Severn Sound

Remedial Action Plan

AN INTERIM FISH HABITAT MANAGEMENT PLAN FOR THE SEVERN SOUND

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and
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FOREWORD

Severn Sound is one of the 43 "Areas of Concern" (AOC) identified by the International Joint Commission (IJC) based on water pollution problems in the Great Lakes Basin. A detailed Remedial Action Plan (RAP) must be developed in each of the AOCs that takes an ecosystem approach to restoring and protecting environmental quality.

As part of the Severn Sound RAP development, the need for an interim plan to manage fish habitat in Severn Sound was a clear and urgent priority expressed by both the public and fisheries biologists working in the area. In addition, further study of the nature of fish habitat and the importance of knowing how to protect it was also recognized as necessary.

This document provides an interim plan for the protection, the restoration and enhancement of fish habitat in the Severn Sound. The report has been prepared under the auspices of the Canada-Ontario Great Lakes Remedial Action Plan Program. Financial support for the meetings held in the development of the plan was provided by the Severn Sound Remedial Action Plan Team through the Ontario Ministry of Environment and Energy.

During the meetings held to develop the report, the participants used concepts and portions of the plan in other planning initiatives. Municipal planners in the area welcome guidance that the plan offers for use in their official plan process. MNR Midhurst and Parry Sound Districts are using the plan in review of shoreline development or construction proposals. The Federal Department of Fisheries and Oceans focused on the Severn Sound area plan as a case study in their habitat management workshop held in March, 1991.

The map classifying shoreline (Map 1) will change as more knowledge becomes available. It is intended that the map be updated on an annual basis following the completion of ongoing habitat inventories. A full review of the plan will be undertaken in 4 years (1996) when the results of studies on the effects of shoreline development activities on fish habitat are available.

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TABLE OF CONTENTS

FOREWORD i

ACKNOWLEDGEMENTS ii

INTRODUCTION 1

POLICY FRAMEWORK 8

THE PLAN 13

IMPLEMENTATION OF THE PLAN 18

THE FISH COMMUNITY OF SEVERN SOUND 20

SEVERN SOUND FISH HABITAT 26

REFERENCES 31

GLOSSARY OF TERMS 33

APPENDIX 1 38

APPENDIX 2 41

APPENDIX 3 44

MAP 1 50

INTRODUCTION

Changes in the fish and wildlife communities and habitat of Severn Sound are an important concern identified by the Severn Sound Remedial Action Plan Team (SSRAP, 1988; 1990). Fish habitat concerns must be expressed in terms consistent with existing planning processes within Severn Sound in order to effectively conserve and develop habitat.

The purpose of this document is to provide an interim fish habitat management plan for Severn Sound which will be scientifically defensible and will provide a useful tool to area planning authorities. The plan is prepared with the understanding that additional documentation of fish habitat is proceeding and that scientific studies of the value of fish habitat and the effects of development on it are ongoing in the Great Lakes community. As information becomes available, the plan will be updated.

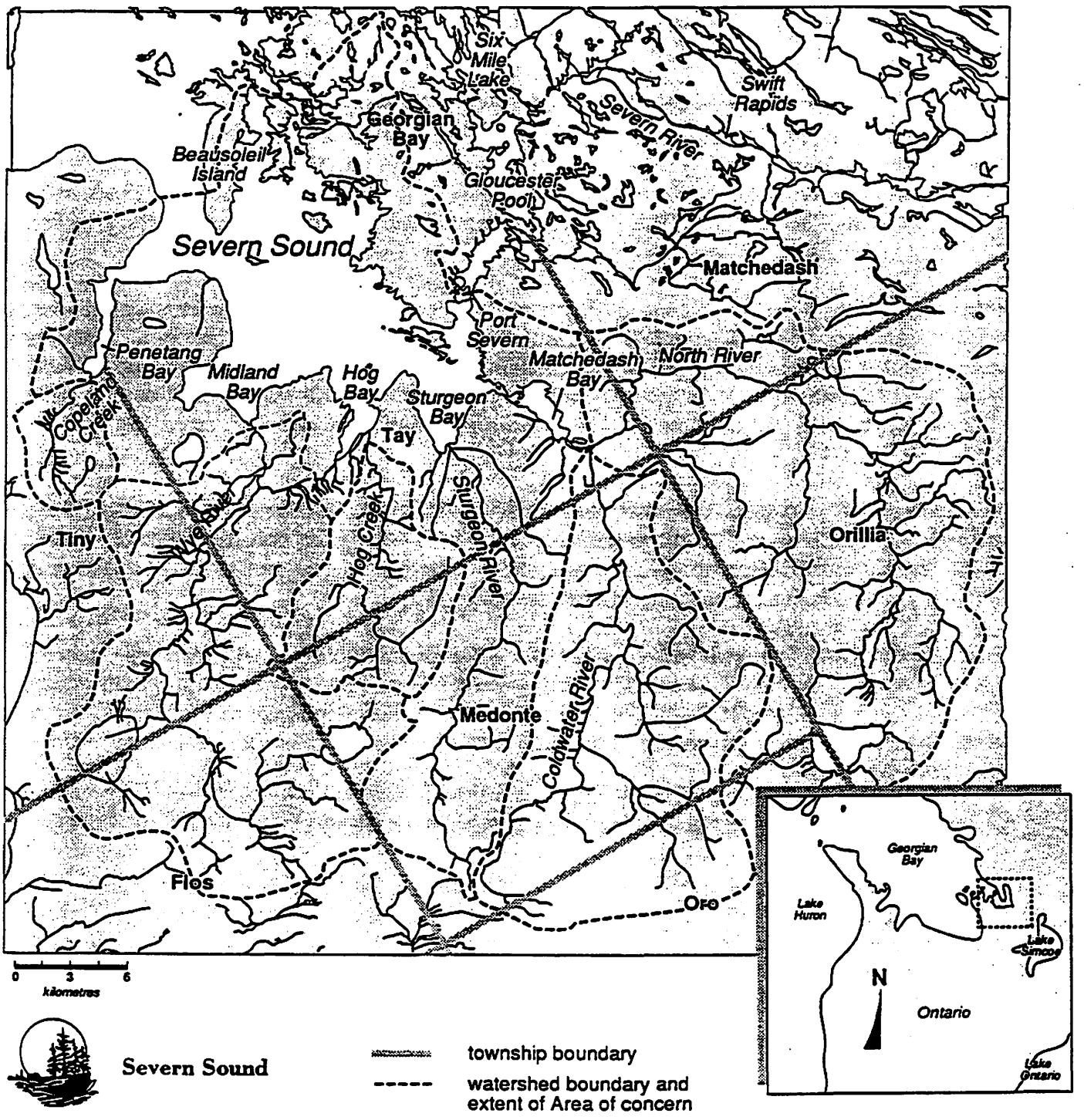
The area of the plan

Severn Sound is a complex of shallow bays in southeastern Georgian Bay. To the south it incorporates a variety of smaller bays and harbours including Penetanguishene Harbour (Penetang Bay), Midland Bay, Hog Bay, Sturgeon Bay and Matchedash Bay. Along the north shore are numerous rocky islands and bays. The Area of Concern extends from the gap between Beausoleil Island and Pinery Point on the mainland to Port Severn and includes the immediate watershed as shown in Figure 1. Severn Sound has a surface area of 127 km^2. The immediate watershed draining to Severn Sound (excluding the Severn River basin) is 1000 km^2.

For the purposes of the interim plan, only shoreline areas immediately associated with the Sound are considered. This includes tributary mouths and shorelines in Tiny Township, the Town of Penetanguishene, Tay Township and the Town of Midland, in Simcoe County and Georgian Bay Township in the District Municipality of Muskoka. Major tributaries flowing into Severn Sound include: Severn River, North River, Coldwater River, Sturgeon River, Hog Creek, Wye River and Copeland Creek. A tributary habitat rehabilitation is underway through the Severn Sound Remedial Action Plan. For planning purposes, this document will deal only with coastal and tributary mouth habitat of Severn Sound.

FIGURE 1

Severn Sound and area



What is Fish Habitat?

According to the Fisheries Act (sec. 34(1)) fish habitats are "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes". During at least one stage of their life cycle, most aquatic species are dependent on the near shore zone for survival. The near shore zone, for operational purposes in Severn Sound, extends from the high water line to two meters depth. Within the zone a wide variety of physical, chemical and biological characteristics can be found. Characteristics such as wave-washed gravel and cobble could be important to some fish species while beds of emergent or submerged aquatic plants can be important to other species. Some habitats may only be available to fish during years of high water on Georgian Bay but are none the less critical when they are flooded and need to be managed with this in mind.

Within Severn Sound there are certain habitats in short supply that have particular significance to the life cycle of some fish. For example, walleye have very specific spawning requirements and there are only two known locations in Severn Sound.

The Effects of Shoreline Activities on Fish Habitat

Fish have specific substrate requirements for spawning. Shoreline development and marine construction can smother or bury eggs or permanently alter current conditions and substrate, rendering near shore areas useless for spawning.

With increased development along the shoreline and tributaries of Severn Sound comes an increased threat to near shore fish habitat. When habitats are altered or eliminated, the capacity of Severn Sound to sustain a balanced and naturally reproducing fish community is reduced. The loss or destruction of habitat during any life stages could contribute to adverse changes in the fish community, especially reduction of major predators such as northern pike, muskellunge and walleye. Several areas of wetland, important for pike spawning, have already been lost to shoreline development and black crappie numbers have increased. If the spawning habitat of predator fish species is destroyed, their numbers will decline and prey species will over populate.

Habitat can also be destroyed needlessly through a fragmented approach to managing the nearshore waters of Severn Sound. Integration of the planning efforts of federal, provincial and municipal governments into a management plan is vital.

With increased development along the South shoreline of Severn Sound, in particular Penetanguishene, Midland and Hog Bay, the nature of the nearshore habitat has changed. In other areas such as Matchedash Bay and the North Shore there has been less alteration. For example, wetland habitats have decreased by 68% and 18% in Penetanguishene and Hog Bays respectively since 1951 (V. Cairns, unpublished). In the past, the construction of marinas and mooring areas has lead directly to losses of wetlands.

The existing docking or number of boat slips in Severn Sound has reached 4, 453 (MNR 1991) and is increasing with 1360 proposed additional slips presently under review (Table 1). An historical review of air photos of Penetanguishene Bay shows a rapid increase in the number of slips in recent years (Table 2).

Shoreline activities in the Severn Sound watershed include several one-time or infrequent larger undertakings:

- marina expansion and development (filling and dredging)
- large municipal or private docks
- construction of water intakes/sewage plant outfalls
- construction of dams
- water crossings: culverts, bridges, pipelines, transmission lines
- drains under the Drainage Act

Large construction projects such as bridges or sewage plant outfalls are considered as part of an undertaking under the Environmental Assessment Act and the Fisheries Act and require site specific studies describing existing habitat, means of mitigating the impacts on the fish community during construction and after the work is completed, and possible compensation if habitat will be lost.

In addition, there are a number of smaller scale works undertaken by individual shoreline owners and developers. MNR issued 189 work permits for activities on or near the waters of Severn Sound during 1990 and 1991 (Table 3). Works could destroy rare or critical fish habitats or have minimal effects to abundant habitats. Although no one project impacts extensive habitat, the cumulative effect of many individual small projects may significantly influence nearshore habitat. Project review, knowledge of fish habitats and mitigation of impacts are required to maintain habitats for fish and allow sustainable development of shorelines.

