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The Oregon Ocean Plan

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Oregon's Ocean Resources Management Plan

The Oregon Ocean Resources Management Task Force

January 1, 1991

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Oregon's Ocean Plan is the result of the vision, leadership, and support of Senator Bill Bradbury, who foresaw the need for Oregon to take affirmative action to protect its ocean resources.

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The Ocean Plan was prepared with the generous assistance of many individuals within state agencies, federal agencies, local governments, universities and the public at large. Their technical knowledge, insights, criticisms, and helpful suggestions are gratefully acknowledged.

A special "thank you" is directed to the many Oregon citizens who cared enough to come to workshops and meetings, voice opinions or share knowledge, and write letters of comment. The Ocean Plan is the better for their participation.

Funds for the preparation of the Ocean Plan were provided from the Oregon General Fund by the 1987 and 1989 Oregon Legislatures. Additional funds were provided by the U.S. Department of Commerce, National Oceanographic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resources Management (OCRM) through both a Section 306 Coastal Zone Management Grant and an Interagency Personnel Agreement.

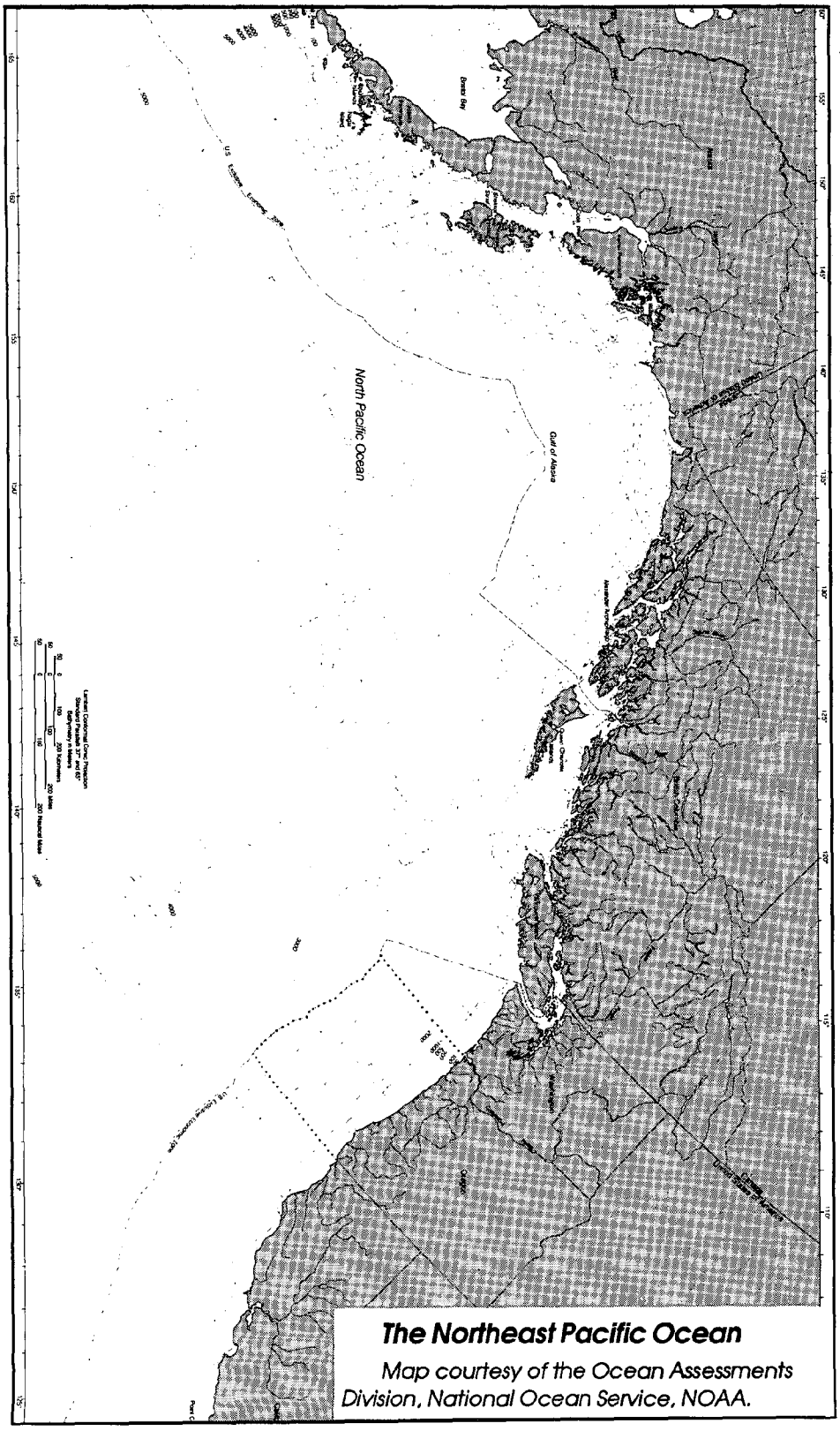
Oregon's Ocean Geographic Information System

Many of the maps in the Ocean Plan were produced by Oregon's State Service Center for Geographic Information Systems (GIS), which is located at the Oregon Department of Energy in Salem.

The mandate for this plan included provisions for the development of a computerized ocean information system. Over the last two years, the GIS Service Center has assisted other state agencies in the development of the ocean GIS. The ocean GIS is a part of the Ocean Plan. The Service Center built the data base using data provided by several sources. The plots in this document reflect only a portion of the database. As more data become available from state and federal agencies and academic institutions, they will be added to the system with the assistance of the service center.

Staff at the GIS Service Center who were instrumental in the development of the database and the plots include Scott Smith, John Sharrard, Richard Crucchiola, and Eric Gillett. The entire Ocean Task Force and staff extend a special thanks to the Service Center staff for their unflagging commitment to quality, accuracy, and service.

The GIS Service Center runs Arc/Info on Sun workstations to manage the data and develop the plots. Final plots are produced on an electrostatic plotter. For more information about the Service Center, write or call the State Service Center for GIS, Oregon Department of Energy, 625 Marion St. NE, Salem, OR 97310. (503) 378-4036



The Northeast Pacific Ocean

Map courtesy of the Ocean Assessments Division, National Ocean Service, NOAA.

Oregon's ocean is but a small part of the vast Pacific Ocean, which is larger than any other single feature on Earth. Our ocean constitutes only part of its edge, but it is the edges of such systems that are the most productive, the most used, and the most vulnerable to disruption from human activities.

This map of part of the northeast Pacific sets the stage for the Ocean Plan. The Plan establishes an area within which resource stewardship shall be the prime determinant of state ocean resource policies.

This map was developed by the Strategic Assessments Branch of NOAA's Office of Oceanography and Marine Assessment. The Branch was created to assess the effects of human activities on estuarine and coastal environments and on the resources of the U.S. Exclusive Economic Zone. The purpose of such assessments is to help balance the development and conservation of resources that affect the coastal environment.

The Oregon Coastal Program, of which the Ocean Program is a part, will be working closely with the Strategic Assessments Branch over the next few years both to exchange data and to enhance their respective capabilities for making data both useable and accessible when and where it is needed in the process of developing and carrying out natural resource policies.

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The Need for An Ocean Plan

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Driving Forces for Ocean Planning

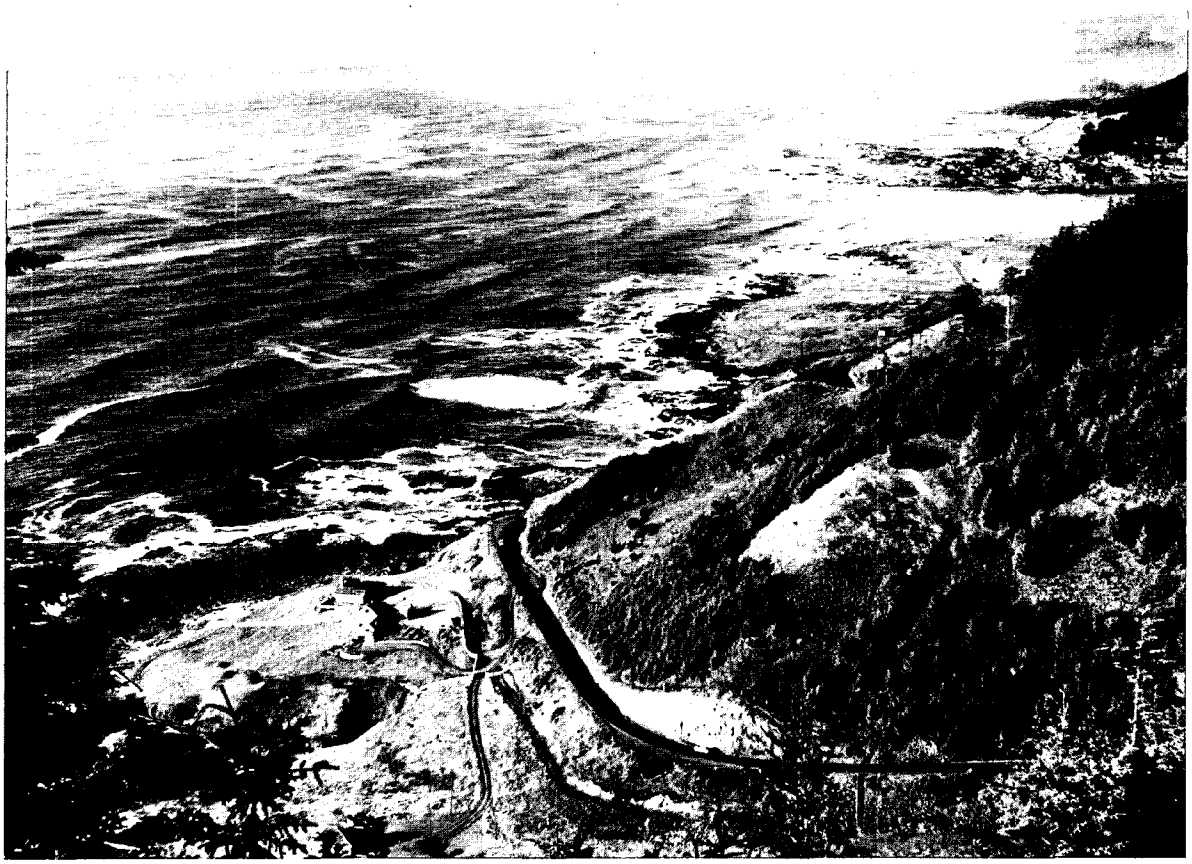
Two sets of forces sparked Oregon's ocean resource planning. First, the Oregon coast and Pacific Ocean are important to Oregonians. Commercial and recreational fisheries, transportation and navigation, clean air and water and recreation are all ocean uses upon which coastal communities rely for their livelihoods and way of life. Oregonians care deeply that the coastal environment be protected and traditional use of renewable resources be maintained. Oregon's state agencies and local governments have control over many of the uses and resources along the coast and within the state's three-mile territorial sea.

Second, national and international forces outside Oregon inject new demands for ocean and coastal resources into the present mix. Global political and economic forces, beyond the control of the state, affect the price and supply of oil, gas, and mineral resources and can generate interest in exploring Oregon's ocean for these resources. The Oregon coast is increasingly attractive as a recreation destination and retirement home for people from congested urban areas with deteriorating environmental conditions. Oregon's ocean fisheries are intertwined with global market demands and the industrialized nature of major international fishing fleets which can affect the marine food chain across vast stretches of ocean. These forces will bring change to Oregon's ocean and shoreline, regardless of how well the state is prepared.

Overarching both these sets of forces is the growing public concern about the quality of the marine environment. There are increasing demands for national and coastal state governments to step up efforts to protect human health, conserve ocean resources and preserve environmental quality. Coastal states, responding to public concerns, are initiating ocean resources management programs to ensure that state and local interests in ocean resources are protected.

Oregon is now faced with the responsibility of managing a range of ocean uses in its territorial sea and coordinating with federal agencies for management beyond. Until now, such

uses either coexisted without conflict or conflicts were managed on a case-by-case basis. Balancing the demands created by new uses will demand an adaptive, equitable management program that is based on clear policies and uses an open process involving all interested parties.



The Pacific Ocean challenges the coast north of Cape Perpetua. The town of Yachats lies in the middle distance. (ODOT photo)

Legislative Action for Ocean Planning

The 1987 Oregon Legislature, through Senate Bill 630, the Oregon Ocean Resources Management Act, created the Oregon Ocean Resources Management Program. The purpose of the program is to plan for the coordinated, comprehensive management of ocean uses and resources off the Oregon coast. The law links together state agency programs, federal programs, local government interests, and public concerns into a coordinated planning and management program. The Act established the Oregon Ocean Resources Management Task Force, and charged it with the assignment of developing an Oregon Ocean Resources Management Plan. The plan was presented to the Oregon Legislature on June 1, 1990, and adopted by the Land Conservation and Development Commission by August 1, 1990, as part of Oregon's Coastal Management Program.

The Act addresses more than an Ocean Plan. It is a statement of Legislative concern that the resources of the Pacific Ocean are important to Oregon and that the state must be prepared to properly respond to increased and new uses of ocean resources. The legislature found that while many state agencies have responsibilities for different resources or uses, there was no policy framework for coordinated, consistent state policy. Likewise, the Legislature determined that federal law and the new U.S. Exclusive Economic Zone provided the state with the opportunity and responsibility to assert the state's interests as a partner with federal agencies in managing ocean resources within 200 miles of the coast.

Legislative Policies

The Legislature provided a policy framework to guide the ocean planning work. The primary policy builds on the foundation of Statewide Planning Goal 19, *Ocean Resources*, and asserts that Oregon will

> *. . . conserve the long-term values, benefits, and natural resources of the ocean both within the state and beyond by giving clear priority to the proper management and protection of renewable resources over non-renewable resources.*

Other policies of the legislature are to

Encourage ocean resources development which is environmentally sound and economically beneficial;

Provide for efficient and coordinated ocean resources management through improvement of the state's coastal management program and state-wide land use program;

Assert the interests of this state as a partner with federal agencies in the sound management of the ocean resources within the United States Exclusive Economic Zone and the continental shelf;

Promote research, study and understanding of ocean processes, marine life and other ocean resources to acquire the scientific inventory information necessary to understand the impacts and relationship of ocean development activities to ocean and coastal resources;

Encourage research and development of new innovative marine technologies for exploration and utilization of ocean resources.

Ocean Program

To implement these policies, the Legislature established a four-part Ocean Resources Management Program to "provide for efficient and coordinated ocean resources management through improvement of the state's coastal management program and state-wide land use program." The Ocean Program includes:

- Those parts of the existing federally approved Oregon Coastal Management Program which pertain to ocean and coastal resource conservation and development, including local government comprehensive plans. Especially important are the estuary management plans and coastal shorelands planning and zoning measures adopted by coastal counties and cities.
- The Ocean Task Force and any successor. This broad interagency process is crucial to addressing complex ocean management issues. The Ocean Plan proposes an Ocean Policy Advisory Council to succeed the Task Force.
- The Ocean Resources Management Plan and future refinements such as the plan for Oregon's Territorial Sea outlined in the Ocean Plan.
- State agency programs for regulation of ocean uses and activities.

The Ocean Resource Management Plan and the other parts of the Ocean Program provide Oregon with a policy framework and a process to draw together the various participants needed to focus on ocean resource issues. Oregon will also have an open, cooperative process involving the public and ocean users to resolve ocean policy issues. As part of the Oregon Coastal Management Program, the Ocean Plan will guide state response to and participation with federal agency action regarding ocean resources.

The Task Force

The Oregon Ocean Resources Management Task Force membership was established by the Legislature to include the many state agencies, local government, groups, and interested parties in ocean issues. The members of the Task Force are listed in the front of this Ocean Plan document. A large and diverse Technical and Scientific Advisory Committee provided advice, information and feedback. In addition, the Task Force was charged with involving the public and coordinating with affected federal agencies and adjacent states. The Legislature was concerned that the Ocean Plan be prepared in a wide open, public process.

Ocean Plan Requirements

The Ocean Plan is required to have four major elements:

1. An analysis of state and federal laws, programs, and regulations affecting ocean resources within the planning area, including gaps, overlaps, and conflicts.

This analysis is in three parts: 1) the *Territorial Sea Management Study*, completed in 1987 for the Department of Land Conservation and Development by James Good, Oregon State University Extension/Sea Grant program and

Richard Hildreth, University of Oregon Ocean and Coastal Law Center; 2) Appendix, *Interim Report of the Ocean Resources Management Task Force*, 1988; and 3) an *Analysis of State Laws and Agency Responsibilities* (included in the Executive Summary of this Ocean Plan).

2. A study of present and future ocean uses off Oregon and an analysis of the state's management regime for these uses.

A description and analysis of uses and activities in the ocean off Oregon are included throughout the Ocean Plan. Some potential uses are listed as issues for future study in the Governance section, Territorial Sea Plan subsection of this plan.

3. Maps and other information in computer format about ocean conditions, uses, and resources to provide a basis for plan decisions.

A comprehensive computerized geographic database has been developed at the Oregon Department of Energy, Geographic Information System Service Center. The Department of Land Conservation and Development has coordinated with a variety of state, federal and academic agencies to acquire and develop this database. This Ocean Plan document contains some maps and other graphic products from the GIS. Improvements and additions to the database and computer system are continuing. The goal is to develop a dynamic, accessible information system available to all who need its information.

4. Recommendations to develop or improve state agency programs for managing ocean resources, with emphasis on oil and gas and related activities, oil spill response, marine minerals, marine water quality, air quality, environmental studies and research, and a permanent management structure and process to keep the plan up to date.

These recommendations are found throughout this Ocean Plan and form the policy and action framework for Oregon's ocean program.

The Impact of the Ocean Plan on State Agencies

The Legislature clearly intended the Ocean Plan to be the coordination framework for Oregon state agencies and their programs for ocean resources. Two separate provisions of the 1987 Act strongly suggest that state agencies are obligated to act in a manner consistent with the Plan.

The Oregon Attorney General's Office has provided an analysis of the impact of the Plan on state agencies. That analysis concludes that 1) state agencies may not act inconsistent with the plan but 2) agencies are not obligated "to elevate priorities identified in the plan over other statutorily or constiutionally mandated responsibilities." Thus, when state agencies take action regarding ocean resources, they must do so consistent with the plan. However, agencies are not compelled to change programs to meet the many recommended actions contained in the program.

The Impact of the Ocean Plan on Federal Agencies

Congressional action in late October, 1990, may profoundly affect the way in which Oregon's Ocean Program guides federal activities both in the state's territorial sea and in federal ocean waters from 3 to 200 miles. The federal Coastal Zone Management Act Reauthorization Amendments of 1990 overturns a 1984 Supreme Court decision in *Secretary of the Interior v. California* in which the Supreme Court held that federal OCS oil and gas lease sales had no affect on a state's coastal zone and hence were not required to be "consistent" with policies and regulations in the state's coastal program.

The new law clarifies that all federal agency activities, whether in or outside of a state's coastal zone (including the three mile ter-

ritorial sea), are subject to the "consistency" requirements of section 307 (c)(1) of the federal Coastal Zone Management Act if they affect natural resources, land uses, or water uses in the coastal zone. "Affecting" activities mean direct immediate impacts, cumulative impacts and reasonably foreseeable indirect effects that occur later and away from the action. No federal activities are categorically excluded.

To achieve the full benefits of this expanded state authority, Oregon will need "enforceable" policies within the Oregon Coastal Management Program pertaining to protection of ocean resources. Enforceable policies include constitutional provisions, court decisions, statutes, regulations, administrative rules, acknowledged land use plans and implementing ordinances.

The Oregon Ocean Resources Management Act and this Plan establish the policy framework for enacting enforceable policies. The new federal law is a strong incentive for the state to prepare a plan for Oregon's territorial sea which provides the needed procedural clarification and regulatory detail to assure policy enforceability. With enforceable plan policies officially incorporated into Oregon's coastal management program, state agencies and local governments will have a powerful tool to hold federal agencies accountable to the standards of Oregon's ocean management program.

Citizen Involvement

The Ocean Plan was developed with substantial citizen involvement in all phases of the planning process as required by the 1987 Act. All meetings of the Task Force were widely publicized through direct notice by mail, articles in newspapers, radio and television announcements and posters. Citizens attended all Task Force meetings. Each Task Force meeting included designated "open mike" opportunities for public comment which were well used. In addition, citizens were often able to interact directly with the Task Force during discussions. Citizens attended and participated freely during three Task Force two-day workshops held in January 1988, January 1989, and February 1990.

In fall 1988, eight public workshops were held. Five were in the coastal cities of Brookings, Coos Bay, Florence, Newport, and Cannon Beach and three in the inland cities of Portland, Eugene, and Medford. A total of over 200 people attended. Several issues and concerns raised at these workshops were subsequently discussed by the Task Force and policies were developed and included in the plan.

In November 1989, workshops were held in Gold Beach, Newport and Astoria with fishermen and four general public workshops were held in Gold Beach, North Bend, Newport and Cannon Beach to discuss the first draft plan. 800 copies of the draft were distributed and over 300 people attended.

Information about the plan and other ocean issues was provided via *Oregon Ocean*, a newsletter. A mailing list was established and new names were continually added from those who attended meetings and workshops. A total of ten newsletters were prepared and mailed to over 1200 recipients. Issue papers were announced and made available upon request.

Copies of both draft plans were widely disseminated in person and by mail. 800 first draft plans were distributed in October 1989, and 1300 final draft plans were distributed in May 1990. In addition to many comments voiced at the fall 1988, November 1989, and May 1990 hearings and workshops, more than sixty letters were received commenting on the first draft ocean plan and thirty letters were received on the final draft. The Task Force made substantial revisions to the first draft plan as a result of these fall 1989 workshops. Some minor amendments were made after the May 1990 hearings.

Local Government Coordination

The 1987 Act recognizes the fundamental role of Oregon's coastal local governments in regulating shoreline land uses which could affect ocean resources. The Ocean Plan is required to be compatible with acknowledged comprehensive plans of adjacent coastal counties. The Task Force was required to work with the Oregon Coastal Zone Management Association, Inc. to make sure that local governments were involved in the ocean planning process.

Coastal local governments were well represented during development of the Ocean Plan. A coastal county commissioner and the Director of the Oregon Coastal Zone Management Association were members of the Task Force. In addition, representatives from coastal cities, counties, and port districts provided comment and advice during preparation and review of plan elements.

The Plan reaffirms that coastal local governments have important regulatory responsibilities for land uses and activities along the ocean shoreline and can take affirmative action to protect ocean resources. In the past, most local governments have simply not regarded ocean resources as part of traditional land use considerations. The Plan contains a listing of ocean resource topics which local plans could address as well as recommendations that coastal cities and counties review their plans and ordinances and amend, as necessary, to protect ocean shoreline resources or regulate onshore development resulting from the use of ocean resources. Five other plan recommendations call for strengthening local government's participation in ongoing ocean planning and decision making.

Federal Agency Involvement

The 1987 Act recognized the major role of the federal government in managing a variety of ocean resources. The Legislature called for close coordination with federal agencies during development of the Ocean Plan. Several federal agencies participated in Task Force workshops and meetings, provided information for the ocean resources GIS or commented on staff papers and draft plan elements. These agencies included:

- Department of the Interior

  U.S. Fish and Wildlife Service/Oregon Islands and Three Arch Rocks National Wildlife Refuges

  U.S. Fish and Wildlife Service/Ecological Services Branch

  Minerals Management Service/Pacific OCS Region

  Minerals Management Service/Office of Strategic and International Minerals
- Department of Commerce

  National Oceanic and Atmospheric Administration

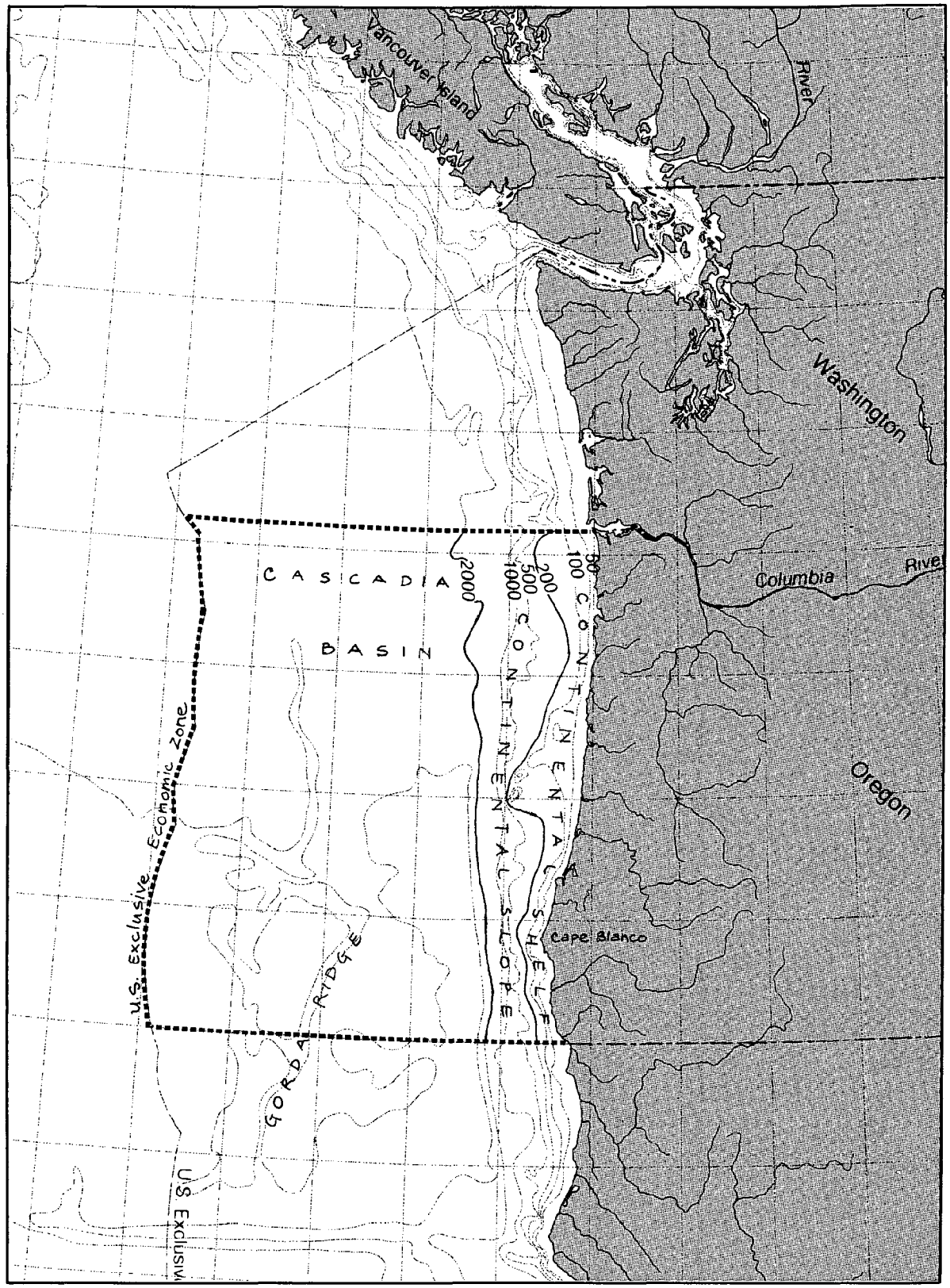
  National Marine Fisheries Service/Habitat Conservation Branch

  National Marine Fisheries Service/ Resource Assessments and Conservation Branch

  National Ocean Service/Office of Oceanography and Marine Assessments

  National Ocean Service/Office of Ocean and Coastal Resources Management
- Environmental Protection Agency/Region 10
- Department of Defense

  U.S. Army Corps of Engineers/Portland District



Oregon's Ocean Planning Area

Jurisdictions at Sea

Management of ocean resources and uses is fragmented and complex. Numerous state and federal agencies have authority or jurisdiction over resources and uses, depending on location or the kind of resource or use. The political and administrative boundaries limiting these authorities are not related to the fluid, dynamic nature of the ocean or its resources. Activities and uses under federal jurisdiction, for instance, may affect resources or uses under state jurisdiction. State programs may affect resources under federal jurisdiction.

One of the principal objectives of the Oregon Legislature was to coordinate these authorities and develop a comprehensive framework for coordinated management among all agencies. The process of developing the Ocean Plan produced more than just a plan; a variety of local, state and federal agencies began to work together to address resource management needs. This communication and coordination has set the stage for Oregon's ongoing ocean management program.

The Oregon ocean planning area

As a first step in ocean resources planning, Oregon defined an ocean planning area from the border with Washington on the north to the California border on the south and westward from the shoreline to the boundary of the United States Exclusive Economic Zone (EEZ) 200 miles at sea.

Three geographic regions fall within this ocean planning area:

- The coastline, including intertidal areas and nearshore rocks and islands;
- The continental margin, including the continental shelf and continental slope; and
- The deep ocean beyond the continental margin, including several features such as the Cascadia Basin, Gorda Ridge and Blanco Fracture Zone.

Coastal watersheds and estuaries were not included in the ocean planning area because these areas, although interconnected with

oceanic ecosystems, are managed through local land use and estuarine plans.

The general oceanographic characteristics of the Oregon Ocean Planning Area have been described in detail in *The Oregon Ocean Book* published by the Department of Land Conservation and Development (DLCD) in 1985. *The Oregon Estuary Plan Book*, published in 1987 by DLCD, contains a full explanation of Oregon's estuarine habitats and how they are managed.

The Exclusive Economic Zone

In 1983, the United States asserted jurisdiction over the resources and uses of the ocean within 200 miles of its coastline, an area known as the U.S. Exclusive Economic Zone (EEZ). Coastal states have primary jurisdiction and control of the first three miles and the federal government has jurisdiction over and controls the remaining 197 miles of the EEZ.

Within the EEZ, the U.S. claims authority to control the exploration, conservation, and management of all natural resources, both living and nonliving, of the seabed, subsoil and overlying waters. The management of natural resources within the EEZ is primarily a domestic, not international, responsibility.

The 200 mile EEZ also coincides with the fishery conservation zone designated by the Magnuson Fisheries Conservation Act of 1976. Within this 200 mile-wide area, regional fisheries councils regulate foreign and some domestic fisheries (see Ocean Fisheries).

The Federal Outer Continental Shelf

Since 1953, the U.S. Department of the Interior has administered the Outer Continental Shelf Lands Act (OCSLA) and has had jurisdiction over the seabed resources of the Outer Continental Shelf (OCS). This OCS area extends from the boundary with the state's three mile territorial sea (see below) seaward an indefinite distance to a depth of water which permits exploitation of resources such as oil and gas. For years this area was roughly defined by a depth of 600 feet, the edge of the geographic continental shelf. However, the Department of the Interior has asserted that the seaward limit of the OCS is now coincident with the U.S. EEZ. It is in this area that the Department of the Interior has pursued oil and gas leases under the OCSLA.

The State's Territorial Sea

The 1953 federal Submerged Lands Act established coastal states' ownership of the sea bottom within three miles of their coastlines. Within this three mile strip, called the territorial sea, coastal states have the power to manage, administer, lease, develop and use the land and natural resources of the ocean. The federal government retains considerable authority in the territorial sea in matters of navigation, interstate commerce, national defense, and international affairs. For example, within the three miles the U.S. Coast Guard has sole authority to establish vessel traffic lanes, the Environmental Protection Agency can designate ocean dumping sites,the Corps of Engineers can dispose of dredged material subject to relevant federal acts, and the military can conduct necessary defense exercises.

In 1988, a Presidential Proclamation extended the territorial sea to twelve miles for international matters, but stated that domestic laws were not to be affected by the extension. Many questions remain regarding the impact and full meaning of the Presidential Proclamation.

Oregon County Boundaries

The boundaries of Oregon's coastal counties extend seaward three miles to the western boundary of the state. However, the Oregon ocean planning law (ORS 196) requires that planning for ocean resources and for submerged and submersible lands of the territorial

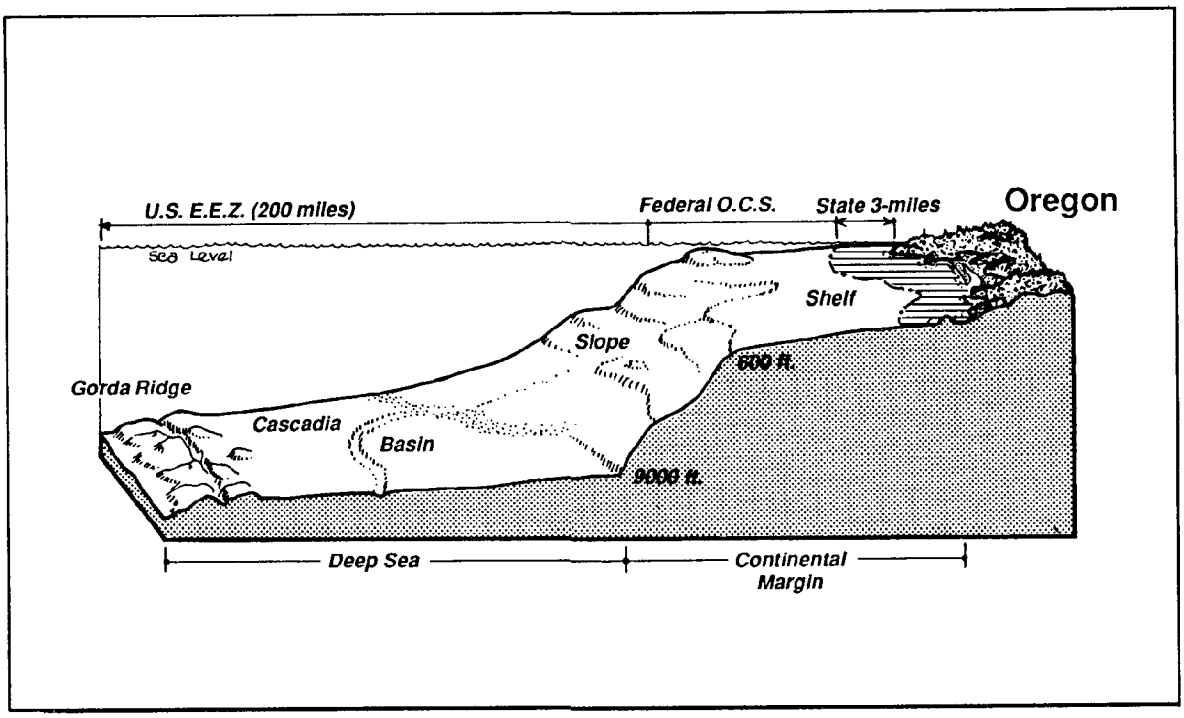
sea be carried out under the Oregon Ocean Resources Management Plan.

Oregon Ocean Stewardship Area.

The Oregon Ocean Resources Management Plan designates an Ocean Stewardship Area as the ecologically sensible area for coordinated, comphrehensive management of ocean resources of direct concern or responsiblity of the State of Oregon. The Ocean Stewardship Area includes the entire continental margin from mean high water along the coast across the continental shelf and down to the bottom of the continental slope.

Oregon does not claim ownership or posession of the entire area. Designation of the area will change neither the jurisdictional boundaries of the state nor the federal legal regimes under which the resources of the U.S. Exclusive Economic Zone are managed. Rather, Oregon believes that by designating an Ocean Stewardship Area, the state is advancing the principles of ecologically sound ocean resources management.

The Oregon Ocean Stewardship Area and the accompanying principles of conservation and habitat protection are discussed more fully in the next section.



Cross-section of Oregon's offshore area (not to scale)

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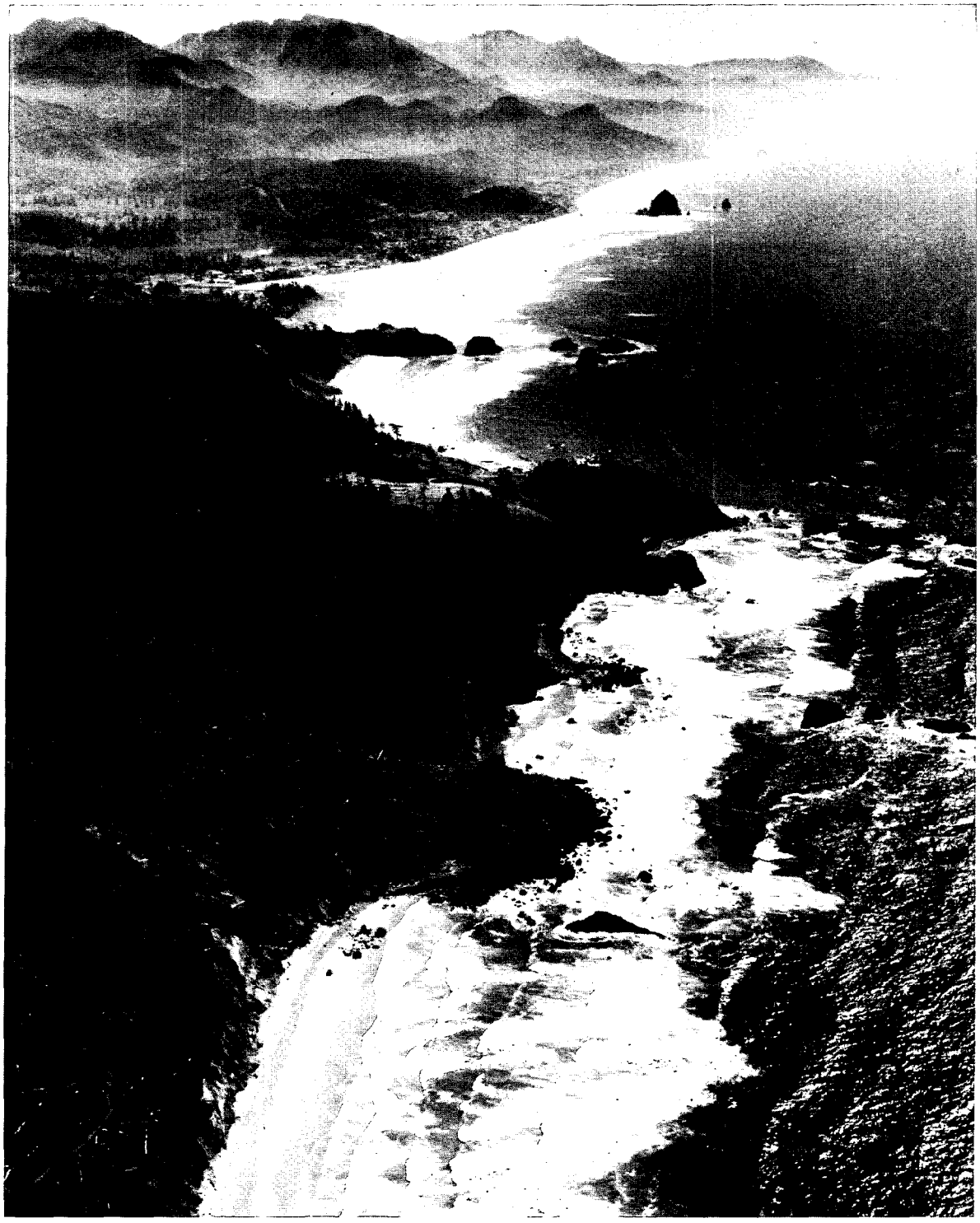


Rugged coastal mountains plunge to the sea at Ecola State Park, in the foreground, and loom just inland of the town of Cannon Beach and Haystack Rock, in the distance. (ODOT photo, 1968)

The Ocean Environment

The Continental Margin
Oregon's Marine Communities

Oregon's ocean resources planning is set in the context of global ocean conditions and dynamics. The huge scale of ocean currents, particularly the North Pacific and Alaska gyres, connect vast oceanic and coastal areas into an interconnected, dynamic system.

In the search for a smaller, but still ecologically meaningful scale, oceanographers identify an area offshore from Cape Mendocino in northern California to Vancouver Island that shares similar species composition and oceanographic conditions. This system, called the northern California Current ecosystem, may be an appropriate unit for future regional planning and management.

For now, Oregon must focus its attention on an even smaller area which makes ecological, practical, and political sense for the state. Oregon's Ocean Plan highlights the entire continental margin off the coast of Oregon as Oregon's area of concern for ocean resources management.

In many places along the Oregon coast, the forest is anchored in sandy sediments previously deposited on the ancient seafloor, then compacted and upliftedby the collision of continents. At the ocean's edge this sandstone gives way first to rocky rubble, then sand, and is returned to the sea. (Oregon Sea Grant photo)

Oregon Offshore Sediment Types

10 0 10 20 30 MILES

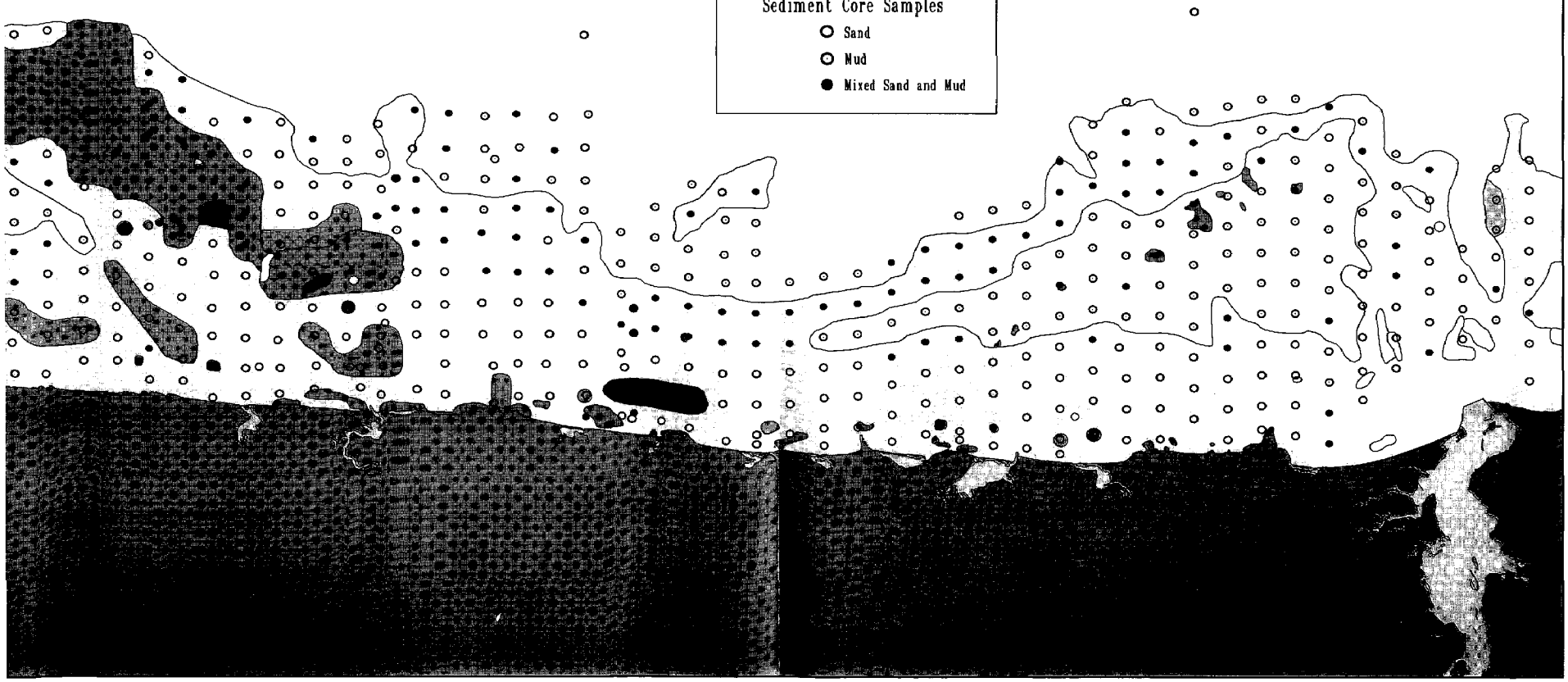
LEGEND

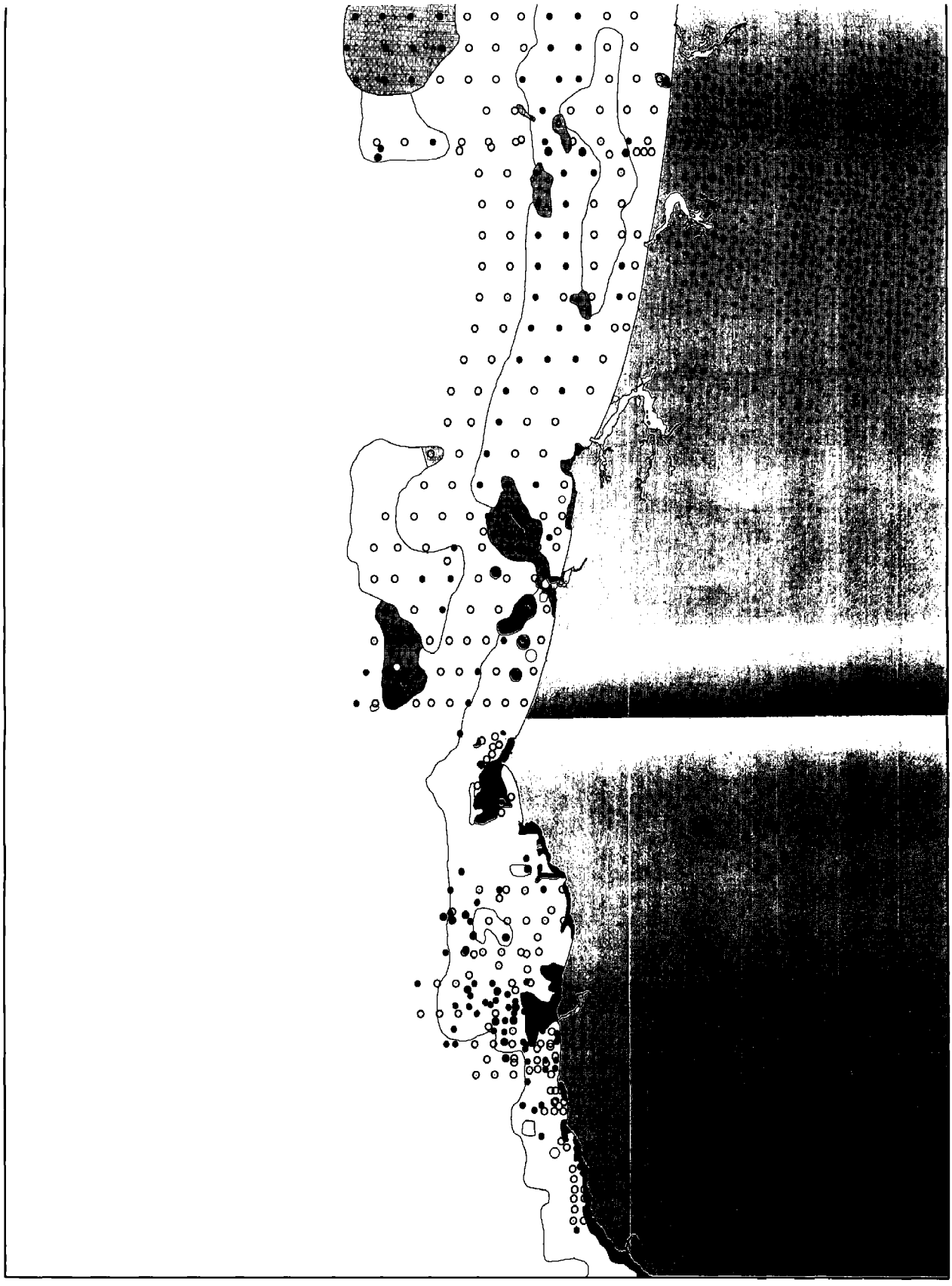
Generalized Sediment Types

- Mud
- Fine Sand
- Medium Sand
- Coarse Sand
- Shell
- Gravel
- Bedrock

Oregon State University Sediment Core Samples

- Sand
- Mud
- Mixed Sand and Mud





The Continental Margin

Analysis of the physical and biological features of the Ocean Planning Area further focuses Oregon's ocean resources management setting on the continental margin for the following reasons:

- The continental margin is defined clearly by physical features.
- The continental margin supports distinct marine biological communities.
- The majority of human uses of ocean resources off the Oregon coast occur on the continental margin.
- Events which occur on the continental margin can directly affect the interests of the state of Oregon.

Physical Features of the Continental Margin

Topography

The continental margin is where the rocks of the continent meet the ocean floor. The major structural features of the continental margin are the continental shelf and the continental slope.

Oregon's continental shelf is a relatively flat, gently sloping terrace. The shelf is narrowest (10 miles) near Cape Blanco and widest (46 miles) off Florence and the central coast. The depth of the shelf at its outer edge where it merges with the steeper continental slope varies from about 450 to 550 feet (about 145 to 185 meters). The shelf is not entirely flat.

The map on the previous page shows the distribution of sediment types off Oregon, and the location and sediment composition of samples taken from the ocean floor over the past several decades.

Source: USGS and OSU

Prominent submarine banks occur near the outer edge of the shelf. The four major banks are the Nehalem, Stonewall, Heceta, and Coquille. Submerged rocky outcrops are also found on the inner shelf, especially between Coos Bay and the Rogue River. Sea stacks and rocky islands thrust above the sea surface close to shore.

Oregon's continental slope is a narrow strip, from 12 miles wide at Cape Blanco to 60 miles wide off the Columbia River. From the outer edge of the continental shelf, the slope plunges to the deep sea bed about 1 1/2 miles below the surface. Gently sloping benches, low relief hills, and a few steep escarpments are found on the upper part of the slope.

Two prominent submarine canyons and numerous smaller submarine valleys breach the outer edge of the continental shelf and the upper slope. The Astoria Canyon cuts deeply into the outer shelf about 10 miles west of the Columbia River. The much smaller Rogue Canyon begins near the edge of the shelf offshore of the Rogue River. These submarine canyons and a number of smaller valleys are important avenues for moving sediment across the shelf and down to the deep ocean floor.

Bottom Sediments

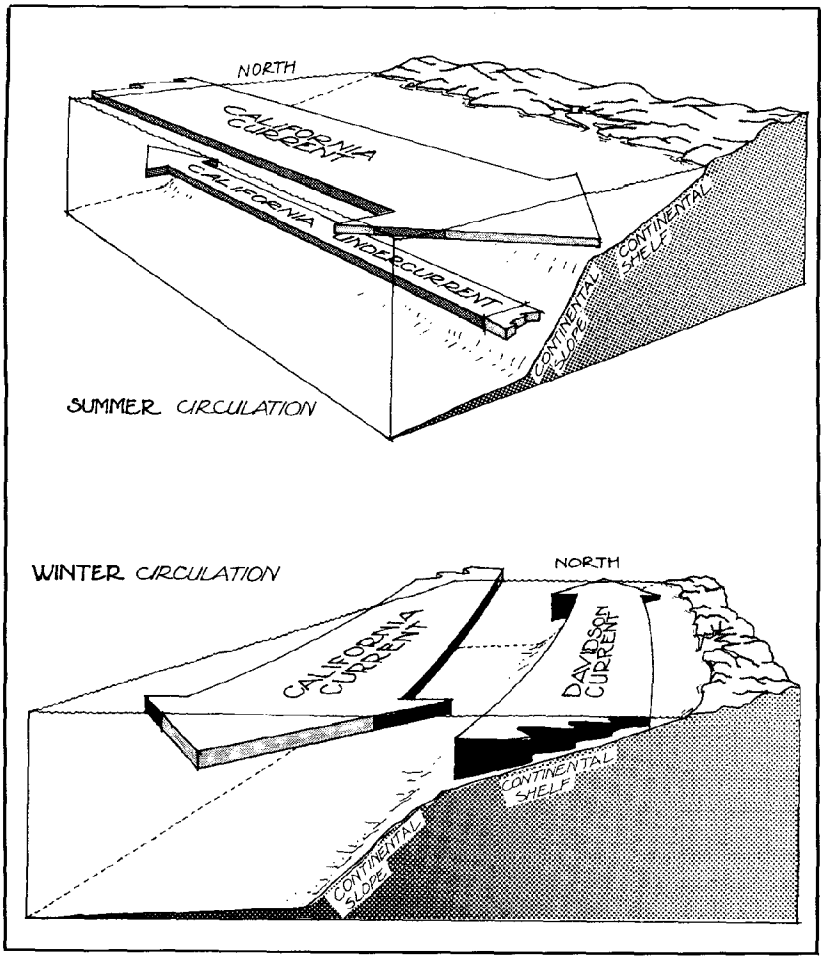
Sand and mud cover most of the continental margin. The movement and deposition of these sediments over the continental margin is controlled by river discharge; estuarine circulation patterns which can trap some of the sediment; coastal erosion; wave characteristics; ocean currents; density differences in the oceanic water column; benthic organisms burrowing in the sediment; and ocean dumping of material dredged from coastal harbors. In the winter, storms can stir the bottom sediments across all of the continental shelf.

Ocean Currents

The movement of water over the continental margin off the Oregon coast is driven by the major Pacific Ocean currents. Local winds and weather create daily, seasonal, and yearly variations in the general circulation patterns.

The North Pacific Current crosses the expanse of the Pacific Ocean from Japan to Canada where it encounters the continental margin near Vancouver Island. The North Pacific Current then splits into a northward flowing current carrying water into the Gulf of Alaska and a southward flowing current carrying water along the coast from Washington to California.

The broad, shallow surface current which flows southward along the Oregon coast is called the California Current. During the summer, the California Current moves southward offshore of the continental margin at speeds of about 2.5 to 5 miles per day. During periods of strong northwest winds, this current may double its speed. A narrow, fast undercurrent moves north ward deep below the surface along the continental slope at depths greater than 600 feet (200 meters). During the winter, the faster (6 to 12 miles per day) Davidson current flows northward at all depths over the continental margin pushing the California current further offshore.

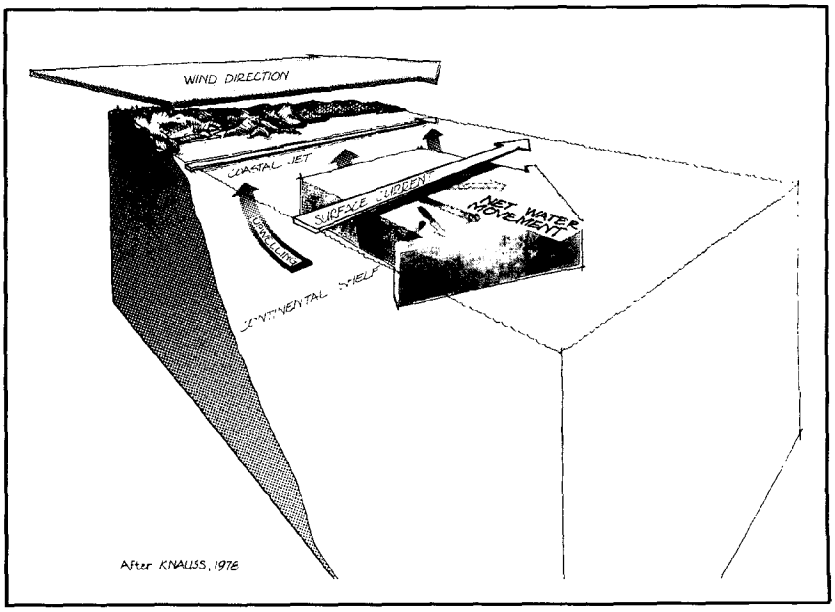


Seasonal ocean currents

Although there are general seasonal patterns in surface currents, the high variability in winds off the Oregon coast results in a great deal of variability in these currents. Current fluctuations are the strongest near the shore and can change quickly and almost simultaneously over long stretches of the coast and throughout the entire water column over the shelf. These fluctuations in current patterns are nearly impossible to predict.

• The Columbia River Plume

The Columbia River also greatly influences ocean currents across the continental margin. The fresh river water mixes slowly with ocean surface waters and forms a large dilute lens or "plume" which extends southwesterly from Astoria. A strong, narrow current flows along the boundary between the lighter river water and the denser ocean water. On the inshore side of the plume, this current often enhances and strengthens the coastal jet. Changes in the winds will move this current either closer or



Offshore water transport and upwelling

further away from the coast. South winds move this current offshore, while north winds move it closer to shore.

- ***Summer Currents and Upwelling***

Summer is the season of upwelling, although upwelling can occur in any season if conditions are right. In the summer, winds are primarily from the north. Due to the earth's rotation and the topography of the continental shelf and shore, surface waters move west away from the shore. This offshore movement causes deep, cold, nutrient-rich waters to rise to the surface. This process is called *upwelling*. Although the most active upwelling is restricted to a narrow band approximately 6 to 15 miles from shore, the upwelling has a great influence on currents over the entire continental shelf.

Differences in the densities between the relatively heavy upwelled water and the lighter surface water set up a fast southward flowing current called a coastal jet. The core of the coastal jet is often as close as 10 to 20 miles from shore and can travel at speeds of 20 to 35 miles per day.

- ***Winter Currents***

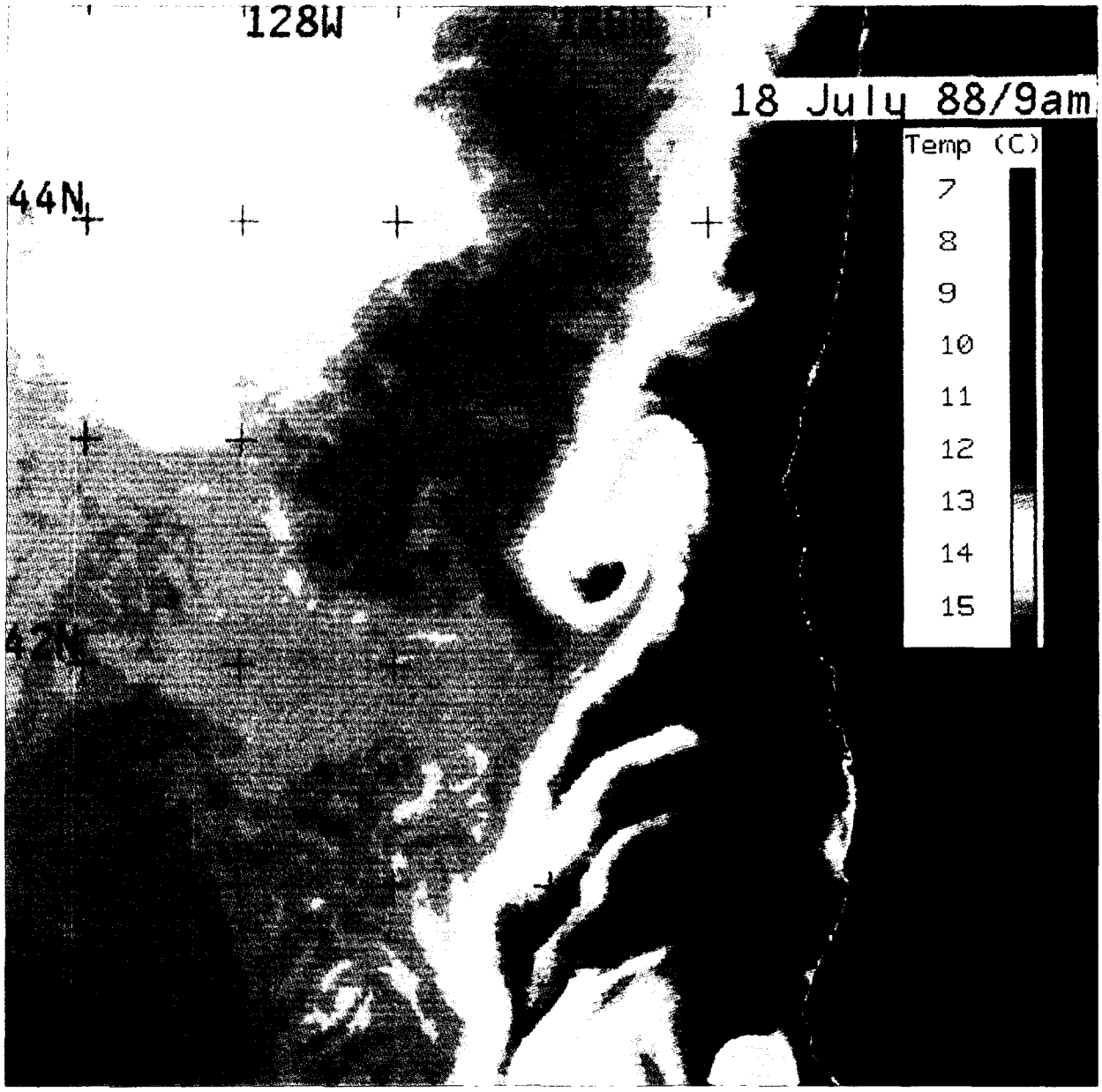
In the winter, winds are predominantly from the southwest. Surface waters across the continental margin move toward the shore during the winter. High runoff from coastal streams and the Columbia River dumps a lot of light fresh water along the coast during the winter. This sets up a northward flowing current along the coast which can reach very high speeds (1 1/2 to 2 miles per hour), especially during strong winter storms. Changing winds often interrupt the general winter current pattern and can move surface waters offshore and trigger coastal upwelling which can last for days or weeks.

- ***Deep Water and Bottom Currents***

Deep water and bottom currents are poorly understood. In the summer, a deep counter current flows northward under the southward flowing surface current. This deep countercurrent is strongest along the shelf break and upper slope. The deep currents also vary with local topography. For example, eddies are common near the banks and the heads of submarine canyons.

- ***Vulnerability to Spills and Contaminants***

The fast speeds, multiple directions, high variability and unpredictability of the currents over the continental margin make the entire continental shelf vulnerable to adverse effects from oil spills and other pollutants. An oil spill can move up or down the entire Oregon coast in the matter of a few weeks, and could come ashore from a spill anywhere over the continental margin in just a few days.



Satellite images reveal that ocean currents flowing near the coastline are as complex and dynamic as those of a mountain stream. Special cameras record the temperature of the ocean's surface waters, and the resulting images show ocean features that are both invisible to the naked eye and nearly impossible to measure using traditional sampling and measuring techniques. Scientists use such images to study how coastal promontories, like Cape Blanco and Cape Mendocino, and submarine features like Heceta Banks affect ocean currents.

This image covers the ocean and coast from Yaquina Bay, Oregon, to Cape Mendocino in California. It was taken in July, when strong northwest winds drive warmer surface waters (red areas) out to sea, thus allowing cold nutrient-rich waters (blue areas) to rise to the surface close to shore. The upwelling colder waters are pulled into complicated eddies and plumes by the warmer southward-flowing California Current.

Fishermen also use satellite imagery to target fish catch, since many fish species congregate near the boundaries between cold and warm waters. (NOAA photo courtesy of Ted Strub, OSU)

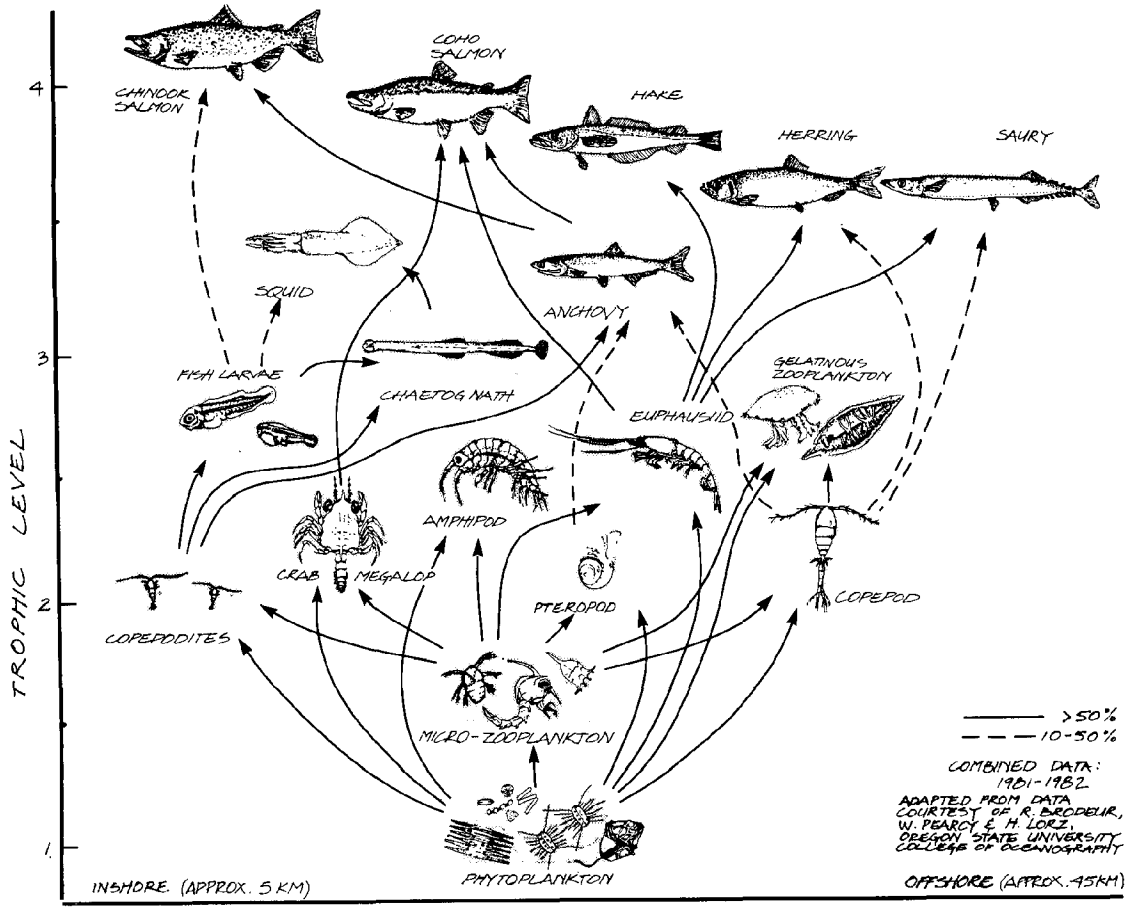
Oregon's Marine Communities

High Biological Productivity

Oregon's continental margin is extremely rich and productive. The coastal upwelling brings cool, nutrient rich waters to the surface over the entire continental margin and stimulates plant growth. Phytoplankton, the microscopic plants of the ocean, thrive in the upwelled water. Primary production in the waters of the continental margin can be more than double the primary productivity of the open ocean. (Primary productivity is a biological measurement of the size of plant populations and the amount of food produced by these plants.) The seasonal occurrence of upwelling and pulses in upwelling events result in seasonal peaks in primary production and in plankton "blooms" throughout the spring and summer.

During the summer the areas of maximum primary productivity are about 15 to 20 miles from shore. Sometimes the areas of highest productivity are concentrated very close to the shore. However, at other times, especially during periods of strong upwelling, these areas of high productivity are spread out across the shelf. Additionally, a lot of primary production occurs in the surf zone.

The large phytoplankton populations support large populations of microscopic animals called zooplankton, primarily copepods,



Typical marine food web off the Oregon coast

euphausiids, and larvae of fish and shellfish. The zooplankton are food for large populations of fish, birds, and mammals. The waters over the continental margin off Oregon are extremely rich and productive, as evidenced at least in part by the large fisheries industry dependent on these waters.

