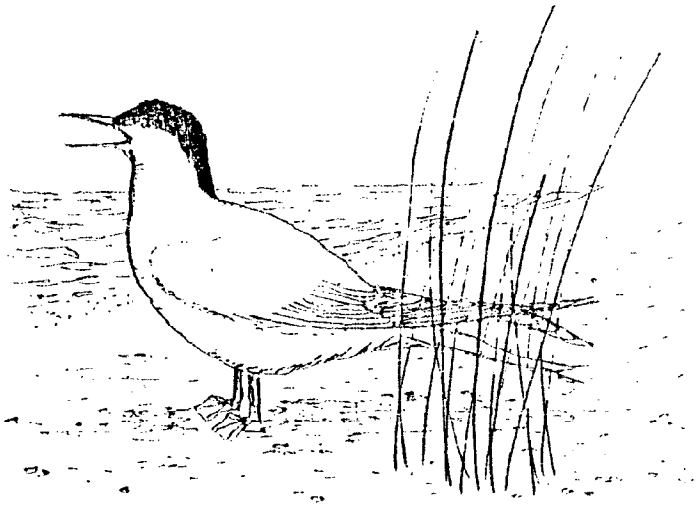
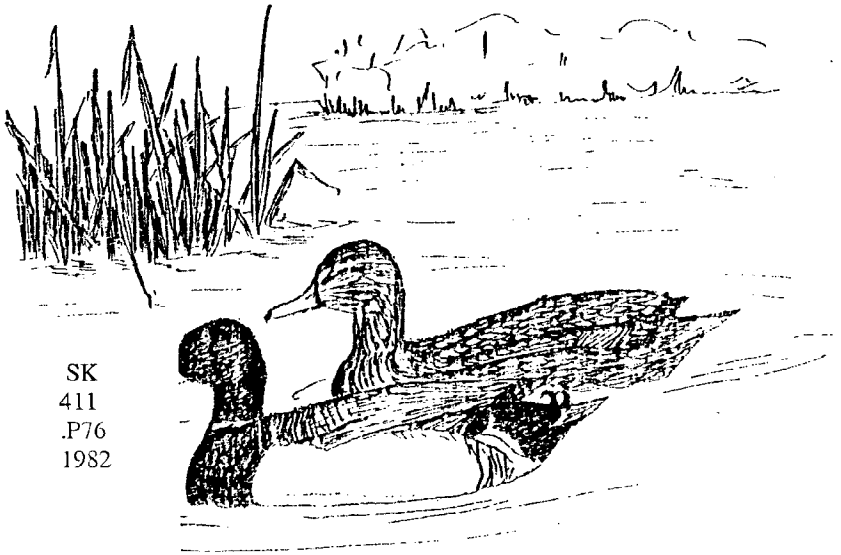
HEARDING ISLAND WILDLIFE MANAGEMENT AREA

PROPOSED MANAGEMENT PLAN





PREPARED BY: THE METROPOLITAN INTERSTATE COMMITTEE... A JOINT VENTURE VENTURE OF THE ARROWHEAD REGIONAL DEVELOPMENT COMMISSION AND NORTHWEST WISCONSIN REGIONAL PLANNING COMMISSION

PREPARED FOR: THE STATE OF MINNESOTA, DEPARTMENT OF NATURAL RESOURCES

A PROPOSED MANAGEMENT PLAN
for
HEARDING ISLAND WILDLIFE MANAGEMENT AREA
DULUTH-SUPERIOR HARBOR

November 1982

Prepared for:

State of Minnesota,
Department of Natural Resources

Prepared by:

Metropolitan Interstate Committee ...
a joint venture of the Arrowhead Regional Development Commission, Northwest Regional Planning Commission, and urban area communities.

With funds provided by:

Minnesota Department of Natural Resources
Non-Game Wildlife Program

Cover artwork: Molly Evans

TABLE OF CONTENTS

INTRODUCTION

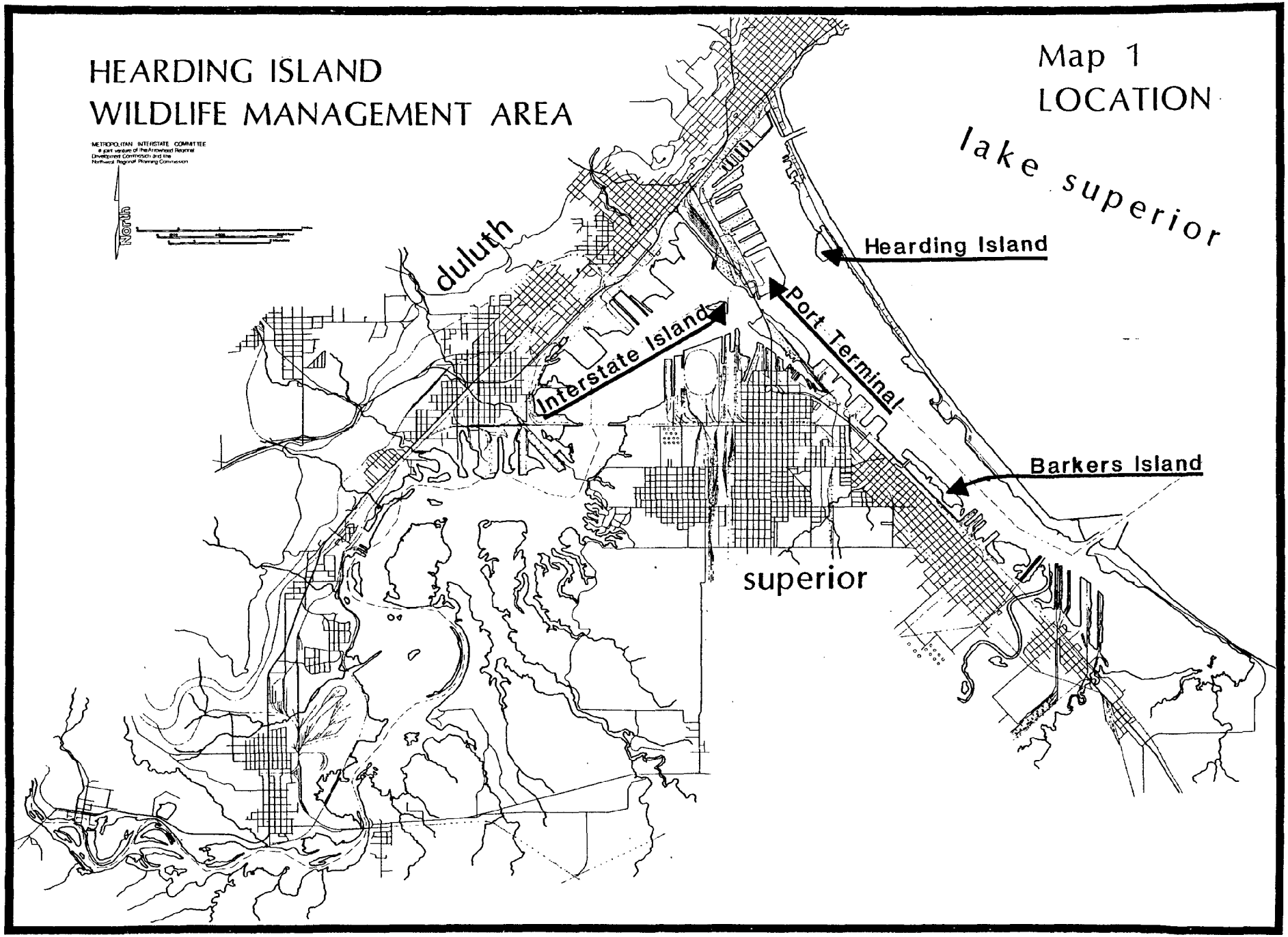
The history of the St. Louis River estuary, and in particular the lower portion which is now known as the Duluth-Superior Harbor, is typical of most natural harbors in the United States. Prior to the advent of the modern shipping industry in the late 1800's, the river was a marsh-filled estuary characterized by shallow waters and shores lined with wetland vegetation. Although quantitative information is for the most part lacking, early historical accounts indicate that, typical of estuarine systems, the river was a highly productive biological area and supported diverse and abundant flora and fauna.

Since the mid-1800's, the estuary has undergone significant change, primarily due to extensive development of the lower river as an industrial port. The major alterations which have occurred include the dredging of shipping channels and docking facilities and filling of extensive areas for use as industrial sites. The Wisconsin Department of Natural Resources has estimated that, of the initial (pre-development) 10,564 acres of open water and wetlands present, over 3,300 have been lost to development. Severe pollution of the river accompanied this rapid growth phase and exacerbated the adverse impacts of the habitat losses incurred. Although the estuary remains an important and vital fish and wildlife area, both the diversity and abundance of species utilizing it have decreased dramatically due to these significant losses of habitat.

Despite the fact that the overall environmental impact of these developmental activities has been decidedly negative, there have been some positive, albeit unintentional, effects also. The most apparent of these regards islands formed through the deposition of dredged material within the harbor. No natural islands exist in the lower estuary, but several man-made ones are present. These include Hog Island, Barkers Island, Interstate Island, and Hearding Island. While creation of these islands contributed to the loss of existing shallow water habitats, these sites also have a history as important wildlife use areas. In particular, they have provided important nesting habitat for colonial and semi-colonial bird species (Davis and Niemi, 1980). The shores and adjacent shallow waters have also served as major feeding and resting areas for various waterbirds and shorebirds.

The use of dredged material islands as colonial bird nesting sites has become a common phenomenon throughout the coastal areas of the United States, and in some regions these sites have proven quite important (Soots and Landin, 1978). As traditional nesting sites have been destroyed, use of the islands has grown.

Dredge islands have several inherent advantages as nesting sites, the most important of which is their isolation from the mainland. This results in reduced disturbance by humans and protection from ground predators. In addition, the islands often are comprised of materials similar to the nesting substrates preferred by colonial birds.