The Process of Developing the Plan

The approach used to develop an interim fish habitat management plan was to bring together federal and provincial fisheries biologists, planning people working in Severn Sound and interest groups active in the area in a series of workshops. The purposes of the workshops were to:

- review what we know about fish habitat in Severn Sound
- consider ways of classifying habitat
- develop a simple, scientifically defensible plan to protect and enhance the habitat in Severn Sound.

A sense of urgency was clear from the discussion of remedial options with the Severn Sound Public Advisory Committee (SSRAP, 1990). Action was needed to protect habitat even if all aspects of fish habitat requirements are not fully understood.

TABLE 1: MARINA DOCKAGE IN SEVERN SOUND (1991)

MARINA NAME	EXISTING DOCKING	PROPOSED INCREASE*
PENETANG HARBOUR:		350
Northwest Basin	115	
Bay Marine	160	
Albert Cove Marina Ltd.	75	
Hindson's Marine Ltd.	350	
Beacon Bay Marina	200	
Bay Moorings	340	
Dutchman's Cove	150	
MIDLAND:		470
Sunnyside Marina (now Bayport Midland Marina Inc.)	230	
Wye Heritage Marina Inc.	1150	
Central Marina	80	
Midland Wye River	22	
Paradise Point Marina	40	
PORT McNICOLL:		
Duncan's Marina	125	
VICTORIA HARBOUR:		190
Queens Cove Marina	310	
STURGEON BAY:		
Caswells Beach	30	
Sturgeon Bay Ratepayers Association	30	
WAUBAUSHENE:		
Marshes Waubaushene Marina	100	
Pier 69	50	
Twin Bridges Marina	25	
PORT SEVERN:		
Lackies By The Bay	22	
Kovac's Boatel (closed 1992)	10	
HONEY HARBOUR:		350
Bayview Marine Resort	50	
Honey Harbour Boat Club	144	
Honey Harbour Small Motors	55	
Paragon Marina and Sports Inc.	185	
South Bay Cove Marina	140	
South Bay Yacht Club (Brandy's Island)	165	
Village Marina Ltd.	100	
TOTALS:	4453	1360

* includes expansions to existing marinas and new proposals.

Source: 1991 MNR, Midhurst District information

TABLE 2

Severn Sound Boat Slip Count Estimated From Air Photos 1931-1987

Location	1931	1951	1965	1973	1982	1987	1989*
Penetang Harbour	20	22	72	189	375	636	710
Midland Bay	-	-	70	140	603	-	-
Hog Bay	4	11	76	50	175	-	-
Sturgeon Bay	7	14	31	34	54	-	-
Matchedash Bay	-	4	13	50	80	-	-

Source: V. Cairns, Fisheries and Oceans Canada, unpublished data.

* Actual slip count.

TABLE 3
SUMMARY OF PERMITS FOR SHORELINE WORK 1990 AND 1991

ACTIVITY	1990	%	1991	%
Dredging	41	38	20	25
Filling	2	2	2	2
Dock Construction	21	19	13	16
Beach Creation	1	1	0	0
Boat House	1	1	2	2
Shoreline Cleanup	7	6	4	5
Breakwall or Shorewall	15	14	13	16
Dock and Breakwall	2	2	0	0
Boat House and Dredging	1	1	2	2
Dock and Dredging	1	1	7	9
Breakwall and Boat ramp	2	2	1	1
Boat ramp or Marine Railway	7	6	5	6
Breakwall and Dredging	1	1	5	6
Shorewall/dredging/ dock	0	0	1	1
Miscellaneous	6	6	6	7
Total permits	108		81	

Source: MNR, Huronia District files for Tiny, Tay and Georgian Bay Townships, Jan.- Dec., 1990 and Jan.- Dec., 1991

POLICY FRAMEWORK

Habitat can be destroyed quickly and needlessly through a fragmented approach to managing the nearshore waters of Severn Sound. Integration of the planning efforts of federal, provincial and municipal governments is vital. There are several efforts presently under way to develop an integrated approach to the management of fish habitat. The goals of these efforts as well as those of the Severn Sound RAP will help to direct the development of the fish habitat management plan.

Fisheries Act and the Department of Fisheries and Oceans Policy for the Management of Fish Habitat

The Fisheries Act prohibits the harmful alteration, disruption or destruction of fish habitat unless it has been authorized by the Minister of Fisheries and Oceans. Fish habitat, as defined by the Fisheries Act is:

> "...spawning grounds, and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes;..."

Essentially, all aspects of the aquatic environment on which fish depend are considered fish habitat. There is no distinction made between quality of habitat or the commercial value of the fisheries it supports. It is important to note that the Fisheries Act is binding on all levels of government and supersedes provincial and municipal legislation.

Habitat protection provisions of the Fisheries Act have been in place since 1973, but it was not until 1986 that the Federal Department of Fisheries and Oceans released its Policy for the Management of Fish Habitat. The Policy established an objective of achieving a net gain in the productive capacity of fish habitats for Canada fisheries resources and established a framework for a nationwide program for the Conservation, Restoration and Development of fish habitats.

Conservation, the first goal towards achieving the net gain objective requires that the current productive capacity of existing habitats be maintained through application of the NO NET LOSS guiding principle. Under this principle, existing fish habitats are protected while unavoidable habitat losses are balanced with replacement habitat. The No Net Loss principle is in keeping with the global concept of environmentally sustainable economic development and provides for growing economic development while preserving the productive capacity of fish habitats. The concept of No Net Loss also provides the basis on which decisions to authorize the harmful alteration, disruption or destruction of fish habitat under the Fisheries Act are made. Authorizations for the harmful alteration, disruption or destruction of fish habitat are not issued unless acceptable measures to compensate for the habitat loss are developed and implemented by the proponent. Furthermore, no authorizations will be issued in cases where the loss of a specific habitat type is considered unacceptable or adequate compensation cannot be achieved.

The Process in Ontario

The Federal Department of Fisheries and Oceans and the Provincial Ministry of Natural Resources have demonstrated their commitment to the Policy by signing the Canada-Ontario Fisheries Agreement and subsequent drafting of a Memorandum of Intent on the Management of Fish Habitat (MOI). Through signing the MOI, Canada and Ontario recognized the joint role of both levels of government in the management of fish habitat in Ontario and outlined a cooperative procedure for the review and approval of projects likely to affect fish habitat.

Day-to-day responsibility for management and administration of fisheries in Ontario has been delegated to the Minister of Natural Resources. However, responsibility for protection of fish habitat and authority to establish conditions under which habitat may be altered, disrupted or destroyed remains with the federal Minister of Fisheries and Oceans. This authority has not, as yet been transferred to the Province of Ontario. Consequently, the Department of Fisheries and Oceans, Fisheries and Habitat Management - Ontario has the ultimate responsibility for authorizing destruction of habitat. Ontario Ministry of Natural Resources fisheries staff are, nevertheless, acknowledged as the experts on local fish habitat. Therefore, decisions regarding the acceptability of compensation measures will be made after consultation with OMNR.

OMNR District offices are the first step in the review and approval process for the Fisheries Act Policy. Projects which may affect fish habitat are reviewed by district fisheries staff, and mitigated if possible. Provincial staff are pivotal in review process. Appendix 1 details the interim referral process for projects involving possible alteration of fish habitat.

Ministry of Natural Resources

The Ministry of Natural Resources is responsible for the management of Ontario's fisheries resources. To better manage them, MNR developed the Strategic Plan for Ontario Fisheries (SPOF II) (MNR, 1992(a)). The overall goal of this Plan is healthy aquatic ecosystems that provide long-term benefits which help satisfy society's need for a high quality environment, wholesome food, employment and income, recreational activity, and cultural heritage.

One of the major issues facing Ontario's fisheries is the incremental loss of fish habitat (MNR 1990). Fish habitat has been lost in much of southern Ontario by poorly-designed shoreline and watercourse development (MNR 1990). The way to reverse this trend is to rehabilitate degraded aquatic ecosystems and to ensure the protection and conservation of fish habitat to prevent further degradation.

Provincial Legal Responsibilities

The Ontario Public Lands Act requires that a work permit be obtained before certain works on public lands and shorelands are undertaken (Table 4) (see glossary/definitions). Work includes logging, mineral exploration, and industrial operations carried out on public lands; the construction of a building, structure or thing on public lands; the clearing of public lands; and the dredging or filling of shorelands. Anyone considering work in or near the water should consult the MNR regarding the need for a work permit. If a permit is required, MNR's staff review of the proposed project can result in one of four possible decisions.

1. Fish habitat will not be harmfully altered, disrupted or destroyed and the project may proceed. A work permit will be issued.

2. Fish habitat will be harmfully altered, disrupted or destroyed but impacts to fish habitat may be avoided by modifications to the plan. A work permit will be issued and impacts to habitat will be mitigated through conditions specified in the permit. The project may proceed.

3. Fish habitat will be harmfully altered, disrupted or destroyed, mitigation will not prevent this but compensation for lost habitat is possible. The proponent will develop, in consultation with Federal and MNR fisheries staff, a compensation plan and a compensation agreement will be negotiated between the three parties. A work permit will be issued with conditions to minimize impacts to fish habitat. An authorization under Section 35(2) of the Fisheries Act will be issued by DFO. The project may proceed.

4. Fish habitat will be harmfully altered, disrupted or destroyed, mitigation will not prevent this and compensation is not possible. No work permits or authorizations will be issued. The project may not proceed.

MNR Interim Fisheries Guidelines for Shoreline Alterations (MNR, 1991)

The purpose of these guidelines is to provide a consistent approach for MNR district staff who review work permit applications submitted by landowners to do work in the nearshore areas of lakes and rivers. The guidelines will also ensure that MNR's review of nearshore projects is consistent with the objectives outlined in the Policy for the Management of Fish Habitat (DFO 1986) and the Strategic Plan for Ontario Fisheries (MNR, 1992(a)).

TABLE 4

SOME NEARSHORE ACTIVITIES THAT MAY REQUIRE WORK PERMITS UNDER THE PUBLIC LANDS ACT

- Docks
- Boathouses
- Dredging or filling
- Revetments, beach maintenance or building, perched beaches, groynes, shorewalls and breakwalls
- Clearing of land (including aquatic plant removal and removal of logs, gravel, sand, etc).

Source: MNR 1991

These guidelines identify nearshore activities/projects which will maintain the current productive capacity of fish habitat. The guidelines also specify building practices which minimize the adverse effects of any shoreland and/or shoreline work on fish habitat.

Several plans prepared by OMNR in recent years are consistent with this interim plan for Severn Sound fish habitat.

The Lake Huron Management Committee has produced two documents, "Lake Huron Strategic Fisheries Management Plan", 1986 and "Fish Community Objectives for Lake Huron", 1993 (draft). The environmental objective of the strategic plan states "Provide an environment in the lake and its tributaries which can support self-maintaining populations of desired and wholesome fish species". Direction to achieve this objective will concentrate on a number of areas including "Protecting Habitat - Protect and rehabilitate fish habitat including stream habitat which is or could be used by lake dwelling fish...". The habitat objective from the Community Objectives states "Protect and enhance fish habitat and rehabilitate degraded habitats, ...".