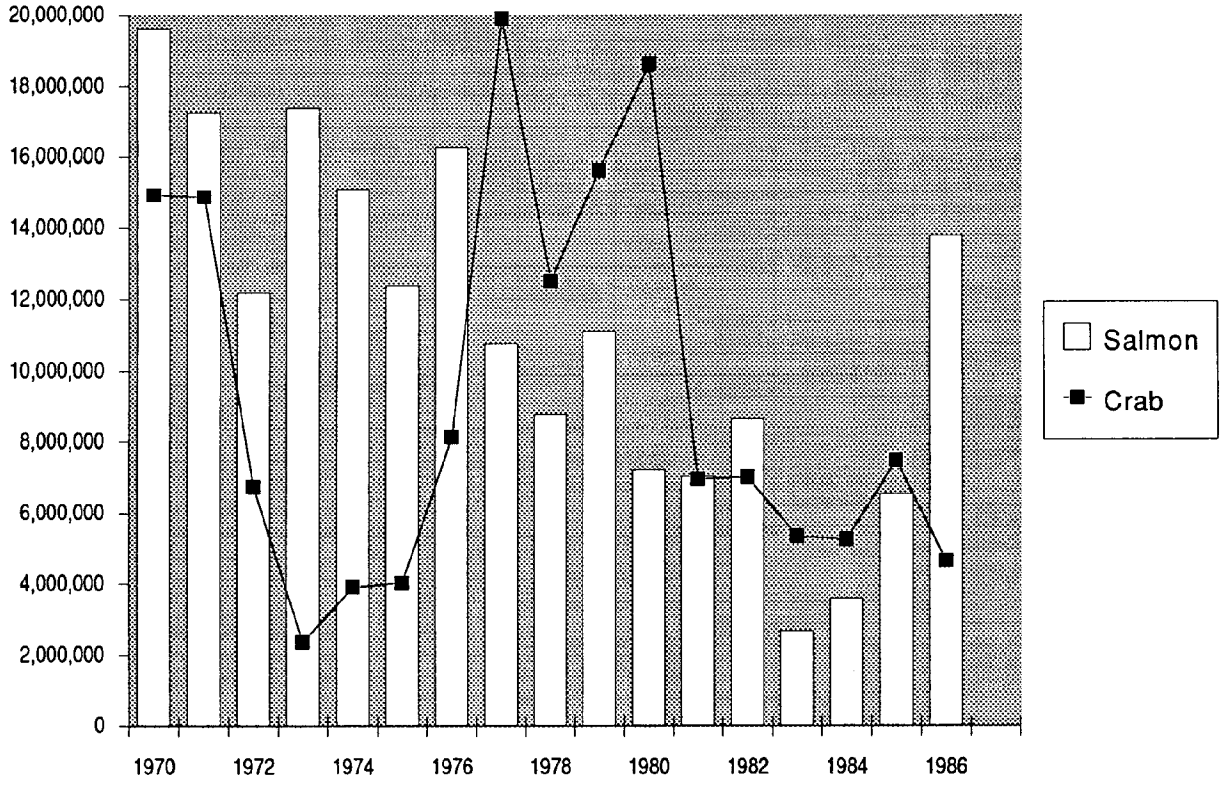
An Ecotone - The Mixing of Several Biological Communities

The waters of Oregon's continental margin are biologically important for other reasons too. This habitat forms what ecologists call an ecotone, a boundary area where different biological provinces overlap. In an ecotone, members of different communities are mixed together. The species found off Oregon are representative not only of a native community, but also of subarctic communities which are at the southern edge of their distribution and Californian communities which are at the northern edge of their distribution.

Populations of animals at the edge of their ranges tend to be smaller, more variable annually, and more sensitive to environmental changes than populations in the center or optimum part of their range.

Coho salmon off Oregon are an example of a species in an ecotone and at the edge of its range. In North America, coho salmon are found only in the cold, productive waters of the subarctic region. Abundance of coho is maximum at the center of its geographic range (i.e., offshore from British Columbia) and declines with changes in latitude towards the edges of its distribution. Average annual coho commercial catch data over the past 60 years demonstrate this distribution pattern. From year to year, the relative strengths of currents flowing

Commercial Salmon and Crab Landings, 1970 - 1986
in pounds round weight



History of two fisheries shows wide annual variability

into the area off the Oregon coast from the northern subarctic and from the southern subtropical regions vary greatly. The environmental variability in water temperature and nutrient supply results in variability in biological productivity and in species composition of populations of zooplankton and fish. Migration routes of adult salmon and distribution patterns of the zooplankton on which they feed will also vary from year to year. And, offshore Oregon the average size of mature fish, fecundity, and survival of adult coho is generally less than in the middle of their range where such environmental fluctuations are not as likely.

Highly Variable and Highly Vulnerable Communities

One of the most characteristic and unique qualities of biological communities of the continental margin off Oregon is the extreme variability, both seasonally and yearly in planktonic and larval species and in fish stock. This high variability results in a high vulnerability to long-term, widespread, and adverse effects from human activities.

Rich Fish Populations

The productive continental margin supports large and diverse populations of fish, all of which are food to or feed on other creatures of the sea in a vast and complex food web. Some of these fish species are commercially important.

Populations of many fish species are concentrated over the entire continental margin. The distribution of fish is, of course, highly variable and different species are associated with specific sediment types. But, in general, fish populations tend to be highest in areas where there is a break or change in bottom topography, such as over the banks, along the shelf break, and at the heads of submarine valleys and canyons.

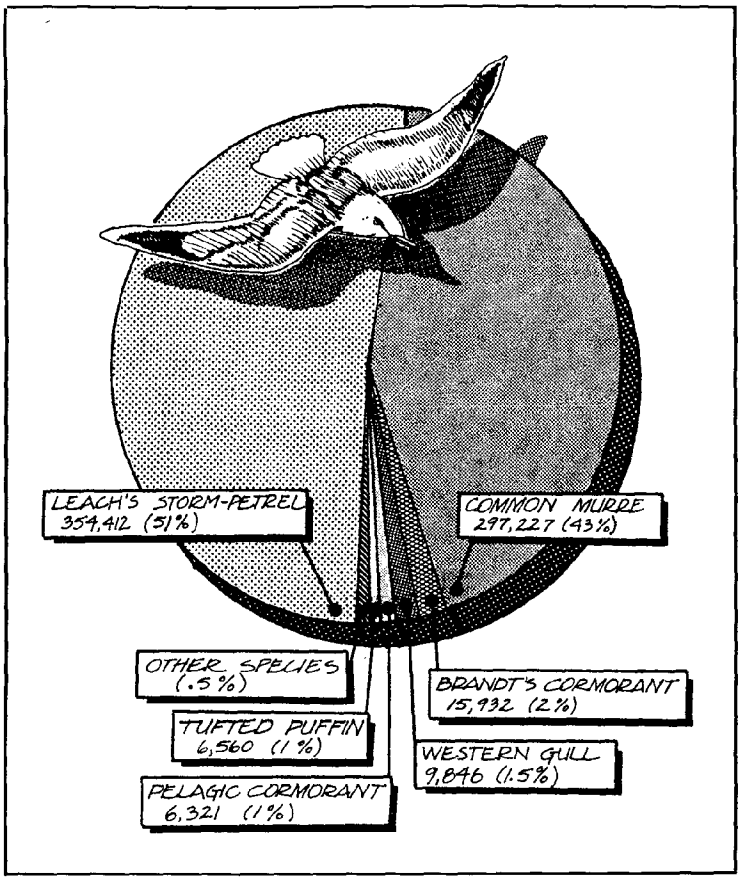
Trying to draw a boundary line or pinpoint a region in the Oregon Ocean Planning Area and say that fish are concentrated within that boundary or region is very difficult. Charts plotting the distribution of spawning areas and nursery grounds show different species using the nearshore waters, the offshore banks, the continental shelf break, and the continental slope. Other charts plotting the distribution of larvae, juveniles and adults show fish populations all across the continental margin.

The only boundary that does make ecological sense is the seaward edge of the continental margin. Although some species are found in the waters of the deep ocean and the continental margin, in general, the species composition of fish populations, the size of the populations, and the distribution of spawning areas of the continental margin are distinctly different from those of the deep open ocean.

Huge Breeding and Feeding Bird Populations

Large numbers of seabirds migrate along Oregon's continental margin. Multitudes of nesting seabirds along Oregon's coast depend on relatively undisturbed coastal nesting habitats and on the rich coastal waters for food for themselves and their young. Some bird species have very particular habitat and feeding requirements and are found only in certain areas. As examples, the northern fulmar and the sooty shearwater are found primarily along the mid and outer shelf and the shelf break. The California and western gull are nearshore and coastal birds which are rarely found seaward of the shelf break. Some seabirds such as the tufted puffin nest in burrows dug in the dirt atop offshore rocks and islands and travel daily to the rich feeding grounds near the edge of the continental shelf to capture fish to bring back to the fledglings in their nests.

Biologists believe that many of today's seabird populations are just remnants of much larger seabird populations common in the times before intense human use and development of the coast. A number of seabird species have been formally listed as sensitive,



Populations of breeding seabirds and proportion of the total seabird population of each species.

threatened, or endangered by the state and federal governments.

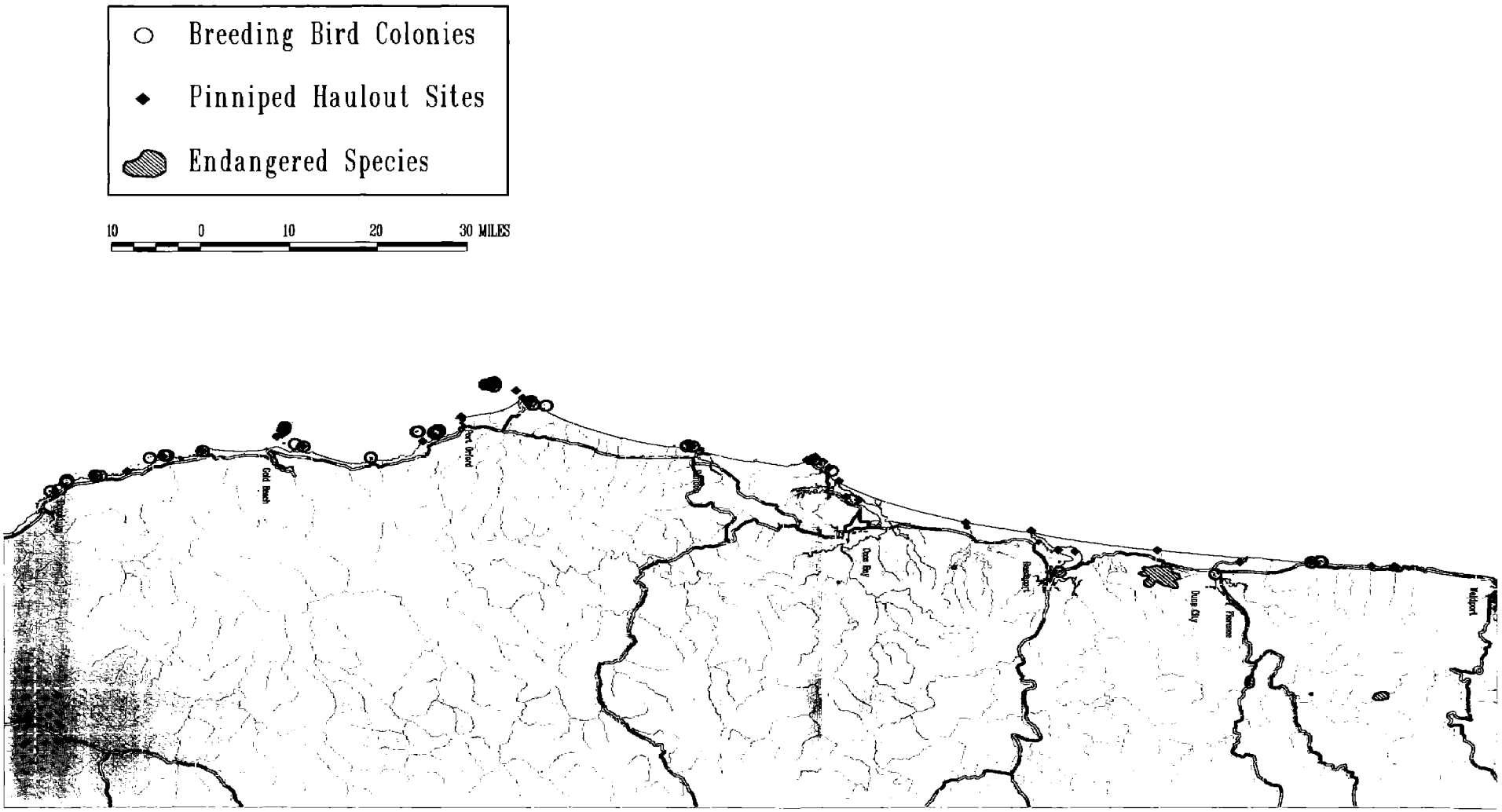
Diverse Marine Mammal Populations

The continental margin is important habitat to a wide variety of migrating and resident marine mammals. Gray whales migrate along the Oregon coast within a few miles of shore from November through June. A year round population of adult killer whales is found over the shelf. Several species of seals and sea lions use the offshore rocks and islands as pupping and haul out areas. Northern fur seals migrate along the shelf edge from its wintering grounds in southern California to its breeding grounds in the Pribilof Islands.

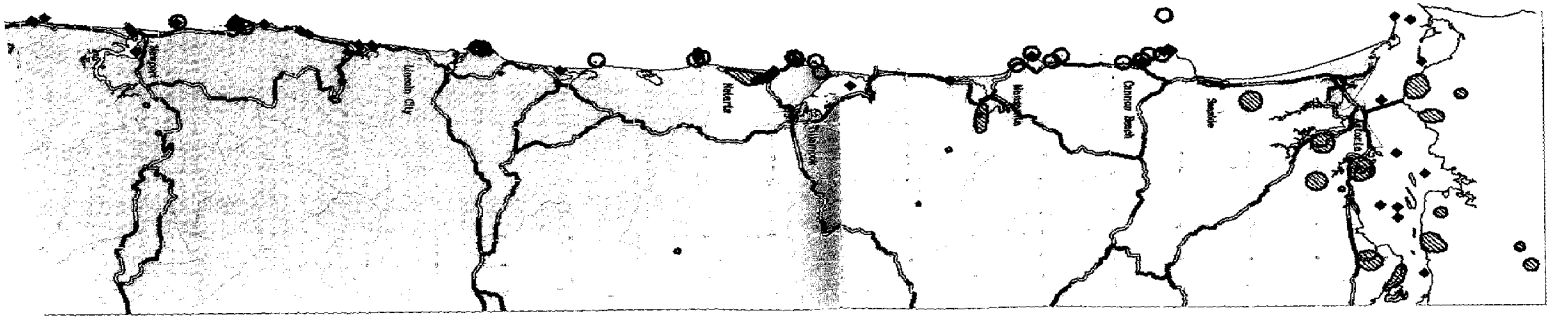
Marine mammals of the offshore rocks and islands depend on the waters of the continental margin as feeding areas. For example, northern sea lions leave their rookery areas near Cape Arago and the Rogue Reef and travel as far as 20 to 25 miles offshore to forage for food. California sea lions, harbor porpoises, and harbor seals not only feed in river mouths and estuaries, but they also forge across the continental margin out to the shelf break.

The map following this page shows the location of the most sensitive marine species habitats along the Oregon coast. Sites on the map include bird colonies that serve as breeding sites, pinniped haulout locations, and known threatened or andangered species locations.

Source: ODFW and USFWS


Breeding Bird Colonies
Pinniped Haulout Sites
Endangered Species
10 0 10 20 30 MILES
Gold Beach
Port Orford
Coos Bay
Reedsport
Florence
Newport
Waldport

Sensitive Species Locations



The Human Environment

The Counties
The Coastal Economy
Ocean Users and Uses

Many Oregonians have chosen the coast as their home. They live in small towns like Langlois, Yachats, and Gearhart; in the larger cities of Astoria, Newport, and Coos Bay; in retirement or second home developments like Little Whale Cove and Salishan; and in relatively remote areas where neighbors are few.

The coast is many things to many people: the family home for many generations; a place to earn a living from the rich natural resources, such as timber, fish and shellfish; a retreat from the populated cities and hectic urban living; a place to play, to walk on the beaches, to fly kites, to hike, to race dune buggies, to canoe and kayak, to angle from a small boat or the shore; a place to study the natural phenomena of the forests and the sea: an environment to stimulate human imagination and explore individual creative capacities; and, basically, a place to live, do business, and raise a family.

The population of Oregon's coast lives in five coastal counties and the coastal parts of two large, mostly inland counties. These counties, from north to south, are Clatsop, Tillamook, Lincoln, Lane, Douglas, Coos, and Curry. The 1987 estimated coastal population totaled about 190,000 persons or approximately 24 persons per square mile. The largest metropolitan area along Oregon's coast is the Coos Bay area where the neighboring cities of Coos Bay and North Bend have a combined total population of about 24,000. Coastal Oregon has thirty-three cities and approximately 40% of the coastal population resides in cities with populations over 2500. The total population of coastal Oregon is roughly 7% of the state's population.

Oregon coastal communities are experiencing significant changes in their population and their economies. Many of these changes are a function of the overall national demographic trend toward an older population. Oregon, and especially the coast, has a relatively large percentage of elder citizens. Many retired people

have moved into coastal areas because these communities are so "liveable" and provide retreats from urban or industrial areas. Young adults have left coastal areas to seek educational and job opportunities elsewhere. Both of these trends are likely to continue.

Nye Beach in the city of Newport is typical of the close relationship of Oregon's coastal communities with the ocean. Jumpoff Joe, a landslide area from ocean erosion, is located in the center of the photo. Rising sea level is projected to accelerate erosion along the cliff edge. Cities will need to plan for this geologic eventuality. (ODOT photo, 1978)

The Counties

Clatsop County

- ***Population: 33,100***
- ***Principal Industries: Fishing, Lumber, Agriculture, and Recreation***

Clatsop County was named for the Clatsop Indians, one of the many Chinook tribes living in Oregon. Fort Clatsop, Lewis and Clark's winter headquarters in 1805, is now a national memorial and is located near the mouth of the Columbia.

Astoria, the county seat, was the first American city to be settled in the West. Astoria was established as a fur trading post in 1811. The first U.S. Post Office west of the Rocky Mountains was also established in Astoria in 1847.

Tillamook County

- ***Population: 21,400***
- ***Principle Industries: Agriculture, Lumber, Fishing, and Recreation***

Dairy farms dominate Tillamook County's fertile valleys. The county is the home of the world-famous Tillamook cheese. Logging and lumbering are also again becoming economically important due to the reforestation and regrowth of most of the huge "Tillamook Burn" area.

Tillamook County offers ocean and stream fishing, charter and dory boats, clamming, crabbing, beachcombing and hiking. The county's oceanfront is famous for its scenic grandeur.

Lincoln County

- ***Population: 38,800***
- ***Principle Industries: Lumber, Fishing, Agriculture, and Recreation***

Newport is Oregon's oceanography research center with OSU's Mark O. Hatfield Marine Science Center which also provides facilities for the National Oceanic and Atmospheric Administration, Environmental Protection Agency, U.S. Fish and Wildlife Service, and the Oregon Department of Fish and Wildlife. Newport, a major fishing port, is also the Dungeness crab capitol of the world. Lincoln City, formed by the consolidation of five small towns, is an oceanside community with numerous tourist-oriented attractions and resorts. Lincoln City is also a popular retirement community.

Sport fishing is popular and productive along the coast of Lincoln County, from the Siletz River and Bay to Yachats River. Sizeable charter and commercial fishing fleets operate out of Depoe Bay and Newport. Mild winters and cool summers help to produce an abundance of horticultural specialities.

Lane County

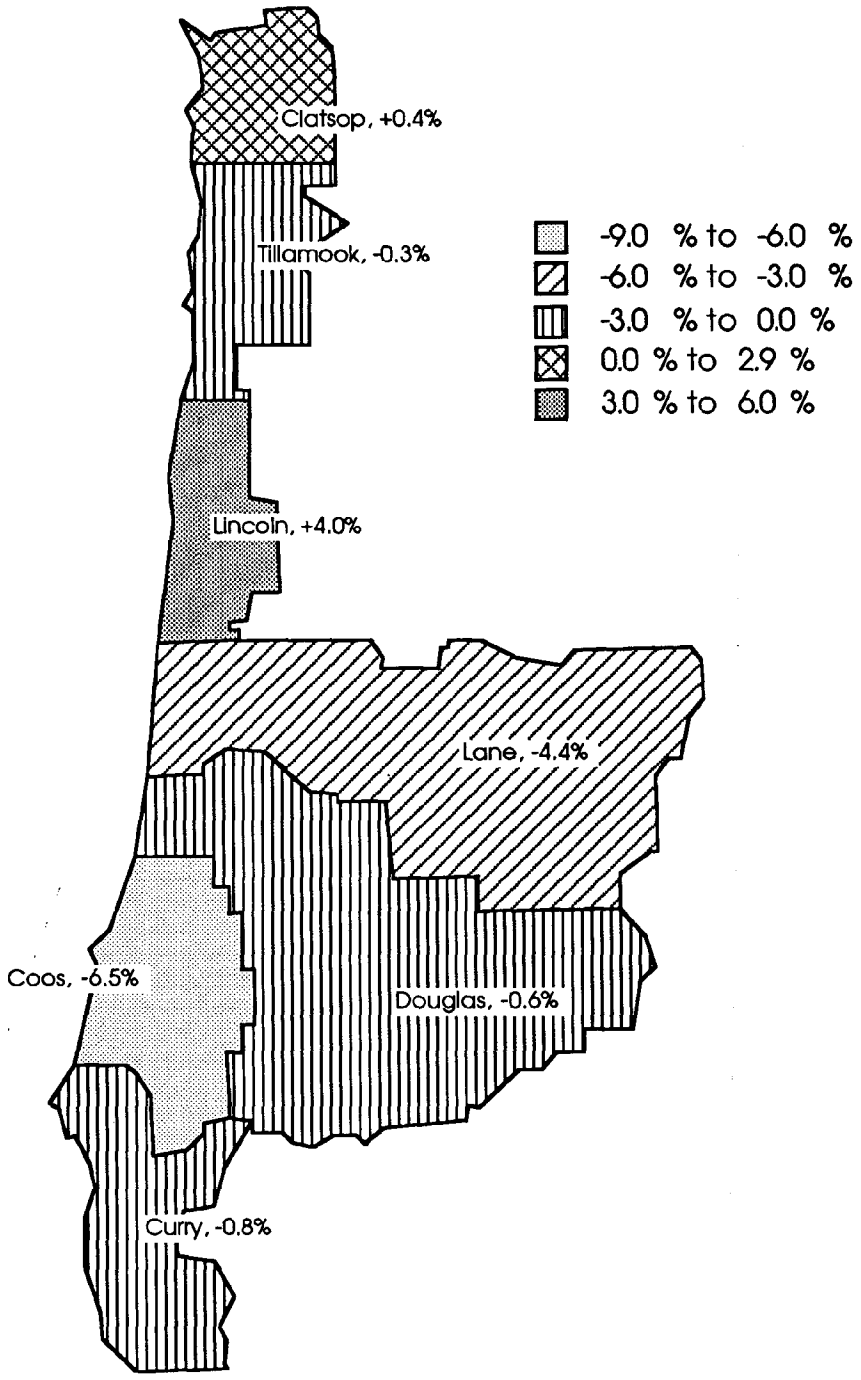
- ***Population: 273,700***
- ***Principle Industries: Agriculture, Education, Fishing, Food Processing, Logging, Manufacturing of Wood Products, Recreation, and Tourism***

Only a relatively small part of Lane County is located in the coastal zone. Eugene, Oregon's second largest city, occupies the population focus of the county in the Willamette Valley. Florence, at the mouth of the Suislaw River, is the only coastal city in Lane County. Most of the land in coastal Lane County is part of the Suislaw National Forest.

Douglas County

- ***Population 92,150***
- ***Principle Industries: Lumber, Mining, Agriculture, Fishing, and Recreation***

Douglas County extends from the coast up the Umpqua River drainage to the Cascades. Only a relatively small part of the county is actually in the coastal zone. Almost all of the coastline of Douglas County is in the Oregon Dunes National Recreation Area. Reedsport, Gardiner, and Winchester Bay, all located near



Percent change in coastal county populations from 1980 - 86

the mouth of the Umpqua River, are the center of population and activity in coastal Douglas County.

Coos County

- ***Population: 61,000***
- ***Principle Industries: Lumber, Fishing, Agriculture, Shipping, and Recreation***

The name "Coos" is derived from the native Coos Indian word which may translate to "lake" or "place of pines." Although trappers had been in the area a quarter of a century earlier, the first permanent settlement in present Coos County was made at Empire City, now part of Coos Bay, by members of the Coos Bay Company in 1853.

Forest products, tourism and fishing dominate economic activity in Coos County. Boating, dairy farming, myrtlewood manufacturing, ship repair, module fabrication and agriculture specialty products, including cranberries, also play an important role. The International Port of Coos Bay, considered the best natural harbor between Puget Sound and San Francisco, is the world's largest forest products shipping port.

Curry County

- ***Population: 17,100***
- ***Principle Industries: Lumber, Agriculture, Commercial and Sport Fishing, Recreation, and Tourism***

The county contains valuable standing timber and also offers spectacular coast scenery and recreational attractions, such as beachcombing, clamming, and crabbing; excellent fishing (freshwater and saltwater); river scenic boat trips; and coast, river and mountain hiking trails. The Port of Brookings is considered one of the safest harbors along the coast for ocean recreational fishing.

Agriculture in Curry County includes raising sheep and cattle, dairy farming, and raising cranberries, blueberries, and horticultural nursery stock.

(The source of most of the preceding material is the *Oregon Blue Book, 1989-1990.*)

A large freighter glides into the Columbia River estuary at Astoria. The Columbia River, along with Coos Bay, is a major international port on the Oregon coast. (Oregon Sea Grant)

Seafood processing, often small scale and labor intensive, is an economic mainstay of several coastal ports. This part of the industry depends on a continuous supply of fresh fish from the ocean. (Oregon Sea Grant)

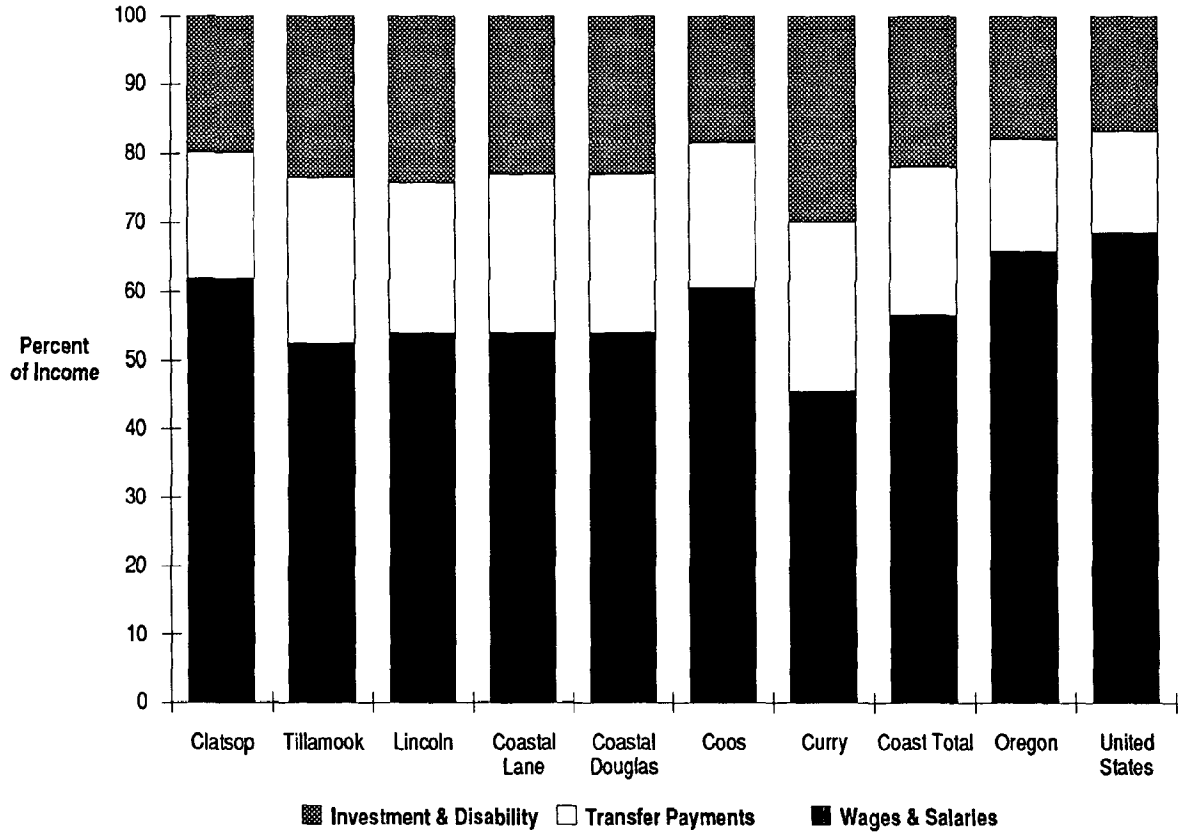
The Coastal Economy

Personal Income

Coastal Oregon has experienced generally low overall economic growth and amplified swings in employment during national recessions. The demographic "aging" of the coastal population combined with the coast's reliance on natural resource-based industries that are subject to dramatic supply and demand changes have caused per capita personal incomes of coastal residents to lag behind averages for the rest of Oregon and the U.S.

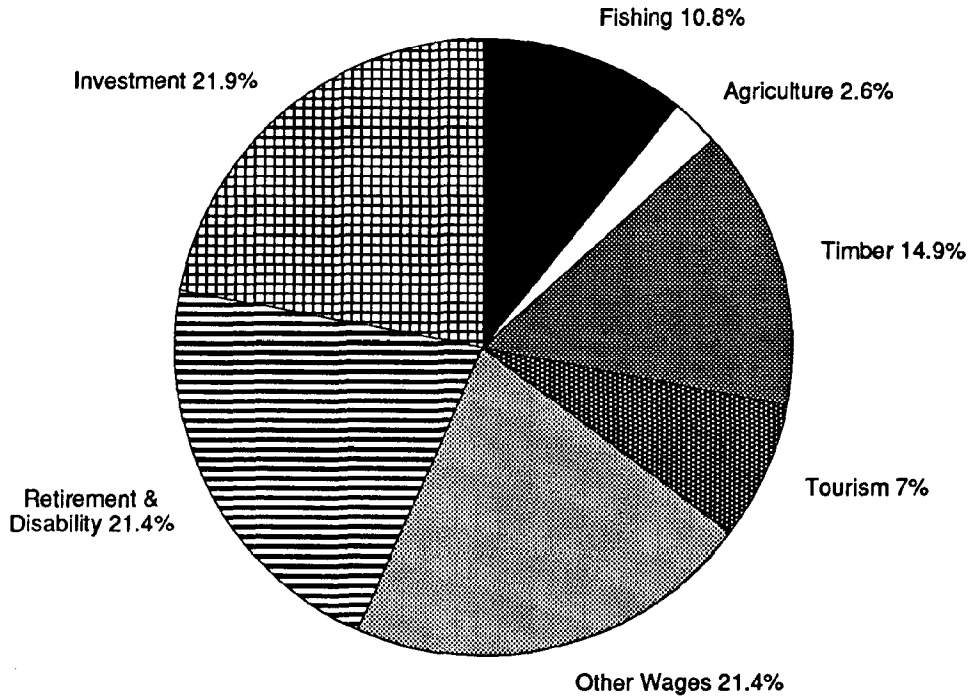
Coastal residents depend on economic activity in six basic categories: commercial fishing; commercial agriculture; lumber and wood products; tourism; passive income from investments and transfer payments, such as Social Security payments and retirement pensions; and other export industries such as water transportation, marine cargo handling, paper and paperboard mills, boat and ship building, and state and federal education and research facilities.

The Oregon Coastal Zone Management Association (OCZMA) recently published an analysis of the coastal economy in *The Economic Landscape of the Oregon Coast*. The results of this study show that passive income from such sources as social security payments, other retirement benefits, disability payments, interest and dividend income, and rents are becoming increasingly significant as the average age of the coastal population increases. Of the natural resource based industries, the timber



Sources of personal income in 1987 in coastal counties, Oregon, and the U.S. (Source: OCZMA)

Personal income sources in Oregon's coastal communities in 1987. (Source: OCZMA)



industry accounts for about 15% of the total estimated personal income of coastal residents, whereas fishing makes up about 11% of the total.

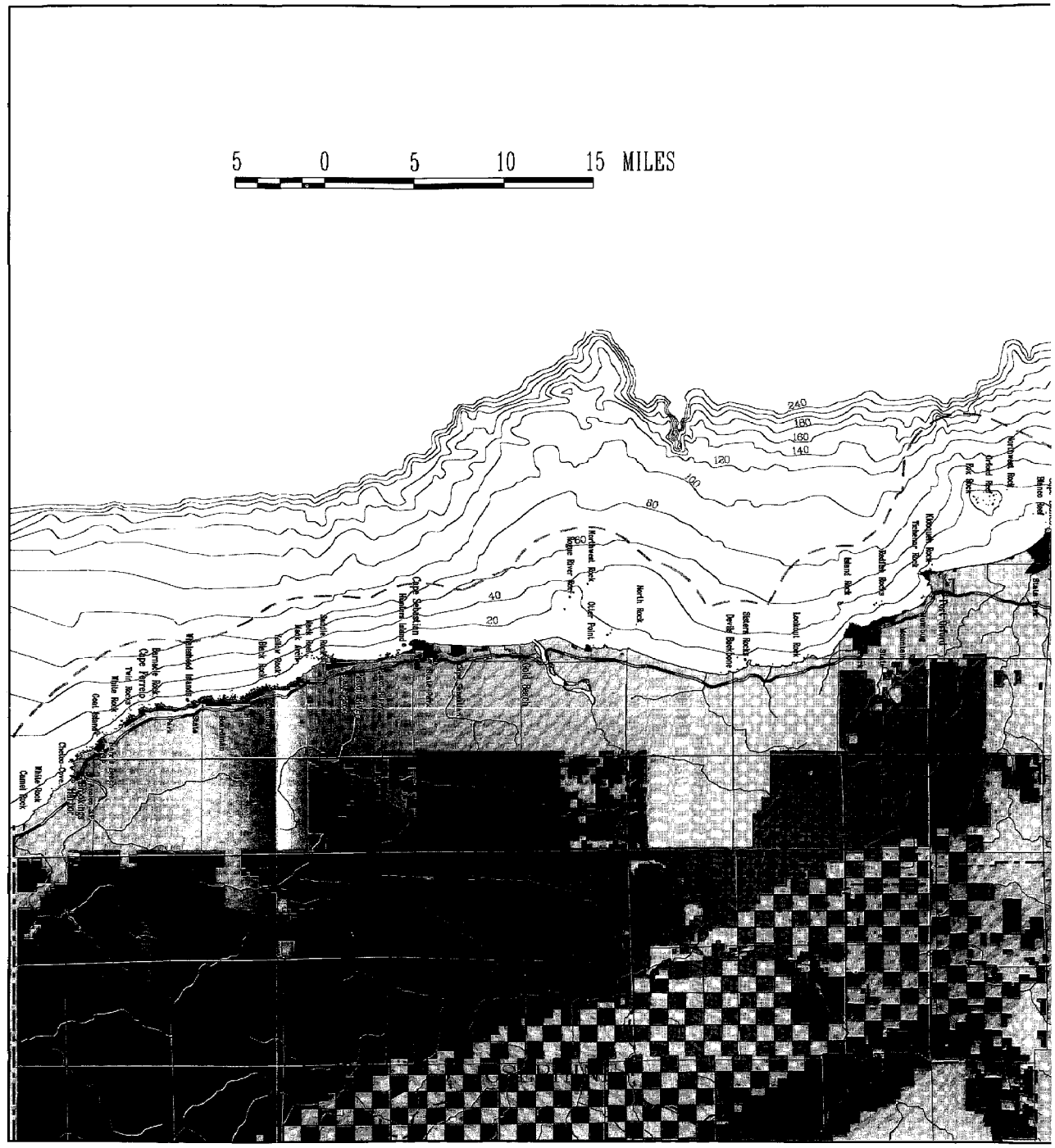
Coastal Retirement

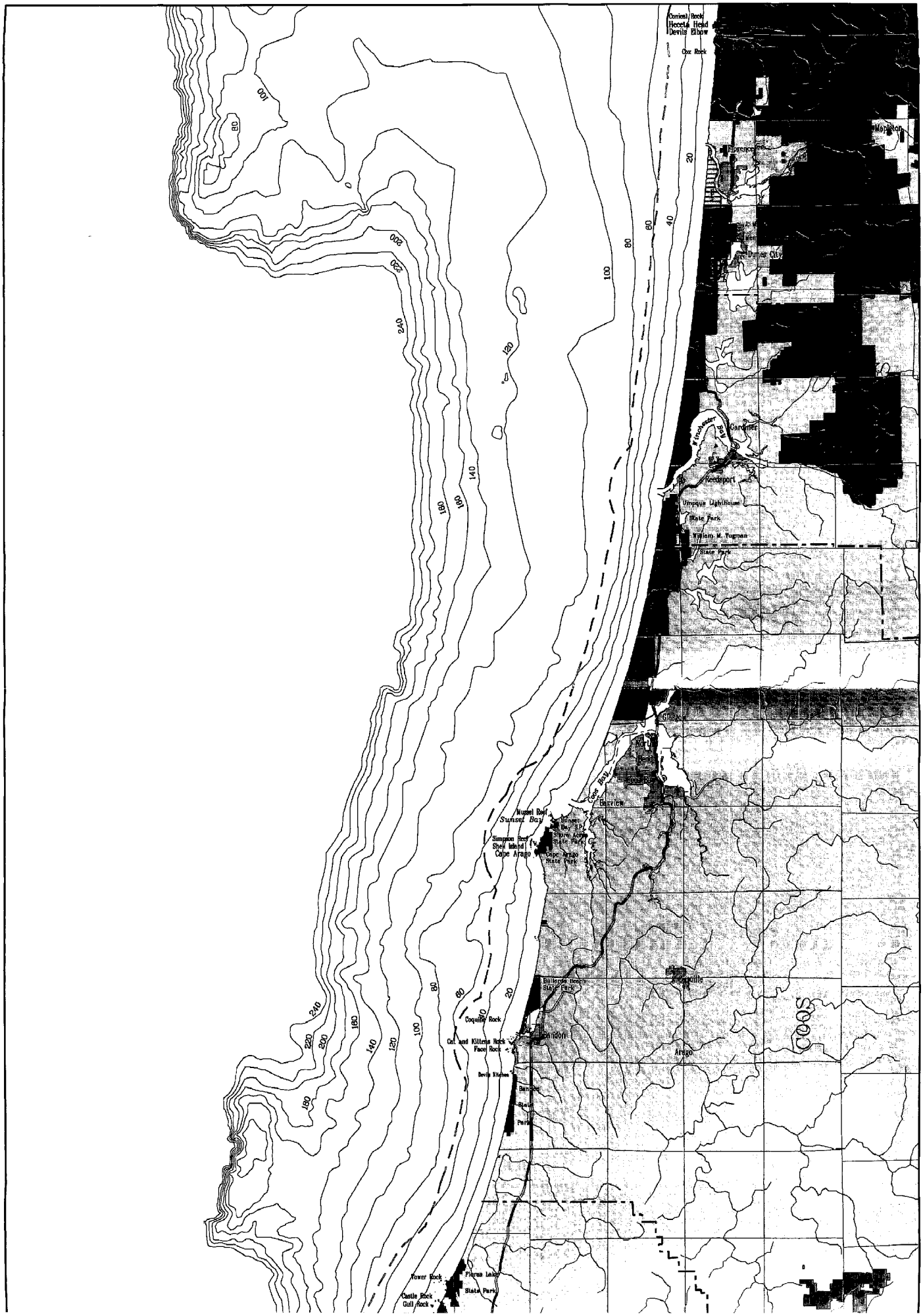
The OCZMA economic profile reveals the growth of "transfer payments" as a major sector of the coastal economy. This retirement-related sector is larger than either timber or fishing in almost all counties (except Clatsop County where commercial fisheries is slightly higher). This influx of older persons, coupled with historic patterns of "out-migration" of young people after high school, creates a higher percentage of older persons and a shrinking pool of young labor for industrial development on the coast.

The relationship of the coast's two largest sectors, "transfer payments" and "investments" to ocean and coastal resources is not clearly defined or understood. There is a strong connection between the attraction of Oregon's relatively clean, uncrowded coastal environment and the growing population of retired persons from outside the coastal area.

The size and growth of transfer payments spells a shift in the coastal economy away from reliance on resource extraction and gives a glimpse of the changing social and political makeup of coastal communities. For this population, many with political savvy and money, the ocean is more of a visual and aesthetic resource than a resource to be actively exploited.

The following plot shows many of the generally recognized features along the coast: Highway 101, urban growth boundaries, counties, and so on.


5 0 5 10 15 MILES
240
180
160
140
120
100
80
60
40
20
Northwest Rock
Rogue River Reef
Cape Sebastian
Hunters Island
Otter Point
North Rock
Sisters Rocks
Devils Backbone
Lookout Rock
Island Rock
Redfish Rocks
Kibbuah Rock
Tichenor Rock
Fort Orford
Rock Rock
Orford Reef
Northwest Rock
Blanco Reef
Saddle Rocks
Black Rock
Kellow Rock
Black Rock
Whitehead Islands
Barnacle Rock
Cape Ferrelo
Twin Rocks
White Rock
Coal Island
Chetco Cove
White Rock
Camel Rock
Gold Beach



Conical Rock
Heceta Head
Devils Elbow
Cox Rock
Florence
Dunes City
Winchester Bay
Gardiner
Reedsport
Umpqua Lighthouse
State Park
William M. Tugman
State Park
Glasgow
North
Bend
Coos Bay
Barview
Mussel Reef
Sunset Bay
Sunset Bay S.P.
Shore Acres
State Park
Simpson Reef
Shell Island
Cape Arago
Cape Arago
State Park
Coquille
Bullards Beach
State Park
Coquille Rock
Bandon
Cat and Kittens Rock
Face Rock
Devils Kitchen
Bandon
State
Park
Arago
COOS
Tower Rock
Castle Rock
Gull Rock
Floras Lake
State Park

Three Arch Rocks
Seal Rock
Oceanside
Netarts
Netarts Bay
Cape Lookout
Two Arches
Cape Kiwanda
Haystack Rock
Pacific City
Nestucca Bay
Proposal Rock
Neskowin
Cascade Head
Three Rocks
Oretown
Siletz Bay
Fishing Rock
Rabbit Rock
Byler Bay
Pirate Cove
Depoe Bay
Whale Cove
Cape Foulweather
Devils Punch Bowl
Otter Rock
Yaquina Head
Yaquina Bay State Park
Newport
Yaquina Bay
Stonewall Bank
Seal Rocks
Waldport
Alsea Bay
Cape Perpetua
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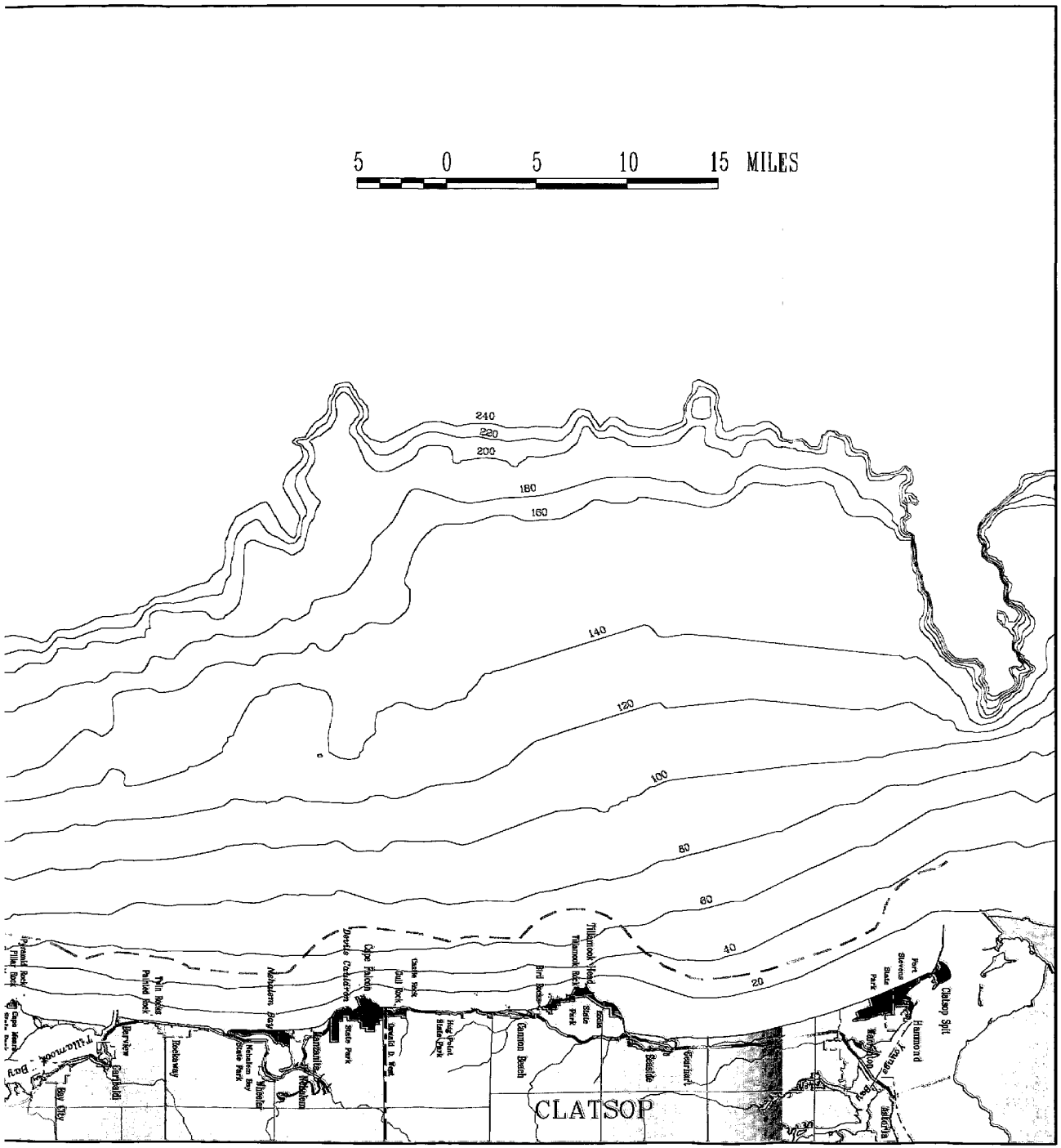
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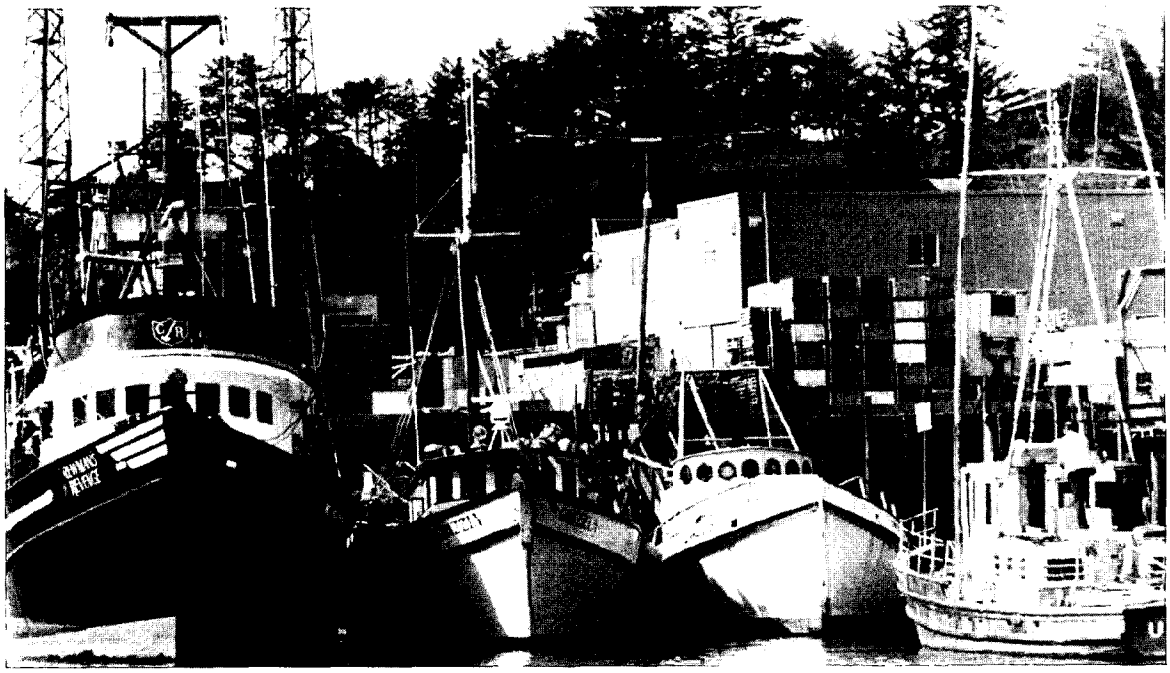
Ocean Resources

The direct economic role of ocean resources varies from community to community. In 1987, commercial fishing, a major social component of the coast, provided 10.9 percent of the total coastal personal income. Yet for that same year in Lincoln County, fishing contributed 16.4 percent ($80.9 million) and in Clatsop County 20.5 Percent ($94.2 million) of the total personal income, both well above average. On the other hand, in Curry County, commercial fishing contributed about 4.7 percent ($10.4 million), slightly less than tourism at 5 percent ($11.0 million). None of these figures reflect the economics of ocean recreational fisheries which are not specifically addressed by recent available studies.

Other ocean related industry is concentrated in a few major ports. In 1987, the marine transportation and cargo sector contributed less than 2 percent of the total personal income but 4.5 percent ($34 million) in Coos County. Boat building in Coos Bay provides about 1 percent of Coos county's personal income, while boatbuilding at Reedsport provides about 2.6 percent of Douglas county's personal income.

The economic contribution of recreational activities related to the ocean is difficult to quantify because there is no clearly defined "industry" to measure. The OCZMA study focused on portions of selected industries that are directly affected by visitor expenditures: hotels and lodging places, amusement and recreation services, eating and drinking places, retail sales and automobile service stations that are directly affected by tourist's expenditures. Overall, tourism is estimated to contribute approximately 7 percent to the total personal income of the Oregon coast. How much of this is directly related to ocean and coastal resources is simply impossible to determine. In some communities, such as Depoe Bay and Brookings, recreational ocean fishing contributes significant income to the community, especially during salmon season. Whale watching trips, especially from Newport and Depoe Bay, are a growing segment of off-season trips for charter boat operators.



Fishing vessels represent the personal investment of individual fishermen in the future of Oregon's fisheries industry. (Oregon Sea Grant)

These boats tied up a Newport are a small part of Oregon's commercial fishing fleet, which numbers about 2000 vessels. (Oregon Sea Grant)

Ocean Users and Uses

Oregonians depend on the ecologically and economically valuable resources of the ocean. Human uses of the ocean are concentrated on the resources of the continental margin. These resources can be listed and categorized, but Oregonians know that they are ecologically interconnected and interdependent and that these resources are highly valuable to human economies and highly vulnerable to disruption by human activities.

Commercial and Recreational Fishing

Commercial fishing was one of Oregon's first industries. In the mid-1800's, Scandinavian and French immigrants fished for salmon in the lower Columbia River. Using horses and their own human strength, these people worked gill nets, beach seines and fish wheels to reap an abundant harvest which was processed and packed in nearby plants. With the new invention of gasoline engines, adventurous fishermen ventured "across the bar" at the mouth of the Columbia and began to fish the resources of the ocean.

The rich harvest of the oceans and rivers played an important role in the development of the Oregon economy and the establishment of various cities and ports all up and down the coast.

Today, Oregon fishermen catch fish almost everywhere. Some fishermen may work relatively close to shore taking day trips to nearshore reefs. Others will stay out for several days and fish the rich resources at the edge of the continental shelf. Still others participate in the distant water fisheries of the central Pacific. Even so, Oregon fishermen tend to concentrate their efforts on the rich fishery resources of the continental margin. About 95 percent of the value of the fisheries and the total pounds landed in Oregon is from fish and shellfish harvested from the continental margin.

Fishermen form a diverse community. They fish a wide variety of species including salmon, cod, rockfish, snapper, sablefish, sole, flounder, halibut, tuna, shrimp, crab, whiting, sea urchins and squid. Some of them are independent businessmen who own one or more vessels. Others work as crew members. Some work with foreign companies in joint fishing ventures.

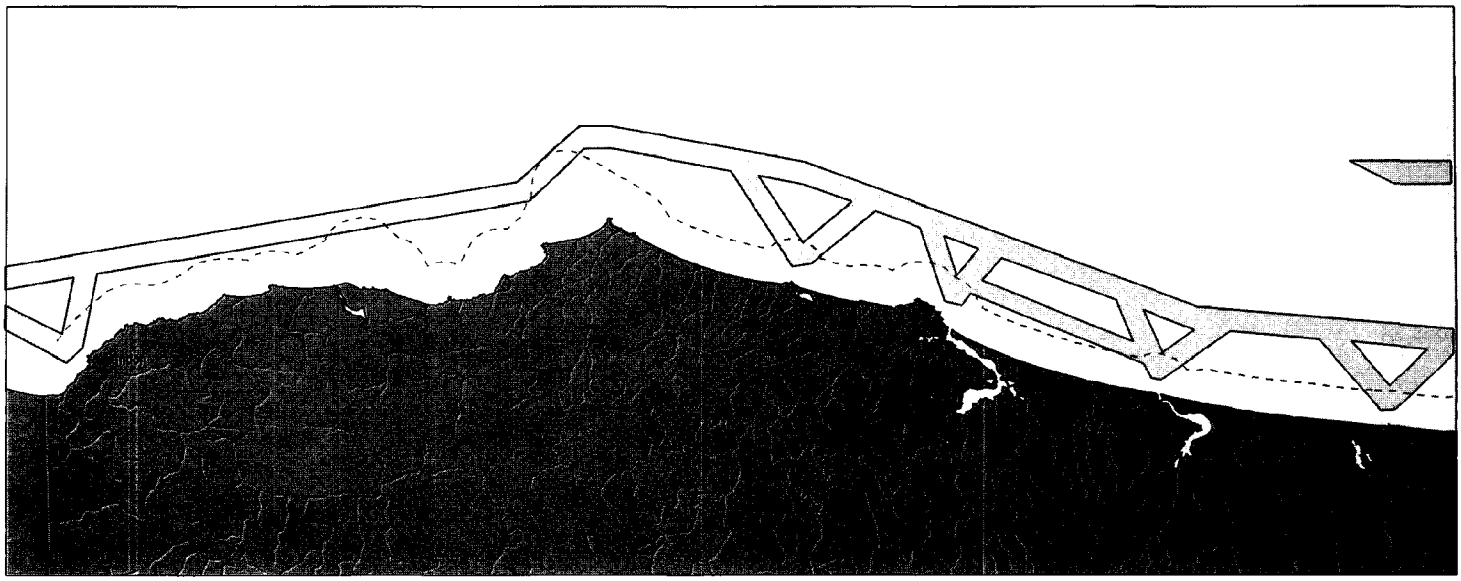
Commercial fishing contributes about 10 percent of the total personal income of coastal counties and communities and in major fishing ports may contribute as much as 25 percent of all personal income.

Fishing is also a cherished way of life for many coastal residents whether they are directly involved in the fishing industry or not.

Navigation and Transportation

Oregonians have long used the beaches and the nearshore waters to get from one place to another along the coast and to transport goods to and from markets. In the years before the coastal highway was completed, coastal residents drove their carts and carriages and later their automobiles along the highway of the beach. For many years, coastal traders using barges and small ships have carried goods to communities up and down the entire west coast. Captains of fishing vessels and merchant ships sought refuge in the natural harbors where communities were also developing. Today coastal pilots meet large oceangoing vessels several miles at sea and guide them to safety in these harbors.

The deep water ports of the lower Columbia River (including Portland), Coos Bay, and Newport are part of a complex network of inland and oceanic transportation systems serving millions of people worldwide. People in coastal ports like Coos Bay often host regular crewmen from the Soviet Union, Japan, Korea, the Philippines and Hong Kong.



The plot on these pages shows the location of towboat lanes off Oregon. Lane locations are published by the OSU Sea Grant Extension Service, and are used by towboat operators and fishermen to

Oregonians have strong economic ties to major nations around the Pacific Rim and the world. Huge vessels regularly leave Oregon loaded with wood products such as chips, logs, and lumber and with grain for foreign trade. Large quantities of imported commodities also enter the U.S. through Oregon's ports. These imports include automobiles, chemicals, metal products, clothing, shoes, and machinery.

Numerous smaller, shallow draft coastal ports support the commercial and recreational fishing industry, pleasure boaters, and domestic coastal trade.

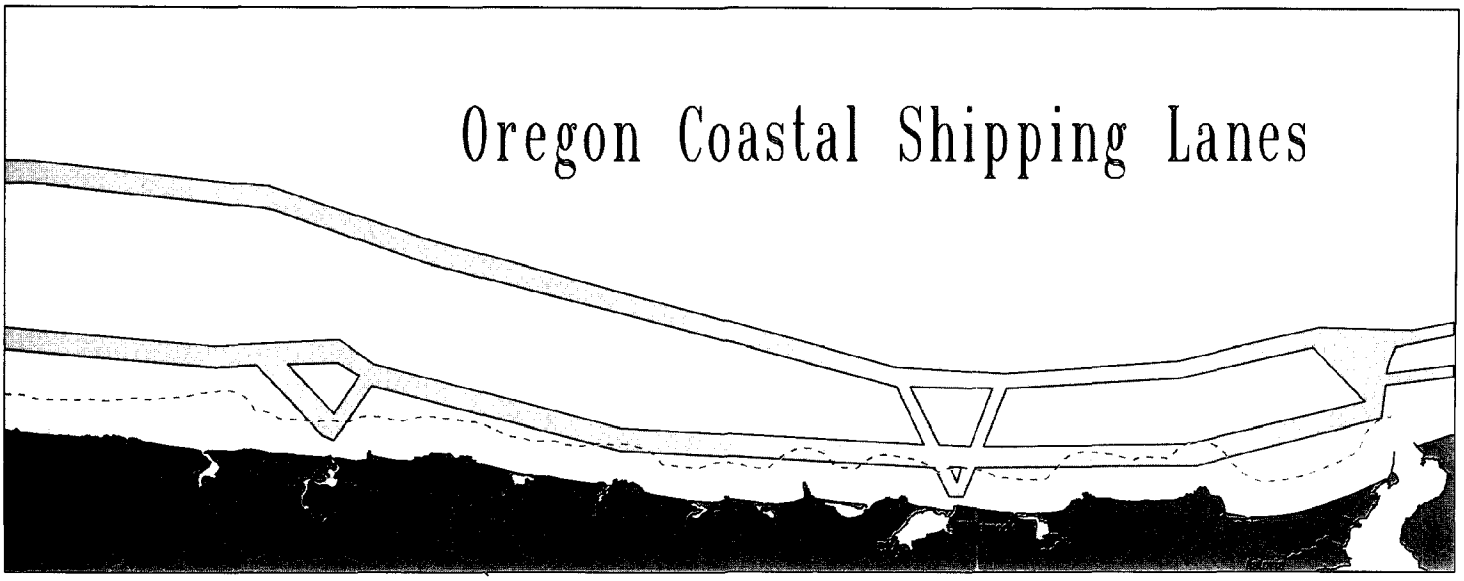
Much of the domestic trade between the Pacific coast states is carried by shallow draft barges. Barge captains generally follow the 60 fathom (360 feet or 120 meter) contour, four to five miles offshore.

Each day, several supertankers full of North Slope crude oil, travel southward from Valdez, Alaska, to refineries in California and the Gulf of Mexico states. Tanker captains generally chart a straight line course which slices diagonally across the Oregon ocean planning area from about 150 miles at sea off Astoria to about 50 miles at sea off Cape Blanco.

Waste and Dredged Material Disposal

Worldwide, the ocean has become the final dumping place for many of the wastes of human society, including municipal and industrial waste, dredged material, and marine and terrestrial litter. Oregon's coastal communities and industries, like others around the world, use the ocean to dispose of waste and unwanted material. Some of the sources of the waste, such as municipal sewage treatment plants and harbor dredging projects, are deliberate societal choices. Whereas, others are the result of carelessness or ignorance.

Six municipal wastewater treatment works and three pulp and paper mills currently discharge directly into Oregon's coastal ocean. At current levels, the pollutants from these out-



avoid conflicts. Since the process of agreeing on lane locations and publishing the results began, conflicts and fishing gear losses—which were not uncommon—have become practically nonexistent.

falls are relatively small and seem to be dispersed quickly.

Oregon's coastal ocean is also used for the disposal of dredged material. The need to keep channels in harbors open for vessels requires maintenance dredging. Growth of ports can require new dredging. Everyone who uses products transported over the ocean or who eats fish from the ocean contributes to the need to dredge. The Corps of Engineer's discharges from 7 to 11 million cubic meters of sediment from coastal harbors and rivers at about twenty authorized dredged material disposal sites on the continental shelf. These sites are generally located near river mouths in water depths ranging from 50 to 185 feet. The dredged material that is currently being dumped on Oregon's continental margin is clean, uncontaminated sand.

Discharges from rivers transport a variety of pollutants from many sources into the coastal waters. Many of these may be untraceable to specific sources and may, in fact, be unidentifiable. No one and yet everyone is responsible.

Marine Litter

Marine litter fouls Oregon's continental margin. People litter. They unthinkingly throw beer bottles, plastic packaging, and garbage overboard. They leave the leftover trash from a beach picnic on the shore. They throw cigarette butts in the sand.

Plastics and other trash, which end up in coastal waters and on the bottom, kill marine organisms. Although no scientific studies have been done on the origin and amounts of marine litter on Oregon's shoreline and across the continental margin, beach cleanup projects report that the great majority of the litter found is from boats, that significant amounts of litter is found near campgrounds and picnic sites, that about 60% of all items found are plastic, and that the amount of litter deposited by tides the day after a beach cleanup is often equal to the amount picked up by the cleanup effort.

Recreation and Aesthetics

Oregon's coast has been termed a national treasure. People from all over the world come to the Oregon coast to admire its beauty, to relax, to experience nature, to play, and to find inspiration. Oregonians place a high value on pristine beaches, rocky headlands, and scenic vistas.

The waters of almost the entire continental shelf and much of the upper slope from north to south along the Oregon coast are visible from publicly accessible viewpoints. On a clear day, a person standing on the beach can see about 6 miles to the horizon. On a clear day, a person standing on the Yaquina Bay Bridge can see about 16 miles out to sea; From Cape Arago, a person can see about 17 miles up and down the coast and out to sea; from Cape Blanco, 19 miles; from Sea Lion Caves, 24 miles; from Otter Crest Lookout, 28 miles; from Neahkahnie Mountain Lookout, 32 miles; from Cape Sebastian, 35 miles, from Cape Perpetua Lookout, 37 miles; and from Cascade Head, 45 miles.

Degradation of the aesthetic resources of the coast could greatly alter the quality of the Oregon coast and could negatively affect the coastal experience and the economies which are dependent on tourism and recreation.

Possible Future Uses

Oregonians and visitors to the Oregon coast worry that future development of ocean resources will adversely affect the way of life on the coast.

• Marine Minerals Mining

The federal government and a few companies have been interested in the mineral resources of Oregon's continental shelf. Currently no mining is occurring on the continental margin, but economically recoverable deposits may be present.

Developers may be attracted to offshore gravel deposits as onshore sources are depleted or demand increases. The gravel deposits off Oregon are small and localized, but they lie in relatively shallow water where miners using dredges could recover the gravel.

Major placer deposits of mineral-rich "black sands" may lie beneath the ocean off the coast Oregon. Mining entrepreneurs have been interested in the possibility of mining these "black sands" and the interest may increase in the future. The extent of these placer deposits and the economic viability of marine minerals mining off Oregon are poorly known.

The potential for adverse environmental effects from marine mining and the degree of spatial and other conflicts with the fishing industry and other ocean users are poorly understood at this time. But, Oregonians are concerned.

• Oil and Gas Development

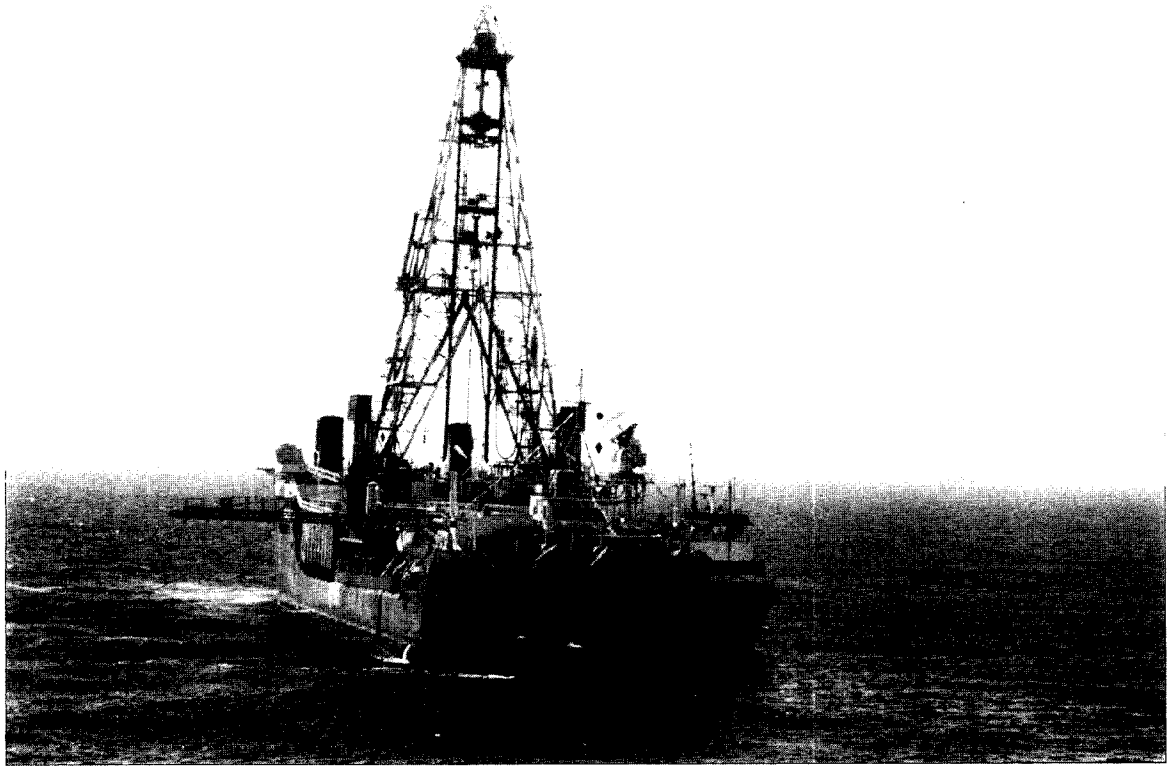
Although Oregon's offshore geology has not been fully explored, geologists who have interpreted existing information postulate that oil and gas deposits may be present in three sedimentary basins which extend across the continental shelf and upper slope. Existing technology and the economics of oil and gas development would probably limit oil and gas activities to the continental shelf and upper slope. The federal government and the oil and gas industry are very interested in knowing the magnitude of oil and gas resources off the Oregon coast.