HEARDING ISLAND
WILDLIFE MANAGEMENT AREA
METROPOLITAN INTERSTATE COMMITTEE
a joint venture of the Arrowhead Regional Development Commission and the Northwest Regional Planning Commission
North
Map 1
LOCATION
lake superior
duluth
Hearding Island
Port Terminal
Interstate Island
Barkers Island
superior

Two colonial bird species have used dredged material islands as breeding sites in the Duluth-Superior harbor - the common tern and the piping plover (Davis and Niemi, 1980). The pattern of use has been similar to that seen in other areas of the United States. The birds have invaded a given island soon after its formation, used the site for a number of years, and then relocated due to encroaching vegetation (these species prefer sparsely vegetated or bare, sandy substrate for nesting). Since material has not been deposited on these islands for many years, they have become heavily vegetated and therefore unusable by the birds.

The common tern and the piping plover are critical status species. Both are endangered in the state of Wisconsin (WDNR, 1981), and preliminary critical species lists for Minnesota include the common tern as threatened and the piping plover as endangered (pers. comm., J. Green). Their status on a national basis has been of concern for a number of years also as indicated by their inclusion on the National Audubon Society Blue List - a list of bird species which appear to be undergoing significant population declines throughout their range (Arbib, 1981). The piping plover is under strong consideration for inclusion as a federal endangered species and is likely to be so designated next year.

For the last several years, essentially all of the common terns and piping plovers nesting in the St. Louis River estuary have used one site - the Duluth Port Terminal (Map 1). This site is an industrial area, and its use by these birds certainly cannot be considered one which is secure or one which will be adequate in the future (Davis and Niemi, 1980). Its progressive development poses an increasing threat to the viability of the common tern and piping plover populations. This area has also been colonized by ring-billed gulls, and their population is rapidly expanding. This species has a history of displacing terns from preferred nesting habitat, and this appears to be happening at the Port Terminal site.

This past year the number of piping plover nests dropped from the 4-5 observed the last several years to only one, and the common tern nesting population, although comparable in size to recent years, experienced very poor nesting success (T. Davis, pers. comm.). These events appear to be due to a combination of factors including disturbance by humans, predation by skunks, major construction and accompanying alteration of the site, as well as the aforementioned competition for nesting space with ring-billed gulls.

This single nesting site is not only important with respect to the estuary, but also with respect to the entire Great Lakes system. In 1977, the most recent year for which comprehensive information regarding colonial birds nesting in the Great Lakes region is available, this colony comprised nearly 70 percent of the Lake Superior and 7 percent of the entire Great Lakes breeding population of common terns (Scharf, 1978). Some changes have occurred since then, including significant growth of a colony located in nearby Chequamegon Bay (pers. comm., Fred Strand - WDNR), but the Port Terminal

colony continues to be the largest on Lake Superior and therefore of major importance to this species. Similarly, the few pair of piping plovers present in the colony are a rare occurrence on the Great Lakes. In a recent survey of the entire Great Lakes coastline of Michigan, only 31 plover pairs were found (Lambert and Ratcliff, 1981), and this past year the only nesting record for this species on Lake Superior in addition to the Port Terminal site was a single nest in Chequamegon Bay. The Port Terminal is one of only two plover nesting sites known in Minnesota. Thus, it is important that the nesting populations of these two species in the St. Louis River estuary be preserved. To attain this goal alternative nesting habitat must be provided for these birds as soon as possible.

Dredge islands such as Hearding Island, due to their historic importance and relative lack of human use, are prime candidates for development of nesting habitat. This potential was recognized in a preliminary plan for relocation of the Port Terminal colony (MIC, 1978). In that plan, Hearding Island was highly recommended for such use because of its proximity to the present nesting area and its public ownership. Similarly, the Land Use and Management Plan for the estuary (MIC, 1978) recognizes Hearding Island's value in this regard.

HEARDING ISLAND HISTORY

Hearding Island was created in 1934-35 through the deposition of sandy material dredged from the harbor bottom. Since that time, the island has been left to natural processes although additional dredged material was placed on the site in 1968 (Aguar et al., 1969). According to the original harbor chart made in 1861, the area where Hearding Island now lies was shallow water from 3 to 6 feet deep. What now is the channel between the island and Minnesota Point was predominantly wetland vegetation.

During the years immediately following its creation, the island was sparsely vegetated, and, from the early 1940's to the early 1950's, it served as the major nesting site for common terns and piping plovers in the estuary (Davis and Niemi, 1980). As many as 87 common tern nests and 10 piping plover nests were observed on the island during this period. Although precise maps are not available, it appears that the birds nested on the bayside of the island (P.B. Hofslund, pers. comm.). By the mid 1950's, encroaching willows and aspen apparently caused the birds to abandon the site.

In contrast to the island itself, the surrounding waters have undergone significant man-induced alteration since creation of the area. One of the major changes has been the dredging of a 6 foot deep boat channel between the island and Minnesota Point. This dredging was performed by the U.S. Army Corps of Engineers in 1967 in response to concerns expressed by local residents with respect to stagnant water and difficulty of boat access to the area. This dredged channel extends the entire length of the northeast side of the island and approximately 1000 feet toward the shipping lane on the southeast end of the island. In 1979, members of the Sand Point Yacht Club dredged a portion of the area again.

The extensive shallow waters between the island and the shipping lane to the west have also been altered significantly since formation of the island. In 1967, 550,000 c.y. of sand were mined from the bottom in an area off the southeast end of the island. This created a deep hole approximately 30 to 35 feet deep. An additional 150,000 c.y. of material was removed from this same site in 1976 (pers. comm., K. Yetter).

The island was designated a wildlife management area by the Minnesota Department of Natural Resources (MDNR) in 1978, and a program to develop a portion of the site as common tern and piping plover breeding habitat was undertaken. Since then, general goals and plans for the site have been discussed and preliminary site work begun. However, no detailed management plan has been formulated or adopted. Such a plan is neccesary so that the required site work can be completed and the island made suitable as a nesting area for the species of concern.

GOALS AND OBJECTIVES

General

In accord with the Duluth-Superior Harbor Land Use and Management Plan, this project will:

1. Enhance and expand the natural resource base of St. Louis Bay.

2. Enhance the habitat and overall biological value of Hearding Island in partial compensation for historic environmental losses in St. Louis Bay.

In achieving these aims, the project will also become part of the overall harbor natural resources management program (MIC, in prep.) which in turn is a refinement of and amendment to the Land Use Plan.

Specific

1. To develop and maintain a portion of the island as habitat suitable for common tern and piping plover nesting and brood rearing.

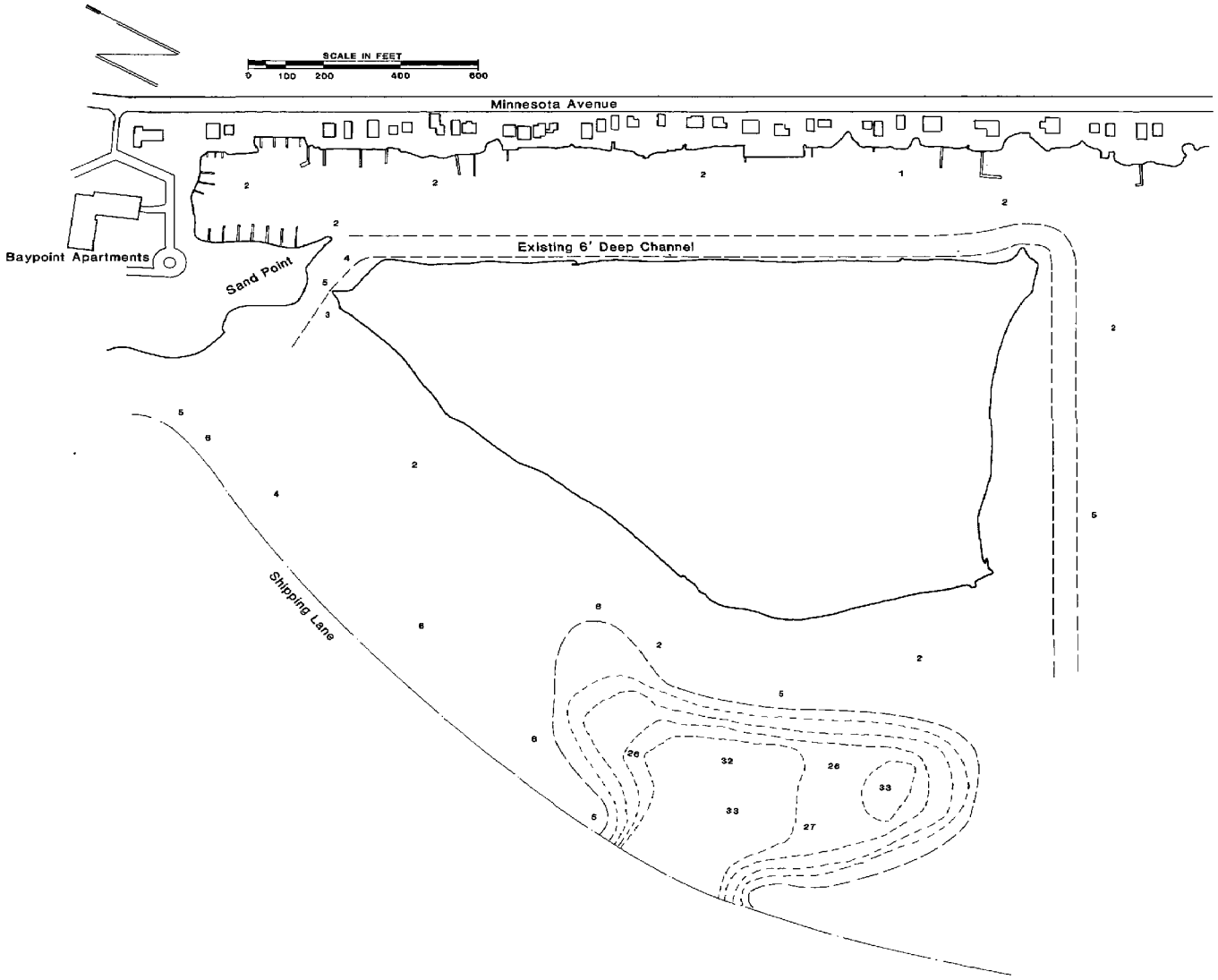
2. To maintain and/or enhance the value of the island and surrounding area as a wildlife viewing area.

3. To monitor and evaluate management activities and make recommendations for future efforts including possible enhancement of fish and waterbird use of the adjacent shallow waters.

HEARDING ISLAND
WILDLIFE MANAGEMENT AREA

PROPOSED MANAGEMENT PLAN

Map 2
HEARDING ISLAND AND VICINITY



PRESENT CONDITIONS

Physical Development

To this date, the management area has undergone no physical development, although the adjacent portions of Minnesota Point have. Most of that portion of Minnesota Point adjoining the island is comprised of private residences and many of these have small docks extending toward the island. The lands adjacent to the northwest end of the island have been developed for various purposes including two small marinas and an apartment complex. The main shipping lane lies approximately 1000 feet southwest of the island.

Zoning and Regulations (see IMPLEMENTATION section also)

Most of the adjoining portion of Minnesota Point and Hearding Island itself are zoned residential (R-1-C, single-family homes, public buildings, and home occupations) (Map 3). However, Duluth zoning ordinances allow for marina construction within residential areas through special use permits, and this option has been excercised along the shoreline immediately north of the island (Sand Point Yacht Club and private marina). A small area just northwest of these marinas is zoned commercial (C-2, highway commercial). It is in this area that the apartment complex lies.

Portions of the management area are within official floodplain and shoreland zones (Chapter 51 of administrative code, City of Duluth). A narrow strip of land along the shore of the island lies within the flood fringe. The only restrictions within such an area are that modifications shall not unduly interfere with the capacity of the waterway to handle floodwaters. No part of this management plan appears to be in conflict with this restriction. Much of the island also lies within the shoreland zone (within 300 feet of the waterway). Removal of vegetation and grading in this portion of the island, activities which are required in this management plan, may require use permits from the City of Duluth (see IMPLEMENTATION section). The official Harbor Line runs between the island and Minnesota Point and thus federal regulations which require special permits for work on any property within areas bounded by the official Harbor Line do not apply to the management area.

The shallow waters surrounding the island are navigable, public waters and are subject to MDNR and Minnesota Pollution Control Agency (MPCA) permitting procedures. Initial work on the island would not include any modifications to these waters and thus no permits would be required. However, future phases of the project, as described in later portions of this document, could involve such work.

Ownership

The State of Minnesota is legal owner of navigable waters and bottoms which lie below the low-water line of such waters. The State also claims to be owner of all fast land lying atop

such bottoms. Using these premises, the State has claimed ownership of Hearding Island and internally transferred it to the Minnesota Department of Natural Resources (MDNR). The MDNR has in turn formally designated the island a wildlife management area. In a similar fashion, the State of Minnesota is owner of the surrounding waters and bottom sediments.

Soils

The soils on the island have not been analyzed or mapped, but on-site observation indicates that the underlying material is sandy in nature. Much of the island, in particular the wooded areas, have developed a few inches of organic topsoil. The exposed and underlying sandy soil is probably Soil Conservation Service types 55 and 55W (Beaches and Wet Beaches). These are medium to coarse sand and are well-drained.

Vegetation

The vegetation on the island, typical of dredged material sites, has progressed from the sparse sand and dune species which were present during the first few years after creation to predominantly shrubs and young hardwood forest (Map 4). When the island was designated a wildlife management area in 1978, its approximate 30 acres was comprised of 18 acres of hardwood forest (*Populus spp.* mixed with *Salix spp.*), 7 acres of bare to sparsely vegetated sand, 2 acres of brush, 3 acres of wet meadow, and 1/2 acre of water and marsh (interior pond). A qualitative examination of the island was made in 1973 (National Biocentric, Inc.) and a summary of the vegetation present is given in Appendix A.

Since that time, the MDNR has conducted preliminary site work. In 1979, approximately 5 acres on the bayside of the island were cleared by chainsaw, although the tree stumps remain. This area showed signs of extensive re-sprouting of aspen suckers in 1980 and subsequently was chemically treated. An additional acre, adjacent to the original five, was hand girdled in 1979. This procedure was repeated in 1980, and essentially all of the trees in this area are now dead although still standing.

Aquatic vegetation around the island varies with location. Due to wave action and accompanying turbidity, most of the the west or bayside is essentially devoid of vegetation. Beds of sago pondweed have been reported in this area (MDNR file report, 1972), but on-site inspections this past year failed to locate any such vegetation. The bottom in this area is primarily hard-packed sand. In contrast, the east or lakeside of the island is heavily vegetated and includes species such as wild rice (MDNR, 1972).

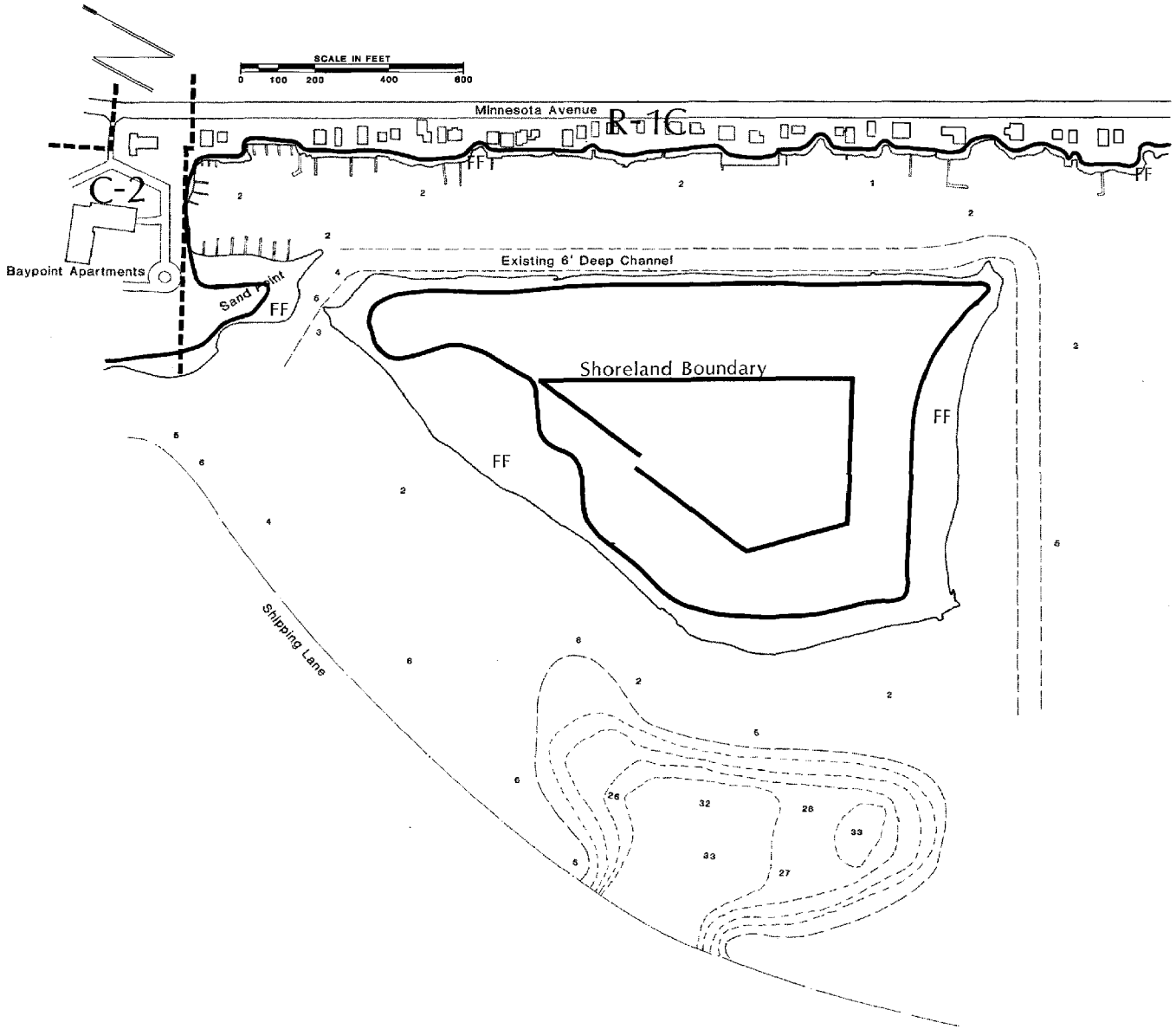
No federal or state endangered or threatened plant species are known to occur on the island or in the surrounding waters. Similarly, the habitats present on the island are not unique.

