

HANDBOOK FOR GEOPHYSICAL SURVEY OPERATORS

FOR WASHINGTON'S OFFSHORE AND
INLAND MARINE WATERS

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Shorelands and Coastal Zone Management Program
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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE NUMBER</u>
PREFACE	ii
1 INTRODUCTION	1
Background	5
Legislation	6
Federal - OCS Lands Act	6
- Memorandum of Agreement	9
State - Shoreline Management Act	11
- SEPA	14
Environmental Overview	15
2 WASHINGTON'S FISHERIES	22
Fishing gear and methods	23
Crab and fish pots	23
Longline	30
Gillnets	32
Trawls	36
Purse seines	38
Trolling	41
Reef net	42
3 MARINE MAMMALS/MARINE BIRDS/SENSITIVE HABITATS	43
Marine mammals	43
Seabirds	57
Sensitive habitats	60
4 SEISMIC SURVEYS	68
Process	70
Operations	72
5 APPENDICES	77
Geophysical survey permit process	77
Geophysical survey permit	79
Memorandum of Agreement	81
SEPA Checklist	87

LIST OF FIGURES

<u>FIGURE</u>	<u>TITLE</u>	<u>PAGE NUMBER</u>
1	Cross Section of Continental Shelf	iii
2	Washington/Oregon OCS Planning Area	2
3	Idealized Cross Section of Ocean Subfloor Strata	19
4	Map of Ocean Fisheries	24
5	Illustration of Crab Fishing Boat	25
6	Map of Crab Fishing Areas - North Coast	26
7	Map of Crab Fishing Areas - South Coast	27
8	Illustration of a Longliner	31
9	Illustration of a Gillnetter	34
10	Illustration of a Trawler	34
11	Illustration of a Purse Seiner	39
12	Illustration of a Troller	39
13	External Anatomy of Cetaceans	45
14	Relative Sizes of Adult Cetaceans	49
15	Pinniped Habitat - North Coast	53
16	Pinniped Habitat - South Coast	54
17	Pinniped Habitat - North Puget Sound	55
18	Pinniped Habitat - South Puget Sound	56
19	Sensitive Bird Habitats - North Coast	63
20	Sensitive Bird Habitats - South Coast	64
21	Sensitive Bird Habitats - North Puget Sound	65
22	Sensitive Bird Habitats - South Puget Sound	66
23	Profile of Seismic Survey Operation	69
24	Seismic Streamer Towing Configuration	71

LIST OF TABLES

<u>TABLE</u>	<u>TITLE</u>	<u>PAGE NUMBER</u>
1	List of Marine Mammal Species Reported from the Coastal Waters of Washington	44

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PREFACE

Washington State's marine environment is rich in resources. A wide diversity of habitats support many species of marine mammals and birds, and a valuable commercial fishing industry.

The shallow undersea terrace adjacent to the coastline, called the continental shelf, provides habitat for many living resources. Submarine canyons and offshore banks support a tremendously productive commercial fishery, and marine mammals, seabirds and fish thrive in a complex food web.

The continental shelf also abounds with non-living resources. The Washington/Oregon outer continental shelf may contain approximately 180 million barrels of oil and 3.2 trillion cubic feet of gas in undiscovered reserves, according to estimates by the federal Department of the Interior. Based on 1983 figures for United States consumption, these reserves would provide a 56-day supply of oil and an 11-week supply of natural gas for the entire United States. Interest in the oil and gas potential of the Washington/Oregon offshore has prompted the Secretary of the Interior to schedule a lease offering in the year 1991.

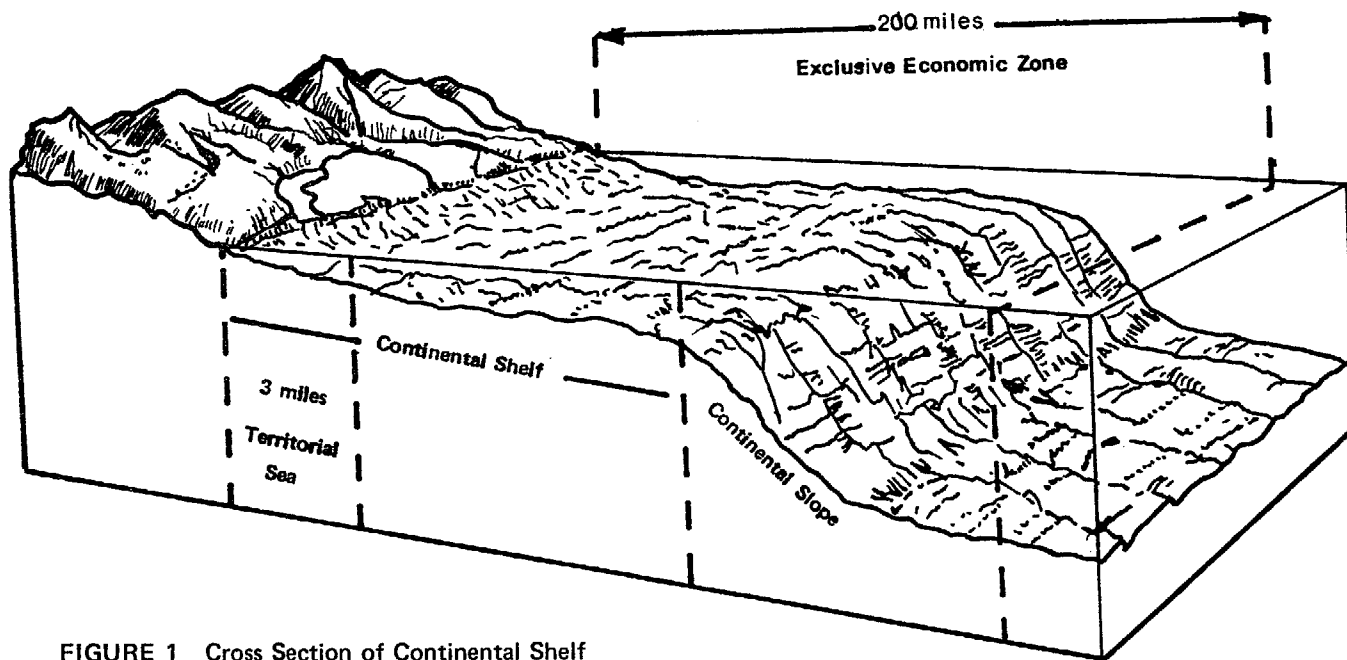


FIGURE 1 Cross Section of Continental Shelf

GEOPHYSICAL SURVEY HANDBOOK

Although the continental shelf extends seaward 8-40 miles off Washington's coast, the term outer continental shelf, or OCS, is used to describe the federally-managed submerged lands that lie seaward of the state's three mile territorial sea. The federal government's jurisdiction, called the Exclusive Economic Zone, extends 200 miles out from the coast (Figure 1).

GEOPHYSICAL SURVEY HANDBOOK

Historically, the culture of Washington's coastal Indians thrived on the abundant seafood found in the waters off our coasts. Today, the commercial fishing industry remains productive, contributing an estimated 1.2 billion dollars each year to the state's economy.

As interest in the Pacific Northwest's hydrocarbon potential increases, it becomes imperative to create and improve communication between marine resource users. Only through careful planning of seismic programs, and detailed communication between geophysical operators and fishermen, can we avoid or at least minimize operational conflicts so that the two industries can successfully coexist.

SECTION ONE

INTRODUCTION

The level of pre-lease activity, especially offshore geophysical or "seismic" surveys, is likely to increase as a result of the placement of Washington and Oregon's offshore on the proposed lease schedule (Figure 2). Offshore geophysical surveys are the principal method by which geologists map the geologic strata beneath the seafloor in search of clues about petroleum deposits.

Typically, geophysical surveys mark the first step in offshore exploration. Whether in state or federal waters, this activity requires a permit. There are a number of important criteria for permit issuance, among them the stipulation that the activity not adversely affect the state's fisheries and wildlife resources.

The Washington State Department of Ecology is the agency that responds to the U.S. Department of the Interior's outer continental shelf (OCS) oil and gas lease program. Ecology has responsibility for ensuring that various OCS activities in Washington and adjacent waters are consistent with state coastal zone planning objectives.

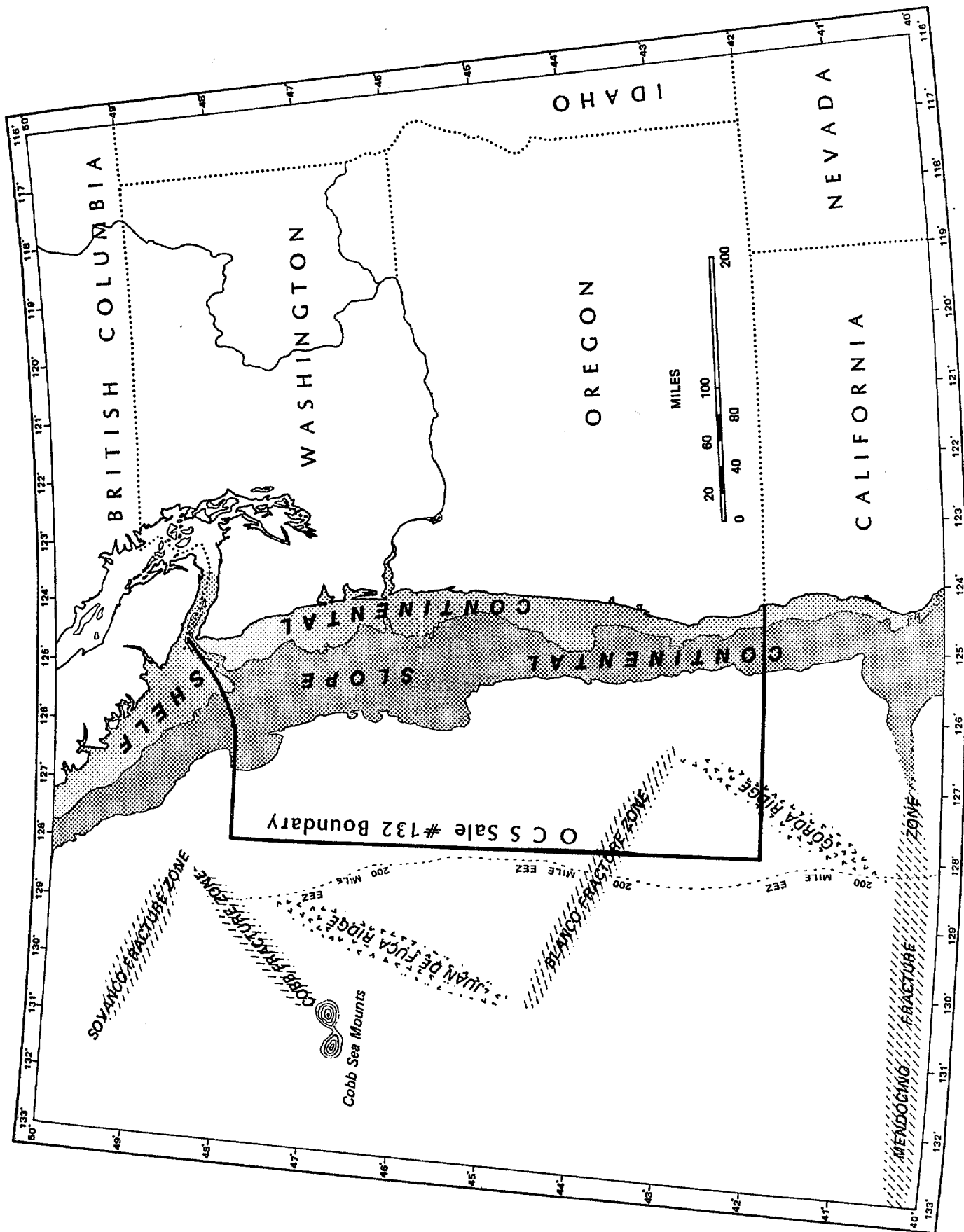


FIGURE 2 Washington/Oregon OCS Planning Area

Given that user conflicts on the OCS have often been a result of inadequate coordination and notification, the department has pursued various means of improving the dialogue between different marine resource users. To this end, the Washington Departments of Ecology and Fisheries negotiated with the U.S. Department of the Interior a Memorandum of Agreement. The memorandum contains a means for minimizing conflicts between federal seismic survey operations and state-managed fisheries and a notification process of proposed surveys.

The purpose of this Handbook for Geophysical Survey Operators is to improve communication between marine resource users. By providing appropriate information to both seismic survey operators and to commercial fishermen, the handbook is intended to establish and promote communication between the two groups.

The handbook is organized as follows:

Section One - provides an environmental overview and an overview of federal and state permit requirements.

Section Two - contains information on commercial fishing areas, gear and methods, and avoidance of fisheries operations.

Section Three - includes information on marine mammals, seabirds and sensitive habitats.

Section Four - focuses on seismic survey methods of operations for the benefit of interested members of the fishing industry.

Section Five - summarizes the issues and contains lists of references, contacts and appendices.

Since offshore oil and gas drilling has not occurred along the Washington coast in more than 20 years, the focus of this handbook remains on pre-lease activity. The Department of Ecology recognizes that subsequent stages of post-lease exploration and development could cause additional impacts to coastal fisheries and wildlife. For example, drilling could result in chronic oil spills and effluent discharges, space conflicts and obstructions, and navigational problems due to increased vessel traffic.

BACKGROUND

Oil seeps were first reported in Washington circa 1881 along the sea cliffs on the west side of the Olympic Peninsula. Few exploratory wells have been drilled off Washington shores since then. Only one -- the Medina #1 near Ocean City, Washington -- ever produced a significant amount of oil. This well spouted 12,000 barrels of crude oil, but the pressure rapidly dwindled and it was capped in 1962.

Periodic exploratory activities continued however, including several seismic surveys that were conducted in the early 1980s. One seismic survey had disastrous results.

In December, 1980, more than 1,200 crab pots were caught in the airgun array of a vessel conducting a geophysical survey in federal waters off Washington causing in excess of \$100,000 damage to fishing gear alone. As these pots were rendered irretrievable, they continued to capture crab. The Washington Department of Fisheries estimated a 5% loss of the offshore Dungeness crab resource and untold opportunity costs as a consequence from this incident alone.

It was the realization that such an accident could occur again that prompted the State of Washington to become involved in the regulation of geophysical surveys.

LEGISLATION: FEDERAL

In 1945, President Truman proclaimed that the natural resources of the continental shelf were subject to federal jurisdiction and control. In 1953, the Submerged Lands Act and the Outer Continental Shelf Lands Act reaffirmed federal control of the outer continental shelf, while clarifying that coastal states controlled the waters and submerged lands three nautical miles seaward of their coastlines.

Outer Continental Shelf Lands Act

The Outer Continental Shelf Lands Act (OCSLA), passed in 1953, directs the Secretary of the U.S. Department of the Interior to develop a 5-year schedule for offshore oil and gas leasing, exploration, and development on submerged lands of the outer continental shelf (OCS).

In 1978, the U.S. Congress amended this act to both expedite development on the nation's OCS and to provide environmental safeguards. Undoubtedly, the 1972 Arab oil embargo prompted the former directive, while concerns about major oil spills, such as the one in the Santa Barbara Channel in 1969, led to the latter.

The OCS Lands Act requires the Secretary of the Interior to develop a five-year lease program which, upon completion of the environmental review and public comment process, is submitted to Congress. In developing the program, the Secretary must, under the OCS Lands Act, consider the following:

- Provide for national energy needs;
- Share the developmental benefits and environmental risks equitably among regions;
- Consider the economic, social and environmental value of the resources in the OCS and related potential impacts of oil and gas activities on these resources;
- Consider other uses of the OCS, including fisheries;
- Obtain fair market value for the resources leased on the OCS; and
- Balance the need for oil and gas production with the potential for adverse environmental impacts.

Offshore Oil and Gas Development Process

The process for offshore oil and gas development begins with preliminary exploration, for which the MMS (Minerals Management Service) issues permits for geophysical or "seismic" surveys. Geophysical survey ships explore and map sub-sea geology, searching for geologic formations that may indicate the presence of hydrocarbons. Permits for seismic surveys can be issued before an area is on a lease schedule.

In the first phase of the leasing process, the Secretary of the Interior prepares a five-year schedule of leases that identifies the areas in which lease sales will be held. After a schedule is accepted, and prior to an actual lease sale, Interior gathers environmental data, oil and gas resource estimates and other information for inclusion in a draft environmental impact statement (EIS).

State agencies, local governments and citizens may review the draft EIS. This is a focal point for citizen involvement and comment. Based on this review, recommendations on the EIS and lease sale are made by the Governor to the Secretary of Interior.

Interior then prepares a final EIS which includes responses to stipulations or recommendations from the state. Tracts for final lease consideration are included in the EIS. Once the Dept. of Interior determines which tracts are still under consideration for lease, if any, they announce a "Proposed Notice of Sale." The state can then review and comment on tracts proposed for lease. The OCS Lands Act requires the Interior Secretary to follow the Governor's comments unless "national interests" override. After any modifications, a "Final Notice Of Sale" is issued and the lease sale is held.

Finally, petroleum companies must bid on particular tracts within the lease area. Before exploratory drilling can begin, the oil company must obtain permits from several federal agencies including the Army Corps of Engineers, the Coast Guard, the U.S. Geological Survey, and the U.S. Environmental Protection Agency. Drilling must also be consistent with state coastal zone management plans (See Appendix, page 87).

MEMORANDUM OF AGREEMENT

In 1982, a memorandum of agreement (MOA) was signed between the State of Washington and the Department of the Interior.

The memorandum outlines a procedure to avoid or minimize conflicts between outer continental shelf seismic survey operations and state-managed fisheries resources.

The MOA establishes three time periods or "windows" for seismic work correlating to the fixed-gear fishing activities off the Washington coast. Survey operators are encouraged to conduct operations during the "period of low-fishing activity" between September 15 and November 25, which is off-season for the fixed gear coastal crab and black-cod fisheries.

March 16 through September 14 is a "period of moderate fishing activity". Approximately 60 crab vessels fish during this period, with as many as 18,000 crab pots. Crab gear is generally located inside the 20 fathom line. Operators are encouraged to plan any surveys during this period for the area outside the 20 fathom line.

During the "period of peak fishing activity", from November 26 through March 15, as many as 165 crab fishing vessels and 42,000 pots can be found in waters to depths of 65 fathoms. Seismic surveys should be planned to avoid this peak fishing period.

The Memorandum also contains a notification process by which the MMS alerts the state of proposed surveys. The state Departments of Ecology and Fisheries have at least two weeks to review survey applications and recommend permit conditions to the Dept. of Interior. If potential conflicts with fixed gear fisheries are identified, the state usually recommends geographic restrictions to be placed on the proposed survey.

Prior to this agreement, the state had no formal role in reviewing federal permits for geophysical exploration off the Washington coast (See Appendix, page 81).

LEGISLATION: STATE

Shoreline Management Act -- RCW 90.58

The state Shoreline Management Act (SMA) was passed in 1971, calling for development of a program to balance development and protection of Washington's valuable shoreline resources. Under the Shoreline Management Act, surface drilling in Puget Sound and the Strait of Juan de Fuca is prohibited. This prohibition, however, does not restrict geophysical exploration activities.

In 1983, the SMA was amended to provide the Department of Ecology with permit authority for oil and gas exploration in state marine waters so that aquatic resources, water quality, and normal public uses were protected. The permit applicant completes the required application form and State Environmental Policy Act checklist.

Pursuant to regulations adopted by the department in 1983, the permit application must be reviewed by other state natural resource management agencies, local governments, and Indian tribes affected by the proposed exploration activity. The reviewing agencies and interested persons are allowed fifteen days from receipt of the application to respond to the Department of Ecology. In addition, a public notice must be published in area newspapers. Depending upon public response, the department may hold one or more hearings.