Environmental risks of oil and gas development and potential use conflicts with the fisheries industry, as well as the aesthetic impacts of oil and gas development are of great concern to Oregonians. Geographically, these concerns are focused on the entire continental margin.

• Other Uses

Looking to the future, other potential users of Oregon's coastal ocean could include people growing oceanic plants and animals in large scale mariculture operations, kelp or other marine algae harvesters, people who want to in-

stall or have installed artificial reefs which would attract fish and to serve as a fishing or SCUBA diving site, and new recreational users such as people exploring reefs in private recreational submersibles or jet skiers or sail boarders hosting marathons along the coast. Oregonians will probably have many interesting and difficult ocean resource use choices in the future.



If offshore oil and gas exploration were ever permitted off Oregon, drill ships such as this one operating in the Santa Barbara Channel, may be used. The ship is anchored into position, drill pipe is lowered from the tower through a hole in the ship's bottom, and the hole is drilled into the seafloor. (DLCD photo)

The Policies of the Ocean Plan

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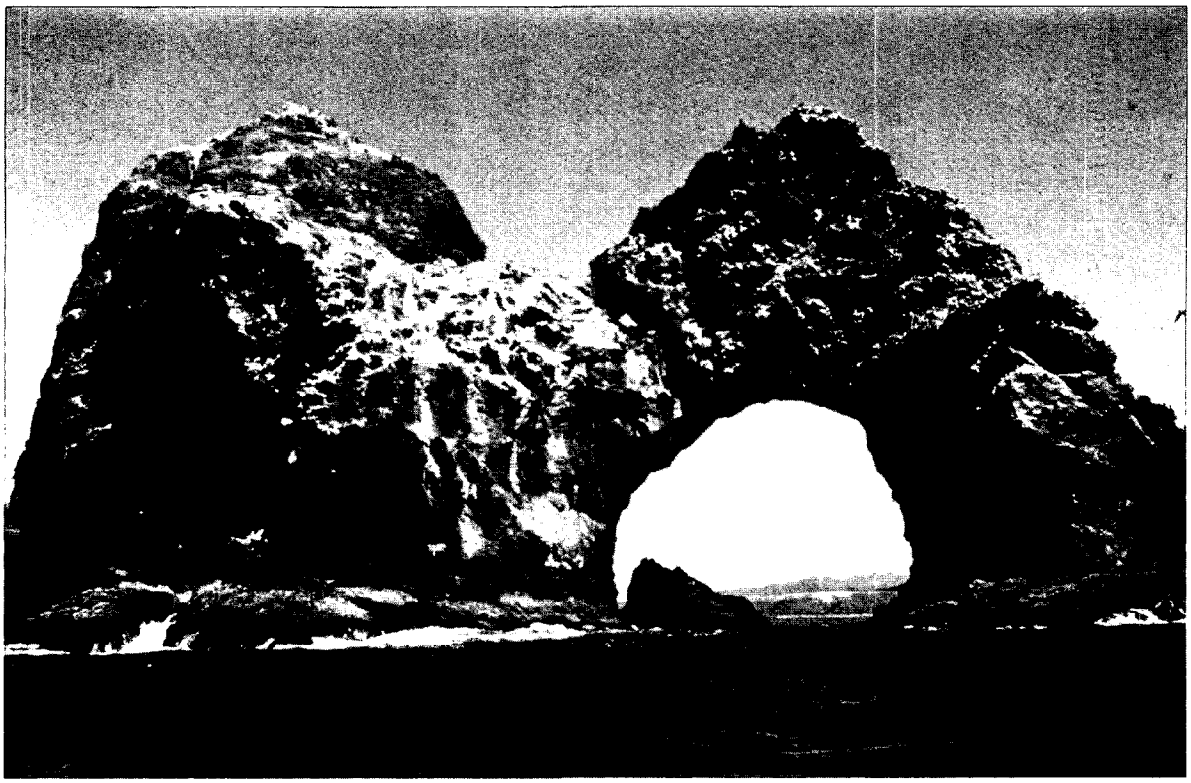


Mack Arch off Curry County is one of nearly 1400 rocks and islands along the Oregon Coast. These islands, many of which are crucial habitat for seabirds and mammals, are central to Oregon's commitment to marine resource conservation and habitat protection. (U.S. Fish and Wildlife Service photo)

Ocean Resources Stewardship

Conservation and Habitat Protection

Stewardship means taking care of the Earth and its resources for the long-term future. Ocean stewardship is at the heart of the Oregon Ocean Resources Management Plan. The goal of ocean resources stewardship is to maintain the quality and the productivity of the marine ecosystem while sustaining the economies that rely on its resources.

Oregonians value the coast and the ocean very highly, and expect government agencies to be good stewards of public resources. The Ocean Resources Management Task Force listened to the people of Oregon and has taken seriously their charge to be wise stewards of the ocean. Ultimately, ocean resource stewardship is the responsibility of each individual citizen.

The Ocean Plan identifies important ocean resources and the risks to these resources, examines how Oregon can respond to problems, and recommends goals, policies, and needed actions. The Ocean Plan charts the ocean stewardship path for the future through sound ocean resources management decisions.

The Oregon Ocean Resources Management Plan is Oregon's ocean stewardship plan.

Stewardship Transcends Political Boundaries

Stewardship concerns and responsibilities are not limited by governmental boundaries and agency jurisdictions. Oregon believes that ocean stewardship means that the state's ocean resource management concerns extend beyond its legal boundaries.

The U.S. government has asserted authority over ocean resources within a 200-mile Exclusive Economic Zone (EEZ). Oregon has jurisdiction over, and therefore direct responsibility for managing, the ocean resources within the territorial sea, which extends seaward three miles from the shore. The state also has certain rights and responsibilities for the management of resources within the EEZ,

just as the federal government has specific control and responsibilities over certain activities within the territorial sea.

The Oregon Legislature, in passing the Oregon Ocean Resources Management Act, recognized that the conservation of long-term values, benefits, and natural resources of the Oregon coast and ocean meant looking beyond the territorial sea. Therefore, Oregon's ocean planning effort began by looking at the resources and uses of the entire 200-mile zone to determine where Oregon's ocean resource management responsibilities are concentrated and what makes ecological and management sense.

Management on an Ecological Basis

Ecosystems are not fixed within lines on maps or jurisdictional boundaries. Ocean currents dissolve the meaning of governmental boundary lines. Fish swim freely in ocean waters. Marine birds and mammals migrate great distances between breeding and feeding areas. Marine birds and mammals also range widely from rookeries and haulout or resting areas in search of food. Sediments from coastal rivers are deposited along the entire continental margin and are then shifted and redeposited by ocean currents. Pollution from rivers, ocean dumping, littering, or oil spills can quickly spread in many directions.

The geographic scope of Oregon's ocean stewardship responsibilities must combine oceanographic characteristics of the biological communities and habitats, as well as, practical management considerations and political boundaries.

Oregon's primary ocean and coastal stewardship responsibilities and resource management interests extend from the seaward edge of the continental margin to the coastal mountains. This area is an ecological entity linked together by many physical and biological phenomena: winds, currents, tides, species assemblages of plants and animals, food webs and migration patterns to name just a few. Human activities in this dynamic and integrated zone can directly affect ocean resources throughout this ecological area.

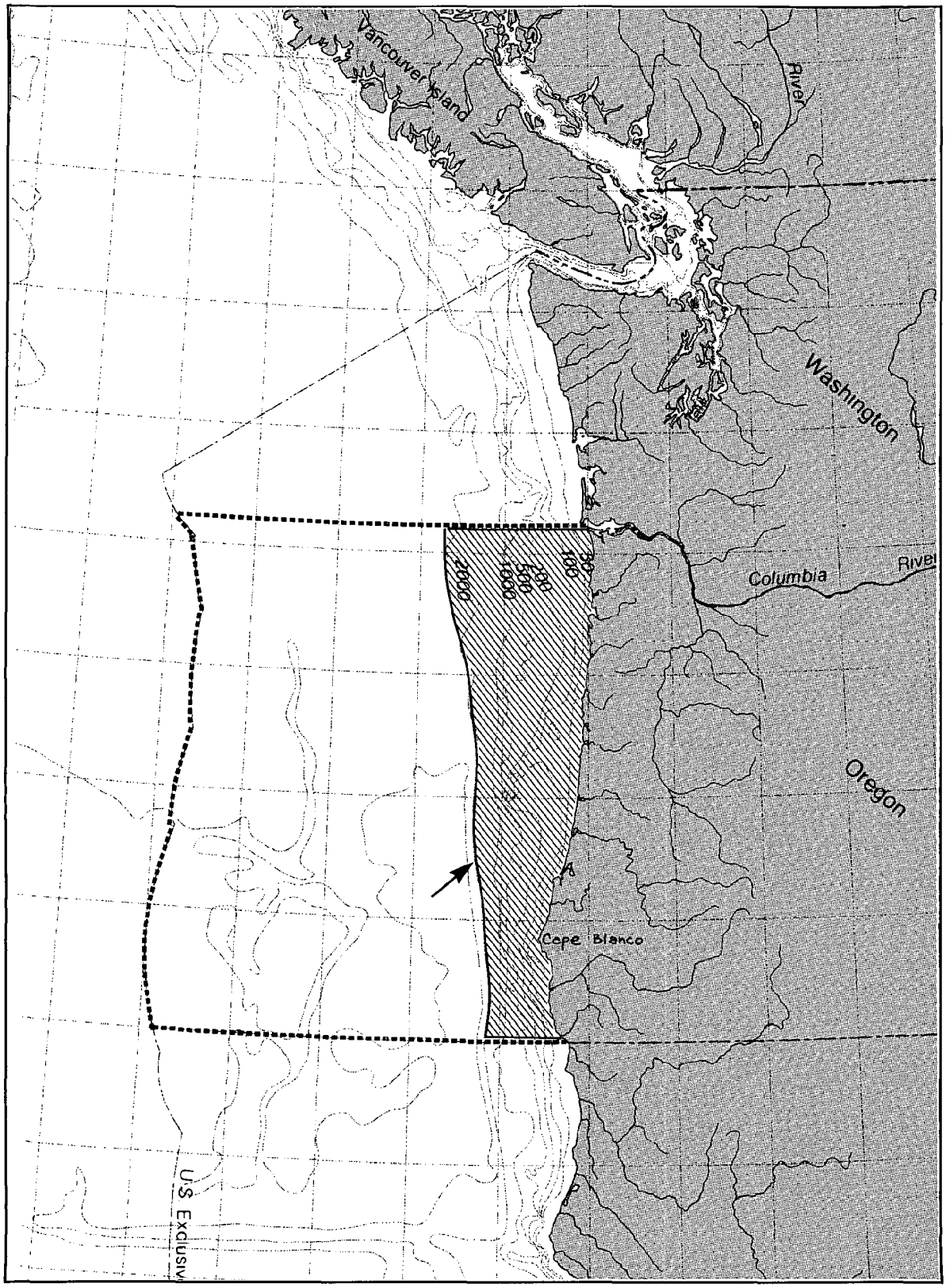
The Oregon statewide land use planning program, including local plans and estuarine plans, addresses activities on the landward side of this zone. The Oregon Ocean Resources Management Plan addresses the water side.

The Ocean Stewardship Area

The ocean stewardship ethic is global in scope, but the Oregon Ocean Plan focuses directly on the coastal and oceanic area in which events directly affect the interests of Oregonians and in which stewardship actions by Oregonians are most likely to have results.

Oregon is making an unequivocal statement that ocean resources management must be based on ecological realities and must reflect the interrelationships of the resources of the continental margin, the human uses of these resources, and the responsibilities and concerns of federal, state and local governments. Oregon is identifying an ocean stewardship area as the ecologically sensible ocean resources management area. The Ocean Stewardship Area is Oregon's area of direct concern and responsibility for ocean resource management.

The Ocean Stewardship Area includes the entire continental margin from mean high water, across the continental shelf, and down to the bottom of the continental slope. The width of the continental margin varies from about 35 miles off Cape Blanco to about 80 miles off the northern coast. Depth to the ocean floor at the edge of the margin varies from about 9000 feet (3000 meters) off the southern coast to about 6600 feet (2200 meters) off the northern coast. A straight line drawn at about 125 degrees and 20 minutes west longitude approximates the seaward edge of the continental margin.



The Ocean Stewardship Area

Oregon does not claim ownership or possession of the entire Ocean Stewardship Area. But Oregon does proclaim that sound stewardship and resource management requires changing the way decisions have been made in the past, especially in this area.

Designation of the Ocean Stewardship Area will neither change the jurisdictional boundaries of the state, nor change the federal legal regimes under which the resources of the exclusive economic zone are managed. Designation will not expand the state's federal consistency authority beyond activities which affect Oregon's coastal zone.

By designating this Ocean Stewardship Area, Oregon is advancing the principles of ecologically sound ocean resources management. Oregon believes this approach can advance the national and international discussions necessary to establish new concepts of ocean stewardship responsibilities.

Within the Ocean Stewardship Area:

- Ocean resource uses and activities directly affect the interests of the State of Oregon
- Oregon has management interests in oil and gas exploration and development, marine mineral mining, marine transportation and ports, marine birds and marine mammals, intertidal areas, ocean fisheries, oil spills, recreation, cultural resources, aesthetic qualities, and water and air quality
- Oregon shares management responsibilities and interests in concert with federal resource management agencies

Within the Ocean Stewardship Area, Oregon will:

- Conserve living marine resources, including biological communities and habitats
- Give priority to renewable resources over nonrenewable resources
- Support scientific research on marine ecosystems, ocean resources, and oceanographic conditions to develop better information upon which to make better ocean management decisions
- Seek appropriate co-management arrangements with the federal government to ensure that ocean resources in the Ocean Stewardship Area are managed consistently in accordance with the policies of the Oregon Ocean Resources Management Plan
- Coordinate and cooperate with adjacent states and encourage regional approaches to management of ocean areas, when appropriate
- Involve local governments and the public in ocean resource management decisions
- Develop marine management areas, where needed, to provide increased opportunities for public recreation, to protect biological communities and habitats, and/or to advance scientific understanding of the ocean.

Stewardship and the Coastal Watersheds

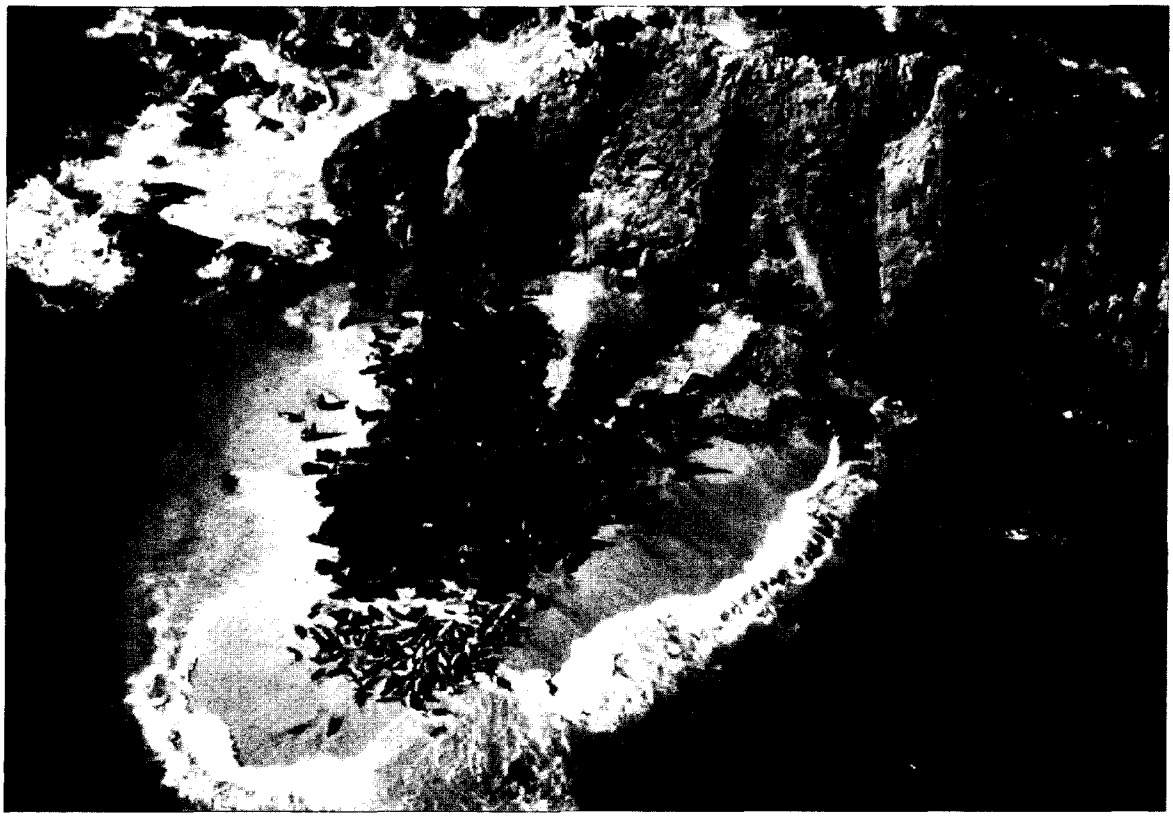
Oregon's ocean resources are interconnected in several important ways with coastal watersheds. Rivers discharge beneficial nutrients and harmful pollutants into the ocean. Estuaries, where fresh river water mixes with salty ocean water, are crucial to the biological cycles of many species of marine animals and directly contribute to the productivity of the ocean. Anadromous fish, primarily salmon, use both freshwater rivers and the salty ocean as equally important ends of a continuum of habitat needs acquired over millions of years.

Oregon's Ocean Stewardship Area neither includes estuarine and riverine habitats nor addresses their management. These rivers and estuaries, their adjacent shorelands, and the lands in the watersheds are already included in Oregon's Coastal Management Program. Cities and counties in the Oregon Coastal Zone have already adopted comprehensive land use plans which address, in addition to fourteen

statewide planning goals, three specific coastal goals Goal 16, Estuaries, Goal 17, Shorelands, and Goal 18, Beaches and Dunes. Each estuary is managed through an estuarine managment plan adopted as part of the county comprehensive land use plan. The Ocean Stewardship Area complements Oregon's comprehensive management program for watershed resources and extends state management policies and activities into the interconnected ocean realm.

Note: *The Oregon Estuary Plan Book*, published in 1987 by the Department of Land Conservation and Development, contains a full explanation of how Oregon's estuaries are managed.

Estuaries are the link between rivers and the ocean. This view of the mouth of Coos Bay reveals how the ocean floods into the bay to mix with fresh water from coastal rivers, which results in a unique, rich habitat for plant and animal life. This estuary mouth, like many others along the Oregon coast, has been stabilized for navigation with rock jetties. (ODOT photo, 1972)



Shell Island, off the tip of Cape Arago near Coos Bay, is particularly valuable as a resting and feeding area for sea lions (the darker animals) and seals (the lighter animals near the tip of the sandy area.) But because this area can be easily reached at low tide, the mammals face increasing disturbance from humans. (U.S. Fish and Wildlife Service photo)

Conservation and Habitat Protection

The conservation of all ocean resources is the principle that guides Oregon's ocean resources management. This principle seeks to protect the integrity of marine ecosystems while giving priority to the protection and wise use of renewable resources over nonrenewable resources.

Ocean resources conservation means that the integrity, diversity, stability, complexity, and the productivity of marine biological communities and their habitats are maintained or, where necessary, restored. Ocean resources conservation also means that Oregon will attempt to accommodate the needs for economic development while avoiding wasteful uses and maintaining future availability. However, if a development activity endangers the quality of oceanic ecosystems which provide renewable resources for the long term future, then economic development activities cannot take precedence over ocean resources conservation.

The Need for Conservation

The ocean may seem boundless and its resources unlimited. But the size of the ocean, its unseen depths, and its seemingly infinite expanse obscure the fact that its productive and assimilative capacities are limited. As big as it is, the ocean system is affected by both human-caused disruptions and natural fluctuations. More and more, ocean waters are called upon to provide resources for growing human populations and to absorb society's increasing wastes.

Pollution can impact large areas and affect large populations of marine organisms. If fish harvests exceed a population's ability to maintain a viable, sustainable size, then fish populations can collapse, entire biological communities can be altered, and entire fishery industries can be displaced. Coastal community development and population growth can result in non-point source pollution and can encroach upon nesting and breeding habitats for marine birds and mammals.

Future demands on Oregon's ocean for food, waste disposal, energy, minerals, and other uses mean that the ocean system will be increasingly sensitive to depletion, degradation, or destruction. Ocean resource management decisions should be made with caution and a view toward the future. Short term gains must not be made at the cost of long term detriments to the marine ecosystem. Careless use and wasteful exploitation violate the principle of conservation.

Ocean resource conservation is good for Oregon's economy. Much of Oregon's economy, especially on the coast, depends directly on maintaining a healthy natural resource base: sustainable populations of fish and shellfish, unpolluted air and water, recreational opportunities, and outstanding visual qualities, to name just a few. A healthy future for Oregon means conservation.

Habitat Protection

All plants and animals require certain habitat conditions to survive and flourish. In the ocean, these habitats are a complex combination of many factors, including seafloor type, water depth, light penetration, wave exposure, and nutrient availability. Some organisms, especially seabirds and marine mammals, require isolation from human activities as an element of their habitat.

Diverse, abundant habitat types are the foundation of a productive marine ecosystem. Habitat diversity provides resilience against damage to populations that could result from either natural or human-induced environmental changes. Habitat destruction can have unforeseen consequences for populations, communities, or ultimately, for entire marine ecosystems.

Ways to Conserve Ocean Resources

A wide range of approaches for conserving ocean resources exist. State and federal resource agencies already employ many different management techniques to conserve ocean resources. For example, they set permit conditions, require use of the best available technology, establish harvest limits, set fishing seasons, encourage or require mitigation, and impose environmental performance standards.

Pollution control technologies can reduce the effect of waste discharges on marine ecosystems. Harvest limitations or gear restrictions are used by fishery management agencies to maintain long-term sustainable yields of fish. Off-site mitigation measures can sometimes compensate for otherwise unavoidable ecosystem damage. In some cases where an ecosystem or a species is under severe stress, human activities or use of a resource must simply be prevented and the habitat or species preserved.

Managing marine ecosystems and protecting biological communities and habitats, rather than just managing individual species and activities, are essential to a sound ocean resource conservation program. State and federal agencies, long accustomed to managing harvests of certain species or focusing on a single activity, such as navigation or water quality, must begin to develop a better understanding of marine habitats and the populations and communities they support. This understanding must be incorporated into management decisions. Major research and study of habitat elements and conditions, especially in the productive nearshore region, are necessary. Program goals and policies will need to reflect a habitat management philosophy.

In the long term, comprehensive planning and ecosystem based management is often the best way to resolve issues and provide for sustainable resource use. Management which focuses on the interactions between biological communities and habitats in the ocean is a new effort nationally and internationally. But ecosystem-based comprehensive planning and management are essential to the conservation of ocean resources necessary to support human communities for the long term future.

Ocean Resources Conservation in Oregon

Ocean resources conservation is the mandate of the Oregon Ocean Resources Management Act of 1987:

> *Oregon will conserve the long-term values, benefits and natural resources of the ocean both within the state and beyond by giving clear priority to the proper management and protection of renewable resources over nonrenewable resources.*

The legislature's choice to give "clear priority" to renewable over nonrenewable resources reinforces an existing policy in Oregon's Coastal Management Program. Statewide Planning Goal 19, *Ocean Resources* requires that:

> *All local, state and federal plans, policies, projects and activities which affect the territorial sea shall be developed, managed and conducted to maintain, and where appropriate, enhance and restore, the long-term benefits derived from the nearshore oceanic resources of Oregon. Since renewable ocean resources and uses, such as food production, water quality, navigation, recreation, and aesthetic enjoyment, will provide greater long-term benefits than nonrenewable resources, such plans and activities shall give clear priority to the proper management and protection of renewable resources.*

Goal 19 further requires the identification and protection of important biological habitats; the protection of the integrity of the marine ecosystem, including its natural productivity and diversity; and the long-term protection of resources of the continental shelf for fishing, navigation, recreation, or aesthetic purposes. Any minerals mining, oil and gas development, dredged material disposal, or ocean dumping of wastes must not substantially interfere with or detract from the use and long-term protection of renewable resources.

Goal 19 identifies Oregon's principal ocean resources conservation techniques. These are the identification of environmental resources that may be affected by a resource use, the assessment of the effects of a proposed resource use, and the use of contingency plans for emergencies.

Protection and Preservation of Critical Habitats and Species

Special protective measures may be needed for certain critical habitats to maintain the integrity of the marine ecosystems or to assure the survival of populations of threatened or endangered species. Special protection of critical habitats and species is necessary when certain human activities or uses threaten the long term viability of an ecosystem, its biological communities and habitats. Increased protection usually means some kind of restriction on activities or uses.

Endangered, threatened, or sensitive marine bird and mammal species require special protection to insure their survival as viable populations, and to prevent species extinction. Only a few areas off the Oregon coast are likely to require this intense level of protection.

Oregon's Coastal Management Program recognizes the need to protect critical habitats. Goal 19, *Ocean Resources*, requires protection of ". . .important biological habitat. . .and other biologically important areas for marine mammals, marine birds, and commercially and recreationally important fish and shellfish."

Increased protection of a critical habitat must be justified on a case-by-case basis. Factors to be considered include:

- The ecological significance of the habitat to maintaining ecosystem structure, biological productivity, biological diversity, and representative species assemblages
- The ecological importance of the area to maintaining populations of threatened or endangered species
- The importance of the area in important life history stages of marine organisms, especially special areas used for feeding, courtship, breeding, spawning, nurseries, parental foraging, overwintering, and resting or haul out
- Vulnerability of the biological community and the habitat to the adverse effects of pollutants, noise, seismic testing, habitat alteration, human trespass, and harvest
- The severity of impacts on the biological community and the habitat from existing or potential uses
- The uniqueness of an area within Oregon's Ocean Planning Area

Some habitats are so important to the continued health of marine ecosystems that the more use-oriented management techniques do not afford sufficient protection. Other habitats or species are unique to Oregon and may require special measures to protect against adverse effects from other ocean uses. Oregon's overall ocean resources conservation policies requires that these important, vulnerable or extremely valuable resources be preserved.

In such cases the need to preserve certain resources or qualities of the marine ecosystem should take priority over human activities or resource uses.

Preservation means that no adverse human-induced changes to a biological community or habitat should be allowed, and that human activities which could cause such changes need to be prohibited.

Information Needs

Information about marine resources and environmental conditions is crucial to the implementation of a conservation policy. Existing state and federal programs already require that a significant level of resource, environmental, and socioeconomic information support ocean resources management decisions.

For example, Oregon's Statewide Planning Goal 19, *Ocean Resources*, requires government agencies that carry out actions, projects, or plans affecting ocean resources to

> *. . .develop inventory information necessary to understand the impacts and relationship of the proposed activity to continental shelf and nearshore ocean resources. As specific actions are proposed, inventory information shall be gathered . . . . sufficient to describe the long-term impacts of the proposed action on resources and uses of the continental shelf and nearshore ocean.*

In addition, the National Environmental Policy Act (NEPA) requires federal agencies to prepare an environmental impact statement (EIS) prior to making decisions on "major Federal actions significantly affecting the quality of the human environment."

Oregon's ocean resources conservation program will build on these existing information requirements and will strive to forge a strong link between scientific and economic information and public policy decisions.

Recommendations

The goals of the Oregon Ocean Plan are to conserve all marine resources; to protect marine habitats; and, where necessary, to preserve fragile, vulnerable, unique, and critical marine communities and habitats.

The recommended conservation and habitat protection policies set the stage for the entire Ocean Plan. Recommended policies and needed actions for specific ocean resources and uses are found in the section called *Resource Issues and Recommendations*. Recommendations on improving ocean resources governance, education programs, research activities, and on needed legislative changes are found in the section called Getting the Work Done.

Recommended Policies for Conservation

1. Allow only those activities and uses of ocean resources in Oregon's Ocean Stewardship Area which are consistent with the goal of ocean resources conservation.
2. Require an environmental inventory and impact assessment for all ocean resource management decisions with potential to significantly affect the marine ecosystem. Assessments must analyze and describe the long-term effects of the proposed action on biological communities, marine habitats, and uses of the continental shelf and nearshore ocean.
3. Require an environmental risk assessment for all proposals to develop nonrenewable ocean resources. This assessment shall determine the probability that biological communities and habitats will be exposed to adverse effects from operating procedures or accidents, the sensitivity of these biological communities and habitats to such exposure, and the probable impacts of exposure on the marine ecosystem.
4. Prohibit a proposed activity when the environmental impact and risk assessments show that the value of affected biological communities and habitats is high, the risk of adverse effects from the proposed activity is high, and the proposed activity cannot be modified to reduce the risks to acceptable levels.
5. Resolve conflicts between ocean resource uses to:
   - Protect the overall integrity, diversity, stability, and complexity of the marine ecosystem.
   - Give priority to the conservation of renewable resources; to renewable resource uses over nonrenewable resource uses; and to non-consumptive uses over consumptive uses.
6. Use non-regulatory means to promote and achieve ocean resource conservation, when likely to have results equivalent to or better than regulatory means.
7. Promote public education and interpretation

programs to increase understanding of marine ecosystems and the need for ocean resource conservation.

8. Support the use of mitigation techniques to reduce adverse effects on biological communities and habitats to the maximum extent practicable. However, the potential for mitigation shall not be used as the sole justification to allow an ocean resource development activity.
9. If necessary to obtain needed information about environmental risks and effects, allow small-scale pilot projects under the following conditions:
   - A pilot project must include research on the effects of the activity on the marine ecosystem, and must make the results of research available to the public.
   - A pilot project must conserve living marine resources; and must not adversely affect any critical marine habitat.
   - A pilot project must be carefully monitored by state and federal agencies.
   - A pilot project must be scheduled only for short periods of time, must be evaluated before proceeding to additional activities, and must avoid interference with other existing uses
   - The scale of a pilot project must be the minimum to obtain the needed information.

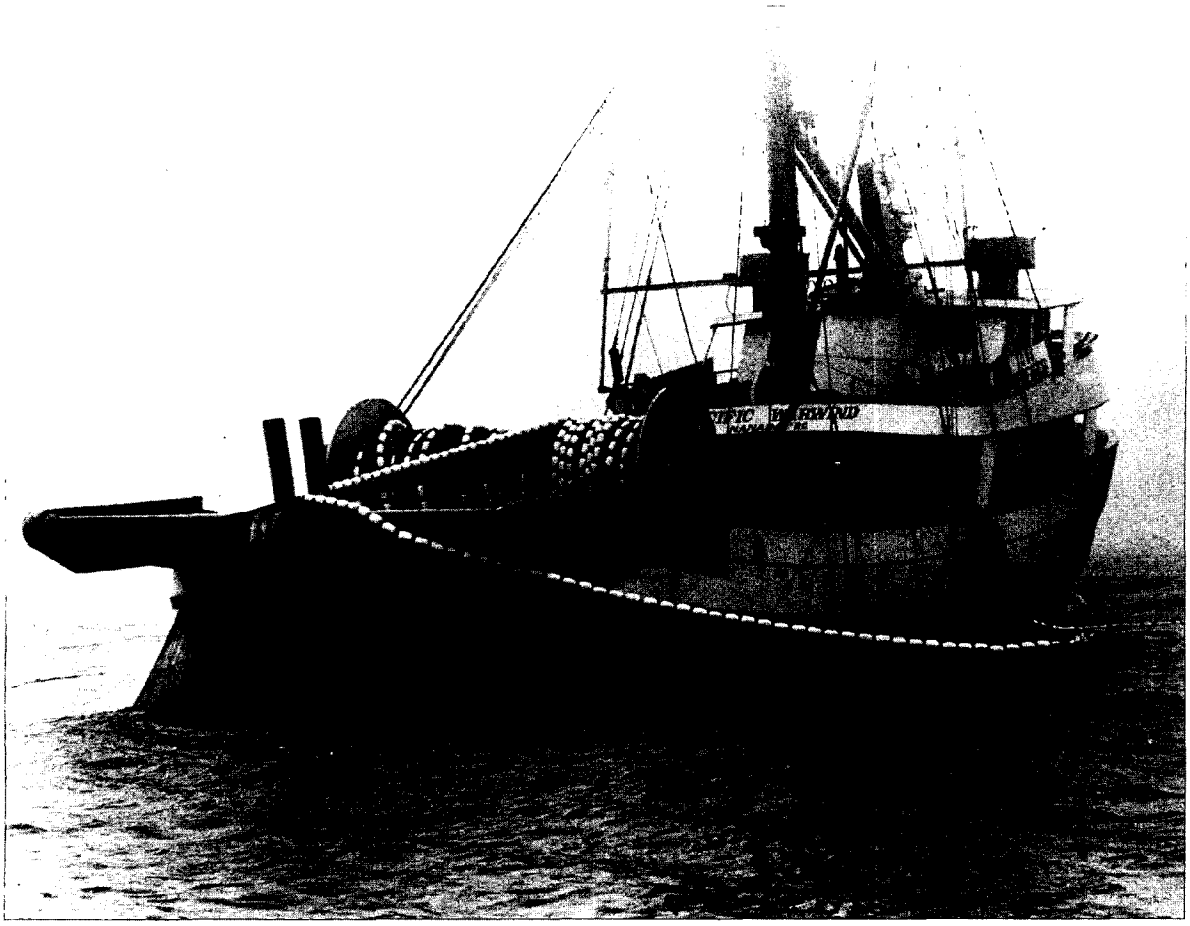
Recommended Policies for Habitat Protection

1. Expand state agency decision making on ocean resource uses and activities to include considerations of entire ecosystems, in addition to individual species or activities management
2. Identify critical habitats within the Oregon Ocean Stewardship Area which require special management or protection. Protect these biological communities and habitats from adverse effects, disruption, or damage.
3. Enforce federal and state laws protecting migratory birds, marine mammals, and endangered, threatened, and sensitive species.
4. Restrict uses or access, if necessary, to protect endangered, threatened, and sensitive species or their habitats.

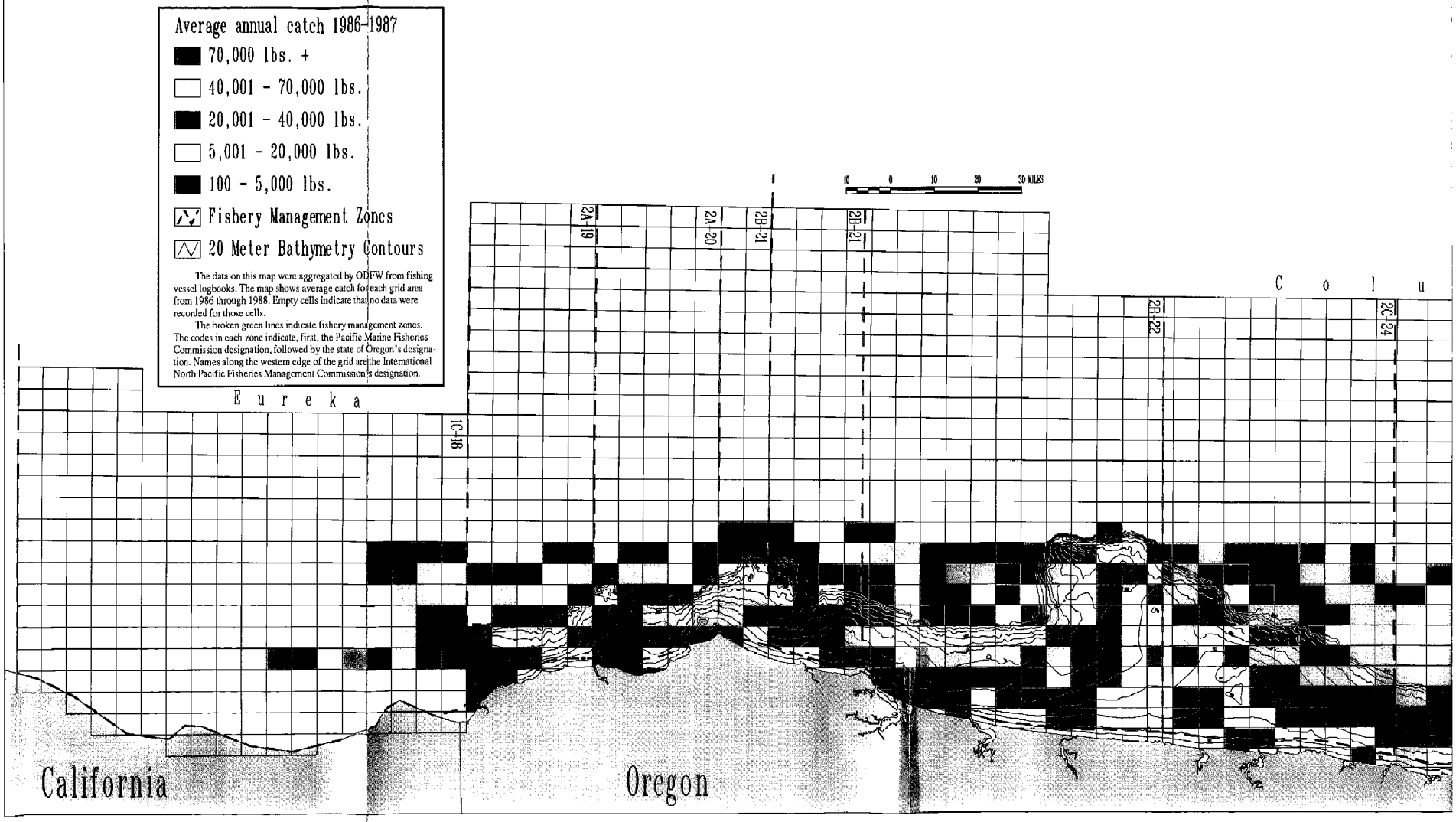
Dungeness crab, fresh from the ocean's cold waters and then a steaming water kettle, are sold at markets up and down the Oregon coast. More than simply a delicious seafood, Dungeness crab symbolizes a coastal way of life. (Oregon Sea Grant)

Resource Issues and Recommendations

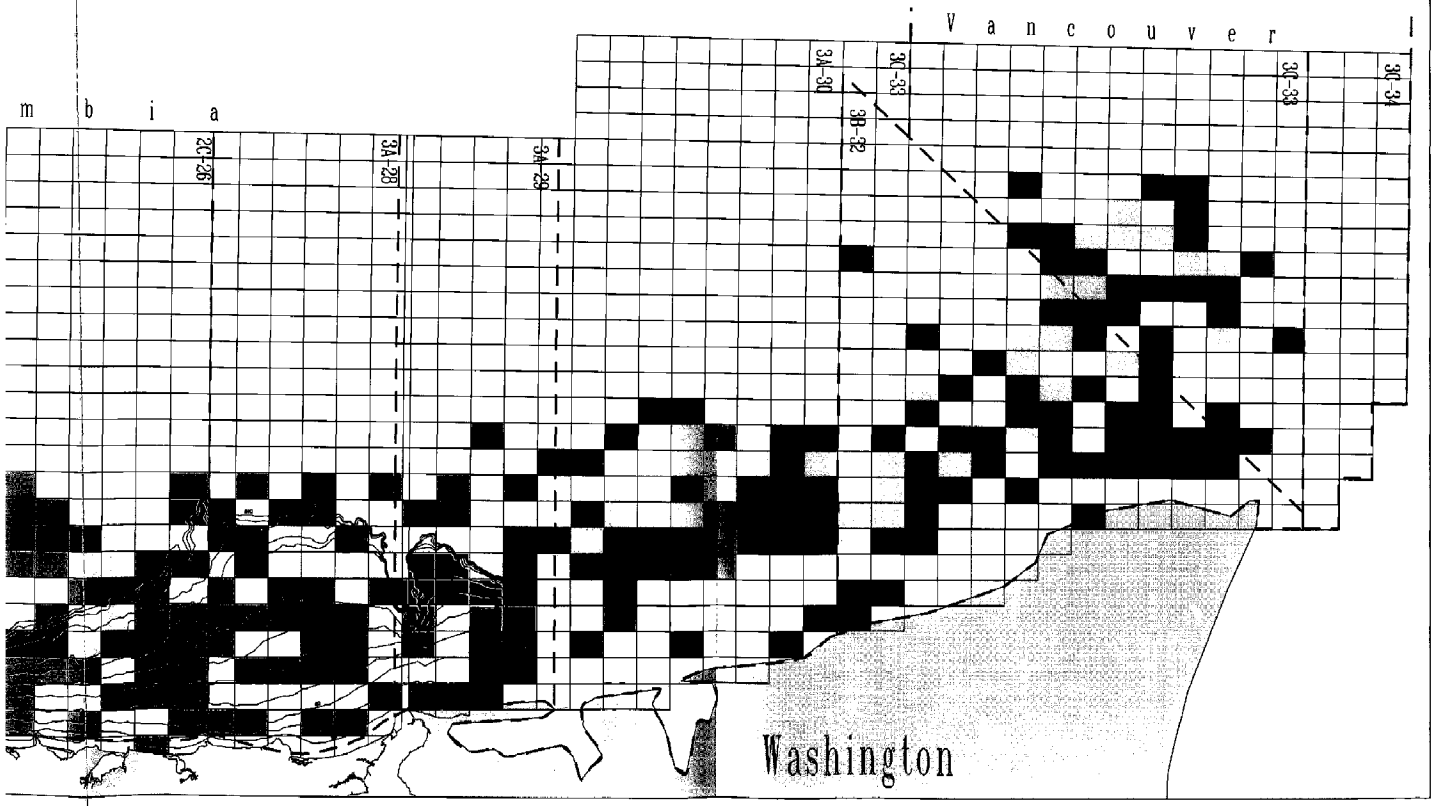
Ocean Fisheries
Marine Birds and Mammals
Intertidal Plants and Animals
Recreation, Tourism, and Cultural Resources
Water and Air Quality
Oil and Gas
Oil Spills
Marine Minerals



Pulling in a research catch for Oregon State University on this cruise, this vessel out of British Columbia shows the typical net and drum arrangement of larger west coast "high line" trawlers which fish the productive waters off Oregon. (Oregon Sea Grant)


Average annual catch 1986-1987
70,000 lbs. +
40,001 - 70,000 lbs.
20,001 - 40,000 lbs.
5,001 - 20,000 lbs.
100 - 5,000 lbs.
Fishery Management Zones
20 Meter Bathymetry Contours
The data on this map were aggregated by ODFW from fishing vessel logbooks. The map shows average catch for each grid area from 1986 through 1988. Empty cells indicate that no data were recorded for those cells.
The broken green lines indicate fishery management zones. The codes in each zone indicate, first, the Pacific Marine Fisheries Commission designation, followed by the state of Oregon's designation. Names along the western edge of the grid are the International North Pacific Fisheries Management Commission's designation.
10 0 10 20 30 MILES
Eureka
1C-18
2A-19
2A-20
2B-21
2B-21
2B-22
2C-24
C o l u
California
Oregon

3-year Average Catch for Sablefish



Ocean Fisheries

Resources

Characteristics and Contributions of Oregon's Fishing Industry

Whether counted in dollars of personal income generated or appreciated as the history and cultural characteristics of people who face the elements to make their livelihoods at sea, commercial and recreational fisheries are keystones of Oregon's coastal economy and culture.

Fishing is a cherished "way of life" for many coastal residents, offering a sense of freedom and independence often hard to achieve in the modern world. The competitive nature of the business and the outdoor environment provide additional rewards. But, economic risks and unpredictable incomes also come with the occupation.

Fishing can be a tradition in a community and a heritage in a family. Even those who don't fish for a living get a special pleasure from watching a fishing boat pass under a bridge going out to sea or unload its catch in an bustling fishing port.

Importance to Coastal Economy

Ocean fisheries are an important part of Oregon's coastal economy. Economic significance can be expressed in several ways. Pounds landed in a fishery in a given year begins to tell the story of economic value and can be a basis for comparison between years. Ex-vessel value is the amount of money actually paid to the fishermen for fish landed. Another measure is the amount of personal income (total wages, salaries, and profits) generated in a community directly by harvesting and processing and indirectly in those industries and businesses which supply goods and services to the fishing industry. Complex economic models can be used to calculate the contribution of the fisheries industry to local, state and regional economies. The West Coast Fisheries Assessment model was developed for the West Coast Fisheries Development Foundation and is the source of most of the economic information presented here.

Ocean fishing contributes about 10 percent of the total personal income of coastal counties and communities. In major fishing ports such as Newport and Astoria, commercial fishing can account for over 25 percent of all personal income. Statewide, commercial fishing and processing contributed almost $300 million in personal income to the Oregon economy in 1989. Recreational ocean fishing also generates a considerable amount of personal income in Oregon. Charterboat trips in 1985 generated over $4.5 million in personal income. The local personal income impact of recreational ocean salmon fishing in Oregon in 1985 has been estimated at $10.8 million.

Diverse Community

But numbers only begin to tell the story of Oregon's fishing community. The fishing community is not easily described and no single description can accurately portray this diverse community. Even the term "fishing" is imprecise and is used to describe a variety of efforts.

Within both the commercial and the recreational industries, a fishery may be categorized by the species being caught: the salmon fishery or the shrimp fishery, for example. Gear types

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The plot on the facing page shows average annual sablefish catch off Oregon from 1983 through 1986. Actual logbook catch data were used by ODFW to develop the database represented in part by this plot, but trawl locations were aggregated into 5-minute blocks to protect the proprietary nature of the data.

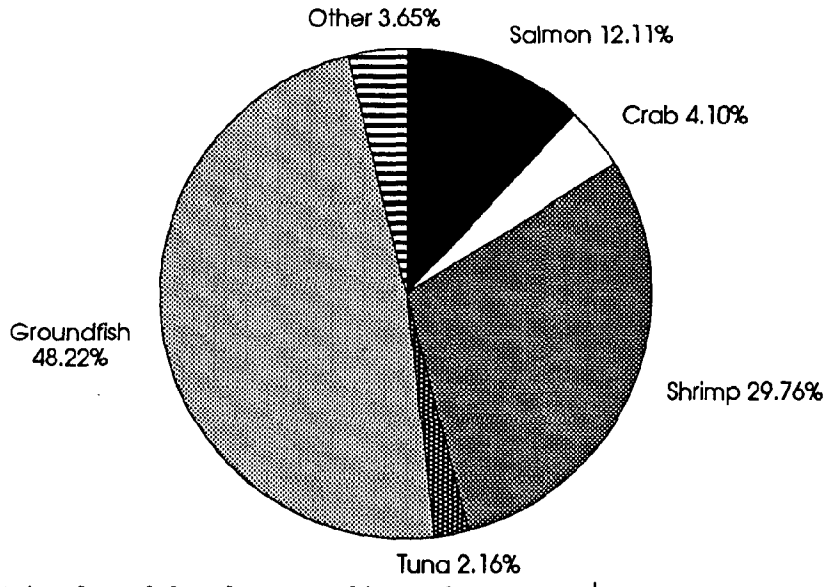
Also shown are the fishery management zones off Oregon and bathymetry to the edge of the continental shelf.

Source: ODFW

also define different fisheries, such as the bottom trawl fishery, the troll fishery, or crab pot fishery. Yet, often one type of fishing gear is capable of catching a number of different species. And, any given species can be caught by a number of different types of fishing gear (although some species can be legally kept only if caught using a particular gear type). Further, many fishermen modify their gear or have boats which can be rigged with several different types of gear so that the fishermen can enter or leave different fisheries depending on season, species abundance, market prices, or government regulations.

Fishing vessel captains are a heterogeneous group. A recent survey of trawl vessel captains showed that they ranged in age from 25 to 65, in education from grade school to Ph.D.s, and in experience from 1 to 44 years.

1986 commercial fish landings



The Oregon fishing industry includes boat crewmembers, captains, and owners; buyers, packers, and processors; and marketers of fishing gear and supplies. Most fishermen are small, independent businessmen who may pursue widely divergent business strategies. And although they sometimes compete for the same species, commercial and recreational fisheries are two different industries often involving different people and different boats.

The major fishing ports are Astoria, Tillamook, Newport, Coos Bay, and Brookings. Other smaller ports focus on a particular fishery: Port Orford on sea urchins or Depoe Bay on recreational fishing, for example.

"Common" Resource

The fishing community does share in one thing: all fishermen are dependent upon a public or "common" resource. The fish and the habitat in which they live are not "owned" by any one person or group. Government agencies have management responsibilities for fish, wildlife and their habitats. Fishermen may capture and sell fish and the fisherman who is the most skilled, the most efficient, or the luckiest can earn more than others. As a common resource, many may use the fisheries resources of the ocean and many may use the ocean in ways that can affect fisheries resources. Only through practicing stewardship and complying with laws and regulations can these common resources be protected and maintained for the good of all, for the long term.

Fisheries Management

The state and federal governments are actively involved in a number of fisheries through regulation of seasons, gear types, allowable mesh sizes, trip limits, annual harvest quotas and through the issuance of licenses and permits. Some fisheries are also managed as limited entry programs which control the num-

Personal Income Contribution of the Oregon Commercial Fishing and Processing Industry in 1989

Astoria area (includes Columbia River fisheries)	$70.8 million
Tillamook area	$10.5 million
Newport area	$95.0 million
Coos Bay area	$46.5 million
Brookings area	$15.3 million
TOTAL *	**$ 294.9 million**

* NOTE: The total is slightly greater than the sum of the coastal counties due to "leakages" of purchases which occur in areas outside the coastal counties.)

ber of vessels in an fishery.

Fisheries management tends to focus on individual species or an assemblage of similar species.

The goals of fisheries management are multiple and include efforts to protect the resource from overfishing; to maintain the economic viability of the fishing industry; to maximize the economic value of the resource; to maximize the biological yield of the stocks; and to result in cost effective and enforceable regulatory regimes. Successful achievement of these goals can be extremely difficult, especially in those numerous situations when achieving one goal means not achieving another.

The Oregon Fish and Wildlife Commission

The Oregon Fish and Wildlife Commission, acting through the Oregon Department of Fish and Wildlife (ODFW), is responsible for the management of the fisheries resources of the state, including the protection and enhancement of important fisheries habitats. ODFW is also responsible for the collection, application, and dissemination of information on the management of wildlife and food fish resources. There are limitations to the power of the Fish and Wildlife Commission and ODFW. Their jurisdiction does not extend to treaty Indians or to U.S. Fish and Wildlife Service hatchery operations. ODFW must share management responsibilities and regulatory jurisdiction with the Pacific Fishery Management Council for several ocean fisheries. In addition, the International Pacific Halibut Commission, a U.S.–Canadian organization, manages the entire Pacific halibut fishery off the western coast of North America.

The Magnuson Act

The Magnuson Fishery Conservation and Management Act of 1976 (MFCMA) is the major federal law governing ocean fisheries of regional importance. Prior to 1976, fisheries management in the U.S. was a complex, haphazard, and uncoordinated mix of state laws and regulations which often resulted in either no management of a fishery or different management approaches on the same species in adjacent states. Information on fish landings and the status of fish populations was fragmented and inadequate to really understand what was going on in the fisheries.

What was clear from the 1930s to the early 1970s was that the U.S. fishing industry was

relatively static while foreign fishing off U.S. shores had dramatically increased. Extensive foreign fishing was adversely affecting the balance of trade and the economic viability and future of the domestic fishing industry. Furthermore, the large and efficient foreign fishing and factory ships were threatening to overfish a number of important fish species off the U.S. coast.

The Magnuson Act extended national fishery management jurisdiction out to 200 nautical miles (the fishery conservation zone or FCZ).

Within the FCZ, foreign fishing is prohibited unless authorized by an existing international treaty or by international agreements which meet the requirements of the Magnuson Act. Foreign nations are required to apply to the U.S. for approval to fish within the 200 mile zone or to fish for U.S. anadromous fish beyond 200 miles. The Magnuson Act clearly states that preference to harvest fish within the 200 mile zone must go to U.S. fishermen. The system under the Magnuson Act requires that the federal government set a total allowable foreign fishing catch that allows foreign vessels to catch only that portion of an optimal yield of a fishery which is not being harvested by U.S. fishermen. The Magnuson Act also requires that foreign vessels allow U.S. officials to board, observe, search and inspect the vessels and their operation to insure compliance.

The Magnuson Act also provides for joint ventures. Joint ventures are agreements between foreign and U.S. companies. U.S. fishermen catch the fish that would otherwise be underexploited because the U.S. fishing industry doesn't have the capacity to process them or because there is no U.S. market for the particular species. The U.S. fishermen sell their catch directly to foreign factory ships for processing.

Regional Fishery Management Councils

Regional fishery management councils were established by the Magnuson Act as an attempt to provide some management consistency to those important ocean fisheries which are regional in scope. The regional fisheries management councils are composed of a representative of the federal government, state fisheries management directors, and individuals nominated by the governors of the member states. The councils are responsible for developing management plans for important regional fisheries occurring primarily between 3 and 200 miles of the coast. The Secretary of Commerce has the basic authority for managing these regionally important fisheries, based on the recommendations of the regional councils. States continue to have management authority within 3 miles of their shore. However, the Secretary of Commerce can preempt state authority if he or she finds that the state management actions will substantially and adversely affect the carrying out of a fishery management plan (FMP) adopted by the council. Therefore, state fishery management plans and regulation usually parallel regional FMP's. The National Marine Fisheries Service (NMFS), a branch of the National Oceanic and Atmospheric Administration (NOAA) within the U.S. Department of Commerce, is the federal agency responsible for the administration of the Magnuson Act and for developing fishery data to support management decisions.

The states of California, Idaho, Oregon and Washington are members of the Pacific Fishery Management Council (PFMC). Oregon has two obligatory seats on the Council: the director of ODFW and an individual who is nominated by the governor and who is required by law to be knowledgeable and experienced in fisheries issues. An Oregonian may also serve as an at-large-member of the Council, increasing Oregon's representation at times to three seats of the thirteen total seats. The Council has adopted fishery management plans for salmon and groundfish, an assemblage of bottom and mid water species, including cod, rockfish, sole, and flounder. The Council has no management

responsibilities for tuna, a highly migratory species extending far beyond regional waters of the Pacific Northwest; for halibut which is managed through an international treaty with Canada; or for fisheries which are managed by tribal groups.

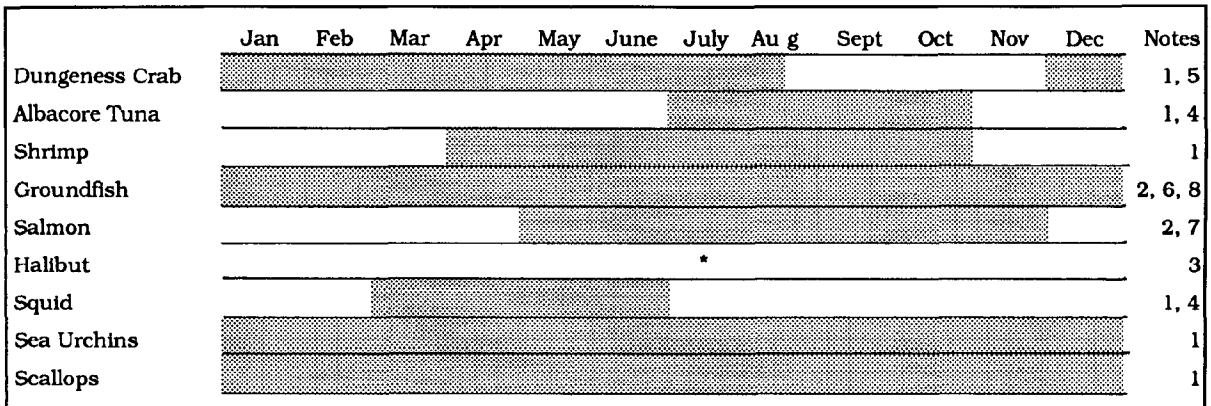
Recent History of Oregon's Ocean Fisheries

The fishing community has been through good times and extremely bad times. Some fishermen have become wealthy while others have gone broke. A vast array of factors unrelated to fishing knowledge or skill can interact to determine the fortunes of individuals within the fishing community and the fishing economy as a whole. The fisheries industry and the fates of individual fishermen are sensitive to changes in local, national and even global markets; the introduction of new harvesting, processing and transportation technologies; annual and seasonal variability in weather patterns, oceanographic conditions, and fish populations; environmental pollution and habitat destruction both at sea and on the land; stresses in other industries, such as the oil and gas industry and the insurance industry; and changes in state, national and even international governmental policies and regulations, some of which only indirectly involve fishing.

The Years 1960 to 1989: Boom, Bust, Recovery and Adjustment

From 1960 to the present has been the most turbulent period in the history of Oregon's commercial fishery. Some fishermen became quite successful during the 1960s and then lost all they had gained. Several fisheries declined drastically during the early 1980s, but

Oregon's commercial fishery seasons



Source: Bob Jacobson

Notes:

1 Fishery managed by ODFW
2 Fishery managed by the Pacific Fishery Management Council and ODFW
3 Fishery managed by International Pacific Halibut Commission. 1989 season limited to 2 days.
4 No regulated season opening and closing dates. Timing and length of seasonsd may vary annually, depending on oceanographic, environmental, and market conditions.
5 Crab pots can legally be placed in water 64 hours prior to the 12/1 season opening date.
6 Year-round seasons for both trawl and fixed gear fisheries, but vessels regulated by trip poundage limits on species or groups of species.
7 Salmon season opening and closing dates vary by species and area, but always occur from May 1 to November 30.
8 The joint venture fishery for whiting ordinarily starts in April and closes when the quota is reached. In 1989, the quota was reached in the end of June.

in the last few years catches have either leveled off or improved, with the catch in some fisheries approaching record levels.

In the late 1960s, increased earnings in the salmon and crab fisheries brought prosperity for many Oregon fishermen. Many invested their profits in new vessels and equipment, aided by federal programs such as the Farm Credit Act, the Capital Construction Fund, and the Fishing Vessel Obligation Guarantee Program. Landings continued to increase through most of the 1970s, with shrimp a particular success: in 1978, the ex-vessel value of shrimp exceeded that of troll-caught salmon.

Japanese and Soviet vessels, fishing off the Oregon coast since the mid-1960s and off Alaska a decade earlier, had severely damaged the stocks of halibut, Pacific ocean perch and other species. However, after passage of the Magnuson Act in 1976, which declared U.S. jurisdiction within 200 miles of our coastline, optimism regarding the future of the commercial fishing industry rose to extremely high levels. The result was a burst of boat building—shrimpers, bottom trawlers, and midwater trawlers—unmatched in the history of the commercial fishery. In the late 1970s the salmon and shrimp fisheries declined dramatically, but trawl fisheries prospered. A midwater trawl fishery for widow rockfish developed off Oregon in 1978 and grew rapidly.

In 1978, a then-controversial fishery developed on Pacific whiting (hake), a species which previously had been caught only by foreign vessels and for which there was little U.S. market. Operating under a joint venture agreement with the U.S.S.R., Oregon fishermen harvested an initially small quantity of hake and transferred it to a floating Soviet factory ship for processing and distribution on international markets. Since 1978, the number of joint ventures and the amount of fish caught has grown rapidly. Between 20 and 30 Oregon fishermen have been involved in whiting joint ventures off the Oregon coast with the U.S.S.R., Japan, Poland and Bulgaria. Many more have participated in joint ventures in Alaska with several foreign nations. In 1985 American catcher boats took approximately 200,000 tons of whiting off the Washington, Oregon, and California coasts. As of 1989, there are no more directed foreign fisheries on whiting within the 200 mile zone. The initial controversy and concerns over joint ventures have subsided and the fisheries are closely managed and rigidly monitored by the Pacific Fishery Management Council and NMFS.

Joint ventures have provided a tremendous economic boost to a select few Oregon fishermen. Joint ventures have been, overall, the most lucrative of any of the fisheries during the 1980s. In addition, vessels that have been participating in the joint ventures are ones that otherwise would have been fishing on traditional groundfish stocks. Therefore, more vessels have been able to participate in the Oregon trawl fishery.

The years from 1980 to 1984 brought tremendous upheaval. Some of the commercial fishery was overcapitalized, with too many boats competing for declining resources. The oil price hikes of 1979, high interest rates, and subsequent insurance rate increases hit fishermen quite hard.

And then in 1982, an El Niño caused havoc all along the coast. An El Niño event occurs when normal wind patterns over the Pacific break down, allowing warm surface water to back up and spread out over the coastal eastern Pacific. The changed current patterns result in changed fish migration patterns, reduced growth and survival rates, and changes in the distribution and quantity of prey species. The 1982 El Niño, one of the strongest on record, devastated the industry. Boat payments were missed and some fishermen lost homes and other possessions.

Almost the only success story in this period was the distant water fishery. More and more Oregon fishermen joined in such Alaskan

fisheries as Dungeness crab, sablefish, halibut, groundfish and pink shrimp. In some Oregon ports, the income brought back from Alaska soon represented a substantial portion of all fishery income.

With the end of the El Niño, ocean temperatures returned to normal levels. Fewer boats competed for the returning stocks, and by 1986 recovery was well underway.

During most of the 1980s, consumer demand for seafood products in the U.S. grew steadily at rates greater than in the prior decades. Factors leading to the rise in seafood consumption include increase in income, changing lifestyles, and a greater awareness of the health benefits of seafood. However, growth in per capita U.S. annual consumption has declined in recent years. During 1989, prices for most seafood products declined—some dramatically. Should these lower prices remain, as increased competition in both harvesting and marketing also take place, the Oregon fishing industry could face a period of adjustment.

The Future

Recent analyses done for the Oregon Coastal Zone Management Association and the National Coastal Resources Institute suggest that changes in Oregon's fisheries industry may be necessary. For example, to compete successfully with Alaskan salmon and Norwegian farmed salmon, the marketing of Oregon salmon may need to emphasize the high quality and desirability of wild Pacific salmon which are brought to market quickly. And development of an Oregon onshore whiting processing industry may be an economic antidote to Alaskan catcher-processors working in the waters off the Oregon coast and reducing the groundfish that would otherwise be landed in Oregon.

Recreational Fisheries

Recreational salmon fishing is the keystone of the recreational fisheries industry. The target species are chinook and coho, with coho constituting about 80-90 percent of the recreational catch. Coho generally occur at shallower water depths and are, therefore, more accessible to recreational fishing gear than chinook, which are generally found deeper in the water column. Most recreational salmon fishing takes place in or quite near the territorial sea. In addition, since recreational boats are day boats, coming in at the end of each day, most recreational salmon fishing occurs within 10 miles of port.

In general, the recreational salmon fishing effort is highest in July, followed closely by August. Recreational salmon seasons, like commercial seasons, are quite complex, varying with location and from year to year. In-season management actions such as season closures, area closures, and restriction of fishing to certain days of the week, are also common. The long term goal of recreational salmon management for the Oregon coast is a season lasting from Memorial Day through Labor Day.

The recreational salmon fishing fleet is composed of private and passenger-carrying charter boats. Accurate data on the number of private and charter boats actually engaged in the sport salmon fishery off the Oregon coast at any one time are difficult to obtain. There are no good data on the salmon fishing efforts from private boats. And, estimates in 1986 indicated that only 132 of the 226 licensed charter boats were actually involved in the recreational salmon fishery.

Groundfish also are of major importance in the recreational fishery. Recreational groundfish fishing is pursued from private boats and charterboats and from the shore. While there are no seasonal restrictions on recreational fishing and groundfish are found in at least small numbers over much of the continental shelf, most of the recreational fishing occurs from late spring through early fall and is done within the territorial sea. Reef areas where rock outcroppings occur relatively near the shore are quite popular. Major reef areas in-

clude the area from Tillamook Head to Cape Lookout, the area from Siletz Bay south to Alsea Bay, a small area off Cape Arago, and an area running from the Pistol River south to the California border. The only recreational groundfish areas outside the territorial sea are two areas off Tillamook Bay and the Stonewall Banks off Newport.

Typically the various rockfish species constitute about 80 percent (by weight) of the recreational groundfish catch while ling cod constitutes about 14 percent. These species tend to aggregate around rocky outcroppings or reefs, and by so doing make themselves more available to recreational fishermen. The recreational halibut catch is becoming increasingly important and fishing efforts, especially out of Newport, are increasing rapidly.

The groundfish catch (in numbers) increased rapidly during the 1970s due primarily to the introduction of LORAN C which allowed fishermen to return easily to favorite fishing spots, improvement in fathometers which allowed fishermen to detect fish schools on the reefs even when the schools are quite close to the bottom, and the availability of small radar sets for use on small charter and private boats.

Commercial and Recreational Fishing Conflicts

Conflicts can arise between commercial and recreational fisheries. In general, most of the conflicts fall into one of five main categories: resource conflicts between commercial and recreational salmon trollers; resource conflicts between commercial groundfish trawls and recreational groundfish hook and line fishermen; resource conflicts between commercial groundfish rod and reel fishermen and recreational groundfish hook and line fishermen; resource conflicts between commercial longline halibut fishermen and recreational halibut fishermen; and spatial or navigational conflicts between commercial and recreational boats. As specific conflicts arise the parties usually try to work out some compromise.

Major Fisheries Species

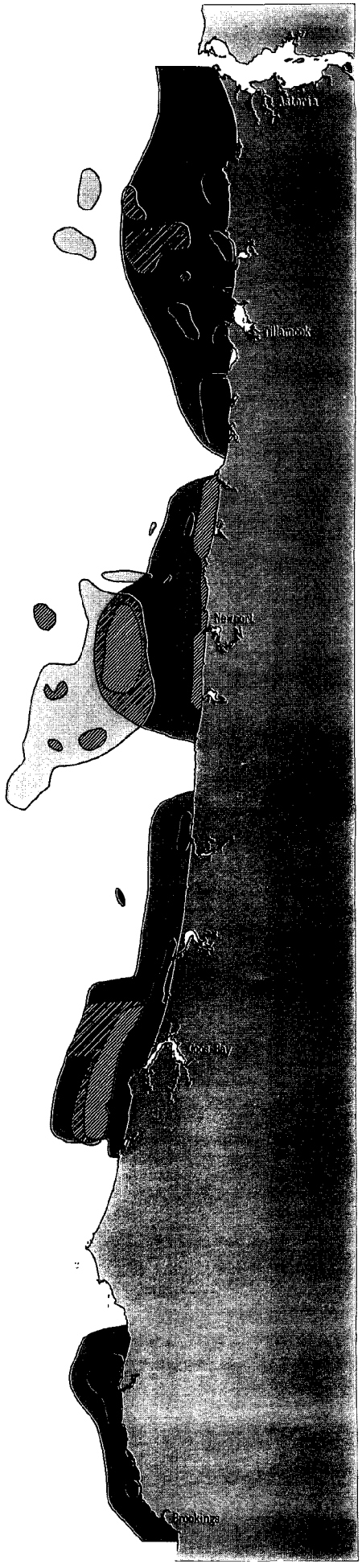
Salmon

The primary targeted species of the ocean salmon fishery are Chinook and coho salmon. The Oregon ocean salmon fishery uses only salmon troll gear. Trollers tow a number of lures or baited hooks through the water at depths of up to 80 fathoms (480 feet). Vessels vary in size from 18-foot day boats to 60-foot trip boats. The ocean troll fishery harvested over 6 million pounds (round weight equivalent) in 1989.