The MNR districts bordering Severn Sound have also developed fisheries management plans which address habitat issues and are consistent with this plan. The Parry Sound plan states as a strategy "Identify, protect and maintain important habitats" and one of the tactics is to review applications for work on or near the water to ensure that important fish habitats are protected. In Midhurst (formerly Huronia) the plan states, "Protect existing habitat" and tactics include implementing the DFO "No net loss" policy, reviewing plans to ensure protection of habitat and encouraging municipalities to protect fish habitat in their Official Plans.

Severn Sound Remedial Action Plan Goals, Objectives and Remedial Actions

GENERAL GOALS:

1) to improve water quality in Severn Sound
2) to maintain a healthy ecosystem in Severn Sound

WATER USE GOALS:

1) The water should be swimmable virtually everywhere in Severn Sound
2) The fish and water-based wildlife habitats in Severn Sound should be protected to maintain their healthy, naturally reproducing communities
3) the fish from Severn Sound should be edible

TARGETS:

1. Sustain walleye and pike/muskie populations in Severn Sound at levels similar to the 1970's. A total sports fish catch (with top-level predators forming 10%) of about 20 tonnes of fish per year per creel area is targeted. Creel areas are historical zones within Severn Sound which occupy approximately 50% of the open water area and are representative of all habitats (see MNR Midhurst files).

2. No net loss of shoreline wetland and fish habitat as per Department of Fisheries and Oceans policy.

REMEDIAL ACTIONS:

1. Identify and priorize near-shore habitat and wetlands present in Severn Sound, and provide a method of protecting them. Methods would involve some form of planning and development controls to prohibit any alteration of the areas.

2. Protect and enhance the limited areas currently used by spawning walleye in Severn Sound.

3. As an interim measure, stock sufficient numbers of fingerling walleye to restore an abundance of larger predator fish of Severn Sound to achieve a healthy balanced community.

THE PLAN

Unlike many of the Great Lakes Areas of Concern, Severn Sound has considerable shoreline habitat supporting the fish community.

There is good agreement among fisheries biologists, local fishing industry operators and residents that harmful alterations of unique and essential habitats, such as wetlands, tributary mouths and spawning beds, will seriously affect the fish community. Those areas where the natural littoral zone vanished behind sheet pilings and shoreline recreational development represent opportunities to restore and develop habitat. The remainder of Severn Sound shoreline lies somewhere between these extremes either due to lack of information on habitat or due to a previously lower sensitivity of the fish community to shoreline alteration in these areas.

The challenge then is to protect and enhance fish habitat in the nearshore areas of Severn Sound. The overall targets of the plan, in accord with the Severn Sound RAP goals include:

1. **No further loss of unique and essential habitat**
   - Encourage demonstration projects for habitat restoration especially in areas identified, such as Penetang Bay, and other areas recommended by fish habitat inventory studies.

2. **Sustain top-level predators including walleye, northern pike, muskellunge, smallmouth bass and largemouth bass at levels similar to the 1970's with these species forming 20-30% of the total sport fish catch.**

3. **Promote a balanced and diverse fish community by maintaining native species richness and abundance.**

The strategy of this plan is to:

1. **Protect those shoreline areas known to be essential.** These areas will be designated ***RED AREAS*** and will have the highest restriction on development and construction activities that can alter the nearshore.

2. **Encourage development of habitat in those areas where habitat was destroyed in the past.** These areas will be designated ***GREEN AREAS*** and will permit alteration of the shoreline that creates or enhances nearshore habitat with the development.

3. **Proceed cautiously in those areas where additional information is necessary before development can occur.** These areas will be designated ***YELLOW AREAS*** and will be subject to further habitat inventory and case by case review of proposed nearshore activities.

The Severn Sound shoreline has been classified into these colour categories (Map 1, at back). Staff conducting reviews of Severn Sound shoreline development or construction proposals at the federal and provincial level would consider the category of nearshore and the accompanying review guidelines prior to granting approval.

Similarly, the municipalities would amend the Official Plan policies that incorporate these concerns, similar to the model amendment discussed in the Severn Sound Stage 2 Report. This would have the combined effect of providing developers and proponents with an early indication of the concerns for the nearshore in order to plan their undertaking.

Red Areas

Red areas are unique and essential habitats and include coastal wetlands, estuarine wetlands and known sensitive spawning areas. The goal is that there be no loss of productive capacity of these areas. To accomplish this goal, there must be no harmful alteration of the areas.

Coastal and estuarine wetlands have been identified as essential habitats supporting healthy fish populations throughout the Great Lakes. Appendix 2 provides a more detailed description of the importance of these wetlands to Severn Sound. The decline of these wetlands in the Great Lakes and in Severn Sound has also been documented (Wetlands Conservation 1991; Vic Cairns unpublished data). The coastal and estuarine wetland areas identified and classified to date by MNR in the Severn Sound area are discussed in later sections.

Spawning areas are essential habitats that, if altered, can seriously harm a fish population. For example, in Severn Sound only two walleye spawning areas have been identified to date (at Port Severn and on the North River). These relatively small areas are crucial to the walleye population and must be protected from any alteration that would change the turbulent flow or the rocky nature of the substrate. Muskellunge spawning areas are also known to be sensitive to changes. These are more generally located in littoral areas with emergent vegetation.

Green Areas

"Green" areas of shoreline offer limited fish habitat due to past alteration. These are areas with shoreline altered such that the shallow or littoral zone has been eliminated through dredging and filling and the construction of vertical walls. They are largely composed of grain terminal docks and urban waterfront on the South Shore. They offer opportunities for restoration and development of productive habitat when redevelopment is proposed. They also offer opportunities for habitat rehabilitation projects.

The goal in these areas is to promote development designs that include restoration and enhancement of fish habitat. Terms of reference for habitat restoration projects should be developed in consultation with MNR and DFO staff.

Yellow Areas

"Yellow" areas are those shoreline areas remaining between "Red" and "Green" areas. They may be less sensitive to development changes or are simply less well understood. The goal for these areas is to review development proposals on a case by case basis. In some cases development may proceed on the basis of mitigation of harmful impacts or compensation for like-habitat and mitigation of harmful impacts.

ACTIVITIES PERMITTED

Activities that may take place in the nearshore areas for each shoreline area are listed in Table 5. The general guidelines provided in the MNR publication "Interim Fisheries Guidelines for Shoreline Alterations" and by local district offices should be consulted for more details - a summary of which is provided in Appendix 3.

TABLE 5

GENERAL ACCEPTABILITY OF SOME COMMON PROJECTS IN PLAN AREAS

	RED	GREEN	YELLOW
Revetment - solid *	No	Yes	Yes
Revetment - rip rap	Yes	Yes	Yes
Nearshore breakwater	No	Yes	Yes
Dredging small scale	No	Yes	Yes
Dredging large scale	No	Yes	Yes
Dredging maintenance	No	Yes	Yes
Fill beach	No	Yes	Yes
Fill property	No	No	No
Docks solid	No	No	No
Docks other	Yes	Yes	Yes
Groyne	No	No	No
Shorewall	Yes	Yes	Yes
Boathouse	Yes	Yes	Yes

No - not allowable **Yes - may be allowed through review process**

* see glosary for general definitions

REVIEW OF PROPOSALS

Provincial Review

Under the Interim Plan, as is the case now, the Ministry of Natural Resources District Offices would be the main provincial agency of contact. MNR District staff would review each proposal for shoreline development and marine construction. In addition to the case by case review, information on proposals should be compared with a running database of the shoreline in order to check on previous proposals and the state of habitat specific to the area. The classification of the shoreline (RED, GREEN, YELLOW) will govern the general concerns and general review requirements that apply. Any site specific information can enhance the value of the review time (see Appendix 1).

Other federal and provincial agencies will also have review concerns depending on the nature of the proposal. Transport Canada staff comment on the navigation aspects of marine construction proposals. Environment Canada and Environment and Energy Ontario comment on proposals that involve dredging and the disposal of dredged material especially where the sediment is suspected of being contaminated.

Penetang Bay presents a different legal framework for work approvals. Although the impacts to fish habitat are similar to the rest of the Sound, the bed of the Bay is designated a Federal Harbour and therefore Provincial legislation (ie. Public Land Act) does not apply. The Federal Fisheries Act does apply, but there is presently no mechanism for the approval of small scale projects which normally are administered through the Public Lands Act. This situation needs to be resolved in order to completely implement this plan.

MNR Districts will circulate proposals to municipalities for their information, followed by copies of approvals or refusals.

Municipal review

Municipal review of proposed shoreline development proposals would proceed essentially the same as before with the addition of official plan policies relating to fish habitat management. Marine construction projects would be circulated for review and comments requested through the normal agencies review of zoning changes and Official Plan amendments and other proposed changes in land use. Municipalities have a role in obtaining advice from provincial agencies to form their position on shoreline developments regardless of the ownership of the lake bed.

IMPLEMENTATION OF THE PLAN

Planning considerations

Placing policies that require consideration of fish habitat in Municipal Official Plans bordering Severn Sound will have the effect of clearly declaring concerns to proponents of shoreline development at the earliest possible time in the planning process.

The "model official plan amendment" in Severn Sound Stage 2 Report was provided to encourage a unified approach across municipalities bordering the Sound and to assist municipalities in expressing fisheries concerns in a planning format. It is intended that the municipalities bordering the Sound agree on the modifications to the model and adopt similar policies that would provide a unified basis for the municipal review of proposals.

The plan will be used in the review of development proposals and applications for marine construction by provincial and federal agencies.

Updating the Interim Plan

The shoreline designations (Map 1) would be updated on an annual basis in order to incorporate additional information collected on habitat and the fish community in Severn Sound.

Major projects are underway by the Department of Fisheries and Oceans to assess the capacity of Severn Sound for producing fish. MNR is also conducting surveys of Severn Sound that will provide a more detailed inventory of habitat. The conclusions and recommendation of those studies will not be available for some time. These results, combined with general research on habitat requirements of fish and the effects of shoreline development, will be incorporated into a revised plan. It is expected that the plan could be revised by 1996.

Monitoring Progress

As part of the provincial commitment to the implementation of the Severn Sound RAP, monitoring of progress in achieving the goals of the Interim Fish Habitat Plan will be required.

In several areas of Severn Sound, particularly in Penetanguishene and Midland Bays, a gain in fish habitat is expected following the development of areas of severely degraded nearshore habitat. Fish habitat in the nearshore areas of Severn Sound has been classified on an interim basis with respect to susceptibility to damage from shoreline development activities. Twelve kilometres of shoreline (4% of total shoreline) have been identified as areas for habitat creation. It will be necessary to monitor the work permits and shoreline activities, on an ongoing basis, in order to prevent inappropriate shoreline alteration and

destruction of habitat. It is also important to develop an approval process for projects in Penetanguishene Bay.

Surveys of fish habitat are continuing in order to document the capacity of Severn Sound to sustain a productive and naturally reproducing fish community. These studies will improve on the existing classification of nearshore habitat and the fish community monitoring techniques.

Monitoring of the Severn Sound fish community must continue on an ongoing basis to track trends in population changes and community composition in response to remedial actions. In particular the restoration of top-level predators must be monitored.

Studies of the walleye population in Severn Sound are required to test theories that explain the walleye population changes in relation to other community changes (e.g. black crappie, brown bullhead increases, zooplankton size shifts). Annual index netting to maintain and improve on time trends in fish community structure must be continued.

The following list of monitoring activities has been developed through the Remedial Action Plan Team as applied to fish habitat and the fish community of Severn Sound.

Habitat

- Keep track of work permits and shoreline activities, especially near identified areas and shoreline in each category in order to prevent inappropriate shoreline alteration and destruction of habitat. Maintain "habitat budget" by area and overall on an ongoing basis. Document annual gains and losses. Include 5 year benchmark surveys.

- Continue long-term monitoring of tributaries at existing stations for phosphorus load.

- Monitor tributaries annually at index sites to record changes in fish use (i.e., biomass surveys)

- Annual progress report of Matchedash Bay Project

Fish Community

- Monitor fish communities via long-term, annual index netting surveys and creel surveys (1 in 5 years)

- Monitor commercial fish harvests in Severn Sound (carp and baitfish) and walleye outside the Sound

- Track species diversity (annual index netting will be used in part):
  - larval fish survey every 3-5 years
  - encourage additional sampling of rare species by special interest groups (eg. muskellunge, sturgeon, small fish)

- Index survey of selected littoral habitats every 3-5 years

THE FISH COMMUNITY OF SEVERN SOUND

The fish community of Severn Sound is large and diverse consisting of 65 recorded species, 54 native and 11 introduced species (Table 6). The majority inhabit the Sound year round but some occupy the area only when conditions are suitable. They migrate through the Sound to inflowing streams (salmon and trout) or leave the Sound to offshore waters of Georgian Bay (walleye) as habitat needs dictate for each species.

The fish community, as indicated by spring index trapnet catch, is summarized by ecological roles as suggested by Reckahn and Thurston (1991) (Figure 2). Panfish are black crappie, rock bass, yellow perch and pumpkinseed sunfish. Predators include northern pike/muskellunge, walleye, smallmouth and largemouth bass. The benthic fish are white sucker, redhorse sucker and brown bullhead.

In 1975 the largest percentage of the catch was predator species (>40%) consisting mainly of walleye and northern pike/muskellunge. Panfish were about 30% of the catch, mainly black crappies (20%). Sucker species dominated the benthic community (25%) with brown bullheads making up less than 5%. By 1980 predators had dropped to less than 10% of the catch with the biggest declines in walleye and the esocid complex while basses had increased from about 1% to 5% or one half of the predator catch. Panfish populations responded and had increased proportionally to 70%, with black crappies equalling almost 66% of the total fish caught. The benthic group dropped to 15% and bullheads remained less than 5% of the total. This community structure changed slightly through 1984 and then in 1985 predator numbers increased to 20% with northern pike comprising one half the predators or 10% of the total catch. Northern pike increases may have been a response to improved spawning success because of rising lake levels which peaked in 1986 (Reckahn and Thurston, 1991). At the same time, black crappie numbers dropped to 40% but still remained the most frequently caught panfish. In 1988, predators dropped to below 10% again while panfish numbers dropped to 40% and benthic species rose above 40%, for the first time, with brown bullheads increasing from about 5% to 40% of the catch. Bullhead numbers rose to over 50% of the total catch in 1989. By 1992, predator numbers remained low, panfish had increased to the highest value since 1988 and benthic have dropped to 25% but bullheads remained high.

Table 6
FISH SPECIES OF SEVERN SOUND

carp	*Cyprinus carpio*
goldenshiner	*Notemigonus chrysoleucas*
emerald shiner	*Notropis atherinoides*
common shiner	*N. cornutus*
spottail shiner	*N. hudsonius*
spotfin shiner	*N. spilopterus*
sand shiner	*N. stramineus*
blackchin shiner	*N. heterodon*
blacknose shiner	*N. heterolepsis*
mimic shiner	*N. volucellus*
northern redbelly dace	*Chrosomus eos*
creek chub	*Semotilus atromaculatus*
brassy minnow	*Hybognathus hankinsoni*
bluntnose minnow	*Pimephales notatus*
fathead minnow	*P. promelas*
alewife*	*Alosa pseudoharengus*
gizzard shad	*Dorosoma cepedianum*
mottled sculpin	*Cottus bairdi*
slimy sculpin	*Cottus cognatus*
burbot	*Lota lota*
yellow perch	*Perca flavescens*
walleye	*Stizostedion vitreum*
logperch	*Percina caprodes*
Iowa darter	*Etheostoma exile*
johnny darter	*E. nigrum*
whitebass	*Morone chrysops*
white perch*	*M. americana*
largemouth bass	*Micropterus salmoides*
smallmouth bass	*M. dolomieui*
black crappie	*Pomoxis nigromaculatus*
pumpkinseed	*Lepomis gibbosus*
bluegill	*L. macrochirus*
longear sunfish	*L. megalotis*
rock bass	*Ambloplites rupestris*
threespine stickleback	*Gasterosteus aculeatus*
brook stickleback	*Culaea inconstans*
brook silversides	*Labidesthes sicculus*

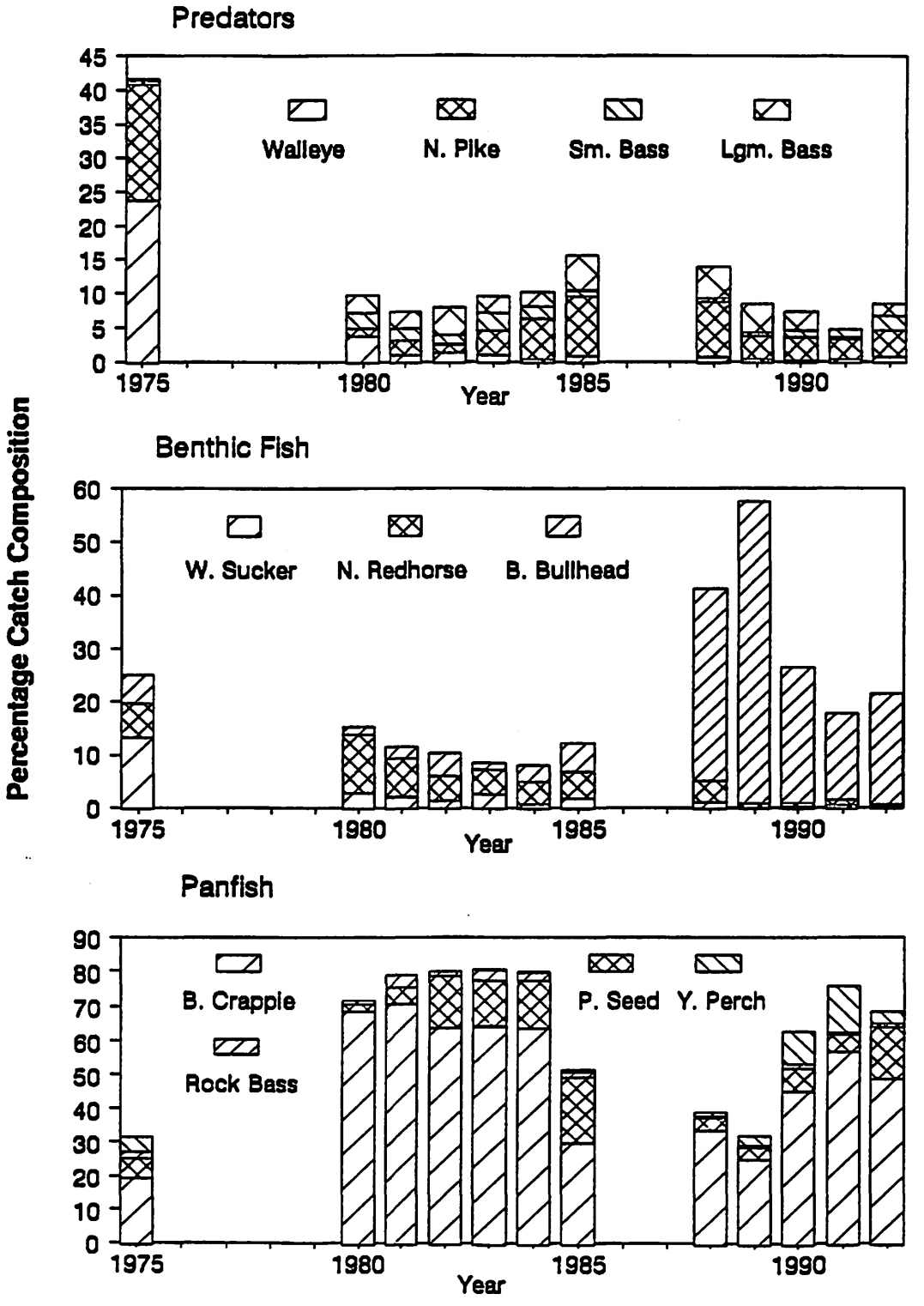
Table 6
FISH SPECIES OF SEVERN SOUND

sea lamprey*	*Petromyzon marinus*
silver lamprey	*Ichthyomyzon unicuspis*
lake sturgeon	*Acipenser fulvescens*
bowfin	*Amia calva*
tadpole madtom	*Noturus gyrinus*
brown bullhead	*Ictalurus nebulosus*
channel catfish	*I. punctatus*
American eel*	*Anguilla rostrata*
trout-perch	*Percopsis omiscomaycus*
rainbow smelt*	*Osmerus mordax*
lake trout backcross*	*Salvelinus namaycush X S. fontinalis*
brook trout	*S. fontinalis*
brown trout*	*Salmo trutta*
rainbow trout*	*Oncorhynchus mykiss*
pink salmon	*O. gorbuscha*
chinook salmon*	*O. tshawytscha*
lake whitefish	*Coregonus clupeaformis*
lake herring	*C. artedii*
longnose gar	*Lepisosteus osseus*
banded killifish	*Fundulus diaphanus*
northern pike	*Esox lucius*
muskellunge	*E. masquinongy*
central mudminnow	*Umbra limi*
northern hog sucker	*Hypentelium nigricans*
White sucker	*Catostomus commersoni*
longnose sucker	*C. catostomus*
redhorse	*Moxostoma sp.*
quillback	*Carpiodes cyprinus*

* introduced species

Figure 2

Composition of catch in Sturgeon Bay as indicated by Spring trapnet samples, 1975-1992



Source: MNR Midhurst District data.

During 1990, electrofishing surveys were conducted in inshore littoral habitats of Penetang, Hog and Matchedash Bays (Randall, unpublished data). The electrofishing surveys provided information on the species composition and abundance of fish inhabiting the littoral areas.

More than 40 species of larval fish (early life stages) were collected from various sites within Severn Sound by John Leslie and Bud Timmins during 1988 to 1992. Most of these were caught in nearshore areas. Sunfish were the most common larval fish in the catch followed by smallmouth bass. Other commonly found species included carp, spottail shiner, bluntnose minnow, rainbow smelt, alewife, brook silverside and banded killifish. Of special note were larval lake whitefish collected in early May just outside Penetanguishene Bay.

Twenty-seven species of fish were captured in the nearshore areas. Yellow perch (*Perca flavescens*) and pumpkinseeds (*Lepomis gibbosus*) were the most abundant species in all three bays, comprising from 60 to 80% of the total catch (numbers). Other species which were captured relatively frequently included the black crappie (*Pomoxis nigromaculatus*), white suckers (*Catostomus commersoni*), rock bass (*Ambloplites rupestris*), alewives (*Alosa pseudoharengus*), smallmouth bass (*Micropterus dolomieui*) and largemouth bass (*M. salmoides*). In terms of biomass, predators comprised between 18% (Penetang) and 24% (Matchedash) of the total biomass (Table 7). Native species of fish made up from 85% to 90% of the total fish biomass. Generally, these data indicated that the fish communities inhabiting the inshore areas of all three bays were diverse, and all trophic groups were represented, panfish were high and predators low.

Eutrophication and habitat degradation can affect the species of fish present in littoral habitats. Fish biomass can be high in eutrophic areas, but often the biomass is dominated by carp (Lee et al. 1991), which is considered to be an undesirable, non-native species because of its negative affect on the habitat (increased turbidity). Randall et al. (1993) compared fish data in littoral habitats of Severn Sound with data from Hamilton Harbour and the Bay of Quinte. Generally, the biomass of fish was higher in Hamilton Harbour than in any other areas, because of the more eutrophic conditions (phosphorus levels). Although total biomass was high, habitat degradation had a negative impact on the trophic structure of the fish communities. The biomass of carp and other non-native species was higher in Hamilton Harbour, while species richness was lower than in the Severn Sound bays (Table 7).

Predators comprised a higher proportion of the biomass in the Severn Sound habitats than in Hamilton Harbour. Using the nearshore fish data, Minns et al. (1993) calculated an 'Index of Biotic Integrity' (IBI), a composite indicator of the health of the littoral fish communities. IBI values for the Severn Sound bays were significantly higher than IBI values for Hamilton Harbour. However, some differences were found among the bays within Severn Sound. IBI values for Penetang Bay were less than values for Hog and Matchedash Bays, largely because predators were less abundant. Minns et al. (1993) warned that Penetang Bay may be perilously close to the transition from a clear to a turbid state. Thus, although data from the inshore areas

of Severn Sound generally indicated fish communities that were healthy relative to Hamilton Harbour, habitat conditions in localized areas showed signs of degradation.

TABLE 7

Summary of fish data from Penetang, Hog and Matchedash Bays, as determined by electrofishing in littoral areas (1.5 m depth contour) along 100 m transects in 1990. Data from two areas in Lake Ontario (Hamilton Harbour and Bay of Quinte) are given for comparison.

	Penetang	Hog	Matchedash	Hamilton	Quinte
Number of transects	84	28	36	60	59
Biomass (kg/tran.)	4.8	3.8	3.6	9.1	6.9
Biomass (kg/ha)[1]	160	127	120	303	230
CV of biomass[2]	96	86	71	140	87
% predators	18	23	24	9	25
% native species	91	88	90	38	77
Species richness	5.1	4.8	6.9	4.1	6.7
Mean IBI[3]	57.0	61.2	64.6	28.7	57.4

[1] kg/ha was estimated assuming a catch efficiency of 0.3 and a survey area of 100 m X 10 m.

[2] CV is the coefficient of variation.

[3] IBI is the Index of Biotic Integrity (see Minns et al. 1993).

SEVERN SOUND FISH HABITAT

Spawning Habitat

Muskellunge and northern pike, important predators in the fish community, both spawn in and use coastal wetlands for nursery habitat during their first season of life. A total of 16 muskellunge were recently observed in potential spawning habitats (Craig and MacIntyre, 1990). These were seen along the north shore west of Potato Island and east of Moore Point . Surveys are continuing in 1991 and 1992. Work conducted in the early 1980's (Craig and Black, 1986) revealed other locations on the North Shore of Severn Sound important as muskellunge nursery habitat and potential spawning habitat.

Walleye spawn at two locations near Port Severn where water exits Gloucester Pool and below Laughlin Falls on the North River. The walleye spawning bed at the overflow channel of Lock 45 was about 930 sq. m but the addition of rock rubble (32 - 130 cm in diameter) in 1979 increased this to 4650 sq. m. Rubble was added to the Laughlin Falls spawning area in 1989 to reduce silting and to increase spawning substrate.

Lake sturgeon also spawn at Port Severn but very little is known about their spawning habitat or populations.

Rainbow trout and chinook salmon migrate through Severn Sound to spawn in tributary streams. Rainbow trout enter streams in the spring to spawn and usually spend two years in the stream environment before entering Severn Sound and Georgian Bay again to mature. The most productive streams are the Coldwater and Sturgeon Rivers. Chinook salmon enter the streams in late summer - early fall to spawn. After hatching the young return to the Sound to develop. The greatest run of fish occurs in the Coldwater River.

Sea lamprey, an undesirable introduced species, ascend area streams to spawn during the late spring. Young live and develop in these streams before completing their lives in Georgian Bay. The Sturgeon River has the largest run. The Federal Department of Fisheries and Oceans regularly surveys streams for lamprey and initiates treatment with "lampricide" to control this species.

Nursery Habitat

Submerged aquatic plant beds have long been known to provide nursery habitat for a large variety of fish species. Extensive beds of submerged aquatic plants are supported in most of the shallow Bays of Severn Sound. Midland Bay, Tiffin Bay and the Port McNicoll area are exceptions due to harbour facilities, vertical shoreline retaining walls and steeper bottom slopes. The entire lower section of Penetang Bay and most of Sturgeon Bay and Hog Bay support a diverse aquatic plant community.

Unfortunately, submerged plant beds in nearshore areas can also interfere with other water uses such as navigation and swimming. Beds may be cleared or dredged to make way for other uses without consideration of their value as nursery habitat.

Fish and Habitat Use of Penetang Bay

In Penetang Bay, forty fish species were collected, by Leslie and Timmins (1988) representing 20 families and >4000 fish. Relatively few (10) species frequented open waters of the harbour. Evidence of spawning was confirmed by the presence of embryos and larval fish of at least half the species captured (Table 6).

The first larval fish collected (at 11°C in early May) were lake whitefish at the control site just outside the Bay (Figure 1). Yellow perch, burbot, and rainbow smelt appeared next in Mid May. These species were caught in open water in the upper sector of the harbour, but did not move into the south basin.

There are many possibilities for "sunfish" spawning and nursing in the shallow waters of Penetang Harbour. Six species were present as larvae and juveniles. Pumpkinseed formed nearly 20% of the total catch of larvae, and reached peak abundance (816.1 per m^3) off the Main St. Water Pollution Control Plant (WPCP), and 652.1 per m^3 at West Beach. These values for pumpkinseed surpass highest abundance found at other RAP sites (e.g., St. Clair River and delta, Hamilton Harbour, Bay of Quinte) on the Canadian side of the Great Lakes. Pumpkinseed was one of only two species (including black crappie) found at all shore sites and in open waters. The large expanse of vegetated shallows in the harbour suit pumpkinseed at all stages of early life as well as during adulthood. Smallmouth bass was the second most abundant sunfish, and represented 9% of the total catch. It was found mainly at West Beach, the windward side of Magazine Island, and off the Main St. WPCP. Relatively few (each <1%) largemouth bass or black crappie were collected. These species were found mainly at West Beach and near the Main St. WPCP.

The minnow family, which serve as forage for sport and commercial fish, were represented by 12 species, three of which were distributed widely in the harbour. Succession of common carp, spottail shiner, and bluntnose minnow occurred in early to mid-June.

Other leading species, in terms of abundance, were rainbow smelt, alewife, brook silversides, and banded killifish. The enriched waters with prolific aquatic vegetative growth and associated fauna near the Main St. WPCP contained most species, which were usually in highest abundance and whose appearance was most protracted. Several species of fish can be found at this site in early spring and late autumn (and probably in winter). Decaying and remnant vegetation prevail during these seasons, affording shelter and forage opportunities that may not exist elsewhere. Adult alewives were absent throughout the harbour, but juveniles (age +1) were caught in quantity with a 61 m beach seine during mid-September

to early October, after which they apparently left the harbour. West Point and Magazine Island were sites most frequented by alewife in late season.

A few each of a number of species of interest were caught in the harbour or adjacent waters. These include parr of brook trout, central mudminnow, sticklebacks, slimy sculpin and redbelly dace, all apparently solely located at the mouth of Copeland Creek, whereas walleye, burbot, white bass, and lake whitefish were collected mainly in open water or at the control site.

Spawning habitats in Penetang Harbour for predators, such as northern pike and walleye, either do not exist or are scarce. Although adult northern pike were the second most common fish caught in gill nets, no young were collected. Lower than normal water levels during 1988, and hence reduced available spawning habitat, may have played a role in the absence of young northern pike. In addition, this species is difficult to capture when young. The only possible spawning habitat suitable for northern pike exists near the shore of private land at the northern limit of the harbour (i.e., Michaud Point). Hence, the harbour itself likely does not contribute greatly to recruitment of this warmwater predator.

The low total catch of black crappie larvae was somewhat unexpected, since local anglers reported catches of adults throughout the harbour. This species usually occurs in a wide range of water clarity (Leslie, personal observation), where there is an abundance of submersed vegetation.

Physical nearshore substrate in Penetang Bay was mapped in 1989 by King and Portt. A total of 18.7 km of shoreline were examined, 60% was natural and the remainder had been altered by the building of breakwalls or the addition of fill. Sand was the predominant natural substrate (34%) while organic material was present along 11% of the shoreline. Most of the organic material was located in the south and west sections of the inner bay.

Fish and Habitat Use of North Shore

Fish habitats from Port Severn to Moore Point were surveyed in 1990 (King and Portt, in preparation). Largemouth and smallmouth bass nests were also recorded. A total of 92.4 km of shoreline were examined, 70.3 km of island shore and 22.1 km of mainland. Hard bottom (bedrock, cobble, sand etc.) dominated both the mainland (91%) and island shorelines (98.4%). Organic materials were only found along the mainland (5.3%), in protected areas. Man made structures made up 2.3% of the shoreline. The total area 1.5 m or less deep was about 331 ha and the area between the 1990 waterline and the historic high water mark was an additional 188 ha, creating potential fish habitat of 519 ha. Aquatic vegetation was present on more than half the area 1.5 m or less in depth. Submergent beds, with more than 50% coverage, were present in 30% of the area, mixed emergents, in 20%.

More than 7000 fish representing 21 species were caught, of which 80% were young-of-the-year. Largemouth bass were the most frequently caught young-of-the-year species over the two sampling dates. Forage species such as bluntnose minnow, spottail shiners and yellow perch were also frequently encountered.

Survey work continued from Moore Point to Honey Harbour in 1991. As noted earlier, several muskellunge spawning sites have been located in this area and documentation continues in cooperation with Muskies Canada volunteers.

Fish and Habitat Use of Southeast End

An historical comparison of the fish inhabiting the nearshore habitats of Sturgeon Bay was undertaken by MNR (Craig and Tombolini, 1988). Nearshore fish populations, although variable from year to year, remain diverse and virtually unchanged through Sturgeon Bay, even in the vicinity of Victoria Harbour Sewage Treatment Plant (start-up 1984).

Wetlands

Coastal wetlands are important fish spawning and nursery habitats throughout Severn Sound. A total of six wetlands have been identified and classified as provincially significant (Class 1-3) using the provincial evaluation system (Table 8). The largest and most significant wetland is Matchedash Bay Marsh, 1250 ha, at the extreme eastern extremity of Severn Sound. At least 39 fish species inhabit Matchedash Bay. Many wetland areas are also located along the North shore but have not been inventoried or classified.

Table 8 Evaluated Wetlands on the Severn Sound Coast

Township	Wetland Name	Classification	Area (ha)
Georgian Bay	Quarry Island	3	354.4
Tiny	Penetanguishene Bay Marsh	3	29.3
Tay	Hog Bay	3	31.6
	Matchedash Bay Marsh	1	1250.1
	Port McNicoll	2	76.9
	Sturgeon Bay Marsh	2	192.1
	Victoria Harbour Marsh	3	39.0

Summary of habitat

We presently have enough information about fish habitats in Severn Sound to develop an interim management plan that can be scientifically defensible. The locations of walleye spawning areas are well known and their significance is accepted by conservationists, planners and developers. The locations of major wetlands are known along the South shore but require additional investigation along the North shore. Data gathered to date supports the importance of these areas as spawning and especially nursery habitats for a large number of fish species. Other areas of near shore aquatic vegetation have also proved productive to fish, especially young-of-the-year in investigations completed to date.

The protection of northern pike and muskellunge spawning habitats is more difficult. They seem generally associated with areas of aquatic vegetation but little has been documented about pike and little is available about muskellunge. OMNR and Muskies Canada volunteers continue to search the North shore each spring for spawning adults. While many observations have been made, the documentation is far from complete. The situation with the bass species is similar, some spawning data has been collected but more is needed.

A fish habitat plan that protects critical habitats for scarcer species of the fish community, especially predators, and recognizes the significance of areas of aquatic vegetation while recognizing the potential for habitat creation in degraded areas will go a long way to achieving the Severn Sound RAP Water Use Goal #2, ***"The fish and water-based wildlife habitats in Severn Sound should be protected to maintain their healthy, naturally reproducing communities".***

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GLOSSARY OF TERMS

Accretion	the slow and imperceptible addition of shoreland by natural deposition.
Armour stone	a naturally occurring rock material that is used in the construction of shore protection devices. When used as shore protection it dissipates wave energy and reduces erosion. It has a long life span and is not highly susceptible to wave and ice action.
AOC	Area of Concern
Fill	the material used to refill a ditch, an eroded area, a low lying area, or other excavation, or the process of doing so.
Backshore	the part of the shore or beach that is usually dry, extending from the limit of wave uprush at the average annual high water level to either the place where there is a marked change in material or physiographic form, or the line of permanent vegetation (usually the effective limit of storm waves), or the high water mark.
Bar	a submerged or emerged embankment of sand, gravel, or other unconsolidated material built in the nearshore zone by waves and currents.
Beach	the zone of unconsolidated material that extends landward from the average annual low water level to either the place where there is a marked change in the material or physiographic form, the line of permanent vegetation (usually the effective limit of storm waves), or the high water mark. A beach includes foreshore and backshore.
Benthic	of or living on or in the bottom of a water body; benthic region, benthos.
Berm	a bench or terrace between two slopes.
Biological Features Map	maps that have been constructed for the shoreline management plan that display natural resource values, especially significant fisheries habitat.

Breakwater	a structure protecting a shore area, harbour anchorage, or basin from wave action.
Crown Land	all land (including land under water) held by the Province, both land which has never been sold and land which has been reacquired.
DFO	Department of Fisheries and Oceans (Federal)
Dissipate	expend or scatter harmlessly, as of energy of moving waves.
District Land Use Guidelines	the District Land Use Guidelines indicate what the Ministry of Natural Resources wishes to achieve on Crown Land and influence on private land and the lands of other agencies, such as Conservation Authorities, in order to achieve Ministry objectives.
Downdrift	the direction the predominant movement of littoral materials.
Dredgate	the material removed from the lake/river bed during a dredge operation.
E.A.	Environmental Assessment
E.A.R.P.	Environmental Assessment and Review Process
Ecosystem	a community, including all the component organisms, together with the environment, forming a life maintaining, interactive system.
Environment	air, land or water, plant and animal life including man, and the social, economic, cultural, physical, biological and other conditions that may act on an organism or community to influence its development or existence.
Erosion	a volumetric reduction of shoreland by natural or man influenced processes.
Erosion Rate	the net loss of shorelands normally located above the lake surface elevation over a specific period of time.
Fetch	the distance over water which waves are generated by a wind having a generally constant direction and speed.

Filter	the layer of well graded rock and/or a synthetic material between protection works and backfill soil through protection works.
Groyne	a shore protection structure built at an angle form the shore to trap sediment drift and to protect the shore from erosion by currents and waves by making a beach.
Groyne Field	a series of groynes acting together to protect a section of shoreline.
Habitat	the place or site where an animal or plant community naturally or normally lives.
Headland	an erosion resistant promontory, either natural or man made, extending into the lake; embayments often form between adjacent headlands.
High Water Mark	the upper most extent that water levels range, also associated with a break in slope and/or vegetation.
Integrated Resource Management	the coordination of resource management that ensures that conflicts are minimized and that management which would benefit several programs is encouraged. Integrated management encourages multiple use, but recognizes that in some circumstances management of areas for a single purpose may be necessary.
Littoral Area	pertaining to or along the shore, usually shallow water zone, less than 1mm in depth, where many fish spawn, raise young and where food organisms are produced.
Marsh	an area soft, wet, or periodically inundated land, generally treeless and usually characterized by aquatic plant growth.
MOI	Memorandum of Intent on the Management of Fish Habitat
MNR or OMNR	Ontario Ministry of Natural Resources
Outfall	a structure extending into a body of water for the purpose of discharging sewage or storm run-off.

Pier/Dock	a structure, usually of open construction, extending out into the water from the shore to serve as a landing place, a recreational facility or other use.
Pile	a long, heavy timber or section of concrete or metal to be driven into the ground or lake bed to provide support or protection.
RAP	Remedial Action Plan
Remedial Works	structural measures intended to provide a remedy specifically aimed at problems of erosion and inundation for the purposes of shore management.
Revetment/Breakwall	a facing of stone, concrete, etc., built to protect an embankment or shore structure against erosion and failure by wave action or currents. Its principle is to allow for the dispersion of energy through friction and gravity.
Riparian Owner	the owner of land containing or directly abutting a natural lake or watercourse.
Riparian Rights	the rights of a person owning or bordering on a watercourse or other body of water in or to its banks, bed or water.
Rip rap	a layer, facing or protective mound of stones randomly placed to prevent erosion, scour or sloughing of a structure or embankment; also, the stone so used.
Rubble	rough, irregular fragments of broken rock.
Sand	granular soil or detritus coarser than silt and finer than gravel, ranging in diameter from 2mm to 0.06mm.
Seepage	water escaping through or emerging along an extensive line or surface; the slow movement of water through soil by gravity.
Sheet Pile	a pile with a generally slender flat cross section to be driven into the ground or lake bed and linked or interlocked with like members to form a vertical wall or bulkhead.
Shore	the area of interface between land and water extending form the lakeward limit of the littoral zone landward to the first major change in terrain.

Shorelands	those lands extending from the average annual water level which have potential and direct significant impact on nearshore waters and the shore ecosystem through run-off, and where land use activity is primarily water-oriented.
Silt	inorganic particles carried in suspensions or deposited by currents, ranging in diameter from .05mm to .005mm.
Toe Erosion	the erosion which occurs at the bottom of bluffs largely as a result of the continuous removal of earthen material by waves and currents.
Turbidity	reduced water clarity resulting from the presence of suspended matter.
Wetlands	land where the water table is at, near, or above the land surface long enough to promote the formation of hydric soils, or to support the growth of hydrophytes. Included are wetland forests (swamps), wetland thickets, marshes, bogs and fens

APPENDIX 1

Fisheries Act Policy

Environmental Assessment and Review Process Guidelines Order

Recent court decisions have ruled that the federal Environmental assessment and review process (EARP) must be applied to all activities where the Federal Government has decision making authority. Since authorizing the harmful alteration, disruption or destruction of fish habitat constitutes a decision by the federal Minister of Fisheries and Oceans, all projects which impact fish habitat must be reviewed in accordance with the Environmental Assessment and Review Process Guidelines Order (1984). The courts have also ruled that the Federal environmental assessment is required even though the project may have undergone provincial review.

The federal Environmental Assessment and Review Process (EARP) consists of two steps:

Step 1: Initial Assessment

Step 2: Full Public Review

The decision to move from Step 1 to Step 2, the public review stage, is made by the initiating department on the basis of information obtained during the Initial Assessment stage of the review.

The Initial Assessment step of the process also consists of two stages: a Screening and an Initial Environmental Evaluation. Decisions made during the Screening stage determine whether or not the Initial Environmental Evaluation will be necessary. Three possible decisions can be made at the Screening stage of the Initial Assessment.

1. The impacts are not significant or can be mitigated with known technology. The project can proceed through the normal regulatory process.

2. There is insufficient information to assess the magnitude of the impacts or the ability to mitigate is not known and additional information must be obtained. The project moves into the Initial Environmental Evaluation stage of Stage 1 and more information is obtained.

3. The impacts are significant and/or there is significant public concern. The project is referred to the Minister of Environment for full public review by an independent panel.

If, as a result of a screening decision, an Initial Environmental Evaluation is required, additional information is provided by the proponent and evaluated by the initiating department with the assistance of other federal and provincial agencies. Material required to complete this stage of

the assessment is normally obtained from consultants' reports, specific studies, provincial E.A. documents and MOE, DOE, DFO, and OMNR technical and scientific staff.

On the basis of advice from other agencies and the additional information provided by the proponent, the initiating department makes one of the following decisions:

1. The impacts are not significant or can be mitigated with known technology. The project can proceed through the normal regulatory process.

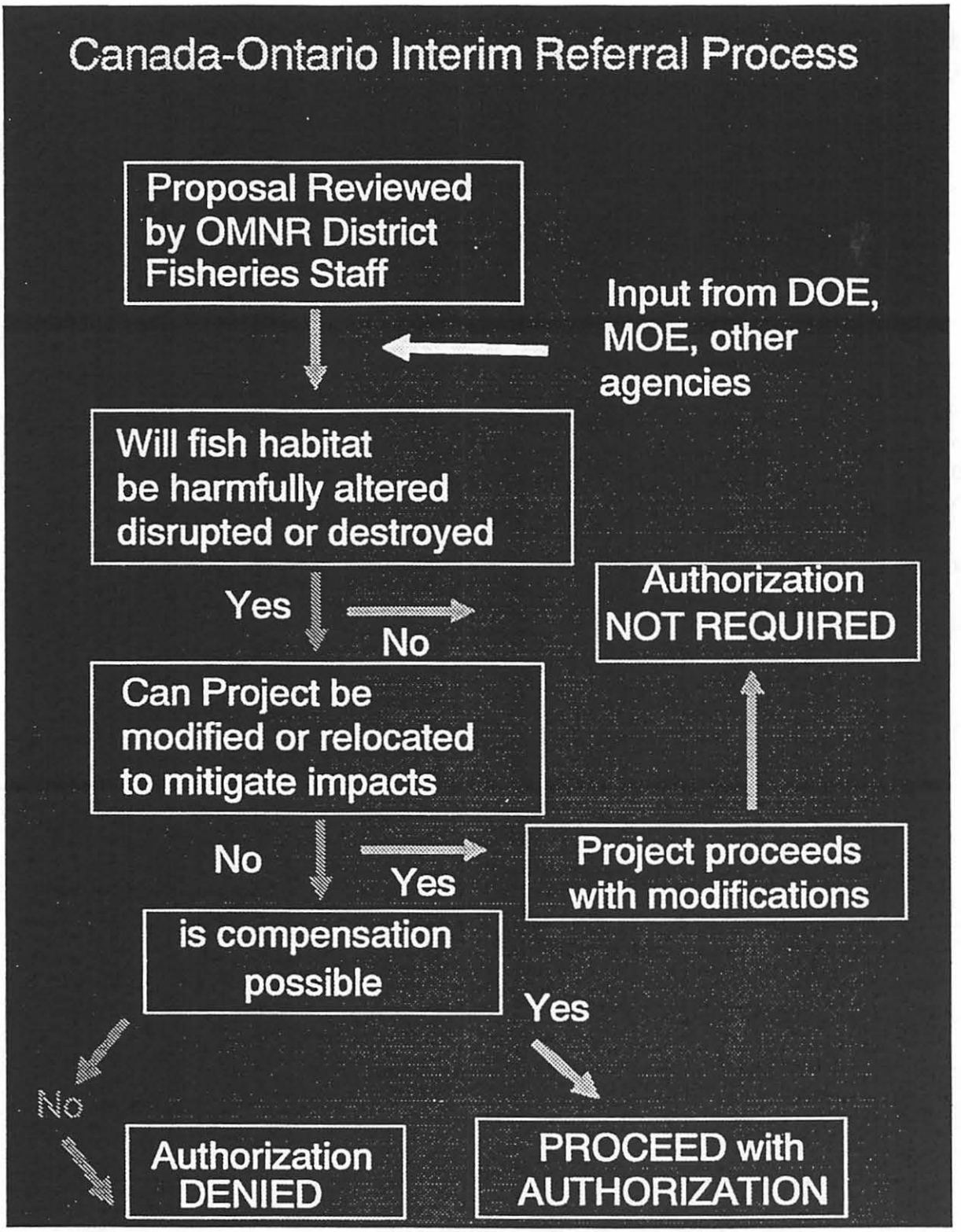
2. The impacts are significant. The project is either modified or stopped.

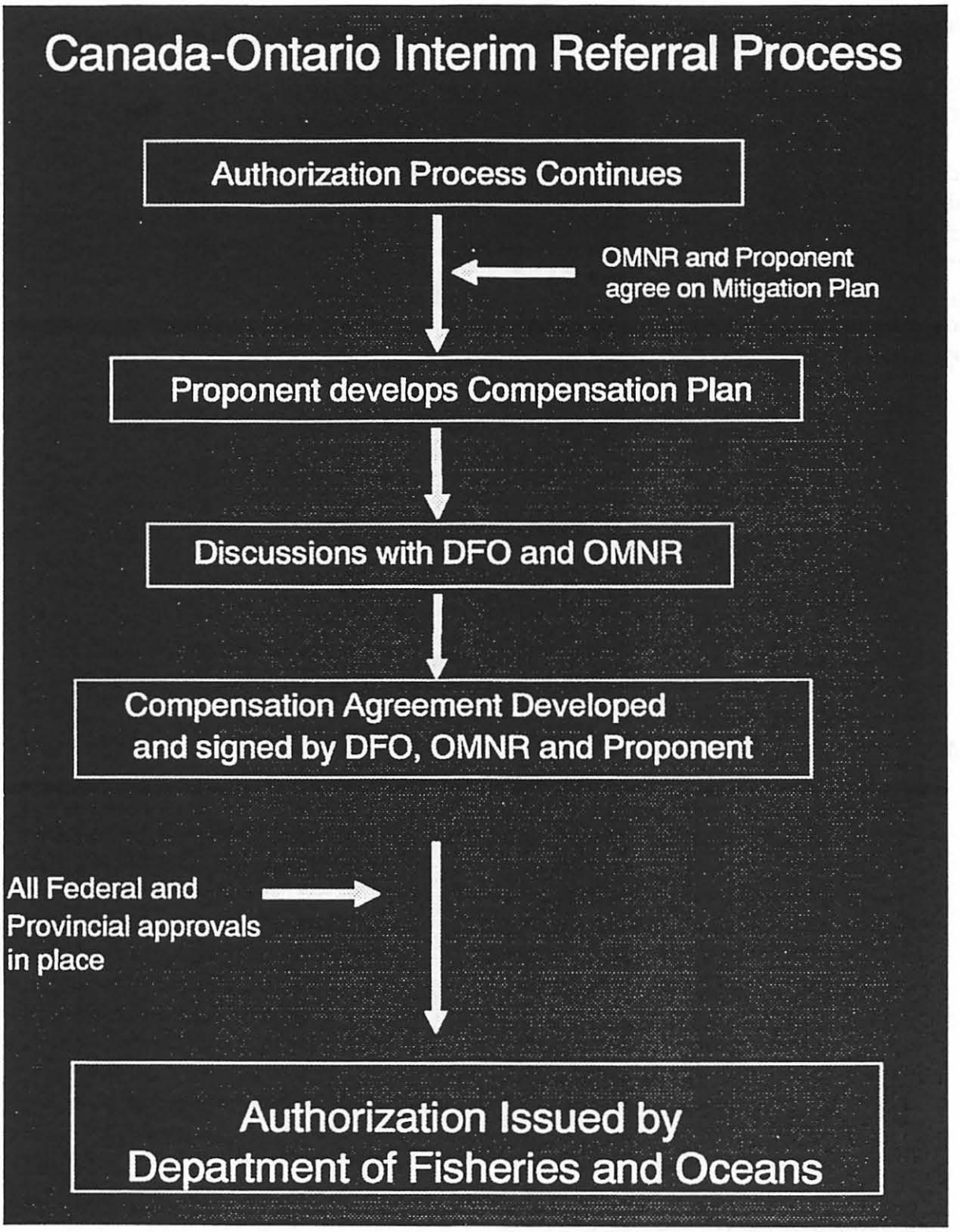
3. The impacts are significant and/or there is significant public concern. The project is referred to the Minister of the Environment for full public review by an independent panel.

In almost all cases, projects can be addressed within E.A.R.P. with only minor modifications or specific remedial measures. In rare cases, where projects are apt to lead to unknown or potentially significant public concern, E.A.R.P. requires that these proposals be referred to the Minister of Environment for full scale public review.

This decision has been interpreted to mean that projects requiring authorization under Section 35(2) of the Fisheries Act must be subject to an E.A.R.P. review before an Authorization can be issued.

Appendix 1 Continued:




Canada-Ontario Interim Referral Process
Authorization Process Continues
OMNR and Proponent agree on Mitigation Plan
Proponent develops Compensation Plan
Discussions with DFO and OMNR
Compensation Agreement Developed and signed by DFO, OMNR and Proponent
All Federal and Provincial approvals in place
Authorization Issued by Department of Fisheries and Oceans

APPENDIX 3

The Importance of Coastal Wetlands in Ontario

Coastal wetlands are areas periodically inundated with standing or slowly moving water, often separated from the lake by gravel or riprap berms. Those wetlands that are inland from the lake or "controlled" contribute indirectly to lake fisheries through nutrient recycling, groundwater recharge, flood storage, nutrient consumption, acting as a sediment basin, etc.). Few species of fish use the "controlled" marshes. On the basis of fish movement between lake and marsh, species richness, and larval fish sampling, Herdendorf (1987) concluded that the contribution of the controlled marsh to the open water fishery was small. These results have been confirmed in other studies. This is an important finding since many of the existing coastal wetlands are controlled. Most marsh restoration technology in the Great Lakes appears to be limited to bermed impoundments. The number of man-made marshes will proliferate as natural wetlands disappear.

1. Forty-three percent of the coastal wetlands on the Canadian side of Lake Ontario have been lost. Heavily settled (urban) areas lost an average of 75% of their wetlands (Stephenson, 1988).

2. Total wetland losses on Lake St. Clair were estimated at 40% between 1873 and 1968 (Herdendorf et al., 1986). Seventy percent on the Michigan side of Lake St. Clair (Jaworski and Raphael, 1976).

3. Vascular plant diversity in surviving wetlands has decreased by 50% in one Lake Erie Marsh and probably most (Herdendorf, 1987).

Fish Utilization of Coastal Wetlands

1. Matchedash Bay, at 800 ha the largest wetland within Severn Sound, provides habitat for 39 species of fish (Fraser, D.M. ed,1989).

   Up to 30 fish species, including many young-of-the-year, were found in wetland habitats of Penetang Bay (King and Portt, 1990; Craig and McIntyre, 1990 & 1991).

2. Eighteen of the 36 fish species found in Lake Ontario marshes are game and commercial fish; the remaining species were forage fish that contribute to the food web. All 36 species utilize marshes for some aspect of reproduction.(Stephenson, 1988).

3. Wetlands are primarily used for fish reproduction and appear to be more important as nursery habitats than as spawning habitats (Stephenson, 1988).

4. High productivity and habitat diversity are due to alternate periodic flooding and low water levels that maintain wetland vegetation in an early state of successional development. This also facilitates the release of nutrients from sediment and decaying vegetation (Geis, 1979).

5. Phytoplankton production in western Lake Erie marshes is much higher than offshore areas. Increased primary production results in increased zooplankton production serving as prey for larval fish (Herdendorf, 1987).

6. Aquatic plants are the most important primary producers in freshwater marshes (Wetzel, 1983). They harbour large numbers of invertebrate prey species (Herdendorf, 1987) but macrophyte production enters the production system through detritus and benthos pathways (Tilton et al., 1978).

7. Lake Erie marshes contribute significantly to the game and commercial fisheries of Lake Erie and St. Clair (Herdendorf, 1987; Herdendorf et al., 1986). Forty three species of fish are or were associated with the coastal marshes of western Lake Erie. Twenty six have significant commercial, recreational or prey value. As much as 90% of the standing fish crop consists of forage (prey species) (Herdendorf, 1987).

8. Marshes play a central role transferring nutrients and energy from the marsh to the less productive lake waters.

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APPENDIX 3

Shoreline Structural Standards

These are directional guidelines only. The advice of a Professional Engineer and Biologist, in the form of structural design and/or environmental study, may be required when considering some types of work and their impacts. This is particularly the case when proposals are contrary to the guidelines. A Professional Engineer's design must provide evidence that the building materials or works will not put undue stress on the environment during construction, while installed or during ongoing maintenance activities. Mitigation measures must be outlined to minimize any identified impacts.

These guidelines were compiled through extensive research and field experience. Consultation with Professional Engineers and Fisheries Biologists was part of the compilation process.

i) BUILDING MATERIAL CONSIDERATIONS

Shore structures are often constructed from a variety of building materials. These materials include wood, rock, steel, concrete brick, gabion baskets and refuse. This plan identifies preferred building materials and those that are unacceptable for use along the shoreline.

Wood is commonly used for docks, boathouses, cribs and other shore-related structures, and usually has no major negative impacts. Wood should be affixed so that it does not float away or act as a battering ram during the water or storm events. The use of untreated wood is encouraged, as all wood preservatives contain toxic chemicals. In situations where the wood is constantly submerged, untreated wood can last as long as treated wood. Consider using untreated wood below the surface and treated wood for those parts of the structure that are intermittently submerged or exposed to the elements.

Treatment of wood with stain or preservatives should be done in an environmentally conscious manner. All brush on wood preservatives should be applied away from water in order to prevent spillage into the water, and should be allowed to fully dry before being placed in the water.

Creosote - treated wood should never be used in or near the water as it contains over 70 chemical compounds and is known to exhibit toxic effects on aquatic ecosystems. It is also a skin irritant. The use of old creosoted railway ties is especially undesirable.

Rock is found throughout the planning area and often on the beach area where alterations are desired. Removal of rock from shorelines for the construction of shore works is generally restricted. Rock is an excellent building material but must come from an inland site. Removal of shoreline rock causes destruction of fish and wildlife habitat and signifacantly reduces the natural wave breaking capacity of the shoreline.

Many types of rock are available in the planning area. Rounded boulders resulting from glaciation are most prevalent, especially along farm fence lines. These, if large enough and cleaned of soil, may be ideal for creating offshore breakwaters. To establish a revetment, more irregular, sharp-edged quarry rock should be used. This rock will lock together and form a more stable slope. Slope is a very important consideration when constructing shore protection works. Most rock revetments need to be underlain with a filter material to prevent fine soil particles from entering the aquatic environment. Properly located, the addition of rock to the shore may improve fish habitat.

Steel has been used in various shore projects and has worked reasonably well. It should be noted that steel does eventually break down, particularly from the effects of ice. The problem can be reduced by placing the works sufficiently back from the water's edge and thus not creating an undesirable vertical face within the influence of the lake.

Concrete is generally not recommended for shore works as it has a very limited life span and is subject to the freeze-thaw cycle, which causes cracking and structure breakdown. Undermining is an additional problem, as the fine materials from below and behind the structure are sometimes removed by wave action, resulting in instability and cracking. Although concrete is, for the most part, inert, it can cause a safety hazard and unwanted side effects once it begins to deteriorate. Concrete should not be used near the water but can be used above the high water mark. Concrete blocks are also not recommended as they are found to be too light to withstand wave action and they often collapse, are removed by ice, or topple over.

Brick is very similar to concrete, and the same general concepts apply.

Gabion baskets are used for a variety of shore works including shorewalls, groynes, revetments, and docks. They can work if constructed and used properly; however, they have a limited lifespan if used in the water. The wire meshing deteriorates in time and the baskets can fall apart, creating a safety hazard. They should be filled with angular rock, as opposed to rounded rock, and this material must not come from the shore area.

Refuse or "unclean" fill has been used on shorelines for backfill or recreational structures. This practice is unacceptable and applications to fill will require that "clean", environmentally inert fill be used from a recognized source. The use of scrap vehicles, unclean oil tanks, creosoted railway ties, used tires and asphalt for shoreline structures will not be approved.

Other - numerous other materials may be used for shore works and many are successful, while others fail terribly, resulting in environmentally damage, property and investment loss, and adjacent property conflicts. When completing an application to construct shore works, always include building materials so that the MNR can review your proposals and make the appropriate recommendations based on knowledge and experience.

ii) SHORE ALTERATION CONSIDERATIONS

This section deals specifically with all types of alterations and what the considerations are for construction and use. The MNR reserves the right to decline an application if it does not conform to the intent of this plan, or to suggest a modification that may negate the concerns. In addition, when authorization is given to place/build a structure on the shoreline, the structure becomes the sole responsibility of the proponent. Any maintenance, restructuring or removal of the structure can require further authorization and will be the proponent's obligation. Details of how to apply for a work permit, preferred mitigation etc. are available from the MNR district in which the works are proposed. Huronia district has a booklet available entitled "Shoreline Work Permit Guidelines", February 1992. These guidelines will revised annually as new information becomes available and further fish habitat policies emerge.

Groynes

A groyne is a shore protection structure built at an angle to the shore to trap sediment so that the resulting beach provides shore protection. It is usually constructed using rock, broken concrete, gabion baskets, sheet steel or wood piles.

Impact of Fish Habitat

Groynes can have a detrimental effect on fish habitat. They can significantly change water and sediment movement patters in the nearshore areas and effect water quality by increasing suspended sediment and turbidity. These structures can also displace natural shoreline habitat, especially when rock along the shore is used for construction. Groyne construction may cover spawning, nursery and feeding areas used by fish.

Appoval Process

Groynes will not be approved.

Revetments and Shorewalls

Revetments are a facing of rip-rap (rock), concrete, armour stone or gabion baskets built to protect an embankment or shore structure against erosion or failure by wave action or currents. They are normally constructed at or near the high water mark and are sloped, usually at a one-to-three vertical to horizontal ratio. Shorewalls are vertically faced protection structures used to protect eroding banks or create land at the land water interface. They are either thin structures (ie. sheet piling) penetrating into the ground or gravity structures resting on the surface (ie. armour stone).

Impacts on Fish Habitat

Revetments and shorewalls can harmfully alter fish habitat depending upon design, material used and location with respect to the high water mark (HWM). Poured concrete, concrete blocks or sheet piling do not conform to the natural shoreline and if built below the HWM may result in decreased fish habitat diversity. Rip rap (rock) or armour stone does conform to the natural shape of the shoreline and may enhance fish habitat by maintaining or increasing habitat diversity. The installation of a filter layer between the soil and the construction material and revegetation of the rock area will further reduce sediment input to the waterbody. Appropriate timing of construction will also minimize habitat impacts.

Approval Process

Constructing revetments and shorewalls from poured concrete, concrete blocks and sheet pilings will be discouraged while the use of rip-rap and armour stone will be encouraged. Revetments should be placed at or above the HWM. A work permit under the Public Lands Act is required from the Ontario Ministry of Natural Resources before work can begin. A building permit from the local municipality may also be required.

Offshore Breakwaters

Offshore breakwaters are structures used to protect a shore area, harbour or anchorage from wave action. They are often considered in large scale developments such as marinas. Breakwaters are typically constructed from large rock.

Impacts on Fish Habitat

Breakwaters can have a positive effect on fish habitat if they are designed, located and constructed with fish habitat improvement in mind. It is important not to impact water movements or cover fish spawning, nursery or feeding areas.

Approval Process

Breakwaters will require a work permit under the Public Lands Act from OMNR, and may require exemption under the Navigable Waters Protection Act from the Department of Transport (Federal) and authority under the Fisheries Act (Federal) from the Department of Fisheries and Oceans.

Docks and Boathouses

Waterfront property owners may construct a dock and/or boathouse from a number of different materials such as wood, steel or concrete. These structures may be fashioned in a number of ways: they may be entirely on land or entirely in or over water; they may be suspended or on stilts or may have a solid foundation of concrete or cribbing. The level of concern the MNR has regarding possible impacts on fish habitat depends on the design proposed.

Impacts on Fish Habitat

Docks and boathouses with minimum littoral zone contact and disruption should have little detrimental effect on fish habitat. These structures can provide additional cover for fish populations and therefore may result in a net gain in fish habitat. As the proportion of the surface area of the dock or boathouse covering the littoral zone is increased, the probability of destroying fish habitat is also increased. Solid structures destroy fish habitat and affect water quality by restricting water movement.

Approval Process

In order to build a dock or boathouse, a work permit under the Public Lands Act is required from the MNR. The type of structure will determine the approval process within MNR. Structures that do not adversely affect fish habitat can be reviewed quickly and will generally be approved. Docks and boathouses with greater than 50% of the dock area supported by cribs are not recommended and are generally not approved. In general, the use of solid docks and boathouses is discouraged.

Dredging and Filling (Including Beach Criterion)

Waterfront owners often want to straighten the shoreline, reclaim eroded land or create a beach by the placement of soil, sand, rock or concrete etc. as fill along the shoreline.

Three common types of dredging projects are generally accepted:

i) dredging private boat access channels (only when there is no other alternative);
ii) maintenance dredging of existing private boat access channels, boating channels or marina/harbour basins;
iii) large scale dredging projects to develop new marina/harbour basins.

Impacts on Fish Habitat

Dredging or filling in the littoral zone of a waterbody destroys fish habitat. Both activities remove areas of the littoral zone used by fish for spawning, feeding or shelter. However, under certain circumstances and under strict control, dredging and filling may result in a net gain in fish habitat by increasing edge effects and thereby increasing species diversity and abundance.

Approval Process

Dredging and filling activities conducted on or over Crown lands or shorelands require a work permit under the Public Lands Act from the MNR. If large areas are to be dredged or the area is known to contain contaminated sediments, authorization by the Ministry of the Environment is required in order to determine proper disposal requirements for the dredgate.

Large projects may require special studies and/or reports including fisheries impact. Authorization under the Federal Fisheries Act from the Department of Fisheries and Oceans may also be required.

Aquatic Plant Control

Aquatic plants play an important role in the ecology of shoreline areas. They provide habitat for fish to spawn, hatch their eggs, and feed and hide from predators. Aquatic plants also help maintain water quality by stabilizing sediments. However, too many plants may interfere with boats, swimming and other water activities.

Impacts on Fish Habitat

Indiscriminate removal of aquatic plants may disrupt the valuable role aquatic plants play in the ecology of the shoreline. The use of spawning, food production or shelter areas by fish may be lost through the removal of aquatic plants.

Approval Process

There are two methods available to control aquatic plants: chemical and mechanical. The use of chemicals is not recommended in Severn Sound. The MNR reviews and provides comments to the MOE regarding these projects. To mechanically control aquatic plants, a work permit under the Public Lands Act is required from the MNR. In most cases, to protect habitat, the mechanical removal of aquatic plants will not be approved. Removal of aquatic plants from areas which have been historically used as a beach (ie. municipal beach or swimming area) will be approved.

MAP 1: SEVERN SOUND FISH HABITAT MANAGEMENT PLAN

SEVERN SOUND FISH HABITAT MANAGEMENT PLAN - 1992

SCALE 1:90,000

GEORGIAN BAY

PLAN BOUNDARY

OUTER HARBOUR

PENETANG HARBOUR

SEVERN SOUND

MIDLAND BAY

HOG BAY

STURGEON BAY

MATCHEDASH BAY

PLAN BOUNDARY

- HIGHEST RESTRICTION ON DEVELOPMENT
  129 KM - 37%
- SUBJECT TO FURTHER REVIEW AND INVENTORY
  138 KM - 39%
- REHABILITATION OF HABITAT ENCOURAGED
  12 KM - 4%
- UNCLASSIFIED COASTLINE
  72 KM - 20%

IDENTIFIED WETLANDS

1-PENETANG BAY MARSH	-CLASS 3
2-HOG BAY MARSH	-CLASS 3
3-PORT MCNICOLL MARSH	-CLASS 2
4-VICTORIA HARBOUR MARSH	-CLASS 3
5-STURGEON BAY MARSH	-CLASS 2
6-MATCHEDASH BAY MARSH	-CLASS 1
7-QUARRY ISLAND MARSH	-CLASS 3

SEVERN SOUND

MAP PRODUCED BY THE G.I.S. UNIT
RESOURCES MANAGEMENT BRANCH
MINISTRY OF NATURAL RESOURCES AND FOOD

MAF G.I.S