The department will approve an exploration activity permit application if it determines that the proposed activity meets the criteria set forth in the Shoreline Management Act. Exploration activities may not:

GEOPHYSICAL SURVEY HANDBOOK

Page 13

- interfere materially with the normal public uses of the marine waters of the state;
- injure the marine biota or other fish and wildlife, beds, or tidelands of the waters;
- violate water quality standards established by the department;
- create a public nuisance; or
- conflict with a shoreline master program approved by the department.

The Department of Ecology may place terms and conditions in the exploration activity permit as necessary such as, geographic limits on the area of operation, timing of the operation, limitations on hours of operation, placement of on-board observers, use of lead boats, insurance or bond, and/or fishermen (or other users group) notification procedures (See Appendix, page 77).

State Environmental Policy Act -- RCW 43.21C

The State Environmental Policy Act, known as SEPA, affects all state laws, regulations, and policies. It was enacted in 1971 to ensure that the environment is given appropriate consideration in state and local permit decisions.

When a permit is applied for, the applicant fills out an environmental checklist to identify potential environmental impacts from the project. The purpose of the checklist is to provide information to help the applicant and the agency identify impacts from the proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an environmental impact statement is required.

If the environmental impacts of the proposal are determined to be inconsequential, a determination of non-significance (DNS) will be issued. For a major project, or any project which poses greater impacts, an environmental impact statement (EIS) will most likely be necessary.

Once the applicant has written the EIS, the lead agency for the project is responsible for circulating the document to other agencies and the public. Review periods are 15 days for a DNS and 30 days for an EIS (See Appendix, page 77).

ENVIRONMENTAL OVERVIEW

The marine environment is a complex system influenced by climate, currents, winds, waves, depth, geomorphology, salinity, and, as ocean resources become more exploitable, by man. Since life in the marine environment is highly dependent on the interrelationships between different species and the environment, the disturbance of one species or section of the environment may directly or indirectly affect others.

This section provides an overview of the important physical and biological processes at work in the marine environment.

PHYSICAL DESCRIPTION

Open Coast

Washington's southern coast is characterized by long sandy beaches, interrupted by three important bays and estuaries: the Columbia River estuary, Willapa Bay, and Gray's Harbor estuary.

In contrast, the northern coast is considerably more remote and rugged, marked by numerous steep and often unstable cliffs interspersed with sandy beaches and rocky coves.

Rock outcrops, seastacks, and islands are found off of Washington's coast, the majority in the northern stretch.

The Strait of Juan de Fuca is the transition zone between the open ocean and Puget Sound. The Strait is 80 miles from Cape Flattery to Whidbey Island, and is between nine and thirteen miles in width.

Puget Sound

Puget Sound, an interconnected system of inlets, bays, and islands, is sometimes referred to as a huge estuary. It is a result of geological processes that created deep channels, 300-900 feet deep, broken by islands and peninsulas. The marine environment of Puget Sound is influenced by freshwater runoff from rivers, wind patterns controlled by mountains and islands, and the saltwater influx and tidal action from the Pacific Ocean via the Strait of Juan de Fuca.

Rock and gravel shorelines predominate in the Sound, although sand, mud, and clay shorelines are present, and several estuaries have extensive siltation. Submerged shelves are narrow or nonexistent. The bottom slopes gradually to a depth of 300-700 feet on the average, reaching a maximum of 900 feet in several places.

CLIMATE

Western Washington's climate is one of relatively mild winters and cool summers. The Pacific Ocean moderates the air masses passing over it which influences the regional weather. Although the winds on the Pacific Northwest coast are prevailing westerlies, there is a seasonal cycle of winds largely determined by the circulation of the North Pacific high pressure area and the Aleutian low pressure area.

During the summer the North Pacific high predominates. Summers are generally times of fair weather with winds from the north to northwest and little precipitation due to the buffer provided by the North Pacific high pressure system. In the winter the North Pacific high weakens and the Aleutian low intensifies. Winds are generally from the southwest in winter months, bringing precipitation and cloud cover.

GEOLOGY

The seafloor off Washington -- the continental shelf -- is gently sloping and ranges in width from approximately eight to forty miles. The Washington shelf is intersected by several large submarine canyons. These canyons are the result of large rivers that flowed through soft marine sediments thousands of years ago when the sea level was low (late Pleistocene). One submarine valley, extending in a southwesterly direction from the mouth of the Strait of Juan de Fuca at Cape Flattery, is four miles wide and cuts 300 feet down into the continental shelf, .

At the edge of the continental shelf, the gradient steepens and the seafloor slopes down to the ocean depths.

The sedimentary rock formations and geological faults and folds that contain oil and gas are similar to those found on dry land. Oil originated in the sunlit, shallow, coastal waters of ancient seas with the accumulation of dense sediments that time and conditions transformed into oil and natural gas. Reservoirs of petroleum and natural gas are formed when the oil and gas is trapped between layers of impermeable rock (Figure 3).

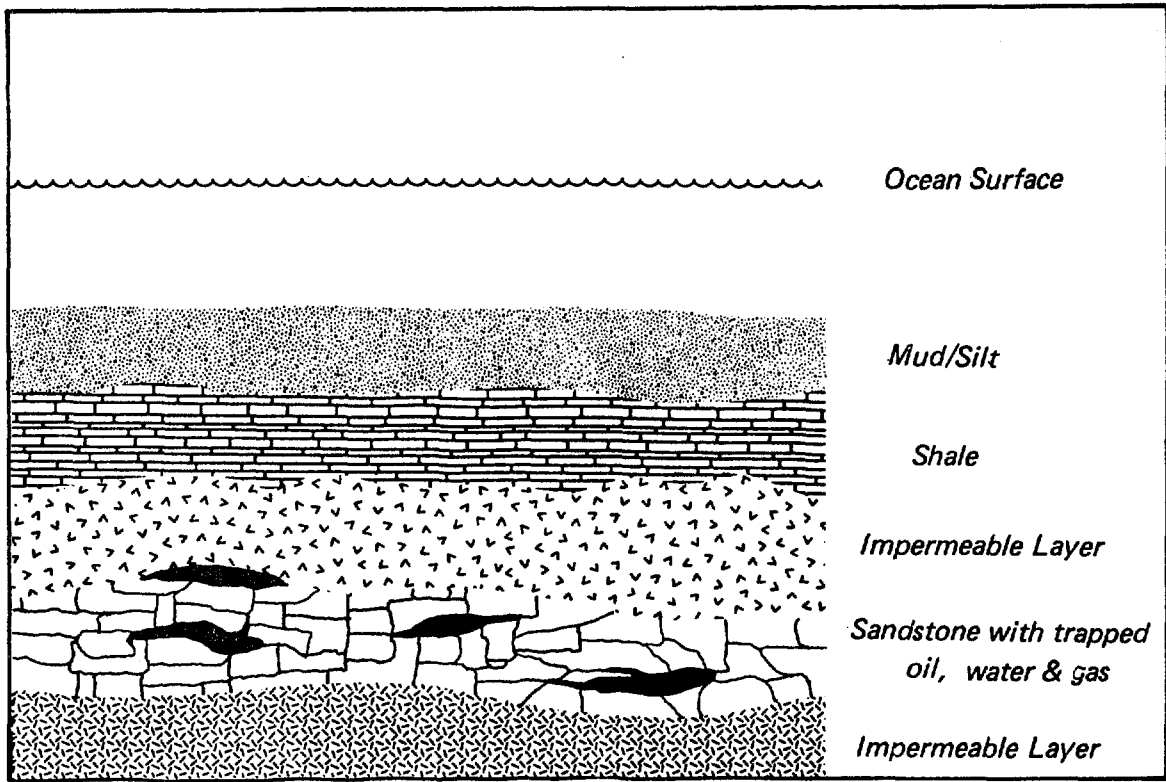


FIGURE 3 Idealized Cross Section of Ocean Subfloor Strata

OCEANOGRAPHY

The OCS region is influenced by two currents -- the Alaskan current which is an eastern counterclockwise current and two clockwise segments of the westward drift of the North Pacific current. Generally the large scale circulation is southward from May to August, northward between October and February, and variable the rest of the time.

During summer months there is a phenomenon known as coastal upwelling. During upwelling, relatively cold nutrient-rich water moves upward from the depths to replace sun-warmed surface water. This phenomenon is largely a result of north-northwest summer winds that produce a southward flow in the surface layer combined with an offshore surface flow due to the earth's rotation. Ocean currents sweeping over the edge of the continental shelf also create upwelling along the shoreline and eddies and turbulence over the continental shelf. This causes cold, saline water to upwell in eddies resulting in low dissolved oxygen content and high salinities. Both air and sea temperatures in the nearshore region are lowered as a consequence of upwelling and humidity is increased.

BIOLOGY

The abundance of life in the oceans's upper layers is a direct result of available energy from light. Marine plants and some microscopic animals capture energy from the sun through photosynthesis and convert it to a form that other organisms may use. The combination of abundant nutrients from upwelling and the energy from light allows the growth of phytoplankton, masses of microscopic floating plants. These plants are consumed by animals, including zooplankton, which in turn are eaten by carnivores such as fish. And the food chain continues -- fish become prey for other fish, marine mammals, birds, and humans.

Further discussions of the marine birds and mammals of the outer coast and inland waters may be found in Section Three.

SECTION TWO

WASHINGTON'S FISHERIES

WASHINGTON'S FISHERIES

INTRODUCTION

Commercial fisheries are an extremely important industry in Washington State. In fact, in both number of pounds and total value of fish and shellfish, fishermen from Washington lead the nation. While this includes fish caught in distant waters -- off Alaska and other states -- the figures for fish caught in Washington inland and offshore waters are impressive on their own. According to a recent study published by the Natural Resources Consultants of Seattle, an annual harvest of 150 million pounds of fish and shellfish, worth an average of \$93 million has been harvested commercially in Puget Sound and the waters off Washington's coast over the past few years.

The fishing industry's value to Washington is calculated in two ways: direct figures, or the prices paid for landed fish, and indirect figures, the revenue gained from supporting industries such as canneries, marine supply companies, net makers, shipyards, marinas and fish markets. Adding the direct and indirect value of Washington's fisheries, the Natural Resources Consultants of Seattle arrived at a figure of approximately \$294 million that was added to the state's economy in 1985.

The most important fisheries to Washington are those for the five Pacific salmon: sockeye (red), pink (humpback), chum (dog), coho (silver) and chinook (king). Important fisheries also exist for albacore tuna, sablefish, flatfish, Pacific hake, rockfish species, Pacific herring, shrimp, dungeness crab, oysters, scallops, and clams (Figure 4).

FISHING GEAR AND METHODS

Fixed gear, a term used to describe fishing gear which is set out then retrieved after varying amounts of time, has the greatest potential for conflict among marine users. Mobile gear, which includes all gear used from the vessel itself, pose less of a conflict, although navigational conflicts still must be avoided.

Fixed gear includes crab and fish pots, longlines, and gillnets. These devices either attract target species through the use of bait and/or ensnare them. Mobile gear includes trawls and seines.

Crab and fish pots

In the ocean, crab pots are set in depths of up to 65 fathoms, although most are set inside of 40 fathoms

- Coho (silver) Salmon
- Sockeye (red) Salmon
- Pink (humpback) Salmon
- Chum (dog) Salmon
- Chinook (king) Salmon
- Albacore Tuna
- Sablefish
- Pacific Hake
- Rockfish species
- Pacific Herring
- Shrimp
- Dungeness Crab
- Oysters
- Scallops
- Clams