Until the 1960s, Oregon troll landings, although they fluctuated greatly, remained relatively low. However, in the early 1960's methods for raising hatchery salmon resulted in increases in the number of smolts released and, although it cannot be scientifically proven, perhaps in the number of adult salmon returning to Oregon's coastal waters. In addition, in the 1960's and early 1970's there were a number of years of very strong upwelling which resulted in extremely large increases in commercial and recreational salmon landings. The commercial fishery responded to this increase in adult coho abundance with a large increase in fishing effort. Unfortunately, the good upwelling years were followed by a series of rather weak upwelling years, which, together with the increased fishing effort resulted in a drop in coho landings. The El Niño event of 1982-1983, with its poor upwelling and warmer water temperatures, further reduced salmon abundance. Both coho and Chinook populations

The plot on the facing page shows heavily-used charter fishing areas off Oregon. The data for the map were developed through exhaustively interviewing charterboat operators along the entire coast. Many of the areas also support commercial fisheries.

Source: ODFW



Principal Recreational Charter Fisheries

- Salmon
- Halibut
- Other Bottomfish
- Halibut & Other Bottomfish
- Salmon & Halibut

10 0 10 20 30 MILES

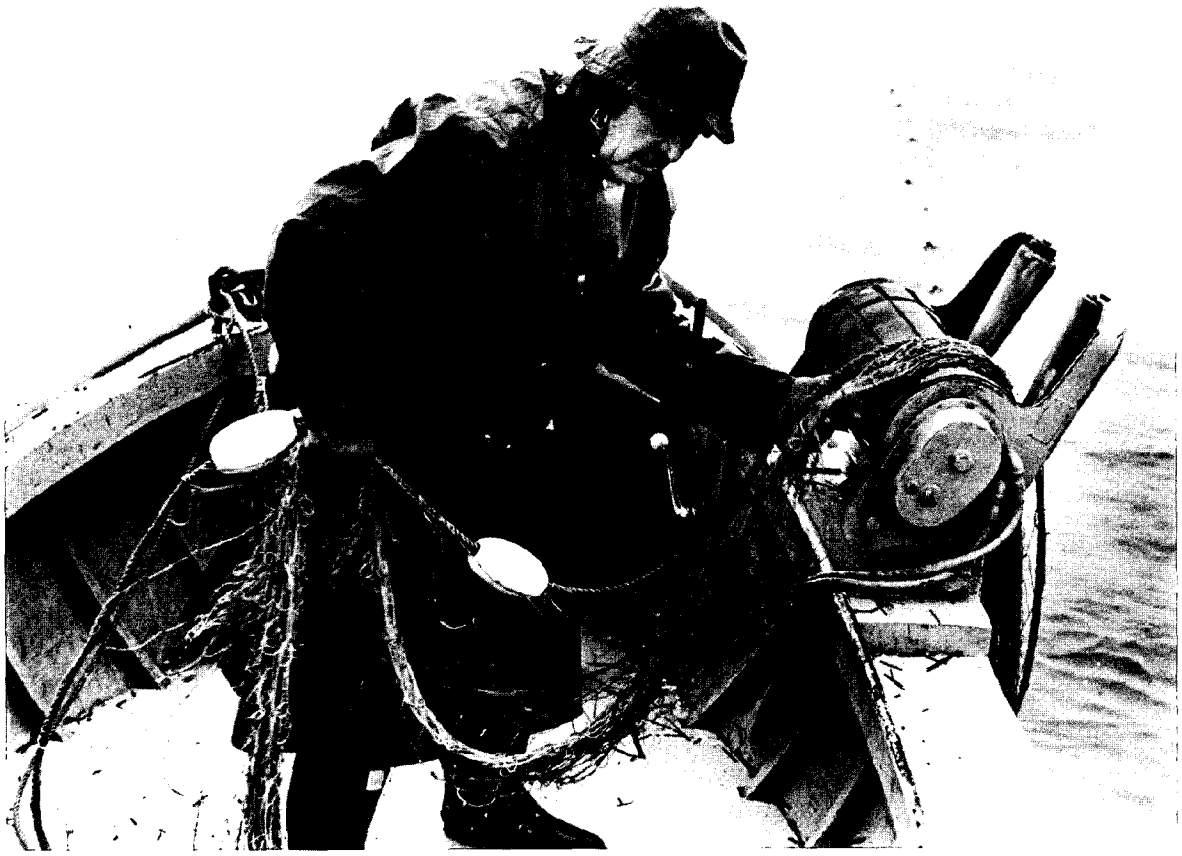
now appear to be recovering.

Most commercial salmon trolling is done outside the territorial sea, and some boats may range as much as 50 miles offshore. Most recreational salmon fishing occurs in the territorial sea within a one day boat trip of port.

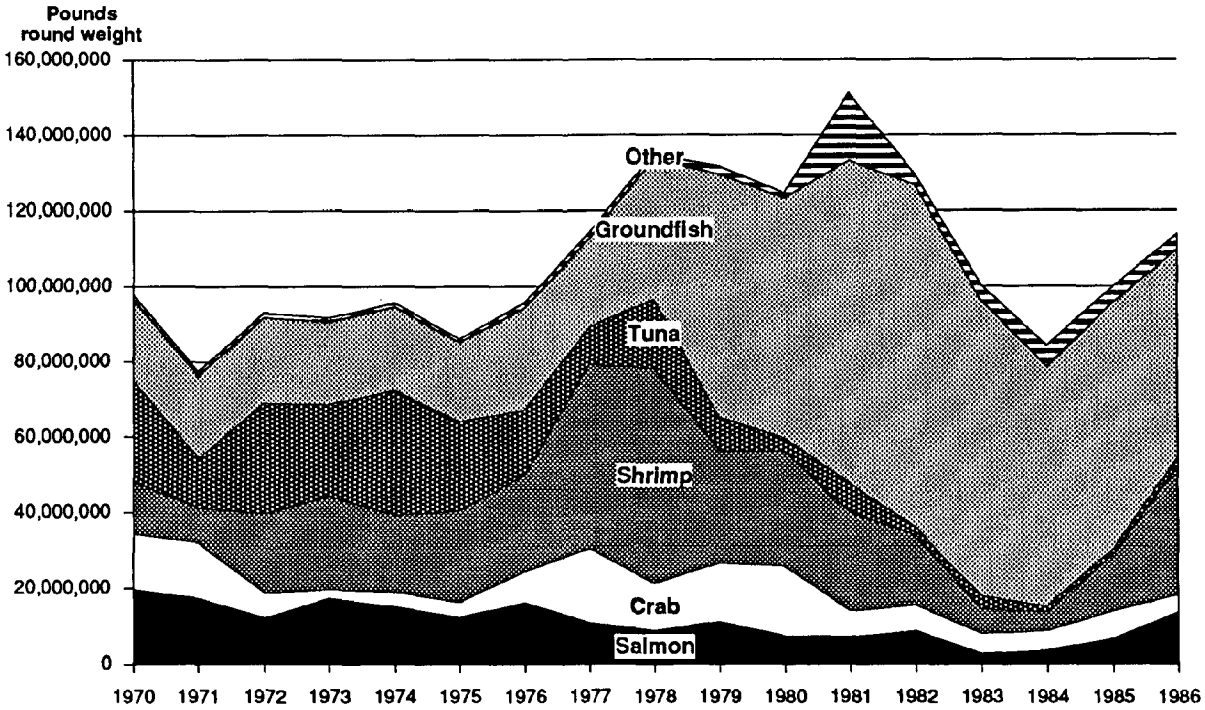
Although the details differ from species to species, salmon fry hatch from eggs laid in the gravel bottoms of coastal streams and the upper sections of major river systems such as the Columbia. After an initial period in fresh water the fingerlings migrate downstream changing into smolts and preparing to enter the ocean where they will mature over the next few years. Adult salmon then return to fresh water streams to spawn and die. The migratory behavior of the salmon make then vulnerable to changes in habitat and water quality in both oceanic and terrestrial ecosystems. Poor logging practices can destroy breeding habitats by clogging streams with mud and silt. Industrial water pollution in estuaries can impede the progress of migrating smolt or spawning adults. Periods of poor upwelling such as the recent El Niño, have been shown to result in lower survival of hatchery smolt.

Groundfish

The groundfish fishery includes over 80



Commercial fishing is highly personal. This gillnetter deploys his net into the waters at the mouth of the Columbia River. Small owner-operated vessels are the majority in Oregon. (Oregon Sea Grant)



Total commercial fish landings, 1970 – 1986, showing proportion of major fisheries. Source: Oregon Agricultural Statistics

fish species, such as cod, rockfish, snappers, sablefish (black cod), soles and flounders. Of all the fish and shellfish landed in Oregon in 1989, groundfish made up about one half of the total weight and one third of the total value. Over 83 million pounds of groundfish were landed in Oregon during 1989. This catch had an ex-vessel value of over $26 million. Most of the product is processed in shore-based plants. The groundfish fishery typically generates more employment in the processing industry than any other Oregon fishery.

Most groundfish are harvested by trawlers using midwater or bottom trawl nets. Some groundfish are also taken by hook and line or fish pots. Trawlers drag funnel-shaped nets through the water. The nets are wider at the mouth and taper back to a narrow "cod" end that collects the catch. Trawl nets have two heavy metal doors near each side of the mouth of the net which help keep the mouth open as the net is towed through the water. Nets which are to be towed over rough bottoms have steel bobbins or rubber discs attached to the bottom of the mouth to help prevent snagging on the bottom. Trawls can be over 100 feet across the opening and 150 feet long. Trawlers must be equipped with cables, winches, and booms adequate to drag and lift heavy nets full of fish.

A nearshore mixed species trawl fishery occurs both inside and outside the territorial sea up to depths of about 250 fathoms (1500 feet). A variety of species are caught including ling cod; Pacific cod; Pacific whiting; various rockfish (called the "*Sebastes* complex"); English, petrale, and rex sole; sanddabs; starry flounder; and other flatfish, dogfish, skates and rays.

Midwater trawls are fished any where from just above the bottom to just below the surface. These trawls are generally larger and must be towed faster than bottom trawls. The midwater trawl fishery targets widow rockfish and Pacific whiting. The midwater trawl fishery occurs mostly outside the territorial sea.

Deep water bottom trawling occurs over

muddy and rocky bottoms. The bottom trawlers are often referred to as draggers. The fishery targets primarily Dover sole, with black cod and rockfish species taken as incidental catches. The fishery takes place entirely outside the territorial sea at depths from 250 to at least 700 fathoms (1500 to 4200 feet).

Black cod or sablefish are harvested commercially by deep water trawl nets, pots, and longlines. In 1989, about 66% of the black cod were caught by trawls, 23% by pots, and 11% by longlines. Pots are generally fished in 200 to 400 fathoms (1200 to 2400 feet), although in the past several years fishermen have begun exploratory sets in as much as 900 to 1000 fathoms (5400 to 6000 feet).

Charterboat recreational fisheries using hook and line also target groundfish, especially rockfish species, lingcod, and cabezon. Charter fisheries currently are limited to a maximum fishing distance of about 12 hours from port. Most of the demand for charter fishing occurs during the summer tourist season.

Management of the commercial groundfish fishery is difficult due to the large number of species involved. Increasingly stringent regulations have been imposed by the Pacific Fishery Management Council over the past several years to protect weaker stocks from overfishing.

Albacore Tuna

Albacore are caught by trollers towing as many as 12 to 14 lines of varying lengths. Oregon tuna trollers range far offshore, some venturing into the central Pacific. The boats are large and some are equipped with fish freezing equipment which allows the boats to remain at sea for weeks or months at a time. Many of the larger salmon troll vessels annually participate in the tuna fishery when salmon fishing season slows in mid-summer. In winter, these vessels often turn to crab fishing.

Over the last twenty years, Oregon landings of albacore have generally decreased. From a high of around thirty million pounds landed in 1974, landings dropped to about 3.9 million pounds in 1988 and 1 million pounds in 1989. The ex-vessel value peaked in 1974 at $12,571,000 and plunged to $814,000 in 1985. In 1988 the ex-vessel value increased to about $3.3 million, but fell in 1989 to about $780,000.

The downward trend in both catch and ex-vessel value is not confined to Oregon. The same trend exists in California and Washington. The reduced landings appear to be the result of reduced fishing effort caused by lower ex-vessel prices and perhaps a decrease in albacore abundance. The collapse of the U.S. tuna canning industry has seriously depressed the market. Many fishermen forego tuna altogether, while others have taken to marketing directly to the consumer.

Albacore tuna are distributed through out the North Pacific. Albacore migrate into the waters of the Pacific Northwest in mid-July and early August from the central North Pacific as the surface waters begin to warm. Albacore are seldom found in water temperature less than 54 degrees F and they prefer temperatures from 58 to 64 degrees F. Albacore also prefer areas where the horizontal water temperature gradient is rather steep, such as oceanic fronts between warmer and cooler water masses. During years in which ocean temperatures are unusually warm, albacore appear earlier in the summer and are available further north. By late fall, albacore leave the waters off the Oregon coast and migrate back to the warmer waters of the central Pacific.

Large concentrations of albacore are also known to effectively "disappear" from the Pacific Northwest, missing their regular migration route for what may be years at a time when water temperatures are cool. There are no seasonal restrictions in the albacore fishery in Oregon. Rather the beginning and end of the season depends upon water temperature.

Halibut

Halibut are harvested by "longliners" which stretch a groundline with baited hooks over the ocean floor. Halibut are fished at

depths of 15 to 150 fathoms (90 to 900 feet). Halibut groundlines may be several miles long, are anchored at each end, marked with buoys, and have many hooks spaced 15 to 30 feet apart. The halibut fishery involves mostly medium to large fishing vessels.

Historical catches of halibut from a small area off the mouth of the Columbia may have been as high as 5 million pounds in the early 1900's. During the late 1960's and early 1970's halibut stocks declined dramatically. Catches off Oregon reached a low of about 5600 pounds in 1980. During the 1980's halibut catches gradually increased. In 1985, approximately 29 vessels harvested 176,500 pounds of halibut in 33 days of fishing.

The halibut fishery is tightly controlled by the International Pacific Halibut Commission, a U.S.–Canadian organization created in 1923. The Commission establishes a series of periodic summertime open fishing periods and quotas for the Washington/Oregon coastal area. In 1989 the commercial season off Oregon consisted of one two-day period.

Shrimp

The small pink shrimp is the target species in Oregon's shrimp fishery. Pink shrimp are found in concentrations called "beds", the boundaries of which roughly coincide with areas of green mud 50 to 100 fathoms (300 to 600 feet) deep. In years of high abundance they may be found as shallow as 35 fathoms and they are known to occur at depth up to 250 fathoms. However, these deep areas do not contain shrimp in commercial quantities. The beds occur off the northern California, Oregon, and Washington coasts. Fishermen from one state may periodically fish the beds off the other two states. The pink shrimp fishery in Oregon is managed as a limited entry fishery with controls on the number of participating boats.

Shrimpers tow one or two small-meshed (1 1/2 inch) nets just above the ocean floor. Chains attached to the nets drag along the muddy bottom, stirring shrimp up into the net. Although shrimp nets and gear are specific to this fishery, many shrimpers change gear and operate in the groundfish and crab fisheries as season and profitability dictate.

The Oregon shrimp fishery developed in the late 1950s. After the introduction of machinery which could automatically peel these tiny "cocktail" shrimp, the fishery effort greatly increased. The fishery grew steadily through the 1970s, peaking in 1978. From the late 1970s through the mid 1980s, landings and the catch per unit effort decreased. Landings during 1983 and 1984 were particularly low, probably as a result of the 1982-1983 El Nino event. Since 1985, the shrimp fishery has been experiencing a comeback. In 1989, over 49 million pounds of shrimp were landed in Oregon with an ex-vessel value over $18 million.

The pink shrimp live only about three or four years. Because of their short lifespan, the relative success or failure of one year class can have a considerable effect upon the size of the stock. Sizable fluctuations in abundance result. Pink shrimp are major food items for a number of fish species including whiting, sablefish, and petrale sole. Therefore, variations in the size of these fish populations may be a major controlling factor on the size of the shrimp population. Pink shrimp population size is also effected by ocean currents and water temperature. Larval shrimp apparently have a higher survival rate in years of strong upwelling.

Crab

Dungeness crab are fished commercially in Oregon ocean waters with anchored strings of crab pots. A variety of vessels of various types and sizes, from small trollers to large trawlers are seasonally converted to be used in the crab fishery. There is no limit on the number of pots fished per boat. Some vessels fish over a thousand pots. An average of 400 vessels per year have participated in the fishery over the past ten years.

Landings over the years have varied in approximately eight to eleven year cycles. The

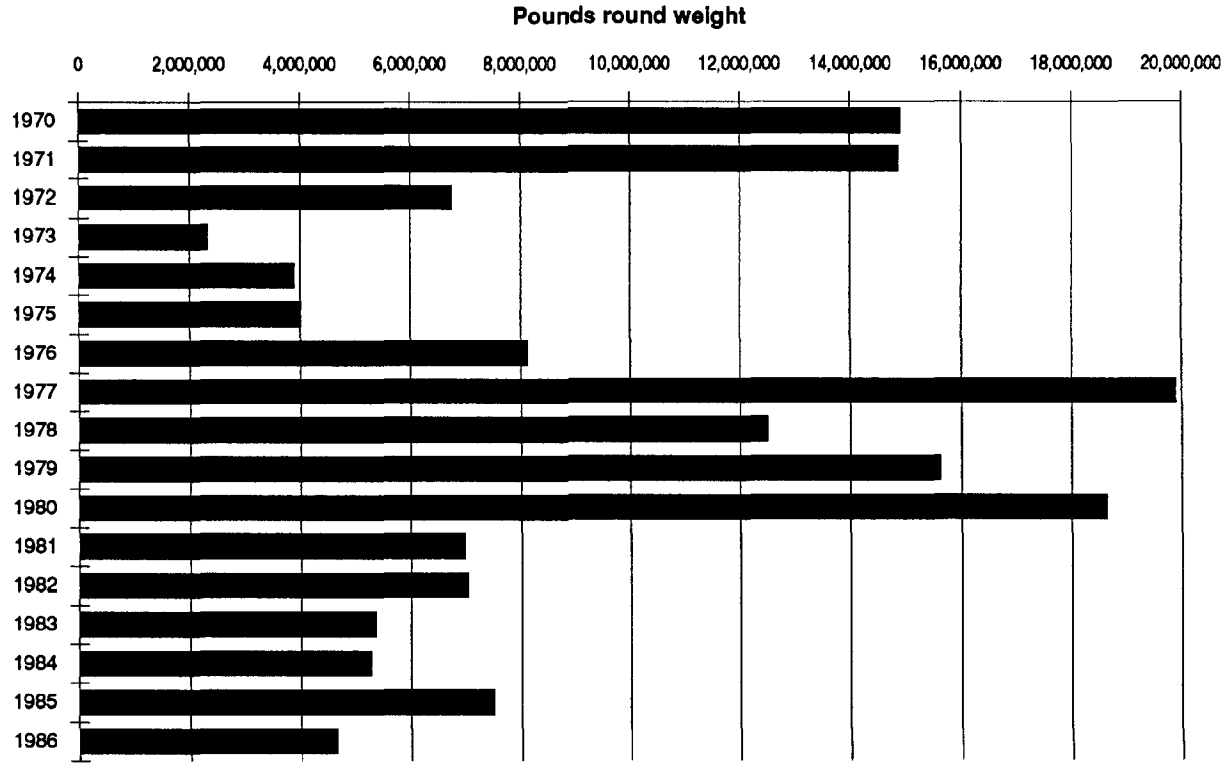
reasons for these fluctuations are not yet fully understood, but they are probably related to oceanographic or biological factors rather than fishing pressure. Catch has fluctuated from lows of 2 to 4 million pounds per year in the years from 1973 to 1975 to highs of over 18 million pounds in 1980. In 1989, approximately 10 million pounds of crab were landed in Oregon at an ex-vessel value over $11.6 million.

Only adult male Dungeness crabs at least 6 1/4 inches across the shell may be harvested. All other crabs caught in the pots are returned live to the sea.

Adult Dungeness crab molt during the late summer months. For the several months following the molt, the meat yield and quality is low and the product unacceptable to processors. The crab fishery is closed during this period to protect recently-molted, soft shelled crabs, which could die after handling and being thrown back into the ocean. The ocean crab season runs from December 1 through August 15, but over 75 percent of the annual catch generally occurs within the first two months of the season. Most of the legal sized male crabs are caught by this time and fishing interest turns toward the approaching shrimp and salmon troll season.

Adult crab populations are most prevalent shoreward of 75 fathoms. During spring and summer months, the adults tend to congregate inside of 45 fathoms. Juvenile crab concentrate in shallow nearshore waters, intertidal beach areas, and estuaries. Crabs migrate seasonally, moving inshore in spring and early summer and offshore in fall and early winter. The placement of crab pots follows this pattern.

Commercial crab gear is most efficiently fished in shallow water less than about 75 fathoms. However, only in the winter does the fishery actually extend out to 75 fathoms, although a trend in the fishery seems to be to set the traps deeper and deeper. Weather conditions limit how shallow crab are fished. During



Dungeness crab landings in Oregon ports, 1970-1986

the rough winter months, gear is rarely set inside of 10 fathoms in order to avoid gear loss from strong surges and surf. During the summer gear can be set shoreward to 2 to 3 fathoms. Crabs live on sandy bottoms. A substantial amount of fishing also occurs in sandy areas interspersed among rock outcroppings.

The crab fishery experiences significant gear and spatial conflicts. Generally, crabbers will avoid heavily trawled areas to reduce the chance of gear loss. To help resolve problems with potential gear loss, crabbers and towboat operators have agreed to specific coastwide tow boat traffic lanes.

Pacific Whiting

Pacific whiting or hake may be the most abundant finfish species present in offshore waters. Whiting have not been historically harvested by Oregon fishermen, but the species became an important target species for early foreign fishing fleets off the Oregon coast. Over 96.4 million metric tons were harvested in west coast waters (no breakdown is available for Oregon) in 1984. Joint venture fisheries took 78.9 million metric tons, direct foreign fishing took 14.8 million metric tons, and U.S. trawlers took 2.7 million metric tons. In 1989 about 200 million metric tons were taken off the west coast of the U.S. As of 1989, there is no direct foreign fishing on whiting in the 200 mile zone off Oregon.

Whiting is a high volume, low priced species. The flesh undergoes rapid enzymatic breakdown after harvest. Quick processing is necessary for a quality product. Processing generally has occurred on large floating factory ships operating on the fishing grounds. Whiting are harvested primarily by midwater trawls. Fishing generally occurs from April through October when the whiting appear in Oregon's coastal waters.

Interest in whiting is continuing to increase among domestic processors and fishermen. The whiting fishery probably has the greatest potential of any fishery for expansion of domestic fishing and processing, and for future contribution to local economies of the state.

Sea Urchin

Red sea urchins have become the targeted species for a relatively new and small fishery off the southern Oregon coast. Red sea urchins inhabit rocky substrates that support concentrations of kelp and other marine algae. In Oregon, these areas are restricted to the nearshore rocky reefs.

Sea urchins are harvested by divers using a short-handled rake. The distribution of the sea urchin fishery is determined primarily by availability of suitable sea urchin habitat, regulatory and physical restrictions on depth of harvest, weather, and market factors. ODFW regulations set the minimum harvest depth at 10 feet below mean lower low water. Dive equipment allows effective harvest to about 90 feet, although urchins are currently harvested to about 70 feet in Oregon. The timing of harvest tends to coincide with the availability of markets which are rather unstable. The major market is in Japan where sea urchin gonads are considered an aphrodisiac.

The urchin fishery has undergone a rapid expansion in the past few years as divers have moved north from a declining California fishery. The first landings were made in Oregon in 1986. In 1987, 203,000 pounds were landed. In 1988, about 1.9 million pounds (round weight) were landed in Oregon, with an ex-vessel value of about $560,000. The 1989 fishery landed about 7.8 million pounds valued at about $2,652,000. Most of the catch currently comes from the Port Orford area, but the fishery is expected to move north in a few years. The fishery is managed as a limited entry endeavor.

Squid

The squid fishery is a relatively new and minor fishery. The first landings were made in 1982 when 7 vessels landed 113,000 pounds. By 1985, 13 vessels landed 1.8 million pounds, primarily in Newport.

Changes in market demand and competition with California squid fisheries have controlled the occurrence of the squid fishery in Oregon. The fishery expanded in the early 1980s in response to increased demand for squid and the availability of vessels idled due to poor shrimp fishing. The fishery declined after 1985 as a result of severe price reductions and increases in the shrimp fishery.

The gear used to harvest squid includes purse seines, lampara seines, and shrimp trawls. The fishery is open all year, but most of the harvest occurs from March through June when the squid are spawning.

Squid school in nearshore areas prior to and during spawning. Squid appear to spawn mostly over sandy bottom areas in 10 to 55 fathoms (60 to 330 feet) of water. Virtually all of the squid catch has been made within the territorial sea. Schools near Newport, Heceta Head and Coos Bay were fished from 1982 through 1985. Other spawning schools have been observed but have not been fished.

Scallops

Although beds of weathervane scallops were known to Oregon fishermen, no targeted fishery existed prior to 1981. Scallops are fished using a dredge with a mesh made of chain. In 1981 three New England scallopers on their way to Alaska "discovered" productive scallop beds off Coos Bay. Other New England vessels quickly joined the fishery. Many of the local shrimpers suffering from the low abundance of shrimp that year also joined the fishery. Within a few months, the best beds had been fished out and the catch per unit effort seriously declined. The New England boats then left the area. In 1981 landings totalled over 16 million pounds round weight. In 1982 landings dropped to 1.5 million pounds and have remained low since then.

Oregon scallops have very low reproductive success in many years. Therefore, at any given time the great majority of scallops in a bed will all be from one year class. This results in a situation where landings will be low most years, but occasional good year classes, perhaps as seldom as once in a decade, will yield occasional years of higher landings.

Other species

Minor fisheries and incidental catches in major fisheries include a variety of species such as hagfish, thresher sharks, dogfish sharks, skates, rays, octopus, wolf eels, and cabezon.

Primary information sources for the preceding section:

Oregon Department of Fish and Wildlife statistics.

Good, J.W., R.G. Hildreth, R.E. Rose, and G. Skillman. 1987. *Oregon Territorial Sea Management Study.* Oregon Sea Grant Program.

Fox, D.S. 1989. *Distribution of Selected Ocean Fisheries.* Oregon Department of Fish and Wildlife.

Radtke, H. and S. Davis. 1988. *The Economic Landscape of the Oregon Coast.* Oregon Coastal Zone Management Association.

Radtke, H. and W.S. Jensen. 1990. *Market, Structural, and Resource Availability Changes in the Pacific Fishing Industry That Could Affect the Economies of Oregon Coastal Communities: A Preliminary Assessment.* Oregon Coastal Zone Management Association and the National Coastal Resources Institute.

West Coast Fisheries Development Foundation. *Oregon's Commercial Fishing Industry: Its Importance to Oregon's Economy.*

Risks

Commercial and recreational fisheries can be affected by a wide range of problems and issues: some are responsive to human efforts to change them, others are entirely beyond the reach of humans to affect; some are internal to a particular fishery, others transcend all fisheries; some are due to economic factors within the fishing industry, others involve events in entirely different, non-fishing, sectors

of the economy; some are local in scale, others are national, regional, or even global; some can be addressed through private efforts within the industry, others are better managed through government agencies.

Weather

The El Niño of the early 1980s affected oceanic current and temperature patterns across vast areas of the Pacific. The productivity and species composition of biological communities changed dramatically. While some species experienced severe population declines, others were not substantially affected. Some fishermen switched to alternate target species; others left the industry.

Weather events on a smaller scale, such as severe winter storms, can keep fishing vessels in port, cause loss or damage to gear, and can take the lives of fishermen at sea. More accurate marine weather forecasts would help reduce the risks to fishermen from storms. The fishing industry also works to minimize weather-related risks by improving safety precautions and equipment in the industry.

Markets

Regional, national and global markets all affect the economic vitality of the fisheries industry. For example, Pacific Northwest salmon fisheries are affected by a number of external market-related characteristics including the growth of the Alaska salmon fishery in the last few years and the ability to transport fresh and fresh-frozen salmon out of Alaska; the influx of pen-reared salmon from northern Europe, Iceland, Chili and British Columbia; and the value of the dollar compared to foreign currencies, especially the yen. To maintain a competitive edge, the fishing industry makes every effort to handle the product and to work with processors and shippers in ways to assure that high quality fish reach the market. Seafood commodity groups also use marketing campaigns to promote their products in the retail market.

Natural Variability

Natural variations in the population dynamics of target fish and shellfish species and of their prey species have direct impacts on the fisheries industry and the livelihood of fishermen. For the most part natural fluctuations in abundance are not well understood by scientists, fishery managers, or fishermen.

As an example, the Dungeness crab population has an eight to eleven year abundance cycle off the entire West coast. Although the reasons for this cyclical abundance are currently unknown, theories among researchers point to biologic or oceanographic causes. Additional scientific research on the effects of various oceanic conditions on the life history of Dungeness crab can provide fishery managers with more accurate population data to predict abundance and to set regulations that protect the population from inadvertent overfishing.

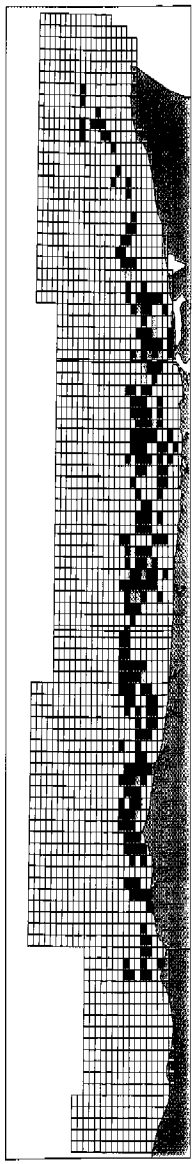
Overfishing

Overfishing can, unfortunately, be the result of competitive harvest of a "common" resource, such as marine fish and shellfish. State, federal, and international fisheries agencies aim to prevent overfishing and assure the long term viability of fisheries and the fish and shellfish populations. Solid scientific research, professional training, accurate monitoring, and effective enforcement are all keys to attaining these goals.

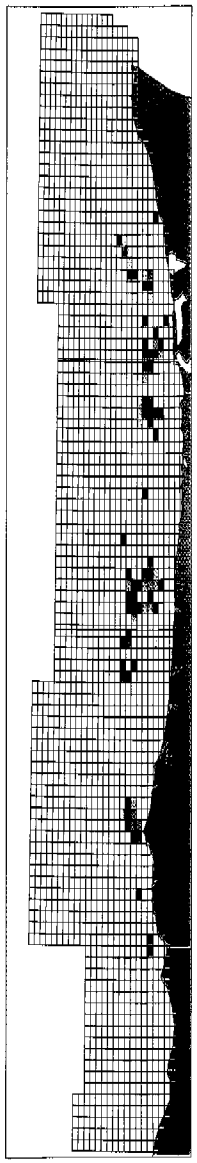
The plots on the following pages show, as did the one at the opening of this chapter, the average catch of various species from 1984 through 1986, aggregated into 5-minute blocks. These data will help fishery managers determine the relative value of ocean areas, and will help them identify important fishery habitats and potential resource-use conflicts before they actually occur.

Source: ODFW

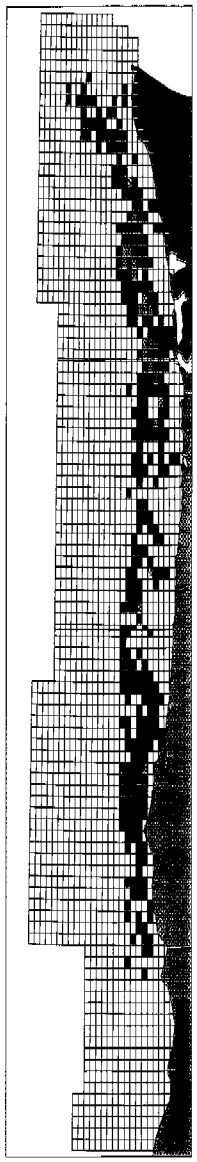
Widow Rockfish (Bottom Fishery)



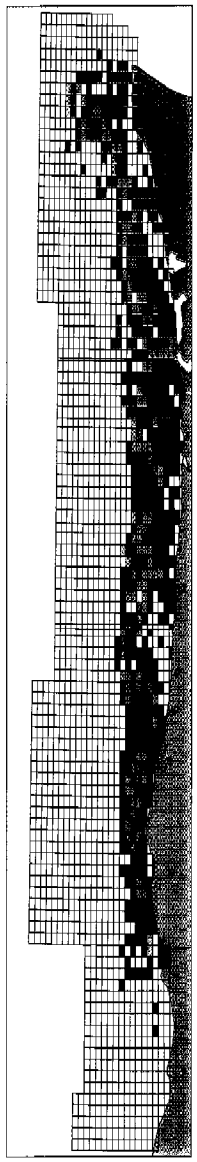
Widow Rockfish (Midwater Fishery)



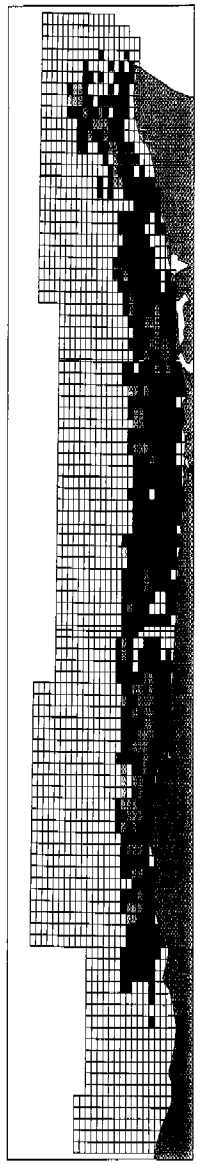
Yellowtail Rockfish



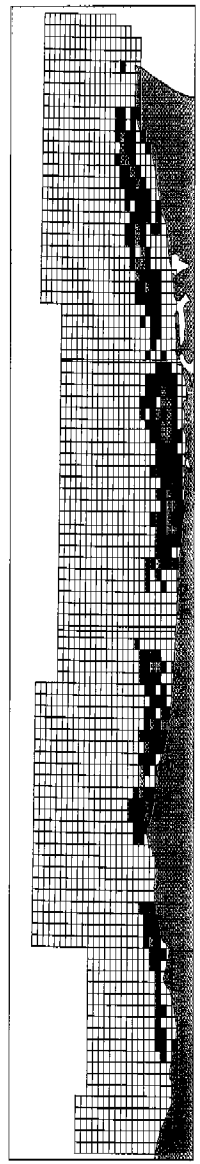
All Other Rockfish



Dover Sole



Ocean Pink Shrimp



Average Annual Catch 1986-1987

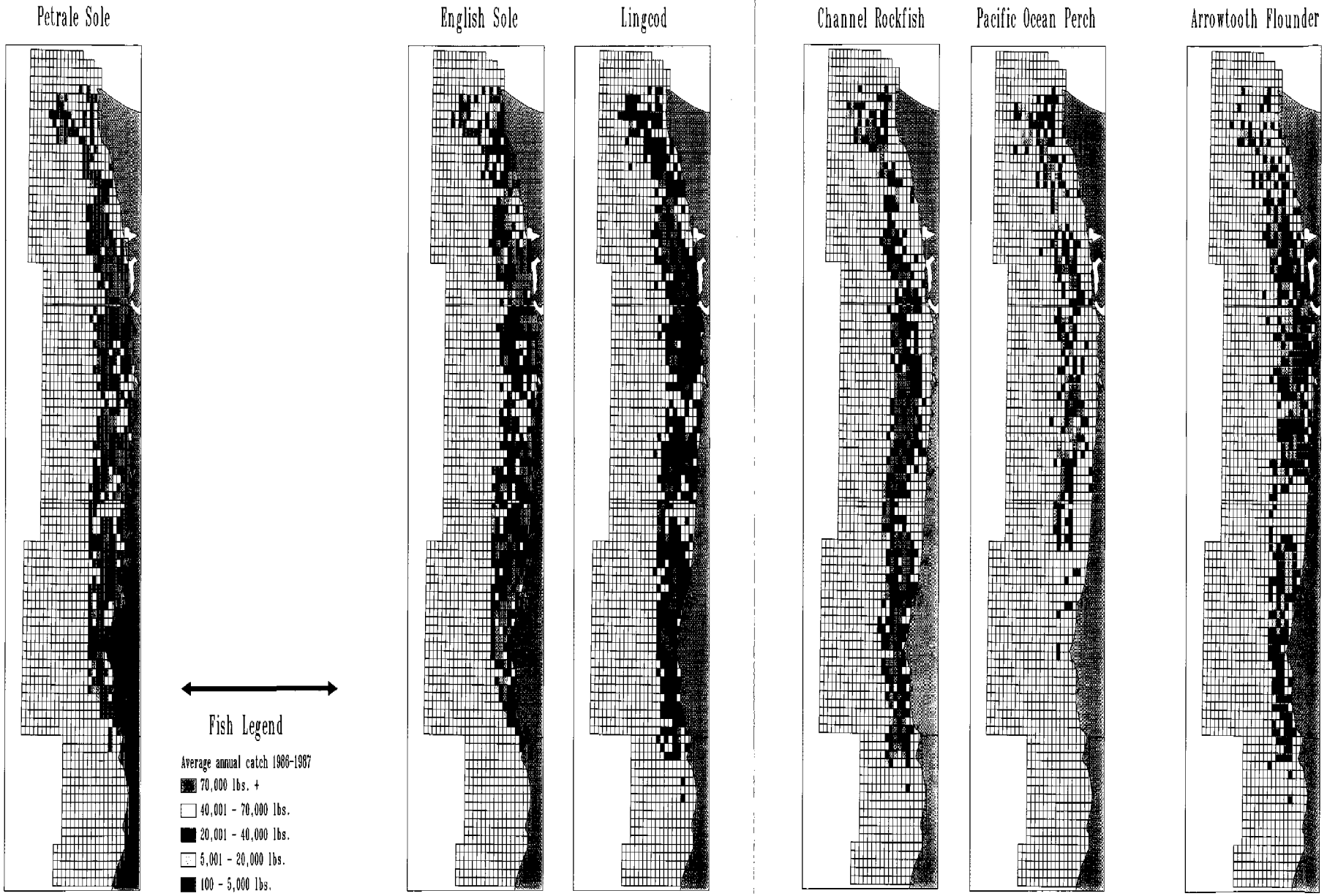
- 500,000 lbs. +
- 350,001 - 500,000 lbs.
- 200,001 - 350,000 lbs.
- 100,001 - 200,000 lbs.
- 100 - 100,000 lbs.

Shrimp Legend

Fish Legend

Average Annual Catch 1986-1987

- 270,000 lbs. +
- 180,001 - 270,000 lbs.
- 90,001 - 180,000 lbs.
- 30,001 - 90,000 lbs.
- 100 - 30,000 lbs.


Petrale Sole
English Sole
Lingcod
Channel Rockfish
Pacific Ocean Perch
Arrowtooth Flounder
Fish Legend
Average annual catch 1986-1987
70,000 lbs. +
40,001 - 70,000 lbs.
20,001 - 40,000 lbs.
5,001 - 20,000 lbs.
100 - 5,000 lbs.

Use and Spatial Conflicts

Other risks to maintaining a healthy fishing industry come from potential and existing conflicts over the use of space. For example, oil rigs or exploratory drilling ships with their associated anchors or guy lines can preclude fishing vessels, especially ones that fish with long nets or trawls, from several square miles of fishing ground. Boats towing barges or seismic surveying instruments can cut loose floats from crab pots and destroy expensive fishing gear. Recreational water users such as jet skiers, sail boarders, and small boat fishermen can increase congestion around port entrances and create navigational problems for fishing vessels leaving or returning to a harbor.

Pollution

Pollution can taint the flesh of fish reducing their market value or making them entirely unmarketable. At higher concentrations, pollutants poison fish and other organisms in the food web, including humans. Oil spills can disperse over vast distances destroying fish runs. Untreated sewage dumped in bays and estuaries can result in the bioaccumulation of bacteria and toxic chemicals in the flesh of filter feeding clams and oysters making them unacceptable food for humans. Runoff from the land carrying chemical pesticides, heavy metals, or durable plastics all pose threats to the ultimate viability of marine ecosystems, including food fish and shellfish.

Habitat Disruption and Destruction

Marine fish habitats vary widely and may cover vast areas or be restricted to relatively unique bottom features. Broad, flat muddy or sandy bottoms cover much of Oregon's continental margin and provide habitat for such bottom fish as Dover sole and sablefish and for Dungeness crab. Others, such as yellowtail and canary rockfish, congregate around rocks and reefs for food and protection. Still others, such as herring and hake, school in midwater and feed on tiny shrimp-like creatures. Certain habitats provide just the right conditions for spawning and rearing of young fish. Other habitats allow juvenile fish to hide from predators while maturing. Several species of fish that are caught in the ocean breed and feed in fresh water streams and coastal estuaries.

Many of the complex relationships in and among marine habitats are poorly understood. And yet, subtle changes in these habitats and large scale disruption or destruction can affect the survival of fish populations. Poor logging practices on land, dredging and filling of estuaries, mineral mining on the sea bottom, deposit of drilling muds and cuttings from offshore oil drilling rigs, and extraction of sand or gravel from the sea floor can all change the habitats on which fish and prey food depend. And, all too often, scientific knowledge is not adequate to predict with certainty what the effects will be of a particular project.

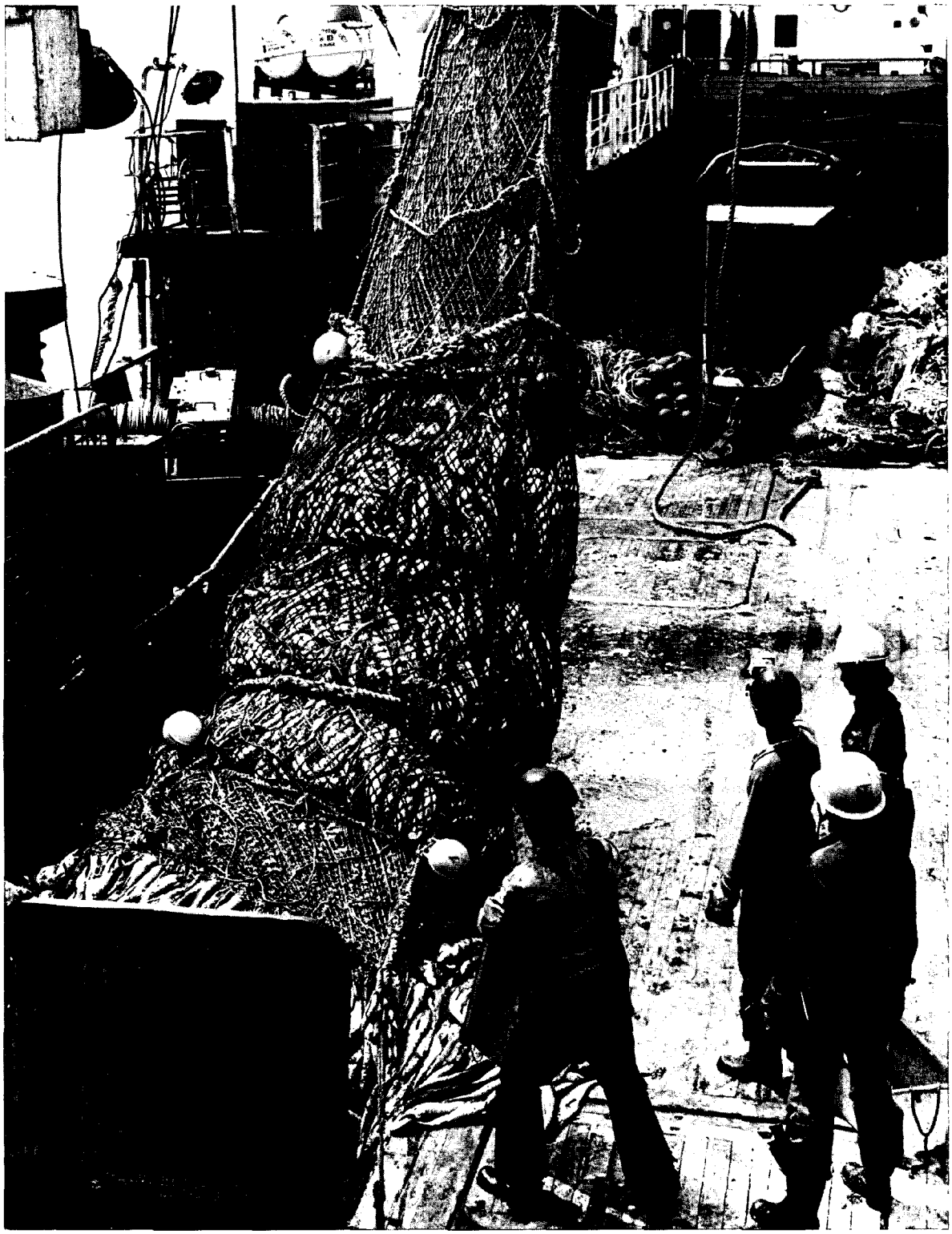
Issues

The future will bring new challenges to ocean resources management. Pressures to explore and develop the nonrenewable resources of the ocean, such as oil, gas, and minerals, are likely to increase in our modern consumptive society . New uses of renewable resources may develop, including new fisheries, which may conflict with existing uses of renewable resources. Human efforts to expand the uses of both renewable and nonrenewable resources will increasingly impact marine ecosystems.

The mandate of the Oregon Ocean Resources Management Act is clear. Oregon will:

> *Conserve the long-term values, benefits and natural resources of the ocean both within the state and beyond by giving clear priority to the proper management and protection of renewable resources over nonrenewable resources.*

The Pacific Fishery Management Council and the Oregon Fish and Wildlife Commission manage fishery harvests and develop management plans for certain ocean fisheries off Oregon's coast. Oregon supports the existing



Large factory trawlers, complete with on-board processing facilities, represent a significant challenge for Oregon's commercial fisheries. This Soviet vessel is fishing for hake (Pacific whiting), a mid-water fish which teems off Oregon through the late spring and summer. U.S. factory trawlers will be more common off Oregon as fisheries off Alaska are depleted. (Oregon Sea Grant)

state and federal systems which manage ocean fisheries. The proposed recommendations on ocean fisheries in the Oregon Ocean Plan are intended to complement existing fishery management programs without duplicating, counteracting, or diminishing existing fishery management efforts. The Oregon Ocean Plan does not propose any new governmental organizations or systems to directly regulate ocean fisheries. The Oregon Ocean Plan does not set harvest limits, determine gear types, set fishing seasons, or engage in any other activity which is more appropriately handled by existing state or federal fishery management systems.

The Oregon Ocean Plan appropriately addresses only three types of risks to commercial and recreational ocean fisheries: pollution, habitat disruption and loss, and the lack of adequate information.

Pollution

The potential impacts of nonrenewable resource exploration and development along with the use of the ocean as the ultimate dump for the wastes of civilization raise great concerns for the future of ocean fisheries.

Statewide Planning Goal 19 requires that the extraction of material from or discharge of waste products, including dredged material disposal, into or affecting the territorial sea do not substantially interfere with or detract from the use of the continental shelf for fishing, navigation, recreation, or from the long term protection of renewable resources.

Uses of nonrenewable resources such as oil and gas development or marine minerals mining may be appropriate uses of ocean resources, but only if they do not adversely affect the maintenance and enhancement of renewable uses of ocean resources, such as commercial and recreational fisheries. The policies of the Oregon Ocean Plan, especially the policies on oil and gas development and marine mineral mining are based on the fundamental need to protect fisheries and other renewable ocean resources and their uses.

Habitat Disruption and Loss

All fishery habitats, whether they are marine, estuarine, or fresh water, must be conserved. All agencies and entities responsible for managing freshwater and estuarine resources should be encouraged to provide a high level of protection to fulfill the goal of conserving fisheries habitats.

Although both federal and state law provide for fishery habitat protection as part of traditional fisheries management programs, most fishery management efforts have focused on harvest or catch management. A better understanding and management of marine habitats is needed and should be fully incorporated into fishery management programs.

Inadequate Information

Statewide Planning Goal 19 specifically directs local, state and federal agencies, within the limits of each's jurisdiction, to:

> *(1) Develop scientific information on the stocks and life histories of commercially, recreationally and ecologically important species of fish, shellfish, marine mammals, and other marine fauna; (2) designate and enforce fishing regulations to maintain the optimum sustainable yield (OSY) while protecting the natural ecosystem; (3) develop and encourage improved fishing practices and equipment to achieve the OSY while protecting the natural marine ecosystem; and (4) develop scientific understanding of the effects of man's activities, including navigation, mineral extraction, recreation, and waste discharge on the marine ecosystems.*

Adequate specific information is lacking about Oregon's ocean on such subjects as: oceanic habitats; marine ecosystem dynamics; population behavior and the interactions between populations: the location of key spawning, rearing, and refuge areas for fish species; small scale current patterns; natural oceanic variability; the sensitivity of various populations and habitats to specific disruptions; and the potential impacts of different types of human activities. This information will be

necessary to continue to manage Oregon's fisheries in a manner that protects the resource from overfishing and from adverse effects of the exploration and development of nonrenewable resources; maintains the economic viability of the fishing industry; maximizes the economic value of the resource; maximizes the biological yield of the stocks; and results in cost effective and enforceable regulatory regimes.

Conclusions and Recommendations

Oregon values ocean fisheries as the keystone use of ocean resources.

- Oregon's ocean fisheries, both commercial and recreational, are highly significant to the continued health and welfare of local, regional, and statewide economies.
- The entire Ocean Stewardship Area is important to Oregon's commercial and recreational fisheries. Oregon's diverse and productive fisheries are dependent upon a variety of habitat types and areas throughout Oregon's Ocean Stewardship Area. Protecting the oceanic environment is crucial to the maintenance of the fisheries industry. Sound ocean resources management must conserve all of oceanic habitats.
- Ocean fisheries are managed through a complex system of state and federal laws and regulations.
- Better understanding of the importance of specific marine habitats and of the dynamics of marine ecosystems to the viability, diversity, and productivity of fish populations is needed.
- Oregon must conserve marine ecosystems, including biological communities and marine habitats. Oregon needs to identify and protect important fishery areas.

The goals of the Oregon Ocean Resources Management Plan are to support and enhance Oregon's ocean fisheries; ensure the continued health and productivity of marine habitats that support Oregon's ocean fisheries; support existing state and federal fishery management efforts; and protect ocean commercial and recreational fisheries from any adverse affects of exploration and development of nonrenewable ocean resources, such as oil, gas or marine minerals.

Important Fishery Areas

For planning and resource management purposes, Oregon is highlighting several types of "Important Fishery Areas". The term "Important Fishery Area" as used in the Oregon Ocean Plan includes:

1. Habitats important to the biological success of commercially and recreationally caught fish species, such as spawning, rearing, resting and feeding areas.
2. Areas important to commercial and recreational fishing activities, including:
   - High catch areas. (e.g., High total pounds landed and high dollar value of landed catch)
   - Areas where a few members of the fleet catch a relatively small number of pounds of highly valued fish.
   - Areas which are seasonally important to fishing activities such as areas where high catches are limited to certain times of the year or areas which are important migratory routes.
3. Habitats that support populations of animals which are important as food or prey species to commercially and recreationally caught fish species.
4. Areas important to commercial and recreational fishing activities for specific individual ports or particular fleets.

(As more information is gathered about "Important Fishery Areas", the Oregon Department of Fish and Wildlife may include additional categories of "Important Fishery Areas", if needed.)

Some of these important fishery areas are easy to identify and are known to be vital to sustaining the diversity and productivity of Oregon's ocean fisheries. These areas include Heceta-Stonewall Banks, Coquille Bank, Astoria Canyon, Rogue Canyon, and the area offshore from Cape Blanco.

But, the information available about many of the "Important Fishery Areas" is limited. "Important Fishery Areas" need to be identified, studied, evaluated, and protected from activities which would adversely affect ocean fisheries or could adversely affect the viability, diversity, and productivity of these habitats and the biological communities they support.

Gathering and analyzing information about all of the "Important Fishery Areas" of Oregon Stewardship Area will be time consuming and costly. Oregon's efforts need to be focused on (1) identifying areas so vital to the health and welfare of ocean fisheries that only renewable resource uses should be allowed, and (2) evaluating the significance and sensitivity of specific areas where nonrenewable resource uses are being proposed and determining whether the probable impacts of the proposed activity on commercial and recreational fisheries are acceptable.

Recommended Policies

1. Conserve, protect and, where needed, enhance or restore marine habitats that are important to commercial and recreational fish species.
2. Give clear priority to the proper management and protection of renewable resources over nonrenewable resources throughout Oregon's Ocean Planning Area. Commercial and recreational ocean fisheries have priority over uses of nonrenewable resources, including oil, gas and mineral exploration and development.
3. Allow only those uses of nonrenewable resources within the Ocean Stewardship Area that do not adversely affect commercial or recreational fisheries and that do not adversely affect the long-term viability of fish populations or the quality of marine habitats.
4. Heceta-Stonewall Banks, Coquille Bank, Astoria Canyon, and Rogue Canyon are too important to Oregon's ocean fisheries to risk disturbance from nonrenewable resource uses. In these areas, prohibit commercial exploration and lease sales consistent with the majority position in the Marine Minerals Policies. Allow nonproprietary academic and public agency scientific research related to marine minerals if the Oregon Department of Fish and Wildlife determines that the research activities will not cause significant adverse effects on the fisheries or on sensitive marine populations or habitats.
5. In other "Important Fishery Areas", allow specific uses of nonrenewable resources if the Oregon Department of Fish and Wildlife determines that the specific proposed activity will not adversely affect commercial or recreational fishery activities, the quality of fish habitats, or the viability of fish populations.
6. Support research on marine ecosystems, fish populations, and fish habitat needs which will promote sound fishery management decisions. Study, evaluate, and identify specific "Important Fishery Areas". Evaluate the probable risks and effects of the specific activities on ocean fisheries.
7. Develop public education and interpretation programs about the commercial and recreational fishing industry; its characteristics, key species, important fishery areas, and contribution to Oregon's economy and culture.

Needed Actions

☐ The Ocean Policy Advisory Council should:

- Encourage the Oregon Department of Fish and Wildlife, National Marine Fisheries

Service, and Pacific Fishery Management Council to continue to identify and to take appropriate steps to manage important fisheries and protect fish habitats.

- Encourage the Oregon Department of Fish and Wildlife, National Marine Fisheries Service, and Pacific Fishery Management Council to undertake, as a high priority, research on marine habitats and ecosystem dynamics which support Oregon's commercial and recreational fisheries.
- Oppose any uses of nonrenewable resources which could adversely impact ocean fisheries. Act to implement the policies identified in the sections on oil and gas and on marine minerals of the Oregon Ocean Plan.
- Provide a forum for evaluating the acceptability of the risks associated with the impacts of nonrenewable resource uses on renewable resource uses, especially ocean fisheries.

☐ The Oregon Department of Fish and Wildlife should:

- Develop and adopt a marine habitat classification system.
- Identify the geographic extent of "Important Fishery Areas" throughout the Oregon Ocean Stewardship Area. (See definition of "Important Fishery Areas" above). Determine whether any additional protective measures are needed for these areas to protect recreational and commercial fisheries from adverse effects of nonrenewable resource exploration, development, or use.
- In instances when a specific project is proposed for the exploration, development, or use of a nonrenewable resource in an "Important Fishery Area", conduct detailed biological assessments, economic assessments, and risk evaluations to determine whether the proposed activity is likely to adversely affect commercial or recreational fisheries or to adversely affect the long-term viability of fish populations or the quality of marine habitats.
- Identify those "Important Fishery Areas" (in addition to the five areas identified in Policy 4 above) that are so vital to recreational and commercial fisheries that the risks associated with nonrenewable resource exploration, development, and use are simply not acceptable.
- Conduct and support research on important fishery areas (especially nearshore areas) that support populations of animals which are important as food or prey species to commercially and recreationally caught fish species. Determine whether any additional protective measures are needed for the areas.
- Coordinate the development of public education and interpretation programs about the commercial and recreational fishing industry; its characteristics, key species, important fishery areas, and contribution to Oregon's economy and culture.

Marine Birds and Mammals

Resources

Oregon's ocean waters, rocky coast, and nearshore rocks and islands are home to many marine birds and mammals.

Most of the bird and mammal colonies are within three National Wildlife Refuges: Oregon Islands, which includes over 1,400 nearshore rocks and islands; Cape Meares, with several endangered species and an adjacent old-growth forest; and the Three Arch Rocks, where twelve of the thirteen species of breeding seabirds in Oregon nest, including the largest colony of common murres south of Alaska. The refuges include only the dry land part of the rocks and islands. A few of the marine bird and mammal rookeries and haul out sites are on privately owned property, such as Tillamook Rock. A number of the rocks and islands are accessible at low tide.

Marine Birds

The birds of the Oregon coast include year-round residents; migrants on their way north to breeding grounds in the Arctic or south to wintering areas in warmer climates; oceanic birds coming ashore to nest and fledge their young; and inland birds feeding on the rich resources of the estuaries and coastal streams.

The nearshore rocks and islands are hubs of bird activity. Huge breeding colonies use the rocks and islands. Many marine birds take off from nesting sites on the rocks and forage widely over the entire width of the continental margin. Some species use the rocks as staging areas where individuals congregate to get ready for long migrations. The rocks are also rest stops and shelters in the migratory routes of other species.

Although the length of the Oregon coast is less than a quarter of the entire California-Oregon-Washington coastline, over one-half of the nesting seabirds of the entire continental U.S. Pacific coastline are found along the Oregon coast. Nearly 1.2 million seabirds, including several threatened and endangered species, depend on the nearshore rocks and islands for breeding, nesting, and resting habitats. The total population of breeding seabirds in Oregon varies from year to year due primarily to natural variations in food supply.

Thirteen species of marine birds breed along Oregon's coast. They are the double-crested, Brandt's and pelagic cormorants; Cassin's and rhinoceros auklets; Leach's and fork-tailed storm-petrels; pigeon guillemots; western and glaucous-winged gulls; common murres; black oystercatchers; and tufted puffins. Other birds which visit or migrate through coastal Oregon include: loons, grebes, albatrosses, shearwaters, fulmars, bald eagles, Canada geese, numerous species of ducks, plovers, sandpipers, turnstones, sanderlings, phalaropes, and the endangered brown pelican.

Although most people recognize Western gulls and cormorants, these familiar species are only a very small part of the picture. The ubiquitous western gull accounts for about 1.5 percent of the total breeding population of seabirds along the Oregon coast. Common murres and Leach's storm-petrels number in the hundreds of thousands and account for over 90 percent of Oregon's population of breeding seabirds.

Common murre colonies are often extremely large and dense. Tens or hundreds of thousands of birds can be packed shoulder-to-shoulder on the rocks during the summer breeding season. Nesting sites are usually flat rock surfaces on island tops or rocky ledges. Murres lay a single egg and both parents will feed the chick until it is ready to leave the nest. Murres are deep divers and will travel far along the coast searching for small fish which they bring back to the nest one at a time.

National Wildlife Refuges

The U.S. Fish and Wildlife Service (USFWS) administers four National Wildlife Refuges along Oregon's ocean coast. Three of the refuges are located along the open coast, while the fourth is located at Bandon Marsh, a salt marsh in the Coquille River Estuary.

Cape Meares National Wildlife Refuge

Located at Cape Meares, southwest of Tillamook Bay, this refuge protects one of the few remaining coastal old growth forests and a number of vertical cliffs which serve as breeding habitat for marine birds. Endangered species using the area include American peregrine falcons and bald eagles. The 138-acre refuge is designated as a Research Natural Area by the federal government and is managed jointly by the Oregon Parks and Recreation Department and the USFWS.

The refuge is managed as an ecological preserve with no habitat alterations. Public use of this refuge is limited to hiking on the trail that meanders through the forest and links up with the adjacent Cape Meares State Park.

Three Arch Rocks National Wildlife Refuge

Located just offshore from Oceanside and south of Cape Meares, this refuge is composed of six small rocks and three large rocks totalling about 17 acres. Only the area above mean high tide line on each of the rocks is actually within the refuge. The refuge is the largest breeding colony of seabirds in Oregon. Twelve of the thirteen species of seabirds which nest along the Oregon coast are found here. The common Murre colony at Three Arch Rocks is the largest colony south of Alaska. Endangered species make extensive use of this refuge, including: the American peregrine falcon, bald eagle, Aleutian Canada goose and California brown pelican. The Seal Rock Unit of the refuge is a haulout area and pupping area for northern sea lions.

The refuge is closed to all public entry to ensure that marine birds and their nesting habitats remain undisturbed. No human-related habitat alterations of the refuge are allowed.

Oregon Islands National Wildlife Refuge

This refuge stretches from Tillamook Head south to the California border and includes more than 1400 rocks and islands. Only those portions of the rocks and islands that are above mean high tide and are separated from the mainland at mean high tide are included within the refuge. (There are a few exceptions to this rule where rocks are privately owned or administration has been maintained by the U.S. Bureau of Land Management.)

The wildlife resources of the refuge are tremendous. The majority of the more than one million marine birds that breed in Oregon nest within the boundaries of this refuge. Endangered species using the refuge include American peregrine falcons, bald eagles, Aleutian Canada geese, and California brown pelican. Harbor seals, northern elephant seals, northern sea lions, and California sea lions make extensive use of the refuge for pupping and haulout areas. The breeding colonies of northern sea lions on the Rogue and Orford Reef Units of the refuge are the largest south of Alaska.

The refuge is a wilderness area and ecological preserve. No habitat alterations caused by humans are allowed. Public access is not allowed at anytime with the limited exception of officially approved scientific research projects.❖

Leach's storm-petrels are very small, somewhat secretive birds. Although it is the second most common bird along the Oregon coast, few birdwatchers have ever seen one. A rock that looks barren, with perhaps just a few gulls on it, may actually have tens or hundreds of thousands of small storm petrel burrows just under the surface. Adult storm petrels enter and leave the burrows under the cover of darkness to avoid being killed and by gulls. Once the single egg is laid, one of the parents will stay in the burrow on the nest while the other parent forages for food. Once the chick hatches, the fishing efforts of both parents are needed, so the chick will be left alone in the burrow. Storm-petrels range far across the continental

margin and the open ocean to forage for zooplankton and small fish.

Marine Mammals

The cold waters of the Pacific Ocean and the rocks, islands and reefs off the Oregon coast are important habitats for a variety of marine mammals: whales, dolphins, porpoises, seals and sea lions.

Nearly everyone who visits or lives along the Oregon coast is familiar with the gray whales. The gray whales migrate between their summer feeding grounds in the Arctic and winter calving lagoons of Baja California. Migrating whales travel within a few miles of the coast and can often be seen from shore. The southern migration takes place from November through late January and the northern migration occurs from March through May. A small part of the population, probably mostly young individuals, spends the summer along the Oregon coast.

Once threatened with extinction from whaling, the gray whale population has recovered in recent years. Whale watching has become a popular tourist attraction and a number of charter fishing boats add whale watching trips to their activities.

Minke, sperm, blue, humpback, fin, sei, and right whales also migrate past the Oregon coast, usually many miles from shore. Pods of killer whales, or orcas, can be seen near the shore and at the mouths of coastal rivers where they feed on fish, seals and sea lions. The smaller harbor porpoise and white-sided dolphin are also common in Oregon's nearshore waters.

The whaling industry that threatened extinction of many whale species has almost stopped worldwide. However, many whale species are still listed as endangered by the federal government, because populations are still low.

Seals and sea lions depend on both the land and the sea. They feed at sea on fish and invertebrates and come to shore to breed, bear their young, and rest. Nursery areas, called rookeries, and resting areas, called haulout areas, are located on protected shore areas and on the nearshore rocks and islands. Seals and sea lions are very particular about rookery and haulout sites and will return to the same site year after year.

Harbor seals are year round residents and are the most common seal along the Oregon coast. Biologists estimate that there are as many as 5200 seals along the Oregon coast. Harbor seals eat bottom fish, rockfish, herring and salmon. Seals awkwardly scoot along on their bellies when out of water and usually haulout on rocks only a few feet from the water. Although gregarious with their own kind, harbor seals are shy around humans and will abandon their haul out areas when approached.

Small numbers of northern elephant seals travel northward in the summer from their range in central California to haulout areas along the Oregon coast. From shore, Northern elephant seals can be seen hauling out on Simpson Reef near Cape Arago.

Northern fur seals breed in islands in the Bering Sea and Baja California. After breeding, they spend most of their time at sea and can be seen about 10 to 100 miles from shore migrating past the Oregon coast.

Two different species of sea lions, the northern (or Steller's) sea lion and the California sea lion, are seen along the Oregon coast.

Sea lions not only are larger than harbor seals, but they are built differently. Sea lions walk on their front flippers and can propel themselves up and over rocks. When in the rookeries or haulout areas sea lions can be found on rocks many feet above the water. Sea lion are quite noisy. Their barks can often be clearly heard from considerable distances.

The California sea lions are the most abundant sea lion along the coast. They are blackish brown and males will grow to around seven

Endangered, Threatened and Sensitive Species

Extinction

Extinction is the ecological death of a species. When a species cannot adapt to changing conditions and fails to produce enough young to keep pace with its death rate, a species will eventually become extinct. Extinction is a lingering process. At first, a species disappears from a section of its normal range. As the region of extinction spreads, the participation of the remaining populations in ecosystem dynamics becomes less and less. Eventually, if the populations cannot revive, the species becomes extinct. Whole ecosystems can be affected by the extinction of a single species.

Biologists are concerned that the rate of extinction has dramatically increased as human influence on the planet has grown. Besides irreversibly destroying genetic diversity, species loss to an ecosystem can render the system less stable and adaptive to climatic or geological changes.

Loss or alteration of habitat is the major cause of human-induced species extinction. Other major causes include direct killing or poisoning, pollution, and the introduction of non-indigenous competing or predatory species.

Endangered and Threatened Species

Under federal law, an endangered species is "a species that is in danger of extinction throughout all or a significant portion of its range" and a threatened species is "a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range".

The Endangered Species Act of 1972 directs federal agencies to conserve endangered and threatened species and the ecosystems on which these species depend. The goal is to bring populations levels of endangered and threatened species back to a level at which the species no longer are in danger of extinction and no longer need special protection. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service are required to identify and list species which are endangered or threatened.

The Endangered Species Act makes it unlawful to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct".

Oregon's wildlife laws have sections which are similar to the federal Endangered Species Act. The Oregon Fish and Wildlife Commission has the responsibility for identifying and listing endangered and threatened species and for developing programs to protect these species.

The marine birds and mammals along the Oregon coast which have been listed by the federal (US) and state (OR) government as endangered (E) or threatened (T) include:

Bald eagle (US, OR: T)

Aleutian Canada goose (US, OR: E)

American peregrine falcon (US, OR: E)

California brown pelican (US, OR: E)

Western Snowy Plover (OR: T)

Gray, right, blue, fin, sei, humpback, and sperm whales (US, OR: E)

The Oregon Department of Fish and Wildlife also maintains a watch list of sensitive species which may become eligible for listing as threatened or endangered if populations declines should continue. A number of birds and mammals along the coast are considered to be "sensitive" including: fork-tailed storm petrel; dusky and cackling Canada geese; northern goshawk; greater yellowlegs; long-billed curlew; marbled murrelet; purple martin; bank swallow; and northern sea lion.❖

feet long. California sea lions range from British Columbia to Mexico, but all breeding occurs south of Oregon. After mating is over in mid-July, some of the young males migrate northward as far as Canada. Aggregations of up to 2000 young male sea lions are common at Simpson Reef in early September. The young males move south again in the spring to breed. Oregon seems to have a healthy population of California sea lions. The population peaks in the fall at about 3500 individuals. California sea lions feed on hake, herring, rockfish, sculpins and salmon. During the winter California sea lions can be seen in "flotillas" in river mouths and bays.

The northern or Steller's sea lion is a much more easily disturbed than the California sea lion and is quite vulnerable to disruption from human activities. Northern sea lions have a

tawny pelt and the males develop a thick mane around their bulky necks. Northern sea lions are larger than California sea lions. Males grow to 12 or 13 feet and weigh around 2000 pounds. Females are about half the size of the males. Northern sea lions range from the Channel Islands off southern California, north along the coast to the Bering Sea, and south around the Kamchatka Peninsula to the Sea of Okhotsk. Northern sea lions feed primarily on squid, whiting, herring and rockfish.

About 2500 of the world population of 250,000 northern sea lions breed in Oregon on a few rocky outcrops. The Rogue and Orford Reefs are the largest breeding sites for the northern sea lion in U.S. waters south of Alaska. Northern sea lions have also colonized caves near Heceta Head. These "sea lion caves" are a popular tourist site and the owners of the upland access have provided means to observe the animals without disturbing them. In July, after the end of mating season, some of the males travel northward into British Columbia and Alaska. Most of the Oregon females and pups remain along the Oregon coast throughout the winter. In April 1990, the National Marine Fisheries Service listed the northern sea lion as a threatened species throughout its range.

Risks

Pollution

Marine birds and mammals require uncontaminated coastal and ocean waters. Pollutants, including oil, chemicals, plastic debris, and other contaminants, pose real threats to the health and survival of marine birds and mammals. Many of these pollutants come from land-based, human activities. Chronic pollution from oil or other chemicals decreases reproductive success and lowers survival rates. Oil from major tanker spills, oil well accidents or blowouts, and even bilge discharges can kill many birds and mammals. Plastic pollution is a growing threat. Animals may die when trapped by floating nets or lines. Plastic debris is sometimes mistaken for food and, when eaten, clogs an animal's digestive system.

Disturbance and Loss of Habitat

Human disturbance probably poses an equal, if not greater, long-term and ongoing threat to marine birds and mammals than pollution. Loss of suitable habitat for breeding, nesting, foraging, roosting, resting, and wintering, whether at sea, on the coast, or inland, also threatens survival of healthy populations of marine birds and mammals. Even existing conflicts with fisheries activities put stress on bird and mammal populations.

Impacts of human disturbance range from slight disruption of courtship, mating behavior, incubation, and feeding activities to outright mortality due to unusual exposure to heat or cold, trampling of the young by frightened adults, and predation of unprotected eggs or nestlings.

Marine bird colonies are especially susceptible to disruption during late spring and summer. This is the breeding season and the season of the lowest tides, when access to the rocks from shore is easiest. A single disturbance can result in the loss of a significant portion of the young for that year. For example, even one person coming onto a rock where tufted puffins are building nests or incubating eggs will cause the puffins to abandon the rock for that breeding season. Even if the puffins can find an alternate site, which is unlikely, the delay usually will prevent the birds from successfully breeding that year.

The cumulative effects of a number of small disruptions can reduce or even decimate marine bird or mammal populations across widespread areas. The reproductive rate of many marine birds and mammals is quite low, therefore, a few years of poor breeding can have major effects on population sizes. When human induced mortality over a few years is coupled with the natural mortality from low food supplies for a couple of years, such as during the recent El Niño, colonies of birds can

be wiped out. Observations in California and Washington indicate that murre colonies which were decimated during the early and mid 1980's have not come back.

Although the observed effects of close approach to a breeding colony may seem small, the results can be disastrous. Biologists report a recent example where a small boat was observed quietly watching a breeding colony of double-breasted cormorants. Some of the birds moved just a few feet off their nests to get a better look at the people. As soon as the cormorants moved away from the nests, ravens approached the unguarded nests ate large numbers of cormorant eggs.

More disturbing events cause more dramatic impacts. Loud noises from boats anchored up next to the rocks or from low flying aircraft can scare whole colonies off the rocks. Frightened, stampeding birds may trample eggs or young and can knock the eggs or young chicks off the nests to tumble to their death in the rocks or water below.

For marine mammals, there are even fewer isolated rocky outcroppings suitable for resting and rearing young. Marine mammal colonies are easily disturbed, especially during pupping seasons. Disturbance can be caused by people gaining access to the rocks at low tide and by fishermen or divers anchoring their boats and noisily operating near the rocks.

Management Issues

Population Declines and Loss of Habitat

Oregon's nearshore rocks and islands, so important as rookeries and haulout areas, are quite vulnerable to human disturbances. Several key bird and mammal colonies along the Oregon coast are currently threatened by disturbance and noise from nearby human activities and from unauthorized intrusion. Some of the rocks and islands along the Oregon coast are located near shore and are accessible by small boat or by foot at low tide. Some are close to popular fishing, shellfish harvesting, or recreational boating areas. The rocks and islands are also subject to noise and harassment from low airplane and helicopter flights, including military overflights and search and rescue operations.

The rocks and islands are the last possible refuge for many birds and mammals. Once common on the onshore cliffs, bluffs and beaches, marine birds and mammals have retreated from the advancing humans to the offshore rocks and islands.

Before human settlement of the coast, the marine bird populations were much larger than they are today. Biologists estimate that 100 years ago the bird population along the Oregon coast may have been as much as two to three times as large as it is today. Birds nested in large colonies on the many cliffs and bluffs along the shore and on the nearshore rocks and islands. Human presence has pushed the bird colonies offshore to the undeveloped rocks and islands, the only remaining habitat for the birds.

Seals haulout on sand bars or mud flats, but the rookery areas are only on the nearshore rocks and islands. This was not always the case. Before humans disrupted their behavior, the seals would establish nursery areas on the beaches. The nearshore rocks are less desirable rookery areas for the seals, but they are the only sites left where the seals are relatively protected from disturbance.

Archeological evidence indicates that northern fur seals used Whale Cove for a pupping area. Now northern fur seals do not breed anywhere along the Washington-Oregon-California coast. Remains from Indian middens indicate that northern sea lions used the beaches around Seal Rock as pupping and nursery areas. Today northern sea lions are entirely absent from this area.

Repeated disturbance at one site can result in its abandonment with little chance of relocation and can cause permanent population

Northern (Stellar) sea lions rest on rocks of Rogue Reef about three miles off the mouth of the Rogue River. This is the largest Northern sea lion rookery south of Alaska, and serves as an important year-around feeding and resting area. (ODFW photo)

declines. Since 1987, biologists have noticed that, although the number of northern sea lion pups at the rookeries on the Rogue and Orford reefs has been relatively stable, the number of adults tending these rookeries during the pupping season has declined substantially. Biologists are concerned that the reduced number of adults on the pupping rocks may result in reduced survival of pups and a future population decline. This decline has occurred at the same time as there has been an increase in boat activity around the rookeries, primarily associated with sea urchin diving, and an increase in low flying aircraft over the rocks, primarily Coast Guard overflights.

Biologists are seriously concerned about the survival of northern sea lions. The northern sea lion population in Alaska has declined precipitously in the past few years. The growth in Alaskan fisheries may have decreased the food supply of the northern sea lion. Additional factors such as entrapment in trawls and gill nets, pollution, and habitat disruption combine to seriously threaten the survival of the northern sea lion in Alaska. Populations in the eastern Pacific near the Kurile Islands may be experiencing similar declines. In California, where once there were a number of large rookeries, only two small northern sea lion rookeries remain and these appear to be declining.

So far, the Oregon population of northern sea lions has been somewhat stable. However, recent observations raise questions about the long term viability of the northern sea lion population in Oregon. Disruptions of adult activity at the pupping areas have been observed. Also, there are no suitable alternative rookery

sites for northern sea lions along the Oregon coast The ultimate fate of the Oregon northern sea lion population is uncertain. As populations decline elsewhere, the health of Oregon's northern sea lions will become more and more significant to the survival of the entire species. The Oregon Department of Fish and Wildlife has listed the northern sea lion as a "sensitive" species.

In April 1990, the National Marine Fisheries Service used its emergency authorities, under the Endangered Species Act, to list the northern sea lion as a threatened species throughout its range. Two protective measures became immediately effective off the Oregon coast as a result of this listing. First, shooting at or near northern sea lions is prohibited. Killing northern sea lions has been illegal since 1988. But now, commercial fishermen are no longer permitted to shoot around or at the animals in order to scare them away from fishing gear. Second, emergency measure allows observers to be placed on fishing vessels.

Fragmented State and Federal Responsibilities

No single government agency has responsibility for the many valuable marine birds and mammals of Oregon's coast and ocean. Nor does any single agency have the authority to manage the many activities which occur around sensitive marine bird and mammal habitats.

The U.S. Fish and Wildlife Service (USFWS) has management authority for the over 1400 rocks and islands which are part of the Oregon Islands National Wildlife Refuge. These rocks and islands are important breeding, nesting, and resting areas for marine birds and mammals. The USFWS authority covers only the dry land part of these rocks and islands. (See the information box on National Wildlife Refuges).

The National Marine Fisheries Service (NMFS) and the USFWS share the lead responsibilities for identifying and protecting endangered and threatened species. Generally, NMFS has primary responsibility for marine mammals and USFWS is responsible for marine birds.

All of the nearshore rocks and islands are within the state's territorial sea, so the state has jurisdiction over the surrounding waters and land below the water. The Division of State Lands has proprietary jurisdiction over the ocean bottom and the rocks below the water line. The Oregon Department of Fish and Wildlife can regulate the harvest of fish and invertebrate animals around the rocks. ODFW has the dual responsibility of managing fisheries to assure long term returns and to minimize disruptive impacts of local economies from shifts in the fisheries industry and of protecting marine habitats and animals from adverse disruption.

Navigation and vessel safety is the concern of the U.S. Coast Guard. Aircraft activities are the concern of the military and civilian aviation agencies, such as the Federal Aviation Administration and the Aeronautics Division of the State Department of Transportation.

In May 1989, the USFWS officially requested that the Ocean Resources Task Force establish special management areas with buffer zones and use restrictions around a number of the nearshore rocks and islands. The USFWS identified thirty-three areas where they believe human disturbance and habitat degradation are threatening the viability of important marine bird and mammal colonies. (The USFWS proposal and the 33 areas are briefly described at the end of this section of the Ocean Plan).

The USFWS believes that protection of marine birds and mammals requires better cooperation and coordination between state and federal agencies and that new federal-state comanagement arrangements are needed to address issues which neither the federal government nor the state government can do alone.

Effective management and protection of the

marine bird and mammal populations will require specific knowledge of the nature of the disturbances at each specific site and the cooperation of a number of state and federal agencies.

However, management programs and regulations are only partial solutions. Enforcement of even existing regulations is difficult without a commitment of much greater time and money. Creative non-regulatory approaches will also be needed to complement management schemes.

Limited Scientific Information

Unfortunately, there is very little historical or scientific data on marine bird and mammal populations of the Oregon coast and nearshore waters. Knowledge of normal and abnormal animal behavior, historical diaries, research at Indian middens, and studies of specific sites and species can provide some background information.

Data does exist for the California coast and the Washington coast, especially in Puget Sound. This data clearly shows the decline of marine bird and mammal populations and the displacement of breeding colonies with increasing pressures from human activities. Professional biologists infer that what has happened along the Washington and California coasts has or is happening along the Oregon coast.

Two coastwide surveys of marine birds along the Oregon coast have been conducted, one in 1979 and the other in 1988. Although these surveys provide valuable information, they must be used with caution. The data from just these two points in time are not adequate to draw scientific conclusions about population trends.

Exact data on the size of marine bird and mammal populations is difficult to obtain and requires many, many hours observing animals in the field over many years. Such efforts can also be very costly. And, even if accurate counts are obtained, comparing data and drawing scientifically supportable and meaningful conclusions can still be very difficult.

Counts of marine bird and mammal populations can vary greatly from year to year, seasonally, and even hourly. Annual variations in oceanic conditions and food supply; seasonal variations in animal behavior, especially reproductive cycles; and daily activities, such as foraging for food, must all be considered by biologists trying to estimate population sizes, determine population trends over time, or draw conclusions on the effects of environmental variables on population size.

Recently, biologists examining data from the 1979 marine bird survey and aerial photos of some of the nearshore rocks which were taken in 1979 before the survey was conducted have concluded that the 1979 survey probably underestimated the common murre population. The photographs shown many more common murres than counted in the survey. The survey was apparently conducted after the common murre nesting season was completed and many of the birds had left the rocks.

Marine bird and mammal populations also vary greatly from place to place along the coast. The exact nature of problems with disturbance and habitat disruption differs from site to site depending on habitat type, species affected, proximity to human activities, and specific use conflicts.

The task of obtaining more information can be narrowed by focusing on the specific areas identified in the USFWS proposal to the Ocean Resources Task Force. (See description of the proposal at the end of this section of the Ocean Plan). There may be more than the 33 sites identified by the USFWS which need additional protective management or there may be less, but the first important step is to develop additional documentation of these 33 areas.

Limited Public Understanding

Because many of the marine birds and mammals cannot be readily seen from shore, the public is often unfamiliar with their variety, numbers and behavior. Likewise, the

effects of human activities on these important and vulnerable species are often unnoticed except by professional biologists. Impacts of human activities on marine bird and mammal populations may be subtle, cumulative, and occur over long periods of time.

Human disturbance of marine birds and mammals often stems from unintentional and uninformed activities. Pilots in low flying aircraft may simply not be aware that their sight-seeing flights over a breeding colony of common murres can leave a trail of ecological damage that will last for years. Adventurous beach visitors may not know that their challenging climb up a rocky cliff can lead to significant disruption of breeding habitat. SCUBA divers anchoring alongside a nearshore rock while diving may not realize that their activities can decrease the likelihood of successful birthing and rearing of sea lion pups.

Also, many people are not familiar with or do not understand the reasons for the federal and state laws protecting marine birds and mammals. Some people, especially tourists, may also simply not be aware that the nearshore rocks and islands are part of a wildlife refuge and that trespass on them is prohibited.

Conclusions and Recommendations

Conservation of the marine bird and mammal resources of the nearshore rocks and islands requires priority attention.

- Human activities have and will continue to affect marine bird and mammal populations along the coast of Oregon. Oregon must act to assure the continued viability of these populations and the quality of the habitat upon which they depend.
- More scientific information on marine bird and mammal populations and their susceptibility to disruption is needed. More site specific information is necessary to design appropriate and effective management approaches to protect marine birds and mammals along Oregon's coast.
- Better and more extensive programs are needed to educate the public about marine bird and mammal resources along the coast and about the impact of human activities on these animals. Education programs also need to be targeted toward ocean users, including the fishing industry, on the specific effects of their activities on marine bird and mammal populations.
- Protection of marine birds and mammals and their habitats requires improved cooperation and coordination of state and federal agencies, and local governments. Opportunities for comanagement need to be explored.

Decisions to prohibit, restrict or allow activities to continue around sensitive areas must be a careful balancing act involving the public, ocean users, local governments, and state and federal resource management agencies.

The question of allowing anchorages near sensitive marine bird and mammal populations will require special attention. Fishermen traditionally use the areas around the rocks and islands for night and foul weather anchorages. Traveling in the lee of the rocks and islands also provides safe passageways during rough seas. Concern for the needs of fishermen and for the safety of people and their boats necessitates full consultation with affected parties and careful consideration of any proposed special management measures around the nearshore rocks and islands.

The goal of the Oregon Ocean Plan is to protect marine birds, marine mammals, and their habitats from adverse disruption, from intentional or unintentional harassment, and from pollution, especially oil spills and plastic debris.

Recommended Policies

1. Promote public awareness and appreciation of marine birds, marine mammals, and their habitats. Develop public education

and interpretation programs to increase public understanding of the biology of marine birds and mammals, their habitats needs and the vulnerability of marine birds and mammals to human disruption and disturbance. Ensure that these education programs are readily available and widely distributed. Develop targeted education efforts to specific ocean resources user groups, including the fishing industry and recreational boaters.

2. Provide state protection to marine birds and mammals, especially endangered, threatened and sensitive species, and to habitats which are critical to maintaining viable marine bird and mammal populations.
3. Develop provisions in Oregon's plan for the territorial sea that will improve protection of sensitive marine bird and mammal populations and will provide for the development of site-specific management programs.
4. Strengthen state programs to complement federal bird and mammal protection programs. Actively pursue comanagement opportunities.
5. Prohibit activities around nearshore rocks and islands which threaten the continued viability of marine bird and mammal populations, especially endangered, threatened, and sensitive species on the thirty-three sensitive areas identified below.
6. Support the use of the nearshore rocks and islands for safe passage and anchorage where necessary to protect human lives. Allow anchorage and passage for matters of convenience only if these activities do not adversely affect sensitive marine bird and mammal populations.
7. Support a range of resource management and protection measures which include both regulatory and non-regulatory approaches, as appropriate to each specific case. Support increased enforcement efforts of existing state and federal agencies.
8. Until Oregon completes an evaluation of the sensitivity of specific marine bird and mammal populations and their habitats and until Oregon adopts a plan for the territorial sea or other enforceable programs which provide specific protection for sensitive marine bird and mammal populations and their habitats (See Needed Actions):
   - Allow fishing and the harvest of renewable resources around all of the nearshore rocks and islands unless the Oregon Department of Fish and Wildlife determines that a specific use or activity adversely affects sensitive marine bird or mammal populations.
   - With the exception the fisheries activities which do not adversely affect sensitive marine bird or mammal populations and safe passage and anchorage where necessary to protect human life, prohibit all other activities within 1/4 mile of the thirty-three sensitive areas identified below. Prohibited uses include such recreational activities as jet skis; sea kayaking; SCUBA diving; tidepooling; birdwatching; and sightseeing boats, planes, and helicopters.
   - Prohibit exploration and development of nonrenewable resources, including oil, gas and marine minerals, within three miles of all nearshore rocks and islands. Allow academic and public agency scientific research on nonrenewable resources within three miles of the nearshore rocks and islands, if ODFW determines that these activities will not adversely affect sensitive marine bird or mammal populations or their habitats.
9. Support the outstanding contribution of volunteer wildlife rehabilitation centers to protect Oregon's marine bird and mammal populations and provide state support through equipment, information, training,

and funding, as appropriate, to increase Oregon's capability to care for injured wildlife and respond to oil spill events.

10. Increase communication among the Oregon Department of Fish and Wildlife, Oregon State Police, Oregon Department of Parks and Recreation and wildlife rehabilitation centers on marine mammal protection.
11. Develop protocols for involvement of wildlife rehabilitation centers in oil spill response planning and implementation.

Needed Actions

☐ Oregon's plan for the territorial sea should include:

- Criteria for the identification, designation and protection of sensitive marine bird and mammal populations and habitats.
- An evaluation of the sensitivity of marine bird and mammal populations and their habitats focusing on the thirty-three sensitive areas identified below plus any other sites which the Oregon Department of Fish and Wildlife determines are in need of evaluation. (See list at the end of this section).
- An analysis of the need for and adequacy of alternative protective measures around sensitive marine bird and mammal populations and habitats.
- Site-specific measures to protect sensitive marine bird and mammals populations and habitats that include enforceable policies and interagency or intergovernmental management agreements where necessary.

During the development of the plan for the territorial sea, the Oregon Department of Fish and Wildlife should continue to work with other state agencies and with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to find ways to advance the objectives of the Oregon Ocean Resources Management Plan to protect marine birds and mammals and their habitats.

☐ The Ocean Policy Advisory Council should:

- Provide a policy forum and assist the efforts of state and federal agencies to document the use and significance of specific sites to marine bird and mammal populations; to document site specific use conflicts; to develop alternatives for resolving use conflicts around specific sites; and to analyze and develop specific proposals for any needed additional protective management measures around specific marine bird and mammal habitats. The thirty-three sensitive nearshore rocks and islands identified by the U.S. Fish and Wildlife Service should be used as the focal points for this discussion and evaluation. However, other sites may be considered if further research and evaluation indicate that there may be other important marine bird and mammal habitats. These evaluations and assessments should be given high priority by state agencies and should be completed as soon as possible.
- Assist efforts of state agencies to provide immediate protection for stressed marine bird and mammal communities.
- Request the assistance of the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration to help identify specific problems and solutions to protect sensitive marine bird and mammal populations and their habitats.
- Encourage and assist efforts to develop marine bird and mammal interpretive programs for areas near rookeries or haulout areas to educate the public about marine birds, marine mammals, and their habitats and about their vulnerability to human disruption. Encourage the development of marine education programs on these subjects throughout Oregon's school system. Support the educational efforts of the Oregon Sea Grant Program.
- Provide a forum to work with the National

Oceanic and Atmospheric Administration, Pacific Fishery Management Council, Federal Aviation Agency, Coast Guard, Oregon Marine Board, and any other affected agencies to find ways to reduce disturbances from a broad range of human activities to marine bird and mammal colonies.

- Facilitate the efforts of the Oregon Department of Environmental Quality and local governments described in the section on marine water quality to protect water quality in Oregon's ocean waters, including promoting recycling of plastics and other wastes.
- Facilitate efforts to develop a strong state oil spill prevention, response and cleanup capability as described in the section on oil spills.

☐ The Department of Fish and Wildlife should:

- Conduct and support scientific research on marine birds, marine mammals and their habitats to provide information for use in management decisions to improve protection of these resources.
- Identify key marine bird and mammal habitats, including habitat requirements for breeding, foraging, and resting.
- Establish criteria for the designation and protection of sensitive marine bird and mammal habitats.
- Evaluate the sensitivity of marine bird and mammal populations at specific sites. Assess the sources and levels of disruptions at specific sites.
- Examine resource protection needs of specific sites. Analyze alternative protective management approaches for protecting marine birds and mammals.
- Develop site-specific measures to protect sensitive marine bird and mammals populations and habitats from adverse disruption. Develop enforceable policies, administrative rules, and interagency or intergovernmental agreements where necessary.
- Examine the need to establish state wildlife management refuges that either overlay or surround the federal refuges and to develop a comanagement scheme with the USFWS for such areas. If necessary and appropriate, seek additional authority for such refuges.
- Develop, in cooperation with wildlife rehabilitation centers, specific educational programs and informational materials to educate state and local police and coastal park employees about marine birds and mammals and the appropriate actions to be taken to protect these animals.
- Develop protocols for involvement of wildlife rehabilitation centers in planning for and responding to oil spills.

Sensitive Marine Bird and Mammal Habitats

During 1989, the U.S. Fish and Wildlife Service (USFWS) came to the Oregon Ocean Resources Management Task Force with a proposal for additional state protection of the marine birds and mammals of the nearshore rocks and islands.

The USFWS, with the help of the Oregon Department of Fish and Wildlife (ODFW), examined all of the approximately 1400 nearshore rocks and islands in the Oregon Islands National Wildlife Refuge, major headlands along the coast, and the remaining rocks and islands not in the Refuge, to determine which marine bird and mammal colonies may be in need of additional protection. The USFWS identified thirty-three as especially crucial habitat for marine birds and mammals. (These thirty three areas are identified and briefly discussed below). The USFWS officially requested that the Ocean Resources Task Force designate these thirty-three areas as special management areas. The USFWS proposed that the state manage human activities around these areas to protect the marine birds and mammals using these habitats and to complement the needs and objectives of the Oregon Islands National Wildlife Refuge. The USFWS suggested that buffer zones and use restrictions be developed for each of the thirty three areas.

The USFWS and ODFW developed the following factors to evaluate the significance, sensitivity, and vulnerability of the marine bird and mammal habitat areas along the coast:

- The ecological significance of the area to maintaining ecosystem structure, biological productivity, biological diversity, and representative species assemblages.
- The ecological significance of the area to important life history stages of marine organ isms, especially special feeding, courtship, breeding, nursery, parental foraging, overwintering, and resting or haulout areas.
- The presence of state or federally listed sensitive, threatened, or endangered species. The ecological importance of the area to maintaining populations of sensitive, threatened, or endangered species.
- Species diversity on an individual nearshore rock or island. The size of the populations of marine birds and mammals and the percentage of the total Oregon population of a particular species on an individual rock or island.

The current stresses and the severity of impacts of human activities on the habitat and biological community. The vulnerability of the biological community and the habitat to the adverse effects of pollutants, noise, seismic testing, habitat alteration, human trespass, and harvesting.

The USFWS suggested that buffer zones and use restrictions may be needed in the following cases:

- If an endangered, threatened, or sensitive species requires a specific area for part of its life cycle (e.g., reproduction, feeding, or nesting), then a total exclusionary buffer zone of 500 feet is necessary for that portion of the year that the species requires use of that area.
- If an area contains a high percentage of the total number of marine bird or mammal species found along the Oregon coast, then a total exclusionary buffer zone of 500 feet is necessary for that period of time that those species require its use.
- If an area contains a high percentage of the total state population of a species, whether breeding, wintering, or general population levels, then a total exclusionary buffer zone of 500 feet is required for that period of time when the area is in use.
- If a species or habitat is highly vulnerable to a particular human activity which causes adverse impacts on the species or habitat, then a minimum exclusionary buffer zone of 500 for that activity is necessary for as long as the species or habitat is vulnerable to that activity.

The USFWS suggested these buffer zones and use restrictions as their best professional judgment and as a starting point for discussion. Applying the above guidelines to the thirty three areas, the USFWS identified ten areas which they believe need permanent buffer zones. (These areas are identified in the following list).

Tillamook Head Rocks

This site includes a group of rocks and pinnacles located immediately adjacent to Tillamook Head. These rocks provide breeding habitat for more than 1,000 Brandt's cormorants and several hundred common murres. Up to 150 harbor seals use this area as a pupping area in spring and early summer and as a resting area year around.

Low flying aircraft and boats approaching too close to this area pose a threat.

Tillamook Rock (Lighthouse)

This privately-owned rock with an abandoned lighthouse is located one and a half miles west of Tillamook Head. This rock and the associated abandoned structures serve as a major seabird breeding colony with more than 7,000 common murres and 400 Brandt's cormorants recorded here in 1988. This rock also serves as a roost site for hundreds of endangered brown pelicans.

Human presence on the rock and boat and aircraft traffic around the rock pose potential harm. The rock's isolation aggravates these potential problems since human disturbances are difficult to observe.

Sea Lion Rock (Ecola Point)

This site is the second largest resting area for northern sea lions on the north Oregon coast. The rock is used year round by northern sea lions with population sizes up to 250. More than 2400 common murres were recorded nesting here in 1988 and the rock serves as a roosting site for endangered brown pelicans.

Low flying aircraft and close approaching boats are the principal concerns here. The USFWS suggested a permanent buffer zone around this rock.

Bird Rocks (Chapman Point)

This area includes four rocks just off Chapman Point approximately 1 mile north of Cannon Beach. Together these four rocks provide nesting habitat for more than 41,000 common murres and 3,100 Brandt's cormorants. This is the second largest concentration of nesting Brandt's cormorants in Oregon and the third largest in the world. The endangered brown pelican uses these rocks for roosting and threatened bald eagles have been observed preying on murres here.

There is a high volume of low level aircraft disturbance here and trespass on the eastern rock is a problem on low tides. Boats are generally not a problem here because the rocks are located in or very near the surf. However, people on surf boards are becoming a problem.

Castle Rock (Arch Cape)

This rock is located approximately 3/4 mile west of Arch Cape in Clatsop County. In 1988, more than 10,000 common murres were recorded nesting here in addition to 4 other species of marine birds. This site also serves as a roosting area for endangered brown pelicans.

Low flying aircraft and close approaching boats are the major concerns here.

Gull Rock (Arch Cape)

This rock is located 1/4 mile west of Cove Beach and about 1/2 mile south of Arch Cape. More than 6,000 common murres and 100 Brandt's cormorants nested here in 1988. This site may also be used as a roosting site by endangered brown pelicans.

This rock is very near Castle Rock listed above and, therefore, has the same aircraft and boat disturbance concerns.

Unnamed Rock (Cape Falcon)

This is a large unnamed rock immediately adjacent to Cape Falcon in Tillamook County. This site serves as a major Brandt's cormorant nesting colony with 668 birds recorded here in 1988.

This is an isolated section of coastline, so human trespass is not a concern. However, low flying aircraft and close approaching boats may be impacting the birds.

Pyramid Rock (Cape Meares)

This rock is located approximately 3/4 mile northwest of Cape Meares. Over 9,000 common murres and 288 Brandt's cormorants nested here in 1988. The diversity of marine birds nesting here is high. Seven of the thirteen species nesting along the Oregon coast are found here. This site is also used by the endangered brown pelican.

There is a high volume of low level aircraft flights and boat traffic around this rock resulting in repeated disturbances.

Pillar Rock (Cape Meares)

Located about 1/4 mile northwest of Cape Meares, this rock is a major seabird colony supporting more than 10,000 nesting common murres.

Located very near Pillar Rock, this rock also receives a high volume of low flying aircraft and close approaching boats.

Three Arch Rocks

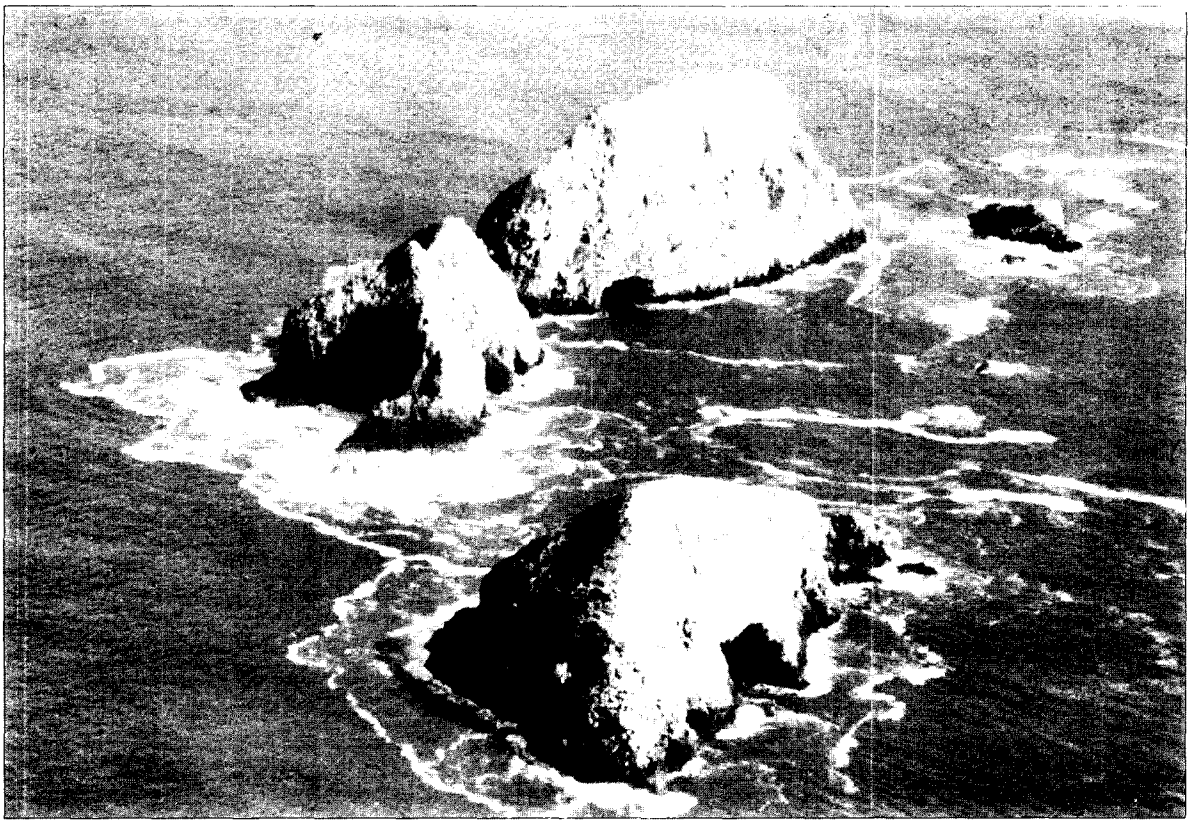
Three Arch Rocks is immediately offshore from the community of Oceanside. This site includes the three large rocks and six smaller rocks, including one on the east end known locally as Seal Rock.

The USFWS suggested a permanent buffer zone around these four rocks.

The three large rocks collectively support more than 200,000 nesting seabirds making this the largest seabird colony between central California and British Columbia. Three Arch Rocks contains the largest breeding population of common murres south of Alaska and the largest population of tufted puffins in Oregon. In addition to the huge number of birds, diversity is extremely high. Twelve of the thirteen species of nesting seabirds along the Oregon coast breed on Three Arch Rocks. Endangered species also make extensive use of this site. The endangered Aleutian Canada goose uses the western rock as a nocturnal roost site and feeding areas from October through April. Endangered brown pelicans use these rocks as roost sites from June through November. Endangered peregrine falcons have been seen here throughout the year. On occasion, threatened bald eagles are seen over the rocks apparently preying on murres.

Seal Rock is the largest haul out or resting site for northern sea lions on the north Oregon coast. As many as 300 animals have been recorded here. In recent years, this site has also served as a breeding location for northern sea lions with the small number of pups being produced making this the only breeding location for northern sea lions in Oregon north of Cape Blanco. Also, low numbers of California sea lions use this rock as a haul out site from fall through spring.

Human disturbance at Three Arch Rocks is very high. Although trespass on the rocks does not occur very often, the area is plagued with low flying aircraft that flush thousands of birds from their nests and scare sea lions off the rocks. There is also a high volume of boat traffic around the rocks that occurs daily in fair weather, In addition to motoring right up to the rocks, large boats have been observed going through the arches in the rocks flushing nesting birds out.



Three Arch Rocks just off the community of Oceanside is the site of the largest seabird breeding colony on the Oregon coast. Although these rocks are designated as a National Wildlife Refuge, human disturbance is very high. (Oregon Department of Parks and Recreation)

Cape Lookout (south face)

The south face of Cape Lookout is a major seabird colony site. The diversity is high. Eight of the thirteen species nesting along the Oregon coast are found here. In 1988, more than 12,000 common murres and 562 double-crested cormorants were recorded at this site. Endangered peregrine falcons have been observed here and the site is a historic breeding site for this species.

Low aircraft flights are particularly disturbing to the birds possible due to the acoustic effects of the sheer rock wall. This is also a popular anchorage location for boats. Much of the time wind noise probably masks the noise of the boats. Problems can occur if the boats get too close to the birds.

Haystack Rock (Pacific City)

This site is located 3/4 miles offshore from Pacific City near Cape Kiwanda. This rock provides breeding habitat for more than 3,000 marine birds and for twelve of the thirteen species of seabird which nest along the Oregon coast. This rock is extremely important to endangered Aleutian Canada geese and dusky Canada geese (sensitive species). Both of these Canada geese subspecies use this rock for roosting and feeding from October through April and are easily disturbed.

This rock receives a high volume of low level aircraft flights and a high amount of boat traffic literally within feet of the rock.

Cliff Creek Cove (Cascade Head)

This beach area on Cascade Head is the site of the second largest aggregation of California sea lions in Oregon. From September through April, up to 1,000 California sea lions use this location as a resting area. An additional 100 northern sea lions can also be found at this site during the same period.

The area is fairly remote. Pedestrian disturbance is probably not serious. Boats and aircraft may disturbance problems at times.

Unnamed Rock at Cascade Head

This site is located at Cascade Head in Tillamook County about 1/2 mile north of Two Arches Rock and includes a small headland and two adjacent rocks. Together these sites support over 4,700 nesting common murres and 664 Brandt's cormorants.

The isolation of this site eliminates human trespass as an issue, but there are a significant number of low level aircraft flights past here and a lesser number of nearby boat traffic.

Two Arches Rock (Cascade Head)

This site includes Two Arches Rock and two adjacent rocks just off Cascade Head. Together these three rocks form a major marine bird colony which supports more than 32,000 nesting common murres and 104 Brandt's cormorants. This area also serves as a roosting site for endangered brown pelicans.

Low level aircraft flights in this isolated areas are of great concern and occur frequently. Boat traffic is also of concern but is less common.

Gull Rock (Otter Rock)

This large rock is located about 1/2 mile northwest of the town of Otter Rock. This is a major seabird breeding site with over 20,000 common murres and 558 Brandt's cormorants nesting here. There is also a good diversity of nesting marine bird species here. In addition to its value as a major seabird colony, up to 100 harbor seals haul out to rest at this site throughout the year and to give birth to pups in spring and early summer.

Trespass by humans seldom occurs here now, however, there is a high volume of low level aircraft flights and close approaching boats at this site causing disturbances. The USFWS suggested a permanent buffer zone around this rock.

Shell Island and Simpson Reef (Cape Arago)

The Shell Island and Simpson Reef rocks are located west of Charleston near Cape Arago. This group of rocks is occupied by the greatest diversity of seals and sea lions found anywhere on the Oregon coast. Between 500 and 1,000 harbor seals use this site with numbers peaking during the spring and early summer pupping period. This is the primary shoreline reproductive areas for harbor seals in the state. Up to 2,000 California sea lions use this haul out and resting area during the fall northward migration; the largest single concentration of this species in Oregon. In addition, over 100 northern sea lions and nearly 20 northern elephant seals occupy this location at various times throughout the year.

Pedestrian traffic at low tides is extremely heavy in this areas and there is a high volume of low flying aircraft resulting in serious disturbances to the marine mammals of this area. The USFWS suggested a permanent buffer zone around this group of rocks.

North Coquille Point Rock (Bandon)

This rock is among a group of rocks just offshore from the City of Bandon. In 1988 this rock supported more than 9,000 nesting common murres and 214 Brandt's cormorants. The diversity of nesting seabird species is high with a total of seven species found here. The endangered Aleutian Canada goose can be found using this rock during spring staging and migration. Endangered brown pelicans use this rock as a roost site.

The rock is west of the beach intertidal zone thus trespass by humans does not occur and close approaching boats are not often a problem since the rock is either in or very near the surf zone. There is a high volume of low flying aircraft.

Several other nearby rocks are also important habitats for marine birds and mammals. Elephant Rock and Table Rock support breeding populations of tufted puffins, common murres, pigeon guillemots and other species. This area is also used as a pupping and nursery ground by harbor seals. The U.S. Fish and Wildlife Service highlighted this area, but recognizes that much of this area is so close to the beach and is accessible by foot at low tide that special coordination with the city and state governments will be necessary to protect these resources and still respect the public's right to use the beaches. Several citizens specifically requested inclusion of this area during public meetings on the draft policies.

Cat and Kittens Rocks (Bandon)

This is a group of rocks located about 1/4 mile southwest of Coquille Point near Bandon. This is a major seabird colony with more than 30,000 common murres and 218 Brandt's cormorants nesting here in 1988. Up to 250 harbor seals use this site throughout the year as a resting area and for birth and care of young during spring and summer. This location is one of the five major use areas for harbor seals on the southern Oregon coast.

The birds and mammals here are very sensitive to the high volume of low flying aircraft that pass over and to boats that approach too close in calm weather. The USFWS suggested a permanent buffer zone around this group of rocks.

Face Rock (Grave Point)

This rock is about 1/4 mile offshore from Grave Point near Bandon. In 1988 this rock supported more than 4,800 nesting common murres and 312 Brandt's cormorants. The diversity of nesting seabirds is high with seven species recorded here in 1988.

Disturbance problems here are associated with low flying aircraft and close approaching boats.

Castle Rock (Cape Blanco)

This large rock is located at the mouth of the Sixes River about 2 mile north of Cape Blanco. Castle Rock provides breeding habitat for approximately 600 double-crested cormorants.

Although the rock can be reached by wading, its vertical sides prevent climbing and, therefore, trespass by humans does not occur. Close approaching boats may occasionally be a problem. Low flying aircraft are the main concern at this relatively isolated location.

Gull Rock (Cape Blanco)

This major seabird colony is located about 1 mile north of Cape Blanco and is just west of the surf zone. Seven species of marine birds breed here including more than 36,000 common murres and 1,020 Brandt's cormorants. This site is also used by endangered brown pelicans as a roost site. Gull Rock is also one of the five major haul out areas for harbor seals on the south coast, between 100 and 200 harbor seals use this site for pupping during the spring and for resting during the entire year.

Disturbance problems are associated with low flying aircraft and boats approaching too closely. Trespass by boat access is very easy during calm weather. The USFWS suggested a permanent buffer zone around this rock.

Orford Reef

This special area includes Long Brown Rock, Large Brown Rock, Best Rock, Square White Rock, Seal Rock, Conical White Rock, Arch Rock and West Conical Rock. Together these rocks serve as a major seabird breeding site and a major sea lion haul out and pupping area. This site is one of the two most important haul out areas for northern sea lions on the Oregon coast, both in terms of the number of northern sea lions using the and in the number of pups born here. This site may be occupied by nearly 1,000 animals and may produce 100 to 150 pups each year. The northern sea lion is listed by the state as a sensitive species and the National Marine Fisheries Service is considering listing it as endangered or threatened under the Endangered Species Act. This site along with the Rogue Reef, constitute the largest reproductive area for northern sea lions in U.S. waters south of Alaska. In addition to its importance for marine mammals, the Orford Reef is also a major seabird breeding location. The rocks of the reef support seven nesting species of marine birds including more than 34,000 common murres and 400 Brandt's cormorants. The reef is also used by endangered brown pelicans as a roosting site.

The plot on the facing page shows the locations of nearshore rocks and islands that serve as important bird and mammal habitats, and which require more protection from human interference than that afforded by existing laws, regulations, and programs.

Source: ODFW and USFWS

Bird and Mammal Sites Requiring Additional Protection

Disturbance from close approaching boats and the activities of commercial and sport fishermen as divers is extensive in this area. Low flying aircraft are also believed to be a problem. These human activities are seriously threatening the use of this area by the northern sea lions and are affecting the ability of these animals to successfully breed and rear their young. Nesting seabirds are also being adversely impacted. The USFWS suggested a permanent buffer zone around these seven rocks.

Redfish Rocks (Port Orford)

This group of five rocks is located west of Coal Point about 3 miles southeast of Port Orford. These rocks serve as major seabird breeding sites with over 20,000 common murres and 200 Brandt's cormorants recorded here in 1988. Diversity is high with seven different species of marine birds breeding here.

Low flying aircraft and boats approaching too close to the rocks are the major concern here.

Island Rock (Humbug Mountain)

Island Rock is a large rock located 1 1/2 miles southeast of Humbug Mountain in Curry County. This is a major seabird colony with a diverse assemblage of breeding species. Eleven of the thirteen species of seabirds breeding along the Oregon coast are found here, including more than 20,000 common murres, 762 Brandt's cormorants, and 300 tufted puffins. Endangered species use is high here also with Aleutian Canada geese using the rock during the spring and brown pelicans roosting on the rock from spring through fall.

Low flying aircraft and close approaching boats are the main concerns here.

Unnamed Rock (Hubbard Mound)

This large flat rock is located about 1 and 1/2 miles west of Hubbard Mound and serves as a major seabird breeding colony. In 1988 over 20,000 common murres and 162 Brandt's cormorants nested here. Endangered brown pelicans also use this rock as a roosting site.

This rock is very low to the water so that when boats approach too close nesting seabirds can be severely disturbed. Low flying aircraft are also a concern here.

Dog Rock (Hubbard Mound)

This rock is located about 1 mile west of Hubbard Mound. In 1988 approximately 3,000 common murres and 30 Brandt's cormorants were recorded nesting here. Endangered brown pelicans use this rocks as a roosting site. The rock is one of the five major haul out areas for harbor seals on the south Oregon coast and is used by 150 to 200 seals throughout the year, including pupping season.

Boats approaching too close scare the birds and seals from the rock as do low flying aircraft. The USFWS suggested a permanent buffer zone around this rock.

Double, Needle and Pyramid Rocks in the Rogue Reef

Rogue Reef is the major haul out and rookery for northern sea lions in Oregon. Along with Orford Reef, these two sites comprise the largest rookery for northern sea lions in the U.S. south of Alaska. Between 1,000 and 1,500 northern sea lions may use the Rogue Reef during the spring and summer pupping and breeding season. Over 500 pups are born here each year. This area is also an important resting or haul out area for northern sea lions and California sea lions at all times of the year. In addition, the rocks south of Pyramid Rock are one of the five major haul out areas for harbor seals on the south coast. All of these marine mammals are protected under federal law. The northern sea lions is listed as sensitive by the State of Oregon. Rogue Reef is also an important seabird breeding colony with seven species nesting here including over 500 Brandt's cormorants and 3,600 common murres.

Disturbance from commercial and sport fishing boats and by divers coming in too close to the Reef is very high. There is also a high volume of low flying aircraft flights. These activities are adversely affecting the marine birds and mammals of the Rogue Reef. The USFWS suggested a permanent buffer zone around these three rocks.

Hunters Island

This large rock is located just south of Cape Sebastian about 1/4 mile offshore. The breeding seabird fauna is extremely diverse here with ten of Oregon's thirteen coastal breeding seabirds found here including over 19,000 Leach's storm-petrels and 466 double-crested cormorants. Endangered species use this rock including Aleutian Canada geese during spring migration and brown pelicans from spring through fall. Up to 200 harbor seals also use this location. This rock is the southern most of the five major haul out and pupping areas for harbor seals on the south Oregon coast.

Current problems at Hunters Island include boats coming too close to the rocks and low flying aircraft over the rock. The USFWS suggested a permanent buffer zone around this rock.

Mack Arch

Mack Arch is located 1 mile west of Burnt Hill Creek near the northern limit of Samuel Boardman State Park. This rock serves as a major seabird colony with more than 21,000 common murres nesting here.

Low flying aircraft and close approaching boats

Intertidal Plants and Animals

Resources

The plants and animals of the intertidal live at the boundary between the ocean and the land, in the zone buffeted by tides and waves. The tidepools, rocks, boulders, and nearby reefs support dense, colorful, and diverse communities of marine plants and animals. Many of the plants and animals of these intertidal communities live only in the intertidal zone and very nearshore subtidal waters.

Intertidal communities differ from place to place along the coast depending on how sheltered the community is from the waves and on whether the bottom is sand, mud, basalt, granite, or sandstone.

Rocky shores are densely populated by plants and animals which have remarkable adaptations and abilities to stay put with the onslaught of the pounding surf. The biological community of the wind swept sandy beaches is less rich than the rocky areas just a few feet away. The constantly shifting sands are suitable homes only for those animals which can burrow or tunnel into the sand.

Intertidal communities also change dramatically within a few vertical feet. Animals and plants high on the rocks are adapted to long exposures of air or salt spray and may be covered by the tides for only a few hours during several days out of every month. Mussels, barnacles, and limpets are the common animals of the high intertidal. The animals and plants of the low intertidal zones tend to be more delicate creatures which are submerged most of the time and are only exposed to air during the very low tides a few times a year. Anemones; a variety of starfish, including the huge sunflower star and the bright red blood star; purple and red sea urchins; delicate nudibranchs or sea slugs; sponges; tunicates, primitive ancestors of animals with backbones; and a vast variety of red, green and brown algae are just a few of the organisms of the lower intertidal and very nearshore subtidal.

Risks

Pollution

Intertidal ecosystems are vulnerable to pollution from sources both on land and at sea.

Miscellaneous trash carelessly tossed aside in parks or at roadside pulloffs or left after a beach picnic becomes beach litter. Once captured by the waves and tides this trash can be transported up and down the coast and can come ashore many times before it is finally deposited in a mussel bed, eaten by a marine bird, or entangles the head of a seal. Volunteer efforts to clean up beaches report that the most litter is found near parks and recreation areas and that more litter comes in on each high tide.

Poorly designed, operating, or located ocean outfalls from municipal sewage systems can contaminate intertidal organisms with disease-causing bacteria. The chemicals used in treating the sewage can poison intertidal organisms and can leaved bleached and sterile rocks where there were once vast beds of mussels and barnacles.

Oil spilled from tanker accidents or discharged when a ship pumps out its bilge can coat and kill intertidal plants and animals. The only ways to clean up oil soiled rocks and sandy beaches include washing rocks with detergents; bulldozing or shoveling the beach and trucking the oiled, sandy, rocky mess to a disposal site somewhere else; and blasting the rocks with high pressure water jets. These clean up methods also destroy intertidal biological communities and habitats.

Overuse and Abuse

Intertidal plants and animals, especially those of the rocky shores, are easily damaged by habitat disruption, pollution, and physical

Low tide reveals a fringe of rocky intertidal habitat at the foot of the cliff at the Inn at Otter Crest. This fringe, often of volcanic basalt or very hard sandstone, is typical of many promontories on the Oregon coast. (Oregon Sea Grant photo)

damage from increasing numbers of curious humans exploring the intertidal areas.

Intertidal communities are slow to recover from disruption. Many organisms grow slowly and live for many years. A single destructive event can have long term effects. And, most intertidal organisms don't move around very much, so repopulation from adjacent undisturbed areas can be extremely slow.

The simple act of many people walking on snails, anemones, other invertebrates, and marine plants can denude intertidal communities. When overturned rocks are not carefully and quickly replaced, habitats are destroyed and animals killed. Thoughtless collection of starfish and other organisms for intertidal souvenirs results in waste and destruction.

Management Issues

Limited Public Awareness

Visitors to Oregon's tidepools may be completely unaware of the effect of their actions on the viability of intertidal communities. Knowing and following very simple guidelines for tidepool etiquette could substantially reduce the impact of visitors and school groups on intertidal ecosystems.

Few opportunities currently are available near popular shoreline areas for visitors to learn about intertidal ecology and human impacts. Increased education opportunities and on-site interpretive programs can raise the stewardship consciousness of visitors to Oregon's coast.

Impoverished Intertidal Areas

Along the Oregon coast, the very low tides of the spring and summer months attract

hundreds of visitors a day to a few highly popular and relatively small intertidal areas. A few places along the coast that once abounded with diverse intertidal life are now impoverished. Other areas all along the coast are in danger of being degraded by overuse and will need special management attention in the future.

Haystack Rock and Yaquina Head are two well-known areas where overuse and abuse denuded intertidal communities. The diversity of life forms found in the intertidal areas has decreased. Starfish and sea urchins are less abundant than in similar places along the coast. Actions by concerned members of the public, assisted by state and federal agencies, have helped restore these areas. The Haystack Rock Awareness Program has improved the protection and preservation of intertidal communities through education.

Growing Tourism and Coastal Populations

Oregon's coast is attracting increased numbers of visitors and residents. The coast offers outstanding recreational opportunities, pleasant residential communities, and beautiful scenery. This growth offers many economic benefits, yet with these benefits come increased risks of negative impacts on the quality of intertidal ecosystems. All of the problems of pollution, overuse, and abuse will undoubtedly worsen as the numbers of both visitors and coastal residents increase.

To have both growth and healthy intertidal communities will require Oregon to act quickly and positively to improve public awareness and appreciation of intertidal ecosystems, to protect and restore those areas which have already been degraded, and to provide high quality recreational opportunities along the coast.

Fragmented State Agency Responsibilities

Both the Oregon Department of Fish and Wildlife and the State Parks Department have concerns about protecting fragile intertidal com-

Tidepool Etiquette

Everyone needs to learn about rocky intertidal ecosystems and about "tidepool etiquette." Informational signs and educational programs are needed at popular intertidal and tidepool areas, in the schools, and at tourist and recreational facilities. Development of new interpretive programs at Oregon's State Parks along the coast would be a valuable contribution.

Visitors to the rocky intertidal can consciously conserve living marine resources by following a few simple guidelines:

- Don't collect animals as souvenirs or simply for the sake of collecting. A dry starfish on a bookshelf or, worse, a rotten starfish in the bottom of a beach bucket is a senseless waste. School children don't need to collect "one-each" of everything they see. A single specimen may be more than enough for a school project or study.
- Study and observe plants and animals in their natural settings. Don't put them in a bucket to carry up the beach. Much more can be learned about a plant or an animal by carefully watching it in its natural environment than in a bucket or an inadequate aquarium. Even if an organism survives the crowding or low oxygen conditions in a bucket, returning an animal to somewhere it doesn't normally live may be the same as killing it.
- Carefully pick up only a few animals to look at and then replace each one, just as carefully, precisely where it was found. A fragile organism which normally lives in protected crevices can die or become easy prey if it is just tossed back into the sea or placed on the top of a dry rock.
- Carefully replace any overturned rocks to their original location. The homes of organisms living under and on top of rocks are destroyed when a rock is overturned in search of tubeworms, small fish or hermit crabs and then left exposed to the sun and predators.
- Don't litter and, if possible, remove trash found on the shore.
- Tread lightly and remember that the intertidal will remain a rich and fascinating place only if everyone acts as a responsible ocean resources steward.❖

Haystack Rock Awareness Program

The vision of the Haystack Rock Awareness Program is simple and direct: "To create a group of dedicated people joined together to preserve and protect the precious natural wonder of the Haystack Rock habitat". The Haystack Rock Awareness Program provides interpretive and educational opportunities to help coastal visitors and residents understand and enjoy and, thereby, become a part of the "stewardship circle" for marine resources.

The program offers active interpretive programs both on and off the beach. On days of the very low tides, interpreters and volunteers can be found giving talks, helping visitors see nesting birds through spotting scopes, and showing visitors samples of intertidal life in tide pools and under microscopes. Volunteers also stop and talk to visitors who venture unknowingly into closed wildlife protection areas or are collecting prohibited species. When not on the beach, interpreters and volunteers give public evening programs and slide shows and do the work to keep this important effort going.

Life long learning experiences are being created for the community and for visitors.

Begun as a pilot project in 1985, the Haystack Rock Awareness Program is clearly a success. The Program involves local citizens in providing positive protection of community resources, increases awareness of marine resources and the stewardship responsibilities of every citizen and visitor, and creates an opportunity for preserving the high quality of life along the coast while providing for economic growth through enjoyable and educational tourism opportunities.

The Program receives funding and support from the City of Cannon Beach, the Seaside School District, the Oregon Department of Fish and Wildlife, the U.S. Fish and Wildlife Service, and many local individuals, businesses, and community groups. ❖

munities and providing high quality recreational and educational experiences for the public. But neither agency alone can conserve intertidal communities.

ODFW can regulate the taking or harvest of intertidal animals. ODFW regulations make it unlawful to wantonly waste or destroy any intertidal animal at any time. ODFW regulations also set harvest or personal bag limits, and establish a permit system for commercial harvest of intertidal organisms. ODFW has no authority to regulate the harvest of marine plants or to manage areas to reduce the effects of human activities, other than harvesting intertidal animals, on intertidal ecosystems.

Enforcement of existing rules can be extremely difficult. Even if illegal actions are reported immediately to fish and wildlife officials, actually being able to catch someone in the act and stopping the destruction is unlikely. Enforcement of existing regulations would not solve the problem of unintentional overuse and abuse.

The State Parks Department operates a series of excellent coastal parks and has actively promoted public access to the beaches. But, the focus of these parks tends to be toward onshore recreational opportunities, not managing intertidal areas or providing interpretive programs on intertidal ecology.

The Division of State Lands also has a limited role as the "landlord" for intertidal areas and as the permitting agency for the harvest of marine plants.

Conclusions and Recommendations

The problem of conserving the intertidal plants and animals of Oregon's ocean coast requires priority attention.

- A number of Oregon's intertidal and the adjacent subtidal communities are threatened with destruction through overuse and abuse.

- Education and heightened public awareness can help conserve intertidal resources.
- Growth of tourism and development of coastal areas will place additional stresses on Oregon's shoreline and intertidal plants and animals.
- Excellent opportunities exist at sites along the coast for marine education and interpretation programs, increased public enjoyment, and heightened awareness and appreciation of life on the edge of the land and the sea. Some of these locations need better management in order to continue providing these opportunities for the future. State agencies will need to explore new approaches and to coordinate existing programs to fulfill these opportunities.

The goal of the Oregon Ocean Resources Management Plan is to protect intertidal ecosystems from adverse changes to biological communities and habitats.

Intertidal Marine Gardens

A few tidepool and intertidal areas along the Oregon coast need special management attention. The Ocean Policy Advisory Council, the Oregon Department of Fish and Wildlife, the Division of State Lands, and the State Parks Department should work together to evaluate ideas for "Intertidal Marine Gardens" and to develop a process to designate and manage Intertidal Marine Gardens. Local governments, tribal groups, and the public must be involved in the evaluation, review, and designation process. (Sites currently suggested for consideration as Intertidal Marine Gardens are listed and briefly described at the end of this section).

The term "marine garden" was first used by the Oregon Department of Fish and Wildlife in the early 1960s. Biologists, teachers, and researchers asked ODFW to provide special protection for an area near Otter Rock. After careful consideration, ODFW used its authority to regulate harvest of intertidal animals to close the area between Cape Foulweather and the Devil's Punch Bowl. Within this area it is unlawful to take, catch or molest any intertidal invertebrates. ODFW called this area a "marine garden". The ODFW has also established marine gardens at Cape Perpetua, Yaquina Head, and Haystack Rock.

The ODFW marine gardens as they currently exist are only partial answers to the problems of providing special management attention to sensitive, vulnerable and valuable intertidal ecosystems. ODFW's authority is limited to regulating the harvest of animals and closing areas to harvest. ODFW cannot regulate the harvest of marine plants or manage public access or use in these areas.

A new and expanded concept for Intertidal Marine Gardens can provide better protection and can enrich recreational and educational experiences.

The purpose of these new Intertidal Marine Gardens would be to protect sensitive intertidal areas from overuse, overharvest, and excessive collecting, and to ensure future public use and enjoyment of tidepool areas without jeopardizing the continued health and integrity of intertidal and subtidal ecosystems.

These new Intertidal Marine Gardens would focus public attention and raise awareness about these fragile intertidal areas. Intertidal Marine Gardens should have educational programs to increase the understanding and appreciation of intertidal ecosystems and to help every visitor become a responsible ocean resources steward. Informational displays, interpretive programs, nature trails, and visitor centers at the Intertidal Marine Garden sites or at nearby state parks will all be important means to increase public understanding and to provide high quality recreational experiences.

Public use of an Intertidal Marine Garden should be encouraged as long as the integrity of the intertidal ecosystem is maintained. The actual uses allowed or prohibited at a particular Intertidal Marine Garden would be determined

after site evaluation and public review. In general, allowable uses could include: hiking; picnicking; tidepooling; recreational fishing; and harvesting individual mussels for bait for recreational fishing. Prohibited uses could include: any other harvest of plants or animals, including commercial harvest; and all commercial or industrial uses.

To protect the intertidal resources and to allow time for overused or abused areas to recover, sections of an Intertidal Marine Garden could be temporarily closed and visitors could be directed to alternative viewing sites. This rotation of open viewing areas within an Intertidal Marine Garden site could conserve intertidal ecosystems and provide continual recreational and educational opportunities.

This new concept of Intertidal Marine Gardens will require the Oregon Department of Fish and Wildlife, the Division of State Lands, and the State Parks Department to explore new ways to manage these areas. New legislation will also be required. Currently no single state agency has the necessary authority or jurisdiction to manage and protect intertidal resources, to develop and promote educational and recreational opportunities, and to control potentially damaging uses of these new Intertidal Marine Gardens.

(Note: The term Intertidal Marine Gardens as used in the Oregon Ocean Plan applies only to oceanic intertidal areas and does not apply to estuarine areas.)

Recommended Policies

1. Protect sensitive intertidal habitats and communities from pollution and from overuse and abuse.
2. Promote public awareness, understanding, and appreciation of intertidal habitats.
3. Establish Intertidal Marine Gardens, where necessary, to protect particularly vulnerable intertidal areas and to provide opportunities for public enjoyment and learning.
4. Develop provisions in Oregon's plan for the territorial sea to protect intertidal plants, animals, and habitats.

Needed Actions

☐ Oregon's plan for the territorial sea should include:

- Criteria for the identification, designation and management of Intertidal Marine Gardens.
- A designation process for Intertidal Marine Gardens which allows full opportunity for the participation of local governments and the public.
- A list of suggested sites suitable for designation as Intertidal Marine Gardens. Site-specific information and analysis of resource management issues at these sites which make them appropriate for consideration as Intertidal Marine Gardens.
- An analysis of alternative management approaches to protect intertidal communities and habitats within Intertidal Marine Gardens.
- Specific sites to be designated as Intertidal Marine Gardens and proposed management plans for these sites.
- A description of the public information and education programs which will be a major component of an Intertidal Marine Gardens program.
- Proposals for any needed changes in state agency programs or authorities.

The process for evaluating, identifying, and designating Intertidal Marine Gardens in Oregon's plan for the territorial sea should begin with the list of sites identified in the Ocean Resources Management Plan. (See the list at the end of this section).

Until Oregon's plan for the territorial sea is completed, the Oregon Department of Fish and Wildlife, the Division of State Lands, and the State Parks Department should actively ex-

plore ways to advance the objectives of the Ocean Plan and should seek any new authorities which may be necessary to do this.

☐ The Ocean Policy Advisory Council should:

- Assist efforts of state agencies and local governments to provide immediate protection for stressed intertidal communities.
- Encourage and assist efforts along the coast to develop educational materials, including interpretative programs, permanent signs for roadsides and parks, and suggestions for alternative viewing sites in areas currently being overused or abused.
- Encourage and assist discussions between the Division of State Lands, the Department of Fish and Wildlife, and the Parks Department to explore ways to designate and manage Intertidal Marine Gardens and to provide for public education programs.
- Facilitate efforts among state agencies, local governments, tribal groups, and the public to develop Intertidal Marine Gardens, where needed. Assist efforts to develop criteria, to evaluate sites, to involve the public, and to designate sites to be Intertidal Marine Gardens.
- Facilitate the efforts described in the section on Marine Water Quality to protect water quality in Oregon's ocean waters, including promoting recycling plastics and other wastes.
- Facilitate the efforts described in the section on Oil Spills to develop a strong state oil spill prevention, response and cleanup capability.

☐ The Department of Fish and Wildlife should:

- Conduct or support scientific research on intertidal ecosystems to provide information that will help improve protection of these ecosystems and will help Oregon develop its plan for the territorial sea.
- Work with educators to develop programs and materials that will heighten public awareness and appreciation of intertidal habitats and communities and will help reduce unintentional abuse and overuse.
- Be the lead agency in the development of Intertidal Marine Gardens. Lead agency tasks include: developing criteria for the evaluation of suggested sites; evaluating specific site suggestions for Intertidal Marine Gardens; developing site specific management plans for Intertidal Marine Gardens; coordinating with the Division of State Lands, the Parks Department, and the Ocean Policy Advisory Council to establish and manage Intertidal Marine Gardens; consulting with local governments and the public in these activities. At any proposed Intertidal Marine Garden site that is adjacent to a state park, ODFW will work with the State Parks Department to integrate physically and administratively the Intertidal Marine Garden with the state park. The State Parks Department may need to take the lead in managing any Intertidal Marine Gardens adjacent to existing state parks.
- Develop proposals for the 1991 legislative session to define ODFW's authority to designate, develop management plans, and administer Intertidal Marine Gardens. The legislative proposals should expand ODFW's management authority to address public access and use issues as well as the harvest of all intertidal plants and animals. The legislative proposals should also establish a review and consultation process with affected state agencies and provide for full participation of local governments and the public.

☐ The Oregon Parks Department should:

- Expand educational and interpretive programs on ocean resources at State Park sites along the coast.

- Work with OPAC, DSL and ODFW to explore better management approaches to intertidal areas, especially the designation of Intertidal Marine Gardens. At a proposed Intertidal Marine Garden site that is adjacent to a state park, State Parks will need to work with ODFW to find ways to integrate physically and administratively the Intertidal Marine Garden with the state park. At such sites, the State Parks Department may need to be the lead management agency.

☐ The Division of State Lands should:

- Coordinate with ODFW, the Parks Department, and OPAC to explore better ways to manage and protect intertidal areas while providing quality recreational opportunities, especially through the designation and management of Intertidal Marine Gardens.
- Work with ODFW and the Parks Department to make any necessary legal and fiduciary arrangements necessary to develop and designate Intertidal Marine Gardens.

The tidepool offers a fascinating glimpse of sea life. Several intertidal areas are threatened by thoughtless collection of starfish and other creatures. (Nan Evans)

Suggested Locations for Intertidal Marine Gardens

The Ocean Plan only begins the effort to identify those special places which could become Intertidal Marine Gardens.

Criteria suggested by ODFW for evaluating an intertidal site for designation as an Intertidal Marine Garden include:

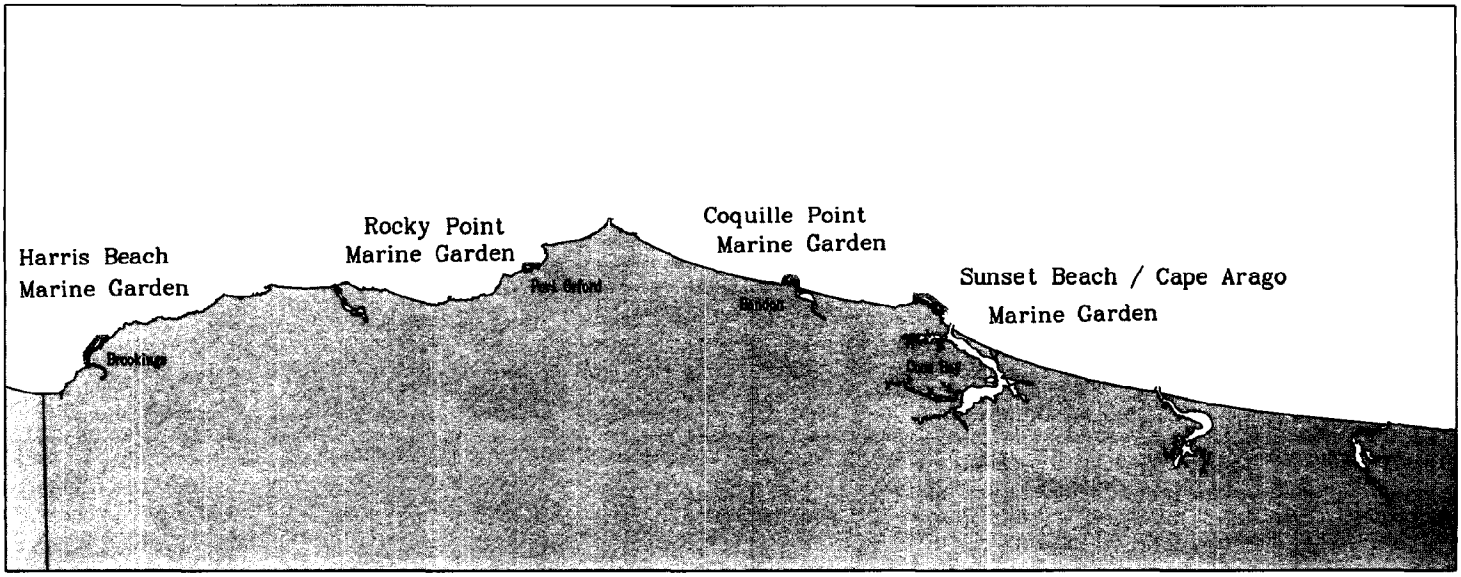
- The diversity, abundance and sensitivity of the intertidal communities and habitats at a particular site.
- The current and projected level of public use of the site.
- The potential for adverse impacts on intertidal communities and habitats from overuse, overharvesting, or excessive collecting that could occur without special protective measures at the site.
- The opportunities for high quality public recreational use and development of interpretive activities.

Based on these criteria, the Oregon Department of Fish and Wildlife and members of the public have suggested the following sites as good candidates for Marine Gardens. Their location along the coast are shown on the following pages.

- **Haystack Rock.** Located at Cannon Beach, this "sea stack" is a large rock isolated on a sandy beach. Haystack Rock is easily accessible. Overcollecting has been a problem in the past and the variety of invertebrates is limited, but recovering. In 1989, the area was designated as an ODFW marine garden. The boundaries of the ODFW's marine garden are 300 yards north and south of Haystack Rock.
- **Otter Rock.** Located nine miles north of Newport, on the north side of the community of Otter Rock, this area was designated as an ODFW marine garden in the early 1960s. The boundaries of the area are Cape Foulweather on the north and the Devil's Punchbowl on the south. Rest rooms, ample parking and good trails are available. Channels paralleling the shoreline break up the flat sandstone shelves. Numerous tidepools pocket the rocks. The area has thriving mussel and starfish populations.
- **Yaquina Head.** Located three miles north of Newport, this is one of the most heavily used intertidal areas in Oregon. This is a favorite area for tours and educational programs for school

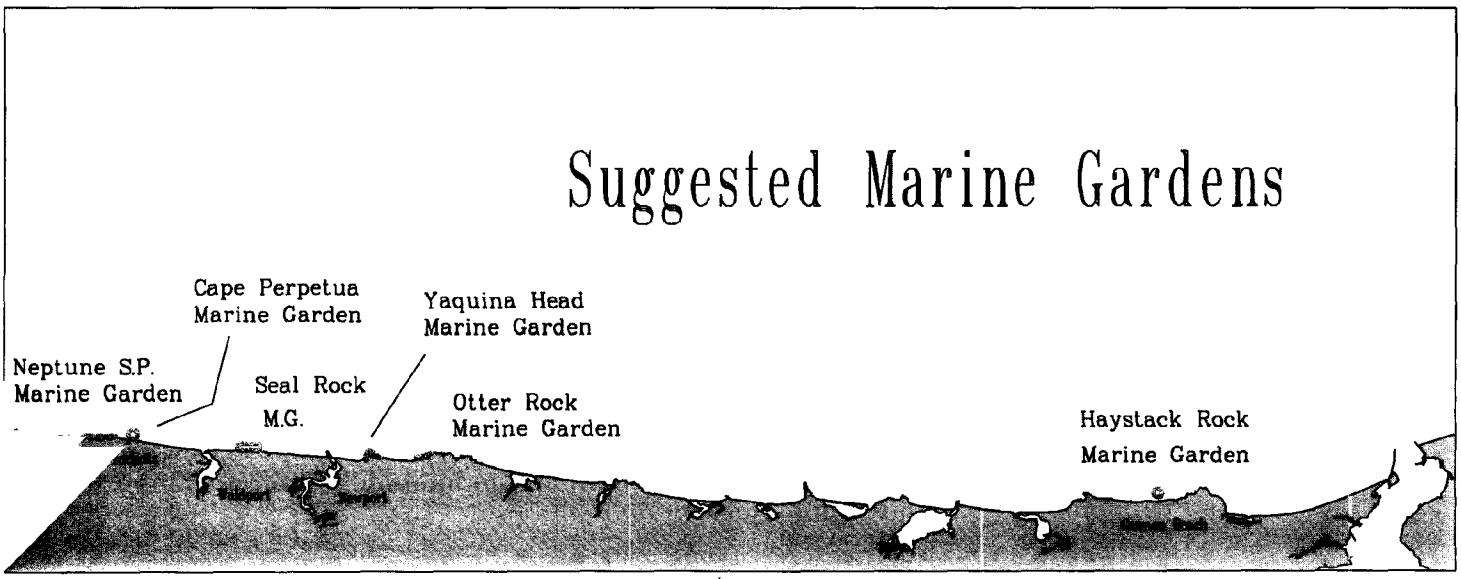
groups. The Bureau of Land Management has provided parking and a viewing site at the old Yaquina Lighthouse. The north side of the headland is relatively inaccessible, except at low tides. Caves cutting into the headland have abundant populations of sponges, colonial ascidians, and coralline algae. Paths and stairways make the south side of the headland easily accessible. Several rocky outcroppings are present, ranging from boulders to isolated islands. Channels and tidepools are widespread. A variety of animals and extensive colonies of sea urchins are found here. The area was designated as an ODFW marine garden in 1987. The sandy beaches on the north and south form the boundaries of the marine garden.

- **Seal Rock.** Located 12 miles south of Newport, there is good access to this intertidal area through Seal Rock State Park. Cliffs, bedrock and boulders are found intertidally around a massive headland and the chain of cliffs nearby. Offshore, numerous islands and reefs, give some protection to the area. The usual assemblage of mussels, barnacles, and sea stars is most common. Seals and sea lions are seen on the offshore rocks.
- **Cape Perpetua.** Two miles south of Yachats, Cape Perpetua is a massive mountain dropping abruptly into the sea. Bedrock shelves along the base of Cape Perpetua are broken by channels and caves which are lined with lush populations of sponges, ascidians, and encrusting algae. Beds of mussels, starfish, and barnacles cover the rocks and channels. Green sea anemones line the sides of the protected tidepools. This area was designated as an ODFW marine garden in the mid-1970's. The U.S. Forest has a visitor center and maintains a network of good trails that lead down to the intertidal zone. The boundaries of this area are the mouth of North Cape Creek to the north and Neptune State Park on the south.
- **Neptune State Park.** Located about 5 miles south of Yachats, this state park has a varied and extensive intertidal area. Bedrock outcroppings and sandy areas are intermixed. Most of the common species of intertidal animals may be found in the numerous tidepools, channels, and among the boulders. Algae and surf grass are abundant. The boundaries of the intertidal area correspond with the state park boundaries. Currently, collecting or taking intertidal animals is allowed in this area only under special permits from ODFW.
- **Sunset Bay and Cape Arago.** Located west of Charleston, this intertidal area includes the



area between the Cape Arago lighthouse and the south cove about 3/4 miles south of Cape Arago. A large state park, good access and abundant intertidal areas make this the second most used intertidal area in Oregon. There are several large coves, extensive reefs, and numerous pools and channels. Several sandy beaches are also present. A good variety of invertebrates can be found in this area. Offshore, large colonies of sea lions and seals can be seen and heard. Currently, collecting or taking intertidal animals is allowed in this area only under special permits from ODFW.

- **Coquille Point.** Located along the western shoreline of the town of Bandon, Coquille Point is a series of rocky outcroppings with adjoining boulders of various sizes scattered on the sandy beach. Access is available at several locations, including a recently built stairway just south of the point. Many of the common species of intertidal plants and animals are found, including those species adapted to open, unsheltered areas. The offshore rocks are close to the point and colonies of breeding birds are easily visible. Seals, which can be readily observed from the bluff or the shore, use the nearshore rocks as pupping and haul out areas. The intertidal areas and the bluff receive no special protection at this time.
- **Rocky Point.** Located about 3 miles south of Port Orford just inside the Humbug Mountain State Park, this area is an excellent intertidal area. Access is from a small road with limited parking. Sandy beaches, boulder fields, offshore reefs and kelp beds are found here. The area which may be suitable for a marine garden is the rocky area north of the sandy beaches.
- **Harris Beach.** Harris Beach State Park is located two miles north of Brookings. The extensive intertidal area lies between the Chetco River on the south to about 1/2 mile north of the state park boundary. Several rocky points, small sandy coves, isolated rocks, and boulder fields are scattered in the area. The state park and good trails allow for easy access to this popular intertidal area. Animals and algae are abundant in this area and some unusual species, such as solitary corals and umbrella crabs, can be found. Currently, collecting or taking intertidal animals is allowed in this area only under special permits from ODFW.❖



Boardman State Park in Curry County preserves many miles of dramatic ocean shoreline for public use, typical of Oregon's commitment to public access to the ocean shore. U.S. Highway 101, shown here at House Rock viewpoint, serves many roles along the coast, including a commercial transportation route, a local access road, and a spectacular scenic drive. (ODOT photo, 1972)

Recreation and Cultural Resources

Resources

Cultural Resources

Long before European influence spread to the Oregon country, native people lived near the sea in villages on estuaries and coastal streams from the Columbia River to California. Community subsistence and ceremony were directly linked to the daily tidal cycle, the seasonal flow of salmon, an abundance of fish and animals and ripening of berries, bulbs, and other plants.

Archaeological evidence suggest that these people first made contact with the Europeans as early as the seventeenth century. At least one shipwreck from this period is known to exist on the Oregon coast. Recent studies theorize that native people may have occupied the coast since before sea-level rise and could have inhabited or at least hunted and fished on what is now the submerged peninsula of the Heceta Banks. These and other sites along the ancient coastal plain would have been inundated or destroyed by the encroaching ocean over the last 10,000 years.

Relatively few village and other cultural sites on the Oregon coast have been identified and even fewer studied. Many sites are inland along rivers. Location and study of sites is hampered by natural processes of the Oregon coast such as high rainfall, stream and shoreline erosion, and rapid plant growth, coupled with the relative impermanence of materials such as wood, bark, fibers and animal materials. Finally, the continuity of native culture, traditions and materials was tragically interrupted and, for many tribes, exterminated over one hundred years ago when miners and settlers began to occupy Indian lands in large numbers.

Much more research and study is needed to better determine and understand the native cultural sites and resources of the Oregon coast. As coastal tribes regain official tribal government status, they can play a major role in determining how tribal cultural sites and resources should best be protected or studied. Information from this research will not only reveal the life and culture of native people but may also help identify the ancient distribution of marine animals such as fur seals and otters before trappers, traders and settlers reached the region.

Historical and cultural sites also exist from early non-Indian settlement and activity. Some of these are known, designated, and protected. Others, such as shipwrecks sites, are only suspected from historical evidence. In the past, Oregon law has regarded the artifacts from these sites, especially those on state-owned submerged lands, as available for private discovery and exploitation. To preserve the integrity of these resources for all Oregonians, state law should be changed to reflect the importance of artifacts and resources to all Oregonians.

Recreation Resources

The Oregon coast abounds with recreational resources and opportunities. Some, such as the sandy beach or tidepool, offer an intimate glimpse of the ocean's edge for those willing to risk wet feet. Others, high above the waves on a cliff or hilltop, provide hikers, bicyclists and auto travelers dramatic vistas of the meeting of land and sea. For the adventurous, numerous sites dot the coast for surf fishing from a rocky point or clam digging at low tide. Oregonians and visitors can camp, picnic, hike and relax in a multitude of state, county or federal parks within site and sound of the ocean. These recreational opportunities are primarily land based but are made meaningful by the ocean's presence.

Coastal recreation also extends into the ocean waters. Generations of hardy sportsmen have arisen before dawn to go charterboat fish-

ing for salmon "over the bar" at Coos Bay, Winchester Bay, Yaquina Bay, Tillamook Bay, the Columbia River and other areas. Surfers found Oregon waves cold but an excellent challenge year round. SCUBA divers have explored sheltered rocky sites near Sunset Bay, Cape Arago, Port Orford and Whale Cove. In recent years, sea kayakers and wind surfers have begun to explore the potential of Oregon's ocean waters. Whale watch charter boats offer a close-up look at these migrating mammals during winter and spring.

For many, the primary attraction is the ocean beach itself and the almost limitless variety of opportunities for enjoyment and recreation. Three major factors contribute to the popularity and enjoyment of Oregon's beaches. First, unlike many states, these beaches are a public resource. Oregon law provide for the protection of the public's right and access to the free and uninterrupted use of Oregon's beaches. Second, access to many beaches is easy and free. There are several hundred access sites along Oregon's 300-mile coastline provided by cities, counties, state parks, and federal agencies where people can get to the beach. Third, Oregon's beaches and shoreline are still relatively clean and Oregonians work to keep them that way. These factors make the Oregon coast very attractive to visitors and residents.

Overall, however, is the visual drama of Oregon's 300 mile-long coast. Travelers can stop at high capes such as Cape Sebastian or Neahkahnie Mountain and scan the horizon for fishing vessels and freighters over forty miles seaward near the curve of the Earth. From hundreds of sites, ranks of rugged mountains to the north or to the south challenge the sea as they appear to recede into the misty distance. Offshore rocks dot the horizon. Along almost eighty miles of central coast, sand dunes, imperceptibly engulfing the forest, create a gentle scene completely different from drama of the ocean. The flow of rivers to the Pacific provides yet other panoramas where the highway vaults coastal estuaries on bridges of classic design. From these bridges, the traveler's eye can behold wide tidal flats, the fringes of salt marsh, and the communities around coastal estuaries.

Travel on the Oregon Coast

As Oregon filled with settlers and the railroad crossed the coastal mountains, the sandy beaches, mild climate and recreational resources attracted weekenders and summertime vacationers to Seaside, Tillamook, and Newport. Even after the automobile came to Oregon, many sections of the coast could only be reached by boat or by driving on the beach. Not until the coast highway was completed in the 1930s was the entire coastline opened to automobiles. Over the past sixty years increased numbers of Oregonians and out of state visitors have come to enjoy the Oregon coast and the outstanding system of coastal state parks.

Travel surveys indicate that the coast is the most popular destination for pleasure travelers in Oregon. The major travel magnet is the natural beauty of more than 300 miles of coastline and the almost limitless recreational opportunities on the beach, the headlands, dunes, estuaries and coastal cities. Travel on the coast is growing. Between 1975 and 1987, total commercial accommodations employment in the north and central coasts grew by over 62 percent compared to a rate of 26 percent for all industries in Oregon. This growth is expected to continue.

Tourism is among Oregon's four largest sectors of the economy and generates about $1.8 billion annually, an amount similar to Oregon's high technology sector. Statewide, the direct payroll from the travel industry is about $319 million representing nearly 37,000 jobs. The state also receives tax revenues from gasoline and corporate income tax related to travel and tourism.

Highway 101

U.S. Highway 101, completed in the late 1930s, links coastal cities and towns from As-

Oregon's Public Beaches

In contrast to most of the nation's beaches, all but 36 of Oregon's 362 miles of shoreline are both accessible and reserved for public use. In other states, going to the beach might involve trespass on private land. Oregonians have always enjoyed the use of virtually all their beaches, but the *right* to do so was not established by law until 1967.

Oregon's public beaches represent two historic threads. First, from earliest human occupation until modern times, ocean beaches have been vital to coastal travel. Both native tribes and settlers found the smooth ocean beaches to be ready-made trails. Some beaches even served as public highways for automobiles until what is now called Highway 101 was completed in 1932.

Second, Oregonians have historically used the ocean shores for recreation. By the late 1800s, Oregon's beaches had become a playground for tourists brought by train from the Willamette Valley. In the early 1900s, the first rough roads to the coast brought automobile travellers who used the beach for travel as well as a place to picnic.

The foundation for Oregon's Beach Bill was laid in 1859. Upon admission to the Union, Congress granted Oregon jurisdiction over all navigable waters in the state. Such waters were to be ". . . common highways. . ." over which all citizens had the right to travel. Furthermore, tidelands belonged to the state under both the Admissions Act and English Common Law.

In 1872, the legislature authorized the sale of tidelands to private citizens. By 1901, the State Land Board had sold off 23 miles of tidal shore. At the same time, recognizing the value of 30 miles of beach on Clatsop Spit as a transportation route, the 1899 legislature declared it to be a public highway.

In 1913, Governor Oswald West, who opposed the sale of tidelands, proposed that *all* Oregon beaches be designated as public highways. The legislature agreed, and established Oregon's ocean shore, between low and ordinary high tide, as a public highway.

Following World War II, increased outdoor recreation sparked a campaign to develop park lands, especially along the coast. The 1947 legislature amended the beach law to allow regulation of cars and airplanes on the beach, to regulate the removal of sand or rock, and to prohibit the state from selling more shorelands. In 1965, the legislature changed the designation of beaches from a highway to a state recreation area, and prohibited sale of the ocean shore except by "special law."

In the 1960s, coastal development raised concern that Oregon's authority over its beaches was not as sound as had been assumed. State law established public ownership of the beaches covered by daily tides, but dry sands up to the vegetation line were actually in private ownership! In addition, the 1965 amendments implied that the legislature *could* sell part of the beach.

In 1966, construction of a barricade on dry sand in front of a north coast motel crystallized the issues of both the legal definition of a beach and the public right to the dry sand portion of the beach. Research revealed that 112 of Oregon's 262 miles of dry sand beach were privately owned.

In 1967, the Highway Commission introduced Oregon's now-famous "Beach Bill" in the legislature to clarify historic public rights to use ocean beaches. To continue public use of the dry sand portion of the beach, the bill established a public recreational easement across private beach areas. The Parks and Recreation Advisory Committee said that "we have the finest beach recreation areas in the nation; and the Highway Commission, through this bill, wants to keep it that way."

Passage of the bill was far from certain. Opposition focused on the location of the vegetation line, the threat to all private property rights on the coast, and violations of the U.S. Constitution. The bill remained stalled for more than four months. Finally, Governor Tom McCall helped forge a compromise that led to the bill's passage. Governor McCall signed it into law on July 6, 1967.

Court tests were not far behind. The new law was tested in cases involving both the barricade and the construction of a private road on the dry sand beach without a permit. In both cases the courts upheld the new law, ruling that the public had acquired easements based on implied dedication and long recreational use of the beach. The Beach Law merely empowered the state to enforce existing public rights to use the beach.

On appeal, the Oregon Supreme Court upheld the Beach Law as an excercise of the state's right to protect the public's use and enjoyment of beaches, since neither the state nor private landowners fully owned the disputed dry sands areas. The Court also referred to the English doctrine of Custom whereby all Oregon beaches are "public recreational land according to an unbroken custom running back in time as long as the land has been inhabited." Federal courts have also upheld the contitutionality of Oregon's Beach Law.

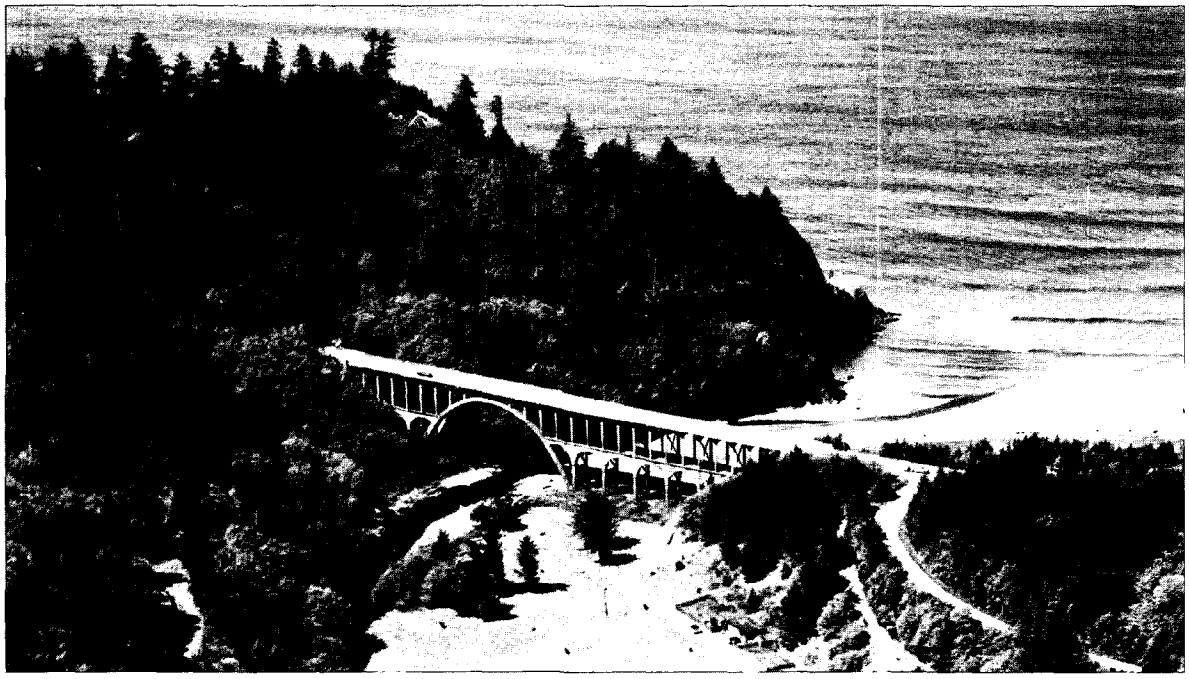
The Beach Law set the stage for Oregon's now-familiar history of environmental legislation. It focused attention on the vulnerability of our beaches and other natural resources to development, and on the potential loss of public rights long taken for granted. Ultimately, Oregon's Beach Law paved the way for the Oregon Ocean Resources Management Act and the Ocean Plan.❖

toria on the north to Brookings on the south. Although it swings inland from the ocean in some places, it is mostly confined to the narrow space between the coast mountains and the sea.

Highway 101 fills three primary, sometimes conflicting, functions. First, as the only continuous transportation link along the entire coast, it is a vital highway of commerce serving residents, businesses and industry in coastal communities. Between some towns on the coast, no viable highway alternative exists. The highway has been widened and straightened along some segments and traffic moves efficiently at high speeds. In addition, Highway 101 is an essential link between coastal communities and major highways to Oregon's interior.

Second, in almost every coastal city and town, Highway 101 is the main street. Many of these main streets are congested, especially during summer, with local traffic, through traffic, and recreational travelers. Some communities have begun to sprawl along the highway away from the city center in typical commercial strip development. Accomodating conflicting traffic demands in these urban centers is a challenge to local officials and transportation planners.

Third, the highway is a major recreational resource for the state and for local communities. It is a work of art designed, engineered and built with respect for the limitations and possiblities of the landscape. Carved into the rock high above the surf, it curves around coastal headlands behind handlaid rockwork and retaining walls. In places it plunges into the coastal forest or hides in the thick coastal brush behind sand dunes, only to emerge again to a new vista of the sea. A series of graceful bridges carries the highway in style across coastal streams and estuaries. In spring, the roadsides are lined with yellow scotchbroom and gorse, pink wild rhododendrons, and, in the open meadow hillsides of the south coast, purple flag iris.



Although the large bridges over Yaquina, Coos, Alsea, and other bays are more commonly photographed, U.S. Highway 101 crosses even small coastal streams on handsome bridges of classical design. Here at Devils Elbow State Park, the northbound traveller exits a tunnel onto this bridge over Cape Creek. (ODOT photo, 1972)

Oregonians and travelers from the world over enjoy the recreational and aesthetic experience of the highway itself as well as the recreation to which the highway provides access. Most travelers use automobiles or recreational vehicles. But a growing number choose to bicycle along the shoulder of Highway 101, riding with the wind from north to south. In some areas, the Highway is linked to the Oregon Coast Trail and provides shuttle access to and from trailheads. State, federal and private campgrounds, roadside picnic areas, and scenic viewsites abound along its entire length. Highway 101 is a statewide recreational resource of tremendous value.

Risks

Increasing Numbers of Visitors

In Oregon, as nationwide, coastal recreation is experiencing pressures and conflicts. The Statewide Comprehensive Outdoor Recreation Plan (SCORP), discussed below, describes recreation in Oregon as "facing a quiet crisis." As more visitors travel the Oregon coast, the array of coastal recreational uses expands and diversifies even while traditional uses remain popular. Even isolated, out-of-the-way areas are increasingly used by visitors seeking scenery and solitude. Highway 101, the coast's major transportation route, is required to handle larger traffic volumes of visitors along with a growing number of residents. Because most visitors on the Oregon coast travel by automobile or recreational vehicle, traffic congestion may make coastal outdoor recreation areas difficult and unpleasant to reach. Once there, visitors may very well find crowded areas and over-taxed facilities. The challenge for Oregon is to meet increasing demands for quality recreation in the face of increasing competition for land and natural resources that provide the recreational experience.

Population Growth

Although the Oregon coast is well endowed with public access and parks, urban growth and rural development along Oregon's ocean shoreline is rapidly filling in the open spaces. This development highlights the foresight of Oregon's early state park program to acquire numerous sites for public use. The rapid pace of development makes imperative the need to actively pursue opportunities to add to Oregon's treasure chest of publicly managed scenic and recreational sites.

Increased urbanization, strip development along Highway 101, and residential development on the shoreline can impact the ocean environment in several ways. Cities may need to turn to new ocean outfalls to accommodate increased municipal sewage. As new homes and vacation cabins are built along the beachfront, increased demand for seawalls and revetments to control the ocean's erosion may reverse the natural beach building process and therefore causes damage and loss to the public beach. Increased pressure to build new homes and cabins may result in development near heretofore isolated bird or mammal habitat.

Unmanaged or too rapid population growth on the Oregon coast can mean an unacceptable increase in traffic congestion on Highway 101 as well as in recreational areas, noise, litter, and significant degradation of air and water quality. Coupled with growing numbers of recreational travelers, this growth could degrade the coastal environment and diminish the quality of the coastal recreational experience.

More Recreation in the Water

Demand for increased "in-water" recreation is already occurring and can be expected to increase both as a function of growing population and of the popularity of "in-water" recreation nationwide. Some of these activities are relatively benign. Others can create conflicts with other uses and resources.

More traditional SCUBA diving and surfing continue to grow in popularity. Sailboarding, already a huge recreation activity in the Columbia Gorge, is spilling over to the Oregon coast as sailboarders seek new challenges. Sea

kayaking, although limited, is a growing sport on the Oregon coast. Jet ski craft are being used in the ocean on occasion. Sturdy rubber boats powered by outboard engines, such as the Zodiac, are increasingly used for recreational fishing around nearshore rocks and reefs. Other uses may not be far off. In Japan, for instance, several companies are building and operating miniature submarines for recreational sight-seeing.

Conflicts and Safety

While the ocean is vast, most recreational use is limited to very nearshore areas. These areas include accessible coves and beaches where SCUBA diving, board surfing or sailboarding may be readily and safely enjoyed. Kayakers, divers and surfers may, upon occasion, venture into more exposed shoreline areas. Some conflicts may arise during certain seasons with some commercial fishing activities or between various recreation users. In addition, recreation in the ocean can be a high risk activity. Surfers, divers, sailboarders and others usually have local knowledge about weather, currents, access, temperature and equipment. But as more people seek new recreational experiences without full appreciation of the inherent risk, safety becomes a key consideration in designating areas for in-water recreation.

Management Issues

State Planning for Recreation

Planning and managing recreation in Oregon involves a complex mix of public agencies and private interests. The Oregon Department of Parks and Recreation is the lead agency for recreation planning in Oregon, manages Oregon's state parks system and houses the State Historic Preservation Office (SHIPO). Other public agencies, such as the U.S. Forest Service, the Oregon Dunes National Recreation Area, and coastal county parks departments provide and maintain recreation facilities along the coast. In addition, the Oregon Marine Board constructs and maintains boat ramps throughout the state.

These agencies and programs are broadly described and analysed in the Statewide Comprehensive Outdoor Recreation Plan 1988-1993 (SCORP) prepared by the Oregon Department of Parks and Recreation. SCORP profiles regional recreational opportunities, including the north coast and south coast, describes state and federal programs, assesses supply, demand and need, and provides suggestions and recommendations for meeting future recreation needs.

SCORP provides a broad overview of Oregon's recreation system and lists various federal, state, local and private programs that contribute. SCORP does not provide more focused analysis and assessment of coastal or other regional recreation needs and limitations. It does not consider the impact of recreation activities on other natural resources.

Highway 101 Improvements

The Oregon Department of Transportation Highway Division is nearing completion of a study of the Highway 101 coastal corridor. The study will make recommendations on improvements for traffic flow in key sections of this mostly two-lane highway. It investigates "parkway" and scenic byway alternatives to provide for through traffic flow while retaining scenic qualities for which the coast highway is famed. Because Highway 101 is both a transportation link and a recreational resource connected with the many state parks and waysides along its length, future improvements to 101 will have a significant impact on coastal recreation.

Public Concerns

Oregon has no overall coordinated plan or strategy for recreation and travel on the Oregon coast. This kind of plan is essential because of the effects that increased recreation use may have on other resources and activities of concern to local governments and state and federal resource agencies.

Oregon is not well prepared to protect or safeguard sensitive natural resources and sites from increased recreational use. Oregon's coast has too few coastal facilities where the public can augment their travel or recreation by learning more about the coast and ocean. Oregon must protect its coastal resources through education as well as enforcement.

Tourism on the Oregon coast is moving from a seasonal to a more year-round industry. But demand continues to be highest from June through September. A sizable infrastructure of facilities, events and employment is geared to a three and one-half month rush. Some coastal communities and businesses, however, are trying ways to expand the visitor season and encourage "off-season" travel and recreation.

During certain times of the year, chiefly the summer travel season, Highway 101 in some areas reaches or exceeds its capacity as a highway of commerce for coastal communities and a recreational resource for visitors. Traffic congestion is not only unpleasant for residents and visitors alike, it is unsafe, disrupts commerce, and degrades the coastal recreational and aesthetic experience. As coastal communities grow and recreational travel increases, this problem will only increase and will not be easily or quickly resolved.

Archeological and other cultural resources are not well known and are not addressed in depth in this plan. These resources are important to Oregonians, especially to the Indian tribes of the Coast and should no longer be considered available for private exploitation.

Conclusions and Recommendations

Oregon needs an aggressive program to identify, acquire, and establish new public recreation areas in the water as well as the coastal upland.

Cultural, historic or archaeological resources and sites of Oregon should be retained by the general public or by the appropriate tribal government rather than exploited for private profit.

Improvements to Highway 101 should be carefully coordinated with recreational plans and should retain recreational and aestheic qualities of key segments.

The Oregon Parks and Recreation Department, in conjunction with other affected agencies, local governments and citizens, should develop a coastwide recreation plan to accommodate increased visitors, improve and expand recreation opportunities and protect sensitive natural resources areas from overuse. In particular, Parks will need to work with the Division of State Lands, the Department of Fish and Wildlife, the Oregon Highway Division, Department of Economic Development, and coastal cities and county governments.

Local governments should review local comprehensive plans to fully consider the impacts of growth and development on the recreational and aesthetic values of their communities.

A plan for Oregon's territorial sea should address shoreline and in-water recreation needs on a site-specific basis.

The goal of the Ocean Plan is to provide quality marine recreation opportunities for residents and visitors.

Recommended Policies

1. Prohibit development activities in the territorial sea which would impair the cultural, scenic, or recreational values of the near shore areas.
2. Prepare a comprehensive coastal and marine parks and recreation assessment and plan to accommodate increased recreational demands while protecting coastal and ocean resources.
3. Pursue an aggressive program to identify and acquire additional public recreation resources and sites on the Oregon coast and to provide for public recreation opportunities in the marine environment.

4. Plan for improvements to Highway 101 which maintain, restore, or enhance recreational, scenic, and interpretive opportunities.
5. Place strong emphasis on education, information and interpretation to protect marine resources, provide for economic development and enhance visitor appreciation of coastal resources and economies.
6. Designate cultural and historic sites, including shipwrecks, as important resources for the general public and not private exploitation.

Needed Actions

☐ Oregon's territorial sea plan should include in–water recreational needs, opportunities, and limitations. The Oregon Parks and Recreation Department and Division of State Lands, in consultation with local government, should identify specific sites for marine parks to be included in the plan for the territorial sea.

☐ The Oregon Parks and Recreation Department should coordinate a recreational plan and strategy for the Oregon coast which includes:

- A scenic resource analysis of the Oregon coast that identifies outstanding coastal views and ocean areas visible from highways, parks and beaches
- An evaluation of possible marine park sites to expand and diversify in-water recreational and educational opportunities while protecting ocean and coastal resources
- An evaluation of upland sites which should be acquired to expand Oregon's state park system on the coast
- Completion of the Beach Access Plan, including an update of access site inventory, a list of new sites for public acquisition and an evaluation of future demand
- Specific proposals for a coordinated marine education and information program to use state parks as focal points for information and to establish Ocean Watch Sites at scenic viewpoints along highways and in parks. This element would involve Oregon State University Sea Grant, Sea Grant Extension, appropriate state agencies, coastal local governments and citizens

The Oregon Highway Division should:

- Preserve major segments of Highway 101 as significant recreational, aesthetic, and historical resources of the State of Oregon
- Incorporate ocean views and vistas, shoreline recreational, and opportunities for interpretation and education into plans for improving Highway 101

☐ The Oregon Legislature should change archaeological and treasure trove laws to protect archaeological sites and shipwrecks as public resources and prohibit private exploitation on public lands.

☐ Local governments should:

- Review comprehensive plans to assess the affects of growth and development on coastal and marine recreation, tourism, cultural and aesthetic resources
- Should seek and identify sites appropriate for acquisition as recreational or scenic sites by the Oregon Department of Parks and Recreation or other public entity

Marine Water and Air Quality

Resources

Clean ocean waters and coastal air are essential to a healthy marine environment. Marine ecosystems, from the microscopic plants and animals near the ocean's surface to the deep ocean, can be adversely affected by almost undetectable amounts contaminants. Even when not lethal, contaminants can interact with each other or add to overall pollution levels to weaken individual organisms, diminish populations, alter the composition of communities of various plants and animals and threaten entire ecosystems. These effects can go undetected until the problem becomes acute, certain parts of the marine ecosystem lose their fuctional value, and the marine environment is jeopardized.

Clean air and water are the foundation of much of Oregon's coastal economy. Fish, crabs, squid, shrimp and other seafood caught by commercial and recreational fishermen are the products of healthy, viable marine ecosystems. A polluted marine ecosystem may mean that fish may simply not be available to be caught or, if caught, will be sick and contaminated. Health risks may arise, consumer demand decrease, and product prices fall. Oregon enjoys a positive reputation for quality seafood products from a clean environment. This reputation may mean a market advantage in coming years if coastal waters remain clean.

Residents and tourists alike expect clean beaches, clean ocean water, and clean air. Polluted water and beaches are not only unattractive but unsafe and unhealthy. Oregon's ocean waters and air are still relatively unpolluted in contrast to some coastal areas in the United States. High environmental quality is a therefore a resource of comparative advantage for Oregon's coastal travel and recreation industry.

The cleanliness of Oregon's ocean waters and air is a function of two variables; a large, dynamic marine system and relatively small volumes of pollution. While the physical dynamics of the marine environment will remain relatively constant, the amount and kinds of pollutants entering Oregon's ocean area are growing.

Ocean Waste Disposal

For centuries, civilization disposed of waste in the ocean on the assumption that the ocean could absorb this waste without harm. The ocean provided a convenient and inexpensive dump where the waste was soon out of sight and out of mind. Certainly, the amounts of waste was relatively small compared to today and, in many cases, the kinds of waste were more "organic".

Today, however, waste disposal in the ocean is a different story. Some ocean areas, including parts of the United States,are threatened because the volume of waste has expanded tremendously and the kinds of waste now include toxic materials, persistent plastic debris, and exotic chemical waste. Some waste is discharged directly to the ocean and is regulated as a "point source," such as treated municipal sewage or industrial effluent, and sand or mud dredged from rivers and bays. Other waste reaches the ocean indirectly, discharged under numerouse individual permits into creeks, rivers, and estuaries. As cities grow and industry expands, more individual permits add to the total pollutant load of the stream and thus the ocean.

A significant amount of waste enters the ocean from agricultural, forestry or urban "nonpoint sources," runoff in upstream watersheds. Catchbasins in the streets of most cities drain rainwater runoff laden with a mixture of oil, antifreeze, bits of plastic debris, lawn fertilizer, and other material. Most farm and forest operations use a variety of chemicals and generate sediments which find their way into a gully, a

creek, a river, an estuary, and the ocean. Industrial sites, both existing and abandoned, contribute oil, grease, chemicals, or heavy metals to the pollutants that wash into streams and the ocean from the rain.

Ocean disposal of waste will continue to be a fact of life for Oregon and the rest of the world because of two realities. First, the geologic reality that the world's rivers empty into the ocean means that many wastes from land activities will continue to end up in the ocean. Second, ocean disposal will be one of several waste management options, including reducing and recycling wastes, incinerating wastes, and land disposal, to meet pressing problems of waste management. For some kinds of waste, the ocean disposal may, in fact, be the most appropriate. Oregon must therefore address marine water and air quality as part of overall ocean resources management, take steps to monitor the health of ocean water and air and take preventative or corrective action as necessary.

Ocean Dumping: A Brief History

Ocean dumping is defined as the "deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other manmade structures at sea" (see London Dumping Convention, below). "Dumping" is different from "discharge" of waste from a pipe from shore.

In 1972, Congress began to regulate the discharge and dumping of materials in the ocean through the Marine Protection, Research and Sanctuaries Act, commonly called the Ocean Dumping Act. This Act banned dumping of a variety of toxic, radioactive and biological agents, placed dumping of dredged materials from navigable waters under the regulation of the U.S. Army Corps of Engineers, and required, for the first time, dumping permits from the U.S. Environmental Protection Agency. The 1972 law allowed municipal sewage sludge to continue to be dumped at sea.

In 1977, the law was tightened to phase out ocean dumping by 1981 of certain industrial waste and municipal sewage sludge which would "unreasonably degrade" or endanger human health and the marine environment. Full implementation was difficult, particularly on the East Coast and some cities continued to dump sludge at an EPA designated site.

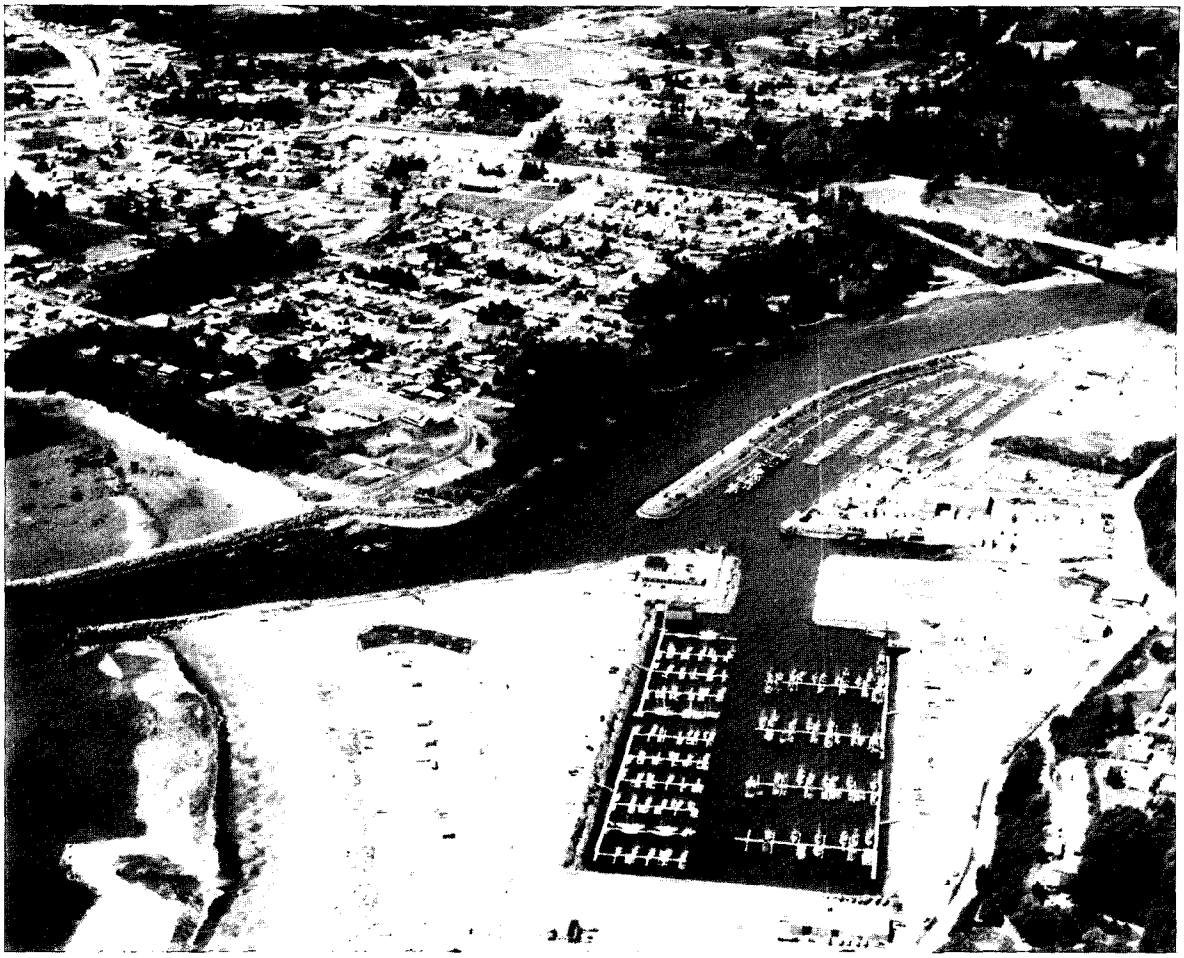
In 1988, Congress reacted to public outrage over waste on the beaches and passed the Ocean Dumping Ban Act which prohibits *all* ocean dumping of municipal sewage sludge and industrial waste by the end of 1991. The 1988 Act requires the EPA to set up specific timetables with ocean dumpers to phase out dumping. However, dumping of dredged material can continue at approved ocean sites.

International Agreements on Ocean Dumping

Ocean dumping is an international issue which concerns many nations. The United States is one of 64 countries which have ratified the terms of the 1975 London Dumping Convention (LDC), which establishes international policy for ocean dumping in both territorial seas of signatory nations and international high seas. The LDC lists a variety of substances that cannot be dumped in the ocean, including mercury, cadmium, persistent plastics, crude and other oils, high-level radioactive wastes, or materials for chemical or biological warfare. The LDC lists other substances that require special permits for dumping.

Risks

Marine biological resources are at risk when water quality is not sufficiently high enough to support healthy biological communities. Toxic contaminants bioaccumulate in the marine food web and create shifts in community structure and composition. Conventional pollutants such as organic materials with high BOD (Biochemical Oxygen Demand) can rob marine waters of enough oxygen to support



Urban and rural development increases the number of pollution sources into coastal and ocean waters. Close inspection of this view of Brookings and the mouth of the Chetco River will reveal sources of potential pollution typical of all cities along the coast. (ODOT photo, 1978)

fish and aquatic life especially in localized bays and estuaries. Although large scale water quality impacts are unlikely at this time, smaller, more localized impacts could cumulatively affect the balance in ecological integrity of marine biological communities along the Oregon coast.

Municipal Waste

In Oregon, six coastal wastewater treatment facilities discharge treated sewage effluent directly into the ocean. Another thirty discharge into estuaries where the effluent mixes with estuarine waters before flowing out to sea. Wastewater treatment reduces or removes several basic components: organic matter which contributes to biological oxygen demand (BOD), nutrients such as nitrogen and phosphorous, particulate matter, pathogens which can carry disease, and other flotable materials, detergents, oils, and grease. For several coastal cities, combined storm and sanitary sewers pose problems when heavy rains cause the volume of runoff to exceed the treatment plant capacity and untreated sewage is discharged into the estuary or ocean.

Industrial Waste

Several industries discharge treated liquid wastes directly into the ocean. These include pulp mills at Toledo, Gardiner, and North Bend. Discharges from pulp mills vary with the

specific process used but generally consist of large quantities of wood fibers and wood sugars. Although the percent of these solids is low and Oregon's turbulent marine environment disperses them widely, the solids discharged by coastal pulp mills account for about 75 per cent of the total BOD discharged along the coast.

Other industrial waste enters the ocean from estuaries and rivers, including creamery waste from dairy processing; fish, shrimp and fish wastes from seafood processing; and oils, chemicals and wood particles from forest product manufacturing.

Nonpoint Sources

Runoff from coastal watersheds carries a variety of pollutants into rivers, estuaries and the ocean. Urban runoff contributes oils and chemicals from parking lots, streets, and rooftops which all shed rain water in a pulse. Agricultural and forestry activities that are critical to the coastal economy can also contribute pollutants such as pesticides and herbicides, sediments from road building and streamside erosion, and organic material from cattle or other livestock.

Vessels

Vessels at sea discharge or accidently leak fouled water, oils and other wastes from bilges or holding tanks. While these are dissipated through dispersion, the cumulative effects contribute to degradation of marine water quality. These discharges may be more pronounced when many vessels berth in the sheltered waters of Oregon's ports.

Marine Debris

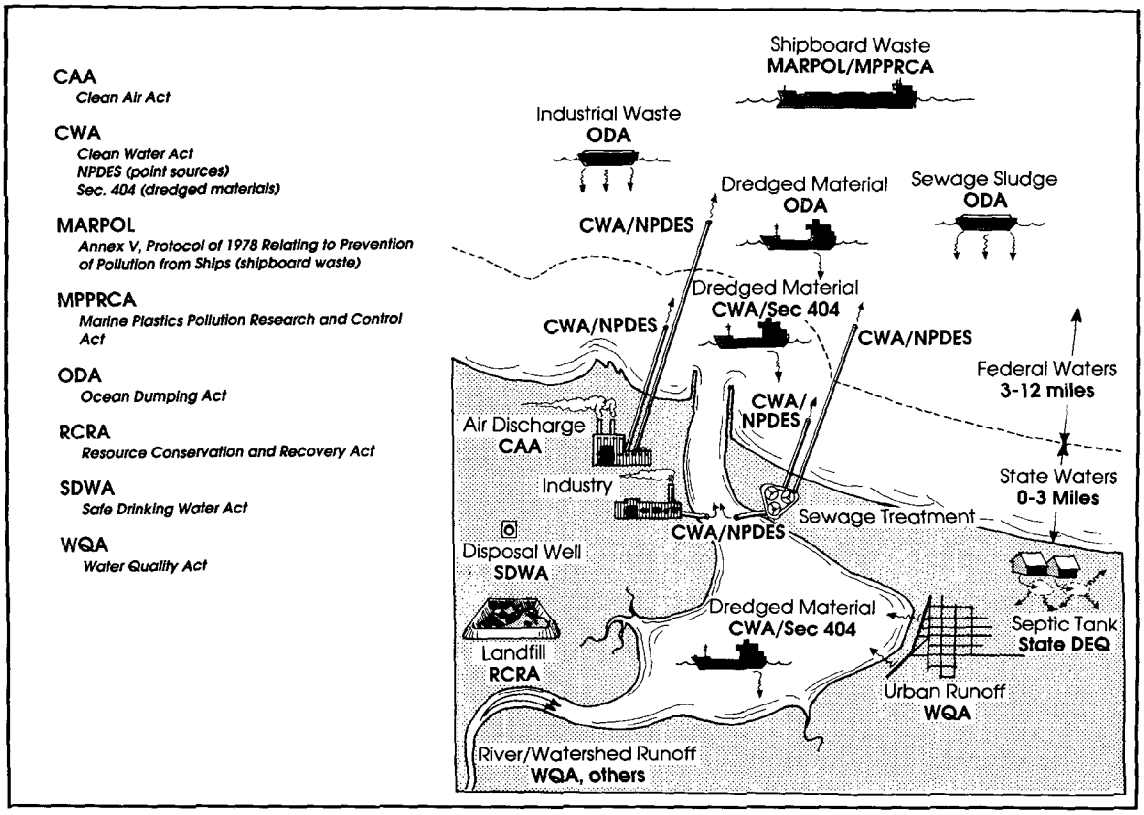
Nondegradable debris, such as plastic and glass, enters Oregon's ocean from a variety of sources. Prior to the recent MARPOL agreement to reduce marine debris (see below), the primary source was the dumping of garbage at sea by foreign and domestic merchant marine vessels, military vessels, commercial fishing vessels, cruise ships and recreational vessels. Even though the amount of debris from vessels is decreasing under MARPOL, much plastic remains at sea. Rivers also bring debris from urban areas and highways. Beach users contribute marine debris by littering. Debris kills sea life, damages vessels' and litters Oregon's beaches. Because plastic degrades at such a slow rate, it accumulates and remains in the environment for years. Recent beach cleanup efforts in Oregon yielded over 26 tons of debris in a single day. A project at the Port of Newport showed that proper waste disposal and recycling facilities in ports are essential to proper disposal of trash in port rather than at sea.

Nuclear Wastes

Between 1944 and 1971, significant amounts of radioactive materials from plutonium-producing reactors at Hanford, Washington, reached the Pacific Ocean via the Columbia River. Radionuclides from these discharges were detected as far south as northern California and as far offshore as 200 miles. Uncertainties with radioactive wastes currently at Hanford may mean slow seepage of contaminants into groundwater and discharges of radionuclides into the ocean via the Columbia.

Hazardous and Toxic Chemicals

Several kinds of hazardous and toxic chemical wastes are now entering the ocean. For many, there is little or no ability to determine the amount discharged or to monitor effects. Trace metals and hazardous chemicals contained in municipal effluent and industrial discharges also enter the ocean via streams and particulates in the air. These include mercury, copper, lead, chlorinated hydrocarbons (DDT), chlorinated biphenols (PCB), other pesticides and herbicides. These materials can effect the marine environment even at extremely low levels. For instance, antifouling paints with tributyltin (TBT) can leach TBT from boat hulls in amounts so small as to be virtually undetectable. TBT was found in Oregon and other states to be deforming oysters. Although Oregon and federal law now strictly controls



Major federal regulation of pollutant discharges in marine waters

the use of these paints, some effects may still occur from residual amounts. In addition, little is known about other possible contaminants.

Oils

Oil spills, as a function of offshore oil and gas development or from marine transportation, are treated in a separate section of this plan. However, significant volumes of oil enter the marine environment in other ways, especially from runoff from urban streets and parking lots, leaking storage tanks or improperly disposed oil, boat engines, and other equipment located near streams. The amount of oil entering ocean waters off Oregon from such sources is unknown.

Dredged Materials

Sand, mud and rock dredged from Oregon's estuaries and rivers for harbor maintenance and improvement are routinely dumped at sixteen specified dumpsites in Oregon's nearshore ocean. The U.S. Army Corps of Engineers has jurisdiction over these operations. Historically, these dredged materials have consisted of clean marine sands with little or no organic matter or other pollutants. However, more recent operations in rivers and bays have yielded more muddy sediments with higher organic content. Concern has been voiced that dredging near industrialized areas in some estuaries can cause sediments contaminated with chemicals, metals, and organic material to release contaminants into the water and enter the food chain.

Airborne Particulates

Scientists have recently begun to study the surface layer of the ocean and the effects of airborne particulates and molecules of man-made chemicals on this critical air-water boundary. Although Oregon may directly contribute vary

little to this particulate "rain" because of relatively low air pollution levels and winds which blow mostly onshore, there is growing concern about effects of airborne pollutants on the ocean environment.

Management Issues

Federal Pollution Control Programs

Although some sources of pollution in Oregon's ocean area are generated within the state, the problem of marine pollution is national, even international, in scope. Major federal laws have been passed, programs developed, and efforts organized to study and protect marine waters. These federal laws and programs are the primary governmental actions concerning marine pollution on the Oregon coast.

The Clean Water Act, administered by the Environmental Protection Agency (EPA), is the single most important law dealing with the quality of water in the U.S., including marine waters. Under the Act, EPA, through an agreement with the Oregon Department of Environmental Quality (DEQ) regulate all "point source" (e.g. a pipe) discharges into rivers, estuaries and the ocean through the National Pollutant Discharge Elimination System (NPDES). Section 404 of the Act regulates dredged materials dumping and is administered by the U.S. Army Corps of Engineers.

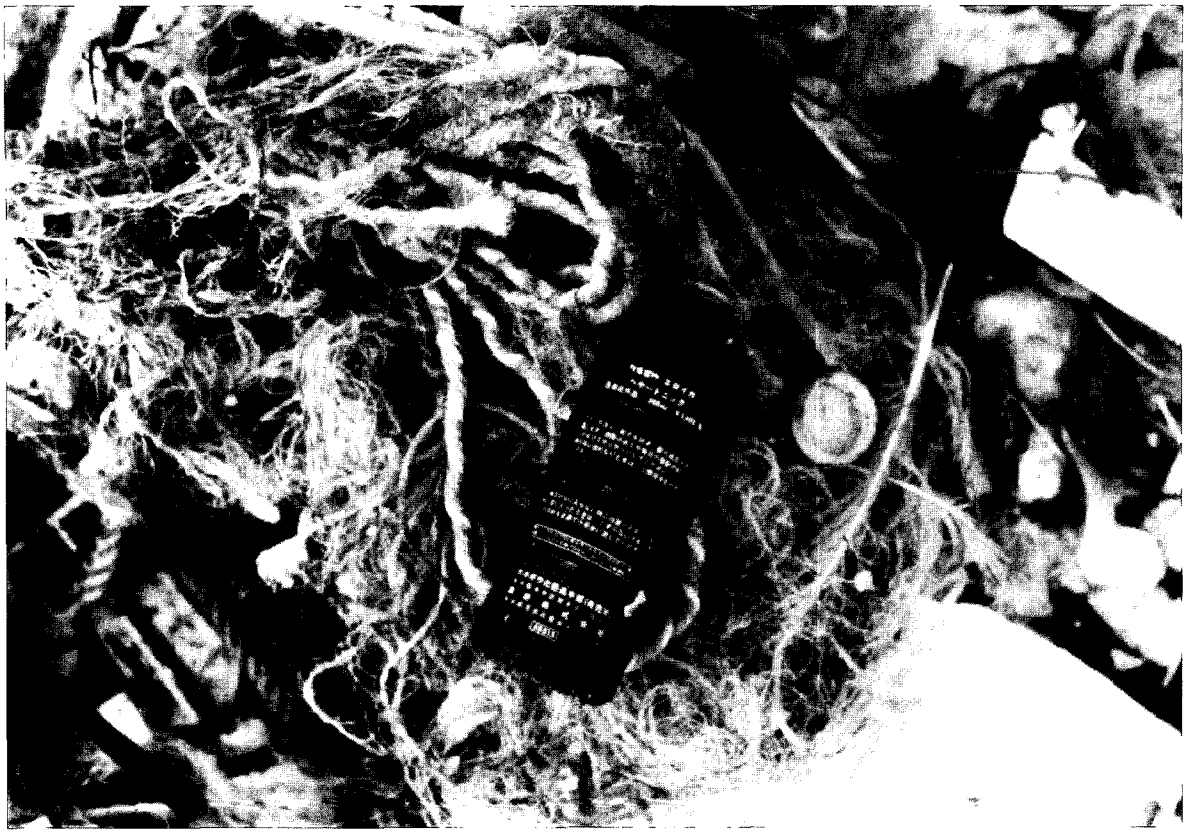
The Water Quality Act, a 1987 amendment to the Clean Water Act, focuses on planning and comprehensive solutions to pollution problems in specific important coastal areas such as Puget Sound, Chesapeake Bay, and major estuaries and near coastal waters. Under this program, Oregon's DEQ is conducting a pilot project with citizens and local governments to identify and control pollution in the Coquille River estuary and watershed. DEQ also has a nonpoint source assessment and control program and is working with landowners and municipalities to reduce runoff.

The Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), also known as the Ocean Dumping Act, regulates ocean dumping of all types of materials, including dredged materials. 1988 amendments to this Act aim to end dumping of sewage sludge and industrial waste in the ocean by 1991. The EPA and the Corps are responsible for administering the Act and the National Oceanic and Atmospheric Administration (NOAA) is charged with ongoing research and monitoring.

The Marine Plastics Pollution Research and Control Act of 1987 directs EPA to find ways to abate plastic pollution. 1988 amendments to the Act require degradable plastic ring carriers for cans and bottles. This Act implements the international agreement on ocean garbage titled Annex V of the Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships (MARPOL). MARPOL is a primary impetus for ports in Oregon to provide garbage disposal and recycling facilities for vessels.

The National Marine Pollution Program is composed of all federal marine pollution programs, especially those from the EPA, NOAA, and the Department of the Interior Minerals Management Service (MMS). The goals of this research program are to understand the fates and effects of toxic materials, nutrients, and biological agents in the marine environment; the effects of loss or modification of marine habitat; the status of marine ecosystems; and the implications for human health from marine pollution. Results of research and study under this program are available to Oregon.

The Clean Air Act of 1977 is the legal framework for all air quality regulations in the U.S. and directs EPA to set National Ambient Air Quality Standards. States are required to develop and implement plans to attain and maintain these national standards. Nonattainment areas are those which do not meet the standards for which special controls are needed



This pile of plastic debris was collected during one of Oregon's annual beach cleanup drives. Citizen beach cleanup efforts, pioneered in Oregon, have helped reduce the amount of plastics along Oregon's shore. However, plastic use throughout society requires constant vigilance to protect marine life from plastic pollution. (ODFW)

such as lowering existing amounts of air emissions to make room for new ones while making progress toward overall attainment. In areas where air is cleaner than national standards, regulations prevent significant deterioration (PSD areas). The Oregon coast is a PSD area and air quality is virtually pristine.

State Pollution Control Programs

The Oregon Department of Environmental Quality (DEQ) has primary responsibility for water and air quality in Oregon's territorial sea. State law gives DEQ authority for a host of pollution control measures. DEQ also works closely with the federal EPA to administer federal permits which are required for point source discharges into state waters through NPDES permits (see above) and to administer clean air regulations which carry out the National Ambient Air Quality Standards. Local governments, through municipal sewerage and storm water facilities, land use plans and local ordinances, also play a role in controlling pollution sources on land which may affect ocean resources.

Oregon has no marine water and air quality program which coordinates the various federal programs, local government efforts and growing state involvement in marine water and air pollution issues. Oregon has only a few marine water quality standards that address the special environmental conditions, biologic resources or pollutant loading of ocean and es-

tuarine waters. Existing water quality policies and standards, based on freshwater conditions in state river basins, apply to marine waters only for specific pollutants. These standards were written and adopted by Oregon's Environmental Quality Commission when knowledge of and demands on estuarine and marine water quality was minimal.

There is little baseline information specific to the Oregon coast's ambient air conditions and water quality in nearshore, as well as offshore, waters. Although NOAA maintains a marine monitoring program throughout the country, Oregon has no coordinated system to monitor the health of marine air and water and then integrate new information as development occurs and waste disposal demands increase.

Increased Waste Disposal

As Oregon's coastal population grows, visitor counts increase, and industrial development occurs, waste will increase and add to pollution loads on estuaries and the ocean. Water consumption will increase and, once used, contaminated water will enter the waste treatment system, adding to effluent outflow. Growing coastal communities will need larger sewage treatment plants with increased and improved capacity for treatment and discharge. In addition, coastal communities will need to revamp existing systems to separate storm and sanitary flow to prevent overload discharge of untreated sewage into estuaries and the ocean.

New Kinds of Waste

The ocean off Oregon will be called upon to absorb wastes not previously discharged in large amounts. Ocean disposal is being considered by some federal agencies and industries for future disposal of hazardous and radioactive wastes. Incineration of solid wastes on ships at sea or on abandoned oil platforms is being proposed for the Gulf of Mexico by industry and some local governments. Similar proposals could be made for offshore Oregon. Disposal of nuclear waste in the deep ocean is under consideration and environmental impact assessments have been made which evaluate a site off Oregon. Exotic chemicals contained in industrial and municipal discharges accumulate in unknown amounts and add to the ocean's burden. These and an increase in shoreside industry can cause air quality effects such as ozone formation, visibility reduction, undesirable emissions and acid rain.

Conclusions and Recommendations

Oregon's marine water quality is relatively good at present and must not be degraded. However, these waters are in jeopardy from increasing demands for waste disposal and from lack of a coordinated state and federal program aimed at the special conditions of Oregon's ocean and estuarine waters. A vigorous marine water quality program, including research, monitoring, and regulations, is necessary to anticipate problems and protect ocean and estuarine water quality.

Oregon must step up efforts to reduce, at the source, the amount of wastes entering rivers, estuaries and the ocean. Local governments, both on the coast and inland, should critically review urban growth and rural development plans and work with state agencies to buffer urban runoff, reduce plastic litter, improve wastewater treatment systems, and promote recycling.

Oregonians as a "public" demand clean air and water. Yet as individual citizens and businesses, more awareness is needed to reduce waste and of the adverse affects on ocean water quality from inappropriate waste disposal practices. Oregon needs programs to promote public understanding that prevention of pollution is both an ethic and a cost-effective way to protect quality of the environment.

Ocean waters of the world are a "commons" belonging to everyone and to no one. Global ocean pollution problems ultimately affect, and are therefore a responsibility of, Oregonians. The state should actively participate in inter-

state and international efforts to prevent marine air and water pollution and protect the commons.

Oregon's coastal air quality is very high and is a valuable resource. Oregon needs to establish a baseline of air quality measurements and a program for monitoring to protect air quality from degradation by new sources of pollution.

Oregon, through the Department of Environmental Quality and the Ocean Policy Advisory Council, should take a leadership role in protecting marine water and air quality in Oregon's Ocean Stewardship Area. A coordinated program should be established to ensure that state and federal regulatory and research programs and local government actions protect water and air quality.

The goals of the Oregon Ocean Resources Management Plan are to:

- Prevent degradation of the air and waters of the Oregon coast
- Protect, maintain, and where necessary, restore the quality of Oregon's coastal and ocean waters to protect human health; maintain recreational use of beaches and water; and protect and propagate fish, shellfish, and wildlife
- Promote increased public awareness of the importance of marine air and water quality, the effects of pollution and debris in the marine environment, and the role of citizens, governments, and industry in keeping marine air and waters clean

Recommended Policies

Air Quality

1. Emphasize pollution prevention rather than cleanup and remedial measures.
2. Require that highest and best controls be used to minimize emissions from ocean activities and assure that they do not degrade the existing high quality of Oregon's marine and coastal air.
3. Require that discharge of pollutants into the airshed of Oregon's Ocean Stewardship Area is consistent with the policies of this plan and such standards as may be developed to carry out this plan.
4. Increase information and data to analyze the effects of air pollution from ocean resources development on marine and onshore air quality.

Marine Water Quality

1. Assert Oregon's leadership role in protecting marine water quality through improved state management capability and through a coordinated program of federal, state and local government.
2. Encourage citizens, local governments, businesses and ocean users to minimize waste disposal in the ocean by reducing waste at its source, conserving water, controlling pollution sources on land and in the water, promoting proper waste disposal, and recycling.
3. Emphasize prevention of marine water pollution by promoting recycling and debris collection in Oregon ports, requiring that discharges from coast and offshore activities be the minimum necessary and be treated to prevent degradation, reducing the use of water, eliminating or minimizing the use of toxic substances.
4. Establish marine air and water quality monitoring systems and promote research to analyze the effects of pollution on intertidal and oceanic ecosystems.
5. Support and participate in interstate and international efforts to reduce and eliminate marine debris and pollution.
6. Promote the use of products that can be recycled or manufactured without adverse affects on marine water quality.

Needed Actions

☐ Oregon's plan for the territorial sea should include marine water and air quality

protection measures. These measures should be derived from a coordinated state-federal marine water and air quality protection program for the Oregon Ocean Stewardship Area. This coordinated state-federal program should address the following:

- A coastal air quality monitoring program to provide baseline data and information, define sensitive airsheds and develop air quality models to address potential impacts to surface and upper air from offshore and onshore sources
- A marine water monitoring program to establish baseline water quality data at key sites and provide additional data and information over time to ensure that Oregon's marine life and marine ecosystems are not being adversely affected by waste discharges into estuaries or the ocean
- Marine water quality discharge and dumping standards to prevent degradation of waters and sediments of Oregon's Ocean Stewardship Area
- Better siting standards, backup facilities and emergency procedures for municipal and industrial ocean outfalls to ensure that marine water quality, recreation areas, shellfish harvest, research and critical habitat areas are protected
- A research program to study the effects and relative benefits and risks from estuarine and ocean discharge of municipal wastewater effluent
- A marine debris management program as part of Oregon's solid waste program

☐ The Department of Environmental Quality should coordinate preparation of the marine air and water quality program for Oregon.

☐ The Department of Fish and Wildlife should:

- Provide technical assistance during development of a marine water quality protection program for the Oregon Ocean Stewardship Area
- Coordinate with the Department of Environmental Quality to establish baseline sites to monitor marine water quality and biologic communities

☐ The Department of Land Conservation and Development should:

- Assist coastal local governments to develop land use policies and implementing measures to reduce marine pollution from upland sources
- Coordinate with local governments and other state and federal agencies to plan for and promote activities which increase public awareness and information about marine pollution and debris.

Oil and Gas

Resources

Oregon's offshore geology is complex and only generally understood. While the available geologic information indicates that several sedimentary basins exist off Oregon where oil may be trapped, these basins are ill-defined. No "recoverable" deposits of oil and gas have ever been discovered off Oregon. More geologic information is needed to make better estimates of petroleum resources and location offshore Oregon.

In 1981 the U.S. Geological Survey (USGS) estimated 300 million barrels of oil and 1.5 trillion cubic feet of gas on the Oregon-Washington Outer Continental Shelf. USGS believes there is a 50 per cent chance that at least 100 million barrels of oil (at 42 gal./bbl) and 600 billion cubic feet of gas would be recoverable. By comparison, a 1984 Minerals Management Service (MMS) report estimates that a total of 180 million barrels of oil and 3.26 trillion cubic feet of gas lie within the entire planning area, of which a smaller amount is thought to be recoverable.

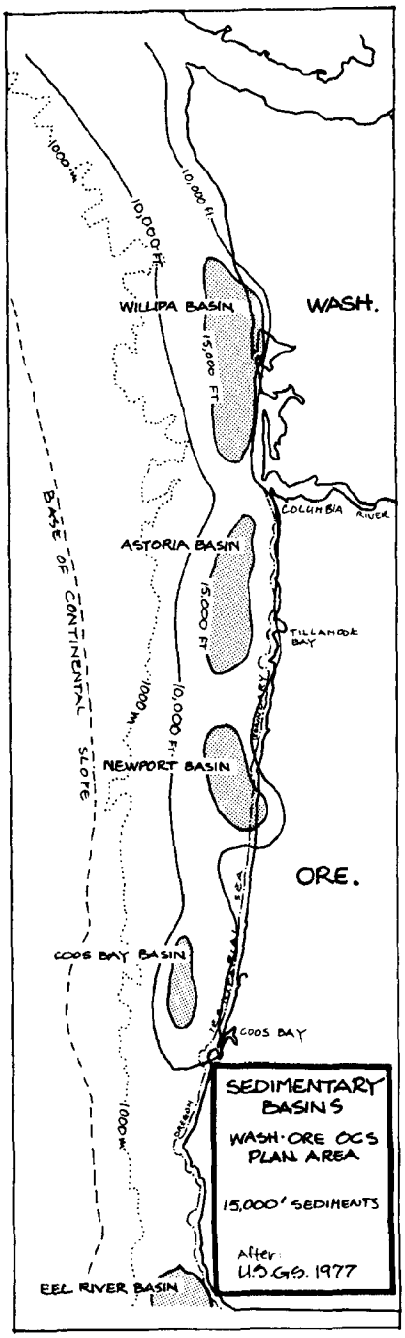
The world oil market has a great influence on whether oil and gas off Oregon is worth recovering. MMS estimates that at $15.75/bbl, 50 million barrels could be economically recovered off Oregon and Washington. At $32.50/bbl, double the price, 60 million barrels could be recovered from the same area.

Risks

Exploration and development for oil and gas off the Oregon coast is still many years away, if ever. But already, Oregon is trying to anticipate the kinds of risks inherent in this kind of ocean activity. Because these risks vary according to the stage of exploration or development, these stages are discussed first. For more information, see the *Interim Report.*

Oil and Gas Development Steps

Based on activities elsewhere, the following five steps are described as typical steps in developing offshore oil and gas resources. These steps assume two things: one, that the



oil industry has an interest in exploring and developing oil and gas off Oregon and, two, that a lease sale could ever be successfully held.

The first of these steps, seismic surveys, would usually come before a lease sale. The second would be to obtain a lease from either federal or state government. The last three steps would come only after a lease sale and would be focused on blocks leased by the company. Each step would increase the detail of information available to a company, Minerals Management Service and Oregon.

First, prelease exploration would involve seismic survey vessels using acoustic signals to obtain profiles of geologic structures down to several miles below the seafloor. In Oregon waters, these surveys would require a permit from the Division of State Lands. In federal waters, Oregon has no regulatory authority but does have a Memorandum of Agreement with MMS to coordinate these surveys with current fishing activity to avoid conflicts at sea.

Second, a company would need to obtain a lease in order to drill for oil. If oil and gas leases were ever offered in state waters, the lease would be entered into by the State Land Board. In federal waters, the Department of the Interior Minerals Management Service issues leases after receiving bids. Oregon has limited influence on federal lease sale decisions, as discussed below.

Third, if a lease sale were held and a company successfully obtained a lease, mobile exploration rigs would be brought in to drill exploratory wells to determine whether oil is, in fact, present. These rigs range from special drill ships which anchor into position to huge floating platforms with legs that jack to the seafloor. The exploration stage may take several years. Companies would need to submit a plan of exploration (POE) to MMS for review and approval. Oregon would also review that POE and would require the POE to be "consistent" with provisions of the federally approved Oregon Coastal Management Program. This would be the first opportunity for Oregon to clearly apply state standards to regulate offshore oil and gas activities in federal waters.

Fourth, should exploration confirm the presence of commercial oil or gas deposits, a permanent production platform would be erected on the site and a number of wells drilled to determine the extent of the field. Major planning decisions would be made about both offshore and onshore facilities. A plan of development (POD) would be required and would be reviewed and approved by MMS, several federal agencies and by affected states. An environmental impact statement (EIS) would be required for the first production platform in this Washington-Oregon frontier planning area. Review of the POD and EIS would provide an opportunity for Oregon to impose state regulatory standards on oil development activities in federal waters.

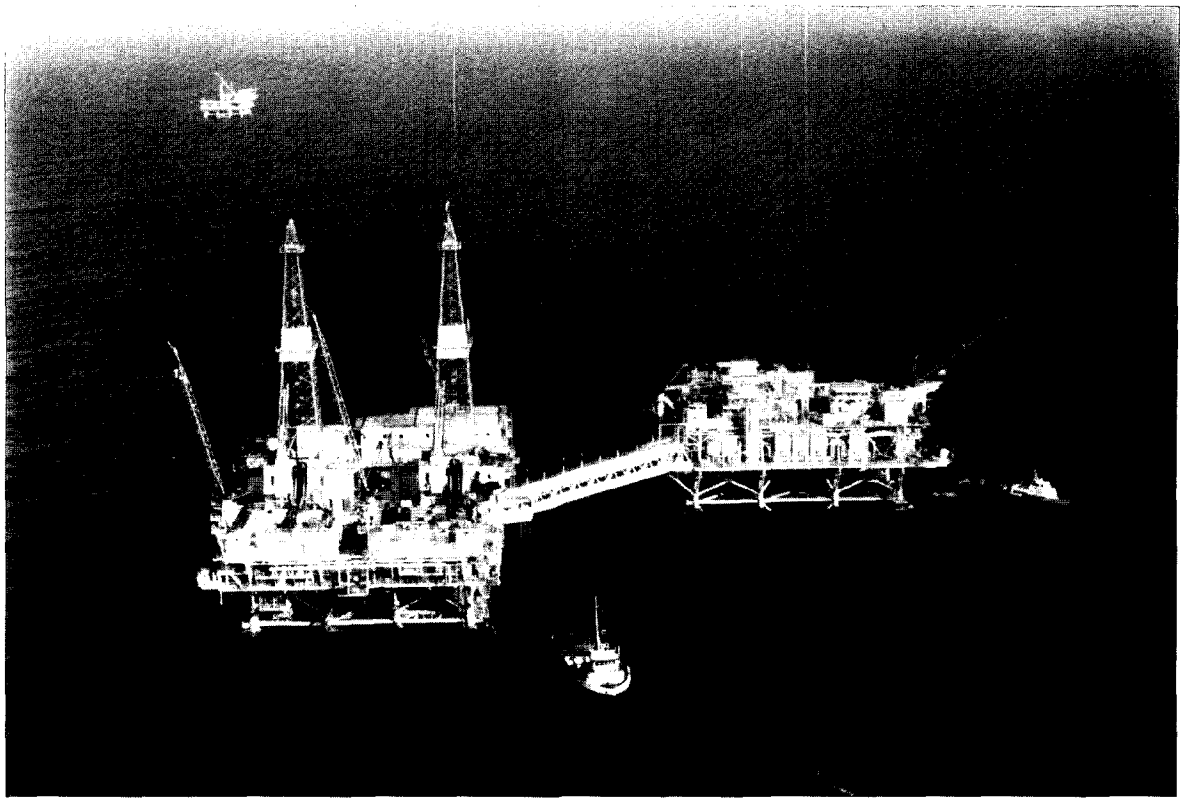
Fifth, as an oil or gas field is developed, preparations would be made for production of crude oil and transportation to refining plants. Oregon state agencies and local governments would have the ability to regulate these onshore facilities through the "consistency" provisions of the state's coastal management plan, local comprehensive land use plans and implementing ordinances.

Effects of Offshore Oil and Gas Development

Offshore oil and gas development activities have the potential for a wide range of adverse effects on the marine environment as well as coastal communities.

• *Oil Spills*

The risks most associated with offshore oil and gas development are from oil spills. While oil spills from offshore platforms are rare, tanker accidents are far more frequent and can be dramatic, such as in Prince William Sound, Alaska. The volume of spilled oil is not necessarily the critical factor. A small event in the wrong place at the wrong time, such as near a critical seabird feeding area, has the potential



Offshore oil and gas platforms, pumping from as many as forty wells, are sophisticated industrial facilities located in the marine environment. This one, off Long Beach, California, includes a processing platform to separate oil from natural gas and water before piping it to shore. (DLCD photo, 1983)

to be worse than a large spill. Beyond the drama of the spill event, the effects of oil on marine ecosystems life is varied and complex. A spill forty miles at sea in winter may have very different effects from a small spill in summer near the mouth of an estuary. Similarly, the economic effects of an oil spill on coastal communities will vary. In addition to large, spectacular spills, chronic release of oil in small amounts can contribute to degradation of coastal waters.

- ***Contaminants***

Contaminants result from offshore oil and gas development in several forms. Oil spills, discussed above, are one kind. But others include drilling muds and cuttings used to lubricate the drill bit and flush cut rock chips to the surface. Formation waters (water trapped in sediments in the rock strata) have high levels of chlorides, hydrocarbons and gases. Air pollution from diesel engines used to power offshore operations is a contaminant of concern off California.

- ***Disturbance and Noise***

Vessel and aircraft traffic can adversely affect marine mammal or seabird colonies, especially during breeding, nesting or pupping seasons. Likewise, noise from offshore platforms is a potential risk to seabirds and marine mammals. Some coastal residents and visitors may be adversely affected from these same noise, aircraft or vessel activities in relation to offshore development. The Ocean Plan recommends that no oil and gas activities take place within three miles of offshore rocks and islands.

- ***Habitat Alteration or Removal***

Drilling muds and cuttings (above) can

smother bottom dwelling communities of sea life near drilling operations. On soft sand or mud bottoms, subsurface pipeline installation results in short-term sediment mounds and trenches in swaths which can smother or remove these organisms. Work on rocky or hard sediment bottoms requires blasting with resultant removal of habitat.

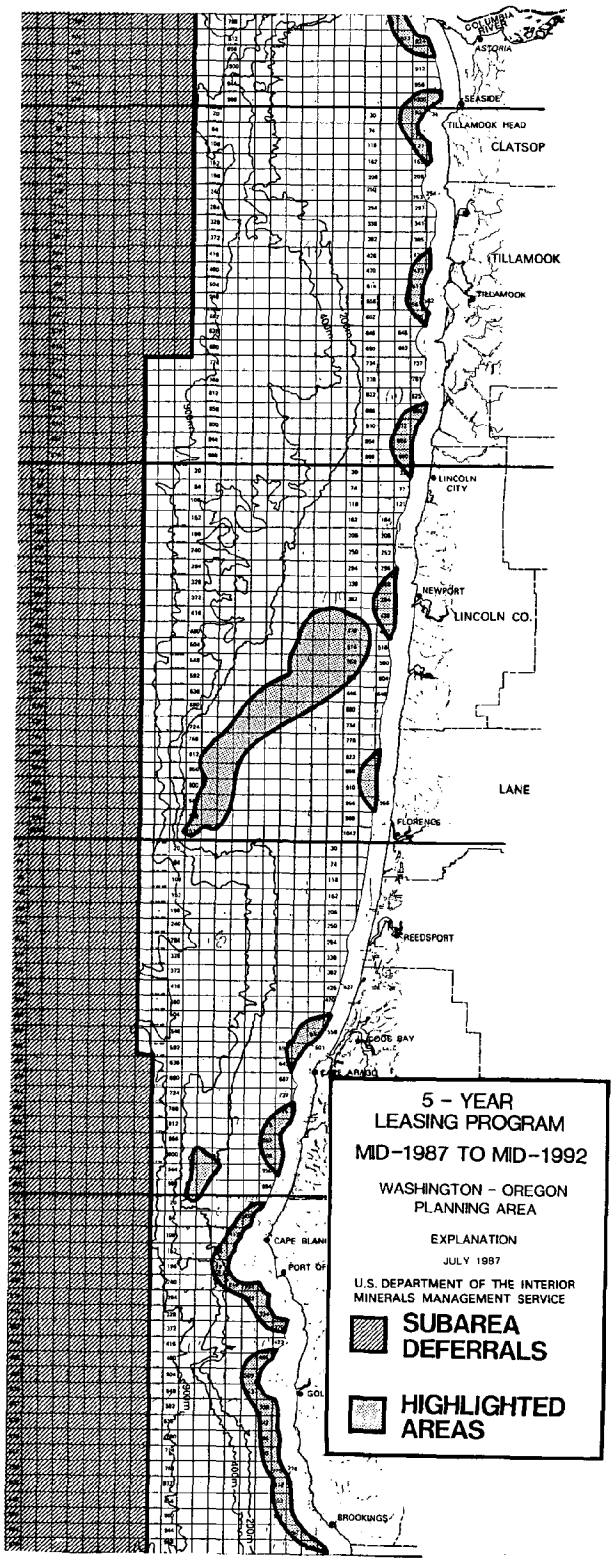
- ***Conflicts with other Users***

There are two principal kinds of potential conflicts with ocean fisheries: space-use conflicts where drilling or production activities take up ocean space from fisheries, and pipeline or subsea equipment conflicts with fishing gear. Both may have economic consequences for fishing operations. The Ocean Plan recommends that oil and gas activities be prohibited from important fishery areas (see Ocean Fisheries policies).

- ***Onshore Impacts***

Offshore oil and gas exploration and development operations can generate a number of onshore impacts, depending on the phase of the operation, the location, and the size of the oil deposit. These impacts can have wide-reaching economic and environmental impacts in coastal communities. After a lease sale, companies which begin exploration need a range of onshore support facilities, including docks for supply vessels, vessel repair yards, airfields for helicopters, storage areas for drilling muds and equipment.

If oil is found, these support services would continue to be needed as platforms are established and production wells drilled. Production of offshore oil would require a means of transporting oil from the platform to a refinery. Pipelines would be the likely method of bring oil ashore to a marine terminal for short-term storage and transshipment to processing. If transported by tanker, a number of risks arise from potential tanker accidents within or near the host estuary. If transported by pipeline from the marine terminal, impacts from the pipeline would ensue



OUTER CONTINENTAL SHELF OF OREGON

along its entire length.

Environmental Record of Offshore Oil and Gas Development

The environmental record of the U.S. petroleum and offshore oil development industry is mixed and incomplete. Some facts are known and others have yet to be studied. Some short term effects from oil and gas activities have been studied; some long term cumulative effects have not been studied.

The oil industry points out that there have been no major oil spills from offshore platforms in U.S. waters since the 1969 Santa Barbara oil blowout. There are several reasons for this: improvements in drilling technology and procedures, tougher federal safety and pollution requirements and inspections in federal waters. However, many smaller spills, less than 1000 gallons each, occur each year related to offshore platform activity but are not included in the environmental record of platforms in federal waters.

Cumulative, long term environmental impacts from offshore activities have not been well studied. The cumulative effects of small, chronic oil spills is not known nor is their cumulative interaction with other discharges from "formation waters," (i.e. water which contains hydrocarbons, heavy metals and salts which is pumped to the surface along with oil), and the dumping of drilling muds and cuttings into the marine environment. However, studies in the Gulf of Mexico show significant changes in the composition and diversity of marine biotic communities in areas of chronic low-level pollution from hydrocarbons. Other "monitoring studies" are underway off Southern California.

Management Issues

A principal concern of the State of Oregon is the process by which areas of the public's ocean are leased for private exploration and development. Leasing is *the* crucial step for Oregon. Once a company obtains a lease, whether from the state or the federal government, there is tremendous financial and political momentum to proceed to development and, if oil or gas is found, production. Oregon must make all key decisions about oil and gas development *before* leasing, not after. An understanding of the leasing process is important to addressing Oregon's concerns.

State Oil and Gas Leasing

Within Oregon's three-mile territorial sea, the Division of State Lands (DSL) has authority to enter into leases for oil and gas exploration and development. The DSL has never issued leases for oil and gas within the territorial sea.

The 1989 Oregon Legislature, following early recommendations of the Ocean Resources Management Task Force, imposed a moratorium through 1995 on oil and gas exploration and development within state waters. This plan recommends that Oregon prohibit oil and gas exploration and development within the territorial sea and does not suggest a time limit.

Federal OCS Leasing Program

(Note: see also the *Interim Report* of the Oregon Ocean Resources Management Task Force, July 1, 1988, for a more detailed discussion of the federal OCS leasing program and Oregon-Washington Lease Sale #132.)

Beyond three miles, the federal government controls oil and gas leasing on the "outer continental shelf" (OCS). The Outer Continental Shelf Lands Act gives the U.S. Department of the Interior authority and a mandate to lease for oil development on the outer continental shelf. Interior has prepared a five-year national OCS lease sale program for 1987-1992 which includes Lease Sale #132 in April, 1992, off Oregon and Washington.

The Oregon-Washington OCS Planning Area extends from three miles seaward to well beyond the continental margin. It encompasses nearly 70,000 square miles or over 48 million

acres.

- ***Developing Oregon's Position***

During 1985, 1986, and 1987, Oregon Governors Atiyeh and Goldschmidt provided comments to Interior during preparation of the 1987-1992 lease sale program. Among other issues, the governors requested that a number of areas be deleted from lease sale consideration (see map), including:

- Areas deeper than 200 meters (600 feet), which is the edge of the continental shelf
- The Heceta-Stonewall Banks complex and Coquille Banks
- Six mile buffers around the rocks and islands of the Oregon Island National Wildlife Refuge, the mouth of the Salmon River and Cascade Head Natural Research Area
- Six mile buffers around the mouths of Coos Bay, Yaquina Bay, and the Columbia River

Only areas deeper than 900 meters were actually deferred. All other requested deferral areas, which total about 900 square miles, were "highlighted" for "special pre-sale consideration."

In addition, the governors expressed several basic policies that Oregon would use in evaluating offshore leasing proposals:

- Federal consistency with the requirements of Oregon's Coastal Management Program
- Goal 19, *Ocean Resources*, which gives priority to use of renewable marine resources over nonrenewable and which requires that decisions be based on scientific information
- Inadequate scientific information exists to determine potential environmental impacts from OCS leasing and development
- Lease sales should be based on specific areas of geologic potential rather than broad administrative units
- A regional coordinating group of Oregon, Washington, affected Indian treaty tribes, and Interior is needed to make leasing decisions in the Northwest

- ***Pacific Northwest OCS Task Force***

In February, 1988, Governor Goldschmidt, Washington Governor Gardner requested then-Secretary of the Interior Hodel to establish a state-federal-tribal task force to resolve issues related to OCS leasing in the Pacific Northwest. In January of 1989, Secretary Hodel agreed to establish the Pacific Northwest OCS Task Force (PNWOCSTF) composed of representatives of the Governors of the States of Oregon and Washington, the Northwest Indian Fisheries Commission, the Columbia River Intertribal Fish Commission, and the Department of the Interior Minerals Management Service (MMS).

The PNWOCSTF is charged with preparing recommendations to the Secretary on a host of OCS leasing issues. As a priority, the Task Force, through its technical and scientific advisory committee, is coordinating development of regional plan and strategy for environmental studies. In February, 1990, the Task Force recommended to the Secretary that Lease Sale #132 be cancelled and any leasing decision deferred until needed environmental studies are completed and the results analysed. That may take seven to ten years. Eventually, the PNWOCSTF may take up issues of which, if any, areas should be leased for oil and gas.

- ***Litigation***

In March, 1988, Oregon joined a lawsuit with Washington, other states and environmental organizations to challenge the 1987-1992 OCS Lease Sale Program, in particular the adequacy of the Environmental Impact Statement. The plaintiffs argued that the Secretary should have considered alternatives to offshore leasing such as energy conservation measures, that there was no criteria for determining which OCS areas were scheduled for leasing and which ones weren't, that the leasing areas should have been based on geologic rationale,

and that the EIS contained a flawed cost-benefit analysis that undervalued costs to many areas. The states lost almost every issue in federal court.

Congressional Moratoria on Offshore Leasing

Since 1983, Congress has used the annual budget process for the Department of the Interior to impose "a moratora" on certain lease sales or any official planning step leading to lease sales opposed by the public and states. Moratorium language has been written into Interior's appropriations bill aimed at areas off California, Florida, and areas in the Atlantic Ocean to prohibit spending funds to plan for or conduct OCS leasing activities. A number of lease sales have been stalled for years through this Congressional tactic. Because no lease sale activities were yet occuring off Oregon and Washington, Congressional appropriations language requested by the states was aimed at conducting needed environmental studies and establishing the Pacific Northwest OCS Task Force.

Presidential Action Cancelling OCS Lease Sale #132

On June 26, 1990, President George Bush announced the delay or cancellation of lease sales off California and Florida which had been the focus of an OCS Task Force established by the President in February, 1988. The President also announced that he was accepting a recommendation from Secretary of the Interior Manuel Lujan to cancel Lease Sale #132 for Oregon and Washington, hold no lease sale until after the year 2000 and conduct a series of environmental studies over the next five to seven years to provide the Pacific Northwest OCS Task Force and the states with information for future lease sale planning. This Presidential action for the Pacific Northwest responded directly to the recommendations of the Oregon Ocean Resources Management Task Force and the Pacific Northwest OCS Task Force that Lease Sale #132 be cancelled and that environmental studies be conducted before, not after, leasing decisions are made.

Public Concerns

Few issues so galvanize public concern as does the prospect of offshore oil and gas development. Throughout the Ocean Plan process Oregonians consistently expressed strong concerns for scenic and aesthetic qualities, the ocean's immense biological productivity, significant ocean fisheries and degradation of Oregon's clean, healthy, marine environment. Oregonians asked tough questions about the need to drill for oil in a sensitive ocean area in the absence of a national energy policy.

• *Lack of Information*

Marine scientists and natural resource agency staff agree that until much more is known about Oregon's marine environment, Oregon should not make commitments to oil and gas leasing, exploration, or development. Major information gaps must be filled with studies on ocean currents, exchanges with estuaries, marine ecology, fisheries, marine mammals, and seabirds. Even with additional information, these experts believe that living marine resources virtually anywhere on the entire continental margin could be at risk from offshore petroleum production.

Major information gaps and research needs are identified in the section on Research and Information Needs. A technical and scientific subcommittee of the Pacific Northwest OCS Task Force (see above) has recommended a program of environmental studies for the Oregon-Washington OCS Planning Area. These studies would be carried out by the Minerals Management Service's OCS Environmental Studies Program. Even if funded consistently at adequate levels, the recommended studies would take seven to ten years to complete.

- ***Conflicts with Other Resources and Uses***

The Oregon Ocean Stewardship Area, the continental margin, is an area of very high ecological, fishery, and aesthetic values, all which are renewable. In this area are a host of existing uses such as fishing activities which take place year round throughout the entire region, recreation along the shoreline and in nearshore waters, navigation and transport of goods, and aesthetic enjoyment. Marine mammals and seabirds depend on the entire Ocean Stewardship Area for habitat. The benefits to Oregon and its coastal communities from the economic and social uses of these renewable resources appear to outweigh benefits from oil and gas development. Oil and gas development in this Oregon Ocean Stewardship Area would jeopardize resources and uses in both federal and state waters.

- ***Onshore Issues***

If ever permitted, offshore oil and gas exploration and development would bring a new industrial use to the Oregon coast. Several issues would arise from onshore impacts. Actual shore facilities such as docks, marine terminals, and supply yards would probably be located at one of three deep-draft development estuaries; Coos Bay, Yaquina Bay, or Columbia River. Even in these ports, issues of oil spills within the estuary, air pollution, noise, aircraft traffic and space-use conflicts with fishing vessels would be raised and need resolution. Local comprehensive plans and implementing ordinances, along with some state agency permits, would guide decisions about shore facilities related to offshore development.

- ***A Balanced National Program***

Oregon has been concerned that the national OCS leasing program has strayed from its mandate for a balanced approach to leasing and instead has followed a political mandate to open vast areas off the Nation's coast to industry with only minimal attention to "balance." The Outer Continental Shelf Lands Act requires that the OCS leasing program balance the need to find and develop domestic petroleum resources with environmental protection and state coastal zone management needs. Oregon has sought to restore this balance by insisting on thorough environmental studies and analysis before leasing decisions are made and by insisting that the state must be a partner, not merely a respondent, in making crucial decisions about whether, where and when to lease. In this way Oregon can ensure that environmental, social, and economic considerations are adequately addressed to protect Oregon's ocean and coastal resources.

- ***National Energy Policy***

Oregonians are fully aware that the debate over offshore oil and gas goes well beyond possible effects to the Oregon coast and ocean. Oregonians are not willing to risk valued ocean resources for a few days worth of petroleum especially when the federal government has not moved decisively to require more fuel efficient cars and appliances. The simple question is asked: Why risk drilling in Oregon's sensitive and productive ocean area when alternatives easily available to the Nation could yield even more energy? Oregon made this question central to the lawsuit challenging the Five-Year OCS Lease Sale Program (above) and in discussions with the Secretary of the Interior on canceling Lease Sale #132 while the Pacific Northwest OCS Task Force and MMS conduct additional studies.

Conclusions and Recommendations

Oregon has declared, as a statewide planning policy, a legislative policy and a policy of this Ocean Plan, that renewable ocean resources must have priority over nonrenewable resources. Therefore, coastal and ocean renewable resources and their uses must be protected from adverse effects from offshore oil and gas exploration and development.

Oregon is committed to a thoughtful

response to oil and gas issues. The 1987 Oregon Ocean Resources Management Act and this Ocean Plan were designed by the Legislature to be major components of that response. Through the Act and the process of preparing this plan, Oregon has considered the entire range of ocean resources and uses affecting the coast, articulated its overall ocean resources values, expressed its priorities for ocean resource use, and developed policies for future ocean management.

Oregon has assessed available scientific information and concluded that renewable resources throughout the entire Ocean Stewardship Area would be at risk from offshore oil and gas development. Resources and uses within the state's territorial sea, including seabirds and marine mammals and their habitats, beaches and other recreation areas, important fishery areas for commercial and recreational fishing, and estuaries, are especially vulnerable to adverse effects.

Within its own territorial sea, Oregon can control whether or not oil and gas exploration and development take place. The Oregon Legislature has imposed a moratorium through 1995 on oil and gas activities in state waters. In federal waters, Oregon has limited ability to influence federal leasing decisions and must assert its ocean policies in a variety of forums to affect lease sale decisions.

A fundamental difference exists between the mandate of the U.S. Department of the Interior to lease for offshore oil and gas development and the goals and policies of Oregon's coastal and ocean resources management programs. It is essential that Oregon coordinate with MMS on offshore oil and gas issues especially in preliminary, prelease environmental studies and planning work. The Pacific Northwest OCS Task Force is the primary vehicle for this coordination. It provides a forum and mechanism whereby the goals and policies of the Oregon Ocean Resources Management Program can be effectively integrated into the federal process. Oregon's Congressional delegation should continue to support and promote this state-federal coordination through both budget and program actions.

At present, postponing, preventing, or shaping a lease sale in federal waters is largely a function of state-federal negotiation and political leverage through the Congressional delegation. Oregon prefers that OCS leasing decisions be made through a state-federal process that fully considers state coastal management responsibilities and is based on thorough inventories of coastal and ocean resources and conditions, tough assessments of the risks and benefits and consideration of alternatives to OCS leasing.

Alternatives to offshore leasing exist and must be fully utilized before turning to sensitive ocean areas. Oregon's ocean and coastal resources and values need not be jeopardized by failure of the federal government to develop those alternatives.

The goal of the Oregon Ocean Plan is to protect its coast and ocean resources from adverse effects of offshore oil and gas exploration and development.

Recommended Policies:

In State Waters:

1. Prohibit oil and gas exploration and development within the state territorial sea.

Note:

After the Task Force adopted this policy recommendation, the 1989 Oregon Legislature enacted a six-year moratorium on any oil and gas leasing within state waters as part of Senate Bill 1152.

Minority position:

Consider petroleum exploration and development activities that do not adversely affect the ecological integrity and beneficial uses of marine waters within the state territorial sea. Inventories on inshore and continental

shelf areas to develop a better understanding of resources and potential impacts would also be allowed under this policy.

In Federal Waters:

1. Call upon the Secretary of the Interior to cancel Lease Sale #132.
2. Oppose any federal lease sale for the Washington-Oregon OCS Planning Area until at least the following conditions are met to the satisfaction of the Oregon Ocean Policy Advisory Council:
   - Any lease sale is made part of a balanced national energy program. This program must require conservation of energy and consider alternatives to development of oil and gas resources in environmentally sensitive OCS frontier areas
   - The rights of Pacific Northwest Indian Tribes are considered and fully protected in all decisions concerning OCS leasing in the region
   - Environmental studies that the Oregon Ocean Policy Advisory Council agrees are necessary for prelease decisions are conducted and the results analyzed, fully considered, and made available for all parties
   - State environmental standards are met. No degradation will be allowed which would jeopardize the ecological integrity or beneficial uses of marine waters affecting the Oregon coast
   - Onshore economic, social and regulatory impacts on local communities and governments are fully considered and appropriate monitoring and mitigation programs established
   - Special management areas identified in the Oregon Ocean Resources Management Plan as needing protection from oil and gas activities are not offered for lease, including important fishery areas listed under Ocean Fisheries
   - An oil spill prevention and response plan for the Oregon coast has been developed on an interagency basis and adopted by the U.S. Coast Guard and the Oregon Department of Environmental Quality
   - Damage assessment standards and protocols have been approved by the Oregon Department of Fish and Wildlife, the U.S. Fish and Wildlife Service and other responsible agencies
   - A compensation program has been established to compensate the state and other ocean users for a range of costs, including cleanup, loss of gear, loss of resources and opportunities
3. Participate in the Pacific Northwest OCS Task Force.
4. Call upon the Congress to review and revise the Outer Continental Shelf Lands Act. Revisions should result in an OCS oil and gas program that is part of a national energy policy that requires conservation, a management regime that gives priority consideration to renewable resources over nonrenewable, and includes coastal states as full partners in all OCS management decisions.

Oil Spills

Resources

Numerous resources could be affected by a coastal oil spill, including significant and extensive intertidal and estuarine habitats; nearshore fish spawning areas; coastal bird and marine mammal colonies; many endangered or threatened organisms; wildlife sanctuaries; parks and beaches; and the livelihoods of many Oregonians who depend on fishing and tourism.

The rugged, picturesque Oregon coastline is world famous. But the dynamic natural forces that attract so many tourists to the coast increase the chances of a catastrophic spill and decrease the chances of an effective response and cleanup. Strong winter storms are common. Navigation is treacherous at all times. Shipwreck sites are too numerous to count. Experts agree that containing a spill on the Oregon coast would be difficult under the best of circumstances. In a winter storm, it would be impossible.

Oregon is currently ill-prepared to respond to a major oil spill, regardless of its source or location. Existing contingency plans provide a framework for responding to spills and identify sensitive resources in some key areas, but actual response resources are woefully inadequate.

Risks

Substantial oil tanker traffic already exists off the Oregon coast. Most of the large tankers are destined for California. However, medium-sized tankers regularly ply the Columbia River and make occasional calls in Coos Bay. Medium-sized tankers carry enough petroleum products to cause a catastrophic spill. In addition, all large ocean-going vessels carry more than enough oil to foul many miles of Oregon's coastline and devastate sensitive areas.

Oil and gas exploration and development in the Washington and Oregon OCS will only increase the risk of a catastrophic oil spill. The increased port and offshore activity associated with oil development and production will also increase the likelihood of minor or chronic spills. The risks to Oregon's environment overall will be significantly increased.

Vigilance and strict enforcement of existing laws can help prevent spills. As the *Exxon Valdez* incident pointed out, however, present systems are inadequate to deal with a catastrophic spill. Efforts are underway at all levels of government to reduce the risk of oil spills. Alaska, British Columbia, Washington, Oregon, and California are all implementing legislation designed to address the problem. The four states have formed a task force with British Columbia to address interjurisdictional oil spill issues.

Private industry is also taking actions to reduce the risks of oil spills. For example, the American Petroleum Institute (API) recently announced that it will establish a Petroleum Industry Response Organization (PIRO) consisting of a Headquarters Group in Washington, D.C., and five Regional Centers. One of the centers will be located in Seattle, with support facilities located in Portland. Regional Centers will have all the equipment and expertise necessary to respond to a spill of 216,000 barrels of oil (9,000,000 gallons).

All experts agree that prevention of spills is the only way to significantly reduce the risk to the environment. Once large amounts of oil are on the water, present technology cannot adequately protect natural resources. A number of prevention alternatives are being considered, including double-hulled tankers, tanker routing patterns, vessel tracking systems, increased staffing and training of tanker crews, more rigorous inspections of equipment, mandatory contingency plans, and regular oil spill response exercises. Oil spill prevention must be the top policy priority for Oregon.

Management Issues

Vulnerability to a Coastal Spill

Quick action, the availability of materials and expertise, and the existence of a spill contingency plan for Yaquina Bay have all been given partial credit for the relatively low level of damage resulting from the *Blue Magpie* spill of November 1983. The *Blue Magpie* spill is the only major oil spill to occur to date on the Oregon coast.

Oregon's three deep draft development estuaries—the Columbia River, the Yaquina Bay, and Coos Bay—have all been addressed in spill contingency plans. However, none of Oregon's ocean shoreline has been addressed in such a plan. The 1989 Oregon Legislature enacted Senate Bill 1039, which directs DEQ to develop an oil spill response plan for the coastal waters of Oregon by mid-1991. This includes the coast, the Columbia River to Bonneville, and the Willamette to Willamette Falls. SB 1039 specifically requires DEQ to work with volunteer groups, affected local, state, and federal agencies, and adjacent states to develop the plan.

The coastal spill response plan will contain the following components:

- Computerized maps and information about the waters of the state, showing: fish and

Oregon's Spill Regulations

Regulations

State regulations for spill containment and control presently appear to be adequate. State law makes it illegal for any quantity of oil that would produce a sheen to enter the waters of the state from a ship or any on- or offshore facility. ORS also states that any person owning or having control over the oil shall collect and remove the oil immediately, or if that is not feasible, shall contain, treat, and disperse the oil. If immediate action is not taken, DEQ may contract for cleanup and may recover up to three times its cost to do so.

Spill Response

Part of the *Oregon Emergency Operations Plan* is concerned with oil spills. Annex O of the plan, Oregon's *Oil and Hazardous Material Emergency Response Plan*, outlines the authorities, responsibilities, command structure, and notification procedures for all such spills in Oregon. This plan is complemented by spill response contingency plans for Oregon's three deep draft development estuaries: the Columbia River, Yaquina Bay, and Coos Bay. These contingency plans address communications, agency responsibilities, and resource protection.

Oregon, Washington, Alaska, and Idaho, are members of the Environmental Protection Agency's Region 10 Regional Response Team (RRT). The RRT predominantly serves to coordinate the spill response activities of thirteen federal agencies that make up the rest of the team.

Coordination

Annex O addresses the major coordination concerns that are likely to arise in response to an oil spill. In the event of a spill on the Columbia River, the responsibilities of Oregon and Washington officials are described in both Annex O and in the Columbia River spill contingency plan. Both states are members of the Regional Response Team, which itself provides for coordination among agencies in the event of a spill.

Early in 1989, in response to the *Nestucca* accident and spill, British Columbia and Washington met to address trans-boundary spill response issues. Oregon and Alaska were invited to participate after the March 1989 *Exxon Valdez* spill, and California has monitored the Task Force's discussions. Now known as the States-B.C Oil Spill Task Force, the group is addressing several interstate and international spill response coordination issues that arise in the course of a spill. The purpose of the task force is to "...enhance existing means of prevention and explore new ones, research and implement means of financial recovery for both the province and the state[s], and establish ongoing technology sharing." The Task Force's work is entirely independent of the federal response teams.

Oregon and Washington have applied for a Coastal Zone Management Act (CZMA) Section 309 Grant to implement the recommendations of the States-B.C. Oil Spill Task Force. The proposal identifies three issues — the use of dispersants, oiled

wildlife habitats, shoreline sensitivity, refuges and sanctuaries, recreational facilities, areas of economic importance, water intakes and discharges, and access points for responders.

- Identification of the resources most vulnerable to spilled oil, a scheme for prioritizing them for protection, and possible protection methods.
- An index of potential emergency spill response workers and equipment, including sites for possible disposal of oiled debris.
- A strategy to evaluate the spill, notify response personnel, contain and clean up the spill, coordinate with Washington and California, assess damages, and recover costs.

In addition, the plan will attempt to address the following issues:

Prevention

Prevention will be a key element in Oregon's spill control strategy. The extreme difficulty of containing oil once it is spilled in the ocean means that prevention must be the state's first line of defense. Existing state and federal regulations will be examined along with the States/B.C. Task Force Recommendations to determine what steps Oregon can take to

debris disposal, and volunteer management — that the states intend to address in concert. California and Alaska have both been invited to participate.

Oregon's own spill response contingency planning efforts would benefit greatly from the grant work.

Damage Assessment

Oregon law establishes the state's authority to assess natural resource damages from a spill. Authority for damage assessment now rests jointly with the Oregon Department of Fish and Wildlife and the Oregon Department of Environmental Quality.

Oregon has not adopted a systematic method for assessing natural resource damages resulting from a spill. In an emergency, Oregon would probably use the traditional approach to damage assessment, which attempts to place a monetary value on the organisms lost in a spill. Case after case has shown, however, that it is difficult to agree on a monetary value for something that has no defined market value. In addition, it is nearly impossible to identify all of the natural resource losses from a spill. In practice, the expense of identifying losses has usually exceeded the cost of the damaged resources.

Newer damage assessment methods base the calculation of damages on the amount and type of oil spilled and the types of habitats impacted.

Liability and compensation:

Section 301c of the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) provides authority for the state to recover damages for injuries to natural resources, including the reasonable costs of assessing such damages.

Oregon law provides that a party responsible for injury, contamination, or destruction of fish or wildlife or associated habitat is strictly liable for the value of the fish or wildlife and for all costs of restoring fish and wildlife production and habitat in the areas affected by a spill.

In Oregon, a spiller is strictly liable for damages to persons or property without regard to fault. Damages to natural resources are not explicitly included in the law. Since Oregon law neither directly establishes limits nor specifies that there are no limits to a spiller's liability for damages resulting from a spill, the extent of a spiller's liability might be established by federal law (see also the discussion below).

In 1989 the Oregon Legislature enacted SB 1038, which establishes financial assurance requirements for ships that transport oil and hazardous materials in Oregon waters. It also enacted HB 3493, which imposes civil penalties on anyone who intentionally or negligently discharges oil into Oregon waters. Penalty amounts are to be determined by the Director of the DEQ after consulting with the Director of ODFW. Penalties are to be paid into an Oil Spillage Control Fund, from which appropriations may be made by DEQ to advance the costs of spill cleanup and fish and wildlife rehabilitation. ❖

The November 1983 wreck of the freighter Blue Magpie *at Yaquina Bay demonstrated that Oregon's coast is vulnerable to oil spills from many sources. Cleanup crews worked with shovels and plastic bags to scrape oil off the beach. (DLCD photo, 1983)*

prevent spills. Spill planners will work closely with the Oregon Congressional delegation to ensure that pending legislation provides better standards and enforcement.

Volunteer Management

The cleanup of nearly every coastal oil spill in recent years has been assisted by concerned citizens numbering into the hundreds. Rarely are there facilities and expertise immediately available to properly use the concerned crowds. In addition, most who show up to help need special training to do what many of them want to do, which is to care for oiled birds and wildlife. Most spill response planning efforts focus on how to protect environmental resources with the best available technology. Consequently, resources have simply not been available to fully address the use of volunteers at a spill.

What should volunteers do? Who is liable for injuries to volunteers while they are working at a spill? Are facilities available to shelter the volunteers? Who is in charge? Oregon's coastal oil spill response plan will result in lists of both volunteers and the issues surrounding their management. The CZMA Section 309 grant should allow the state to develop guidelines for managing volunteers. Additional work will be necessary to effectively implement those guidelines, and to make citizen volun-

teers a valuable component of Oregon's response to a coastal oil spill.

Dispersant Guidelines

Under certain conditions, substances that break up an oil slick into small particles that sink can be used in the very early stages of the response to a spill. Some experts maintain that dispersants provide a safe and effective way to respond to a spill. However, the effect of using a dispersant can be as damaging to fish and wildlife as the spill itself.

The decision to use dispersants must be made quickly. Ideally, guidelines for making a dispersant decision are clear, and the information necessary to make the decision is immediately available to the spill response team.

Dispersant use has been addressed in state laws and rules in the past. The DEQ may authorize the use of oil dispersants in a spill response emergency. However, the guidelines used to determine the appropriateness of dispersant use are now dated. Under the old guidelines, the opportunity to use dispersants will have passed by the time the necessary information is gathered and a decision is made. New guidelines must be prepared.

Damage Assessment

Two issues related to oil spills are how to assess the damage to living resources and the environment, and how to assign value to the damaged or destroyed resources. Both are necessary for eqitable settlement of claims against the responsible party. Oregon does not have an agreed-upon method to determine the extent of natural resource damage from a spill. Nor has it adopted a method for assigning value to damaged resources. Consequently, assessment and evaluation efforts could double the cost of spill response. It could also leave the state's determination of damages vulnerable to legal challenges. A new methodology must be developed.

Liability for Damages

An associated issue is the extent to which spillers can be held liable for damages to the environment. Damages to lives and property are addressed in Oregon law, but the limits of a spiller's liability for damages to the environment are not specifically addressed in state law. If any limits on liability are established by state or federal law, or agreed to in international protocols to which the United States is a signatory, they must be high enough to cover resource damages, the assessment of such damages, and the costs of restoration. Rules must be developed.

Wildlife Rehabilitation

The rehabilitation of oiled wildlife is always a key issue in any major spill response. Efforts must be made to help injured wildlife. The public's attention will be focused in this area, and many people will volunteer to assist in caring for oiled wildlife. Potential rehabilitation centers must be identified, necessary equipment must be obtained, emergency procedures must be developed, and a cadre of volunteers must be organized and trained.

At the present time, Oregon has no organized rehabilitation program and no mechanism for implementing a major oiled wildlife rescue and rehabilitation effort. Planning efforts must address this issue.

Debris Disposal

Mountains of oiled debris are the inevitable aftermath of a major spill. Disposal of this debris presents communities with difficult decisions. Advance preparations can facilitate the disposal process and overcome potential barriers. All alternatives need to be critically examined, and appropriate decisions regarding methods, needed permits and variances, and acceptable sites need to be made.

Interstate cooperation may be critical. Therefore, agreements need to be developed before a crisis occurs. Oregon has not systematically studied the disposal of oily debris. Planning efforts must focus on the problem.

Vessel Safety

The United States Coast Guard in charged with setting and enforcing safety standards for all vessels, including tankers, and for establishing vessel traffic control systems in areas of congested vessel activity, like San Francisco Bay. The *Exxon Valdez* oil spill in March, 1989, reignited a move within the Congress for the Coast Guard to require double-hulled vessels for petroleum transport in U.S. waters. There is strong evidence that double hulls could significantly reduce but not eliminate, the risk of spilled oil from tanker accidents. Implementing such a requirement will take time and international cooperation.

Federal Oil Spill Issues

As with many other natural resource issues, state laws operate within a context that is clearly circumscribed by federal laws. Federal oil spill issues that are important to Oregon include the following:

Spill Response Planning

In October, 1989, the U.S. General Accounting Office released a report on *Coast Guard Adequacy of Preparation and Response to Exxon Valdez Oil Spill* (GAO/RCED-90-44). The report identifies several issues and offers some items that might be considered for Congressional action. Among the most significant issue is that *no single authority is designated to ensure that oil spill contingency planning preparations are adequate.* U.S. Coast Guard officials the absence of such authority is "...the most significant limiting factor in the contingency planning process."

Oil Spill Liability

At present, a patchwork of federal laws pertain to oil spills. While there is general recognition that comprehensive legislation is needed to more adequately address liability and compensation for spills, Congress has been stuck for fifteen years on the issue of whether to preempt state liability limits.

Since 1975 the U.S. Congress has tried to pass comprehensive oil spill liability legislation. Common wisdom held that a catastrophic spill was necessary to settle differences between the Senate and the House. As expected, the March 1989 *Exxon Valdez* spill appears to have broken the deadlock.

At issue has been whether federal laws should preempt state laws that establish financial responsibilities for spill cleanup and compensation. At least 17 of the 24 states that have liability and compensation laws do not limit a spiller's liability. The Senate has not wanted to preempt state no-limit liability laws, while the House has wanted to override state liability provisions.

In 1989 the House and Senate finally came to agreement on preemption, and both houses passed bills that do not preempt state liability laws. Issues the conference committee needs to address in 1990 are whether to mandate double hulls on oil tankers, and whether to implement international oil spill protocols. (The House would require double hulls immediately and require implementation of international protocols. The Senate would wait for another study on double hulls, and would not implement international protocols.) Differences over the international protocols are concerned, again, with the liability limits that can be established by the states.

Cleanup Costs

Of the four federal laws that address oil spills, the Clean Water Act is the most comprehensive. However, a revolving fund it established to pay cleanup and restoration costs beyond a spiller's liability is severely underfunded. At the time of the *Exxon Valdez* spill, the fund had only $4 million. The size of the fund was a factor in the Coast Guard's decision not to take over spill cleanup efforts. Exxon had far more money than did the Coast Guard to manage spill response.

Establishing Liability

At present, federal law requires proof of gross negligence, rather than mere negligence, to establish liability for spill damages. In addition, damages at present do not include punitive damages; some feel that the potential for punitive damages could motivate spill response and cleanup efforts.❖

Conclusions and Recommendations

Every effort must be made to prevent oil spills from occuring in Oregon's coastal and ocean waters.

Despite preventive measures, Oregon must plan for a coastal oil spill that would overwhelm every available means for immediate response.

Oregon is preparing a coastal oil spill response contingency plan to protect sensitive resources and address critical oil spill issues.

Oregon is a participant in a regional oil spill task force that also includes the states of Washington and Alaska and the Province of British Columbia.

Recommended Policies

1. Emphasize strategies to prevent spills from occuring in Oregon waters.
2. Commit sufficient resources to maintain ongoing spill planning activities so that plans can be updated, expanded, and exercised on a continual basis.
3. Promote efforts within industry to assure that oil spill response equip-ment and trained cleanup personnel will be available to respond immediately to a spill during any activity involving petroleum production or transport in Oregon waters.
4. Emphasize the importance of policies and strategies for dealing with wildlife rehabilitation, oiled debris disposal, volunteer management, damage assessment, and dispersant use.
5. Ensure that any party engaging in petroleum exploration, production, storage, or transport in or near Oregon waters shall develop and acquire approval from the appropriate authority for oil spill contingency plans. The foremost plan element shall demonstrate that all possible steps have been taken to prevent spills from occurring.
6. Insist that federal laws be changed to clearly remove all limitations on the liability of any party responsible for spilling oil or hazardous materials into the waters of the state.
7. Coordinate with other coastal states to encourage the U.S. Congress to designate the U.S. Coast Guard as the sole federal agency with authority to review industry spill prevention and response plans for adequacy.
9. Oregon's coastal oil spill prevention and response plan shall be a part of the state's territorial sea plan.

Needed Actions:

☐ The Department of Environmental Quality should work with other state agencies, adjacent states, federal agencies, industry representatives, and Oregonians to:

- Update existing spill contingency plans, and develop spill contingency plans for all the remaining estuaries and the entire Oregon coastline.
- Ensure that oil spill contingency plans identify spill prevention strategies.
- Identify opportunities to establish wildlife rehabilitation centers on short notice in the event of a spill.
- Identify methods to manage volunteers who want to assist in oil spill cleanup efforts.
- Identify the means for disposing of oily debris from the cleanup of an oil spill.
- Develop a policy for the use of dispersants and other oil reactive agents. If the policy allows their use, adopt a clear protocol or guidelines to govern their use in an emergency spill response.
- Develop a comprehensive damage assessment strategy so that a value can be placed on damaged natural resources; appropriate fees or fines can be assessed; and suitable restoration measures can be taken.

Damage assessment work must also develop realistic criteria to be used to determine when a site has been sufficiently cleaned up.

- Seek continuous funding for contingency plan development, updating, and exercising.
- Seek commitment from industry to develop and maintain necessary response capabilities.

☐ The Ocean Policy Advisory Council should:

- Incorporate major elements of the coastal oil spill prevention and response plan into the territorial sea plan. These elements include a site specific inventory of shoreline, estuarine, and intertidal areas, their sensitivity to spilled oil, and guidelines for various cleanup techniques.
- The Territorial Sea Plan should also include policies and standards for oil spill contingency plan requirements, the use of dispersants, liability limits, damage assessment, and compensation, that are enforceable in Oregon waters.

☐ With the assistance of the Attorney General, the Ocean Policy Advisory Council should:

- Investigate the need, feasibility, and legality of requiring bonding to engage in offshore oil and gas exploration and development.

Marine Minerals

Resources

Significant mineral resources may exist in both state and federal waters off Oregon's coast. Concentrations of chromium, titanium, garnet, gold, and other precious "black sand" minerals are found off the southern Oregon coast as placer deposits on the ocean floor. Titanium-rich sands occur on beaches along the entire Oregon coast. Some gravel deposits also exist. Polymetallic sulfide mineral deposits with iron, lead, copper and zinc may exist in the Gorda Ridge area in deep water nearly 100 miles off Cape Blanco.

The Oregon Department of Geology and Mineral Industries (DOGMI) has published *Mineral Resources Map, Offshore Oregon* (GMS-37) which locates and describes the mineral resources offshore Oregon.

Black Sand Placer Deposits

The black sands deposits off Cape Blanco and the Rogue River are of highest interest at present. These deposits appear to be concentrated in areas where the water is less than 100 meters deep. They lie within both state and federal waters and have been sampled only on the surface of the ocean floor. No core samples have been taken to determine thickness or composition. A program of limited core sampling to determine deposit thickness to about thirty meters is planned for fall, 1990 by a joint state-federal task force (see below).

Placer deposits were created by repeated sorting and reworking of sediments flushed from the ancestral Siskiyou Mountains. Wave action and longshore ocean currents carried away lighter sand grains and left concentrations of the heavier grains at various locations along the coast. This process was apparently repeated several times at successive sea levels since the last ice age.

These deposits occur on beaches and uplifted coastal terraces of the Oregon coast. Gold was recovered from the beach at Gold Beach and Whiskey Run, north of Bandon, from the mid-1800s until the early twentieth century. During World War II some 450,000 tons of raw chromite-rich sands were mined from terrace deposits north of Bandon which eventually yielded about 52,000 tons of concentrated black sands, of which 37-39 percent was chromite. These upland deposits are thought to be similar to offshore deposits.

Oregon's offshore placer mineral deposits are discussed more fully in the *Oregon Ocean Book* and the Task Force's *Interim Report* summer, 1988.

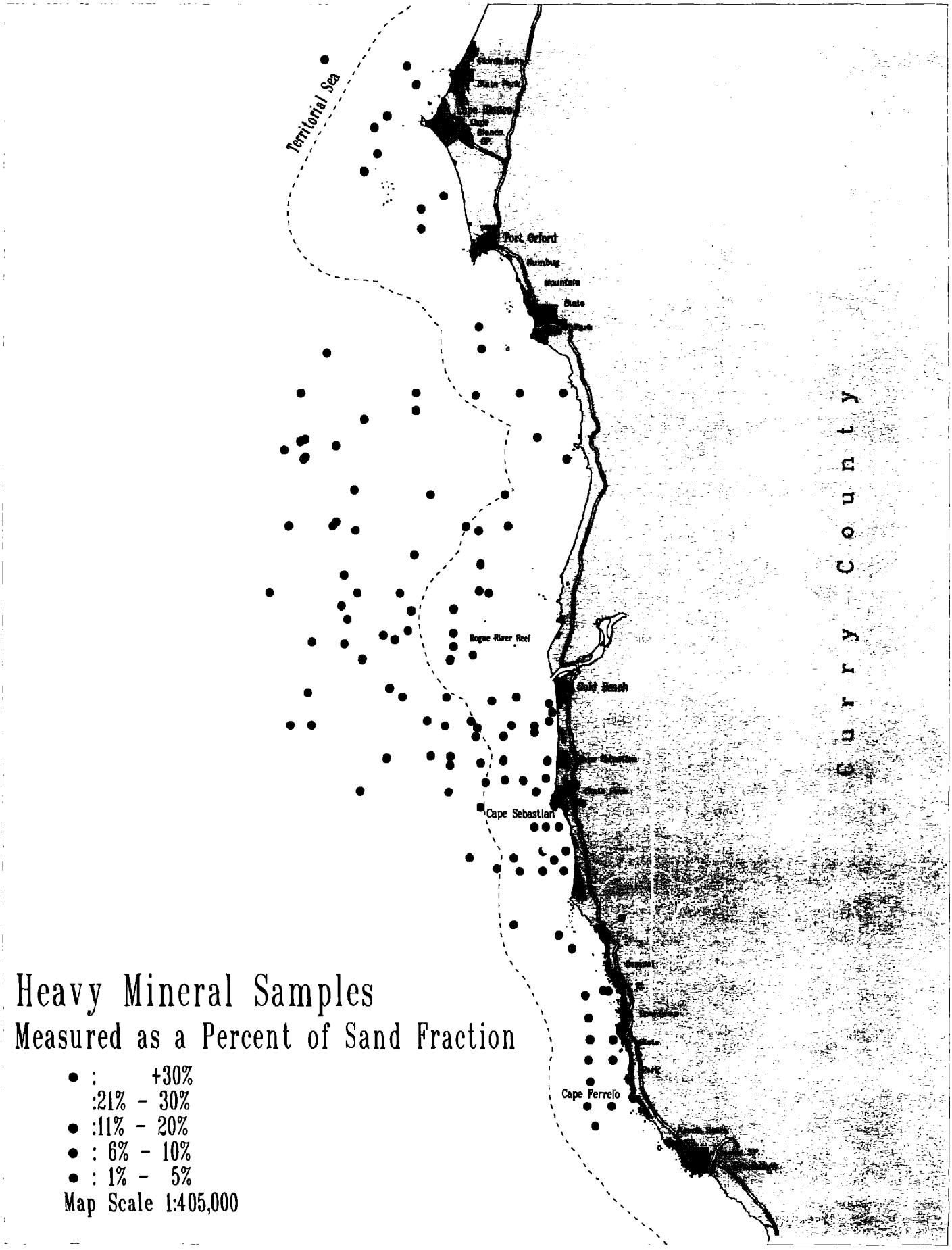
Risks

Environmental Considerations

Because the locations of these surface black sand deposits are fairly well known, it is possible to begin to describe the biologic resources and environmental conditions which must be considered if Oregon ever chooses to allow commercial mineral exploration or development. The two largest known areas of possible placer deposits are located off the southern Oregon coast. One stretches from Cape Sebastian north past the Rogue River from nearshore seaward of Rogue Reef. The other is off the tip of Cape Blanco on the north side of Blanco Reef.

Within or adjacent to these areas are a diversity of living marine resources and other ocean uses. The rocks and islands of the Rogue Reef, Orford Reef and Blanco Reef and other rocks nearer shore are within the Oregon Islands National Wildlife Refuge. All provide important habitat for seabirds and marine mammals and many are listed in this Ocean Plan as sensitive bird and mammal habitat. Several rocks in Rogue and Orford Reefs are critical pupping and rearing areas for the Northern Sea Lion, now listed by the U.S. Fish and Wildlife Service as a threatened species.

The combination of submerged rocks and



Heavy Mineral Samples

Measured as a Percent of Sand Fraction

- : +30%
- :21% - 30%
- :11% - 20%
- : 6% - 10%
- : 1% - 5%

Map Scale 1:405,000

reefs with sandy and muddy bottoms within this area provides rich, varied habitat for fish and shellfish. Many of these species are commercially important including Dungeness crab, pink shrimp, sea urchins, petrale, English and Dover sole, lingcod, and several species of rockfish. Coho and Chinook salmon stocks from the Elk, Sixes, Rogue and other rivers to the south pass through these areas as seagoing smolts and again as returning adults.

Strong summer winds produce significant upwelling along the southern Oregon coast. This upwelling brings cold, nutrient-rich waters to the surface which provides food for phytoplankton blooming in the strong summer sunlight. The oceanic environment is therefore highly productive.

Existing Ocean Users

From late spring through the summer a significant recreational and commercial Coho and Chinook salmon fishery is centered on the region from Cape Blanco to Cape Sebastian. This fishery is highly managed by the Pacific Fishery Management Council and any additional management considerations posed by marine mineral operations will undoubtedly be controversial.

Other commercial fisheries exist at various times throughout the year in the region. These include crabbing, groundfish and mid-water trawling. The exact location of these fisheries varies but most use the areas of placer deposits at one time or another. A sea urchin fishery targets the submerged rocks of Rogue, Orford and Blanco Reefs. Important Fishery Areas are identified in the Ocean Fisheries section and include Rogue Canyon, Coquille Bank, and areas off Cape Blanco. This Plan recommends that nonrenewable resource use be prohibited in these areas.

Navigation is principal existing use of the ocean in some areas where placer deposits exist. A two mile-wide towboat lane passes directly over an area of major black sand concentration about three to four miles off the mouth of the Rogue River. This towboat lane is used by towboats pulling barges along the coast and results from an agreement between towboat operators and the crab fishing industry to establish towboat lanes to avoid crab gear losses. Off Cape Blanco, this towboat lane passes several miles seaward of the known placer deposit areas.

Needed Research

The marine environment off the southern Oregon coast is not well studied. Major research is needed on environmental conditions, ecology of marine life, and the mineral deposits.

Ocean circulation in this region is virtually unstudied. Upwelling and the effects of Cape Blanco on the flow of nearshore and offshore ocean currents are not well known. Bottom currents, both longshore and cross-shelf, need to be studied. The action of storms which stir sediments from the bottom and other seasonal turbidity factors need further research.

Biological studies of bottom dwelling creatures which live in sediments both in and near mineral areas are needed. The use of these areas as spawning or nursery areas for fish species needs to be known. The activities of marine mammals and seabirds and use of food sources in the region must be more fully understood.

The mineral deposits themseves need further study to determine size, thickness, and mineral composition. Other geologic factors also need study including thickness and composition of unwanted sediments and stability of surrounding sediments.

No comprehensive research program has been prepared to guide field studies and research to ensure that a balance of information is obtained. Two recent studies will provide a basis for such a research plan: *Management of Living Marine Resources, A Research Plan for the Washington and Oregon Continental Margin*, November, 1989, Oregon Department of Fish and Wildlife, and *An Assessment of Environmental and Biological Impacts of Placer*

Mining on the Southern Oregon Coast, Oregon State University College of Oceanography for the state-federal placer task force. Additional research needs are identified in this plan in the section on Ocean Research and Information.

Management Concerns

State Regulations for Minerals

Just as the state is in the beginning stages of learning about offshore minerals, so too is the state beginning to fully consider the kinds of laws and regulations that would be necessary to protect renewable marine resources.

Many questions remain unanswered about mineral deposits, environmental conditions, and effects of exploration and development. As these questions are answered, Oregon will be able to better determine the quality and quantity of the minerals, whether mineral development is appropriate, and if so, what regulations are needed. Oregon should proceed cautiously, insuring that the regulatory framework developed provides effective public controls over all phases of private mineral activities.

• *Senate Bill 606: Exploration Contracts*

1987 Senate Bill 606 (now ORS 274.611-.640) allows, but does not require, the Division of State Lands (DSL) to enter into exploration contracts with private companies to explore for minerals. Meant to encourage limited industry exploration for minerals in order to increase the state's information base, the law requires that all information be released to the state. If DSL were to consider entering into exploration contracts, the law requires DSL to make extensive determinations under ORS 274.760 about environmental impacts from exploration. In addition, DSL would have to make an assessment of environmental and socio-economic effects of exploration under Statewide Planning Goal 19, Ocean Resources, prior to any exploration contract.

DSL has not entered into any exploration contracts and has not adopted any administrative rules or regulations for considering exploration contracts. Because of unresolved issues and lack of information related to marine minerals, DSL has agreed with the recommendations of this Plan to defer consideration of any commercial exploration for at least five years.

Even if exploration contracts were to be issued, current law makes it clear that DSL cannot go beyond exploration contracts until several key steps are taken. First, new legislation would be necessary to build an appropriate regulatory regime. Second, the State Land Board could only approve mineral mining which is consistent with an adopted management plan for Oregon's territorial sea. Third, proposals for leasing must be reviewed and approved against the requirements of Goal 19 for which administrative rules have not been developed by the Department of Land Conservation and development.

• *Goal 19*

Statewide Planning Goal 19, Ocean Resources, requires that scientific inventory information must be used to assess effects from proposed actions. Administrative rules are needed to spell out the requirements of such an inventory and effects assessment for all phases of marine mineral exploration and development. When adopted by Land Conservation and Development Commission, these rules will provide a yardstick for interagency review of proposals for exploration contracts and other private mineral activities.

Federal Marine Mineral Program

The U.S. Department of the Interior has jurisdiction over mineral leasing, exploration and development activities in federal waters beyond the state's three-mile territorial sea. The Minerals Management Service (MMS) administers the federal marine mineral program under provisions of the Outer Continental Shelf Lands Act (OCSLA) and has adopted regulations for mineral leasing and for mineral exploration and development.

MMS has not offered any leases for placer

minerals off Oregon. In 1984, MMS announced its intention to hold a lease sale on the Gorda Ridge for polymetallic sulfide minerals. That lease sale was cancelled after the Environmental Impact Statement revealed that this proposal was premature and unwarranted.

Coastal states, environmental organizations and private industry have long complained that the OCSLA is designed to meet the needs of the offshore oil and gas industry and is not suited to marine mineral needs. These groups have advocated that Congress pass new laws more appropriate to the uncertainties and risks of marine mineral exploration and development.

State-Federal Task Forces

In 1984, in response to Interior's proposal for a lease sale on Gorda Ridge, Oregon agreed to join California and the MMS in a technical task force to examine scientific and technical implications of a lease sale on Gorda Ridge. A team of scientists subsequently conducted several annual summer research dives on the Gorda Ridge and concluded that leasing was premature. The MMS has officially terminated its leasing process.

In late 1988, a state-federal placer task force was formed by Oregon and MMS to assess existing information and examine technical issues related to placer mineral deposits off Oregon. That task force has released three reports through the Oregon Department of Geology and Mineral Industries:

An Assessment of Environmental and Biological Impacts of Placer Mining on the Southern Oregon Coast, by Susan Ross, Oregon State University College of Oceanography.

Preliminary Evaluation of Heavy Mineral Content of Continental Shelf Placer Deposits off Cape Blanco, Rogue River, and Umpqua River by LaVerne Kulm and Curt Peterson, Oregon State University College of Oceanography.

A Preliminary Economic Appraisal of Potential Heavy Mineral Placer Deposits Along the Oregon Continental Margin by Nick Wetzel and Scott Stebbins of the U.S. Bureau of Mines.

The placer task force coordinated a field program of limited core sampling in fall, 1990, off Cape Blanco and the Rogue River to obtain more information about the thickness and composition of deposits. Biologic and oceanographic studies were carried out at the same time. Results of this program will provide the State of Oregon, MMS, and the public with better information on mineral deposits and environmental considerations off the south coast.

Public Concerns

• Varied Public Perspectives

Oregonians differ on the issue of marine minerals. Many oppose marine minerals exploration and development altogether. Others want better information but are concerned that exploration by industry would inevitably lead to commercial mining. Some would support commercial exploration with proper environmental restrictions. Most support university and government research programs, although these are chronically short of adequate research funds.

Some are concerned that minerals information will outstrip biologic and environmental information and that the state will be overwhelmed by momentum to proceed with development. Others point out that Oregon has existing controls but must enact others, including the clear ability to completely stop the process at any time.

• Lack of Information

Oregon must have a great deal more information before making any decisions about whether or not marine mineral development would be in the best interests of the state, local communities and the ocean environment. At present there is not enough biologic, oceanographic, or geologic information available to fully assess risks and benefits. In filling these information gaps, Oregon must obtain a balance of information about biologic resources and environmental conditions as well as

marine minerals. Information should be sufficient to allow Oregon to prescribe permit terms, conditions and stipulations on all phases of commercial mineral activities.

- ***Environmental Impacts***

Coastal residents, local governments, and state and federal agencies are concerned about potential adverse impacts from marine mineral mining. These impacts could be minor and temporary or they could be major and long-lasting. Impacts depend on a variety of factors: the size, location, and timing of mining operations, the dynamics of the ocean in the operations area, the physical setting and mineral characteristics of the deposits and the nature and value of the marine resources in the affected area.

It is possible that commercial fishing or crabbing could be temporarily disrupted. Fish habitat in the mining area may be altered. Marine mammals could be affected by noise and disturbance. Mining excavations could modify wave approach to the shoreline and cause erosion of beaches and cliffs. These possible effects require that Oregon proceed cautiously.

- ***Continued State-Federal Coordination***

Oregon must also be mindful of federal government interests in these same black sand deposits adjacent to Oregon's territorial sea boundary. Because exploration or mining in these areas could directly affect Oregon's ocean resources, state and federal agencies must cooperate to ensure that programs are compatible. Such efforts, already begun with the current state-federal placer task force, will need to continue to ensure a coordinated, cautious, marine mineral program for both state and federal waters.

Spectrum of Positions

Minority Position A: No Further Research

A minority of Task Force members reflected the views of some concerned citizens that research planned for Fall, 1990, by the State-Federal Placer Task Force might obtain additional information about marine placer deposits which could set off a "gold rush" that Oregon could not control and which would lead inevitably to mining. These members felt that any field research, even if conducted by agency scientists and universities, should be cancelled outright as premature or postponed until a comprehensive research program could be prepared which balanced environmental with mineral information.

This minority position was retained even after the majority of the Task Force agreed to prohibit any commercial exploration contracts until additional environmental and mineral information was acquired to allow state and federal agencies to make a decision about whether or not commercial exploration was desirable or possible. The minority remained convinced that Oregon should not condone publicly funded academic research to gain more information about marine minerals and the marine environment even when all results were made available to the public.

Minority Position B: Encourage Commercial Exploration

Several Task Force members argued that Oregon should not only allow public research but should encourage commercial exploration under the conditions outlined by existing state law, Senate Bill 606. These members felt that the Task Force had an obligation to prepare a plan which would carry out Legislative policy to "encourge ocean resources development which is environmentally sound and economically beneficial". This minority argued that additional information is needed to gauge both the environmental or economic aspects of marine mineral development and that without the participation of industry, no real assessment of either would occur. Industry will not commit resources to exploration off Oregon if incentives, such as the "preference right" in existing state law, are not provided. These members felt that the majority Task Force policy also contradicts another legislative policy to

"promote research and development of new, innovative marine technologies for exploration and utilization of ocean resources."

Majority Position: Public Research Will Help Build Information Base

The majority of the Task Force felt that scientific research funded by public agencies is needed to obtain information upon which to base future decisions. The majority reasoned that Oregon has sufficient safeguards to preclude a headlong rush to commercial development of mineral resources if publicly funded field research indicates significant mineral resources. The majority was convinced that while it is premature for Oregon to enter into commercial exploration contracts with industry, additional fundamental information is desirable and should be obtained through academic and agency scientists. This additional information will allow Oregon to decide whether to enter into any commercial exploration contracts, and if so, where, when and how. The majority also felt that Oregon should not, as public policy, oppose or prohibit public academic research and scientific inquiry merely because of speculation about how the information might be used. The majority also noted that the public research will allow Oregon to keep pace with federal agencies interested in marine mineral resources in federal waters adjacent to Oregon.

Conclusions and Recommendations

Oregon needs additional information on marine mineral deposits and environmental conditions even before making decisions about commercial exploration. Oregon should continue a cautious, step-wise approach to develop marine minerals policies and gather information without committing the state to future mineral development.

Oregon should use the process of preparing a plan for Oregon's territorial sea to refine and clarify policies and programs on marine minerals. The territorial sea plan should also include a comprehensive framework research program for marine minerals and related biologic and environmental factors.

The state should not enter into exploration contracts with private industry under current law for at least five years enabling state agencies and the public to obtain better information through public means, refine policies and to develop regulations. In addition, no commercial exploration contracts should be permitted until the law is amended to make clear that an exploration contract does not obligate the state in any way to enter into mineral leases even if the company wishes to convert an exploration permit to a lease. Oregon must be able to stop the process completely after a commercial exploration permit.

Certain areas should be off limits to commercial mineral exploration and development. These include Important Fishery Areas identified in the Ocean Fisheries section, and areas within three miles of sensitive offshore rocks and islands as identified in the secion on Marine Birds and Mammals.

Oregon should continue to coordinate with federal agencies on marine minerals and environmental research and should seek a strong state role managing all marine mineral resources off Oregon. New federal legislation is required to establish a federal marine minerals regime compatible with the goals and policies of this Oregon Ocean Resources Management Plan.

Recommended Policies

1. Prohibit commercial exploration contracts under Senate Bill 606 (ORS 274.611-640) for at least five years.
2. Amend ORS 274.611-640 to clarify that an exploration contract neither confers proprietary rights to any minerals found nor obligates the state to proceed with any steps toward mineral leasing or development.

3. Clarify and refine state marine mineral policies in the territorial sea plan.
4. Include in the territorial sea plan a research plan for academic and public agency research related to marine minerals, environmental conditions, biologic resources and socio-economic conditions.
5. Require an inventory and effects assessment under Statewide Planning Goal 19, Ocean Resources, prior to any commercial exploration contracts and require that the proposed exploration plan, if approved by appropriate state and federal agencies, contains necessary terms, conditions and stipulations to avoid adverse impacts from exploration activities.
6. As called for in the section on Marine Birds and Mammals, prohibit exploration and development of marine minerals within three miles of all nearshore rocks and islands until Oregon completes a plan for the territorial sea which includes an evaluation of the sensitivity of specific marine bird and mammal populations and their habitats and provides specific protection measures. During this plan preparation and evaluation period, academic and public agency scientific research related to marine minerals will be allowed within three miles of the nearshore rocks and islands if the Oregon Department of Fish and Wildlife determines that these activities will not adversely affect sensitive marine bird or mammal populations or their habitats.
7. Prohibit commercial mineral exploration and development in Important Fishery Areas as identified in the Ocean Plan.
8. Use the adopted policies of the Oregon Ocean Resources Management Plan to coordinate all state and federal marine mineral activities.

Minority Position

A minority of the Task Force recommend that the following substitute for Policy #4, above:

a. Encourage academic and public agency scientific research to characterize both marine mineral resources and nearby biologic communities and environmental conditions within a comprehensive research program that is designed to determine the costs and benefits of marine mineral mining.

b. Prohibit all academic, public and private agency scientific research or exploration that is not consistent with the comprehensive research program for marine minerals.

Needed Actions

☐ Oregon's plan for the territorial sea should:

- Include a research plan for marine minerals, related environment and biological resources, and socio-economic conditions to guide academic and public agency scientific research
- Include policies and criteria for future state administrative rules related to commercial exploration of marine mineral areas
- Delineate areas where more public research is needed, where future commercial exploration, if any, should be focused, and where other marine resources and uses should be protected from mineral-related activities

☐ The Oregon Legislature should amend ORS 274.611-640 to clarify that an exploration contract neither confers proprietary rights to any minerals found nor obligates the state to proceed with any steps toward mineral leasing or development.

☐ The Division of State Lands should:

- Take appropriate action to make clear that ORS 274.611-640 will not be implemented for at least five years and until the law is clarified
- If administrative rules are prepared to carry out ORS 274.611-640, provide for a Project Review Panel with the Department of Fish and Wildlife as lead agency to

review and approve an inventory and environmental affects assessment under Goal 19, Ocean Resources

- ☐ The Department of Land Conservation and Development should prepare administrative rules to carry out Statewide Planning Goal 19, Ocean Resources, including rules for an inventory and effects assessment.
- ☐ The Governor should work with the Congress to pass legislation for a new national marine minerals regime which requires coordination with state ocean resources programs and encourages evaluation of marine mineral resources without prematurely committing public resources to private development.

Minority Position

A minority of the Task Force recommend the following Needed Actions:

a. The Division of State Lands, in cooperation with the Oregon Department of Fish and Wildlife and Department of Geology and Mineral Industries, should develop a comprehensive research plan for academic and public agencies to characterize marine mineral resources and nearby biologic communities and environmental conditions to determine the costs and benefits of marine mineral development.

b. The state should postpone the proposed minerals research program scheduled for summer, 1990, until a comprehensive research program is adopted.

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Tools for Governing

Territorial Sea Plan
Ocean Policy Advisory Council
Project Review Panels
Coastal Local Governments
State Agency Programs
Interstate Coordination
State-Federal Partnership

The 1987 Oregon Legislature took a visionary step toward ensuring the long-term conservation of Oregon's ocean resources. It established the Oregon Ocean Resources Management Task Force and charged it with preparing a plan for managing ocean uses and resources. The Legislature asked for two kinds of recommendations; those for conserving and protecting ocean resources and those needed to improve Oregon's ocean management capability. In so doing, the Legislature recognized that merely completing a plan will not be enough. Oregon will need to build an ocean management structure to carry out the plan, to update the plan to keep it current, and to amend it to meet new needs.

The Ocean Resources Management Plan provides Oregon with a blueprint for building an ocean management program. This section describes the parts and the steps Oregon will need to take to meet its ocean resource management responsibilities.

Governance refers to the ways in which the State of Oregon will organize to make complex

and sensitive decisions about ocean resources. Governance recognizes that ocean stewardship and conservation of ocean resources involves the interests, concerns, and knowledge of many diverse groups. Citizens, local governments, interest groups, marine scientists, the fishing industry, state and federal agencies, the Governor and the Legislature must all be linked in a comprehensive management framework.

In the past, Oregon has not had a framework for ocean governance. Many agencies, groups and individuals had interests in ocean resources but there was no structure to bring them all together.

One of the principal purposes of the Oregon Ocean Resources Management Act was to improve the management of ocean resources of interest and concern to Oregon. The Legislature recognized that sound management requires a system of governance so that all interested parties can effectively participate. The Legislature found that

> *It is important that the State of Oregon develop and maintain a program of ocean resources management to promote and insure coordinated management of living and nonliving marine resources within state jurisdiction and with adjacent states, to insure effective participation in federal agency planning and management of ocean resources and uses which may affect this state, and to coordinate state agency management of ocean resources with local government management of coastal shorelands and resources.*

The Legislature required that the Ocean Resources Management Plan include recommendations "for a permanent ocean resources planning and management process..." as well as recommendations on other aspects of ocean governance.

Oregon should take the following steps to improve its ocean governance capability:

- Prepare a more detailed plan for Oregon's territorial sea
- Establish an ongoing Ocean Policy Advisory Council
- Convene Project Review Panels
- Strengthen local government participation
- Improve state agency programs
- Coordinate with adjacent coastal states
- Work with federal agencies to build a co-management approach to ocean resource management

The Territorial Sea Plan

Legislative Charge

The 1987 Oregon Legislature anticipated a second phase in Oregon's ocean planning which would focused on the three-mile territorial sea. The Oregon Ocean Resources Management Act (ORS 196) required that the State Land Board adopt a more specific plan for "management of the resources and uses of the submerged and submersible lands of state territorial sea consistent with...the policies and recommendations of the Oregon Ocean Resources Management Plan." The territorial sea plan was required to be completed by July 1, 1991 and will become "the basis for rules to be adopted by the Division of State Lands."

Rethinking the Plan

In 1987, legislators and others expected that the Oregon Ocean Resources Management Plan would contain more detail and specific recommendations for the entire ocean planning area than has, in fact, been possible with the information available, time, and resources allotted. Preparation of a management plan for the territorial seabed for adoption by the State Land Board was expected to have been a relatively simple process based on the specifications in the ocean plan.

After developing this ocean plan, Oregon must now take the "next step" in ocean planning and prepare a more specific plan for the territorial sea. However, this plan must now be thought of more broadly than envisioned in 1987 for several major reasons:

- First, the most controversial issues concern resources and uses nearshore and have been resolved only at the broad policy level. More detailed information is needed to support discussion and negotiation of management proposals for specific sites.
- Second, a wide range of participants and interested parties must continue to be involved in resolving more specific planning issues in the territorial sea. This is especially true of the public which is keenly interested in ocean issues.
- Third, state agencies involved in ocean resources management are just beginning to forge a coordinated consultation process for sound integrated decision-making. The experience gained in developing the ocean plan will be highly valuable in developing the territorial sea plan.
- Fourth, the legislative deadline for plan completion does not allow sufficient time to gather additional information, discuss and resolve issues and prepare more specific recommendations.

Legislation will be necessary to amend the specific requirements of ORS 196, related to the territorial sea plan.

Plan Topics

Some of the topics which the territorial sea plan should address are:

Marine birds and mammal habitat areas

A territorial sea plan would provide a significant opportunity to improve protection of sensitive marine bird and mammal populations and to develop management programs tailored to the needs of each site. The planning process should refine criteria, document and analyze information, and develop site-specific measures.

The Department of Fish and Wildlife should be the lead agency and work with U.S. Fish and Wildlife Service and National Marine Fisheries Service. These agencies should coordinate with fishermen, Sea Grant Marine Extension Agents, local governments, and citizens.

Intertidal areas (Intertidal Marine Gardens)

The territorial sea plan process should

begin with the list of sites identified in the Ocean Resources Management Plan to develop a program for marine gardens. The plan should address public information and education needs as a major component of a marine gardens program.

The Department of Fish and Wildlife should be the lead agency and work with the Park and Recreation Department, Division of State Lands, OSU Sea Grant, local governments, and citizens.

Oil spill response

Key elements of Oregon's coastal oil spill plan being developed by the Department of Environmental Quality should be included in the territorial sea plan. These include, at a minimum, a site specific inventory of shoreline, estuarine, and intertidal areas, their sensitivity to spilled oil and the preferences or limitations of various clean up techniques.

The territorial sea plan should also include enforceable policies and standards for oil spill contingency plan requirements, use of dispersants liability limits, damage assessment and compensation within Oregon waters. The Department of Environmental Quality is the lead agency for a coastal oil spill prevention and response plan.

Marine Water and Air Quality

The territorial sea plan should address specific marine water and air quality needs, including such issues as water quality standards, baseline and monitoring programs, and coordination with federal agencies. The Department of Environmental is the lead agency for marine water and air quality issues.

Leases for Cultivating or Harvesting Marine Plants and Animals

Whether Oregon ought to enter into leases for cultivating or harvesting marine plants and animals on the ocean floor may be questions increasingly raised in the coming years. Leases convey certain benefits to some ocean users and may result in some loss to others who are denied access to the site. The Ocean Plan does not address this issue in any detail. The territorial sea plan process should go further and lay out the groundrules for state policy.

The Division of State Lands, as the proprietor of the seabed, and the Department of Fish and Wildlife should be the lead agencies on this issue.

Artificial Reefs

The Ocean Plan does not address issues pertaining to artificial reefs. The territorial sea plan is an opportunity for Oregon to seek additional information and develop policy to guide requests for placement of reefs.

The Department of Fish and Wildlife should be the lead agency with the fishing industry, local governments and the Division of State Lands key participants.

Recreation and Cultural Resources

The territorial sea plan should address in-water recreational needs and limitations in Oregon's nearshore areas as well an overview of all coastal recreational opportunities and needs . The plan is an opportunity for the state Parks and Recreation Department, local governments, and the public to make a more precise assessment about the need for and location of marine parks and development of other coastal recreation resources while protecting the shoreline environment.

Dredged Material Disposal

Dredged material disposal is regulated by federal permits through the U.S. Army Corps of Engineers at designated ocean dump sites. The territorial sea plan should review the adequacy of siting criteria and dumping practices, determine whether those sites should be designated by the state and make recommendations for state agency policy.

The Division of State Lands, Department of Fish and Wildlife, Department of Land Conservation and Development, Department of Environmental Quality and U.S. Army Corps of

Engineers should be main participants on this issue.

Marine Minerals

The territorial sea plan should include a framework research plan to guide study and research needs for marine mineral decisions.

The Division of State Lands and Department of Fish and Wildlife would be co-leads on work related to marine minerals. Other state and federal agencies and local governments would also participate.

Preparing the Plan

The territorial sea planning process should be viewed as a continuation of the work begun by the Ocean Resources Management Plan. All participants in the ocean resources management planning process should be provided with clear opportunities to participate in the territorial sea plan process. The proposed Ocean Policy Advisory Council is an appropriate forum for ensuring that the plan is developed through an interdisciplinary, interjurisdictional, public process.

A number of difficult and complex issues should be addressed by the territorial sea plan. The original statutory deadline of July 1, 1991, does not leave sufficient time to resolve sensitive issues and agree to workable plan elements. Solutions will require careful work among several state, local, and federal agencies, interests groups, and the public. Legislation is needed to amend state law to provide additional time.

Status of the Plan

The territorial sea plan should be adopted by the Land Conservation and Development Commission as part of Oregon's Coastal Management Program.

Conclusions

The Ocean Resources Management Plan completes the first phase of scoping issues, gathering information, developing policies and identifying needed actions within the 200-mile U.S. Exclusive Economic Zone off Oregon.

Oregon needs to continue its ocean planning program to focus on the state's territorial sea. Within this critical area of state control, few issues have in-depth treatment. Several major issues must be resolved for uses, resources, and specific areas within Oregon's three-mile territorial sea.

Recommendations

1. Oregon should prepare a management plan for the state's territorial sea based on the needs and recommendations of this Ocean Resources Management Plan.
2. The proposed Ocean Policy Advisory Council should coordinate preparation of the territorial sea plan and should continue the interdisciplinary, interagency, public process begun during preparation of the Ocean Resources Management Plan.
3. The 1991 Oregon Legislature should:
   - Establish the Ocean Policy Advisory Council, as proposed
   - Amend state law to broaden the scope and extend the preparation time for the territorial sea plan
   - Provide budget support to the plan process to ensure citizen involvement, public education, and state agency participation

The Ocean Policy Advisory Council

Legislative Charge

The Oregon Ocean Resources Management Act requires the Ocean Plan to contain recommendations concerning a permanent ocean resources planning and management process, including:

- Options for an advisory coordinating body to succeed the Task Force.
- Advisory committees.
- The roles of the Governor, state and federal agencies, local governments, citizens, and other interested parties.
- A process to update and amend the ocean plan.

Options for a Coordinating Body

While there are a wide variety of possibilities for an ocean advisory body, three options are presented here.

One: a state agency-only policy coordinating committee. This committee would be limited to agencies which had actual regulatory or proprietary interests in ocean resources or uses. Several advisory committees could ensure participation of the public, local governments, ocean users, marine scientists and federal agencies.

Two: a citizen's policy commission. Similar in concept to other lay commissions in Oregon, this commission would represent the public's interests in ocean resources without the considerations of agency responsibilities. The commission would need several advisory committees.

Three: a broadly representative policy advisory council. This configuration would be similar to that of the Ocean Resources Management Task Force where the many diverse interests in ocean resources and uses have had "a seat at the table." A scientific/technical advisory committee and, if necessary, other advisory committees would provide advice and assistance.

An advisory body will need staff assistance. ORS 196 designates the Department of Land Conservation and Development as the primary agency for coordination of ocean resources planning activities. DLCD is the appropriate agency to provide staff assistance to an advisory body.

Conclusions

Oregon should continue its ocean resources management program with a broadly representative body, as described in option three, rather than a more limited one. The Task Force is an appropriate model for a permanent Ocean Policy Advisory Council. It would provide a forum for state agencies, ocean users, coastal local governments, citizens and interest groups on ocean resource issues.

An Ocean Policy Advisory Council would be the appropriate body to prepare a plan for Oregon's territorial sea as a continuation of the work of the Task Force (see discussion of territorial sea plan, above). This Policy Council should have the benefit of a technical and scientific advisory committee.

Over the long term, the Policy Advisory Council would provide coordination and oversight as state agencies, federal agencies and local governments carry out the recommendations of the Ocean Resources Management Plan and territorial sea plan. The Ocean Policy Advisory Council may also establish Project Review Panels as described below. The Policy Council would be responsible for updating and amending the ocean plan.

Recommendations

1. The Oregon Legislature should create an Oregon Ocean Policy Advisory Council, composed of representatives of ocean users,

local governments, the public, and state agencies.

2. The purposes of the Ocean Policy Advisory Council should be to:
   - Coordinate preparation of a management plan for the territorial sea based on the needs and recommendations of this Ocean Resources Management Plan and the directions of the Legislature
   - Provide a forum for discussing ocean resource policy, planning and management issues and, when appropriate, mediating disagreements
   - Recommend improvements to the Ocean Resources Management Plan and territorial sea plan as needed
   - Offer advice to the Governor, the State Land Board, state agencies and local governments on specific ocean resource management issues
   - Coordinate interagency and intergovernmental review of specific ocean resource projects or actions through Project Review Panels
   - Encourage participation of federal agencies in discussion and resolution of ocean resources planning and management issues affecting Oregon
3. The membership of the Ocean Policy Advisory Council should be appointed by the Governor as follows:
   - The Governor or Governor's designee
   - Three representatives of the public at large
   - A representative of a conservation or environmental organization with interests in coastal and ocean issues
   - A coastal county commissioner
   - The director or director's designee of the Oregon Coastal Zone Management Association
   - A representative of Oregon Indian tribal interests upon recommendation of the Oregon Indian Services Commission
   - A representative of each of the following ocean users:

     Ports, navigation and transportation industry

     Commercial ocean fisheries, north coast

     Commercial ocean fisheries, south coast

     Charter, sport, or recreational ocean fisheries

     Coastal recreation, non-fishing
   - The director or designee of these state agencies:

     Department of Environmental Quality

     Department of Fish and Wildlife

     Department of Geology and Mineral Industries

     Division of State Lands

     Department of Parks and Recreation

     Department of Land Conservation and Development

     Department of Agriculture

   The Governor should appoint the chair of the Council.
4. The Department of Land Conservation and Development, as Oregon's coastal management agency, should coordinate the activities of the Ocean Policy Advisory Council.

Project Review Panels

Legislative Charge

The 1987 Legislature was concerned that Oregon did not have a clear process to bring together state agencies, local governments, federal agencies and others when reviewing ocean development proposals. The Legislature included the existing state agency coordination requirements as part of the new Oregon Ocean Resources Management Program. ORS 196 requires recommendations for dispute resolution, the role of various agencies and groups in ocean management, and a permanent planning and management process.

Coordination Needs

Oregon's coastal and ocean management programs rely on a network approach to project review and response. Ocean resource development projects, such as intertidal gardens, any proposed artificial reefs, or mariculture facilities, will, therefore, require a coordinated review process among state and federal agencies. In addition, these projects can have onshore consequences which will necessitate participation and coordination with local governments.

Although Oregon agencies already coordinate review of coastal and ocean project proposals, these are often sequential and not integrated into comprehensive project review and assessment. Oregon does not have a reliable interagency procedure to review multi-phased offshore development projects, or to assess subsequent projects related to such proposals.

Experience in California and elsewhere has shown that interagency project review panels are an effective and timesaving means to review, assess, and resolve complex, multiple, or multiphased offshore development proposals. Such panels can coordinate the preparation or review of environmental impact analyses, the development of permits conditions or stipulations. The panels convene as needed, involve all interested parties, and dissolve when project review is completed.

Conclusion

Oregon needs a process to coordinate the review of specific ocean use proposals. Project Review Panels can provide an effective, efficient, and flexible means of assuring that all voices are heard in ocean decisions.

Recommendation

1. The Ocean Policy Advisory Council should, when appropriate, use Project Review Panels (PRP) to address and coordinate the interests of state, federal, and local agencies in specific ocean resource development proposals. A PRP will not have any new or independent authority, but will advise agencies with existing authority.
2. A PRP can be established by the Council upon request of a state agency or affected local government, or upon the recommendation of the Council itself. A PRP should be convened as early as possible in the review process.
3. A PRP is to be used when no other effective mechanism for interagency project review and coordination exists, or when review of a large, complex project or several related projects requires the expertise or authority of several agencies.
4. A PRP is not to be used when the actions under consideration are included in fisheries management plans.
5. Participation on a PRP will be decided by the Council and will:
   - Vary according to the nature of the activity or project being considered;
   - Include all affected parties regardless of their regulatory authority;
   - Include the agency that has principal

decision-making authority over the activity being considered, and other state, federal and local agencies with regulatory, proprietary, or consultative responsibilities;

- Include affected nongovernmental interests as necessary.

6. The recommendations of a PRP are intended to direct subsequent actions of participating agencies related to the project under consideration. Any agency which elects not to accept the recommendation of a PRP shall provide the Ocean Policy Advisory Council with written findings and conclusions to support its position.
7. The functions of a PRP will depend on the nature of the proposed action and the scope of its review. A PRP could:

- Establish requirements for inventory preparation and impact assessments.
- Advise on Goal 19 compliance for permit actions or non-permit actions which could affect marine resources and uses, including proposed legislation, administrative rules, and marine resource management plans and programs.
- Prepare or analyze environmental assessments for Goal 19, environmental impact statements under NEPA, mitigation plans, monitoring programs, and contingency plans.

8. PRP recommendations shall address, where appropriate, permit approval or denial, special permit conditions, operational performance standards, lease stipulations, and mitigation measures.
9. Consistent with state open meeting law, all PRP meetings will be open to the public.

Coastal Local Governments

Legislative Charge

Oregon's Ocean Resources Management Act recognizes the important role played by local coastal governments in Oregon's ocean resources management program. The 1987 Legislature asserted that this ocean program must "coordinate state agency management of ocean resources with local government management of coastal shorelands and resources." The Act requires the ocean resources plan to be "compatible with the acknowledged comprehensive plans of adjacent local counties."

The Act provides for substantial local government involvement in the preparation of the Ocean Resources Management Plan and asks the Task Force for recommendations on the role of local governments in a permanent ocean planning and management process. The Legislature also asked the Task Force to identify issues that affect local government planning programs and describe the work that may be needed to fully address those issues in the local plans.

The Local Government Role in Ocean Management

Local governments have three fundamental roles in ocean resources management.

Participating in Ocean Planning

Coastal local governments should be represented on the proposed Ocean Policy Council by at least two representatives, one from a coastal county and another from the Oregon Coastal Zone Management Association which has members of coastal counties, cities, port districts and soil conservation districts. Membership on the Policy Advisory Council will ensure that local government perspectives continue to be incorporated into long-term planning for ocean resources.

Responding to Proposals

It is essential that coastal local governments, cities, counties, and ports participate on Project Review Panels as they are formed to ensure that local planning concerns, infrastructure responsibilities, and other local issues are fully integrated into the review of ocean projects and actions.

In addition, local governments need the benefit of a clearly defined mandatory consultation process with the Governor on major ocean development activities within the territorial sea, such as for oil, gas, or minerals. The details of this process will need to be defined in the territorial sea plan, refined by the Ocean Policy Advisory Council on an ongoing basis and enacted, if necessary, by the Legislature.

Using Local Plans to Protect Ocean Resources

Coastal local governments should take an active planning and regulatory role for some shoreland uses and activities which affect ocean resources regardless of whether major ocean resource development, such as oil, gas or minerals, is ever proposed.

Coastal counties have long stretches of ocean shoreline with valuable ocean resources. Many coastal cities border on the Pacific Ocean where development decisions can have important consequences for shoreline and coastal resources.

Ocean resource-related issues which local governments should address within comprehensive planning programs include:

- Ocean sewerage outfall siting and design criteria
- Municipal and/or industrial sewerage needs if cities achieve a full "buildout" of land uses within adopted Urban Growth Boundaries

- Shorefront residential development which depend on septic tank sewage treatment
- Beach/shore access, including directing or encouraging access away from sensitive tidepool areas or bird and mammal habitats
- Port facilities for fishing and recreation vessels as well as for other industrial needs related to offshore oil and gas or minerals
- Shoreline "protection" measures, such as seawalls
- Protection or nondevelopment of shore areas susceptible to erosion, slumping or sliding
- Protection of ocean vistas and views in developing areas and along major arterials
- Protection of special marine bird and mammal habitat sites where upland development may encroach on or degrade valuable habitat
- Recreation areas and facilities, traffic and visual issues, relationship of private development to park and recreational values
- Education and interpretive centers and their relationship to community development goals, tourism image, etc.

Revenue to Coastal Communities From Ocean Development

If oil, gas, or mineral mining were ever to occur, coastal local governments would receive very little direct revenue from offshore development under existing law. Oil, gas and mineral leasing and development within Oregon's Territorial Sea would yield rents, royalties and other fees which would go to the state Common School Fund administered by the State Land Board. Under existing law, these funds go to support education and are allocated on a statewide basis.

Oregon would receive some revenue from oil, gas, or mineral leasing and development in the three miles of federal waters adjacent to the state Territorial Sea. Within this three-to six mile zone, Oregon would receive 27 percent of royalties under the Outer Continental Shelf Lands Act. Exactly how this money would be received by the state and allocated to state programs, local governments and coastal Indian tribes has not been decided by the state.

Local communities often bear the burden from providing necessary onshore services to support offshore development. Local residents and governments are not willing to add to demands on already stretched local tax revenue if there is no offset in direct return to the local tax base. Oregon will need to squarely address the issue of allocation of revenues from offshore development to affected local governments if oil, gas, and mineral development is ever permitted in the ocean off Oregon.

Conclusions

Oregon's coastal local governments are essential partners with state and federal agencies in ongoing planning and management of ocean resources and must continue to be full participants in Oregon's ocean resources management program.

Coastal local governments can take an active role in protecting certain ocean resources by using land use plans and ordinances to regulate shoreline and upland land or water uses which may adversely affect ocean resources.

Local communities can be adversely affected by offshore development of oil, gas, or mineral resources without the financial means to offset added costs born by the community.

Local governments need the assurance of a clearly defined consultation process with the governor on certain ocean activities within the territorial sea.

Recommendations

1. Local governments should be represented on any ocean policy advisory body and, as appropriate, on Project Review Panels.

2. Coastal cities and counties should review ocean shoreline marine resources and existing and planned development within their jurisdiction. Comprehensive plan policies and ordinances should be amended as necessary to protect these ocean resources consistent with Statewide Planning Goal 19.
3. Coastal local governments should also review comprehensive plan goals, policies and implementing measures with regard to ocean uses and resources which may affect onshore development. Local government will need to develop a policy basis for effective participation on the Ocean Policy Advisory Council and Project Review Panels.
4. Local governments should use their citizen involvement program as a vehicle for ensuring citizen participation in land use issues which may effect ocean resources.
5. Oregon law should be amended to provide local governments, including Indian tribes as appropriate, with a share of revenues derived from any future offshore development of oil, gas, or minerals, should it ever occur.
6. Oregon should use state General Funds and seek federal funds to assist local governments to participate in ocean resources planning and management.
7. The territorial sea plan should include provisions for mandatory local government consultation with the Governor on permits, leases, licenses, and other approvals for commercial oil, gas, and minerals exploration and development, should this ever occur.

State Agency Programs

Legislative Charge

One of the principal objectives of the Oregon Ocean Resources Management Act is to assess the existing capability of state agencies to manage ocean resources and to recommend improvements to meet coming needs. The legislation requires that the Ocean Plan include "an inventory of the existing state laws and agency rules, authorities and programs which pertain to ocean resources." The plan is to include an analysis of state laws and agency programs that need to be modified, eliminated or enacted.

The Act requires that the Ocean Resources Management Plan include "specific recommendations to develop or improve state agency programs to manage ocean resources and activities consistent with this 1987 Act."

Inventory and Analysis of Agency Programs

The *Territorial Sea Management Study,* 1987, prepared by co-investigators Jim Good, Oregon State University College of Oceanography, and Dick Hildreth, University of Oregon Ocean and Coastal Law Center, compiled and analyzed Oregon's ocean management capabilities and needs. This study is hereby referenced in response to legislative requirements.

The *Interim Report* of the Task Force, summer, 1988, contained a summary of existing agency authorities and programs for ocean resource management. This summary is hereby referenced in response to legislative requirements.

Agency program needs, based on recommended Task Force policies and needed actions, are summarized in this section. These program needs are described more fully in the *Resource Issues and Recommendations* section of this plan.

Conclusions

No new state agency is needed to manage ocean resources. Oregon's network management approach to ocean and coastal resources, coupled with a strong coordination mechanism through the Ocean Policy Advisory Council and the governor, is appropriate to handle ocean resource issues.

Most state agencies need to strengthen or expand ocean or coastal resource programs and staff capability to carry out the recommendations in this plan. Legislative support is needed for these program improvements.

Some legislative changes are required to clarify or add agency authority or improve state programs.

Recommendations

Agency program improvements are summarized here. More detailed recommendations are found throughout the section on issues and recommendations, above.

Department of Fish and Wildlife (ODFW)

ODFW is the agency charged with the direct management of a number of the ocean's renewable resources. ODFW is also the state's primary biological consultant for other agencies and the governor.

As recommended in this plan, ODFW should take an increasing role in planning for the territorial sea, resolving specific management problems, and providing technical assistance to other agencies. To accomplish this, ODFW will need to expand staff capability to meet these coordination and technical assistance needs. ODFW will participate in marine water quality monitoring, oil spill contingency planning, marine gardens to protect intertidal areas, bird and mammal habitat around rocks and islands, environmental studies related to any potential proposals for marine minerals, oil

and gas exploration, marine parks, and public information and education.

Department of Environmental Quality (DEQ)

DEQ is responsible for developing comprehensive plans, programs, standards, and administrative rules for preventing and controlling air and water pollution, disposal of liquid, solid and hazardous waste, and controlling noise emissions from facilities both onshore and in the territorial sea. DEQ has the lead role for Oregon in preparing an oil spill contingency response plan for the Oregon coast as required under 1989 legislation.

To fully address continued ocean planning and management issues, DEQ will need additional resources. New air and water quality programs are needed. DEQ should coordinate preparation of an Ocean Stewardship Area Air and Water Quality Program, and be a key participant on the Ocean Policy Advisory Council during preparation of the territorial sea plan.

Department of Geology and Mineral Industries (DOGMI)

DOGMI is charged with coordinating data acquisition and analysis for geology, minerals and petroleum resources. DOGMI would be Oregon's principal agency for regulating any offshore mineral or petroleum activities, if they were to occur. DOGMI is the coordinating agency for the state-federal placer task force and can be expected to play a similar role in any future state-federal marine mineral studies.

This plan recommends that DOGMI participate on the Ocean Policy Advisory Council. DOGMI would provide technical assistance on marine geology, shoreline erosion, subsea geologic hazards, and marine minerals during preparation of a territorial sea plan. DOGMI will continue to provide technical advice to the Oregon member of the Pacific Northwest OCS Task Force.

Department of Energy (ODOE)

ODOE manages the computerized geographic information system (GIS) being developed for ocean resources. ORS 196 requires that information to support Oregon's ocean plan be developed in a GIS format. ODOE, as the state GIS service center, has made substantial progress in acquiring and entering coastal and ocean information into the system.

The ODOE GIS would will provide the Ocean Policy Advisory Council with information and analysis to develop specific recommendations in the territorial sea plan. In addition, the GIS will support interagency efforts on marine minerals, marine gardens, bird and mammal habitat, shoreline erosion, ocean outfalls and others. Data acquisition and refinement of the GIS will be ongoing within ODOE, coordinated with DLCD and other agencies. ODOE is not recommended as a member of the Ocean Policy Advisory Council.

Division of State Lands (DSL)

DSL is unique among state ocean resource agencies because it has both proprietary and regulatory interests within the territorial sea. On behalf of the State Land Board, DSL carries out the constitutional mandate to manage lands under its jurisdiction with the objective of "obtaining the greatest benefit for the people of this state, consistent with the conservation of this resource under sound techniques of land management." (Oregon Constitution, Art.III, Sec.5(2))

DSL has statutory authority to enter into contracts, leases and other proprietary agreements, in consultation with other agencies, for exploration and development of marine hard minerals, oil, gas, sand and gravel. DSL also issues permits for geological, geophysical and seismic surveying within Oregon's territorial sea. Any fill or removal activity within the territorial sea is also under DSL's regulatory authority.

As a member of the Ocean Policy Advisory Council, DSL would continue to play a central

role in preparing a plan for ocean resources in Oregon's territorial sea.

DSL will also be particularly involved in marine mineral issues and other issues, such as Marine Gardens, which relate to the allocation of submerged and submersible lands and their resources.

Parks and Recreation Department (Parks)

Parks effectively shares jurisdiction over the ocean shore, from the level of extreme low tide to the statutory vegetation line, with DSL under a joint permit notification and evaluation agreement. Parks is responsible for planning for recreation throughout Oregon and with developing and managing state park facilities along the Oregon coast.

Parks should be a member of the Ocean Policy Advisory Council and continue to participate in planning for the nearshore area within Oregon's territorial sea. Parks will be the lead agency in assessing coastal and marine recreation needs and developing plans and programs to meet growing recreational demands on the coast, including marine parks and educational and interpretive programs.

Department of Land Conservation and Development (DLCD)

DLCD, Oregon's coastal management agency, is charged by the Legislature with coordinating ocean planning activities and providing technical and support services to the Task Force. In that role, DLCD actively coordinates with all other state agencies, local governments, and federal agencies on virtually every issue. The agency also provides staff assistance to the governor on OCS and other state-federal ocean policy issues.

DLCD would be both a member of and provide staff support to the Ocean Policy Advisory Council during preparation of a plan for the territorial sea. DLCD will continue to coordinate Oregon's ocean plans and policies as Oregon agencies carry out the plan and implement new ocean programs.

In addition, DLCD will be responsible for adopting rules to carry out Statewide Planning Goal 19, Ocean Resources. These rules will be crucial to determining both process and substance of agency review of proposed activities which affect ocean resources.

Department of Agriculture (DOA)

DOA was added to the Ocean Resources Management Task Force by the 1989 Legislature because of strong interests in ocean seafood products. DOA coordinates three seafood commodity commissions, the Oregon Salmon Commission, the Dungeness Crab Commission, and the Trawl Commission. DOA also regulates oyster production in Oregon's estuaries.

DOA is proposed as a member of the Ocean Policy Advisory Council and will be a liaison between Oregon's ocean resources management program and the seafood industry.

Economic Development Department (EDD)

EDD was added to the Ocean Resources Management Task Force by the 1989 Legislature because of interests in Oregon port development as well as the overall economic health of Oregon's economy.

EDD should continue to participate in Oregon's ocean planning and management but is not recommended as a member of the Ocean Policy Advisory Council.

Interstate Coordination

Legislative Charge

The 1987 Oregon Legislature found, in the Ocean Resources Management Act, that "it is important that the State of Oregon...promote and insure coordinated management of living and nonliving marine resources within state jurisdiction and with adjacent states..." The Legislature also asked for recommendations on coordination with adjacent states.

The 1989 Oregon Legislature specifically required Oregon to coordinate with the states of Washington and California on ocean resource management issues. This legislation requires Oregon agencies to coordinate on ocean and coastal information systems, oil spill and hazardous material response, offshore rocks and islands, and marine fisheries information.

Ecological Basis for Interstate Coordination

The Pacific Ocean, its ocean currents and living resources, links the states of Washington, Oregon and California coasts. For much of the year the California Current flows southward. In winter, however, storms push surface currents northward near shore. These strong currents can transport pollutants from one region to another. Oil spilled at Yaquina Bay in fall, 1983, was strewn northward along the Oregon and Washington coasts. An oil spill off Grays Harbor, Washington, in late 1988 resulted in oiled beaches from Tillamook Bay north to the tip of Vancouver Island.

Young salmon from Oregon rivers pass through waters off Washington, British Columbia and Alaska. Pacific Hake spawn off central and southern California but are an important commercial fishery off the Oregon and Washington coasts. Marine mammals, such as Gray whales and California sea lions, migrate along the entire west coast as do several species of seabirds.

The ocean off Oregon is a small segment of a much broader oceanic region. These regional aspects to ocean resources require a regional perspective for resource management. A 1989 Oregon Department of Fish and Wildlife report, *Management of Living Marine Resources*, identifies the northern Californis Current ecosystem as "...the appropriate unit of management." This region extends from Cape Mendocino, California, to Vancouver Island, British Columbia.

Existing Coordination

Oregon agencies and the Governor already coordinate with other states on several ocean issues. These include such formal mechanisms as participation in the Pacific Fishery Management Council with California and Washington, the Pacific Northwest OCS Task Force with Washington, the U.S.-Canada Halibut Treaty and an oil spill task force with Washington, British Columbia and Alaska. Governor Goldschmidt and Washington Governor Gardner have closely coordinated their position on OCS Lease Sale #132, sending joint letters to the Secretary of the Interior. Other more informal methods include newsletters, conferences and workshops, and information sharing among counterpart agencies.

Coordination Needs

The National Coastal Resources Research and Development Institute (NCRI) has studied the interstate coastal and ocean management needs of the Northeast Pacific Ocean. Coordination issues were a principal topic. Interstate ocean concerns included ocean oil transport, uniform standards for ocean oil and gas development, offshore mining, reducing marine pollution and debris, state ocean management, and needed ocean research.

New Interstate Coordination Proposals

As Pacific coast states become increasingly involved in ocean resources management issues, more formal regional coordination structures may be proposed. The Western Legislative Conference, an organization of western state legislators, is working on a proposal for an interstate compact, including British Columbia, for ocean resources management among Pacific coast states. The Western Governors Association may also form an ocean resources committee. This would strengthen the commitment and practice of coordination at the highest state policy levels.

Conclusions

The fluid, dynamic nature of the Pacific Ocean and the mobile, migratory creatures that live there make it imperative that Oregon enhance its ocean resources management program through coordination with adjacent coastal states. Oregon must take advantage of every opportunity to promote regional solutions to issues which Oregon has in common with other coastal states.

Recommendations

1. The Governor and Oregon's Congressional delegation should support regional solutions to ocean resource management issues when possible.
2. Oregon should participate in regional organizations and other formal interstate agreements to protect and manage ocean and coastal resources.
3. State agencies are encouraged to establish program links to counterpart agencies in other states and to participate in interstate projects where possible.
4. The Oregon Legislature should support proposals for a Pacific states regional marine resources coordination body which supports and enhances the policies and programs of Oregon's Ocean Resources Management Program

State-Federal Partnership

Legislative Charge

The 1987 Oregon Legislature was especially interested in a state-federal partnership for managing ocean resources off Oregon. The Ocean Resources Management Act cited three existing federal laws which "recognize the interests of coastal states in management of ocean resources in federal waters and provide for state participation in ocean resources management decisions." The three are the Magnuson Fisheries Conservation Act of 1976, the Coastal Zone Management Act of 1972, and the Outer Continental Shelf Lands Act of 1978.

The Legislature noted that

> *. . . the 1983 Proclamation of the 200-mile U.S. Exclusive Economic Zone has created the opportunity for all coastal states to more fully exercise and assert their responsibilities pertaining to the protection, conservation and development of ocean resources under United States jurisdiction.*

The 1987 Act includes a Legislative policy to:

> *Assert the interests of Oregon as a partner with federal agencies in the sound management of ocean resources within the U.S. Exclusive Economic Zone.*

The Act includes several directives to the Task Force to "insure that the Oregon Ocean Resources Management Plan is coordinated with federal agency programs for coastal and ocean resources..." In fact, the contributions of several federal agencies have shaped a number of policy and program recommendations in this Ocean Plan.

An Ecological Basis for State-Federal Partnership

The Oregon Ocean Stewardship Area, discussed earlier, is the ocean area most critical to a cooperative state-federal management approach. The seaward boundary, the toe of the continental slope, reflects the seaward extent of the Ocean Stewardship Area, the zone off Oregon where the marine resources and ocean conditions are naturally linked to the landward portion of the coastal zone. Within this region productive upwelling supports productive marine ecosystems, the basis for Oregon's commercial and recreational fisheries. Seabirds and marine mammals from rookeries on rocks and cliffs nearshore feed all across the Stewardship area.

The ocean and its public resources are not contained by boundaries drawn by states and nations to establish ownership and jurisdiction. Oregon's ocean resource management interests clearly extend beyond the three-mile territorial sea while federal agencies have programs and authorities for resources and activities within Oregon's territorial waters. Protection of ocean resources therefore requires co-management by the state and federal governments through coordinated, complementary policies and programs. Among these policies is a commitment to a partnership in ocean management.

Existing Coordination

Oregon and federal agencies already coordinate on a number of ocean resource issues. The Oregon Department of Fish and Wildlife is a member of the Pacific Fishery Management Council along with other states, the Department of Commerce National Marine Fisheries Service and others. Oregon is a member of the Pacific Northwest Outer Continental Shelf Task Force along with Washington, Indian fishery commissions, and the Department of the Interior Minerals Management Service. The U.S. Fish and Wildlife Service and the Oregon Department of Fish and Wildlife coordinate on marine seabird and mammal problems. The Oregon Department of Environmental Quality and the U.S. Environmental Protection Agency cooperate on several relevant ocean programs. A state-federal placer mineral task force involves several state and

federal agencies. The Department of Land Conservation and Development works with the federal office of Ocean and Coastal Resource Management to develop coastal management grant work programs for Oregon.

Existing coordination between state and federal agencies can be enhanced by a commitment from both state and federal agencies to common policies, objectives and process. This Oregon Ocean Resources Management Plan provides a framework for both state and federal agencies to cooperate in managing ocean resources and uses off the state of Oregon.

Conclusions

Oregon and federal agencies must establish a resource management partnership that provides for coordinated, compatible management of ocean resources throughout the Oregon Ocean Stewardship Area.

For most ocean resource issues studied by the Task Force, there is a high degree of existing cooperation and coordination between state and federal programs.

Federal agencies will continue to participate in planning for ocean resources of the Oregon Ocean Stewardship Area.

The objective of state-federal cooperative management of ocean resources should be ecologically sound decisions rather than merely streamlining agency procedures.

Recommendations

1. The state of Oregon should assert the principle of jointly managing ocean resources and uses with the federal government.
2. The policies and standards of the Oregon Ocean Resources Management Plan apply equally to all activities in the Oregon Ocean Stewardship Area.
3. Federal agencies with research, management, or regulatory interests in ocean resources in the Oregon Ocean Stewardship Area are encouraged to participate with the Ocean Policy Advisory Council, Project Review Panels, and individual state agency programs which implement this plan.

Information and Education

A recurrent theme heard throughout the ocean planning process is the need to acquire and effectively distribute information which will help coastal residents, visitors and ocean users ptotect Oregon's ocean and coastal resources. Information which is clear, easy to learn, and understandable is a key to enhanced public awreness, knowledge and support for ocean stewardship.

Oregonians realize that while enforcement of regulations is important, the most effective means of protecting and conserving a number of marine resources is through an effective public information program. With this perspective, many recommendations for action in the Ocean Plan call for information programs and educational activities in response to these needs.

The Audiences

There are many special information needs which can can be distilled to three principal audiences:

Public

At public workshops held during preparation of the Ocean Plan, Oregonians were emphatic that enforcement alone will not protect coastal and ocean resources. They spoke with concern about growing numbers of residents and visitors on the coast who know little about Oregon's coastal and ocean resources and who, through their actions, unknowingly place these resources at risk.

Users

The workshops also revealed that ocean users need additional education and information about resources that may be affected by their activities. Better information about potential conflicts with other ocean users is also needed. With better information and increased understanding some resource impacts can be lessened and user conflicts avoided without the need for additional regulations.

Managers

Oregon's ocean and coastal resources may be properly managed when those who make decisions at the federal, state and local level are knowedgable about the ocean's condition, resources, and uses. While the depth of knowledge may not need to be the same for everyone, a basic level of understanding is essential to assess information and make sound decisions.

Building a Public Information Program

A good public education program should focus on the audience and its information needs, the information and materials to meet the needs, and ways to deliver the material to the audience.

Potential audiences are described above as the "public," ocean "users", and "decision makers." In reality, these audience groupings have a number of components including visitors to the coast, whether tourists from afar or Oregonian, school children of all ages, and new coastal residents, many of whom specifically chose to move to the Oregon coast because of the environment. Decision makers include coastal local officials, Ocean Policy Advisory Council members and other state and federal agency officials and councils whose decisions may affect marine resources. Boaters, divers, fishermen, and other ocean users would benefit from information about new techniques to help protect resources.

The information content of various educational materials must be tailored and packaged to meet the need of the audience. Some content will be purely factual information which identifies and describes through photos, drawings, and description. Much will be interpretive to give meaning to factual information through displays, signs, booklets, and videotapes. Some may be instructive and build understanding through a coordinated program of education and training. A small amount may need to warn of danger or admonish against certain behavior.

Information is made available to the intended audience through a network of distribution pathways and outlets. Opportunities for distribution are almost limitless. Coastal restaurants might use informative placemats on tables. Highway lookout points could have self-guiding signs or displays. State and local parks could distribute printed information or hold evening education programs. Coastal cable channels could offer short video programs for visitors and residents on marine topics. Libraries and schools are logical outlets for information and educational materials. Marine Extension agents and local government offices are also outlets for information.

Oregon's Information Resources

Oregon has most of the necessary resources to build a coastal and ocean resources education program. These resources need to be harnessed into an overall information program and strategy.

Citizens

Citizens are a valuable resource for information, interpretation and education. They can define need, help gather information and prepare materials,and provide pathways for distribution. Several workshop commenters pointed out the success of local citizen interpretive and education programs, such as the Haystack Rock Awareness Program in Cannon Beach, in protecting shoreline areas threatened with overuse. Other examples were cited of coastal residents taking action to rally community support for protection of valuable shoreline areas and of grassroots efforts to learn about and inform the public of Oregon's ocean resources that may be at risk from offshore oil, gas, or mineral development.

Academic Institutions

Oregon State University Sea Grant Program, with its Marine Extension Program and

activities at the Hatfield Marine Science Center in Newport, is Oregon's leading ocean information and education program. The Sea Grant Extension Marine Education Program works with school teachers from around the Northwest to develop curriculum materials for students of all ages. The Sea Grant Communications Program produces a wide range of print materials on ocean and coastal topics and produces top quality films for television broadcast and closed circuit viewing. Special summer programs are sponsored by the Marine Science Center for the public on the coast, many of whom are vacationing and want to learn more about Oregon's marine environment. The public exhibits as the Science Center draw over 300,000 visitors annually and are evidence of keen public interest in the ocean. Marine Extension agents provide technical and management information to ocean users, primarily commercial and recreational fishermen and seafood processors.

State Agencies

Several state agencies must continue to be active participants in building an ocean and coastal information and education network. The Oregon Parks and Recreation Department maintains the many state parks and campgrounds along the coast. This network of parks is a ready means of distributing information along the entire coast or providing interpretive materials aimed at the park locale. The Department of Fish and Wildlife has a strong interest in communicating information about biological resources of the coast. ODFW also need to ensure that fishing and other regulations are well known and understood. The Department of Environmental Quality provides information to the public and specific groups about air and water quality protection. The Department of Land Conservation and Development, Oregon's Coastal Management Agency, has a special responsiblity to make sure that a wide range of coastal and ocean resource information is prepared and distributed.

Federal Resources

The U.S. Forest Service already provides a good deal of information and interpretation through the Cape Perpetua Visitors Center and the Oregon Dunes National Recreation Area. These and forest campground facilities along the coast are resources to be included in an information program. The U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Coast Guard, and Corps of Engineers have information programs for resources or activities within their jurisdiction. These agency programs would provide valuable components and resources for a coastal and ocean information program.

Community Programs

Local information centers, such as the Rogue Pacific Center in Gold Beach, provide local communities with educational materials and programs year-round and help both residents and visitors understand and interpret the natural and human environment of the local area. The Haystack Rock Awareness Program in Cannon Beach has become a model for local interpretive programs. These programs not only develop information materials but provide a direct outlet for the materials to effectively meet specific needs. In addition, local progrms create a climate of awareness and appreciation of local marine resources.

Other public resources include the South Slough Estuarine Reserve information center near Coos Bay, the Columbia River Maritime Museum in Astoria, and the new Oregon Coast Aquarium in Newport. Coastal county parks, such as the Coos Head County Park in Coos County, are potential elements of a coastal and ocean resources education program. Community seafood festivals Newport, Astoria and other communities are distribution opportunities.

Private Facilities

Privately operated coastal visitor centers, such as Sea Lion Caves and Otter Crest, are potential participants in a coordinated program

of marine information and education. Long a part of the Oregon travel landscape, these and other private centers reach a segment of the traveling population that might otherwise be missed. In addition, coastal motels, restautants and local visitor information centers are focal points for information distribution.

Conclusions and Recommendations

Oregon should place a high priority on informing and educating Oregonians and coastal visitors about coastal and ocean resources and uses as an effective means of protecting these resources.

Oregon has many valuable individual educational and informational resources ready to contribute but lacks a coordinated coastal and ocean resources education program.

A coastal and ocean resources public information and education program should be comprehensive and innovative, should place a high value on involving the public in the creation and delivery of information, should link public and private participants, and should respond to needs of ocean users and decisions makers when necessary.

The goal of an ocean and coastal education and information program should be an "ocean aware" public.

Recommendations

1. A coordinated, innovative and responsive Coastal and Ocean Resources Educational Program should be developed by the Ocean Policy Advisory Council to link the various educational and information resources of the state, provide timely and appropriate information and education materials, and involve the public in promoting protection of coastal and ocean resources through awareness.
2. Oregon State University Sea Grant and Sea Grant Extension should be the lead agency for implementing this program. Cooperating agencies should include other Sea Grant units, various state and federal agencies, and community groups and individuals.

Citizen Involvement

From the beginning, the Task Force has been committed to citizen involvement and an open public process. As a first order of business the Task Force set a goal of providing the public opportunities to be involved in all phases of developing the Ocean Plan. A newsletter was begun, a mailing list compiled, and media contacts made. While the Task Force was not able to carry out all possible participation activities, the goal was largely achieved by a public outreach program that included printed information, local workshops, and open Task Force meetings.

Developing the Ocean Plan

Many Oregonians helped shape the Ocean Plan. They participated in workshops, public hearings, and Task Force meetings. They wrote letters of comment and telephoned with ideas and concerns. They asked tough questions that caused critical rethinking of issues. They spoke in support of key ideas and proposals. Although many people worked with the Task Force on the Plan and hundreds of others read materials sent by mail, there were more citizens who were not fully informed about the process or why it was important to be involved. Increasing public awareness and involvement is a goal of this Plan.

Workshops and Meetings

In the fall of 1988, eight public workshops were held in Brookings, Coos Bay, Florence, Newport, Cannon Beach, Portland, Eugene, and Medford. Over 200 people attended to tell the Task Force of their concerns, needs, and ideas about the ocean and its resources.

The Task Force then met in a series of six meetings to address these concerns and begin to formulate preliminary recommendations for policy and action. These meetings were held in a variety of locations and were well attended by the public. Meetings were held through the spring and summer, 1989, in Charleston, Newport, Salem, Portland (2), and Lincoln City (2).

In September, 1989, Task Force staff met

with fishermen and urchin divers in meetings in Gold Beach, Newport, and Astoria. These meetings resulted in discussions with over 100 people directely involved in a variety of ocean fisheries. Then in November, 1989, 800 copies of draft plan policies were printed and distributed by mail and through public libraries and courthouses. These policies were reviewed and discussed at four public workshops held in Gold Beach, North Bend, Lincoln City, and Cannon Beach. Over 300 people attended and over sixty written comments were received.

In response, the Task Force met in February, 1990, for two days in Newport and in March in Portland to consider the comments and make revisions to the plan recommendations. These meetings resulted in a revised draft for public hearings in May, 1990.

Throughout the planning process, Task Force members and staff spoke to a variety of organizations, groups, and school classes about the Oregon Ocean Resources Management Program

Videotapes

All Task Force meetings and public workshops were videotaped. These tapes provided a "realtime" record of presentations, comments, discussions and decisions. Tapes will continue to be available as an archive record for future reference. These tapes also provided the Task Force and staff with a means of seeing and hearing meetings and discussions which needed to be reviewed as part of on-going policy discussions. Task Force members unable to attend specific meetings or workshops were able to see and hear a clear record of events. This was an invaluable technique to preserve comments and ideas for incorporation into the Ocean Plan.

Future Citizen Involvement

Full public involvement in ocean resources issues is crucial. The ocean and its resources belong to the public, many of whom are already involved in or support conservation efforts for coastal resources and even more who enjoy the ocean and coast on a personal basis. The public has vital information to contribute to the process. Knowledge of local conditions, issues,and resources will keep state level planning and management programs rooted in the real world. Public involvement will help engender overall awareness of coastal and ocean issues. This public awerness will translate into support among local government officials, the Legislature, the Governor and Oregon's Congressional delegation, all of whom are able to enact or effect programs which carry out the goals and policies of this Ocean Plan.

This Ocean Plan recognizes that citizens can and should continue to be involved in ocean planning and management. Three elements are proposed for ongoing involvement:

First, as proposed, the Ocean Policy Council would have many public members. Some would represent the public at large, others would represent groups that are vitally interested in using ocean resources and conserving them for continued use and enjoyment. This public representation at the policy level will set the tone for other public participation activities.

Second, the information and education programs proposed in this plan, if carried out, would provide essential information to create public awareness of ocean and coastal issues and set the stage for public involvement.

Third, a coordinated program of public outreach in conjunction with on-going Ocean Policy Council activities and discussions is necessary. The proposed process for a territorial sea management plan should have a high public participation quotient, including workshops, newletters, visual media, and speakers. Citizens should be invited and welcome at Policy Council meetings.

Recommendations

1. The Ocean Policy Advisory Council should commit itself to full citizen involvement during preparation of a plan for Oregon's

territorial sea and should prepare and implement a program that provides information to citizens about planning and management issues and provides opportunities for citizens to be involved in all phases of the ocean resource planning process.

2. The Oregon Legislature should provide the resources to the Ocean Policy Advisory Council to carry out a vigorous program of citizen involvement.
3. Citizen involvement efforts should be linked to a program of public information and education as recommended in this plan.

Ocean Research

Accurate information is essential for sound resource management decisions. Decision makers will need additional information for virtually every topic addressed in this plan. Difficult research questions remain to be answered. What topics or areas need study first? When are secondary topics studied? How to coordinate among various researchers? Where to find funds for rather expensive studies? How does Oregon organize and use information?

While experts in various scientific disciplines will probably differ on the exact nature of necessary research, there is broad agreement on existing data gaps and long-term research needs. A list of information gaps is listed in a following section based on results of a Northwest OCS Environmental Studies Workshop-Conference sponsored by Minerals Management Service in May, 1988, and on information needs identified during policy discussions for preparing the ocean plan. Other research needs have been identified in this Plan related to various ocean activities and uses other than OCS oil and gas. Together, the items on the list form the basis for determining research needs for ocean management in Oregon.

Additional marine research is needed everywhere in the Oregon ocean planning area. However, because the level of management of an area or resource determines the need for marine science information, three areas can be identified off Oregon which have somewhat distinct management demands and consequent research needs.

- First, the resources of the nearshore fringe of rocks, islands, intertidal areas and estuary mouths along the coast are heavily used and especially at risk. There are numerous existing management problems and more can be expected. Information needs here are the most "fine-grained" or site-specific and will be felt most acutely by state management agencies. This is an area for which Oregon ought to provide primary research support.

- Second, Oregon's continental margin, an Ocean Stewardship Area, is an area where a high degree of resource management will be needed and for which information needs are great. Research will be needed by both state and federal agencies to fulfill co-management responsibilities. Research ought to come primarily from federal sources and programs but Oregon should also provide support to continental margin research.
- Third, west of the continental margin to the boundary of the 200 mile EEZ, management needs will be fewer and, consequently, so will the amount and precision of marine resources information. In this area federal agencies will have the primary need for research and therefore should be the primary funding source.

A Strategy for Research

It is extremely difficult, and probably not useful, to establish a strict priority list of needed studies. There are simply too many variables, such as a wide range of research needs and study topics, a diversity of funding sources, variability of time required for each study, the nature of specific management issues, the unforeseen results of research and subsequent new research needs.

For instance, OCS oil and gas decisions will require a relatively high level of information to identify areas and resources and risk and special conditions that must be considered across the entire continental shelf and along the entire coast. The area-wide planning approach of the U.S. Department of the Interior and the potentially widespread effects of oil spills demands that broad assessments of ocean circulation and biological resources are needed. However, information needs for marine mineral decisions will be different. Mineral areas are more closely known, and the environmental and biologic resources in the area can be more readily studied in order to understand specific potential adverse effects. Therefore, more focused sub-regional studies of ocean conditions and resources are also needed.

Oregon can take specific steps to establish an ocean resources information management program so that research recommendations can be made on an annual basis and as a management problem arises and so that information can be integrated into a computerized ocean information system.

Strategic Assessments: Continental Margin

The first step for Oregon is to prepare comprehensive assessments of ocean resources, conditions and uses of the continental margin as a starting point for making ocean resource management decisions and for identifying specific research needs for management. Assessments would use existing information to describe, depict and characterize the physical environment, biotic environment, living marine resources, economic activities and environmental quality of the Pacific Ocean off Oregon and adjacent coastal areas. Assessments would provide a "strategic" context for ongoing planning and for identifying needed information for site-specific "tactical" decisions.

Strategic assessments of Oregon's ocean should follow up the *West Coast of North America Strategic Assessment Atlas* being prepared by the Office of Oceanography and Marine Assessment, National Oceanic and Atmospheric Administration (NOAA). Assessments should be prepared from digital information and displayed in atlas format at a level of detail necessary for most planning and management decisions off Oregon. This computerized geographic data base could also be displayed at higher resolution if needed for a management situation and warranted by the available information.

Oregon should rely on existing data and expertise among NOAA, EPA, and other federal agencies for development of these assessments. Oregon should expand its fledgling ocean

resources information management capability through Interagency Agreement between NOAA, MMS and other contributing federal agencies and the Oregon Department of Energy Geographic Information Service Center. This would allow the Ocean Policy Advisory Council and state agencies access to tremendous data bases and to target the information on analysis of specific management questions.

If possible, Oregon's strategic assessments should be carried out at as part of a regional level assessment, from Cape Mendocino to Vancouver Island. This relatively discrete biogeographic region provides an ecological basis for describing and understanding Oregon's ocean systems.

Broad-Scale Descriptive Studies

Broad-scale studies provide basic information from which more specific information needs can be determined when management problems are presented. These studies are not just "blue-water" scientific exercises; they are fundamental to understanding complex ocean interactions that can directly effect management decisions. In addition, they provide crucial baseline information against which decisions can be analyzed and long-term effects assessed.

There are broad data gaps in oceanography, marine ecology, ocean chemistry, geology and social/economic conditions in the region. These study needs are identified below. Some of these studies, such as ocean circulation off the southern Oregon coast, have never been conducted. Others, such as marine productivity studies, are now possible through satellite technology and remote sensing. These broad studies represent major ocean research challenges and opportunities for Oregon State University, NOAA and other oceanographic institutions.

Because it is unlikely that funds will be available for multi-year broad-scale studies at the level of effort required, a number of smaller more focused studies may be needed to progressively develop information which, when added over time, will fill in the broad-scale picture. Information from these studies will update the strategic assessments, above. This is a task for the Ocean Policy Advisory Council, below.

Focused Research

Management decisions usually target on a specific site or resource. Oregon's Goal 19, *Ocean Resources*, requires that decisions affecting ocean resources be supported by scientific inventory information with particular attention to analysis of impacts of the decision on renewable marine resources. Focused research will often be necessary to meet the requirements of Goal 19 when a specific project is proposed.

In many cases, focused research needs will be revealed when specific problems or decisions are presented, the existing information base is analyzed and specific data gaps are identified. These studies will be especially necessary for proposals for nonrenewable resources and uses such as OCS oil and gas and marine minerals, ocean disposal of wastes, etc. Focused research may also be necessary when artificial reef or mariculture proposals are presented.

Primary responsibility for funding focused research will fall to the private developer but study design and work will be closely supervised by affected public agencies. Oregon should create a mechanism by which private funds can support needed marine research work in the public domain.

Major Information Gaps and Research Needs

The Oregon Ocean Resources Management Act requires that the Task Force recommend

> *Environmental and other scientific research required to make management decisions about ocean resources with an emphasis on the information requirements of the statewide planning goals for ocean and coastal resources in relation to the oil, gas and mineral development activities of the Federal Government in the Exclusive Economic Zone off Oregon*

The Task Force has received recommendations for needed research topics from the Technical and Scientific Advisory Committee, university researchers, and state and federal resource agencies. These research needs are summarized below.

Physical Features Base Map

- Detailed bathymetry of bottom features within Oregon's Territorial Sea, including offshore rocks submerged reefs, in digital format
- Detailed bathymetry of specific features and areas of the continental margin such as Heceta-Stonewall Banks, Rogue and Astoria Canyon

Physical Oceanography

A major step has been taken toward understanding the state of knowledge of ocean circulation in the Pacific Northwest. The Minerals Management Service has completed a study entitled *Coastal Circulation Along Washington and Oregon* as part of its OCS Environmental Studies Program. A conference of researchers from all major oceanographic research institutions and agencies was held in Fall, 1988, and a three-volume report has been published. The following research needs were identified by participants.

- Data on near-surface (0-20 meters deep) and nearshore (from shore to the 50 meter isobath) currents are very limited and there is little information on estuarine/ocean exchange processes
- Early studies of the Columbia River Plume were unable to complete a three dimensional characterization of plume dynamics
- Data on bottom boundary layer currents and sediment transport along the bottom are limited
- The extent of circulation exchange between the waters on and beyond the continental shelf has not been determined
- Topographic effects of specific features such as the Cape Blanco and Heceta Bank are unknown
- There is virtually no circulation data south of Newport, where Heceta Bank lies in a transitional area between two oceanic circulatory regimes
- Interannual variability in circulation patterns on the continental shelf and in nearshore environments is not well researched
- Temperature, humidity, and wind measurements across the continental shelf are sparse. Paired temperature and salinity observations are limited in much of the region off Oregon and Washington

Biology/Ecology

- Productivity data for the waters off Oregon and Washington are old; very little data have been gathered in the last 20 years
- The effects of spilled oil and increased turbidity on primary productivity is unknown
- Understanding of the movement of hydrocarbons through neuston (surface) layer of the water column is limited
- Very little is known about benthic communities and processes, including natural variability. Little is known about marine species' preference or need for specific substrate types
- Oregon does not presently have a marine habitat classification system. Habitat research must emphasize habitats known to be susceptible to accumulation or long-term exposure to spilled oil or those with special aesthetic value

Fisheries Data and Information Gaps

- The accuracy of fishery production models is open to question. More data is needed to more realistically determine allowable harvest levels
- The importance of offshore rocky reefs and rocky bottoms to fish productivity is not well understood. Data on the distribution

and abundance of fish on rocky bottoms, and on soft bottoms inside the 30 and beyond the 200 fm isobaths, are sketchy

- Data on the distribution and abundance of forage and juvenile fishes is also sketchy
- Data on marine habitat parameters and fish catch areas have not been organized and analyzed sufficiently to correlate catch areas with habitat parameters. Important parameters are depth, substrate composition, surrounding substrate, salinity, light, temperature, turbidity, and currents. Critical habitats, including spawning and nursery grounds, have not been defined or mapped
- There is little data on the sensitivity of fish, especially salmonids, to oil and gas exploration activities such as spilled oil and seismic testing
- The effectiveness of mitigation as a management tool has not been sufficiently evaluated

Marine Birds and Mammals

- Offshore seabird populations off Oregon and Washington have never been adequately quantified. There are no seabird population monitoring programs currently in place
- Relatively complete population parameters (other than abundance) have not been obtained for any seabird or mammal species
- The actual impacts of ocean resource development activities on seabird populations have not been sufficiently studied. Decisions have been based on predicted impacts, and such predictions have not been adequately determined to be accurate
- Sensitive seabird habitat areas, including ocean feeding and resting areas, have not been defined and identified
- Important feeding areas for all marine mammals found in Oregon waters have not been identified
- Critical marine mammal habitats need to be identified

Ocean Chemistry and Water Quality

- Oregon's marine waters have never been properly analyzed to determine the levels and characteristics of dissolved compounds, suspended particles, or trace metals
- The habitat value of dissolved chemicals is not well researched
- Little is known about natural background sediments and suspended particulates in the waters off Oregon and Washington
- Little is known about the fate of drilling mud plumes in the water column after the first 24 hours after their disposal
- The transport and fate of oil, heavy metals, and organic compounds in Oregon's dynamic marine environment, regardless of their source, have never been properly investigated and characterized

Social and Economic

- Economic baseline information is needed to provide estimates of coastal employment and population related to ocean resources development and related secondary employment
- Inventory data is needed of coastal areas of recreational, cultural, historic, and ceremonial importance
- The net economic effect of the loss of fisheries to nonrenewable resource activities both within and beyond state waters have not been calculated

Geology

- The nature, extent, and location of geologic hazards, including ground motion, seafloor offsets, active faults, sub-sea landslides, diapirs, and shallow gas-charged sediments.
- The composition and depth of seafloor sediments have not been established across the continental shelf

Data Administration and GIS

Ocean research has developed and made available an immense amount of data on marine systems. Oregon's ocean resource management program will rely on the portion of that data that relates to Oregon waters, marine systems in general, or the effects of resource development activities. The acquisition of such data will require money and time; the appropriate use of the data will require access by experts who are familiar with its limitations.

Research data will come from a variety of sources. It will be used by several state agencies, private interests, citizens, and public interest groups. Although its use cannot be restricted, its integrity must be guaranteed.

Many ocean resource data will be specific to locations in the ocean. They will be ideally suited to use in a computerized Geographic Information System (GIS). Senate Bill 630 specifically required that the Plan include:

> *Maps of existing ocean conditions, uses and resources of the coastline, territorial sea, continental shelf and Exclusive Economic Zone. These maps shall be . . . entered into a computer format to allow ease of data analysis and shall be accompanied, where possible, by computerized information about the mapped resources or features . . . .*

Not all pertinent ocean resource data will be suited for use in a GIS. Both scientific reports and economic data are useful to resource managers, but access to it generally does not require a sophisticated computer. A system is needed to provide access to such data and information.

It is possible to use data in ways for which they were neither intended nor well suited. For example, trawl catch data could be presented in such a way as to conclude that the catch accurately represents a particular population in a particular place, when in fact the catch may have utilized a net that harvested very few fish under a certain size or age. The original developer of the data may know its limits, but everyone who has access to it may not. Consequently, some data will have the potential to be used to draw erroneous conclusions. This potential requires that data limitations be rigorously documented.

The Oregon Department of Energy (ODOE) houses the state's Geographic Information System Service Center. The Service Center is providing the technical expertise to build an Oregon's Ocean Information System. The Service Center is also providing technical assistance to numerous state and federal agencies on other natural resources geographic information systems, some of which will provide useful information to the ocean GIS. The Service Center is working directly with state ocean resource agencies, such as ODFW and DLCD, to assemble data bases on particular resources.

Recommendations

- ☐ The Ocean Policy Council should
  - Establish an interagency process to review and update ocean research needs
  - Provide leadership for an Ocean Research Consortium made up of of Oregon's academic institutions, state and federal agencies, and private industry
  - Work with affected state agencies and State Map Advisory Council to guide development and maintenance of an Oregon Ocean Information System
  - Coordinate the Oregon Ocean Information System with adjacent states and with NOAA, USGS, and other federal agencies with ocean-related digital data
- ☐ The Oregon Department of Fish and Wildlife should develop a system of marine habitat research reserves based on a marine habitat classification system
- ☐ The Oregon Department of Energy's GIS Service Center should continue to provide technical services to build the Oregon Ocean Information System.
- ☐ The Oregon Legislature should

- Strengthen marine research programs at Oregon State University, University of Oregon, and within state resource agencies to support ocean resources management
- Continue to support the development and use of an interagency Oregon Ocean Information System.

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