HEARDING ISLAND
WILDLIFE MANAGEMENT AREA

Map 3

ZONING

PROPOSED MANAGEMENT PLAN

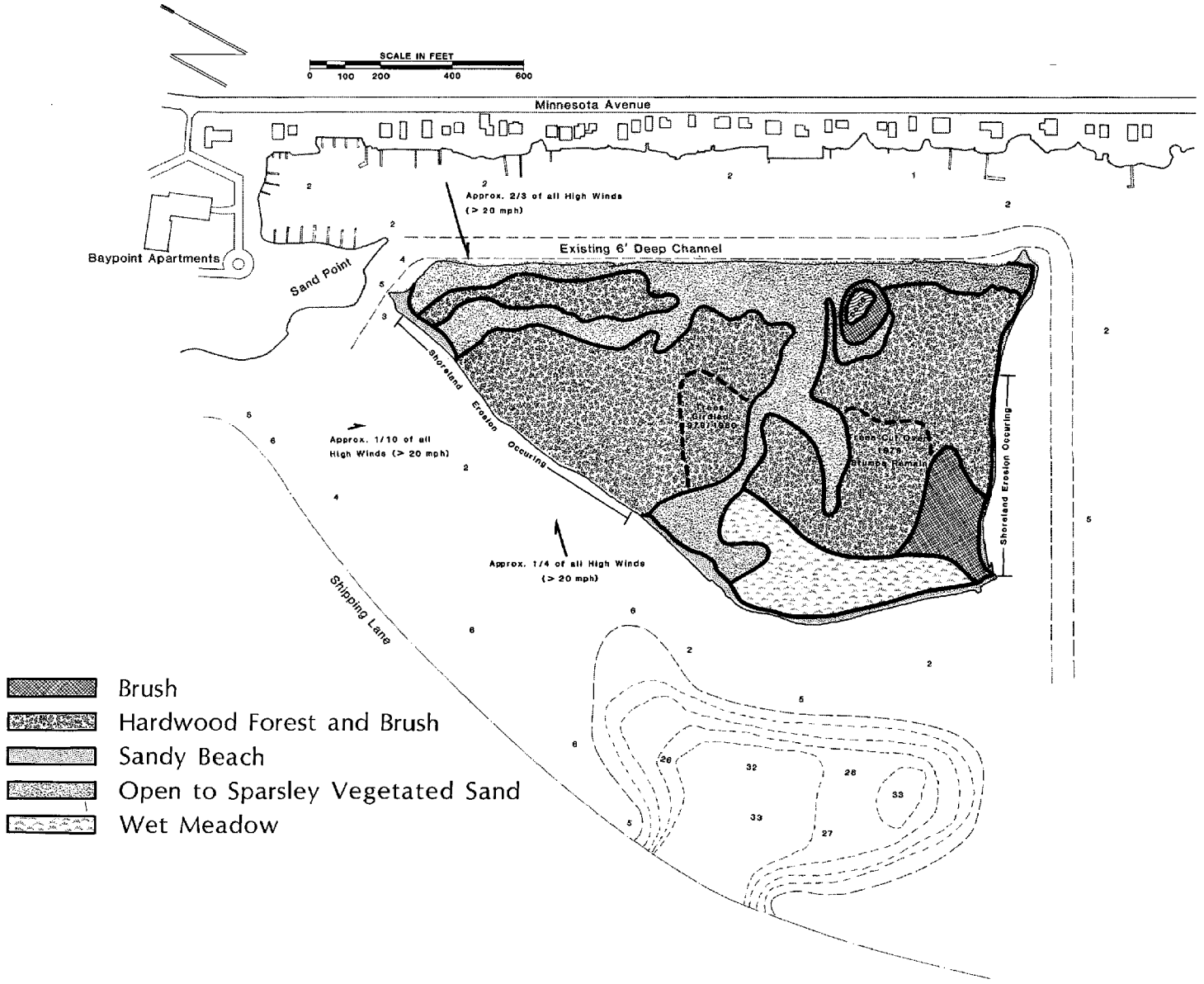


HEARDING ISLAND
WILDLIFE MANAGEMENT AREA

Map 4

VEGETATION AND OTHER PHYSICAL FEATURES

PROPOSED MANAGEMENT PLAN



Wildlife

Quantitative information regarding wildlife use of the management area is lacking for all groups but birds. Cohen (1960 and 1961) censused breeding bird populations and made general wildlife observations on the island, but the vegetation has changed appreciably since then, and his results probably are not indicative of present use of the island. More recently, Niemi et al. (1977) documented bird use of the shores and surrounding waters over a one-year period and conducted breeding bird surveys on the island. Bird species observed during this study are listed in Appendix B (Table B-1).

Bird use of the island itself is limited to species which are common and widely distributed throughout the harbor. In contrast, the beaches and shallow water adjacent to Hearding Island have been recognized as unique bird habitat. The primary importance of the area is its use by large numbers of migratory waterfowl and other water associated birds - in particular gulls and terns. This area supports some of the highest migratory waterbird concentrations in the entire St. Louis River estuary (Niemi et al., 1979). These birds primarily use the waters to the south and west of the island, although the channel between the island and Minnesota Point is also used. The latter area serves as a feeding area due to the presence of preferred aquatic food plants. The remainder of the area is used primarily as a resting/loafing area.

The most abundant waterfowl species is the mallard. It is common for over a thousand individuals of this species to be seen around the island in the fall. Several nests have been found on the island also. These birds feed on the aforementioned vegetation and are fed by local residents also.

Information regarding other wildlife use of the island comes from general observations made by local residents and biologists. These sources indicate that the interior of the island offers nothing unique or particularly valuable from a wildlife standpoint. An active beaver lodge has been present on the lakeside of the island for several years. The beaver feed on the extensive aspen on the island. Other species which have been known to or likely use the island are common and widely distributed wildlife species such as cottontail rabbit and various small mammals.

Two federally threatened or endangered wildlife species are known to occur in the Duluth-Superior harbor. These are the peregrine falcon (federal endangered) and the bald eagle (federal threatened in MN and WI). The latter nests in areas near the estuary and is present in significant numbers as a migrant. The former occurs only as a rare migrant. The harbor also lies within the range of the eastern timber wolf (federal threatened in MN and endangered in WI), and this species may occur in the area. None of these species is known to use the Hearding Island management area, nor does it appear the area is of importance to them.

Two species of critical status in Minnesota use the Hearding Island area - the piping plover and the common tern. The piping plover primarily

occurs as a migrant and feeds on the sandy beaches of the island. It is likely that it occasionally feeds in these areas during the breeding season also. The common tern feeds extensively in the shallow waters on the bayside of the island during both the breeding and migration period.

Fish

Fish use of the area has not been studied in detail. Although all of the species which have been observed in the estuary may occur here (Appendix B, Table B-2), the aquatic habitats present indicate that the shallow waters are not of exceptional importance in this regard (DeVore, 1978). This primarily reflects the sparse vegetation present on the bayside and the lack of relief or rocks, debris, etc. (i.e., low diversity of the bottom habitat). The area probably receives moderate use as a nursery for yellow perch and walleye. No federal or state endangered or threatened fish species have been reported in the St. Louis River estuary and it therefore is unlikely that any such species occur in the vicinity of the management area.

Water Quality and Sediments

Little information pertaining specifically to water quality in the management area is available. Possible stagnation problems in the channel between the island and Minnesota Point were noted by local residents during the early 1960s, although documentation is lacking.

To alleviate this problem and to provide easier passage for boats docked in the area, a channel approximately six feet deep was dredged by the U.S. Army Corps of Engineers in 1967-68. Additional material was removed by members of the Sand Point Yacht Club in 1979. However, local residents continue to complain of stagnation and accompanying odors.

Overall, water quality in the St. Louis River estuary has improved dramatically since the new Western Lake Superior Sanitary District (WLSSD) facility went into operation (1979). Prior to this time, severely depressed oxygen levels were common throughout the lower harbor including the Hearding Island area. Although data are lacking, it is likely that the waters on the bayside of the island have now recovered in this respect. Oxygen levels on the lake side may still be low.

Ironically, one class of pollutants has probably increased in the management area due to operation of WLSSD. Some chemicals, including chlorinated hydrocarbons, are not "treated" by the facility. Since the plant handles wastewater from throughout the region, it in effect serves to concentrate these chemicals in the lower harbor whereas they previously were dispersed throughout the estuary. Furthermore, the chlorination treatment process used in the plant probably produces additional chlorinated compounds. Thus it is likely that areas downriver of the treatment facility are being subjected to higher concentrations of these chemicals than previously. To this date no data regarding this possibility are available, although studies are in progress.

Most of the area has not been sampled for sediment pollutants. Samples taken from four locations near the island during 1973 and 1974 were analyzed by the Minnesota Pollution Control Agency (MPCA) (see Appendix C). Two of these samples were taken from the northeast side of the island (i.e., channel side) and they were considered polluted due to unacceptable levels of chemical oxygen demand (COD), total Kjel nitrogen, oil and grease, and zinc. Two sites were sampled on the west side of the island also, and, although these proved to be far cleaner than the previous two, unacceptable levels of COD and total Kjel nitrogen were found.

Recent studies by the MPCA and U.S. EPA (1975 and 1976) examined the status of sediments in the nearby shipping channel. These studies indicate that the sediments are "marginally polluted". Unacceptable levels of COD, total Kjel nitrogen, oil-grease, lead, and zinc were reported (U.S. EPA, 1977).

Recreation

Recreational use of the island and surrounding waters is varied. The island proper receives limited use, although it has been used as a play area by local children and for other unorganized low intensity activities. Essentially no sportfishing occurs around the island due to the extremely shallow water and generally low populations of game fish. Limited commercial fishing does occur. During the spring, pond nets are placed in the shallow water off the southwest corner of the island. The main catch is smelt which enter the harbor during their early spring spawning run.

The most common recreational activities are boating and bird-watching. Due to the abundant and diverse waterbird populations which use the area during the spring and fall migration periods, the island is a favored observation area for birdwatchers from the Duluth-Superior metropolitan area as well as from other areas of the state (Green, 1977). Observation usually takes place from Minnesota Point rather than from the island itself. The favored observation point has been the general area of the Sand Point Yacht Club and adjoining shoreline to the north. The immediately adjoining shoreline of Minnesota Point also provides docking facilities for local residents and two private marinas. Thus the surrounding waters are important in that they provide boat access to the harbor and Lake Superior.

MANAGEMENT PROGRAM

General Approach

The general plan for the island is to alter a portion of the southwest quarter to provide habitat appropriate for common tern and piping plover nesting. All vegetation and any organic topsoil present in this area would be removed, thus providing a bare, sandy substrate. The remainder of the island would be unchanged, thus maintaining a barrier or buffer zone between the managed nesting area and residential areas on Minnesota Point. This belt of vegetation would vary from 200 to 600 feet in width (see Map 5).

The buffer zone would serve several purposes. Firstly, it would visually isolate the proposed nesting site from the residential and commercial areas on Minnesota Point. Local residents have expressed a strong desire to have a visual barrier between them and that portion of the island to be cleared. This also would benefit nesting birds by reducing disturbance due to human activity on Minnesota Point. The vegetation would also serve to reduce the potential of increased wind erosion and the accompanying problem of blowing sand in adjacent human use areas.

It is recommended that the program be implemented in a phased approach. The first phase would utilize only materials presently available on the island (i.e., no additional fill would be placed on the site). Since much of the potential nesting area is low-lying and requires additional fill in order to be considered prime nesting habitat, this phase would involve only 14 acres of the island. Approximately one third (5 acres) of this would be considered prime nesting habitat. The remaining 9 acres, although cleared, would not be prime nesting habitat due to its proximity to the wooded portions of the island of its low-lying nature.

Previous work with piping plovers indicates that their nests are located an average distance of 300 feet from adjacent treed areas (Lambert and Ratcliff, 1981). There is a great deal of variability in this regard, but, using this figure as a first approximation in determining the portion of cleared land which would not be "usable" as nesting habitat for plovers, 5 of the 14 acres would be so classified. Another 4 acres would remain lower and wetter than desirable and thus less than optimum.

The initial phase would provide habitat to attract nesting birds and would serve as a pilot program. Assuming this effort was successful, research and monitoring programs would be used to determine if creation of additional nesting habitat would be beneficial. If this proved to be the case, future "phases" could be implemented in which more of the initial 14 acres and as much as an additional 6 acres would be managed as nesting habitat. These later phases would require placement of some type of fill on portions of the island.

Desired Physical Characteristics and Management Techniques

The following discussion details work which would be done during the initial phase of this project. Subsequent stages, which may or may not be implemented, are described at the end of this document.

The desired physical characteristics of the island and the primary nesting area are summarized in Table 1 and Map 5. Most of this information has been derived from previous studies of colonial bird use of dredge islands and reflects those characteristics which appear best suited to common terns and piping plovers (Soots and Landin, 1978).

Island Size

The island size considered optimum for use as a colonial bird nesting site is from 5 to 15 acres. Larger islands often present problems in that they can support predator populations, and smaller ones provide limited space for nesting. Hearding Island is somewhat larger than the optimum. The potential for predation will have to be watched closely not only because of the island's size, but also due to its proximity to the Minnesota Point. Although there is no direct connection between Minnesota Point and the island, the channel on the north and northeast sides could be crossed by predators such as skunks and dogs.

Size of Nesting Area

Determining the desirable size of the actual nesting area is difficult. However, if one assumes that the goal is to maintain the present common tern and piping plover populations in the harbor, the area being used at the Port Terminal should serve as a first approximation. The size of this nesting area has ranged from 18 to 26 acres during the past 5 years (T. Davis, pers. comm.). However, these figures include only those portions of the site in which nests have been found and does not include adjacent land, some of which undoubtedly plays a role in use of the area for nesting.

It thus appears that nearly all of Hearding Island could be required to support the existing populations, assuming that nesting has not occurred at other sites within the harbor. However, a maximum nesting area of 20 acres is recommended. This reflects the desire to maintain a zone of vegetation between the island and Minnesota Point (i.e., buffer zone) and to avoid removing vegetation in those areas where shoreline erosion may be a problem. The value of maintaining a buffer zone has already been discussed. Clearing more than 20 acres of the island would probably require additional erosion protection along some of the shoreline and addition of coarser surface material to prevent wind erosion.

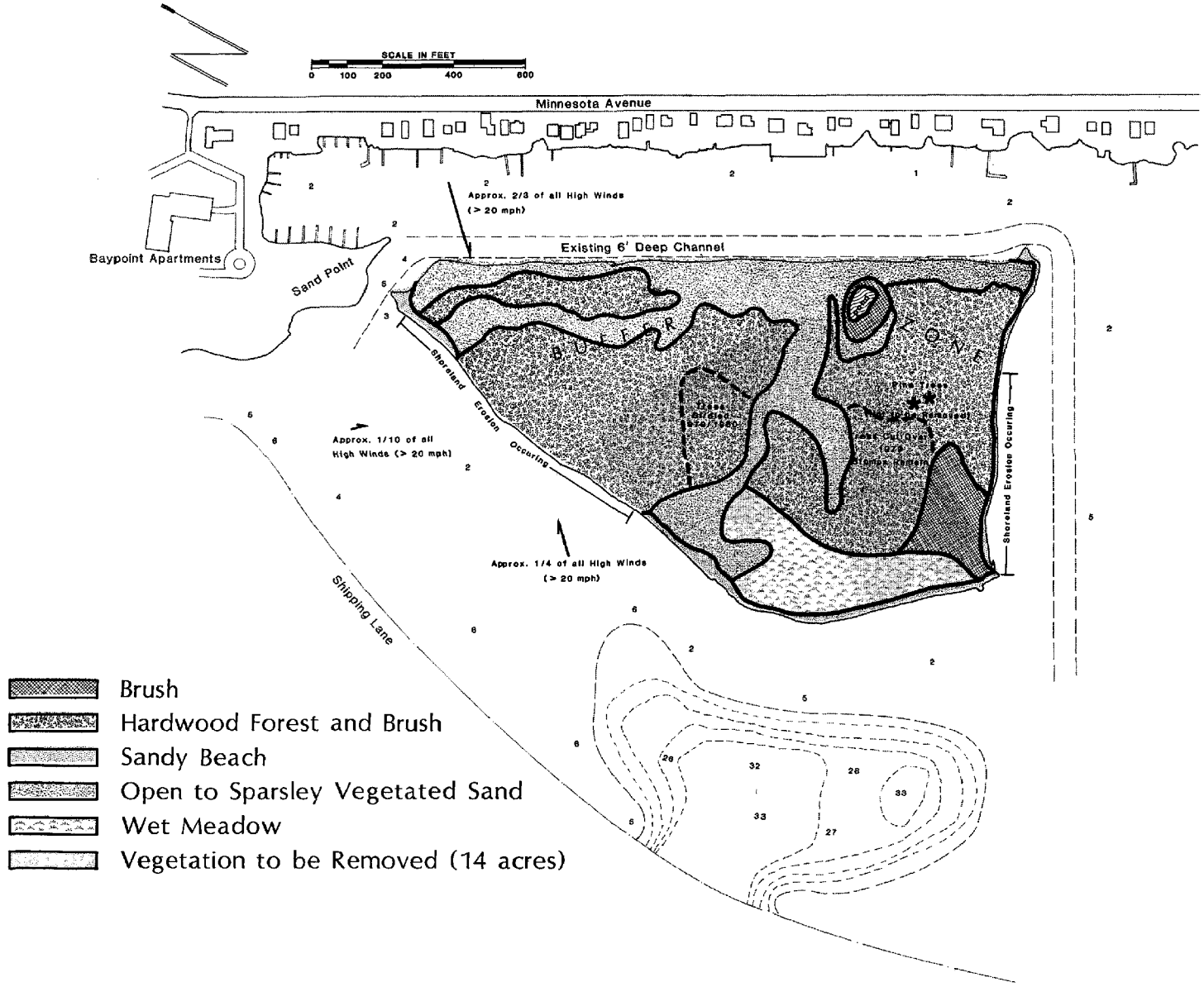
Table 1. Desired physical characteristics of island and/or nesting area.

SUBSTRATE	sandy to small size pebbles (present underlying material acceptable)
VEGETATION	a. bare to sparse herbaceous (less than 25% cover) b. less than three feet high c. evenly distributed in vegetated areas
ISLAND SIZE	5-15 acres (present size larger than optimum, but acceptable)
ISLAND SHAPE	no preference known for target species, although a bay may be useful for secondary user species
TOPOGRAPHY	a. want diversity (e.g., ridges, slopes, etc.) b. maximum elevation to be 10 feet c. slope generally gradual - along shore prefer about 1:30

HEARDING ISLAND
WILDLIFE MANAGEMENT AREA

Map 5
PROPOSED
PHYSICAL CHARACTERISTICS

PROPOSED MANAGEMENT PLAN



Vegetation

Initally, the intended nesting area would be cleared of all vegetation and whatever topsoil exists, thus presenting a bare, sandy substrate. Re-vegetation of this area would be allowed to occur through natural succession until it is apparent that much of the vegetation is approaching unacceptable density, height, etc. At this time from 50 to 100 % of the area would be cleared again. The proportion to be cleared would depend on whether or not nesting has taken place. If the site is being used by the target species, only those areas not used the previous year would be cleared. In this way at least a portion of the nesting area would remain unchanged from year to year, but new, suitable habitat would be provided on an ongoing basis. If no nesting has occurred, all areas deemed unsuitable would be cleared.

All clearing and other site preparation activities should take place outside the nesting season (April 15 to August 30) unless no nesting has occurred during the given year. Since birds are more likely to nest in areas that have had at least a few months to stabilize following clearing activities, the optimum time for clearing and related work is the September-November period rather than early spring.

Initial clearing could be done in several ways including use of a bulldozer, hand clearing, fire, and herbicides. The use of fire and/or herbicides seems undesirable due to potential impacts on local residents and the surrounding waters. Local residents have expressed great concern regarding the potential use of these techniques, and have reacted strongly to the past use of herbicide on the island. In addition, these techniques in and of themselves would not be adequate, and further work to remove the woody debris and to modify the topography would be needed. Hand-clearing, though feasible, would require a large crew and much time. This technique would therefore present problems in terms of getting the site prepared this fall. Due to the urgency of providing nesting habitat for these birds, use of a bulldozer or similar equipment seems the best choice. A bulldozer could remove vegetation and do the required modification of topography simultaneously. The residual herbaceous "scraps" could be burned and then buried on the island. Woody debris could be handled similarly, although other options such as selling this material to the public exist.

Subsequent habitat alterations would be required periodically (on the order of once every 2-3 years) as the natural succession of plants makes the area progressively less suitable as nesting habitat. The precise timing and extent of these activities would be determined through ongoing monitoring and research programs.

Ongoing habitat management would require far less workthan initial clearing since removal of trees and other woody vegetation would not be needed. The primary problem in this regard probably would be aspen suckers and willow. As in the case of initial clearing, this work could be accomplished in several ways including hand clearing, bulldozer, tiller, tractor and harrow, fire, and

herbicides. Once again, the use of fire or herbicides appear undesirable due to potential impacts on local residents and surrounding waters as well as the decidedly negative response local residents have given to use of these methods. Those techniques involving the use of large equipment do not appear as feasible due to the difficulty of getting equipment onto the island.

The most suitable techniques would be hand-clearing and/or use of a tiller. Cooperative programs in which local environmental organizations, the Youth Conservation Corps, etc. assist should be considered in these stages.

Topography

Several factors contribute to the determination of the appropriate topography in the primary nesting area. In general, it is desirable to have some diversity (i.e., relief). This is not because the target species appear to prefer particular topographic features on dredge islands, but because ridges, mounds, and other such features affect the vegetation, and the birds do respond to the latter. Topographic and therefore habitat diversity is even more important in a case such as the present management plan where two species, with slightly different microhabitat preferences, are involved. Ideally the nesting area would provide adequate amounts of both sparsely vegetated and bare substrates and thus potentially support both piping plover and common tern nesting.

Encroaching vegetation typically shows a steady progression from the bottom of slopes to the top. Thus, incorporation of relief features would provide several stages in vegetation development. This should help ensure that the substrates desired by each species would be present and that that they would be present over longer periods of time than would be true in a flat area. There is some evidence to indicate that relief features also have value in that they may provide natural definition of adjacent territories within the colony.

Incorporation of a small, temporary pond may be desirable also. This primarily relates to use by piping plovers. On the Atlantic coast, researchers have found that high beach ponds may be an important feature in nesting areas (Lambert and Ratcliffe, 1981). The present nesting area at the Port Terminal includes such ponds and casual observation indicates some use by the plovers and terns. The major concern in this regard is that if a pond is formed, it should hold water only on a temporary basis. It otherwise could promote disease (e.g., botulism).

The elevation of the nesting area is an important design parameter. As in the case of other topographic features, its importance primarily relates to its impact on vegetation. In addition to its direct effect on wetness of the soils, etc., elevation is a major determinant of the impact that wind will have. Previous work with dredge islands indicates that the usable elevations fall within the 3 to 10 foot range. The higher the island, the more the impact of wind and the slower the encroachment of vegetation. Present elevations on Hearding Island vary from water level to approximately

10 feet above water level. As noted previously, a portion of the proposed nesting area is lower than desirable and wet.

Since the target species prefer bare to sparsely vegetated substrates, an elevation near the recommended maximum (10 feet) is preferred. Should wind erosion prove to be a problem, additions of coarser substrate material (e.g., gravel) which are more resistant to such effects would be indicated. These coarser materials are quite suitable as nesting substrate and would not cause problems in this regard if they appear needed. The continued presence of a large belt of vegetation should minimize this problem.

Another important configuration factor is the overall slope in both the nesting area and the adjoining waters. Experience has shown that gradual slopes are definitely preferred by colonial nesting birds. Diked islands receive far less use than islands with natural slopes. Slopes of approximately 1:30 have been recommended by some researchers. It should also be noted that it generally is preferable to maintain easy access to the surrounding waters for offspring.

The other design factor which is important with respect to topography relates to the apparent desirability of having unobstructed visibility from the nesting area to the water. The target species seem to prefer an extremely large angle of vision and thus points, peninsulas, and the like are preferred. With respect to Hearding Island, most of the primary nesting area would have approximately 270 degrees of unobstructed vision.

Overall, Hearding Island would easily accomodate the above preferences in topography. Initial clearing could incorporate the necessary grading to create the desired features. The existing extensive shallow waters adjacent to the island are suitable and would not require any modification with respect to its use by colonial birds.

Attraction Techniques

In addition to providing appropriate habitat, there are several active techniques which, if employed, may increase the possibilty of attracting birds. The first is the use of decoys. This technique has proven successful with other species of terns (Kress, 1980). The WDNR tried this approach last year at the Barkers Island Sanctuary with no obvious effect, but previous experience indicates that it takes a few years for the technique to yield results. The second approach, to be used in conjunction with decoys, is playing tapes of colony sounds. As with decoys, this technique has proven successful with other tern species. Since the WDNR is using or considering using these techniques in the harbor, a cooperative program between the two DNRs is recommended.

Control Techniques

The success of the project also depends upon controlling the use of the site by gulls - in particular the ring-billed gull. This species has presented problems at the Port Terminal site and it is important that it be prevented from

colonizing the island. The primary problem in this regard is that breeding gulls return to their nesting areas 2 to 3 weeks earlier than do the terns and have first choice of breeding habitat. Because of this they can dominate available habitat and prevent common terns from nesting (Davis and Niemi, 1980).

There appear to be some simple solutions to this problem, all of which revolve around discouraging/preventing the gulls from settling on the island during the few weeks prior to the arrival of the terns. Potential techniques include covering the nesting area with plastic sheeting, using noisemakers to frighten the gulls, and simply having personnel walk the site and disrupt any gulls which may be present. By the time the terns arrive the gulls should have settled into their traditional nesting areas.

Some concern has also been expressed regarding common tern use of adjacent areas on Minnesota Point and potential problems related to the aggressive nature of the bird in its nesting area (e.g., diving at humans in the area). Although it seems highly unlikely that terns would nest in these areas, if monitoring programs indicate that this is happening, techniques similar to those proposed with respect to the gulls should prove sufficient to prevent nesting. It is important that if such action is deemed necessary, it be undertaken early in the season prior to nest establishment and egg-laying. This would allow the birds to locate in other more suitable areas.

Permitting

The first phase of this project probably will not require any permits. Although all work would be done in accord with City of Duluth ordinanaces, preliminary indications from the City are that it will not require permits since the island is owned by the MDNR. The city's formal position remains to be clarified.

Signing

The MDNR placed signs on the perimeter of the island when it was designated a management area, but many of these were located too near the wave impact zone and have since fallen. In addition, these signs do not adequately indicate restrictions, the critical no trespass time period, etc. For these reasons new signs should be created and erected which identify the area and indicate its purpose. Any restrictions, especially as pertain to trespass, and the enforcing agency should be indicated. These signs should be posted around the perimeter of the island such that anyone approaching it would be able to read them from a reasonable distance (e.g., 50 feet). Perimeter spacing of signs in similar situations has been on the order of 100 feet. To avoid the problem of wave impact, the signs should be placed some distance from the shoreline or perhaps placed on the nearest trees rather than relying on posts driven into the sandy soil.

Public Awareness and Education

To insure the success of the project, the general public, especially that segment which uses the harbor and/or resides near the island, must be made aware of the existence of the management area and its purpose. This is advisable during both the developmental and actual management stages. In particular, anglers, birdwatchers, and general recreationists should be told of the enhancement efforts so that they can take full advantage of the added value of the site and be sensitive to the restrictions and precautions neccesary for its proper management.

Research/Monitoring/Long-Range Planning

Research and monitoring programs will be needed to evaluate the effectiveness of the project as well as to determine any modifications of the management plan which may be required. These programs would also provide the information required to determine when future habitat modifications are needed. They should be performed on an annual basis by the Minnesota DNR and/or in cooperation with the local universities or other parties deemed acceptable by the Minnesota DNR and should include assessments of nesting populations of the target species, nesting success of these species, the amount of suitable nesting habitat available, and potential and real predator problems. In the case of piping plovers, a banding program in which any nesting birds and offspring would be banded should receive strong consideration. Information pertaining to nesting success in other portions of the harbor should be gathered also, especially at the present nesting area and on the two other sites being managed as potential colonial bird nesting areas (Barkers Island and Interstate Island). These data should be used to evaluate the Hearding Island program on a regular basis.

Implementation

The Minnesota DNR, in particular the non-game program, has assumed responsibility for this project, and implementation would take place under its direction. Funding for initial work on the island has been allocated. Similarly, ongoing management and habitat alteration required would be the responsibilty of the MDNR.

FUTURE PHASES

The first phase of this program would serve as a measure of the feasibilty of attracting the target species to the island. Although only limited work in relocating bird colonies has been conducted, the available information indicates that it takes several years for such projects to come to fruition (Kress, 1980). The birds must first begin to use a given site for non-nesting activity such as roosting and general loafing. This period may last for several years. Once accustomed to the site, the birds may then begin using it as a nesting area. The actual time involved depends on many variables, many of which cannot be controlled.

In the present case, the crucial factor would seem to be the status of the present nesting site. Previous documents addressing the desire to relocate the birds in question have recommended allowing the vegetation at the Port Terminal site to advance to a stage unacceptable to the birds, thus "forcing" them to another site (MIC, 1977). If this approach were followed, the present nesting area would probably be unusable within four to five years. However, ongoing development on the site results in some of the area being cleared on a regular basis, thus slowing the process.

With these factors in mind, it is recommended that the initial assessment stage be continued for a 10 year period. If at that end of 10 years there has been no success, the entire project should be re-examined. Alternatively, if the initial efforts prove successful, further work on the island should be considered - in particular the possibility of expanding the managed nesting area to the 20 acre maximum.

Since some of the proposed nesting area is low-lying and in some areas wet, expansion of the primary nesting area would require some filling. Although the topography of the island has not been precisely mapped, the following figures represent first approximations of the amount of additional material which would be needed as determined by on site inspection.

1. To make the entire 14 acres included in the original phase of work suitable nesting habitat would require approximately 3 feet of material over an area of about 5 acres (24,200 c.y.).

2. To expand the managed area to the maximum of 20 acres would require another 24,200 c.y. (total of approx. 50,000 c.y.).

There are several sources of fill. One of these, the use of which would also serve to solve a related problem, is the shallow bottom material around the island. This material could be hydraulically dredged onto the island. If the material was taken from the boat channel on the north and northeast sides of the island, the problem of boat access and stagnant waters around the island could be lessened at the same time.

Use of this material does present some problems. In particular, it would have to be demonstrated

that it is unpolluted material. The fact that polluted material has been reported in the area does not speak well for this option (Appendix C), but sampling has been sparce and it has been several years since any analyses were performed. Secondly, the actual cost of dredging would be high. Even small scale hydraulic dredging costs in the neighborhood of $1-2 per c.y. (i.e., $50,000 to expand nesting area to 20 acres) (Dunst et al., 1974).

Another possible source of dredge material is the deep hole between the island and the shipping channel. While it is likely that material which is now present in this hole is polluted, a program in which unpolluted harbor maintenance dredge material would be stored in the hole until needed on the island could be used. As with the previous case, the material could be hydraulically dredged to the island. This type of program could be used indefinitely.

The cost of the above choices would be prohibitive unless they could be done as part of the overall harbor maintenance dredging program or in cooperation with other interested parties which would provide some financial support. Use of the deep hole could be tied in with the harbor maintenance dredging program, but it would require that the cost of disposal, including periodic placement of material on the island, be less expensive than other options available to the U.S. Army Corps of Engineers.

If expansion of the nesting area is deemed necessary or desirable, the above options as well as others would have to be more thoroughly explored with respect to cost, availabilty of dredging equipment, etc. Since this work would most likely take place several years from now, these analyses are not included in the present document and are deferred to such time as it is apparent that the work is needed.

In addition to further work concerning the development of nesting habitat on the island, it appears that the extensive shallow waters around the island may be appropriate for other resource enhancement projects. At present, these waters appear to be moderately productive fish habitat, but knowledgeable observers have noted that certain improvements could greatly increase their value to fish and waterbirds. Thus it is recommended that this potential be examined and, if feasible, such improvements be incorporated into the management plan.

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APPENDIX A

HEARDING ISLAND VEGETATION
1973

Taken from National Biocentric, Inc. (1973).

VI . HEARDING ISLAND

With the exception of a region on the northeastern or Minnesota Point side, this region received spoils last in 1934. The vegetation of the older spoils is stabilized with a mixed hardwoods growth. A band (approximately 50 feet in width) along the land side varies from sparse to dense cover of herbs and willows. In addition, the water to the north and point side supports a dense growth of pondweed, Potamogeton.

A. The Herbaceous Band.

This region forms a continuum from sparse vegetation on the north (Duluth Entry) side to dense vegetation on the south (Superior Entry) side. The substrate texture also varies from coarse sands to silty sands. In addition, the north end of the island is more exposed to wind and possible wave action. On the north end one finds the biennial evening primrose (abundant in small patches) horsetail, willow, some tansey, quackgrass, wild rye, wormwood, and ragweed (Ambrosia artemisiifolia). Beach pea, present here, soon disappears as one moves southward along the band where rush, Canadian thistle, pearly everlasting and strawberry increase. The grass, red-top, (Agrostis sp.) becomes abundant. In some regions, the vegetation becomes very dense and consists of tall (1.5 m.) stands of willow, tansey, and goldenrod with pearly everlasting and timothy present in lesser amounts. This rich growth, with increased mesic conditions, probably results from substrate influence which consists of finer clays and organics.

B. Pond.

Between this band and the woods, a narrow area (about 15 x 150-200 ft.)

perhaps representing an "unfilled" spot between the original deposit and a more recent spoils site, contains water. This vegetation, with sedge, umbrella-sedge, and arrowhead along the edges and duckweed (Lemma sp.), pondweed (Potamogeton sp.) and water-starwort (Callitriche) in the water, provides a differing aspect. Shaded by willow and alder, tansey, sedges, smartweed (Polygonum sp.) occur in fair abundance as does the long leaved chickweed (Stellaria longifolia). The Canadian thistle is abundant, and mint (Mentha sp.) and spiked loosetrife, (Lythrum salicaria) were observed. The vegetation is dense around this region.

C. Woods.

The major portion of the deposition site is covered with forest. Substrate type is a fine sand with appreciable accumulation of organics deriving from the stand of vegetation. The forest floor is about two to three feet above the current lake level. The forest cover is not entirely uniform, however, since there are small meadow openings as well as a strip, some 100 feet wide of meadow through the island.

Canopy height is approximately 25 feet, though individual trees may reach 40 feet in height and appear to be as old as thirty years. Chief woody species include the trembling aspen (Populus tremuloides), willow (Salix sp.), alder (Alnus rugosa), Balm-of-Gilead (Populus balsamifera) and birch (Betula papyifera). The two species, Populus tremuloides and Populus balsamifera, are dominant.

Understory plants, forest edge plants, and meadow opening plants are similar to those previously reported from Barkers Island and Hogg Island.

The successional stages of this island are similar to the others discussed. Again, there is no evidence of climax vegetation present.

APPENDIX B

FISH AND BIRDLIFE OF THE HEARDING ISLAND AREA

Table B-1. Common name, scientific name, and status of bird species observed within the Hearding Island management area during 1977-78.[1]

COMMON NAME	SCIENTIFIC NAME	STATUS[2]
Common Loon	Gavia immer	S,M
Horned Grebe	Podiceps auritus	S,M
Pied-billed Grebe	Podilymbus podiceps	S,M
Double-crested Cormorant	Phalacrocorax auritus	S,M
Great Blue Heron	Ardea herodias	S,M
Black-crowned Night Heron	Nycticorax nycticorax	M
Whistling Swan	Olor columbianus	M
Canada Goose	Branta canadensis	M
*Mallard	Anas platyrhynchos	S,M
Black Duck	Anas rubripes	S,M
Gadwall	Anas strepera	M
Green-winged Teal	Anas crecca	M
Blue-winged Teal	Anas discors	S,M
American Wigeon	Anas americana	S,M
Northern Shoveler	Anas clypeata	S,M
Redhead	Aythya americana	M
Ring-necked Duck	Aythya collaris	S,M
Lesser Scaup	Aythya affinis	S,M
Common Goldeneye	Bucephala clangula	W,M
Bufflehead	Bucephala albeola	W,M
Common Scoter	Melanitta nigra	M
Ruddy Duck	Oxyura jamaicensis	M
Hooded Merganser	Lophodytes cucullatus	S,M
Common Merganser	Mergus merganser	W,M
Red-breasted Merganser	Mergus serrator	W,M
Sharp-shinned Hawk	Accipiter striatus	W,M
Cooper's Hawk	Accipiter cooperii	M
Ring-necked Pheasant	Phasianus colchicus	P
American Coot	Fulica americana	S,M
Semipalmated Plover	Charadrius semipalmatus	M

COMMON NAME	SCIENTIFIC NAME	STATUS[2]
Piping Plover	Charadrius melodus	S,M
*Killdeer	Charadrius vociferus	S,M
Black-bellied Plover	Pluvialis squatarola	M
Ruddy Turnstone	Arenaria interpres	M
Common Snipe	Capella gallinago	S,M
*Spotted Sandpiper	Actitis macularia	S,M
Yellowlegs	Tringa spp	M
Dunlin	Calidris alpina	M
Semipalmated Sandpiper	Calidris pusillus	M
Dowitcher species	Limnodromus spp	M
Herring Gull	Larus argentatus	P
Ring-billed Gull	Larus delawarensis	S,M
Bonaparte's Gull	Larus philadelphia	M
Common Tern	Sterna hirundo	S,M
Caspian Tern	Hydroprogne caspia	M
Mourning Dove	Zenaida macroura	S,M
Belted Kingfisher	Megaceryle alcyon	M,S
Common Flicker	Colaptes auratus	M,S
Yellow-bellied Sapsucker	Sphyrapicus varius	S,M
Hairy Woodpecker	Dendrocopus villosus	P
Tree Swallow	Irodoprocne bicolor	S,M
Blue Jay	Cyanocitta cristata	P
Common Crow	Corvus brachyrhynchos	P
Black-capped Chickadee	Parus atricapillus	P
*Brown Thrasher	Toxostoma rufum	S,M
*Robin	Turdus migratorius	S,M
Hermit Thrush	Catharus guttatus	M
*Veery	Catharus fuscescens	S,M
Ruby-crowned Kinglet	Regulus calendula	S,M
Starling	Sturnus vulgaris	P
*Red-eyed Vireo	Vireo olivaceus	S,M
Nashville Warbler	Vermivora ruficapilla	M,S
*Yellow Warbler	Dendroica petechia	S,M

COMMON NAME	SCIENTIFIC NAME	STATUS[2]
Blackburnian Warbler	Dendroica fusca	S,M
Chestnut-sided Warbler	Dendroica pensylvanica	S,M
Palm Warbler	Dendroica palmarum	M
Common Yellowthroat	Geothlypis trichas	S,M
*American Redstart	Setophaga ruticilla	S,M
*Red-winged Blackbird	Agelaius phoeniceus	S,M
*Common Grackle	Quiscalus quiscula	S,M
*Brown-headed Cowbird	Molothrus ater	S,M
*Rose-breasted Grosbeak	Pheucticus ludovicianus	S,M
American Goldfinch	Spinus tristis	S,M
Dark-eyed Junco	Junco hyemalis	M,W
Tree Sparrow	Spizella arborea	M
Chipping Sparrow	Spizella passerina	S,M
White-throated Sparrow	Zonotrichia albicollis	S,M
Fox Sparrow	Passerella iliaca	M
Swamp Sparrow	Melospiza georgiana	S,M
*Song Sparrow	Melospiza melodia	S,M

[1] Source: Niemi et al. 1977.

[2] S = summer resident
M = spring or fall transient
P = permanent resident
W = winter visitant

*Denotes species that nested on the island in 1976-77.

Table B-2. Fish species known to occur in the St. Louis River estuary.[1]

Common Name	Scientific Name
Yellow Perch	*Perca flavescens*
Walleye	*Stizostedion vitreum vitreum*
Northern Pike	*Esox lucius*
Muskellunge	*Esox masquinongy*
Rainbow Trout	*Salmo gairdneri*
Brown Trout	*Salmo trutta*
Lake Trout	*Salvelinus namaycush*
Chinook Salmon	*Oncorhyncus tshawytscha*
White sucker	*Catostomus commersoni*
Longnose sucker	*Catostomus catostomus*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Silver Redhorse	*Moxostoma anisurum*
Bluegill	*Lepomis macrochirus*
Pumpkinseed	*Lepomis gibbosus*
Rock Bass	*Amblopites rupestris*
White Bass	*Morone chrysops*
Black Crappie	*Pomoxis nigromaculatus*
Black Bullhead	*Ictalurus melas*
Brown Bullhead	*Ictalurus nebulosus*
Yellow Bullhead	*Ictalurus natalis*
Channel Catfish	*Ictalurus punctatus*
Carp	*Cyprinus carpio*
Goldfish	*Carassius auratus*
Smelt	*Osmerus mordax*
Burbot	*Lota lota*
Log Perch	*Percina caprodes*
Johnny Darter	*Etheostoma nigrum*
Alewife	*Alosa pseudoharengus*
Freshwater Drum	*Aplodinotus grunniens*
Trout-Perch	*Percopisis omiscomaycus*
Brook Stickleback	*Culea inconstans*
Spottail Shiner	*Notropis hudsonius*

Common Name	Scientific Name
Emerald Shiner	*Notropis atherinoides*
Bluntnose Minnow	*Pimephales notatus*
Lake Chub	*Couesius plumbeus*
Golden Shiner	*Notemigonus chrysoleucas*
Common Shiner	*Notropis cornutus*
Mimic Shiner	*Notropis volucellus*
Longnose Dace	*Rhinichthys catapoctae*
Tadpole Madtom	*Noturus gyrinus*
Stonecat Madtom	*Noturus flavus*
Lake Herring	*Coregonus artedii*
Central Mudminnow	*Umbra limi*
Creek Chub	*Semotilus atromaculatus*
Sea Lamprey	*Petromyzon marinus*
Silver Lamprey	*Ichthyomyzon unicuspis*

[1]Compiled from DeVore (1978) and Wisconsin Department of Natural Resources, Superior Harbor Fish Index Station Reports.

APPENDIX C

SEDIMENT POLLUTANTS IN THE HEARDING ISLAND AREA
1973-74

Taken from Minnesota PCA files.

LERCH BROTHERS INCORPORATED

GENERAL ANALYTICAL CHEMISTS

MINNESOTA LABORATORIES
HIBBING
NASHWAUK
CROSBY

JP
JNM
CM
DB
PC
ROUTE
FILE

CONSULTING SERVICE
MINNESOTA, WISCONSIN AND CANADA

GENERAL OFFICES
CORNER N. 6TH AVE. W. AND GRANT STREET
MAIL ADDRESS — P. O. BOX 8
PHONE (218) 262-3456
HIBBING, MINNESOTA 55746
March 20, 1973

WISCONSIN LABORATORIES
ALLOUEZ
CANADIAN SERVICE
c/o IRON ORE CO. OF CANADA
LABRADOR CITY, NFLD.
SCHEFFERVILLE, QUEBEC
SEPT ILES, QUEBEC

RECEIVED
MAR 22 A.M.
MPCA — DULUTH
DULUTH, MN.

Dr. Jere Mossier
Minnesota Pollution Control Agency
1015 Torrey Building
Duluth, Minnesota 55802

FILE WP St. Louis #42 Lodging Mn. Pt.

Dear Dr. Mossier:

The following are the results of the bottom sediment samples sent to us per your correspondence dated March 7, 1973:

	A	B
Cadmium, mg/kg Wet	2	4
Chromium, mg/kg Wet	12	20
Copper, mg/kg Wet	2	4
Lead, mg/kg Wet	10	16
*Mercury, mg/kg Wet	13	44
Iron, mg/kg Wet	16,300	28,900
Manganese, mg/kg Wet	80	156
Nickel, mg/kg Wet	4	10
Zinc, mg/kg Wet	31	46
Arsenic	not determined	not determined
Surfactants, mg/kg	10	< 10
Chlorides, mg/kg	< 15	< 15
pH, units	6.8	6.7
Phenols, mg/kg	11.3	.3
Oil & Grease, mg/kg	1,600	2,950
Ammonia, mg/kg (N)	48	64
Volatile Solids (%)	6.54	17.27
Total Solids (%)	55.29	39.90
Total Soluble Phosphorus, mg/kg	3,800	4,700
Total Kjeldahl Nitrogen, mg/kg (N)	2,098	2,289
BOD, mg/kg	495	769
COD, mg/kg	493	890

Sincerely,

Donald H. J. Schnortz, Jr.
Chief Chemist

*P.S. Mercury looks a little high, possibly mercury contamination. If you have any questions, call.

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May 22, 1973

Dr. Jere Mossier
Minnesota Pollution Control Agency
1015 Torrey Building
Duluth, Minnesota 55802

Dear Dr. Mossier:

When compiling data on your bottom samples of April 30, I ran across two decimal point errors on our analysis of your March 7 samples.

	Reported Values		Correct Values	
	A	B	A	B
Mercury, mg/kg Wet	13	44	1.3	4.4
COD, mg/kg	493	890	49,300	89,000

Everyone makes mistakes, but chemists shouldn't. Thank you for your understanding in the matter.

Sincerely,

Donald H. J. Schnortz, Jr.
Chief Chemist

FILE

STATE OF MINNESOTA

DEPARTMENT MPCA-Duluth

Office Memorandum

TO : Mr. Grant Merritt, Executive Director
Dr. John Olin, Deputy Director
Mr. John Pegor, District Representative-Duluth

DATE: February 14, 1974

FROM : Dr. Jere Mossier, Research Biologist

SUBJECT: Polluted bottom sediments in the Duluth Harbor near Hearding Island

The following discussion is derived from attached summary Table 1 presenting data on levels of volatile solids, COD, TKN, oil and grease, mercury, lead, zinc and phosphorus found in bottom sediment samples near Hearding Island in the Duluth Harbor and sampled on 3/7/73, 9/18/73 and 1/4/74.

Samples taken on 3/7/73 have shown that volatile solids, total Kjeldahl nitrogen, oil and grease, mercury and phosphorus all exceed meximum acceptable levels established by the EPA. Further sampling became warranted when Mr. William DeMeria presented bottom sediment data to the Duluth office which showed a change and/or discrepancy in levels of some of the eight parameters being discussed (Table 1). These additional samples, taken 1/4/74 from approximately the same proposed dredging area East of Hearding Island were split and sent to Lerch Brothers, Inc and National Biocentric, Inc. Some of the data are too variable to draw any valid conclusions, ranging from 4.3 - 11.2, 151,000 - 65,700, 20,900 -1,960, 1,800 - 10,600 and 64,164 for volatile solids, COD, total Kjeldahl nitrogen, oil and grease and zinc for Lerch Brothers, Inc. vs. National Biocentric, Inc. respectively. However, the maximum acceptable levels established by EPA are exceeded in all instances for COD, TKN, oil and grease and zinc for samples taken on 1/4/74. Mercury, lead and phosphorus levels were variable again, however, they do not exceed EPA maximum levels. Levels of zinc and lead have increased from 3/7/73 to 1/4/74 while levels of mercury and total phosphorus have decreased below the EPA maximum accepted levels.

Samples taken West of Hearding Island on 9/18/73 (Table 1) show that levels of volatile solids, COD, lead and zinc fall within the range found for bottom sediment sampled 3/7/73 and 1/4/74. However, oil and grease, mercury and total phosphorus are appreciably less than for sediment samples taken East of Hearding Island on the two aforementioned dates.

In summary, bottom sediment samples taken on 1/4/74 exceed EPA maximum levels for COD, TKN, oil and grease, zinc while levels of mercury, lead and phosphorus do not exceed EPA maximum levels. Unfortunately, the data is variable, contributing to serious difficulty in its interpretation.

Table I. Comparison of levels of Volatile Solids, COD, Total Kjeldahl Nitrogen, Oil and Grease, Mercury, Lead Zinc and Phosphorus in bottom sediments East (A, B, 1A, 2W) and West (1A, 1B) of Hearding Island, Duluth Harbor vs. maximum acceptable levels accepted by the Environmental Protection Agency for in-water disposal of bottom dredge material.

		Sampled							
		3/7/73		(Lerch Bros) 1/4/74		(Nat.Biocentric) 1/4/74		9/18/73	
Parameter[1]	Maximum Acceptable Values by EPA	A	B	1A	2W	1A	2W	1A	1B
Volatile solids (%)	(6.0)	(6.5)	(17.3)	(4.4)	(4.3)	(9.0)	(11.2)	(7.4)	(5.3)
COD	50,000.0	49,300	89,000	151,000	150,000	65,700	96,000	110,000	82,000
Total Kjeldahl Nitrogen	1,000.0	2,098	2,289	19,500	20,900	1,960	2,800	1,800	1,000
Oil and Grease	1,500.0	1,600	2,950	1,800	2,000	3,280	10,600	1,110	925
Mercury	1.0	1.3	4.4	.06	.05	0.33	0.43	<.01	<.01
Lead	50.0	10.0	16.0	19	21	26.7	35.0	16	26
Zinc	50.0	31.0	46.0	64	70	76.9	164.0	47	89
Total phosphorus	1,000.0	[3,800]	[4,700]	[84]	[348]	103	381	[<1]	[<1]

1 In mg/kg dry weight unless otherwise indicated
() Indicates %
[ ] Indicates soluble phosphorus