STRAITS OF JUAN DE FUCA



COLUMBIA RIVER

FIGURE 4 Map of Ocean Fisheries

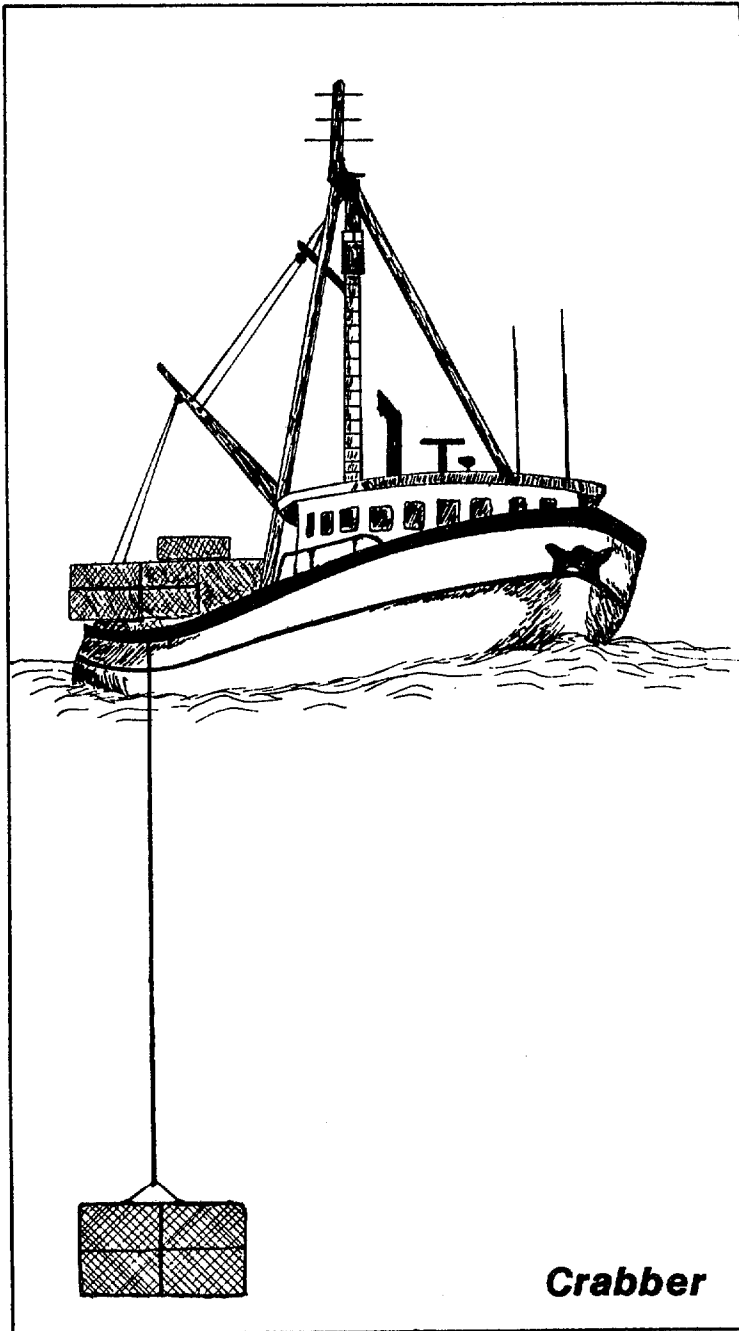


FIGURE 5 Illustration of Crab Fishing Boat

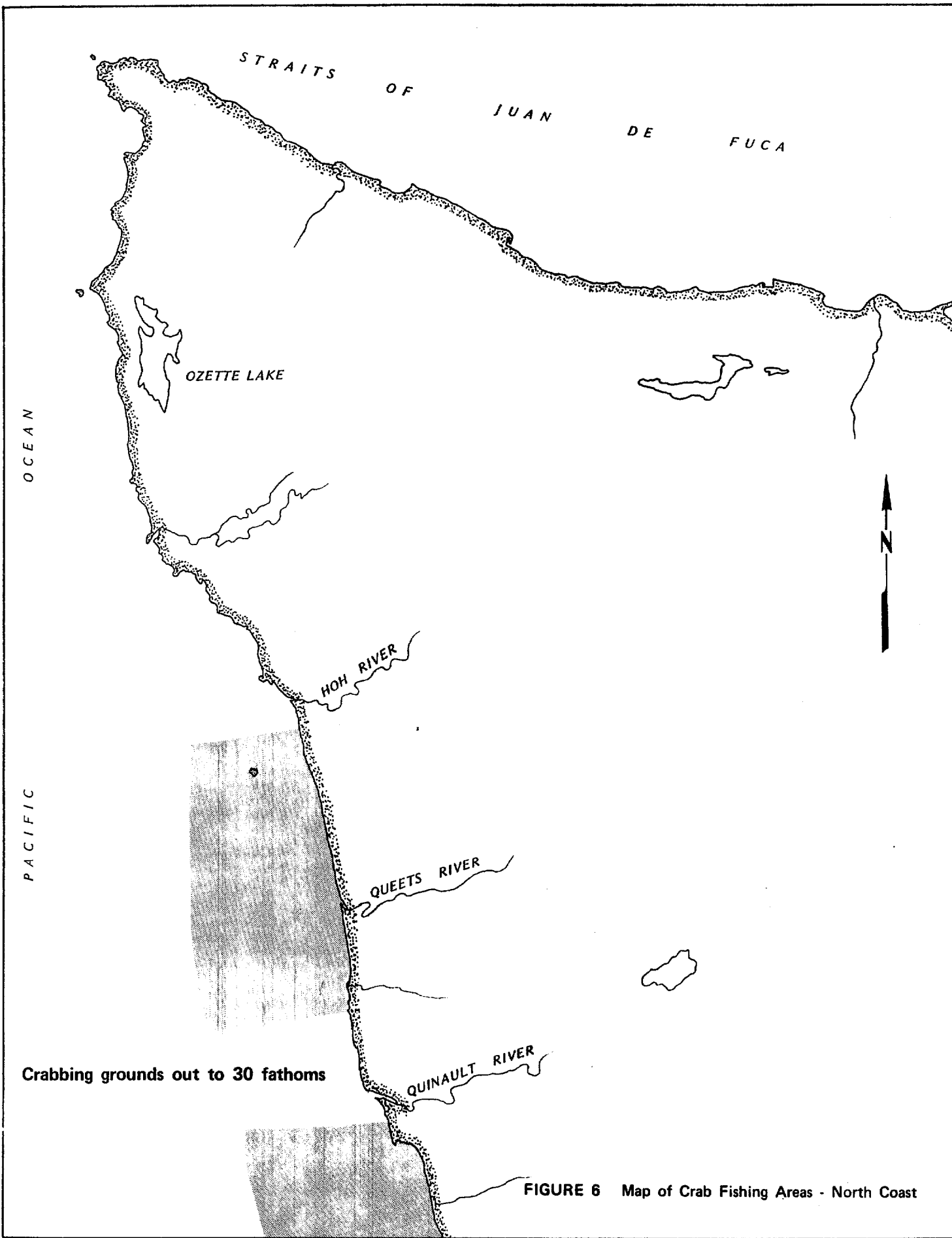


FIGURE 6 Map of Crab Fishing Areas - North Coast

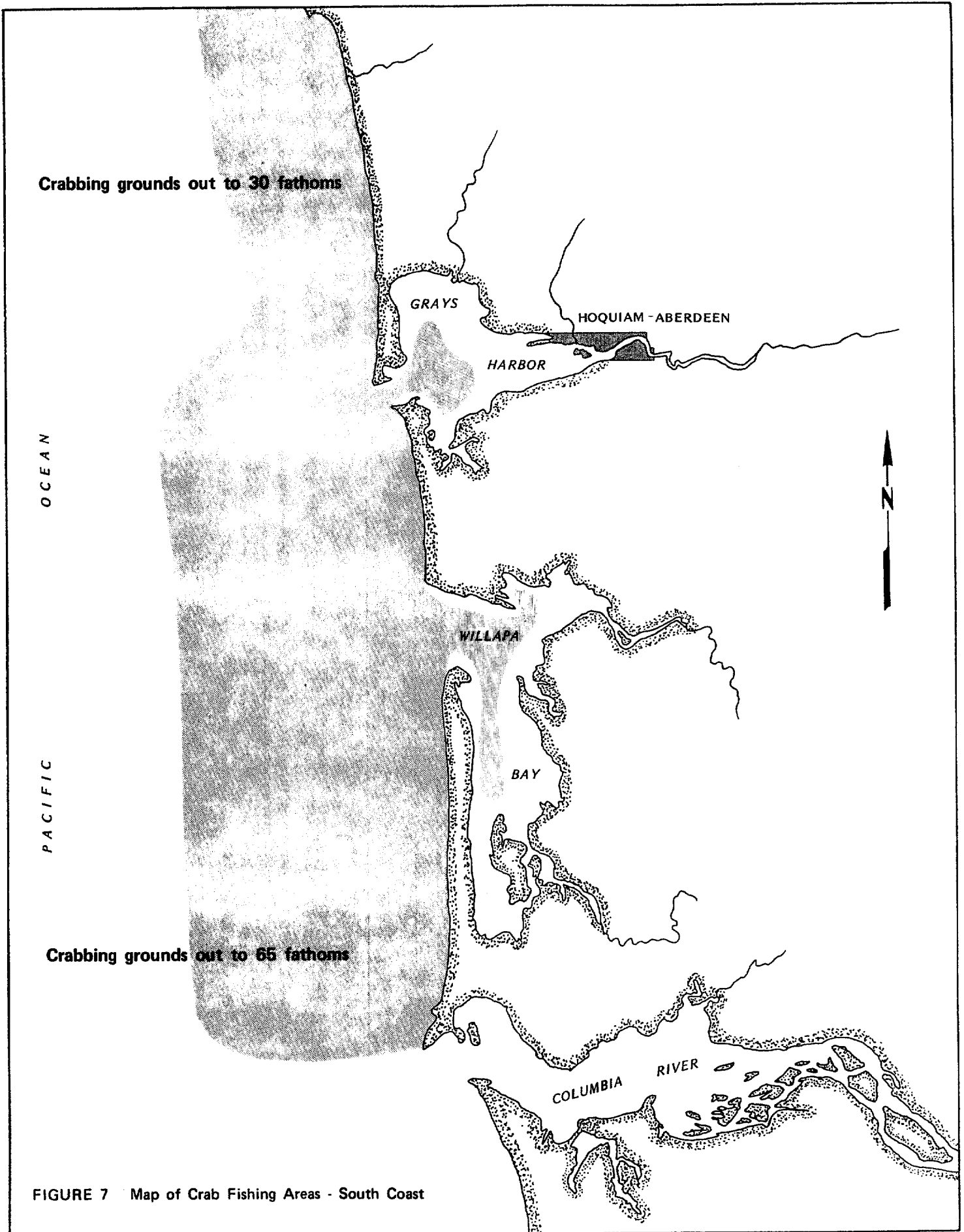


FIGURE 7 Map of Crab Fishing Areas - South Coast

(Figures 5, 6, & 7). Pots are almost always individually buoyed to the surface. However, strong currents can cause buoys to submerge, especially around the mouths of major coastal estuaries where tidal currents make this an almost daily occurrence. Therefore, it cannot be assumed that crab gear is not present when buoys are not in sight.

Crab pots are fished at one to seven day intervals depending on fishing success and weather conditions. During the peak of the coastal fishery, the fleet consists of 100 to 140 boats using a total of 30,000 to 40,000 pots. The cost of a fully rigged crab pot is \$80 to \$120. The season opens December 1 but fishermen are allowed to begin setting pots on November 27. Usually by early spring nearly all gear is moved inside of 20 fathoms and the amount of gear decreases after some fishermen leave the fishery. The season closes September 15 but is occasionally extended by 15 days.

The long-term production average for the crab fishery is over 7 million pounds per season, however crab abundance is cyclical and production has ranged from 2.5 million to 18.4 million pounds.

Sablefish is a finfish species taken in baited pots at depths greater than 90 fathoms. There are between one and five large sablefishery vessels (80-90 feet in length)

operating off the Washington coast in a given year. The fishery operates on a quota system with no set season and is weather-dictated. Generally the fishery begins in spring and may continue until late fall if the quota is not met sooner. In 1985, 845 metric tons of sablefish were landed using pots. By comparison, 2,410 metric tons of sablefish were taken in 1985 with longline gear.

Longline

Longline or set line gear is used primarily for Pacific halibut, rockfish, sablefish and flatfish. Longline vessels are 20-40 feet in length. The gear consists of a heavy groundline, often several miles in length, to which short lengths of line carrying baited hooks are attached every two to six feet (Figure 8). The hooks are baited, usually with herring or squid, and the line "shot" out the stern of the vessel. The fish are attracted by the bait, hooked, and held by the mouth until they are brought aboard the vessel.

Groundlines are anchored on both ends, and buoys and flags are attached for markers. After setting, the vessel returns to the starting point and begins hauling. A winch is used to haul in anchors, buoy lines and groundlines. Crew members remove hooked fish as they are drawn aboard.

Drift lines operate on much the same concept except that the ends are attached to floats instead of anchors. Drift lines are worked continuously; set lines may be fished for as long as 24 hours.

Set and drift line vessels have limited maneuverability while working the line. Drift lines are attached to the vessel and to a marked buoy with a strobe on it at the free

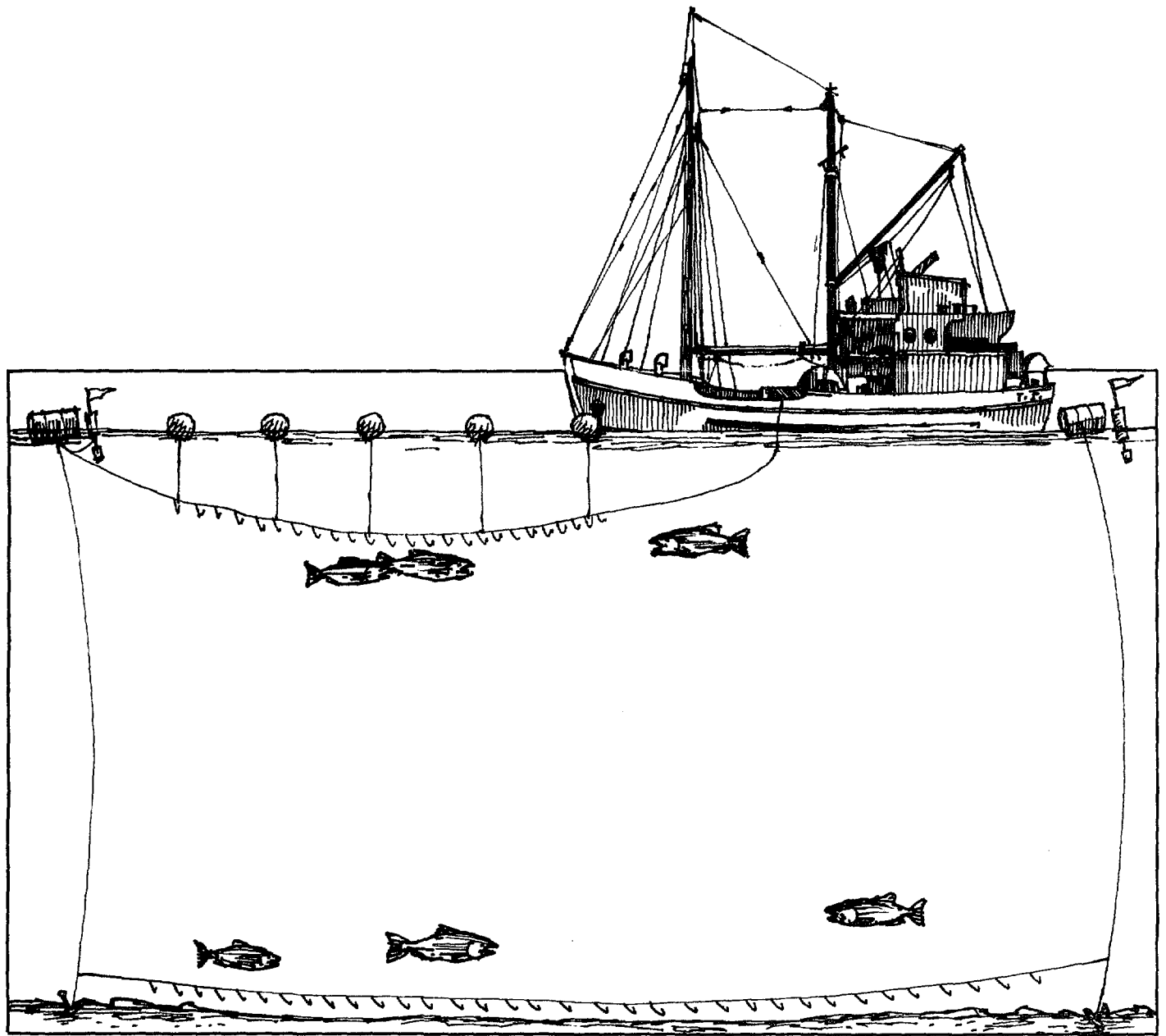


FIGURE 8 Illustration of a Longliner

floating end; however, they still may be hard to see since the lines can stretch from one-half to several miles in length.

Gillnets

A gillnet is used primarily for salmon and herring and in the Columbia River for sturgeon. The gillnet fishery is mostly restricted to estuaries. The net typically measures between 1800 and 2400 feet long and 24 feet deep, with mesh sizes from ranging from 3-1/2 inches to 6 inches depending on the species and size of the fish (up to 10 inches for sturgeon). The net hangs vertically in the water, and traps the fish by the gills or fins as they attempt to swim through the mesh. Nets are retrieved with the help of a power reel or by hand. Fish are removed as the net is retrieved.

There are two main types of gillnets -- set and drift nets. Set gillnets are anchored in place -- one end attached to a river bank or a beach, the other anchored offshore. Drift gillnets have one end attached to a vessel which drifts with the currents. Fishing times can be up to 24 hours for set nets; drift nets are fished for periods of up to several hours.

A set net is kept upright using floats at the top and weights at the bottom, with the ends anchored to keep in place. Large buoys, marked with flags, are attached by lines to the anchors and are used to locate the net and to haul it in. Gillnets can be located at the surface, in midwater, or near the bottom by varying the number of buoys, floats and weights on the net (Figure 9). The Washington set net fishery is limited to Puget Sound and targets on Pacific cod (Port Townsend Bay and Port Gamble) and dogfish (all of Puget Sound). The Pacific cod fishery is closed in 1987, and may be closed for over two years hence to allow for population recovery. The regulations for the dogfish fishery are complex since certain areas may be closed at certain times to prevent incidental catches of other species.

There is wide variation in net length, net mesh, and boat size depending on the waters to be fished. Gillnetting is a very popular type of commercial fishing because of its versatility. Gill nets operate best in turbid water or at night when fish cannot readily avoid them.

While setting and hauling, the gillnetter normally has limited maneuverability. Once a set net is in the water, the gillnet vessel can maneuver freely, however, the net may not be too far beneath the surface so it is important to

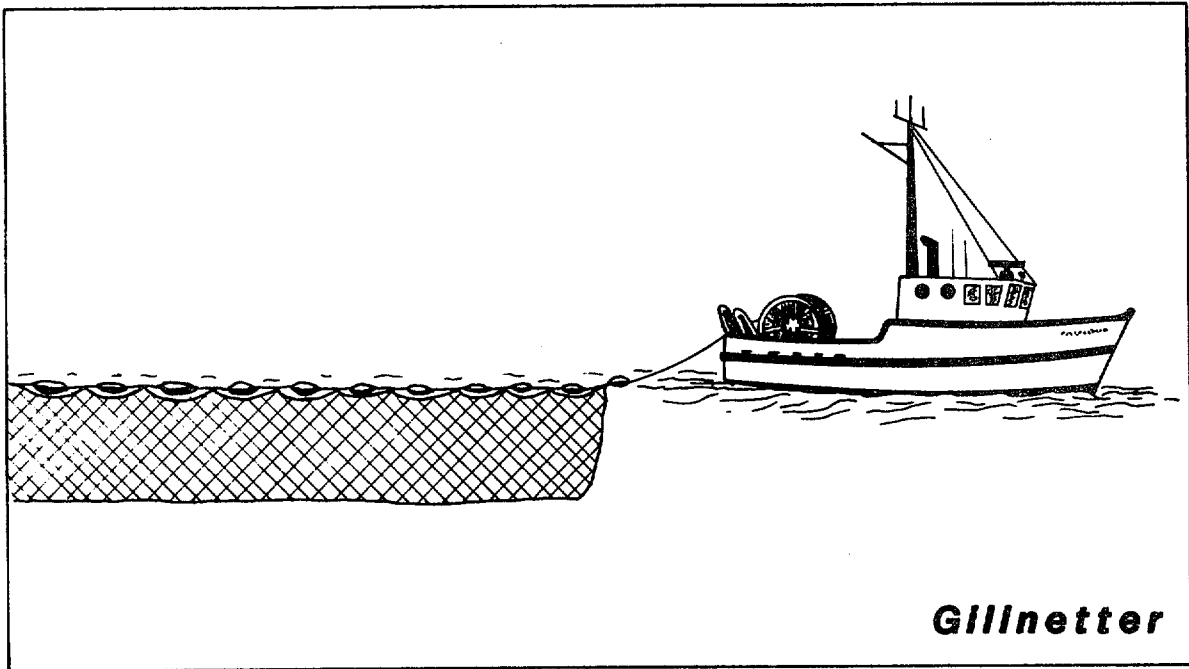


FIGURE 9 Illustration of a Gillnetter

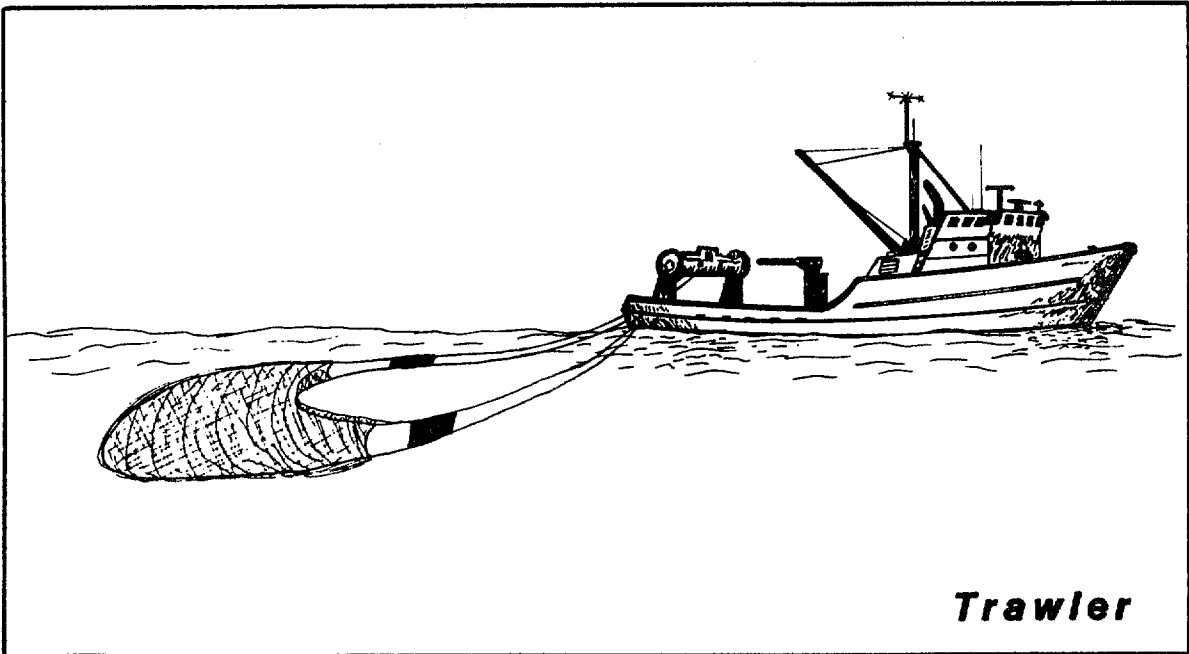


FIGURE 10 Illustration of a Trawler

avoid areas between buoys. A single vessel may have several nets out at a time. Drift net vessels have somewhat less maneuverability since they have nets attached to them.

Trawls

Fishing vessels known as otter trawlers, trawlers or draggers, trail a net behind the vessel, either on the seafloor or through the water column. Trawlers fish waters from 10 fathoms to the deepest parts of Puget Sound, and to about 300 fathoms off the coast (Figure 10).

The trawl net is a large bag, wide at one end and tapered to a closed end, or cod-end, where the fish are trapped. The trawl drags the bottom and scoops up any fish in the area. The trawl has otter boards, or "doors" that attach to each side of the net keeping the mouth open. When the net is towed, the doors are pulled outward because of both the angle at which they are connected to the towline and the water pressure exerted against them. The top of the net opening is held up by floats and the bottom is weighted with lead. The fish are funneled into a smaller bag at the end of the net and hauled into a boat. The length from the mouth to the end of the net can be up to 150 feet.

Trawlers fish on the bottom or in mid-water. On-bottom trawling targets on flatfish, rockfish, sole, and shrimp. Mid-water trawling is used for species such as pollack and rockfish. Mid-water trawls may have expensive sonar and

depth sensing equipment worth up to \$10,000 directly on the net to help locate schools of fish in the water column.

The method of setting and hauling the nets is essentially the same for all types of trawls. When setting the net, the vessel is generally pointing into the seas, holding dead in the water or making way. The codend is put in the water over the stern followed by the rest of the net and the doors. The trawl is then lowered to the desired depth.

A net usually can be set in about 15-20 minutes; however, it may take 45 minutes or more to haul the net. The time it takes to set or haul a net depends on the depth, the winch speed, the weather, and the size of the catch. Fishing times for trawls depend on which type of trawl is being fished. Bottom trawls can range from a few minutes to several hours. Mid-water trawls may last more than 12 hours, with the vessel searching for fish while the gear is in place. The number of tows per day depends on the size of each catch, the distance traveled between schools, the depth, and the weather.

Purse seines

A purse seine is a net up to 2,500 feet long and 240 feet deep with a line that closes the bottom. Specially equipped boats, some with a hydraulic drum used to store the net, 50-75 feet long, are used for this operation (Figure 11).

Purse seines are used to capture schooling pelagic fish. For example, salmon schools near the surface are located visually and intercepted. Once a school is spotted, the net is set by dropping the net skiff, which is attached to one wing of the net, into the water. It drags behind the seiner pulling the net, landing bag first, off the stern into the water. The seiner circles the school until it meets up with the net skiff. The net is held upright by a cork line along the top and chains along the bottom. The purse line, which is made from steel cable, runs through a series of purse rings hanging beneath the net. When the wings are brought together, the purse line is picked up and pulled in by power winches to close the bottom of the net to prevent the catch from escaping. Transfer of the catch to the vessel is accomplished by a large dip net or by some type of fish pump.

Purse seining for salmon generally occurs in water from 8-90 fathoms. The sockeye and pink salmon purse seine fisheries

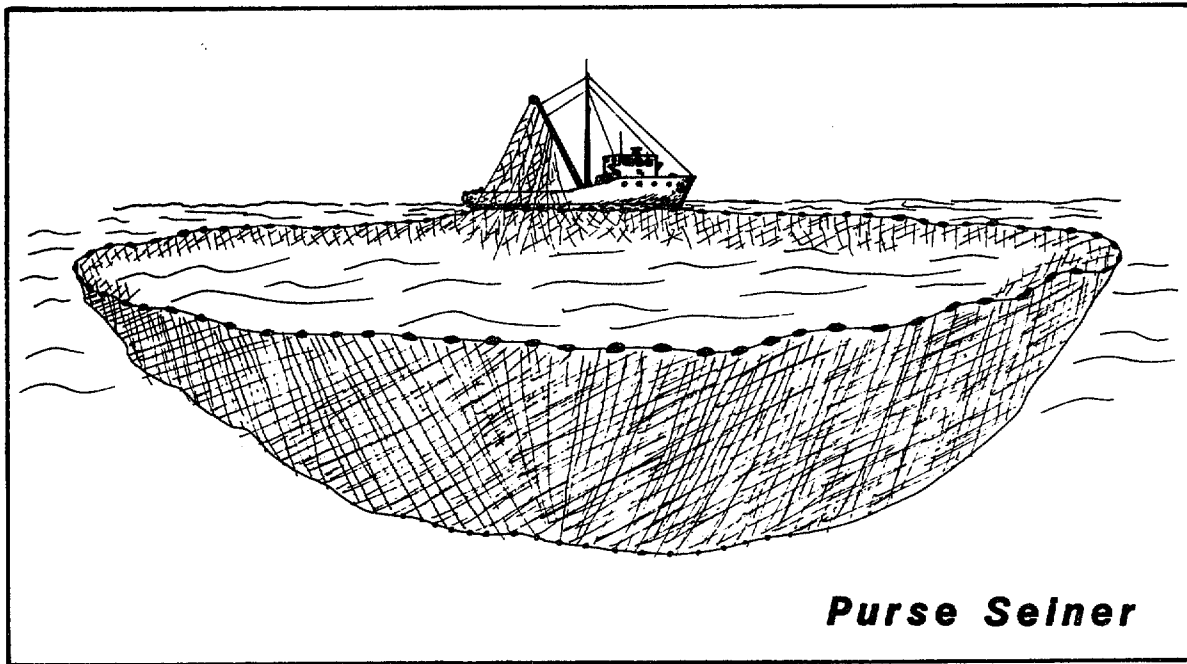


FIGURE 11 Illustration of a Purse Seiner

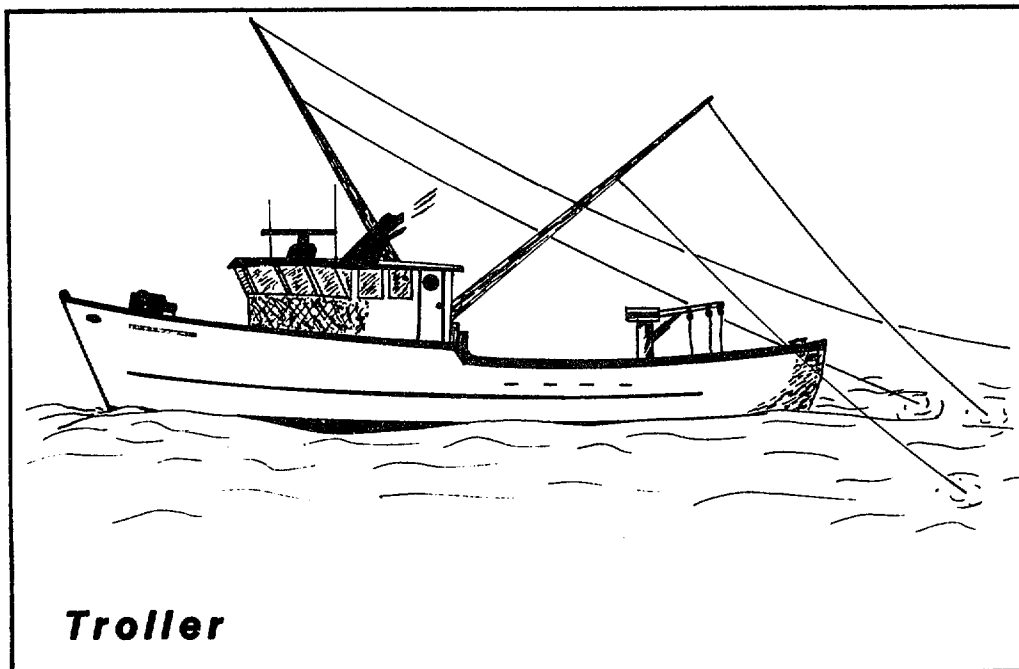


FIGURE 12 Illustration of a Troller

are concentrated primarily in the San Juan Islands area, off Point Roberts and in the Strait of Juan de Fuca. The season for sockeye is from late July to early September. The pink salmon purse seine fishery extends from mid-August to late September. Silver and chum salmon are purse seined mostly within Puget Sound from early September to late October and mid-October to the end of November, respectively.

Two relatively small purse seine fisheries in Puget Sound are the herring fishery and the lampara (a smaller version of the standard purse seine) herring fishery for sport bait (to supply the salmon sport fishery). The first, the non-bait herring fishery, has been closed since 1982 because of insufficient population numbers. When the herring fishery was open, two areas were fished: Bellingham Bay (December-January) and Cherry Point (April-May). Up to 32 boats were involved, fishing in waters from 10-50 fathoms.

The only purse seining outside of Puget Sound is the anchovy bait fishery. Anchovy are used as bait for tuna. This relatively small fishery operates from June-September, primarily near Ilwaco and Westport.

Seiners usually work in groups. The vessels will move on erratic or zig-zag courses, trying to spot schools visually or on sonar. Purse seining is usually done at night,

preferably during periods of a new moon or cloud cover so that the nets are not detected visually by the fish schools. When fishing at night many vessels operate with few lights on as possible until they start hauling in the net, making it difficult to see this type of fishing vessel.

The entire purse seining operation may take more than 1-1/2 hours. When the vessel is circling the school and completes the set, it may take up an area 900 feet across, which would decrease as pursing begins. Once the net is set and pursing begins, the vessel is dead in the water. Not until the net is hauled is it possible for the vessel to maneuver, and even then it has limited maneuverability. During this time, the vessel may drift a considerable distance.

Trolling

Trolling involves dragging lines at various depths through the water at a slow speed. Hooks are attached to these lines and baited with herring or lures. Troll fishing is used along the coast following the salmon runs and for lingcod (primarily in the Strait) and black rockfish (off the coast from Point Grenville to the Strait) (Figure 12).

Gear consists of an outrigger pole on each side of the vessel with varying numbers of taglines attached via a

shock absorbing device; this device is used to absorb the initial jolt of a fish hitting the lure. Salmon are usually fished at depths between 36 and 210 feet with seven lines having four hooks per line; trolling speeds vary from 1 to 3 knots. In contrast, albacore trollers use up to eleven lines with one hook per line fished near the surface at speeds around 6 knots. The length of line trailing the vessel can range from 100 to 150 feet for albacore trollers and from 100 to 425 feet for salmon trollers.

Trolling vessels are anywhere from 16-60 feet in length. The troller is fairly maneuverable when fishing and usually is able to turn within three boat lengths if necessary.

Reef net

The reef net has been adapted from an Indian method of catching salmon. Two large skiffs or small barges are anchored about fifty feet apart, with a net fifty feet square rigged between them. The method is employed for sockeye and pink salmon in the area of the San Juan Islands, and requires clear water to see when the salmon are in the net.

SECTION THREE

**MARINE MAMMALS/MARINE BIRDS/
SENSITIVE HABITATS**

MARINE MAMMALS, MARINE BIRDS AND SENSITIVE HABITATS

Marine Mammals (Table 1) -- Order Cetacea

Cetaceans -- all whales, dolphins and porpoises -- are mammals whose body form and functions have evolved from terrestrial mammals to cope with a life spent entirely in water. Unlike fish, cetaceans must surface to breathe. Blowholes located on top of the head allow cetaceans to breathe while swimming at the surface. The forward limbs have evolved into flippers, while the hind limbs exist only as vestigial appendages -- evidence of the animals' terrestrial heritage. Propulsion is provided by fibrous, horizontally flattened tail flukes.

In the eastern North Pacific these mammals range in size from the five-foot harbor porpoise to the one-hundred foot blue whale. Cetaceans are pelagic, mobile species. Since their behavior and migration is linked to variable oceanographic conditions, their migration patterns are not always predictable.

There are two suborders of living cetaceans (Figure 13). Baleen, or whalebone, whales have no teeth and are externally distinguishable by having paired blowholes and a huge lower jaw. Rooted in the upper jaw are up to 800

TABLE 1 List of Marine Mammal Species Reported from the Coastal Waters of Washington

ORDER	SPECIES	OCCURRENCE	STATUS	
			MMPA	ESA
Carnivora	Sea otter, <u>Enhydra lutris</u>	R	x	x
Pinnipedia	Ca. sea lion, <u>Zalophus californianus</u>	C		
	N. sea lion, <u>Eumetopias jubatus</u>	C	x	
	N. fur seal, <u>Callorhinus ursinus</u>	R	x	
	Pacific harbor seal, <u>Phoca vitulina</u>	C	x	
	N. elephant seal, <u>Mirounga angustirostris</u>	R	x	
Cetacea	Ca. gray whale, <u>Eschrichtius robustus</u>	C	x	x
	Right whale, <u>Eubalaena glacialis</u>	A	x	x
	Minke whale, <u>Balaenoptera acutorostrata</u>	R	x	x
	Fin whale, <u>Balaenoptera physalus</u>	A	x	x
	Sei whale, <u>Balaenoptera borealis</u>	A	x	x
	Blue whale, <u>Balaenoptera musculus</u>	A	x	x
	Humpback whale, <u>Megaptera novaeangliae</u>	R	x	x
	Sperm whale, <u>Physeter macrocephalus</u>	R	x	x
	Pygmy sperm whale, <u>Kogia breviceps</u>	A	x	x
	N. Pacific beaked whale, <u>Mesoplodon stejnegeri</u>	A	x	
	Hubb's beaked whale, <u>Mesoplodon carlhubbsi</u>	A	x	
	Cuvier's beaked whale, <u>Ziphius cavirostris</u>	A	x	
	Baird's beaked whale, <u>Berardius bairdii</u>	A	x	
	Pilot whale, <u>Globicephala macrorhynchus</u>	A	x	
	Risso's dolphin, <u>Grampus griseus</u>	A	x	
	Killer whale, <u>Orcinus orca</u>	R	x	
	False killer whale, <u>Pseudorca crassidens</u>	A	x	
	Common dolphin, <u>Delphinus delphis</u>	A	x	
	N. right whale dolphin, <u>Lissodelphis borealis</u>	A	x	
	Striped dolphin, <u>Stenella coeruleoalba</u>	A	x	
	Pacific white-sided dolphin, <u>Lagenorhynchus obliquidens</u>	A	x	
	Dall's porpoise, <u>Phocoenoides dalli</u>	R	x	
	Harbor porpoise, <u>Phocoena phocoena</u>	C	x	

1. C=Common R=Rare A=Accidental

2. MMPA=Marine Mammal Protection Act
ESP=Endangered Species Act

3. Sea otters were transplanted to the Oregon and Washington coasts from Amchitka Island, Alaska stock in 1969 and 1970.

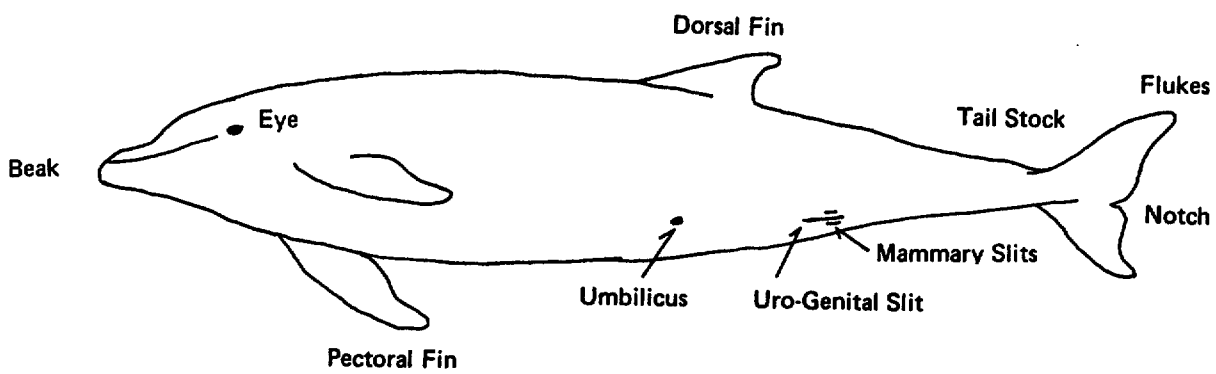
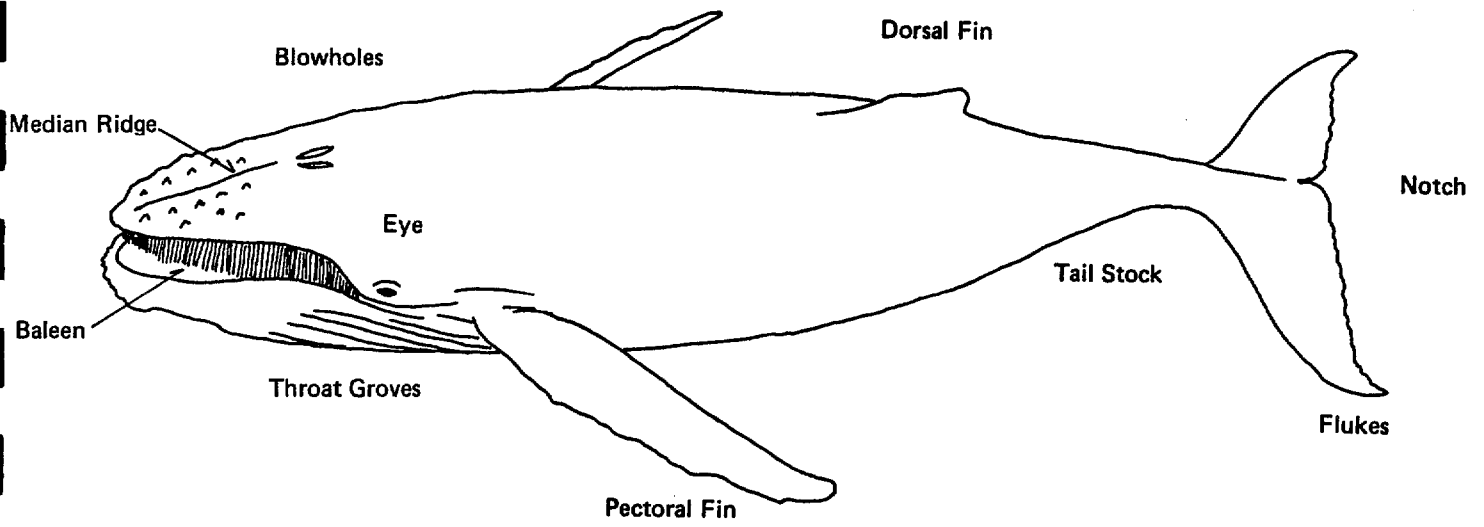


FIGURE 13 External Anatomy of Cetaceans

plates of baleen, a series of parallel horny plates fringed with hairs. They use these plates to strain their food, which consists of zooplankton and small schooling fish. Some species feed by skimming, passing slowly through swarms of relatively passive prey. Others feed by distending the throat to take in huge quantities of water and straining food organisms as the water is forced through the baleen.

Toothed cetaceans on the other hand, have between 2 and 250 teeth, although in the female of some species the teeth remain concealed in the gums throughout life. Toothed cetaceans include dolphins and porpoises. Their teeth allow them to capture prey, such as fish, squid, small birds and marine mammals. In contrast to the paired blowholes on a baleen whale, toothed cetaceans can be recognized by a single blowhole.

In captivity, dolphins and whales have often surprised trainers with an extensive learning capacity. Cetaceans have an exceptionally large brain indicating a high level of intelligence. Their most important sense is hearing. They communicate with others of their species through a variety of sounds; sound also serves as a way of locating food or objects by means of echolocation. Given their dependency on echolocation for finding food and navigating, some scientists are concerned that the acoustic pulses

released by seismic survey airguns might have a more profound impact than previously suspected on their survival.

Much of what we know about these mammals comes from records kept during former whaling (hunting) excursions and from beach strandings. Although some cetaceans have been studied in captivity and others observed during an occasional surface at sea, there are data gaps -- about breeding, migration, and behavior in general. In particular, more studies are needed to determine whether the various stages of oil and gas development disrupt their feeding, migration, and breeding habits, and if so, to what degree.

Migration

Whales migrate individually or in groups called pods. When seen off the Washington coast, they usually are migrating between southern breeding/calving grounds (winter) and northern feeding grounds (summer). Although most sightings of whales are in nearshore areas, they likely occur in greater numbers in deeper offshore waters.

Gray whales are most often observed off Washington in early spring when migrating north. From their summer feeding grounds above the Arctic Circle to calving grounds off Baja California, gray whales migrate a longer distance than any

other mammal. Migration routes follow close to shore, generally within 20 km of land. Gray whales are most commonly observed off Washington from late October to mid-December and from March through June, although each year a few individuals may remain in Washington waters as local residents.

Blue whales and humpbacks may be found off Washington during summer months, while sperm whales may be observed during the winter. The orca (killer) whale, Dall's porpoise, harbor porpoise, and minke whale are year round residents (Figure 14).

Less is known of the migration habits of dolphins and porpoises. Seasonal shifts in abundance of the harbor porpoise and the Pacific white-sided dolphin indicate that they do migrate, although mass movements have not been observed. Both the harbor porpoise and Pacific white-sided dolphins are usually seen close to shore, the latter sometimes congregating in large herds of up to a thousand animals.

Dall's porpoise, a cold water animal, can be found throughout the year off Washington. Risso's dolphin seem to prefer the offshore waters and are not commonly observed north of Vancouver Island.

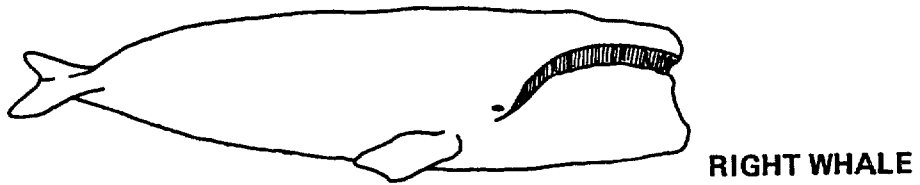
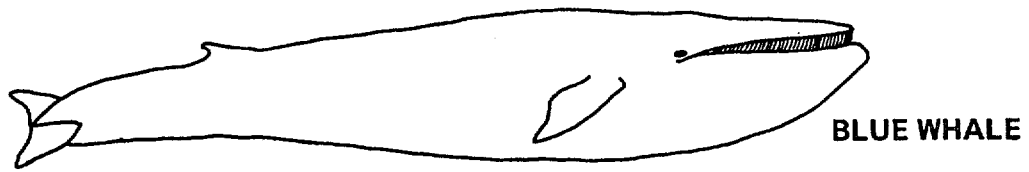


FIGURE 14 Relative Sizes of Adult Cetaceans

Population estimates among different species vary dramatically. Some species such as the right whale were hunted to near extinction in the later parts of the last century and never made much of a comeback. Today only an estimated 200 right whales are thought to inhabit the entire North Pacific. In comparison, as many as an estimated 472,000 sperm whales and 920,000 Dall's porpoise inhabit the North Pacific. Therefore, off the Washington coast, sightings of right whales are considered rare occurrences. However, sighting pods of Dall's porpoise may occur more frequently.

All marine mammals are protected from being killed, captured or harassed under the Marine Mammal Protection Act of 1972. Seven species of cetaceans are on federal and state endangered and threatened lists. The U.S. Fish and Wildlife Service maintains a list for the entire United States, and Washington State has its own list maintained by the Washington State Department of Game. These laws prohibit the killing, capture or harassment of these species and any harmful alteration of their habitats.

Marine Mammals--Order Pinnipedia--Seals and Sea Lions

Seals and sea lions -- the fin-footed mammals -- are dependent on both oceanic and land habitats. Periodically, they must haul out on land to rest and breed. These areas are usually located on uninhabited islands, offshore rocks, or undisturbed portions of coast. Pinnipeds are shy animals and each species congregates in only a few breeding sites, so it is important to protect their haul out sites and rookeries from human disturbance and development.

In Washington waters the most common pinniped is the harbor seal (Figures 15-18 show distributions of pinnepeds and sea otters in Washington waters). There are roughly 12,000 year round residents, many of which live in Puget Sound. Harbor seals are rarely seen very far from a haul out spot.

Two species of migrating seals are sometimes seen in offshore Washington habitats: the northern fur seal and the larger and less common northern elephant seal. In contrast to the harbor seal, the northern elephant seal and the northern fur seal, are rarely seen near land during non-breeding times. Deep divers, they feed off the continental shelf and beyond.

Two species of sea lions, the California and northern sea lion, occur seasonally in Washington waters. Sea lions also spend most of their time near shore, but are known to feed offshore. Unlike the somnolent harbor seal, sea lions are almost always on the move. Fearful of man, sea lions may stampede when disturbed, injuring or killing their young, or perhaps abandon a breeding ground altogether.

Marine Mammals--Order Carnivora--Sea otters

Once hunted to near extinction, the sea otter population is making a comeback. A small population now resides in nearshore waters off Washington's Olympic Peninsula. The sea otter is dependent on shallow marine areas since it obtains food from the bottom, thus it cannot migrate long distances offshore. The seaward limit of the sea otter's habitat is considered to be the 120 foot depth curve.

The sea otter is rarely seen on land. They are generally found in the vicinity of large beds of giant and/or bull kelp. Their preferred food organisms are sea urchin, abalone, crab and clams, although their diet adjusts to what food is available.

The sea otter's dense fur provides its only insulation against the cold, in contrast to the protective layer of

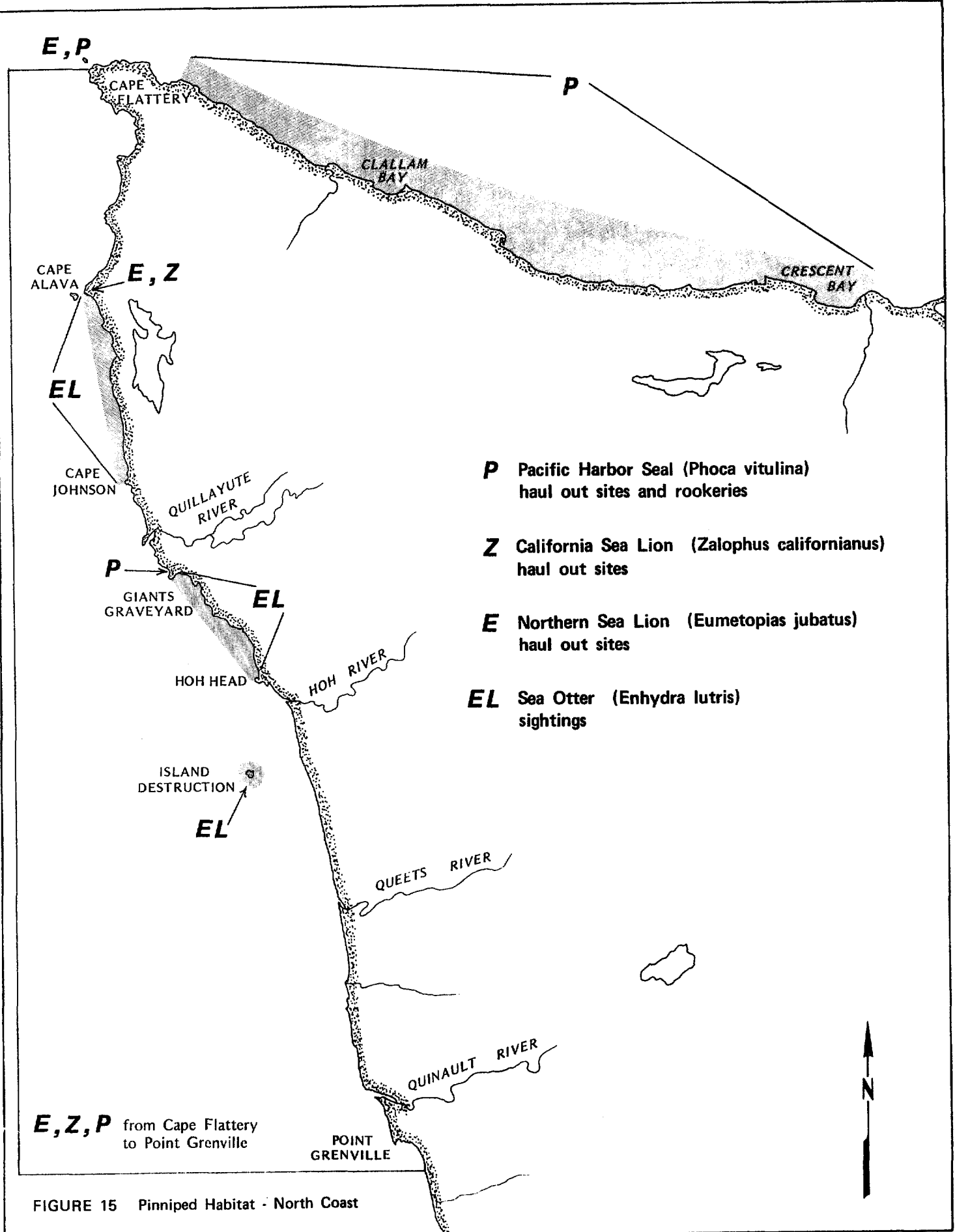


FIGURE 15 Pinniped Habitat - North Coast

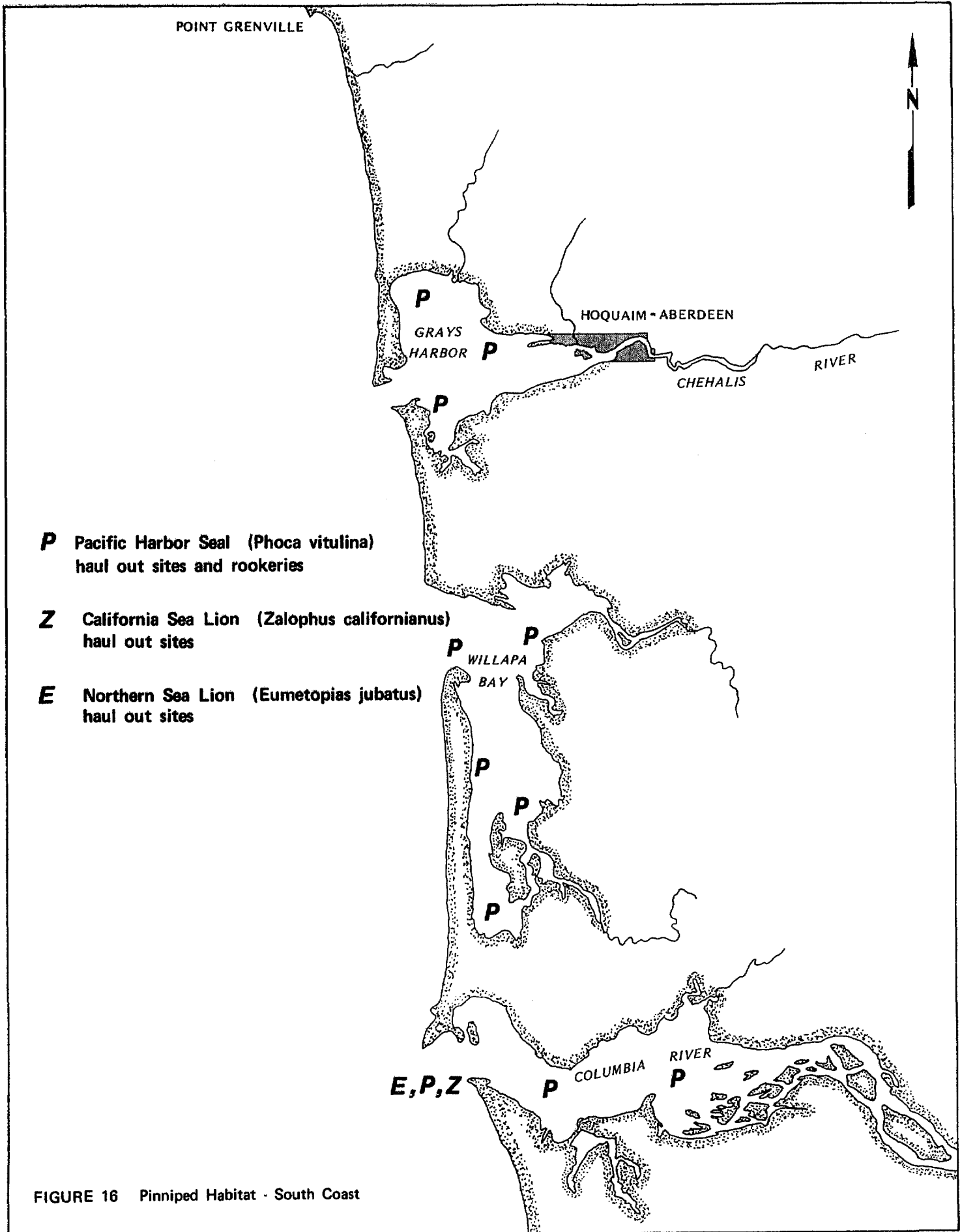


FIGURE 16 Pinniped Habitat - South Coast

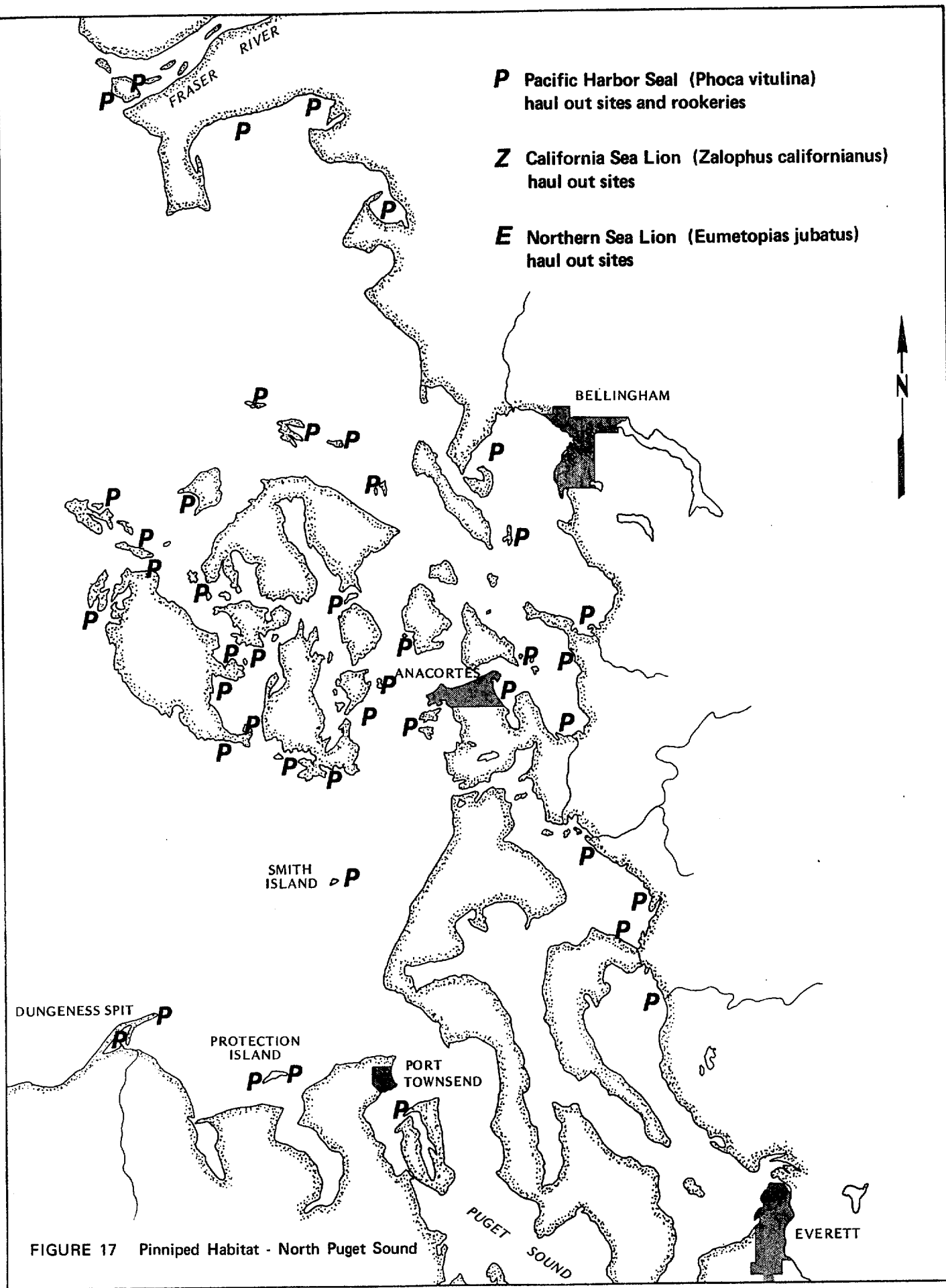


FIGURE 17 Pinniped Habitat - North Puget Sound

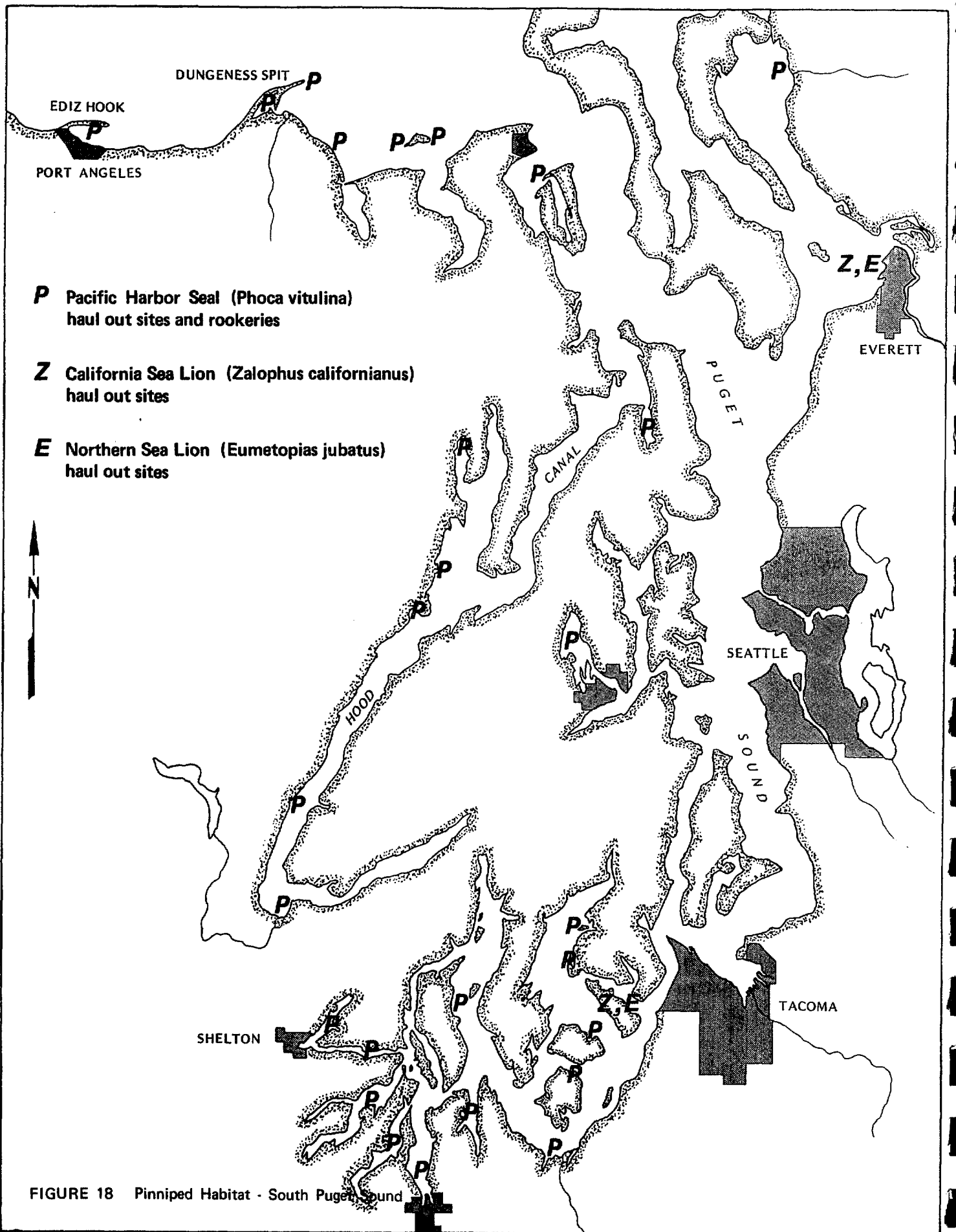


FIGURE 18 Pinniped Habitat - South Puget Sound

blubber found on whales and seals. Consequently, the sea otter is extremely vulnerable to oil or other pollution that would destroy the insulating properties of its fur.

Marine birds

Washington's waters, both nearshore and outer coast, provide habitat for both nesting and migrating marine birds and shore-based birds. Peak numbers of seabirds are found off the Pacific coast during spring and autumn migrations. In addition to migratory periods, the numbers of waterfowl and other marine birds in Puget Sound swell during the winter months, while some marine birds such as gulls and cormorants can be found year round.

Populations during fall migration are larger than those in spring, since many birds subject to high mortality during the first year of life are included in the fall population count. Spring migration is usually shorter in duration, while fall migration is accomplished at a more leisurely pace. Thus, fall migrants may be more vulnerable to environmental impacts since they may be in a given area for longer periods and in greater numbers.

The highest density of seabirds occur over the continental shelf. The most regularly occurring birds are:

Albatrosses

Northern Fulmar

Shearwaters

Storm-petrels

Phalaropes

Jaegers and Skua

Gulls

Terns

Alcids

Very high seasonal concentrations of birds are located in the entrance to the Strait of Juan de Fuca. The southern coast also attracts a great many seabirds. Large flocks of shearwaters can be found feeding on anchovies just off beaches along the southern coast from July to September while many other species forage in and near the three estuaries (Grays Harbor, Willapa Bay, Columbia River) during their annual migration.

There are about 240,000 seabirds known to be nesting along the outer coast of Washington. Among them is the largest nesting population of Caspian terns in the western United States. These terns nest in Grays Harbor, Willapa Bay and

in the entrance to the Columbia River. The Caspian tern has been classified as a species of concern or threatened species in Washington. The birds are vulnerable to increases in water turbidity which prevents them from seeing prey. This can be a critical problem during nesting season in nearshore and estuarine habitats where they forage.

The northern coast also has a large population of nesting birds. About 170,000 alcids -- among them tufted puffins and Cassin's auklets -- breed in Washington at many locations along the northern coast. Roughly 5,400 cormorants, 17,000 gulls, and 40,000 storm-petrels also nest along the ocean coast.

Some marine birds may live as long as 30 years, however they do not mature sexually until they are several years old. This, combined with the fact that they only produce a few eggs at a time, amplifies the effect disturbance of breeding colonies has on the long-term viability of a species.

When adults are frightened into leaving nests, eggs and young may be knocked out, and predators may take advantage of the unguarded nest. In the extreme case, the nest or the colony may be abandoned altogether.

The Puget Sound region is extremely important to 124 species of marine birds. Many rely on the sheltered bays and inlets for winter habitat or for forage during migration periods while others are year round residents. In particular, Puget Sound provides important habitat for brant, snow geese, peregrine falcons and rhinoceros auklets.

Certain islands are of particular importance to breeding marine birds. Protection Island provides breeding habitat for rhinoceros auklets and tufted puffins. Double-crested and pelagic cormorants breed on Colville Island.

Several birds with threatened or endangered status are found in Washington waters. On the endangered list are short-tailed albatross, peregrine falcon, Aleutian Canada goose, and brown pelican. The bald eagle has threatened status. However, all non-game species of migratory birds are protected by the Migratory Bird Treaty Act. This law prohibits hunting, capturing, or interfering with any migratory bird, its eggs or nest.

Sensitive Habitats

There are numerous special animal species inhabiting primarily marine and marine coastal areas, and site specific habitat data for all of them would encompass virtually all

of Washington's coastline. Therefore, the following discussion is confined to our knowledge of critically important habitats for threatened and endangered species.

Species listed as threatened or endangered under Wildlife Policy .602, that frequent the marine and marine coastal areas, and may be impacted by seismic surveys are listed below:

loggerhead sea turtle
green sea turtle
leatherback sea turtle
brown pelican
peregrine falcon
bald eagle
sea otter
gray whale
sei whale
fin whale
blue whale
hump-backed whale
black right whale
sperm whale

Information on sea turtle critical feeding areas of migration routes are not known. Brown pelican feeding and resting areas are poorly known.

The remaining known critical areas can be roughly described as outlined on the maps and as described below (Figures 19-22).

1. Columbia River mouth - brown pelican concentrations during fall, year around bald eagle use.
2. Willapa Bay - brown pelican concentrations during fall, peregrine falcon wintering area.
3. Grays Harbor - brown pelican concentrations during fall, peregrine falcon wintering area.
4. Coastal Olympic Peninsula - brown pelican concentrations during fall, year around bald eagle and peregrine falcon use.
5. Dungeness Spit, Sequim Bay, Protection Island vicinity - peregrine falcon wintering habitat, bald eagle year around use.

4. Brown Pelican
Bald Eagle
Peregrine Falcon

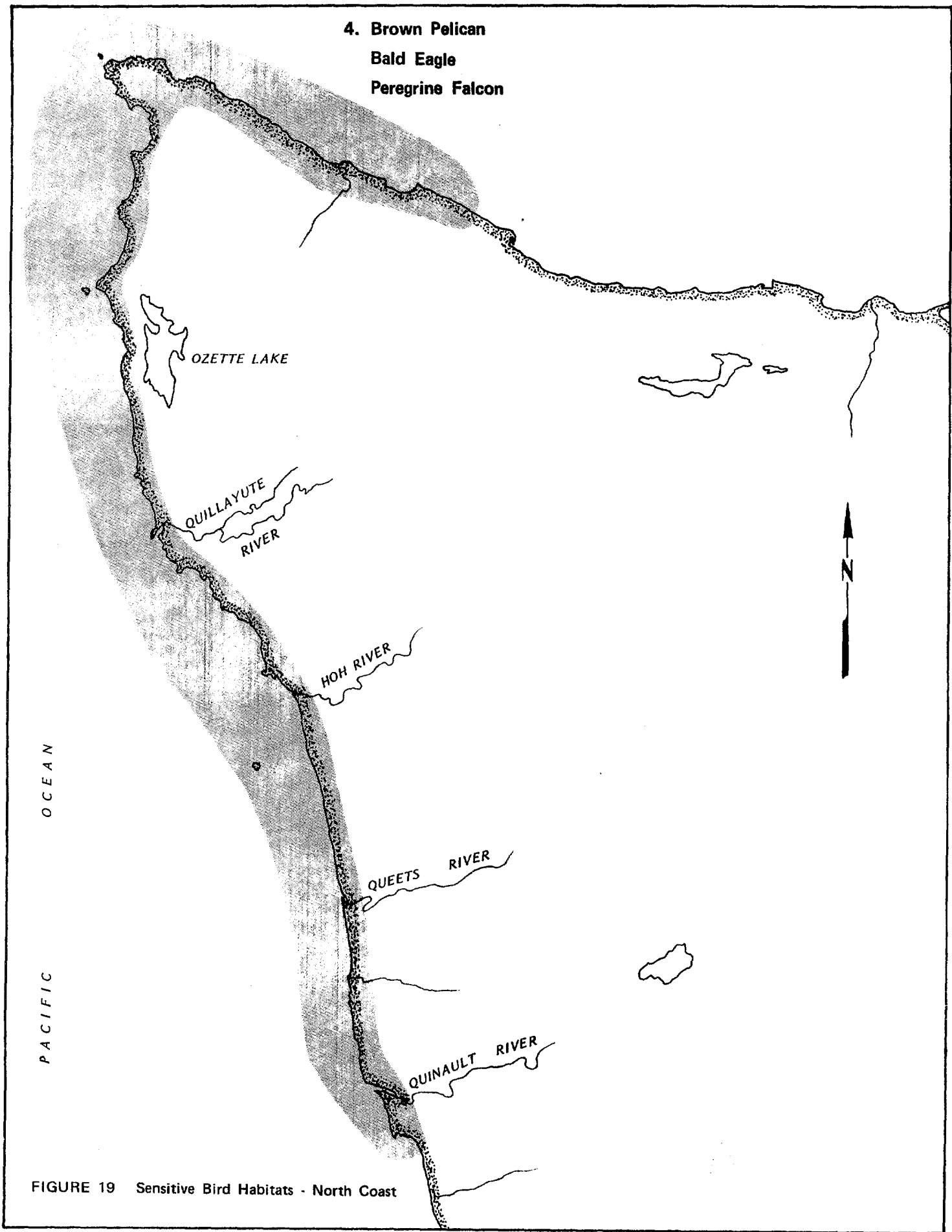


FIGURE 19 Sensitive Bird Habitats - North Coast

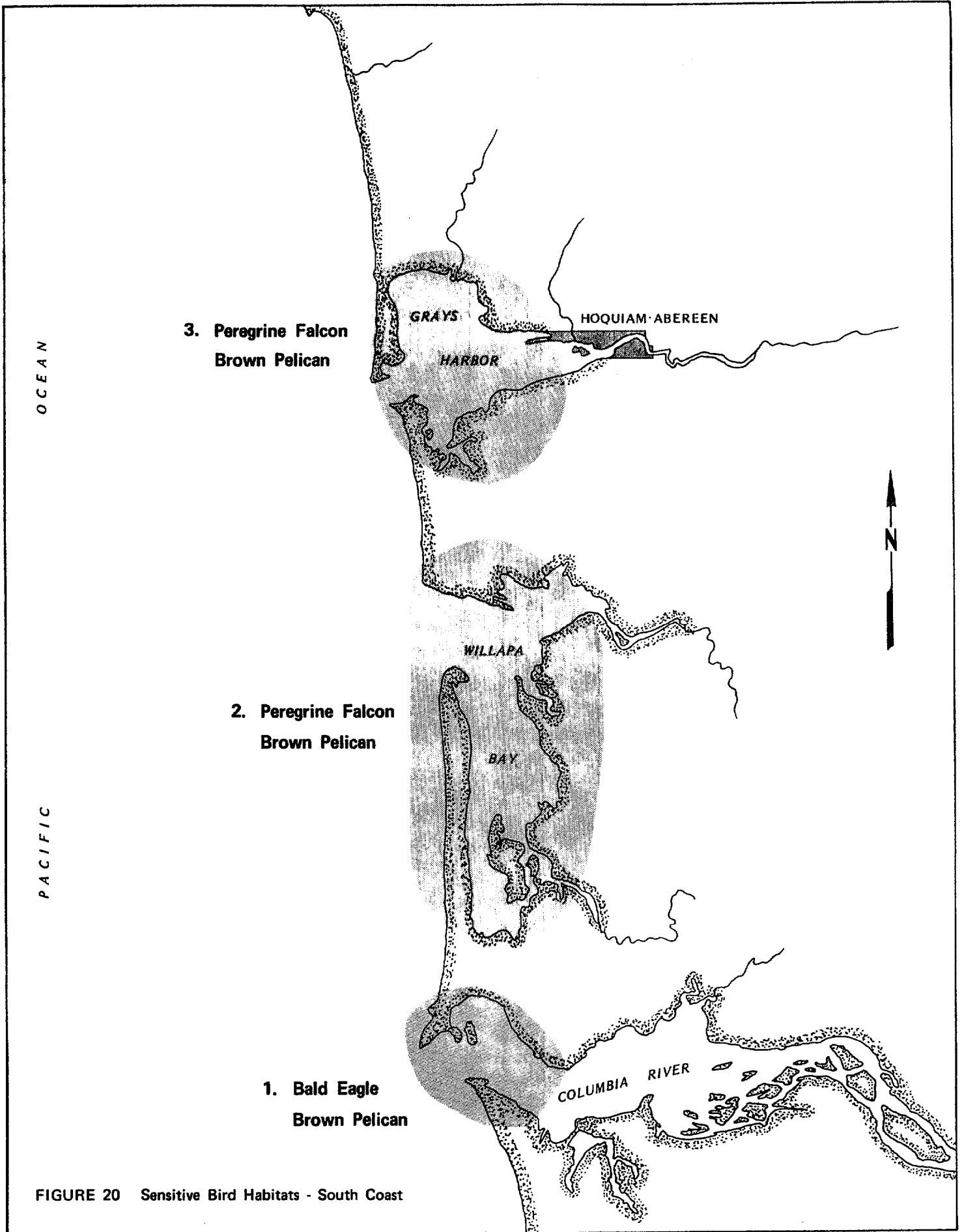
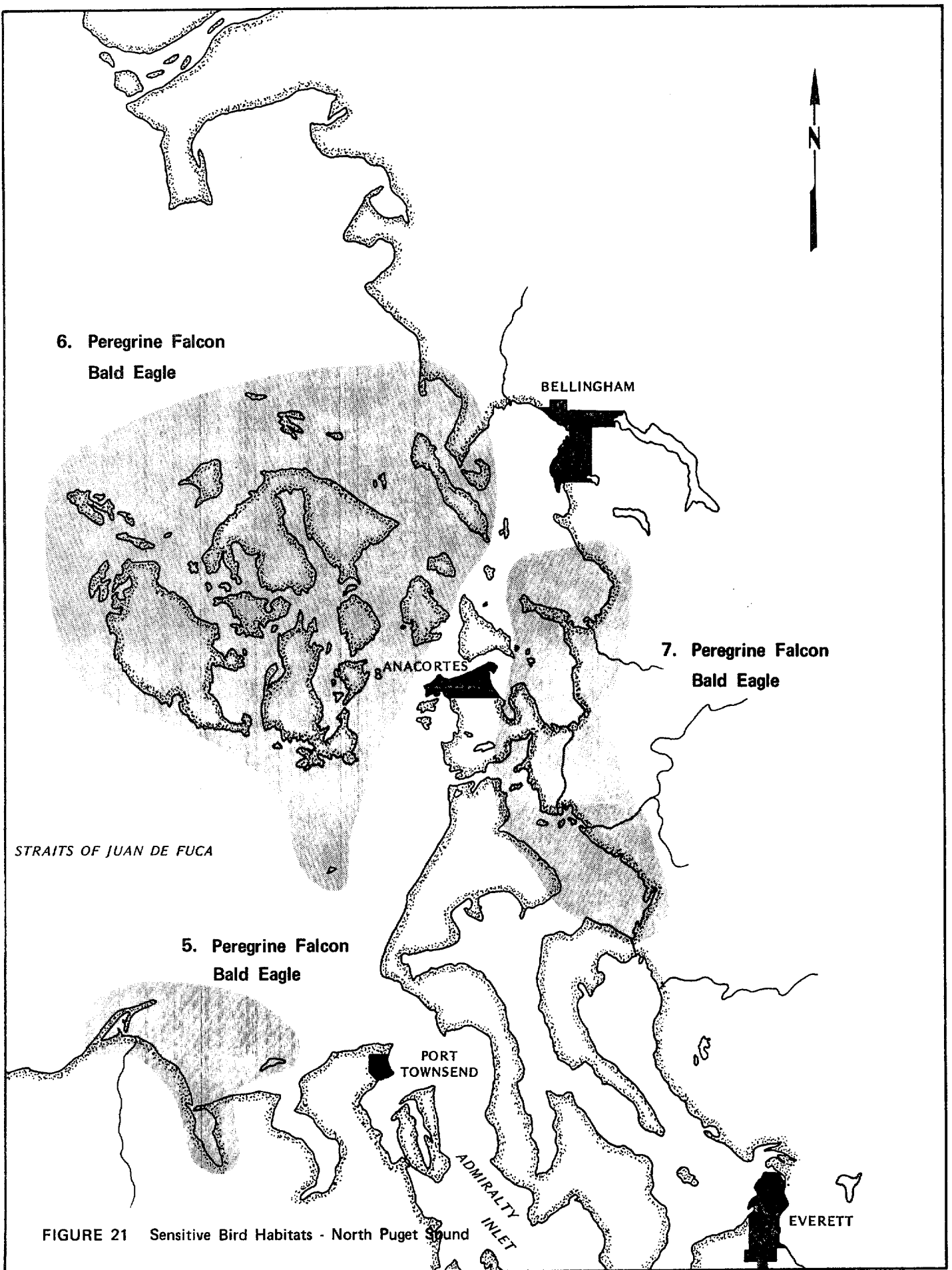


FIGURE 20 Sensitive Bird Habitats - South Coast



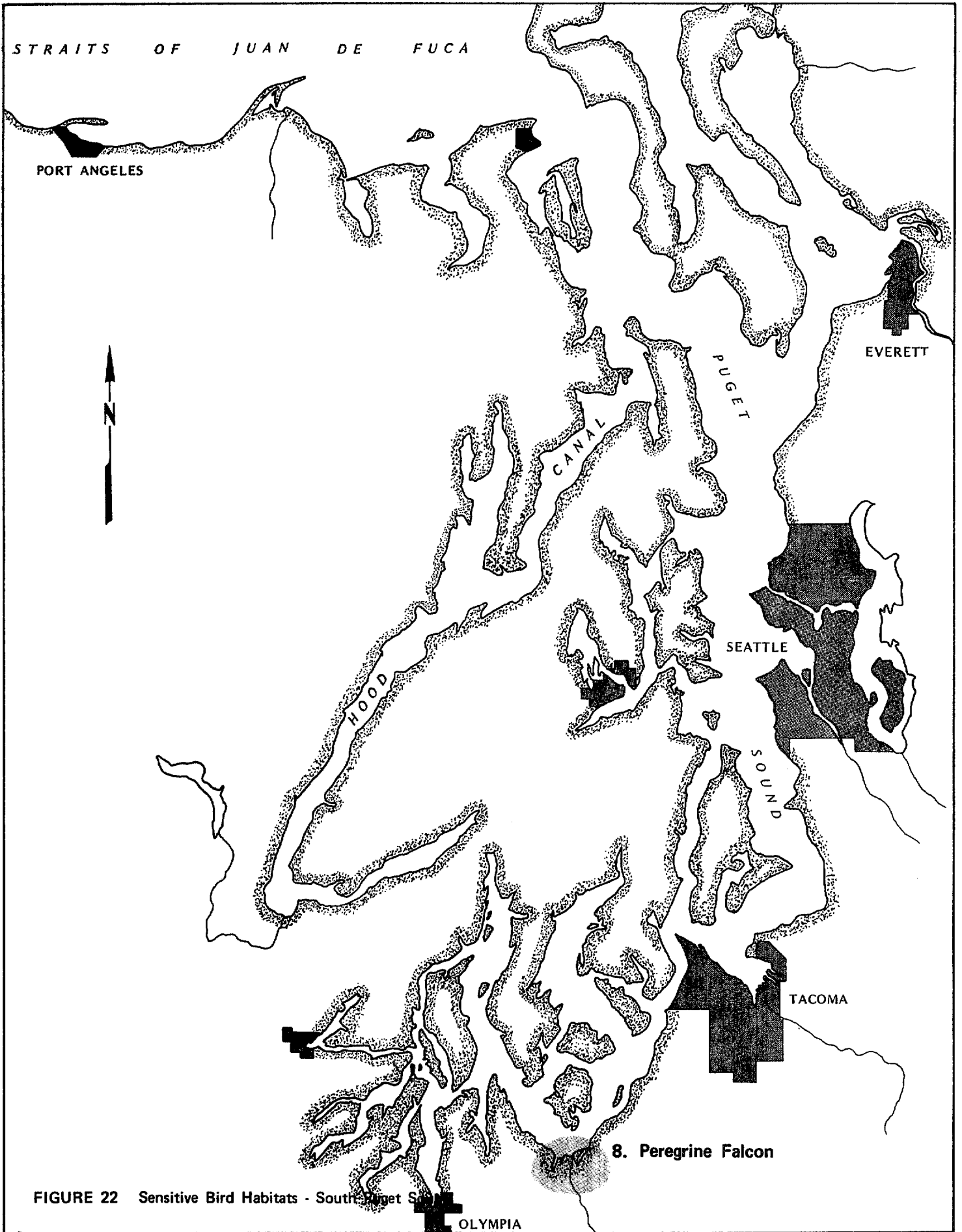


FIGURE 22 Sensitive Bird Habitats - South Puget Sound

6. San Juan Islands, Nooksack estuary - year around bald eagle concentrations, local peregrine use areas.
7. Padilla, Samish, and Skagit Bays and associated estuaries - peregrine falcon wintering use and year around bald eagle use.
8. Nisqually Delta - peregrine falcon wintering area.

The above list identifies the most important threatened and endangered species habitats. These areas also are important habitats for a wide variety of other wildlife, some of which may be sensitive to the disturbances associated with seismic surveys. The bald eagle areas identified herein were chosen for their relatively high densities of nesting or wintering eagles, or because they overlapped with relatively important habitat for another threatened or endangered species. Many bald eagle nesting territories and wintering areas are not included in the designated areas of importance.

SECTION FOUR

SEISMIC SURVEYS

SEISMIC SURVEYS

Oil and gas are hydrocarbons -- chemical compounds once part of living organisms that have been buried, heated and squeezed into new forms. They are located in deposits under the sea floor.

Since the beginning of the modern petroleum exploration era, more than 2.5 million oil wells have been drilled in the United States. Once the "easy" oil and gas was tapped, energy companies turned to the continental shelf to look for additional petroleum reserves. Significant reserves of oil and gas were found and tapped off the coasts of California, Alaska and the Gulf states. However, only recently have the energy industries exhibited interest in offshore Washington, ranking it 15 out of 26 on the latest leasing schedule.

Seismic surveys are the first step to oil and gas development (Figure 23). Seismic surveys provide clues to the sedimentary structure beneath the seafloor. This is done by bouncing sound energy off rock layers found on the ocean floor and recording and analyzing the reflections. Until recent years, the primary energy source for acoustic signals was an explosive, often dynamite. Today, preferred sources include compressed air, electric spark and propane

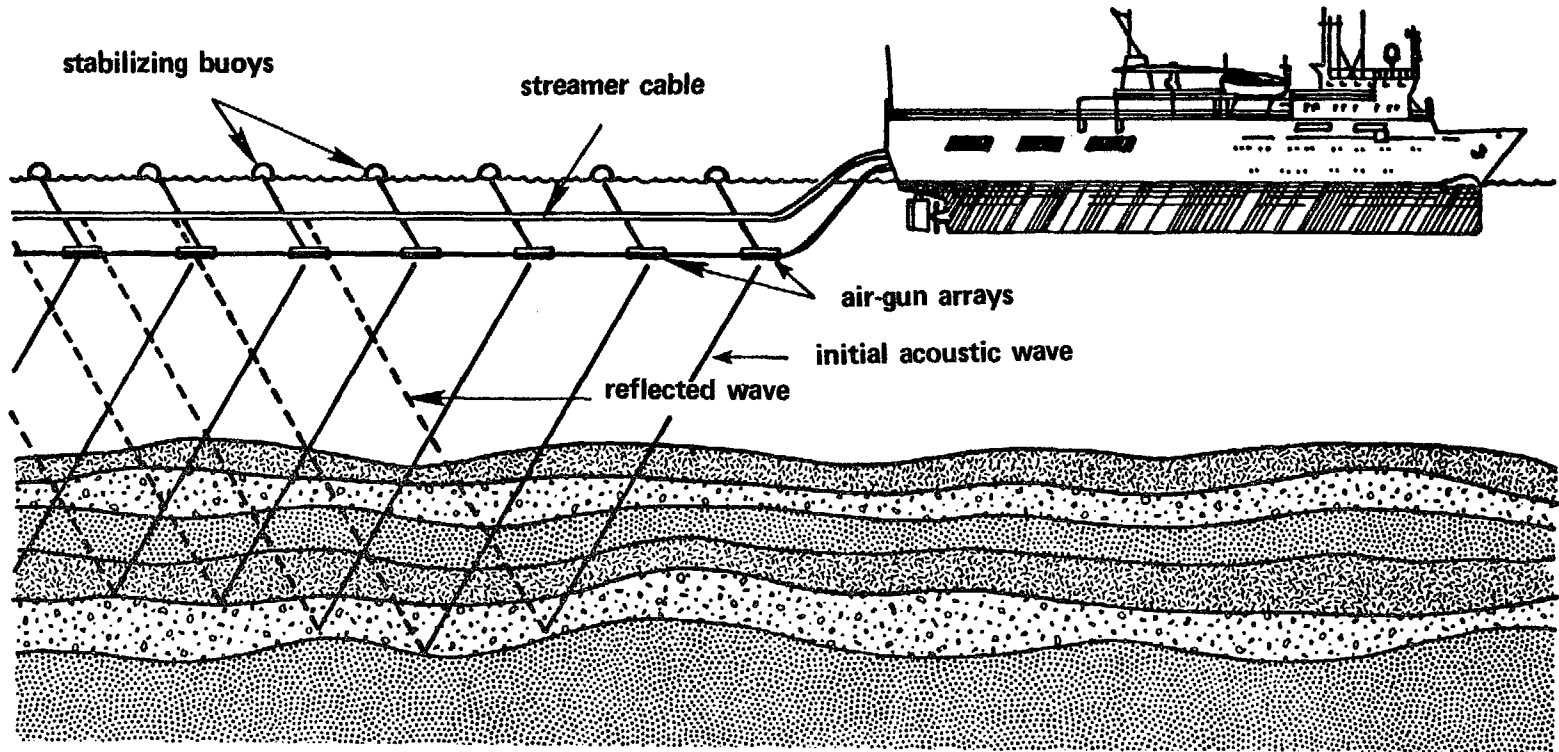


FIGURE 23 Profile of Seismic Survey Operation

gas, all of which are easier to fire accurately and have less impact on marine life.

Acoustic signals generated by compressed air is the energy source most used in seismic surveys conducted in outer continental shelf waters off Washington. What follows is a brief description of the process and operations used in the compressed air type of seismic survey.

The Process

A survey ship sends out pulsed sound waves, generated by an acoustic generator array (typically an airgun array). As these sound waves penetrate the seafloor, the various rock layers reflect the signals back at different times to a series of sensitive listening devices that trail behind the ship on a streamer up to 9,000 feet long. Special instruments on the ship record the numerous signals on magnetic tape, which a computer can process to produce a profile of the subsea formations.

The airgun array is towed directly behind the ship at a depth of 30-40 feet (Figure 24). Some operators may use a device called a paravane to cause the airgun array to tow out away from the vessel and cable. The airguns release compressed air in the water, creating a sharp sound pulse.

TYPICAL STREAMER TOWING CONFIGURATION

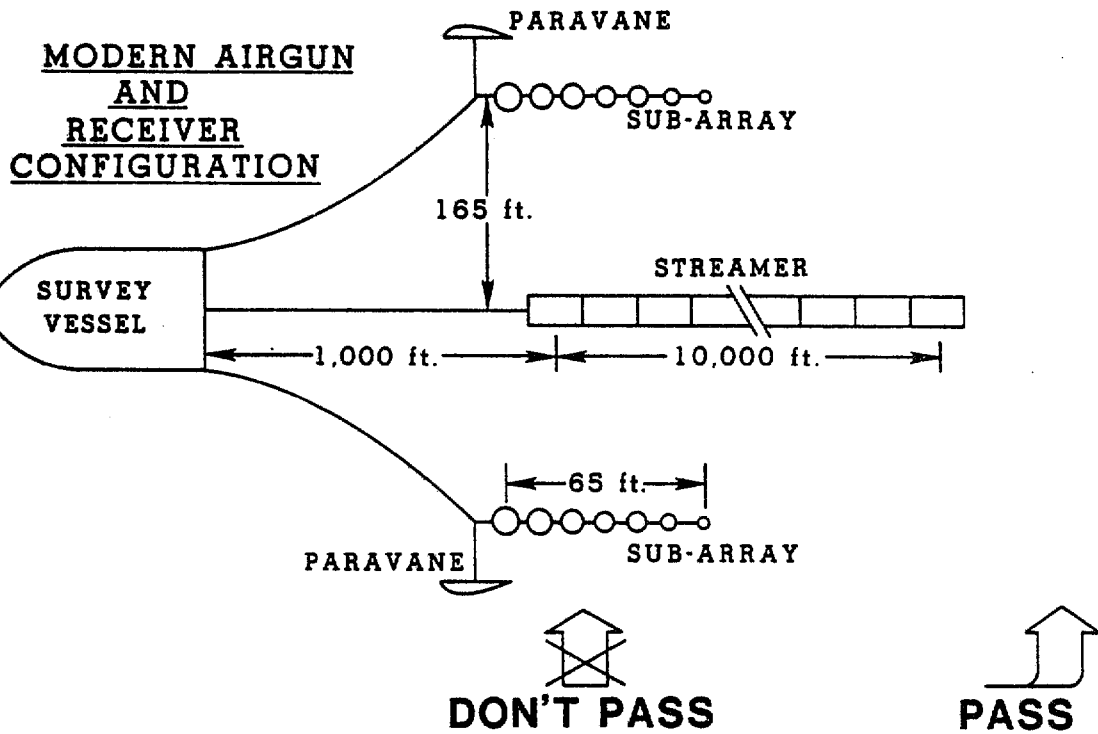
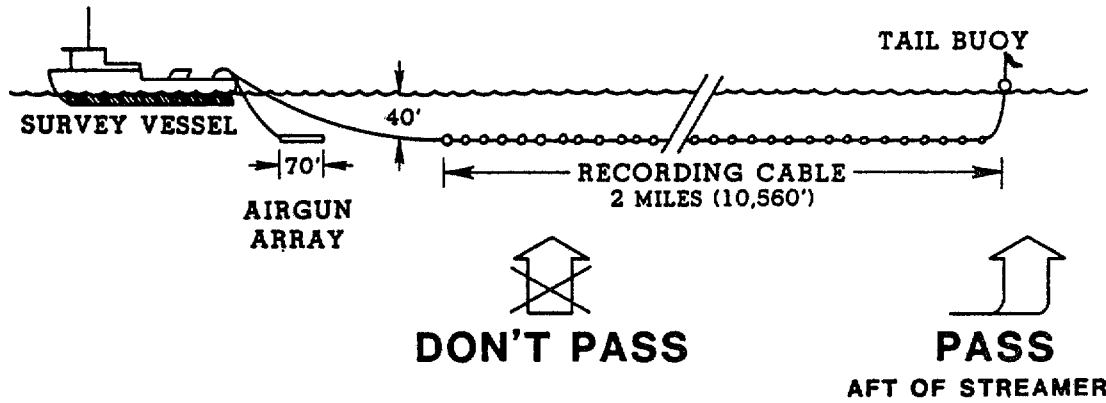


FIGURE 24 Seismic Streamer Towing Configuration

Typically, the array consists of six subarrays, each of which contains seven airguns.

The sound detectors, or hydrophones, are housed in a long streamer cable which is up to two miles in length. Towed behind the ship at depths of 20-40 feet, the streamer cable collects signals from the sound detector in groups, generating a sound record. Then the information is transferred and recorded on a digital magnetic tape.

Operations

The ship starts near one end of the first line by deploying the 2-mile long streamer. A tail buoy connected to the streamer with a rope 100 to 170 feet long is also dropped off. The buoy may have a light and a radar corner reflector to facilitate spotting. To minimize streamer damage and to maintain uniform running depths, a winged device called a bird is attached to the streamer every 980 to 1650 feet. The birds not only help keep the streams fairly level, but they have remote depth control, which permits the streamer to be raised to avoid bottom obstructions and to be lowered for a crossing ship.

The ship travels at a speed of about five knots along a pre-plotted seismic line while spreading the airgun array out

from the ship. A sound pulse which penetrates the rocklayers is released every 80 feet or so by the airgun array. The resulting echoes or reflections from the rock layers are sensed by the detectors in the streamer, amplified by the seismic amplifiers, and recorded on magnetic tape.

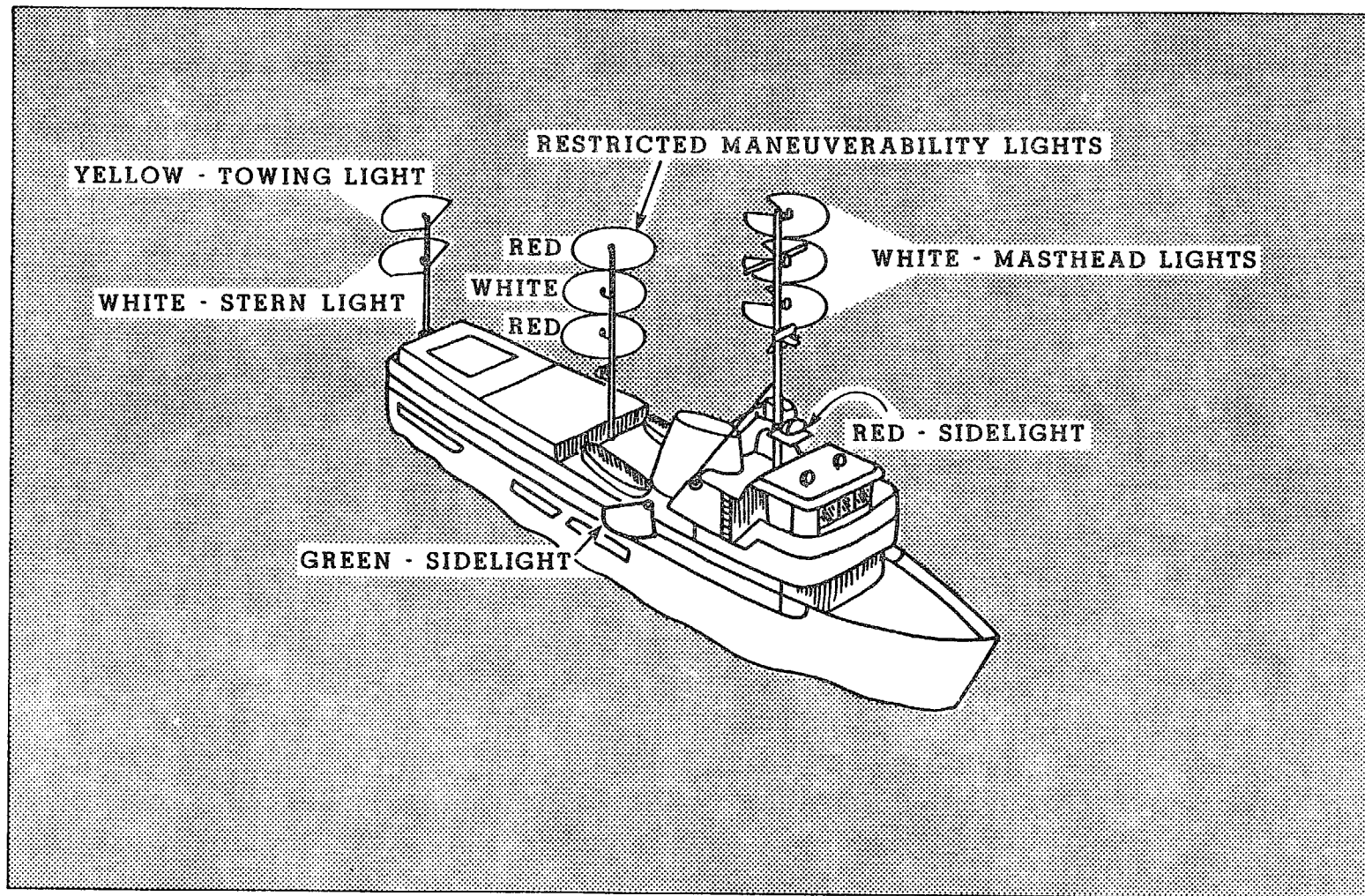
Fishermen should be aware that maneuverability of the slow-moving ship is severely limited. Quick turns and evasive actions are difficult to accomplish without losing or damaging gear. In addition, the vessel's course is pre-plotted in order to correctly interpret the rock layers; deviations from the pre-plotted course may require over two hours circling time to get properly realigned to resume recording. To avoid gear conflict it is suggested that an avoidance distance of 2-1/2 miles be allowed behind the vessel.

Lights/Day Shapes

The lights and day shapes (Figures 25 and 26) used by geophysical vessels when they are surveying with equipment under tow are the same as used by all commercial shipping. As illustrated, the day shapes are black in color and typically two feet in diameter. They are placed equidistant and are visible from all directions. The night lights are

GEOPHYSICAL VESSEL LIGHT POSITIONS

FIGURE 25 Geophysical Vessel Light Positions

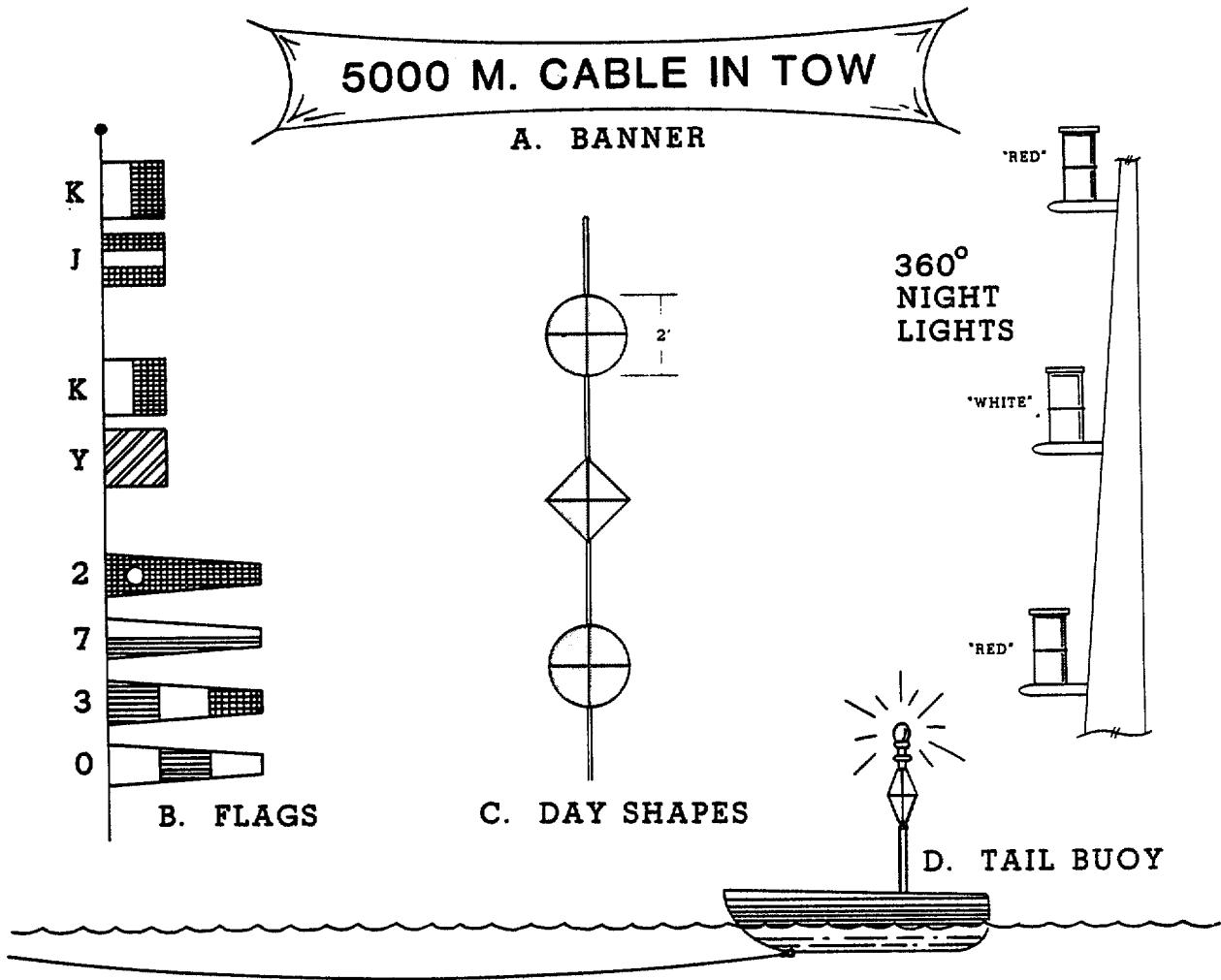


SOURCE: American Petroleum Institute

NOTE: This figure shows International lights for a typical geophysical vessel, with a tow exceeding 200 meters and restricted in ability to maneuver. The red-white-red all-round lights will be located on vessels where they can best be seen. (Adapted from USCG Navigation Rules, 23 Aug. 1982)

GEOPHYSICAL VESSEL

Towing Day Shapes, Night Lights and Flags



A. BANNER Banner to be exhibited on port and starboard side of geophysical vessel. Black block letters will be 36" high on yellow background for maximum visibility. Not all geophysical vessels carry this banner.

B. LENGTH-OF-TOW (International) FLAGS Length-of-tow flags to be flown as indicated on main mast forward of towing shapes as prescribed in H.O. Pub. 102 (1969) International Code of Signals. These flags denote a submerged object in tow and the length of tow is 2730 fathoms (5000 M or 16,400 ft.) aft of the vessel, which is adequate to safeguard all current geophysical cables. Flags will remain constant for all towed cables up to 2730 fathoms (500 M). Thus clearance aft should be this distance at all times while cables are under tow.

C. TOWING SUBMERGED OBJECTS Towing shapes to be flown as indicated on main mast aft as prescribed in USCG Bulletin COMDTINT M16672.2 (1982). These shapes indicate a submerged cable is being towed at or near the surface.

D. TAIL BUOY Typical tail buoy for all geophysical vessels attached to end of towed cable. Usually highly visible, of 12 foot average length, with radar reflector. Some buoys have radar transponders. USCG rules require an all-round white light. Other vessels should not pass between tail buoy and geophysical vessel. These buoys are normally marked unmanned with name of owner and vessel.

FIGURE 26 Geophysical Vessel Towing Day Shapes, Night Lights and Flags

SECTION FIVE

APPENDICES

Chapter 173-15 WAC

PERMITS FOR OIL OR NATURAL GAS EXPLORATION ACTIVITIES CONDUCTED FROM STATE MARINE WATERS

WAC

173-15-010	Authority and purpose.
173-15-020	Definitions.
173-15-030	Exploration activity permit system.
173-15-040	Penalties.

WAC 173-15-010 Authority and purpose. These rules are promulgated pursuant to RCW 90.58.550(6) for the purpose of establishing the basic requirements for the exploration activity permit system. [Statutory Authority: RCW 90.58.550, 90.58.560 and 1983 c 138. 84-01-028 (Order DE 83-35), § 173-15-010, filed 12/12/83.]

WAC 173-15-020 Definitions. The following definitions shall apply:

- (1) "Department" means the department of ecology.
- (2) "Exploration activity" means reconnaissance or survey work related to gather information about geologic features and formations underlying or adjacent to marine waters. Such activities include sonic, ultrasonic, seismic, sparker, side-scan sonar, infrared, heat sensor, chemical analysis (sniffer), or other remote sensing techniques which do not disturb the surface of the aquatic lands, as well as drilling, core sampling, or other exploratory techniques which penetrate the beds underlying or adjacent to marine waters.
- (3) "Marine waters" includes the waters of Puget Sound north to the Canadian border, the waters of the Strait of Juan de Fuca, the waters between the western boundary of the state and the ordinary high water mark, and related bays and estuaries. RCW 90.58.550 (1)(b).
- (4) "Normal public use of the marine waters of the state" means those activities generally enjoyed by members of the public including, but not limited to, recreation, fishing (commercial and sports), navigation and commerce.
- (5) "Vessel" includes ships, boats, barges, or any other floating craft. RCW 90.58.550 (1)(c).
- (6) "Director" means the director of the department of ecology.
- (7) "Person" means any individual, public or private corporation, agency, or other entity whatsoever, except for state or federal agencies. [Statutory Authority: RCW 90.58.550, 90.58.560 and 1983 c 138. 84-01-028 (Order DE 83-35), § 173-15-020, filed 12/12/83.]

WAC 173-15-030 Exploration activity permit system. The permit system established by RCW 90.58.550 shall be as follows:

(1) Applicability.

(a) A person desiring to perform oil or natural gas exploration activities by vessel located on or within marine waters of the state shall first obtain a permit from the department.

(b) An exploration activity permit obtained under (a) of this subsection shall be the sole permit required to be obtained for exploration activity under chapter 90.58 RCW.

(c) Except as provided in (b) of this subsection, nothing herein shall modify any powers of local governments set forth in chapter 90.58 RCW.

(2) Exploration activity permit application.

(a) Applications for an exploration activity permit shall be supplied by the department.

(b) Applications shall be filed with the Shorelands Division, Department of Ecology, Headquarters Office, Olympia, WA 98504.

(c) No application shall be processed until it is deemed complete by the department.

(d) Each application for an exploration activity permit shall be accompanied by a completed environmental checklist as provided in Title 197 WAC.

(3) Processing of complete application.

(a) A complete application will be forwarded to state natural resource management agencies and local governments and Indian tribes affected by the proposed exploration activity.

(b) Comments will be requested regarding the proposed exploration activity and its compatibility with the criteria established under RCW 90.58.550(2). Normally, reviewing agencies will be allowed fifteen days, from receipt of the application as provided by the department, in which to submit comments to the department.

(4) Public notice.

(a) Upon receipt of a completed application, the department shall instruct the applicant to publish notice thereof.

(b) Notices of the proposed exploration activity shall be published in the newspaper of the largest general circulation within each of the counties in which the activity is proposed.

(c) Any person wishing to express views on the proposed exploration activity will be given fifteen days to comment to the department.

(d) All notices of applications for exploration activity permits shall contain, as a minimum, the information called for in the following form:

Notice of Application for
Exploration Activity Permit

Notice is hereby given that (company name or institution) has filed an application for an exploration activity permit for oil and/or natural gas survey and reconnaissance work in (list major bodies of water)

The exploration activity consists of (describe survey gear, vessel, and other equipment in sufficient detail to inform public of the nature of the operation)

The exploration activity is proposed to commence on (date) and end (date)

Any person desiring to express views or to be notified of the action taken on this application should notify the department of ecology in writing of his/her interest within fifteen days of the final date of publication of this notice which is (date). Written comments should be mailed or delivered to the Washington Department of Ecology, Shorelands Division, Mail Stop PV-11, Olympia, WA 98504, (206) 459-6272. Comment period deadline is (date).

(e) An affidavit that the notice has been properly published pursuant to this section shall be provided to the department by the applicant.

(5) Public hearing. A public hearing on the proposed exploration activity permit will be held by the department if it determines, upon consideration of such factors as location, timing, duration, method of operation, and public comments, that a hearing would assist it in implementing the intent of RCW 90.58.550(2).

(6) Department exploration activity permit decision.

(a) The department will approve an exploration activity permit application if it determines that the proposed activity meets the criteria set forth in RCW 90.58.550(2). Exploration activities may not:

(i) Interfere materially with the normal public uses of the marine waters of the state;

(ii) Interfere with activities authorized by a permit issued under RCW 90.58.140(2);

(iii) Injure the marine biota or other fish and wildlife, beds, or tidelands of the waters;

(iv) Violate water quality standards established by the department;

(v) Create a public nuisance; or

(vi) Conflict with a shoreline master program approved by the department under RCW 90.58.090 or 90.58.190.

(b) The department, as lead agency, will comply with the provisions of the State Environmental Policy Act as governed by the procedures established under chapter 43.21 RCW and its implementing rules.

(c) No application for an exploration activity permit shall be approved by the department under this section which relates to surface drilling for oil or gas in the waters of Puget Sound north to the Canadian boundary or the Strait of Juan de Fuca seaward of the ordinary high water mark. RCW 90.58.160.

(7) Exploration activity permit terms and conditions.

(a) The department shall place terms and conditions in the exploration activity permit as necessary to assure that the permitted activity meets the requirements of RCW 90.58.550(2).

(b) Such terms and conditions may include but are not limited to:

(i) Geographic limits on the area of operation;

(ii) Timing of the operation;

(iii) Limitations on hours of operation;

(iv) Placement of on-board observers;

(v) Use of lead boats;

(vi) Insurance or bond; and/or

(vii) Fishermen (or other users group) notification procedures.

(8) Modifications of exploration activity permits. When a permittee seeks to modify an exploration activity permit, detailed maps/charts and text describing the nature of the modification shall be submitted to the department. Modifications to the permit may be made by the department when the department determines that such changes are of a minor nature.

(9) Request for review. All requests for review of any final permit decision under RCW 90.58.550(2) and these rules are governed by the procedures established in chapter 43.21B RCW and its implementing rules. [Statutory Authority: RCW 90.58.550, 90.58.560 and 1983 c 138. 84-01-028 (Order DE 83-35), § 173-15-030, filed 12/12/83.]

WAC 173-15-040 Penalties. Any person violating RCW 90.58.550, or the provisions of these rules, is subject to a civil penalty issued by the department in an amount of up to five thousand dollars a day. See RCW 90.58.560 (1) and (2). [Statutory Authority: RCW 90.58.550, 90.58.560 and 1983 c 138. 84-01-028 (Order DE 83-35), § 173-15-040, filed 12/12/83.]



Application No. _____

Permit No. _____

APPLICATION FOR A PERMIT TO CONDUCT OIL OR
NATURAL GAS EXPLORATION ACTIVITIES IN
STATE MARINE WATERS

This application is required under RCW 90.58.550 and Chapter 173-15 WAC

Name of Applicant _____

Address _____

Telephone _____

Contact Person _____

Name of Geophysical Operator _____

Address _____

Telephone _____ / _____

Contact Person _____

Purpose of activity: Mineral Exploration
 Scientific Research

Number of days needed to conduct exploration activity _____

Beginning date requested ___/___/___

Ending date requested ___/___/___

Vessel name _____

call number _____

size _____

color _____

Lead boat employed Yes
 No

Exploratory equipment to be used (check appropriate boxes)

- airgun*
- sparker*
- sniffer
- magnetometer
- explosives
- other _____

* If seismic signal sources are to be operated during the survey, will they be towed in a wide array? Yes

No

Also, please indicate the length of seismic steamer _____ and depth to be towed _____.

General location (check appropriate boxes)

- Puget Sound
- Strait of Juan de Fuca
- Outer Coast

Nature and location, if any, of onshore support facilities required.

This application must be accompanied by:

- (1) Two sets of nautical charts showing exact location of all proposed seismic lines or seabed disturbing activities.
- (2) A completed environmental checklist as required under Chapter 197.10 WAC.

For proposed oil and/or gas exploration activities involving drilling operations, the applicant is advised to contact the Washington Department of Natural Resources, Marine Lands Management Division, Olympia, Washington 98504 for compliance with the provisions of RCW 78.52.

The applicant agrees that operation shall be conducted in conformance with applicable federal, state, and local laws and regulations now, or hereafter, in effect during the life of any permit issued to this application.

Signature _____ Date _____

Printed Name _____

Title _____

MEMORANDUM OF AGREEMENT
between the
STATE OF WASHINGTON
and the
UNITED STATES DEPARTMENT OF THE INTERIOR

The State of Washington and the United States Department of the Interior (DOI), Minerals Management Service (MMS), Pacific OCS Region, wish to establish a coordinated procedure for the issuance of Federal geological and geophysical (G&G) permits for offshore seismic surveys in a manner which will avoid or minimize adverse impacts to Washington's coastal resources. The authority for the parties to reach this agreement is Section 19(e) of the Outer Continental Shelf Lands Act Amendments of 1978, 43 U.S.C. 1345(e).

Past seismic survey operations by U.S. permittees in waters overlying the Outer Continental Shelf (OCS) have, on occasion, resulted in the loss of and damage to fixed fishing gear of individual fishermen and to state-managed fisheries resources. Previous notification of seismic survey operations via the U.S. Coast Guard's "Notice to Mariners" has not always been effective to avoid the offshore conflicts.

Enhanced coordination between DOI-MMS, the State of Washington, fishermen, and the offshore industry will prove valuable in avoiding future conflicts. For planning purposes, this Memorandum of Agreement outlines specific time periods pertaining to fishing activities offshore Washington. By planning for and conducting seismic survey operations during periods of low fishing activity, conflicts can be avoided or minimized early on.

This Memorandum of Agreement also outlines a process by which DOI-MMS will notify the state of proposed surveys and provide for the incorporation of state recommendations, to reduce conflicts, into the permit prior to issuance. This process assures the state that concerns regarding coastal resources are considered and impacts minimized.

I. Scheduling of Seismic Activities

Three offshore fishing periods have been identified for planning purposes. These periods have been tailored to the fixed-gear Dungeness crab fishing and crab concentrations, but also reflect considerations of other important fisheries.

The Dungeness crab fishery is the activity and resource most directly affected by seismic surveys off Washington. The state has management responsibilities

for the protection and enhancement of the Dungeness crab resource on both the nearshore and offshore areas. The state also manages an active commercial, charter, and recreational salmon fishery off the coast. In addition, the sablefishery, under both the long-line and pot methods, is becoming an increasingly important part of the state's offshore fishing industry and management responsibilities.

A. Period of Low Fishing Activity - September 15 through November 25.

The Dungeness crab fishery is closed during this time frame. There is a small sablefishery during the early part of this period. Sablefish are pursued in waters in excess of 300 fathoms through the use of both pots and long-lines. Seismic operators are encouraged to plan operations for this time period since there are virtually no crab pots present. State review will reflect efforts to avoid conflicts with the sablefishery. Permit review can be expedited during this period due to the relatively low fixed-gear fishing activity.

B. Period of Moderate Fishing Activity - March 16 through September 14.

Approximately 60 crab vessels fish during this period, utilizing as many as 18,000 crab pots. Crab gear is generally located inside the 20 fathom line.

The salmon fishery generally begins in May and runs through August. As many as 1,000 offshore trawlers may work the Washington coast during this period, running out to 100 fathoms. Charter boats and smaller fishing boats operate closer to shore and combined, may number over 1,000 vessels. The sablefishery is also active during this period, with pots and long-lines working areas out to 350 fathoms.

With the emphasis on avoiding fixed fishing gear conflicts, operators are encouraged to plan any surveys during this period for the area outside the 20 fathom line. State review will consider impacts to both the salmon and sablefish resources and recommended measures will reflect these concerns. Proposals for surveys inside the 20 fathom line could likely result in time consuming pot relocations.

C. Period of Peak Fishing Activity - November 26 through March 15.

During this brief period, as many as 165 crab fishing vessels operate off Washington, fishing approximately 42,000 pots. The gear is located in waters to depths of 65 fathoms and cannot be readily moved to shallower waters due to storm-inflicted damage. Winter storms, frequent off the Washington coast, also prevent fishermen from moving crab pots quickly, often necessitating in excess of two weeks to bring crab pots to shallow water or to port.

Because of the high numbers of crab fishermen and associated fixed gear and the winter storm conditions, seismic surveys should be planned to avoid this peak fishing period. State review and recommendations will reflect the importance of the Dungeness crab fishery and the time constraints associated with the relocation of fixed gear.

II. Notification of Participating Agencies

When the Minerals Manager, DOI-MMS, Pacific OCS region, determines that an application for a G&G permit for offshore Washington is complete, a copy will be forwarded to the state agency contacts listed below. The authority for the Department of Ecology's review rests with the Coastal Zone Management Act of 1972, as amended. The Department of Ecology has been designated as the lead agency for the Washington Coastal Zone Management Program and the state OCS Participation Program. The Department of Fisheries is the state agency responsible for fisheries management. Transmitted information will contain a description of the proposed survey in enough detail to enable the state to determine the extent of potential conflicts. In instances where the survey is speculative, or for a "group shoot," a detailed map, to be held confidential upon request by the applicant, will be furnished:

Washington Department of Ecology
Shorelands & CZM Program
Mail Stop PV-11
Olympia, WA 98504
Attn: Brian Walsh - OCS Program Manager
(206) 459-6782

Washington State Department of Fisheries
115 General Administration Building
Olympia, WA 98504
Attn: Ron Westley - Assistant Director,
Shellfish
(206) 753-6749

III. State Review - Scope and Time Limitations

The state, through coordination with field agents and fishermen, will review the G&G permit application to determine the extent of potential conflicts with state-managed resources. If necessary, the state will contact the seismic operator for additional information. Within 14 days of receipt of the necessary survey information, the state will submit comments to :

Minerals Manager, Pacific OCS Region
Minerals Management Service
1340 W. Sixth Street, Suite 244
Los Angeles, CA 90017

The state will inform DOI-MMS of the location and general description of any fishing areas or locations of fixed gear that may be in conflict with the proposed operations, or that there are no conflicts. Comments will also include recommendations deemed necessary by the state to avoid or minimize potential conflicts between the survey and state resources. The state response will also include a listing of Washington State fishermen (or their associations) identified as having an interest in the survey.

IV. Federal Permit Issuance

A copy of the permit will be forwarded to the Departments of Ecology and Fisheries. Where recommendations suggested by the state are not incorporated, written justification will be provided to the state.

Fishermen contacts (or their associations), as provided by the state, will be listed by DOI-MMS in the "Special Provisions" section of the permit to enhance coordination between the operator and potentially impacted fishermen. The permit will require the permittee to contact these designated fishermen (or their associations) and the state agency contacts at least 72 hours in advance of the survey operation.

V. Fishermen Notification

The Department of Fisheries will notify identified fishermen (or their associations) of the permitted survey. This notification will include a posting of a notice at appropriate port locations as well as telephone contacts.

VI. General Provisions

1. Direct contact between the DOI-MMS and other state agencies are in no way limited by the Memorandum of Agreement. Such contacts are encouraged to promote more effective communication and coordination.
2. Nothing herein will be construed as obligating DOI-MMS or the State of Washington to violate any laws or regulations.
3. This Memorandum of Agreement will be reviewed at least annually by DOI-MMS and the participating state agencies, as to current adequacy and need.
4. This Memorandum of Agreement will become effective on the date of signatures as evidenced below, and will remain in effect until mutually revised in writing or until 30 days after notice of termination by either DOI-MMS or the State of Washington.

THIS MEMORANDUM OF AGREEMENT WAS REVIEWED AND REAFFIRMED BY THE PARTIES SHOWN BELOW:

Director for the Department of Ecology
State of Washington

Donald Moos
6-01-82

Director for the Department of Fisheries
State of Washington

Rolland Schmitten
6-01-82

Minerals Manager, Pacific OCS Region
Minerals Management Service
U.S. Department of the Interior

Reid Stone
5-18-82



ENVIRONMENTAL CHECKLIST

Purpose of Checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

1. Name of proposed project, if applicable:

2. Name of applicant:

3. Address and phone number of applicant and contact person:

4. Date checklist prepared:

5. Agency requesting checklist:

6. Proposed timing or schedule (including phasing, if applicable):

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

10. List any government approvals or permits that will be needed for your proposal, if known.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

TO BE COMPLETED BY APPLICANT

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____.

b. What is the steepest slope on the site (approximate percent slope)?

EVALUATION FOR
AGENCY USE ONLY

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

b. Are there any off site sources of emissions or odor that may affect your proposal? If so, generally describe.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

TO BE COMPLETED BY APPLICANT

3. Water

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

5) Does the proposal lie within a 100 year floodplain? If so, note location on the site plan.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals . . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

EVALUATION FOR
AGENCY USE ONLY

c. Water Runoff (including storm water):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

2) Could waste materials enter ground or surface waters? If so, generally describe.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

4. Plants

a. Check or circle types of vegetation found on the site:

- deciduous tree: alder, maple, aspen, other
- evergreen tree: fir, cedar, pine, other
- shrubs
- grass
- pasture
- crop or grain
- wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- water plants: water lily, celgrass, milfoil, other
- other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

c. List threatened or endangered species known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

- birds: hawk, heron, eagle, songbirds, other:
- mammals: deer, bear, elk, beaver, other:
- fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site.

c. Is the site part of a migration route? If so, explain.

d. Proposed measures to preserve or enhance wildlife, if any:

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

1) Describe special emergency services that might be required.

2) Proposed measures to reduce or control environmental health hazards, if any:

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

3) Proposed measures to reduce or control noise impacts, if any:

8. Land and Shoreline Use

- a. What is the current use of the site and adjacent properties?

- b. Has the site been used for agriculture? If so, describe.

- c. Describe any structures on the site.

- d. Will any structures be demolished? If so, what?

- e. What is the current zoning classification of the site?

- f. What is the current comprehensive plan designation of the site?

- g. If applicable, what is the current shoreline master program designation of the site?

- h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

- i. Approximately how many people would reside or work in the completed project?

- j. Approximately how many people would the completed project displace?

- k. Proposed measures to avoid or reduce displacement impacts, if any:

- l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

9. Housing

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
- c. Proposed measures to reduce or control housing impacts, if any:

10. Aesthetics

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
- b. What views in the immediate vicinity would be altered or obstructed?
- c. Proposed measures to reduce or control aesthetic impacts, if any:

11. Light and Glare

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
- b. Could light or glare from the finished project be a safety hazard or interfere with views?
- c. What existing off site sources of light or glare may affect your proposal?
- d. Proposed measures to reduce or control light and glare impacts, if any:

12. Recreation

- a. What designated and informal recreational opportunities are in the immediate vicinity?
- b. Would the proposed project displace any existing recreational uses? If so, describe.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

13. Historic and Cultural Preservation

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

- c. Proposed measures to reduce or control impacts, if any:

14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

- c. How many parking spaces would the completed project have? How many would the project eliminate?

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

g. Proposed measures to reduce or control transportation impacts, if any:

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

b. Proposed measures to reduce or control direct impacts on public services, if any.

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature:

Date Submitted: