter (PAL) (September 28, 2009), pursuant to the Fish and Wildlife Coordination Act, to address the proposed breakwater reconstruction project. The PAL does not address piping plover or piping plover critical habitat since those two listings are handled separately in the USFWS Biological Opinion, which is summarized in this EA.

7.11 The PAL provides background information on habitat and fish and wildlife usage of the Grand Marais area, noting a diversity of migrating shorebirds use the area shoreline and that the mouths of Sucker River, Carpenter Creek and Chipmunk Creek provide important foraging areas for shorebirds. Also noted is the historic deep water fishery that was lost through infilling of the harbor, the importance of the jetties and of the Sucker River to the local fishery. Northeast winds are believed to move Sucker River outflow into the deep part of the harbor where during these conditions local fishermen fish for lake trout, coho, steelhead and whitefish. The Sucker River provides spawning and rearing habitat for several species including steelhead, suckers, and smelt in the spring and brook trout and coho in the fall. The entrance jetties provide microhabitat for whitefish, menominee and lake trout which are often caught by fishermen off these structures.

Specific comments from the PAL regarding environmental effects are discussed below.

<u>7.12 Comment (Alternative 1, No Federal Action)</u>:

> "In summary, we expect the No Action alternative would provide similar habitat as currently exists for migrating shorebirds and migratory fish species. East Bay would connect to Lake Superior, potentially impacting the community of plants and animals associated with East Bay."

<u>7.13 Response</u>: West Bay habitat is changing because of shoreline accretion which, according to the shoreline modeling study, will form a peninsula partway from shore towards the east jetty. Already accretion has moved the shoreline in this area about 200 feet toward the jetty in the past several years. This shoreline accretion/partial peninsula formation would reduce wave energy into West Bay, resulting in vegetative encroachment on the shore and creek mouth habitat in West Bay over time.

7.14 Comment (Alternative 2, Original Breakwater Alignment):

a. "This alternative would present the most significant impacts to shorebirds. The entire southern shoreline at Grand Marais would no longer provide open beach habitat, thereby reducing use by shorebirds. In addition, shorebirds would no longer find the mouths and mudflat areas associated with the river and two streams as suitable foraging areas.

b. "This alternative may have mixed impacts to fishery resources. First, the breakwater would enclose Sucker River in the bay, severing the direct connection between Lake Superior and the river. The only link between the lake and the river would occur through the entry channel, and the resulting restricted access could impede fish movements into the river. The breakwater location, however, would not fragment the harbor and would provide a fairly large staging area for fish to congregate prior to migration upriver.

c. "The modeling work does not indicate erosion of land at Lonesome Point; therefore, East Bay and Lake Superior would not become connected. Wetland vegetative structure and habitat availability would likely remain similar to existing conditions."

7.15 Response: Noted. We understand the flats are wet fine-grained sand, which functions like mud flats, providing feeding areas for shorebirds. Erosion of Lonesome Point would be effectively curtailed if the breakwater were reconstructed on the original alignment.

7.16 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

a. "Due to the similarity in predicted shoreline alterations and resulting impacts to fish and wildlife resources, our comments are combined for these two alternatives together.

b. "Under both alternatives, the breakwater would block sediment and wave movement, with a significant amount of sediment accumulating east of the breakwater, although both alignments may result in increased sedimentation in the navigational channel. At 30 years post construction, the Lake Superior shoreline would move almost 800 meters (1/2 mile) north of its 2006 location (Figures 4 and 5). With this accumulation of sediment, open shoreline habitat would likely remain east of the breakwater, at least along the water's edge. A smaller portion of open beach would remain intact under the 15 degree alignment than under the 55 degree alignment, due to the more easterly terminus of the 15 degree breakwater."

7.17 Response: We do not anticipate any significant changes to shoaling patterns in the harbor entry channel due to the presence of a breakwater.

7.18 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

"The shoreline west of the breakwater, which would no longer receive sediment or waves, would become stabilized through herbaceous and ultimately woody vegetation. We anticipate the protected bay area, formed west of the breakwater, may look and act like an inland lake (Little Lake Harbor to the east may be a good comparison). In addition,

Carpenter Creek, which would outlet west of the breakwater, would become vegetated and stabilized, and the creek mouth would no longer meander along the shoreline and provide mudflats."

7.19 Response: Noted.

7.20 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

"Baird and Associates and Applied Ecological Services' White Paper (2006) included a summary of predicted Sucker River mouth migration under all alternatives. Under both the 15 and 55 degree alternatives, Sucker River would continue to migrate east to west, based on water levels. They predict that the 15 degree breakwater would block the westward migration of the Sucker River mouth, which would continue to meander on the east side of the breakwater. The 55 degree breakwater would present little or no restriction to the westward migration of the river mouth."

7.21 Response: Concur with summary of Sucker River mouth migration predictions from Baird and AES White Paper[14]

7.22 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

"On our site visit in August, the Sucker River mouth was at the approximate location of the 15 degree breakwater terminus and approximately 300 meters east of the 55 degree breakwater terminus. A shoreline resident estimated that between the summers of 2008 and 2009, the mouth moved west approximately 150 meters (Wood, pers. comm. 2009). At this approximate rate of migration, the mouth could be west of the 15 degree breakwater and at the 55 degree breakwater terminus in two years. Based on its current location and rate of westward movement, we suggest that Sucker River could exit either west or east of the breakwater under both alternatives. If the Sucker River mouth were on the west side of the breakwater, we would expect more significant impacts, similar to those discussed under the Original Alignment alternative. We recommend the USCOE analyze this potential change in river mouth location more thoroughly and make contingency plans to determine what actions may be necessary if this occurs."

7.23 Response: Since a western located Sucker River mouth is not expected in the current project time frame, a West Bay location of the Sucker River mouth is not considered in the present analysis. From the present western deflection of the sand spit at the Sucker River mouth it appears than the dominant direction of long shore transport at the mouth is to the west. With strong onshore winds, this spit could narrow or entirely close, causing floodwaters to overtop the spit resulting in the creation of a new channel to the east. This appears to be a common historic cycle. Additionally, it is likely that the farther the Sucker River mouth migrates to the west, the slower the rate of migration becomes because the flat gradient paralleling the shore would reduce flow velocities and therefore the ability of the river mouth to migrated farther west would be

14 June 2006. White paper on discussion of physical and biological impacts of the proposed Grand Marais breakwater alternatives versus the No Project scenario. Baird & Associations and Applied Ecological Services, Inc.

diminishing, except in extreme circumstances not currently anticipated. Once the breakwater is in place it is very unlikely that the Sucker River mouth would migrate past the breakwater and into the enclosed West Bay area. In event the Sucker River mouth were to be in West Bay prior to construction (if construction were delayed several years for example), further evaluation would be required.

7.24 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

> "Under both alignments, erosion would continue at Lonesome Point bluff, eventually connecting East Bay and Lake Superior. Under the 15 degree alignment, the point where erosion would start would be at the northern shore of East Bay; the widest area of erosion would be to the east and would take the shoreline 150 meters inland. Erosion under the 55 degree alignment would begin 300 meters west of the predictions under the 15 degree alternative and generally affect a larger area of shoreline and East Bay."

7.25 Response: The proposed breakwater reduces erosion at Lonesome Point compared to the no project condition. The closer the breakwater is to the original alignment the less erosion will occur at Lonesome Point, with virtually no erosion under the original breakwater alignment.

7.26 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

> a. "Under the 55 degree and 15 degree alternatives, the location of the Sucker River mouth in relation to the breakwater is critical to understanding the potential impacts to shorebird and fishery resources. As we are uncertain of whether the mouth would occur east or west of the breakwater, we have described the impacts under each scenario.
>
> b. "If the Sucker River mouth moves east of the breakwater, we expect similar impacts to shorebirds and shorebird habitat on the east side of the breakwater as described under the No Action alternative. Eroded areas may experience a loss of some beach habitat, or the beach may simply move inland. In depositional areas, maintenance of beach habitat along the water's edge would continue while dunes would form behind. The Sucker River mouth would continue to meander freely on the east side of the breakwater, providing foraging habitat for shorebirds. On the west side of the breakwater, the shoreline would become stabilized through growth of vegetation. Stabilization at the Carpenter Creek mouth would result in loss of the beach and river interface, which provides mudflats and important shorebird foraging habitat."

7.27 Response: Noted. Degradation of the habitat in West Bay would be accelerated and would occur to a greater degree than under the without project condition.

7.28 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

> "Additionally, migratory fish would have direct and unhindered access between Sucker River and Lake Superior, as under the No Action alternative. The breakwater, however, would fragment the harbor and eliminate use of the west harbor by staging fish. A fairly

large area east of the breakwater would remain intact and available for fish migrating up Sucker River."

7.29 Response: Noted. Migrating fish will enter the river during spring runoff flows regardless of the presence of the breakwater.

7.30 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

> "If Sucker River exits to the west of the breakwater, we expect the loss of additional shorebird foraging habitat. Sucker River would become stabilized along with the inner shoreline, further reducing foraging habitat for shorebirds. Migratory fisheries would no longer have direct access to Lake Superior and would need to navigate through the entry channel to find Sucker River. The predicted increased sedimentation for the entry channel would further restrict access. Those fish able to find the river mouth through the entry channel would have only a limited area for staging."

7.31 Response: Staff of the Corps' Hydraulics and Hydrology office have reviewed the project and associated studies and have determined that it is very unlikely that the mouth of the Sucker River could migrate west of the proposed breakwater after construction. Also see responses above addressing the potential for this scenario.

7.32 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

> "Finally, East Bay would connect to Lake Superior under both the 15 and 55 degree alternatives. We expect the same impacts to wetland vegetation and fish assemblages as discussed under the No Action alternative."

7.33 Response: Noted.

7.34 Comment (Alternatives 3 and 4, 15-Degree and 55-Degree Alignments):

> "In summary, impacts to fish and wildlife resources will depend on the location of the Sucker River mouth, either west or east of the breakwater. Both the 15 and 55 degree alternatives would reduce open beach habitat and result in loss of both nesting and foraging habitat for shorebirds. These impacts would become more severe if Sucker River exits west of the breakwater, as may happen under both alternatives. If the river exits east of the breakwater, migratory fish would continue to have unhindered access between Lake Superior and Sucker River for spawning. The river mouth on the west side of the breakwater would hinder fish access to the river. Regardless of the river mouth's location, fisheries may become impacted by fragmentation and loss of access to the bay west of the breakwater. East Bay would connect to Lake Superior, potentially impacting the associated community of plants and animals."

7.35 Response: The mouth of the Sucker River is not anticipated to migrate west of the proposed breakwater (see response before previous response, above). The location of the river mouth will shift across the beach as it has for years. Access from the open waters of Lake

Superior to the mouth of the Sucker River will continue with the 55 degree breakwater alignment. Fish will still have access between the jetties to the waters within the harbor as well.

7.36 The USFWS concludes the PAL with by recommending the following measures to minimize adverse impacts to fish and wildlife (other than piping plover which are separately addressed in the Biological Opinion):

7.37 Recommendation 1: "Model the likelihood for a change of location of the Sucker River Mouth."

7.38 Response: Modeling of the Sucker River mouth migration is not warranted for the low likelihood of the mouth migrating into the West Bay area prior to construction under the present anticipated construction schedule of 2010.

7.39 Recommendation 2**:** "Analyze potential measures to maintain the location of the Sucker River mouth on the east side of the breakwater without the use of riprap, revetments, or hard structures."

7.40 Response: Our Hydraulics and Hydrology Office staff have determined that the Sucker River mouth is very unlikely to migrate into the newly created harbor after construction of the breakwater at a 55 degree alignment to the original breakwater.

7.41 Recommendation 3: "Implement Mitigative measures to offset fisheries impacts if the Sucker River mouth cannot be maintained."

7.42 Response: The mouth of the Sucker River will remain open during spring runoff events across the beach to provide fishery access. No significant impacts on fisheries are anticipated.

7.43 Recommendation 4: "Avoid construction along the shoreline from May 1 to June 1 and from July 15 to October 15 to minimize disturbance to migrating shorebirds."

7.44 Response: Construction of the inner end of the breakwater within 250 feet of shore is necessary in the period from September 1 through October 31 to avoid potential impacts on piping plover. Further restriction of construction in this area would be impractical and could prevent completion of the inner end of the breakwater. The breakwater is approximately 200 feet off shore, no equipment would be allowed to operate on the shore, and the area affected is a very small fraction of the total beach area; therefore, no significant disturbances of migrating shore birds are anticipated. Birds would avoid the immediate work area, but have ample area of shoreline to use for migratory activities.

7.45 Recommendation 5: "Avoid construction in the bay from April 1 to July 15 to minimize impacts to fisheries."

7.46 Response: No significant impacts on fisheries are anticipated. Some turbidity would be generated, but the sandy material would settle quickly and would not affect fish migrations up the Sucker River. Far more turbidity would be generated by natural storm events. Fish would

have to avoid the immediate work area and therefore would not be able to access some of the jetty habitat; however, the constructed breakwater would provide new fishery habitat similar to that of the jetty.

7.47 Recommendation 6: "Analyze how the connection of East Bay and Lake Superior could influence shoreline erosion."

7.48 Response: The proposed breakwater reduces the likelihood of East Bay connecting with Lake Superior. The potential connection of East Bay with Lake Superior is not a project effect, nor would it affect the project; therefore it is not included in the analysis.

7.49 Recommendation 7: "Monitor shorebird use of the shoreline post-construction."

7.50 Response: Monitoring efforts are being focused on the Piping Plover in accordance with the Incidental Take Statement of the Biological Opinion. Use of the Grand Marais shoreline by other shorebirds would continue, with some long-term changes due to the creation of a relatively quiescent area in West Bay, which may be more conducive to species such as whimbrel, spotted sandpiper, and greater and lesser yellowlegs.

7.51 Recommendation 8: "Monitor fisheries use of the harbor and Sucker River mouth post-construction."

7.52 Response: The project is not likely to result in significant effects on the fishery. Monitoring is not considered necessary.

8.0 MAJOR FINDINGS AND CONCLUSIONS

8.1 The proposed rubble-mound breakwater reconstruction has been reviewed pursuant to the following Acts and Executive Orders: Fish and Wildlife Act of 1956; Fish and Wildlife Coordination Act of 1958; National Historic Preservation Act of 1966; National Environmental Policy Act of 1969; Clean Air Act of 1970; Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 1971; Coastal Zone Management Act of 1972; Endangered Species Act of 1973; Clean Water Act of 1977; Executive Order 11988, Flood Plain Management, May 1977; and Executive Order 11990, Wetland Protection, May 1977. The proposed project has been found to be in compliance with these acts and executive orders.

8.2 In accordance with the Federal Endangered Species Act a Biological Assessment (BA) of project effects on piping plover and piping plover critical habitat was prepared. The BA concluded that changes in shoreline dynamics attributable to the proposed breakwater project are likely to adversely affect piping plover and piping plover critical habitat, by accelerating the loss of habitat in West Bay (Carpenter Creek area) versus the no action alternative; however, over time the project is expected to result in as much, if not more, available nesting habitat than would be available without the project. In response, the U.S. Fish and Wildlife Service, prepared a Biological Opinion (BO), which includes some data interpretations and conclusions that differ from that of the BA. The BO concluded in a statement that the proposed action would not jeopardize the Great Lakes population of piping plover and estimated a take of 66 birds over a

projected 30-year period. The BO provides mitigative measures required as a part of the incidental take.

8.3 The project site is located within Lake Superior, which is defined as part of the 100-year floodplain; however, the project would not encourage floodplain development, nor would it impact flood stages. The proposed action complies with the Federal Executive Order on Flood Plain Management (E.O. 11988) because there is no practicable alternative to construction in the flood plain.

8.4 The project is within the coastal zone as defined by the Michigan Coastal Management Program. The rock breakwater would protect vessels within the harbor of refuge, comply with state water quality standards, and would not cause a significant adverse environmental effect. The project would not have adverse effects on the lakeshore and would not cause erosion of adjacent shorelines. Since the project has no adverse effects on the coastal zone, it would be "consistent to the maximum extent practicable" with the Coastal Zone Management Act, and the Michigan Coastal Program.

8.54 Pursuant to the Clean Water Act (CWA), a Section 404(b)(1) evaluation of the environmental effects of the discharge of fill material into waters of the U.S. has been prepared. The Section 404(b)(1) Evaluation concludes with the determination that "the proposed action is in compliance with Section 404 of the Clean Water Act." A Section 401 (CWA) water quality certification, or waiver thereof, would be obtained from the state prior to the signing of a Finding of No Significant Impact (FONSI).

8.6 This Environmental Assessment has been prepared in accordance with the National Environmental Policy Act (NEPA); the Council on Environmental Quality, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 CFR Parts 1500-1508); and the Corps of Engineers, *Policy and Procedure for Implementing NEPA* (33 CFR Part 230).

8.7 This Environmental Assessment concludes that 1) there are no significant cumulative or long-term adverse environmental impacts associated with the Harbor of Refuge breakwater reconstruction project; 2) the project benefits outweigh the minor, temporary impacts that may result; and 3) it does not constitute a major Federal action significantly affecting the human environment.

9.0 PUBLIC REVIEW

9.1 This Environmental Assessment will be made available to the public for a 30-day review period. Following this period and a review of the comments received, a final determination will be made by the District Engineer regarding the necessity of preparing an Environmental Impact Statement (EIS).

9.2 Based on the conclusions of this Environmental Assessment, it appears that preparation of an EIS will not be required. Therefore, a Preliminary Finding of No Significant Impact (FONSI) is included as the following section of this Environmental Assessment. If the District Engineer

determines that an EIS is not necessary, the Preliminary FONSI would be finalized and the proposed breakwater reconstruction project would be implemented.

10.0 **PRELIMINARY STATEMENT OF FINDINGS AND FINDING OF NO SIGNIFICANT IMPACT**

10.1 Proposed Action: The U.S. Army Corps of Engineers, Detroit District (USACE), proposes to reconstruct the breakwater that once existed at Grand Marais Harbor. The proposed action is to reconstruct the breakwater on a rotated alignment, approximately 55 degrees landward from the original breakwater alignment. The reconstructed breakwater would attach to the east harbor entrance jetty and extend landward approximately 2500 feet to provide a protected basin for boater safety. The breakwater reconstruction is needed to protect the harbor basin, a designated Harbor of Refuge, from storms and infilling with sand. Alternatives considered include 1) No Federal Action, 2) Original Breakwater Alignment, 3) Rotate Alignment 15 Degrees Landward, and 4) Rotate Alignment 55 Degrees Landward.

10.2 Coordination: The proposed breakwater reconstruction for Grand Marais Harbor, Michigan, has been coordinated with the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the Michigan Department of Environmental Quality, the Michigan State Historic Preservation Office, the National Park Service at the Pictured Rocks National Lakeshore, and various Native American Tribes and groups. Comments received have been addressed and are discussed in the Environmental Assessment (EA)—*Pile Breakwater Reconstruction, Grand Marais Harbor, Alger County, Michigan*. This EA was provided these and other agencies, tribes, and the public for a 30-day review and comment period.

10.3 Environmental Effects: The Detroit District, Corps of Engineers, has assessed the environmental impacts of the proposed breakwater reconstruction project. The EA indicates that the proposed rubble-mound breakwater would not result in significant adverse environmental effects. Nor would it be expected to result in any significant cumulative or long-term adverse effects. Adverse effects are minor, including short-term noise and air emissions from equipment operation; temporary turbidity from construction operations; temporary displacement of fish; destruction of any bottom-dwelling organisms in the immediate work area; and modification of shoreline habitat and associated effects on shorebirds, including the Federally listed piping plover and piping plover critical habitat. Adverse effects on piping plover and piping plover critical habitat are mitigated through habitat created along the new breakwater, and by special mitigative measures. The project would be beneficial in preventing further sand filling of the harbor basin and by providing shelter from storm waves for safe use of the harbor. A rock breakwater would provide aquatic habitat in place of the existing shifting sand substrate. Fish would return upon completion of construction and the breakwater would be colonized by aquatic organisms and would provide habitat for fish and other wildlife.

10.4 The EA addresses project impacts on the Federally and State-listed piping plover and Federally designated piping plover critical habitat, which occurs on many of the beaches at Grand Marais. The selected breakwater reconstruction alternative has the least adverse impact on piping plover of the three alignments considered. In accordance with the Federal Endangered Species Act a Biological Assessment (BA) of project effects on piping plover and piping plover critical habitat was prepared. The BA concluded that changes in shoreline dynamics attributable to the proposed breakwater project are likely to adversely affect piping plover and piping plover critical habitat, by accelerating the loss of habitat in West Bay (Carpenter Creek area) versus the

no action alternative; however, over time the project is expected to result in as much, if not more, available nesting habitat than would be available without the project. In response, the U.S. Fish and Wildlife Service, prepared a Biological Opinion (BO), which includes some data interpretations and conclusions that differ from that of the BA. The BO concluded in a statement that the proposed action would not jeopardize the Great Lakes population of piping plover and estimated a take of 66 birds over a projected 30-year period. The BO provides mitigative measures required as a part of the incidental take.

10.5 Determinations: The proposed rubble-mound breakwater reconstruction has been reviewed pursuant to the following Acts and Executive Orders: Fish and Wildlife Act of 1956; Fish and Wildlife Coordination Act of 1958; National Historic Preservation Act of 1966; National Environmental Policy Act of 1969; Clean Air Act of 1970; Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 1971; Coastal Zone Management Act of 1972; Endangered Species Act of 1973; Clean Water Act of 1977; Executive Order 11988, Flood Plain Management, May 1977; and Executive Order 11990, Wetland Protection, May 1977. The proposed project has been found to be in compliance with these acts and executive orders.

10.6 The proposed action complies with the Federal Executive Order 11988, Flood Plain Management, because there is no practicable alternative to construction in the flood plain, the project would not impact flood stages, and would not encourage development in the floodplain. The project it would be "consistent to the maximum extent practicable" with the Coastal Zone Management Act, and the Michigan Coastal Program, because the breakwater would protect vessels within the harbor of refuge, complies with state water quality standards, would not have adverse effects on the lakeshore, and would not cause erosion of adjacent shorelines.

10.9 The EA includes a Section 404(b)(1) Evaluation, pursuant to the Clean Water Act (CWA), for placement of rock fill material into the waters of the United States as part of the breakwater reconstruction. The proposed rubble-mound breakwater has been determined to be in compliance with Section 404 of the CWA. The State of Michigan has indicated the project would comply with State water quality standards, pursuant to Section 401 of the CWA.

10.10 Finding and Conclusion: Review of the proposed breakwater reconstruction at a 55 degree angle from the original alignment for Grand Marais Harbor, Michigan, and of the comments received during agency/public review of the EA and Section 404(b)(1) evaluation, indicates that the project does not constitute a major Federal action significantly affecting the quality of the human environment; therefore, an Environmental Impact Statement will not be prepared.

_____ _____

Date

James B. Davis
Lieutenant Colonel, U.S. Army
District Engineer

CLEAN WATER ACT
SECTION 404(b)(1) EVALUATION

Of the Effects of Placing Fill Material into the Waters of the United States

PILE BREAKWATER RECONSTRUCITON
GRAND MARAIS HARBOR
ALGER COUNTY, MICHIGAN

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III. FINDING OF COMPLIANCE OR NON-COMPLIANCE 11

I. PROJECT DESCRIPTION

a. Project Location. Grand Marais Harbor, Alger County, Michigan on the south shore of Lake Superior approximately 75 miles west of Sault Ste. Marie, Michigan.

b. General Description of Project. The Corps of Engineers project, reconstruction of the dilapidated and non-functional breakwater, consists of constructing a rock breakwater approximately 2,200 feet in length. The breakwater will connect to the southern end of the existing east harbor entrance jetty but will angle 55 degrees landward from the original breakwater location. This project will restore the viability of the Harbor of Refuge and minimize further infilling of the harbor from sands transported in the littoral drift.

c. Authority and Purpose. Grand Marais Harbor (including the entry channel, jetties, and the original breakwater, as well as operation, maintenance, and repair activities) is authorized under the River and Harbor Act of 1880. This authorization refers to Grand Marais Harbor as a "Harbor of Refuge."

d. General Description of the Dredged / Fill Material. The rubble-mound breakwater would be constructed with a core of smaller stones, a filter stone layer of intermediate-sized rock, and an outer layer of large armor stones.

(1) General Characteristics of Material (grain size, soil type). The breakwater will be constructed of quarried limestone rock consisting of core stone (2"-8" diameter), filter stone (8"-18" diameter) and armor stone (6-12 tons, 75% > 7 tons).

(2) Quantity of Material. The breakwater is 2200 lineal feet in length (including the dog leg) and constructed using approximately 21,000 tons of core stone, 16,000 tons of filter stone and 50,000 tons of armor stone.

(3) Source of Material. The limestone will be quarried from one or more commercial pits, dependant upon rock specifications.

e. General Description of the Proposed Discharge Site(s).

(1) **Location of Breakwater Reconstruction**. The proposed rock breakwater would be connected to the southern end of the eastern harbor jetty and angle towards shore at a 55 degree angle from the original breakwater alignment. The breakwater is of a dog leg design and ends approximately 200 feet off the existing shoreline.

(2) Size. The proposed breakwater is approximately 2,200 lineal feet (LF) in length including the 200-foot long dog leg. The footprint of the breakwater will cover approximately 5.5 acres of existing lakebed.

(3) Type of site(s) (confined, unconfined, open water, etc.). The project site includes the

unoccupied shallow (1'-12'), near shore waters of Lake Superior within the footprint of the old harbor.

(4) Type(s) of habitat. The lake bed (Great Lakes bottomlands) is comprised of sand (greater than 95% very fine sands or larger materials).

(5) Timing and duration of discharge. Construction would likely occur during the construction season between May and October. Dredging would occur after July 15 unless a waiver from the approved dredging window was granted by the state. No work would occur within 200 feet of the shoreline until after August 15 to insure the work does not impact the piping plover, a Federally endangered bird or designated critical plover habitat. Construction activities would occur over a 4-6 month period.

(6) **Location for Placement of Excavated Sand**. Suitable excavated sandy material would be beneficially placed in the near shore waters (between the 4-foot and the 8-foot depth contours) at the State-designated High Risk Erosion Area (HREA) located approximately 1.3 miles east of the harbor. Alternately the material may be placed at the existing open-water disposal site ½ miles by ½ miles square, located 1 mile due north from the west pier light.

(7) Size. The HERA site begins at a point approximately 2500 feet east of Cemetery Road (if extended to the shore), and extends approximately l000 feet east along the shore. Placement would be approximately between the 4-foot and 8-foot dept contours. The open water site is approximately 1/2-mile by 1/2-mile in area, located 1 mile due north from the west pier light.

(8) Type of site(s) (confined, unconfined, open water, etc.). The HERA site is near shore beneficial placement. The other site is open water lakebed placement.

(9) Type(s) of habitat. Habitat at the HERA site is limited by ongoing severe erosion and would generally be sandy. The open water site would be expected to have a sandy bottom.

(10) Timing and duration of discharge. Sand placement into either site is expected to occur with in the period September 1 through October 30.

f. General Description of Disposal Method. It is anticipated that construction of the proposed rock breakwater would occur using heavy, water based equipment and barges to deliver the rock to the open water project sit and set the rock in place. In-water excavation is required for the inner approximately 800 feet of breakwater. Disposal of excavated sandy materials would most likely be by barge to the high risk erosion area or the open water disposal site.

II. FACTUAL DETERMINATION

a. Physical Substrate Determinations. The existing substrate at the Grand Marais breakwater and sand placement sites is wave-swept, sandy lakebed. There are no wetlands at the sites. Placement of the rock for breakwater construction would not significantly affect long-term chemical, physical, or biological characteristics of the harbor. Placement of the rock for the rubble-mound breakwater will replace a limited area of existing sandy, lakebed. The sheltered inner slopes of the rock breakwater would further add to habitat variety. As a result, populations of algae, benthic macro-invertebrates, and fish may become somewhat more diverse and abundant. Sand placement would not significantly affect long term shoreline processes or the lakebed.

(1) Substrate elevation and slope. The crown of the rock breakwater will extend to 8 feet above low water datum (IGLD, 1985). The maximum depth of rock breakwater would be 16 feet, near the existing jetty. Sand placed in the HERA or the open-water site would temporarily elevate the lake bed, but is expected to be distributed by waves and/or currents.

(2) Sediment type. Rock will replace 5.5 acres of existing sandy lake bed. Fine to coarse sand and small stones would be placed in the HERA or open-water sites.

(3) Dredged / fill material movement. Sandy material is being transported by long shore currents and filling in the harbor of refuge. Construction of the breakwater to prevent further infilling of the harbor will result in a long term filling of the shallower waters east of the proposed breakwater. Over many years, the existing shoreline will move lakeward, until a new equilibrium is reached.

(4) Physical Effects on Benthos (burial, changes in sediment type, etc.). Sandy, near shore, wave swept lakebed of the breakwater construction site and the HERA sand placement site generally contains little benthos because of the shifting sand substrate. Likewise, the current swept open water site is expected to be generally sandy substrate with minimal benthos. Aquatic organisms within the sediments at the location of the proposed breakwater and sand placement sites would be buried by the placement of rock for breakwater construction or removed during excavation of the underlying sediments where dredging is required. The rock substrate will create a stable habitat for other benthic organisms. Organisms within the water column will likely be able to relocate during breakwater construction.

(5) Other effects. Any sandy sediments suspended during the placement of the rock will settle quickly and any resulting turbidity plume generated during construction will be localized and short lived.

(6) Actions Taken to Minimize Impacts . Alternative breakwater designs, footprints and alignment were all considered prior to selecting the proposed design and alignment. The selected alternative minimizes occupation of the open waters and bottomlands

while still providing protection for vessels in the harbor of refuge and minimizing further sand encroachment into the harbor.

b. Water Circulation, Fluctuation, and Salinity Determinations.

(1) Water. The reconstructed breakwater and in-water sand placement would not significantly affect water circulation or lake level fluctuation in Lake Superior. The construction of the breakwater would change water circulation in the enclosed part of the harbor creating a quiescent protected basin for refuge from storms. Water circulation in the harbor is expected to continue because of wave action entering the harbor entrance channel, resulting regular disturbances within the harbor basin to avoid significant stagnation within the basin. Without the breakwater, infilling sand would over the long term, reduce circulation within the West Basin through creation of shallower depths and a land spit from the south shore extending partway to the east jetty, thereby blocking some wave energy and circulation.

(2) Water chemistry –The reconstructed breakwater would not significantly affect water circulation, water chemistry or salinity in the harbor or Lake Superior.

(a) pH – No significant effect.

(b) Salinity – No significant effect.

(c) Salinity Gradients – Not applicable.

(d) Clarity – Minor, temporary increases in turbidity may occur during construction of the proposed rock breakwater and sand placement in-water. This could cause short-term reduction in water clarity. Effects on clarity would be minimal as sand remains in suspension a very short time. Natural storm events produce similar effects in greater magnitude and area extent.

(e) Color – A minor, temporary change in color may occur due to the potential minor increase in turbidity during construction. These effects would return to pre-project conditions shortly after completion of construction.

(f) Odor – No significant effect.

(g) Taste – No significant effect.

(h) Dissolved gas levels – No significant effect. Any potential changes in dissolved gas levels would be the result of minor, temporary increased turbidity and would be short-term.

(i) Temperature – No significant effect.

(j) Nutrients – No significant effect.

(k) Eutrophication – No significant effect.

(l) Others as Appropriate – not applicable

(2) Current Patterns and Circulation. Current conditions include dilapidated breakwater and existing harbor entrance jetties.

(a) Current patterns and flows – The reconstructed breakwater will alter the existing long shore currents and prevent sand that is currently moving in the long shore currents from continuing the infilling of the harbor of refuge. Over several decades, the sand will deposit east of the new breakwater and move the existing shoreline of Lake Superior waterward.

(b) Velocity – No significant effect.

(c) Stratification – No significant effect.

(d) Hydrologic effect – No significant effect.

(3) Normal Water Level Fluctuations. No significant effects.

(4) Salinity Gradients. Not Applicable.

(5) Actions That Will Be Taken to Minimize Impacts. Construction of the breakwater will result in continued viability of the harbor of refuge while minimizing the impacts to lakebed filling. Sediments moving in the longshore currents will deposit sand within the existing open water area east of the proposed breakwater.

c. Suspended Particulate / Turbidity Determinations. Placement of rock for the reconstruction of the rubble-mound breakwater and placing sand in the HERA or open-water sites would result in minor, temporary turbidity.

(1) Change at Placement Site. A minor, temporary increase in turbidity may occur during construction of the proposed rock breakwater. This could cause short-term reduction in water clarity. Effects on clarity would be minimal as the lakebed is predominantly sand and suspended materials settle quickly. These effects would return to pre-project conditions when lakebed materials are not being dredged and rock materials are not being placed in the water. Additionally, storm induced turbidity would be reduced within the enclosed harbor basin after the breakwater is in place.

(2) Effects on Physical Properties of the Water Column. Ambient conditions of Lake Superior at Grand Marais are generally clear except during storm events.

(a) Light penetration – No significant effect.

(b) Dissolved oxygen – No significant effect.

(c) Aesthetics – The shoreline of the harbor is developed. The reconstructed breakwater will be visible from the Lake Superior shoreline but based on elevations, will not obstruct a view of the harbor or a view of Lake Superior from the homes located along the shoreline.

(d) Other as appropriate – None.

(3) Effects on Biota (primary production, photosynthesis, suspension / filter feeders, sight feeders). No significant effect. Temporary turbidity would be shore lived, minimal and localized at the project site, and would decrease quickly with increased distance from the work area.

(4) Actions to Minimize Impacts. Contract clauses to prevent contamination from construction equipment and a spill control plan will be in effect to help ensure timely and effective correction of any spillages. Precautions are required that are preventive of spillage.

(5) The project would be in compliance with the State water quality standards pursuant to Section 401 of the Clean Water Act.

d. Contaminant Determinations. Only clean rock, boulder and cobble material brought in from COE approved quarries would be placed in-water to construct the breakwater. Source materials would be free of metal, chemical and biological contamination. No contamination is known to exist at the disposal / placement site. Only clean cover stones and rock rubble would be used for fill material. Any fine particulate matter mixed in with stones would be removed, as necessary, from the fill material prior to placement. Project operations would cause temporary turbidity from construction activities due to disturbances of the lakebed immediately around the breakwater. Turbidity effects would be minor, dissipating over time and distance from the work area, and would not have significant adverse long-term effects on water quality.

(1) Metals. No significant effect.

(2) Chemical characteristics. No significant effect.

(3) Biological content / pathogens. No significant effect.

e. Aquatic Ecosystem and Organism Determinations. No significant effects.

(1) Plankton. No significant effects.

(2) Nekton. No significant effects

(3) Benthos. Benthos located in the sandy, lakebed in the near shore waters would be eliminated with the construction of the breakwater. The many interstitial spaces of the rock

breakwater will provide suitable habitat for re-colonization by other benthos.

(4) Mammals, birds, reptiles, amphibians and other wildlife. Project would have no significant effect on mammals, birds, reptiles, amphibians and other wildlife. Shoreline changes would modify habitat for shorebirds including Federally listed piping plover. Creation of quiescent harbor basin would provide habitat variety. Effects on piping plover are summarized in Section (6) below.

(5) Effects on the Aquatic Food Web. No negative impacts to desirable Lake Superior fish populations are anticipated as a result of this project. Access to the harbor of refuge and continued fishing opportunities for boaters from the harbor would contribute to a long-term access to the native fishery in the Great Lakes. Bottom dwelling organisms and fish habitat would be expected in and among the rocks of the breakwater. Benthic organisms such as arthropods, phytoplankton and various insects would largely be disturbed or destroyed in the immediate work area, but would re-colonize the site upon completion of the project. The rock breakwater would provide benthic habitat and would be expected to result in an increase in local invertebrate and potential fish diversity, which would positively impact the local ecology.

(6) Federally listed threatened and endangered species. Much of the beach area in Grand Marais is Federally designated critical habitat for piping plover (Federally and State-listed as endangered); therefore, in accordance with the Federal Endangered Species Act a Biological Assessment (BA) of project effects on piping plover and piping plover critical habitat was prepared. The BA concluded that changes in shoreline dynamics attributable to the proposed breakwater project are likely to adversely affect piping plover and piping plover critical habitat, by accelerating the loss of habitat in West Bay (Carpenter Creek area) versus the no action alternative; however, over time the project is expected to result in as much, if not more, available nesting habitat than would be available without the project. In response, the U.S. Fish and Wildlife Service, prepared a Biological Opinion (BO), which includes some data interpretations and conclusions that differ from that of the BA. The BO concluded in a statement that the proposed breakwater reconstruction project would not jeopardize the Great Lakes population of piping plover and estimated an incidental take of 66 birds over a projected 30-year period. The BO provides mitigative measures required as a part of the incidental take. Other Endangered Species Acts determinations for the project include that the project may affect, but is unlikely to adversely affect Pitcher's thistle, and no effect on Canada lynx or gray wolf.

(7) Effects on special aquatic sites.

(a) Sanctuaries and refuges – Not present.

(b) Wetlands – Not present.

(c) Mud flats – There are no mud flats, but wet fine-grained sand flats provide similar function to mud flats, providing feeding areas for shorebirds.

(d) Vegetated shallows – Not present.

(e) Coral reefs – Not present.

(f) Riffle and pool complexes – No significant effect.

(8) Actions to minimize effects. The location of the breakwater was aligned to provide protection for the harbor while minimizing impacts to the existing piping plover critical habitat and occupation of the Great Lakes bottomlands.

f. Proposed Disposal Site Determinations.

(1) Mixing zone determinations. The mixing zone is not expected to extend far beyond the footprint of the proposed rock breakwater due to the sandy nature of material present in the lakebed. The placement of rock will redistribute sandy sediment that will settle quickly and have minimum impact on the surrounding aquatic ecosystem. Disposal of the dredged sandy materials will be to the high risk erosion area (HREA) located 1.3 miles east of the harbor entrance where the sands will enter the littoral drift in the 2-8 foot underwater contour. An alternative disposal site is the ½ mile by ½ mile open water disposal site located 1 mile north of the harbor entrance. The preferred disposal site for the clean, sandy material is for beneficial reuse at the HREA disposal location.

(a) Depth of water at disposal site – At the location of the breakwater, the water depths vary from less than 1 foot near the shoreline to approximately 10 feet (LWD) at the jetty. At the HREA, the sandy materials would be disposed into the 2-8 foot underwater contour. The offshore, open water disposal site exceed 20-foot depths.

(b) Current velocity, direction and variability at disposal site – Water flows along the shoreline are related to winds generated by the weather patterns. The surface winds range from calm to over 50 mph during substantial storm events.

(c) Degree of turbulence – Moderate in the near shore waters during storm events. The sandy materials settle out of suspension very quickly after the disturbance.

(d) Stratification at disposal site – None.

(e) Discharge vessel speed and direction – Unknown at this time but not significant to the ecosystem because of the nature of the sediments and fast settling time.

(f) Rate of discharge – Not applicable.

(g) Ambient concentration of constituents (COC) of interest – None.

(h) Dredged material characteristics, particularly COC, amount of material, type of material (sand, silt, clay, etc.) and settling velocities – COC's are not anticipated in the clean excavated sand or clean construction materials (stone, rock, etc).

(i) Number of discharge actions per unit time – One time discharge, during construction of the proposed rock breakwater unless funding timing results in project spanning two construction seasons. Placement of rock material would occur periodically throughout construction. The disposal of the sandy dredged materials would also occur in one period of multiple bargeloads.

(j) Other factors of disposal site that affect the rates and patterns of mixing – None.

(2) Determination of compliance with applicable water quality standards. The project would be in compliance with applicable State water quality standards.

(a) Potential effects on human use characteristic – Would not be affected by the proposed action. Reconstruction of the breakwater would restore the functionality of the harbor of refuge.

(b) Municipal and private water supply – Would not be affected by the proposed action.

(c) Recreational and commercial fisheries – Minimal adverse impacts on recreational fishing could occur during construction, mainly due to congestion of the harbor area with construction equipment, but there would be no significant long-term or negative effects on recreational fisheries. Reconstruction of the breakwater would provide improved, safer conditions for vessel use within the harbor of refuge. Fishing charters operate out of Grand Marais. Commercial fishing vessels (tribal) do fish offshore of Grand Marais in area MI-7. The ports of debarkation are not listed in the Michigan Department of Natural Resources (MDNR) commercial catch reports but the vessel travel distances to the fishing grounds are shortest from Grand Marais for fishing within unit MI-7. The commercial catch consists primarily of lake trout and whitefish. Commercial and recreational vessels have used the harbor of refuge during storm events when traversing this section of Lake Superior. Overall, the breakwater, by providing habitat and boater protection, is expected to produce fishery benefits.

(d) Aesthetics – Aesthetics would be temporarily impacted during construction activities. The rock breakwater is located lakeward of the shoreline and though visible from residences, the breakwater has a low profile and would not significantly impact the lake view from inside the homes located along the shoreline. The harbor and lake would remain visible.

(e) Parks, national and historical monuments, national seashores, wilderness areas, research sites or similar preserves – Would not be affected by the proposed action. The Pictured Rocks National Lakeshore is immediately west of Grand Marais, but is

outside the zone of influence for any coastal changed produced by the breakwater projects and would not be affected. No parks, national and historical monuments, national seashores, wilderness areas, research sites or similar preserves would be adversely affected.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. The proposed action would restore the viability of the harbor of refuge and would not result in significant negative cumulative effects, including effects on the Federally threatened piping plover. Adverse effects on piping plover and piping plover critical habitat are mitigated through habitat created along the new breakwater, and by special mitigative measures.

h. Determination of Secondary Effects on the Aquatic Ecosystem. The proposed action would restore the harbor of refuge and would not result in significant negative secondary effects on the aquatic ecosystem.

III. FINDING OF COMPLIANCE OR NON-COMPLIANCE

a. Based on the above, the proposed action is determined to be in compliance with Section 404(b)(1) Guidelines of the 1977 Clean Water Act.

b. Alternatives considered for the breakwater reconstruction at Grand Marais, Michigan include: 1) No Federal Action, 2) Original Breakwater Alignment, 3) Rotate Alignment 15 Degrees Landward, and 4) Rotate Alignment 55 Degrees Landward (Figure 4). All three of the breakwater reconstruction alternatives would attach to the inner end of the east entry pier and would be of rubble-mound construction. Of the three (3) reconstruction alternatives, Alternative 4, reconstruction on the 55 degree Alignment, was the selected alternative. The selected alternative had the least impact on shoreline alterations over time while still restoring the harbor of refuge.

c. The proposed rock breakwater reconstruction project at Grand Marais, Michigan harbor of refuge, would not violate applicable State of Michigan water quality standards. A Section 401 (CWA) water quality certification, or waiver thereof, would be obtained from the State prior to construction.

d. The proposed construction project would not result in significant adverse effects on human health or welfare, municipal and private water supplies, recreational fishing, aquatic life, wildlife dependent on the aquatic ecosystem, or the diversity, productivity and stability of the aquatic ecosystem at the project site. The proposed action has been coordinated under Section 7 of the Endangered Species act, a Biological Assessment of piping plover and piping plover critical habitat was produced, and the USFWS Biological Opinion is that the project would not jeopardize the Great Lakes population of piping plover. Mitigative measures will be implemented in accordance with the Biological Opinion (Incidental Take Statement) including avoidance measures, monitoring, etc. as listed in Attachment 3 to the Environmental Assessment.

e. Appropriate steps would be taken to minimize adverse environmental impacts on the

aquatic ecosystem. Contract specifications would include specific environmental protection clauses to ensure protection of natural resources, proper installation of appropriate and effective erosion control measures.

f. The completed construction project would aid in the safe and continued use of the harbor of refuge and provide recreational boater access to sport and commercial fish species in the local area. On the basis of the *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (40 CFR part 230), it has been determined that the proposed action is in compliance with Section 404 of the Clean Water Act.

g. No significant adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation.