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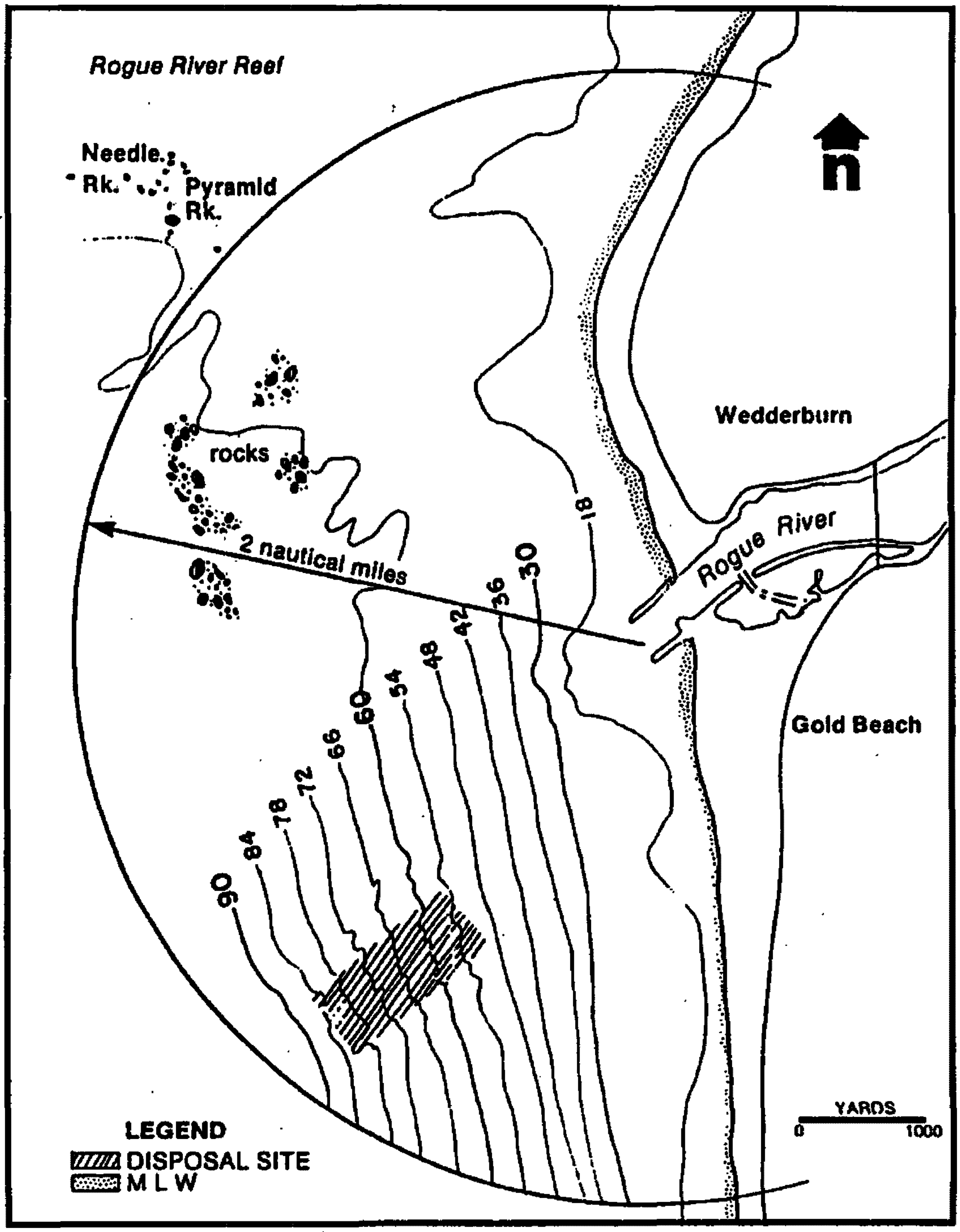
United States Environmental Protection Agency	Region 10 1200 Sixth Avenue Seattle WA 98101	Alaska Idaho Oregon Washington
Water Division	Water Resources Assessment	August 1991

EPA

Rogue, Oregon Dredged Material Disposal Site Designation

Draft Environmental Impact Statement



DRAFT

ENVIRONMENTAL IMPACT STATEMENT

ROGUE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) DESIGNATION

Prepared by

U.S. ENVIRONMENTAL PROTECTION AGENCY (Region 10)

With Technical Assistance From

U.S. Army, Corps of Engineers
Portland District

August 1991

COVER SHEET

Draft

ENVIRONMENTAL IMPACT STATEMENT

ROGUE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) DESIGNATION

Lead Agency: U. S. Environmental Protection Agency, Region 10

Responsible Official: Dana Rasmussen
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Abstract:

This draft EIS provides information to support designation of an ocean dredged material disposal site (ODMDS) in the Pacific Ocean off the mouth of the Rogue River in the State of Oregon. The proposed ODMDS disposal site is the present interim site located two miles southwest of the Rogue River Entrance. Site designation studies were conducted by the Portland District, Corps of Engineers, in consultation with Region 10 EPA. The final designation will allow for continued deposition of sediments dredged by the Corps of Engineers to maintain the federally-authorized navigation project at the Rogue River, Oregon and other dredged materials authorized in accordance with Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). No significant or long-term adverse environmental effects are predicted to result from the designation. Designation of an ODMDS does not constitute or imply approval of an actual disposal of material. Before any disposal may occur, a specific evaluation by the Corps must be made using EPA's ocean dumping criteria. EPA makes an independent evaluation of the proposal and has the right to disapprove the actual disposal.

Public Review and Comment Process:

This EIS is offered for review and comment to members of the public, special interest groups, and government agencies. No public hearings/meetings are scheduled. Comments received on this draft EIS will be addressed in the final. All comments or questions may be directed to:

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1200 Sixth Avenue, WD-128
Seattle, WA 98101

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Deadline for Comments:

EXECUTIVE SUMMARY

Site Designation. Section 102 (c) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 et seq. (MPRSA), gives the Administrator of the U. S. Environmental Protection Agency the authority to designate sites where ocean dumping may be permitted. On October 1, 1986, the Administrator delegated the authority to designate ocean dumping sites to the Regional Administrator of the Region in which the site is located. EPA has voluntarily committed to prepare EISs in connection with ocean dumping site designations (39 FR 16186, May 7, 1974).

This draft Environmental Impact Statement (EIS) was prepared by Region 10, EPA, with the cooperation of the Portland District, U. S. Army Corps of Engineers. This draft EIS provides documentation to support final designation of an ocean dredged material disposal site (ODMDS) for continuing use to be located off the mouth of the Rogue River, Oregon. This document evaluates the proposed Rogue ODMDS site based on criteria and factors set forth in 40 CFR 228.5 and 228.6. This EIS makes full use of existing information to discuss various criteria, supplemented by field data to describe environmental conditions within and adjacent to the site.

As a separate but concurrent action, EPA will publish a proposed rule in the **Federal Register** for formal designation of the Rogue ODMDS.

Major Conclusions and Findings. The preferred ODMDS for final designation is a location approximately two nautical miles southwest from the Rogue River Entrance. The site, when designated, will be used for disposal of sediments dredged by the Corps to maintain the federally authorized navigation project at Rogue River, Oregon and for disposal of materials dredged during other actions authorized in accordance with Section 103 of the MPRSA. The ODMDS site proposed for designation is located in an area suitable for disposal of dredged material in terms of environmental and navigational safety factors.

Disposal of the dredged sediments is a necessary component of maintaining a channel from the ocean to the boat basin entrance channel and an entrance channel to the boat basin. An evaluation of disposal alternatives was conducted. No less environmentally damaging, economically feasible alternative to ocean disposal for material dredged from the entrance to the Rogue River projects was identified. In addition, use of ocean disposal by other dredgers may be expected to increase as other disposal options are exhausted. Designation of an ODMDS is necessary to accommodate this need.

Two alternatives for ocean disposal were considered in detail for the Rogue ODMDS:

1) Termination of ocean disposal at Rogue; and
2) Designation of the existing interim ODMDS.

A third alternative, moving the site within the ZSF, would be considered if future site monitoring disclosed problems (e.g., mounding). The existing site is located in the best location as indicated by current data and surveys.

Based on the evaluation of need and an assessment of environmental impacts from historic dredged material disposal, termination of ocean disposal at Rogue was not considered prudent or reasonable. Evaluation focussed on the existing interim ODMDS and consideration of an ODMDS beyond the continental shelf. The procedures used to evaluate the ODMDS consisted of evaluating each of the five general and eleven specific criteria in 40 CFR 228.5 and 228.6. Use of an ODMDS beyond the continental shelf provided no environmental advantages and incurred significant economic costs.

The interim site, or areas in the same vicinity, have been used by Portland District since 1962. Maintenance operations have been performed by hopper dredge, hopper barge, channel flusher and pipeline dredge. Hopper dredge and hopper barge maintain the main Rogue River channel. The entrance to the boat basin is generally maintained by pipeline dredge, although clam-shell and backhoe dredges have been used in the past. To date, over 3.8 million cubic yards (cy) have been disposed at sea, 494,000 cy of which have been disposed in the Rogue ODMDS since 1977 when the site received its interim designation (40 CFR 228.12). It was entitled "Rogue River Entrance" and was given the following corner and centroid coordinates (NAD 83):

	42° 24' 15" N	124° 26' 52" W	
	42° 24' 23" N	124° 26' 39" W	
	42° 23' 39" N	124° 27' 17" W	
	42° 23' 51" N	124° 27' 30" W	
and	42° 24' 59" N	124° 27' 04" W	(centroid)

The approximate location of this site is two nautical miles from the Rogue River entrance, with dimensions of 3600 feet by 1400 feet and an average depth of 60 feet. The site occupies approximately 116 acres.

After applying the five general and eleven specific criteria, designation of the interim ODMDS was selected as the preferred action. Continued use of the interim ODMDS would not be expected to cause unacceptable environmental effects.

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I. INTRODUCTION

This draft Environmental Impact Statement (DEIS) was prepared by Region 10, U. S. Environmental Protection Agency (EPA), with the cooperation of the Portland District, U. S. Army Corps of Engineers (Corps). Section 102 (c) of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 *et seq.* (MPRSA), gives the Administrator of the EPA the authority to designate sites where ocean dumping may be permitted. On October 1, 1986, the Administer delegated the authority to designate ocean dumping sites to the Regional Administrator of the Region in which the site is located. EPA has voluntarily committed to prepare EISs in connection with ocean dumping site designations (39 FR 16186, May 7, 1974).

Disposal site studies were designed and conducted by the Corps, in consultation with EPA, and the *Rogue Ocean Dredged Material Disposal Site Evaluation Report* (1988) was prepared and coordinated by the Corps. The final Site Evaluation Report described conditions in the vicinity of the proposed ocean dredged material disposal site (ODMDS) at Rogue River, Oregon. The Rogue ODMDS received its interim designation from EPA in 1977 (40 CFR 228.12). The MPRSA requires that, for a site to receive a final ODMDS designation, the site must satisfy the general and specific disposal site criteria set forth in 40 CFR 228.6 and 228.5. The Corps Report proposed that a final ODMDS be designated for the existing interim ODMDS. The report also documented compliance of the proposed ODMDS with requirements of the following laws:

Endangered Species Act of 1973,
National Historic Preservation Act of 1966, and the
Coastal Zone Management Act of 1972, all as amended.

That document was submitted to EPA for review and processing for formal designation by the Regional Administrator, Region 10. The Corps' Site Evaluation Report was used as the basis of the draft EIS. Technical Appendices from the Corps' report are included in this draft EIS.

II. PURPOSE AND NEED

General. This draft EIS provides documentation to support final designation of an ocean dredged material disposal site (ODMDS) for continuing use to be located off the mouth of the Rogue River, Oregon. This document evaluates the proposed Rogue ODMDS site based on criteria and factors set forth in 40 CFR 228.5 and 228.6 as required by the Ocean Dumping Regulations (ODR) promulgated in the **Federal Register** on January 11, 1977, in accordance with provisions set forth in Sections 102 and 103 of the MPRSA. This EIS makes full use of existing information to discuss various criteria, supplemented by field data to describe environmental conditions within and adjacent to the site.

The preferred ODMDS for final designation is the existing interim site located two nautical miles (nmi.) southwest of the mouth of the Rogue River. The site when designated as the final ODMDS, will be used for disposal of materials dredged by the Corps of Engineers to maintain the federally authorized navigation project at the Rogue River, Oregon, and for disposal of dredged materials authorized in accordance with Section 103 of MPRSA. The ODMDS site proposed for designation is located in the area best suited for dredged material disposal in terms of environmental and navigational safety factors.

Location. The Rogue River enters the Pacific Ocean north of the town of Gold Beach, Oregon, approximately 264 miles south of the Columbia River (Figure 1). The estuary is fed mainly by the Rogue River, which drains 5,160 square miles and is 211 miles from its mouth to headwaters.

Need. The Corps is responsible for maintaining the Rogue River navigation channel, which was Federally authorized for the following purposes:

- To provide adequate channel dimensions for tugs, barges and commercial fishing vessels;
- To provide mooring facilities for small boats which take advantage of project facilities; and
- To permit barge and small boat traffic upstream to river mile 0.2.

The project further serves to decrease waiting times and increase safety for vessels crossing the bar, and is one of the harbors of refuge along the Oregon Coast. Consequently, maintenance of the navigation channel to authorized depths is critical to keeping the river and harbor open and to sustaining these vital components of the local and state economy.

Disposal of dredged sediments is a necessary component of maintaining the authorized project. An evaluation of disposal alternatives was conducted and is contained in Section III Alternatives. No less environmentally damaging, economically feasible

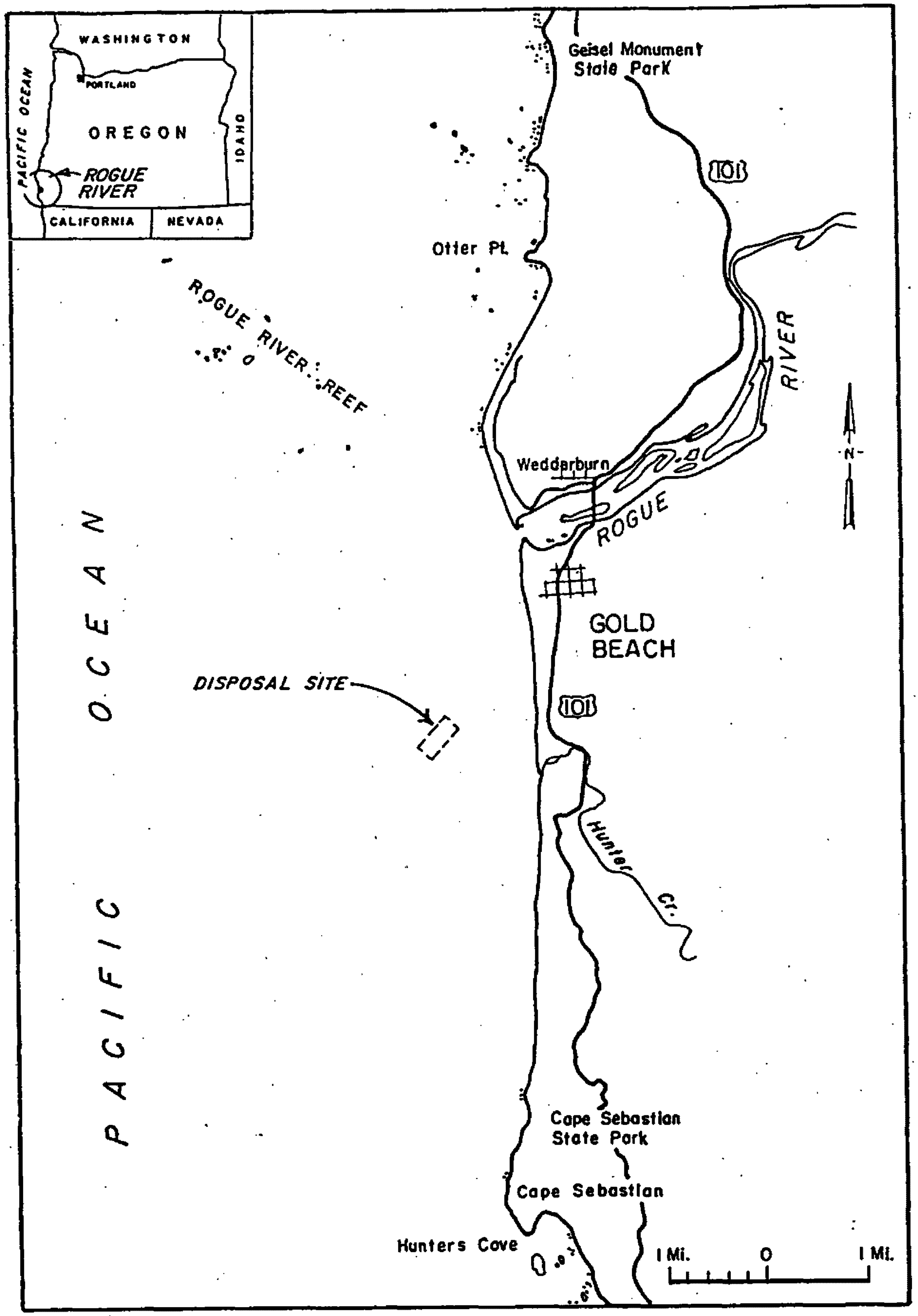

Figure 1
General Location of Rogue River

alternative to ocean disposal for material dredged from the entrance to the Rogue River was identified. In addition, use of ocean disposal by other dredgers may be expected as other disposal options are exhausted. Designation of an ODMDS is necessary to accommodate this need.

Project History. The Rogue River project was originally authorized in 1954 and provided for the construction of jetties, a channel, bank protection and a turning basin. A second channel and turning basin were also built in response to local construction of a small boat basin. Maintenance dredging as a federal responsibility was authorized in 1962. Portions of the authorized project considered in this report are:

- A channel 13 feet deep, 300 feet wide and 3500 feet long from the ocean to the boat basin entrance channel;
- An entrance channel 10 feet deep and 150 feet wide leading to the boat basin itself.

The frequency of maintenance dredging depends upon the volume of sediments transported from upriver into the estuary and the frequency and severity of storms that move offshore sediments into the channel, creating a bar. Shoaling usually occurs throughout the length of the project, from the outer bar to the side channel leading to the boat basin. Sediments are classified as medium to coarse sands. The volume of dredged material deposited offshore from the Rogue River project during the period 1976-1985 ranged from 0 cy to 142,260 cy, with an annual average of 47,500 cy--all of which was from the main channel. Between 1986 and 1989 maintenance activity was less (no dredging occurred in 1988) and volumes reduced to an annual average of 35,600 cy for the three year dredging did occur.

Historical ODMDS Use. The interim site, or areas in the same vicinity, have been used by Portland District since 1962. Maintenance operations have been performed by hopper dredge, hopper barge, channel flusher and pipeline dredge. Hopper dredge and hopper barge maintain the main Rogue River channel. The entrance to the boat basin is generally maintained by pipeline dredge, although clam-shell and backhoe dredges have been used in the past. To date, over 3.8 million cubic yards have been disposed at sea, 494,000 cy of which has been disposed in the Rogue ODMDS since 1977 when the site received its interim designation (40 CFR 228.12). It was entitled "Rogue River Entrance" and was given the following corner and centroid coordinates (NAD 83):

42° 24' 15" N	124° 26' 52" W	
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The approximate location of this site is two nmi. from the Rogue River entrance, with dimensions of 3600 feet by 1400 feet and an average depth of 60 feet. The site occupies approximately 116 acres.

III. ALTERNATIVES

General. Under the MPRSA, designation of ocean dumping sites follow specific requirements. In conjunction with the MPRSA, the Ocean Dumping Regulations, as well as related EPA and Corps of Engineers policies, must be followed. Guidance for the evaluation process has been provided by the joint EPA/Corps workbook (1984). This process generally involved three major phases. Phase I includes delineation of the general area or Zone of Siting Feasibility (ZSF), i.e., disposal is economically and technically feasible. The ZSF is determined by establishing the reasonable haul distance, considering factors such as available dredging equipment, energy use constraints, costs, and safety concerns. Existing information on resources, uses, and environmental concerns are reviewed and critical resources and areas of incompatibility identified. Phase II involves identification of candidate sites within the ZSF based on information evaluated in Phase I. Additional studies can be conducted to further evaluate environmental and other factors, such as disposal site management considerations. Phase III consists of evaluation of candidate sites and selection of preferred site(s) for formal designation by EPA. Preparation of this EIS and the designation rule is part of Phase III (Figure 2).

Constraints. Dredging of the coastal ports is limited to a season from April through October. That limit is imposed by the weather and sea conditions that predominate in the Northwest. The size of the ZSF is controlled by the capability of available dredging equipment as allocated among the nine Oregon, one Washington, and four California coastal projects, and the hauling distance from the Rogue dredging site. The limited operating time available for completing the maintenance dredging along the Oregon Coast, therefore, requires a combination of government and private dredges which operate on the Pacific coast. In a typical year, the Rogue project requires equipment which will permit production of 6,300 cy per day for approximately 8 days of work. Longer hauling distances of dredged material increase vessel operating costs and the time required for completion of the work. Loss of production time due to adverse weather conditions must also be anticipated. Based on these factors, the extreme practical limit of the Rogue ZSF (from an economic viewpoint) is 2 nmi.

Resource Considerations. The natural and cultural resources of the area within the ZSF were identified from information obtained through review of literature, interviews with resource agencies and local users, and through site specific studies. Critical information was evaluated and mapped to identify areas of resource conflict. The selection of resources to use for this determination was dependent on whether the resource was considered limited. A coast-wide resource, i.e., a flatfish spawning area, was not considered a limited resource and was not included in the overlay evaluation technique.

Equipment Considerations. For much of the Corps maintenance work, a hopper dredge must be used because the rough seas encountered at the entrance are not suitable for safe operation of a pipeline dredge. In recent years, use of mechanical dredges in combination with ocean-going tugs and barges has increased. This has somewhat

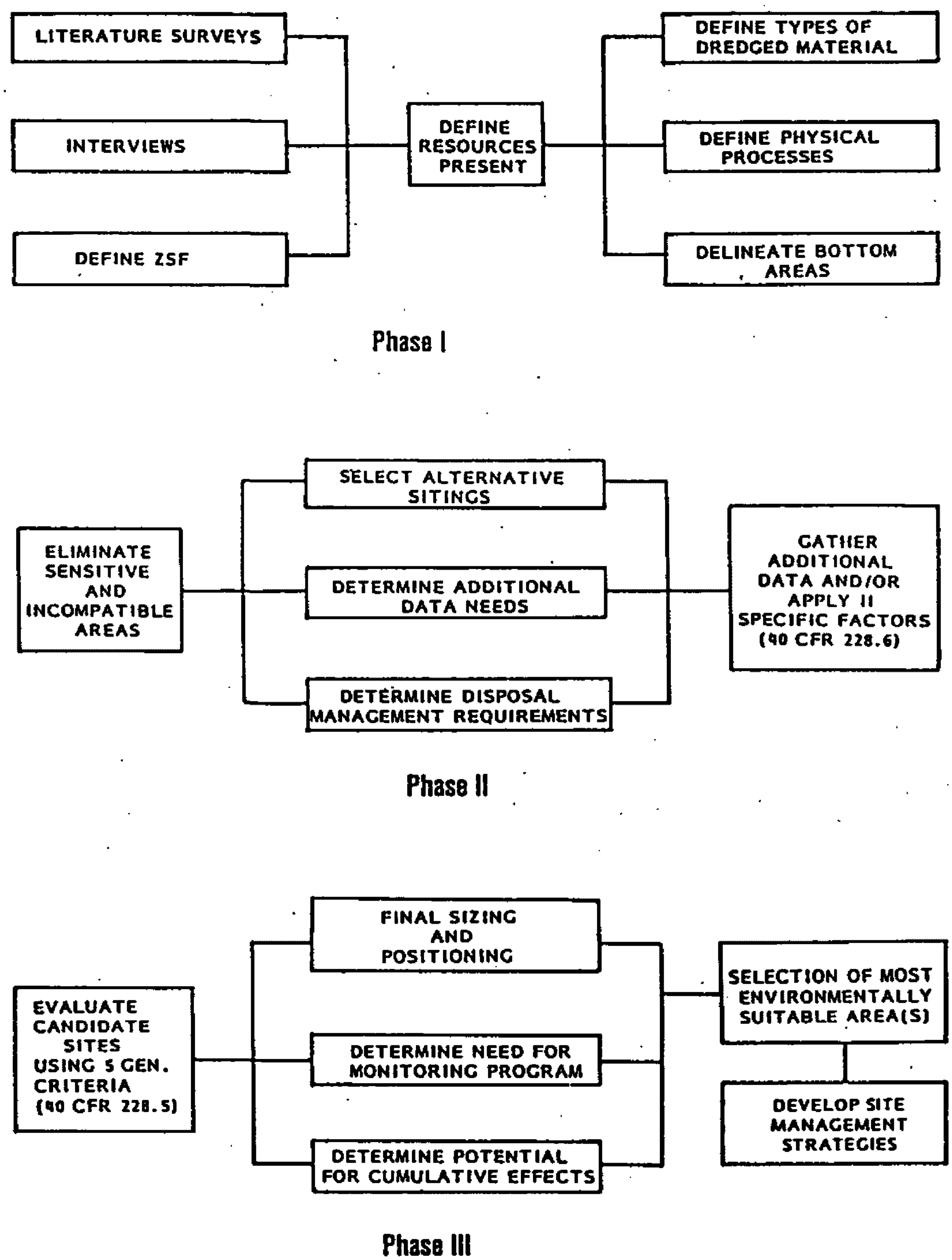

Figure 2
Overall Process for ODMDS Evaluation

enhanced flexibility for scheduling of dredging activities along the Pacific coast; however, limited availability of equipment remains a controlling factor.

With both a hopper dredge or barge, dredged material disposal would normally occur at an in-water site. There are no suitable sites in the estuary because of its narrowness and shallowness. Disposal of entrance material inside the estuary would have greater adverse environmental impacts than ocean disposal because estuarine habitats are generally more productive and far less extensive than are nearshore oceanic habitats. Disposal of the material inside the estuary would also increase the risk of the material eroding and reshoaling in the channel, potentially increasing dredging requirements.

Consideration of Upland Disposal Options. Upland disposal of entrance channel material typically is not feasible for economic and environmental reasons. Upland sites with large capacities seldom exist at such locations. More distant upland sites incur substantially greater costs for rehandling and transportation of the material, and alteration of the sites normally involves some environmental impacts. Pipeline dredging of entrance reaches is usually unsafe. Because of the use of hopper dredges or clamshell dredge and barge, it would be necessary to rehandle materials to use upland sites. Creation of an in-water sump in the estuary would require one be dredged and material bottom-dumped into it, then pumped ashore with a pipeline suction dredge. Creation of a upland dewatering and rehandling area also may be necessary which could further alter marine or estuarine habitats. This would be very costly and also would increase adverse environmental impacts of the project. Another adverse impact of upland disposal is that naturally occurring sediments would be removed from the littoral system and could cause erosion of nearby shorelines over the long term.

Ocean Disposal Options. Two alternatives for ocean disposal were considered for the Rogue ODMDS:

(1) Termination of ocean disposal at Rogue; and
(2) Designation of the existing interim ODMDS.

A third alternative, relocating the site within the ZSF, would have been pursued if ongoing site monitoring had disclosed problems, (e.g., mounding) or if the interim ODMDS were found to be out of compliance with the general and specific criteria. Identification and evaluation of alternative ODMDS in the vicinity of the interim site is not considered necessary as the interim site meets all but one of the general criteria. The existing site is advantageously located as indicated by current data and surveys.

Based on the evaluation of need and an assessment of environmental impacts from historic dredged material disposal, termination of ocean disposal at Rogue is not considered prudent or reasonable. The need for the Rogue navigation project is not at issue and is beyond the scope of this evaluation. Accordingly, evaluation focussed on designation of the existing interim ODMDS site and consideration of an ODMDS beyond the continental shelf. The procedures used to evaluate these options consisted of evaluating each of the five general and eleven specific criteria as required in 40 CFR 228.5 and 228.6.

Application of General Criteria. The proposed disposal site has been evaluated in terms of the following general criteria (Table 1).

Table 1
General Criteria for the Selection of Ocean Disposal Sites

The dumping of material into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

Locations and boundaries of disposal sites will be chosen so that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

If at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet criteria for site selection set forth in Sections 228.5 - 228.6, the use of such sites will be terminated as soon as suitable alternative disposal sites can be designated.

The sizes of ocean disposal sites will be limited in order to localize, for identification and control, any immediate adverse impacts and to permit the implementation of effective monitoring and surveillance programs to prevent adverse, long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

Minimal Interference with Other Activities. The first of the five criteria requires that a determination be made as to whether the site will minimize interference of the proposed disposal operations with other uses of the marine environment. This determination was made by overlaying several individual maps presented in the Technical Appendices onto a base map, giving bathymetry and location of the interim disposal site and the ZSF. The following figures were selected to be included in the evaluation of resources of limited distribution.

- Navigation Hazards Area/Other Recreation Areas
- Shellfish Areas
- Critical Aquatic Resources
- Commercial and Sport Fishing Areas
- Geological Features
- Cultural and Historical Areas

Figure 3 is a composite of all of the above areas and indicates by various patterns, the relative amount of total usage within the ZSF. As the figure shows, the existing interim disposal site for the Rogue River lies south of the most navigationally and environmentally critical area, the reefs in the northwestern part of the ZSF. These reefs represent valuable habitat for fish such as black and yellow rockfish and lingcod. They are extensively fished by sport fishermen. Commercial and recreational salmon fishing occurs in the disposal area, but it is not limited to that area, occurring (as it does) over a wide nearshore area. Disposal operations and the salmon fishing season do overlap, however, communications with ODFW personnel (Appendix A) indicate no observable

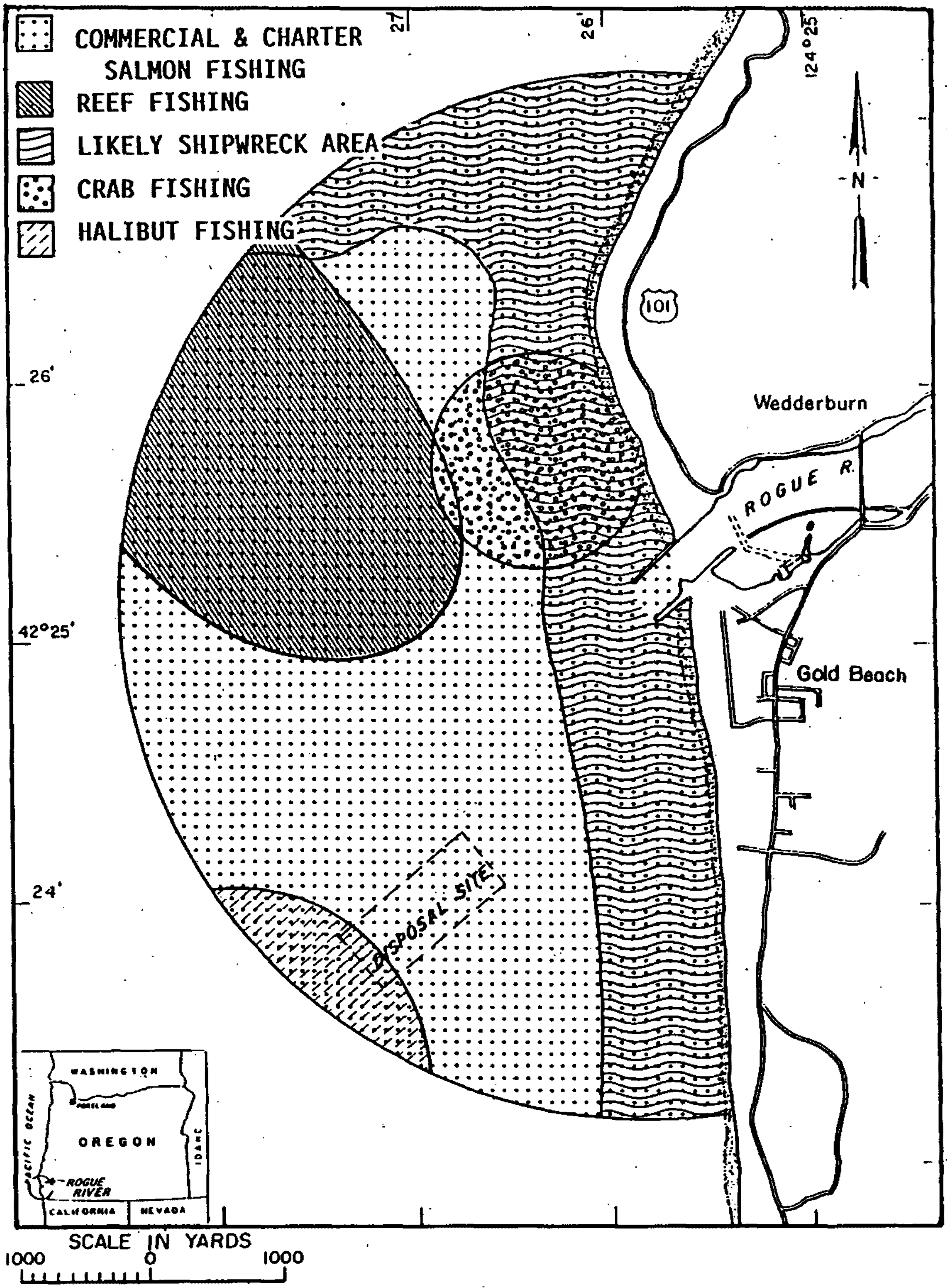

Figure 3
Overlay Evaluation of Individual Resources in ZSF

conflicts between the two uses. Appendix A provides a discussion of all potential conflicts within the ZSF with living resources, and concludes that there have been no major conflicts in the past or predictable conflicts in the future.

Minimizes Changes in Water Quality. The second of the five general criteria requires that changes to ambient seawater quality levels occurring outside the disposal site be within water quality standards and that no detectable contaminants reach beaches, shorelines, sanctuaries, or geographically-limited fisheries or shellfisheries. The nature of material has already been discussed as clean, poorly-sorted sand and gravel; no contaminants or suspended solids are expected to be released. There should be no water quality perturbations that might move toward a limited resource. Bottom movement of deposited material is discussed in Appendix B and, in general, shows a net movement to the north, at the depth of the disposal site, but material appears to be quickly dispersed.

Interim Sites Which Do Not Meet Criteria. Evaluation by the Corps and EPA indicates that the interim disposal site would meet the criteria and factors established in 40 CFR 228.5 and 228.6. A arguable exception is that the site is not located off of the continental shelf. No reported problems or complaints have been received by the Corps or EPA on use of this site. The site is environmentally acceptable for the types and quantities of dredged material it presently receives. (See evaluation of Sites off the Continental Shelf following.)

Size of Sites. The fourth general criterion requires that the size, configuration and location of the site be evaluated as part of the study. The proposed Rogue River site is 3600 feet long by 1400 feet wide, occupying an area of approximately 116 acres. The Rogue ODMDS is similar in areal size and location to other Oregon ODMDS sites. This disposal site is dispersive and is of adequate size to accommodate the annual volumes of material it presently receives. Although volumes of material going to Oregon ODMDS are expected to increase slightly in the future as alternative disposal options are exhausted, this increase is not expected to seriously impact site capacity or resources outside the ODMDS. All Oregon ODMDS are jointly managed and periodically monitored by the Corps and EPA. Development of mounds has been observed at other Oregon ODMDS. Should similar mounding develop at Rogue, disposal practices could be altered or site boundaries adjusted if warranted. Public notices issued for ocean disposal operations, as required by MPRSA, have not generated concerns about significant impacts from their use. Also, no comments have been received about the size, shape, or location of the interim disposal sites. The Rogue site is located close enough to shore and harbor facilities that monitoring and surveillance programs, as required, can easily be accomplished.

Sites off the Continental Shelf. Potential disposal areas located off the continental shelf in the Rogue River area would be at least 15 nmi. offshore, in water depths of 600 feet or greater. The haul distance to any potential site beyond the shelf is much greater than the 2 nmi limit of the Rogue ZSF, making the project economically infeasible. While there may be some flexibility in operations that could increase the haul distance somewhat, the minimum 15 nmi. haul to utilize a continental slope disposal site is economically prohibitive. Further, significant environmental concerns about disposal in such areas make off-shelf disposal questionable.

The purpose of the off-continental shelf site preference is to minimize environmental impacts from ocean dumping. In this instance, evaluation of historic ocean dumping of dredged material at the interim site does not reveal actual or potential resource conflicts or unacceptable adverse environmental effects due to ocean dumping that would argue for use of another site. Disposal into deeper water would remove large quantities of natural sediments from the nearshore littoral transport system, a system that functions with largely non-renewable quantities of sand in Oregon. Disruption of this system's mass balance could alter erosion/accretion patterns, adversely impacting beaches, spits, wetlands, and other shoreline habitats.

Benthic and pelagic ecosystems near the shelf contain important fishery resources and processes effecting them are not well understood. Fine grain sediment and rocky habitats would be directly covered in disposal operations. Lower density silt/clay and organic components of sediments could remain suspended in density layers of the pycnocline, with potential transport inshore and to the surface in seasonal upwelling events. Deposited sediments could be transported long distances downslope. Bottom gradients can be 5 percent to 25 percent on the continental slope, making accumulated unconsolidated sediments susceptible to slumping. Also, offshore transport by nearbottom currents could occur.

Designation of a site beyond the shelf would require extensive seasonal site characterization studies and monitoring to understand the system and evaluate disposal impacts. Distance offshore and depth of required sampling would add further to the time and expense of such a program.

In summary, use of an ODMDS off the continental shelf did not offer any environmental advantages over a site located closer to the shore but did involve substantially greater economic disadvantages.

Application of Specific Criteria. The proposed final ODMDS has been evaluated in terms of the following specific criteria (Table 2).

Geographic Location. Figure 4 indicates the location of the Rogue interim ODMDS and bathymetry. The site lies in 52 to 90 feet of water, approximately 2500 yards southwest from the entrance to the Rogue River. Coordinates were presented in the Purpose and Need Section of this report. The center of the site is on a 216 degree azimuth from the river mouth. Appendix B contains a detailed discussion of the bottom topography of the site. In general, the interim site lies on bottom contours sloping at a rate of 8/1000 feet to the WSW.

Distance From Important Living Resources. Aquatic resources of the site are described in detail in Appendix A. The existing disposal site is located in the nearshore area, and the overlying waters contain many nearshore pelagic organisms which occur in the water column. These include zooplankton such as copepods, euphausiids, pteropods, chaetognaths and meroplankton (fish, crab and other invertebrate larvae). These

Table 2
Eleven Specific Factors for Ocean Disposal Site Selection

Geographical position, depth of water, bottom topography, and distance from coast.

Location in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases.

Location in relation to beaches or other amenity areas.

Types and quantities of waste proposed to be disposed and proposed methods of release, including methods of packaging the waste, if any.

Feasibility of surveillance and monitoring.

Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current velocity, if any.

Existence and effects of present or previous discharges and dumping in the area (including cumulative effects).

Interference with shipping, fishing, recreation, mineral extraction, desalination, shellfish culture, areas of special scientific importance and other legitimate uses of the ocean.

Existing water quality and ecology of the site, as determined by available data or by trend assessment or baseline surveys.

Potential for the development or recruitment of nuisance species within the disposal site.

Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

organisms generally display seasonal changes in abundance and, since they are present over most of the coast, they are not critical to the overall coastal population. Based on evidence from previous zooplankton and larval fish studies, it appears that there will be no impact to organisms in the water column (Sullivan and Hancock, 1978).

The ZSF contains several neritic reefs within it which are described in appendix A. These reefs are an unusual features along the coast and support a variety of aquatic organisms, including the bull kelp (*Nerocystis lutkeana*) and its associated fish and invertebrate community. The site is located approximately 1 nmi. SSE from the reefs. Since the disposal material is a clean sand that settles quickly within the ODMDS, any movement of the disposed sand into the reef area would occur through natural littoral transport. Since the disposal quantity is relatively small compared to the longshore transport, disposal at the current site is not expected to adversely affect marine communities in the reef areas.

Benthic samples are discussed in detail in Appendix A. Based on the analysis of benthic samples collected from the Rogue disposal site and the adjacent areas to the north and south, the disposal site contains benthic fauna common to nearshore, sandy, wave-influenced regions that exist along much of the Pacific Northwest coast.

Sediment in and near the interim disposal site consists of well-sorted, fine sands, typical of Pacific Northwest coastal areas. The infaunal community of the Rogue study area is dominated by gammarid amphipods and polychaete worms. Unlike other ODMDS study areas along the coast, samples from the interim disposal site revealed greater abundances than those from either the north or south reference transects. The species of invertebrates inhabiting the study area are the more motile psammnetic

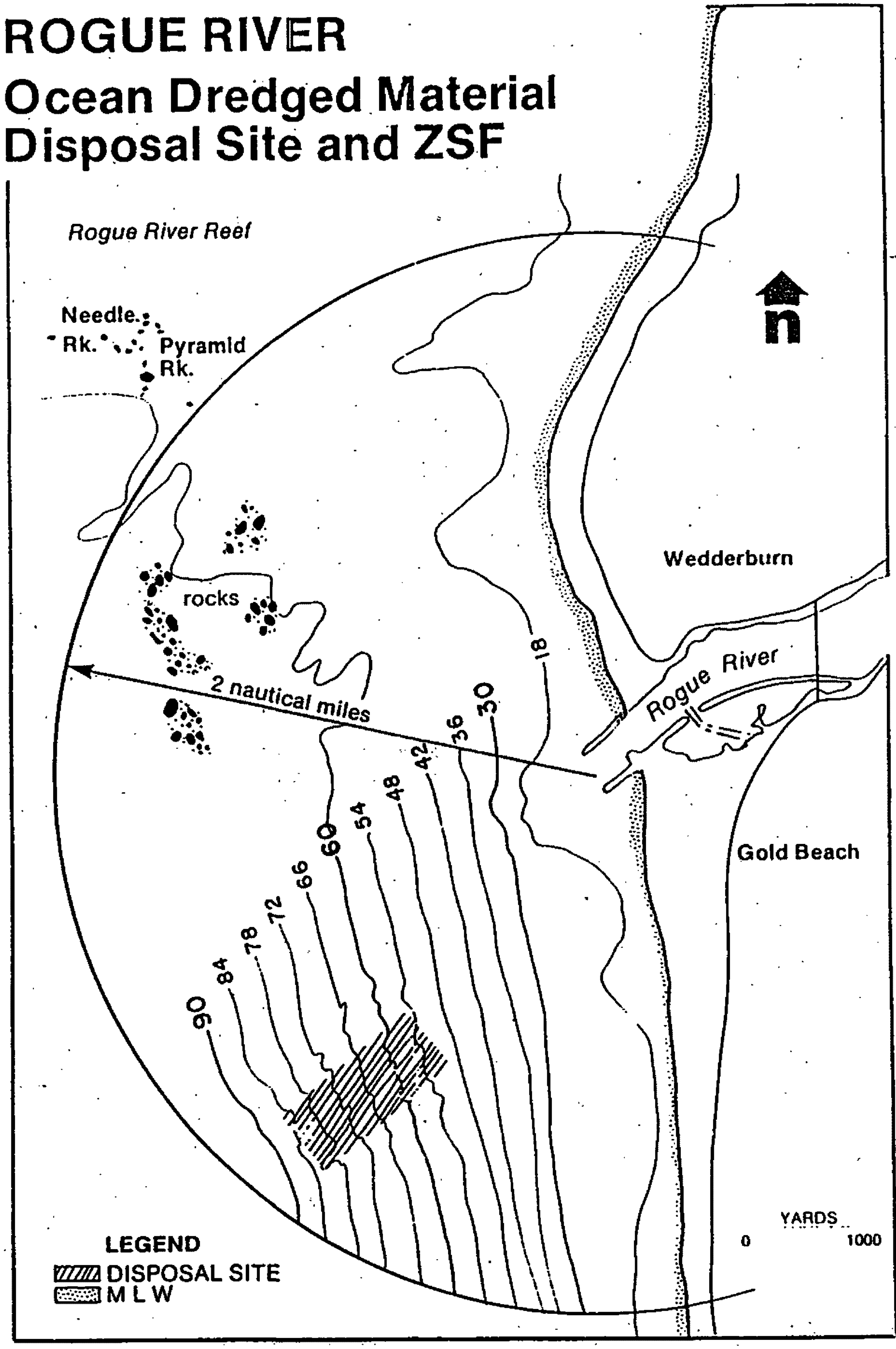

Figure 4
Rogue River ODMDS and ZSF

(sand-dwelling) forms which tolerate or require high sediment flux. Accordingly, continued use of the site for disposal is not expected to harm, but may enhance, these organisms. They are typical of other shallow water disposal sites such as Coos Bay sites E and F (Hancock *et al.*, 1981).

The dominant commercially and recreationally important macroinvertebrate species in the inshore coastal area are shellfish, Dungeness crab and squid.

The nearshore area off the Rogue River supports a variety of pelagic and demersal fish species. Pelagic species include anadromous salmon, steelhead, cutthroat trout, and shad that migrate through the estuaries to upriver spawning areas. Other pelagic species include the Pacific herring, anchovy, surfsmelt, and sea perch.

Demersal species are present in the inshore area and include a number of flatfish which occur primarily over the sandflats. English sole, sandsole, and starry flounder spawn in the inshore coastal area in the summer and juveniles of these (as well as other) marine species may rear in the estuary.

The disposal site is in an area where numerous species of birds and marine mammals occur in the pelagic nearshore and shoreline habitats in and surrounding the proposed disposal site.

Portland District requested an endangered species listing for the ODMDS from U. S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as part of their coordination of the Site Evaluation Report. At that time only the brown pelican and the gray whale were listed. Based on previous biological assessments conducted along the Oregon coast regarding impacts to the brown pelican and the gray whale, it was concluded that no impact to either species is anticipated from the proposed designation and use. A letter of concurrance from the NMFS that no impacts to the brown pelican of gray whale would be anticipated is contained in appendix C. This information was presented to EPA in the final Site Evaluation Report. Subsequently, the Corps and EPA have been informed by the NMFS that they have revised their list of threatened/endangered species. Species listed by the NMFS now include the gray, humpback, blue, fin, sei, right, and sperm whales; northern (Steller) sea lions; leatherback sea turtles; and Sacramento River winter run chinook salmon. A biological assessment was prepared by the Corps for the Chetco ODMDS addressing the newly listed species and revising previous biological assessment on the gray whale. The assessment concluded that no impact to any of the species is anticipated by designation and use of ODMDS. Based on this and previous biological assessments conducted along the Oregon coast, no impacts to any threatened or endangered species are anticipated as a result of designation and continued use of the Rouge ODMDS. EPA is requesting that the NMFS and USFWS review this determination during public review of this draft EIS.

In summary, the proposed ODMDS contains living resources that could be affected by disposal activities. Evaluation of past disposal activities do not indicate that unacceptable adverse effects to these resources have occurred. In the absence of any indication that the resources in proximity to the interim site have been impacted, this site is considered acceptable for final ODMDS designation.

Distance from Beaches and Other Amenities. The northwest corner of the proposed site is just over 2,000 yards from the end of the south jetty. The inshore corner of the site lies approximately 1,500 yards offshore.

Types and Quantities of Material to be Deposited at the Site. The disposal site will receive dredged materials transported by either government or private contractor hopper dredges or ocean-going barges. The dredges available for use at the Rogue River have hopper capacities of 800 to 1,500 cy. Barges have a greater capacity, up to 4,000 cy. Thus, no more than 4,000 cy would be disposed at any one time. For steerage purposes, the ships would be under power and moving while disposing. This would increase dispersion. Annual dredging volume averages just under 50,000 cy and has ranged as high as 142,000 cy. Disposal details are listed in Appendix B, Table B-1.

The material to be dredged consists of medium to coarse sands (Appendix D, Figure D-5). Appendices B and D give results of sediment analysis performed on these materials. These materials are considered to meet the exclusion criteria from further testing as noted in 40 CFR 227.13. Periodic re-evaluation of sediment characteristics by the Corps and EPA occur as part of our management responsibilities.

Feasibility of Surveillance and Monitoring. The proximity of the interim disposal site to shore facilities creates an ideal situation for shore-based monitoring of disposal activities. Routinely, a Coast Guard vessel patrols the entrance and nearshore areas, so surveillance can also be accomplished by surface vessel.

Following formal designation of an ODMDS for Chetco, EPA and the Corps will develop a site management plan which will address post-disposal monitoring. All Oregon ODMDS are periodically monitored jointly by the Corps and EPA already. Several research groups are available in the area to perform any required work. The work could be performed from small surface research vessels at a reasonable cost.

Disposal, Horizontal Transport, and Vertical Mixing Characteristics of the Area. The material dredged from the Rogue River navigation channel is medium to coarse sand. The Rogue area is exposed to normal wave action as described in Appendix B. For the range of depths and grain sizes found at the Rogue ODMDS, there is nearly constant mobilization of bottom sediment due to wave action. This wave-induced motion is not responsible for net transport, but, once in motion, bottom sediments can be affected by other forces such as gravity or directional currents.

The nearshore circulation patterns at Rogue are still unclear. Their complexity is perhaps due to the rocky reefs in the northern part of the ZSF. The prevailing currents at the depth of the disposal site seem to be towards the north. Figure B-10 in appendix B issustrates the sediment transport system assumed to be active. Although the Rogue River must deliver a large sediment load, the bottom contours suggest a rapid distribution offshore. While there is shoreline accretion 1-2 miles to the north, the shoreline to the south seems to be in equilibrium, suggesting littoral transport to the south is balanced by offshore transport. Disposal of dredged material at the ODMDS does not appear to be a significant contribution to coastal processes.

Effects of Previous Disposal. Due to coarser sediments being deposited on finer ones at the disposal site, theoretically there is a potential for mounding to occur. Bathymetric surveys, however, have shown no signs of such a mound forming from past disposal. Periodic monitoring will continue to evaluate this potential problem.

Interference with Other Uses of the Ocean.

Commercial Fishing: Two existing commercial fisheries occur in the inshore area: salmon trawling and Dungeness crab fishing (Appendix A). The length of the salmon fishing season varies each year depending upon the established quota; however, it normally extends from July to September. During this period, the potential exists for conflicts between the dredge and fishing boats. The Coast Guard and ODFW indicated that they are unaware of any instance where this has ever been a problem. The Dungeness crab season is from 1 December to 15 August; however, most of the fishing is done prior to June and usually ends early because of the increase in unmarketable soft shell crabs in the catch. As a result, most crab fishing is done outside of the normal dredging season and it is unlikely that a conflict would result. There are no commercial fish or shellfish aquaculture operations that would currently be impacted by use of the existing disposal site.

Recreational Fishing: Salmon fishing is done by charter and private boats and occurs in the same areas as the commercial fishing, but generally closer to shore. Bottom fishing is done along the reef areas to the northwest by private charter boat. Recreational fishing boats have a potential for conflicting with dredging operations, however, no conflicts have been reported to date (Appendix E). It is unlikely that any significant conflict will develop in the near future.

Offshore Mining Operations: Although offshore deposits of heavy minerals containing magnetite, gold, platinum, chromite, and ilmenite are present offshore, no mining is currently taking place. No oil/gas wells have been drilled off this part of the Oregon Coast and no development is expected in the future. All considerations for offshore mining and oil/gas leases remain in the development stages. The disposal site is not expected to interfere with any of the proposed operations.

Navigation: No conflicts with commercial navigation traffic have been recorded in the more than 60-year history of hopper dredging activity. The probable reason for this is the light commercial traffic at Rogue. Navigation hazards do exist within the ZSF and should be avoided when considering possible disposal site locations. Figure 5 indicates potential navigation hazards. Ships cannot navigate in the northwest part of the ZSF due to the exposed reefs.

Scientific: No scientific studies have been identified within the ZSF (Zone of Sitting Feasibility) that could be adversely effected by the disposal activity.

Coastal Zone Management: Local comprehensive land use plans for the Chetco area have been acknowledged and approved by the State of Oregon. These plans discuss ocean disposal and recognize the need to provide for suitable offshore sites for disposal of dredged materials. In addition, this site evaluation document establishes that

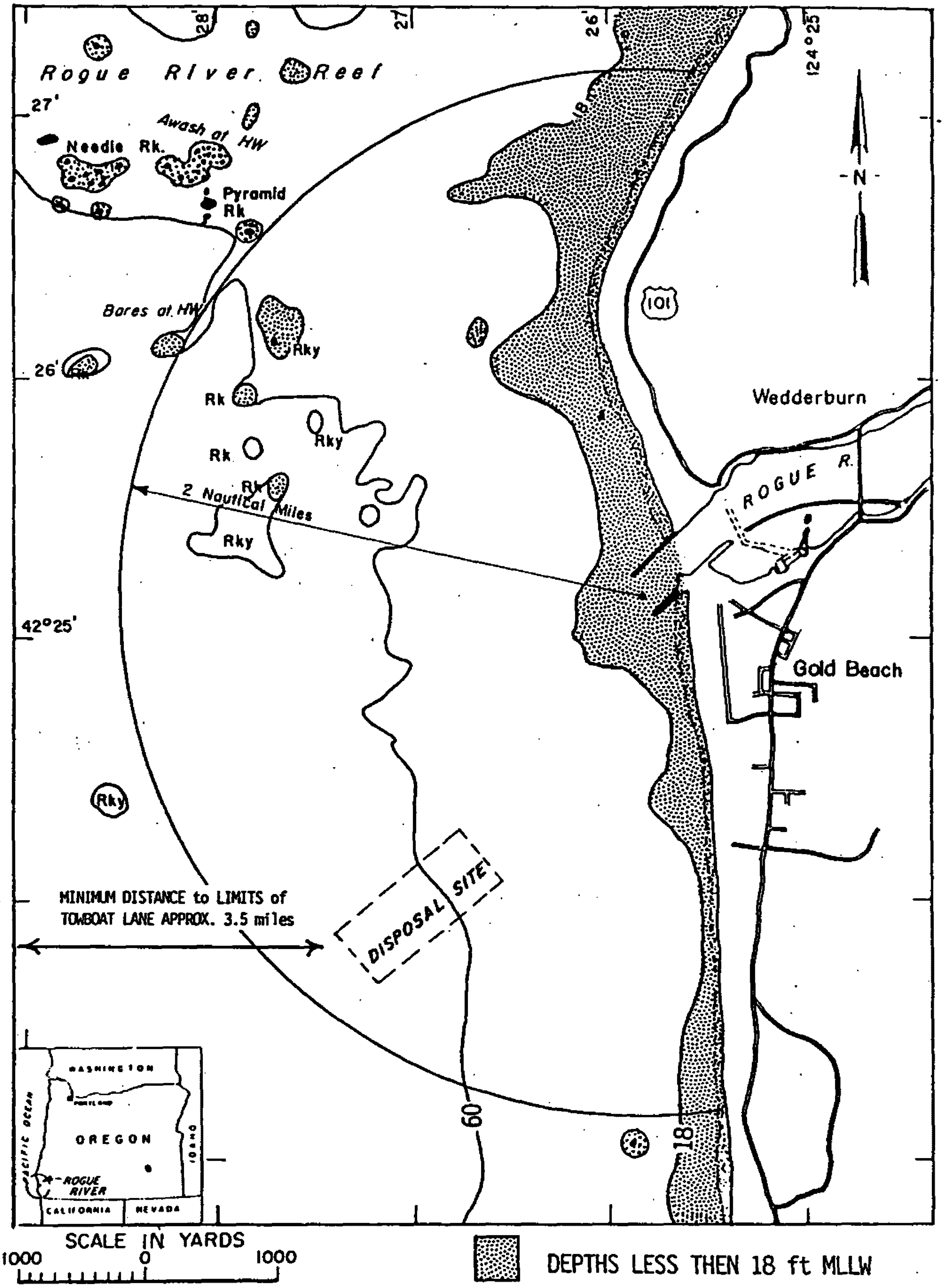

Figure 5
Potential Navigation Hazards

no significant effects on ocean, estuarine, or shoreland resources are anticipated, as Goal 19 of the Oregon Statewide Planning Goals and Guidelines requires.

During coordination of the Site Evaluation Report, the Corps made a determination of consistency with Coastal Zone Management plans. EPA also concludes that designation of the proposed site is consistent to the maximum extent practicable with the state coastal management program. A letter of concurrance with that finding was provided by the Oregon Department of Land Conservation and Development, the state coastal zone management office. Their letter of concurrance is included in appendix C. The letter notes that the Department may reexamine the consistency issue if new information becomes available.

Existing Water Quality and Ecology. Only limited water and sediment quality testing has been done, the details of which are given in Appendix D. Sediments from the navigation channel are medium to coarse sands containing some gravel, with some fine sands present at the upper end of the project next to the boat basin. Elutriate testing was conducted in 1981 which showed no release of harmful concentrations of contaminants. These materials are considered to meet the exclusion criteria from further testing as noted in 40 CFR 227.13. Periodic re-evaluation of sediment characteristics by the Corps and EPA occur as part of our management responsibilities.

A general discussion of the ecology of the area based on available information is presented in Appendix A. The ODMDS and near vicinity is typical of a Pacific Northwest mobile sand community, shifting to the reef system to the north. Monitoring studies have not shown any adverse effects from historic disposal.

Potential for Recruitment of Nuisance Species. It is highly unlikely that any nuisance species would be transported to the disposal site. Nuisance species are considered to be any undesirable organism not previously existing at the disposal site and either transported or attracted there because of the disposal of dredged materials which are capable of establishing themselves there.

Existence of Significant Natural or Cultural Features. The neritic reefs off the Oregon Coast comprise a unique ecological feature. They support a wide variety of invertebrates and fish species, as well as bull whip kelp communities. These areas are sheltered from wave action and receive nutrients from both the ocean and the estuaries and are, thus, usually highly productive. The disposal site is located approximately 1 nmi SSE from the reefs. Since the disposal material is a clean sand that settles quickly, any movement of the disposed sand into the reef area would occur through natural littoral transport. Since the disposal quantity is relatively small compared to the longshore transport, disposal at the current site should not adversely affect the aquatic community in the reef areas.

In spite of the heavy ship traffic supplying the gold fields in the late 1800s, there do not appear to be any shipwrecks of cultural significance that would be affected by continued use of the disposal site. Potential shipwreck areas are shown and evaluated in Appendix F. A letter by the Oregon State Historic Preservation Officer (SHPO) concurs that no significant cultural resources will be affected by the proposed designation and use (appendix C) .

Selection of the Preferred Alternative. Once the general and specific site selection criteria were applied the proposed disposal site, a conflict matrix analysis was completed. Portland District developed the matrix format to simplify the criteria review process and has used the matrix for several ODMDS studies. Each area of consideration on the conflict matrix addresses at least one general and specific criteria. Table 3 contains comments pertinent to the criteria for the proposed site. In addition to the conflict matrix, operational constraints and cost were considered for the site. Based upon the information contained in this DEIS, designation of an ODMDS of the Rogue River, Oregon is considered necessary. After applying the five general and eleven specific criteria to the available options, designation of the interim ODMDS was selected as the preferred alternative. Continued use of the interim ODMDS would not be expected to cause unacceptable adverse environmental effects.

Rogue Ocean Dredged Material Disposal Area Conflict Matrix for Evaluating Potential for Conflict with Required Considerations of Marine Protection Research and Sanctuaries Act

	Area of Consideration	Conflict	Potential Conflict	No Conflict	Beneficial Use	Comments	Relevant General Criteria (From Table 1 & 40FR 228.5)	Relevant Specific Factors (From Table 2 & 40FR 228.6)
1.	Unusual Topography			X			a	1, 6, 8, 11
2.	Physical Sediment and Compatibility			X			b, c, d	3, 4, 9
3.	Chemical Sediment Compatibility			X			a, b, c, d	3, 4, 7, 9
4.	Influence of Past Disposal			X			a, b, d	5, 7, 9, 10
5.	Living Resources of Limited Distribution			X			a, b, d	2, 3, 6, 8, 11
6.	Commercial Fisheries		X				a, b,	2, 8
7.	Recreational Fisheries		X			Salmon	a, b	2, 8
8.	Breeding/Spawning Areas			X		Pelagic Birds, Northern Sea Lions	a, b	2, 8
9.	Nursery Areas		X			English Sole	a, b	2, 8
10.	Feeding Areas			X		Harbor Seals, Brown Pelicans, Pelagic Birds, Northern & California Sea Lions	a, b	2, 8
11.	Migration Routes		X			Juveniles & Adults: Pelagic Birds, Whales, Pennipeds	a, b	2, 8
12.	Critical Habitats of Threatened or Endangered Species			X		Brown Pelicans, Peregrine Falcon, Migrants, Forage in Area	a, b	2, 8
13.	Spatial Distribution of Benthos			X			a, b	2, 8, 10
14.	Marine Mammals			X		Harbor Seals, Northern & California Sea Lions Whale Migration Route	a, b	2, 8
15.	Mineral Deposits		X			Offshore Placer Deposits	a, b, c	1, 8
16.	Navigation Hazard			X			a, b, d	1, 8
17.	Other Uses of Ocean (cables, pipelines, etc.)			X			a, b, d	8
18.	Degraded Areas			X			a, b, d	4, 6, 7
19.	Water Col. Chem/Phys. Characteristics			X			a, b, d	4, 6, 9
20.	Recreational Uses		X			Salmon/Reef Fish	a, b, c, d	2, 8, 11
21.	Cultural/Historic Sites			X			b	11
22.	Physical Oceanography: Waves/Circulation			X			a, b, d	1, 3, 6, 7
23.	Direction of Transport/Potential for Settlement		X			To Offshore Rocks	a, b, d	1, 3, 6, 7
24.	Monitoring			X			c	5
25.	Shape/Size of Site (orientation)			X			d	1, 4, 7
26.	Size of Buffer Zone		X			Offshore Rocks Adjacent to Site	b, d	2, 3, 4, 7, 11
27.	Potential of Cumulative Effects			X			c, d	4, 7

Table 3
Conflict Matrix

IV. AFFECTED ENVIRONMENT

General. A brief summary of existing conditions within the ZSF or specifically at the interim ODMDS is presented below and is the basis for evaluating the suitability of the site for ocean disposal. More detailed information on the affected environment is presented in the appendices which were reproduced from the Corps' Site Evaluation Report. Information regarding the nature and frequency of the sediments dredged from the Rogue navigation channel entrance is also provided.

Physical Environment.

General. The Rogue River estuary is surrounded by steep, rounded hills that gain 700 feet inelevation within a half-mile. Along the coastline, the beach extends inland about 200 yards before rising sharply into hilly terrain. Gold Beach, located on the Rogue River, acquired its name from the placer gold found in gravels beneath the sandy beach that were exposed by winter storm waves. Other metallic minerals located in the beach sands of the area include chromite, magnetite, platinum, and zircon.

The three external sources of sediment in the vicinity of the proposed disposal site, located 1.5 miles from the Rogue River entrance, are fluvial, dredging disposal, and coastal erosion. The primary fluvial source is the Rogue River which has a mean annual discharge of 7,800 cfs. Coastal erosion studies show that much of the shoreline north of the Rogue River is unstable and contributes a continuous amount of sediment to the littoral system. Disposal of dredged material at the ODMDS has contributed an average annual quantity of 47,500 cy of sediment.

Surface sediments within the proposed disposal site are uniformly fine sand. Most of the dredged material is coarse sand. Depths at the site range from 50 to 85 feet. There is no mound of disposal material apparent within the disposal site, indicating that most material is being dispersed by current and wave action. The coarseness of the Rogue River entrance sediments, isolation from existing or historical sources of contaminants, and the presence of strong hydraulic regimes lead to the presumption of clean material exempt from further testing according to provisions of 40 CFR 227.13(b). Water quality analysis conducted on samples taken from the entrance channel indicate that all water quality parameters are within normal ranges.

Physical sediment analysis of entrance channel material indicates it is poorly-sorted sand with small amounts of gravel towards the outer bar. Disposal site sediments are well-sorted, fine, sandy material. Percentages of volatile solids measured in dredged material samples averaged less than 3 percent, while those in the disposal area were less than 2.5 percent.

The ocean bottom in the vicinity of the interim disposal site slopes seaward fairly evenly at 8 on 1000 between the 36 to at least 72 feet contours. The bed is featureless except for what appears to be a 25-foot pinnacle a short distance beyond the southwest end of the disposal site. There is no mound of disposal material apparent within the disposal area. A May 1986 bathymetric survey showed a seaward displacement of the contours with respect to August, 1984 (appendix B). This aggravation is not caused by dredge material disposal, as the volume involved far exceeds that disposed of offshore during those years.

Geology. The surface sediments of the Rogue ZSF that were sampled in 1984 are uniformly fine sand. Mean grain size showed almost no variation, falling between 0.13 mm and 0.16 mm (Table B-2). The one possible exception is a band observed on the sidescan sonar that has been interpreted as a band of gravel or coarse sand. No samples were taken from the band, and it is possible that it is a sand dollar bed instead of gravel.

Sediment dredged from the Rogue River entrance channel are considerably coarser than the offshore sediments. Mean grain size ranged between 0.47 and 0.94 mm and is classified as medium to coarse sand. Samples contain as much as 10 percent gravel. The side channel leading to the boat basin consists of fine sand (0.21 mm) while the boat basin contains silt. The finest material traditionally has been disposed on land by pipeline dredge. A sample taken at the edge of the site is identical with the other native sediments.

Circulation and Currents. The nearshore mean circulation is alongshore, closely paralleling the bathymetric contours, with a lesser onshore-offshore component. Circulation patterns are variable with season and weather conditions. Monitoring of currents over a five year period indicated that the predominant nearshore current direction is to the south, with short 2 to 3 month periods each winter of currents to the north. At the disposal site, measured currents were generally north with slightly more of an onshore component in July. For the April-May period, the strongest currents were usually north along the bottom contours. The currents in July are mostly onshore, across bottom contours and northward. No significant current southward was recorded. Appendix B provides details of the sediment transport processes for the Rogue and the ODMDS.

Water and Sediment Quality. Water quality throughout the ZSF is expected to be typical for seawater of the Pacific Northwest. There is no reason to expect significant chemical contamination in either the water of sediments as few heavy industries are located along the estuary. Basic water quality parameters were taken in field sampling during collections of sediment samples from the channel. All of the values were within normal ranges for the Oregon coast. Sediment from Rogue River disposed at the ODMDS is clean sand. It is coarser than that of the ODMDS but within acceptable limits. Based on this information, there is expected to be no problem with continued disposal of these sediments at the proposed ODMDS site.

Biological Environment.

General. Aquatic resources of the ZSF are described in detail in Appendix A. The ODMDS site is located in the nearshore area and is typical of oceanic habitat common to the nearshore north Pacific Coast.

Benthic. The benthos of the Rogue offshore disposal site is typical of nearshore high energy environments. The community is dominated by the sand dollar, *Dendraster eccentricus*, and the surface-dwelling gastropod, *Olivella*. Polychaete annelids and gammarid amphipods inhabiting the study area were generally the more mobile sand-dwelling forms which tolerate or require high sediment flux. Densities of benthic infauna generally decreased as water depth increased. Distribution and abundance of inshore plankton species vary seasonally, with maximum abundance occurring in the summer months. Copepods are the dominant taxa, followed by crab and fish larvae.

Fishes. The nearshore area off Rogue River supports a variety of pelagic and demersal fish species. Pelagic species include salmon, steelhead, shad, Pacific herring, anchovy, smelt, and sea perch. Demersal species include a variety of flatfish, sculpins, sea perch, and rocky reef fish associated with the neritic reefs and the jetties.

The neritic reefs off Rogue River are a unique feature of the Oregon Coast. They are associated with bull kelp beds which provide important habitat and increase the overall productivity of the reef.

The predominant commercial fishery is for salmon and Dungeness crab. Some commercial and recreational clamming occurs in the intertidal mudflats of the bay and beaches. Recreational fishing is primarily for salmon and bottom fish. Most of the bottom fishing is in the vicinity of the reefs.

Wildlife. Numerous species of birds and marine mammals occur in the vicinity of the proposed disposal site. Information on most species of shorebirds is lacking, so their distribution and abundance can only be addressed in general terms. They occur along much of the coast primarily as migrants and/or winter residents. A few species of shorebirds, including western snowy plover and black oystercatcher, nest along the coast. Bald eagle, peregrine falcon, and brown pelican may occasionally use the area in the vicinity of the proposed disposal site. Information on marine mammals is also limited, except for seals and sea lions. An estimated 300-500 harbor seals occur in the waters around the Rogue River, and the Rogue River reef is the most important norther (Stellar) sea lion rookery (numbering about 1,500) in Oregon waters. Whales are known to occur throughout coastal waters during migration, but population estimates and information on areas of special use are not known.

Endangered Species. Portland District requested an endangered species listing for the ODMDS from U. S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as part of their coordination of the Site Evaluation Report. At that time only the brown pelican and the gray whale were listed. Based on previous biological assessments conducted along the Oregon coast regarding impacts to the brown pelican and the gray whale, it was concluded that no impact to either species is anticipated from the proposed designation and use. A letter of concurrance from the NMFS that no impacts to the brown pelican of gray whale would be anticipated is contained in appendix C. This information was presented to EPA in the final Site Evaluation Report. Subsequently, the Corps and EPA have been informed by the NMFS that they have revised their list of threatened/endangered species. Species listed by the NMFS now include the gray, humpback, blue, fin, sei, right, and sperm whales; northern (Steller) sea lions; leatherback sea turtles; and Sacramento River winter run chinook salmon. A biological assessment was prepared by the Corps for the Chetco ODMDS addressing the newly listed species and revising previous biological assessment on the gray whale. The assessment concluded that no impact to any of the species is anticipated by designation and use of ODMDS. Based on this and previous biological assessments conducted along the Oregon coast, no impacts to any threatened or endangered species are anticipated as a result of designation and continued use of the Rouge ODMDS.

Socioeconomic Environment.

General. The Rogue River enters the Pacific Ocean at the City of Gold Beach, Oregon. Gold Beach, which is the Curry County seat, has a population of 1,585, while Curry County's population is 17,100. The town was named for the gold which was discovered there in the early 1850s. Not long after its settlement, lumber manufacturing became its primary economic activity. Today, the wood products industry remains valuable, but the tourist and fishing industries are now becoming more important.

Natural Resource Harvesting (Commercial). Forest products in the form of lumber and raw logs have traditionally been the largest component of the local economy. Commercial fishing is the also among the largest industries of the area. Both depend on the Rogue River project to some degree.

Offshore deposits of black sand have been identified near the river mouth. Minerals of primary interest in black sands are gold, platinum and chromite, but the sands also contain other heavy metals. No mining is currently being undertaken.

Recreation. The Rogue River area is popular with recreationalists because of the coastal scenery and excellent fishing opportunities both offshore and in the Rogue River. The area is increasing in popularity as a small boat harbor and has excellent facilities for the many anglers who fish here annually. The offshore area also supports a moderate commercial fishery, primarily for salmon and Dungeness crab. Clams are also commercially harvested in the estuary. The fishing and tourist industries are the primary sources of income to the local economy. No significant mineral or petroleum deposits are known to exist in the vicinity of the proposed disposal site.

Cultural Resources. Cultural resource investigations indicate that no significant archeological or historic resources exist in the vicinity of the disposal site. A letter of concurrance from the SHPO is included in appendix C.

V. ENVIRONMENTAL CONSEQUENCES

General. The proposed action is the designation of a site to be available for ocean disposal of dredged material. Designation of the site itself is an administrative action that would not have any direct environmental effects; however, it would subject the site to use as an ocean disposal area. Although no significant impacts are predicted by this designation action, EPA has voluntarily committed to preparing and circulating EISs as part of the designation process. This EIS addresses the likely effects of disposal at the interim ODMDS based upon the Corps' current operation and maintenance dredging program for the Rogue River navigation project. A separate evaluation of the suitability of dredged material and disposal impacts will be conducted for each proposed disposal action by the Corps as required under Section 103 of the MPRSA. EPA independently reviews all proposed ocean disposals of dredged material.

Chemical Effects. Continued disposal of dredged material at the proposed ODMDS would not have a significant effect on the physical environment. The material consists of clean sand, coarser than that present at the disposal site, but still compatible for disposal on the sandy bottom. The dredged material would disperse from the site in the littoral drift system with movement expected to be to the north and offshore during the winter and lesser movement to the south in summer. No mounding is expected to occur.

Sediments proposed for ocean disposal require evaluation following the tiered testing guidance described in the joint EPA/Corps national framework, *Evaluation of Dredged Material Proposed for Ocean Disposal: Testing Manual* (February 1991). Sediment characterization, including chemical and biological testing as needed, has been a standard practice for several years in this region. The material dredged from the Rogue navigation channel meets the exclusion criteria defined in 40 CFR 227.13(b). Sediment characteristics are periodically reexamined by the Corps and EPA.

Biological Effects. Impacts on the biological environment would be primarily to the benthic community. Some mortality could occur as a result of smothering. Most of the benthic species present are motile and have adapted to a high energy environment with shifting sands. Therefore, most would likely survive the effects of disposal. In addition, rapid recolonization would occur from surrounding areas since the sediments would be compatible.

Larger, more motile organisms such as fish, birds, and marine mammal species would probably avoid the disposal activity or move out once it begins. They would likely be exposed to short-term turbidity at most. Therefore, impacts are expected to be limited to disturbance rather than injury or mortality.

No significant impact is anticipated from the designation or continued use of the ODMDS to threatened/endangered species.

Socioeconomic Effects. The designation and use of an ODMDS for dredged material off the mouth of the Rogue River would allow the continued maintenance of the navigation channel. This would result in waterborne commerce remaining an component of the local economy. If a site is not designated, maintenance dredging may ultimately cease for lack of adequate disposal sites, or other, potentially more environmentally sensitive habitats (e.g., wetlands) would be used. If maintenance dredging of the channel ceases, the channel would shoal in and become unsafe or unusable. Shipping and fishing traffic would have to be directed through other ports and the local economy would suffer.

There are black sands containing heavy metals in the disposal area that may be impacted, but are not currently mined. Potential exploitation of these resources would not be impacted by disposal at the ODMDS as the strong currents and wave action continually moves the material out of the site.

No impacts to recreation are expected to occur. Recreational fishery resources would be temporarily displaced during disposal operations. Time delays for recreational boaters caused by the passing of the dredge or an increase in navigation hazards during congested periods could occur. Conflicts such as these can be considered an inconvenience rather than a threat to recreational activity.

There could be a short-term reduction in aesthetics at the disposal site as a result of turbidity following disposal. The material would settle rapidly and not affect any areas outside of the disposal area. Minor impacts, such as changes in sand color, could occur on the adjacent beach, but these impacts would be short-term and would not be considered objectionable.

It is unlikely that any cultural resources are present in the proposed disposal site. Therefore, designation or use of the site is not expected to have any impact on cultural resources.

Coastal Zone Management. In reviewing proposed ocean disposal sites for consistency with the Coastal Zone Management (CZM) plan, they are evaluated against Oregon's Statewide Goal 19 (Ocean Resources). Local jurisdiction does not extend beyond the baseline for territorial seas and, therefore, local plans do not address offshore sites. Goal 19 requires that agencies determine the impact of proposed projects or actions. Paragraph 2.g of Goal 19 specifically addresses dredged material disposal. It states that agencies shall "provide for suitable sites and practices for the open sea discharge of dredged material which do not substantially interfere with or detract from the use of the continental shelf for fishing, navigation, or recreation, or from the long-term protection of renewable resources." Decisions to take an action, such as designating an ocean disposal site, are to be preceded by an inventory and based on sound information and on an understanding of the resources and potential impacts. In addition, there should be a contingency plan and emergency procedures to be followed in the event that the operation results in conditions which threaten to damage the environment.

Ocean disposal sites for dredged material are designated following guidelines prepared by the EPA (Ocean Dumping Regulations). Site selection is to be based on studies and an evaluation of the potential impacts (40 CFR Part 228.4 [e]). This meets the requirements of State Goal 19 for decisions to be based on inventory and a sound understanding of impacts. The five general and eleven specific criteria for the designation of a site presented in 40 CFR 228.5 and 228.6 outline the type of studies to be conducted and the resources to be considered. According to 40 CFR Part 228.5(a), ocean disposal will only be allowed at sites "selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation." Monitoring is to be conducted at ocean disposal sites. If adverse effects are observed, use of the site may be modified or terminated. The requirements of the ocean dumping regulations are broad enough to meet the need of Goal 19. Therefore, the designation of this site for ocean disposal of dredged material following the ocean dumping regulations would be consistent with Goal 19 and the State of Oregon's Coastal Zone Management Plan.

During coordination of the Site Evaluation Report, the Corps made a determination of consistency with Coastal Zone Management plans. A letter of concurrance was provided by the Oregon Department of Land Conservation and Development, the state coastal zone management office (appendix C). EPA also concludes that designation of the proposed site is consistent to the maximum extent practicable with the state coastal management program.

Unavoidable Adverse Impacts. Designation of an ODMDS would allow continued dredging and disposal of dredged material from the Rogue River entrance channel with attendant effects.

Relationship Between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity. Disposal of dredged material at the interim ODMDS would have a unquantifiable, but apparently minor short- and long-term effect of the productivity of the ocean environment. Use of the ODMDS would have a long-term beneficial effect on the economy of the city of Gold Beach and Curry County.

Irreversible and Irretrievable Commitments of Resources. Permanent designation of the interim ODMDS for disposal would commit the site and its resources primarily to that use. Other uses such as oil and gas explorations, and to varying degrees, mining, fishing, and use by certain aquatic species, would be constrained or precluded.

VI. COORDINATION

Coordination By the Corps of Engineers. Procedures used in this evaluation and the proposed continued use of the interim site were discussed with the following State and federal agencies by the Portland District, Corps of Engineers, to support their site designation studies and preparation of their Site Evaluation Report:

- U.S. Coast Guard
- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- U.S. Environmental Protection Agency
- Oregon Department of Fish and Wildlife
- Oregon Department of Environmental Quality
- Oregon State Historic Preservation Officer
- Oregon Division of State Lands

The agencies were briefed on the proposed technique from the task force workbook and existing information was requested of them. Copies of the draft Site Evaluation Report were provided to them by the Corps and their comments on the draft were formally requested. Letters received are included in Appendix C.

The proposed federal action requires concurrence or consistency for three federal laws from the responsible agencies as indicated below.

- Endangered Species Act of 1973, as amended from U.S. Fish & Wildlife Service National Marine Fisheries Service

- National Historic Preservation Act of 1966, as amended, State Historic Preservation Officer

- Coastal Zone Management Act of 1972, as amended, Oregon Department of Land Conservation and Development

Consistency or preliminary concurrence letters from the above agencies are included in Appendix C. State water quality certifications, as required by Section 401 of the Clean Water Act, will be obtained for individual dredging actions as part of the normal permitting of federal project approval process.

Coordination By EPA. Coordination with the Portland District was maintained throughout the site designation studies and during preparation of their Site Evaluation Report. A copy of that report was reviewed by EPA. EPA has voluntarily committed to prepare and circulate EISs for site designation actions. A Notice of Intent to Prepare an Environmental Impact Statement on the final designation of an adjusted ODMDS site off Rogue River, Oregon, was published in the **Federal Register** on Monday, October 2, 1989. The Site Evaluation Report submitted by Region 10, EPA, by the Corps was used as the basis for preparation of this draft EIS. A formal 45-day public review period will allow comments to be received from all State and local agencies, and private groups and individuals on this proposed designation by EPA. A list of those who received the draft EIS for comment may be requested. Many of the same agencies that reviewed the Corps' Site Evaluation Report will receive this draft EIS.

As a separate but concurrent action, EPA will publish a proposed rule in the **Federal Register** for formal designation of the interim Rogue ODMDS. There is a 45-day public review period for the draft rule also. It is planned that the public review periods for the draft EIS and proposed rule be concurrent. However, comments will be accepted on either the draft EIS or proposed rule until the end of the latest 45-day period. Comments will be responded to in the final EIS and rule.

VII. LIST OF PREPARERS

Disposal site studies were designed and conducted by the Corps, in consultation with EPA, and a Site Evaluation Report was prepared by the Portland District, Corps of engineers. That document was submitted to EPA for review and processing for formal designation by the Regional Administrator, Region 10. The Corps' Site Evaluation Report was used by EPA as the basis of this draft EIS. The Technical Appendices from the Site Evaluation Report are reproduced as appendices to the EIS.

Preparation of draft EIS:

U. S. Environmental Protection Agency:

John Malek	Ocean Dumping Coordinator and Project Officer

Jones & Stokes Associates, Inc.:

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Preparation of Site Evaluation Report and Technical Appendices:

U. S. Army Corps of Engineers, Portland District:

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Stephan A. Chesser	Oceanographer
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Geoffrey L. Dorsey	Wildlife Biologist
Steven J. Stevens	Landscape Architect
Michael A. Martin	Archeologist
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APPENDIX A

APPENDIX A

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APPENDIX A

LIVING RESOURCES

Introduction

1.1 Information on aquatic resources was obtained from a field sampling program conducted in May 1984. There was also a thorough utilization of published and unpublished reports, theses, and personal communications with the ODFW Marine Resources Division biologists. Critical resources were determined primarily by whether the resource was unique to the area or was in limited abundance along the Oregon coast.

Plankton and Fish Larvae

1.2 Distribution and abundance of inshore plankton species vary depending upon nearshore oceanographic conditions. In the summer when the wind is predominantly from the northwest, surface water is moving south and away from the shore. Colder, more saline, nutrient-rich water then moves up from the depths onto the shore. This upwelling phenomenon can extend up to 10 km offshore and last from days to weeks depending upon the strength and duration of the wind. Zooplankton taxa during this time are predominantly those from subarctic water masses.

1.3 In the winter, the wind is primarily out of the west and southwest, and surface waters are transported inshore. The zooplankton community during this time of the year consists of species from the transitional or Central Pacific water masses.

1.4 No specific data is available for the area offshore from the Rogue River. However, Peterson and Miller (1976), and Peterson et al. (1979), have sampled the zooplankton community off Yaquina River and found copepods to be the dominant taxa. The species present varied with season. Of the 58 total species collected, 38 were collected in the summer and 51 in the winter. Eight occurred commonly in both summer and winter while seven occurred only or predominantly in the summer and six in the winter. A list of dominant summer and winter species is given below (Table A-1). In general, winter species are less abundant than summer species.

Table A-1
Dominant Copepod Species by Season
in Decreasing Order of Abundance

Winter Species	Summer Species
Pseudocalanus sp.	Pseudocalanus sp.
Oithona similis	Acartia clausii
Paracalanus parvus	Acartia longiremis
Acartia longiremis	Calanus marshallae
	Centrophages abdominalis
	Oithona similis

1.5 Other taxa collected were of minor importance as compared with the copepod abundance except for a few organisms during parts of the year. (A list of the other taxa collected is given in Tables A-2 and A-3.)

1.6 The other plankton species of importance is the megalops larval stage of the Dungeness crab (Cancer magister). Lough (1976) has reported that megalops occur inshore from January to May and are apparently retained there by the strong alongshore and onshore components of the surface currents in the winter. The megalops metamorphose into juvenile crabs and settle out of the plankton, moving into rearing areas in the estuary, or in quiet offshore waters.

1.7 Fish larvae are a transient member of the inshore coastal plankton community. Their abundance and distribution have been described by Richardson (1973), Richardson and Pearcy (1977), and Richardson et al. (1980).

1.8 Three species assemblages have been described off the Oregon coast: coastal, transitional, and offshore. In general, the species in the coastal and offshore assemblages never overlap while the transitional species overlapped both groups. The break between the coastal and transitional groups occurs at the continental shelf break, traditionally described as 200 meters in depth.

1.9 The coastal group is dominated by smelt (Osmeridae) which made up over 50 percent of the larvae collected. Other dominant species include the English sole (Parophrys vetulus), Butter Sole (Isopsetta isolepis), starry flounder (Platichthys stellatus), and tom cod (Microgadus proximus). Maximum abundance occurs from February to July when greater than 90 percent of the larvae were collected. Two peaks of abundance are present during this period; one in February and March (24 percent of larvae) and one in May to July (68 percent of larvae) following upwelling. Dominant species during each peak are shown below (Table A-4).

1.10 The results of the studies off Yaquina Bay indicate that the larval species present in the inshore coastal areas were similar and had the same peaks of abundance as those collected in Yaquina River; however, the dominant species differed. In Yaquina Bay, two species accounted for 90 percent of the species collected, the bay goby (Lepidogobius lepidus) and the Pacific herring (Clupea harengus pallasi). Neither were present in the inshore coastal area. Starry flounder spawn in the area to the north of the estuary and the juveniles use the estuary as juvenile rearing areas. English sole probably use the estuary as a rearing area. Because oceanographic conditions are similar over much of the Central Oregon coast, it is likely that zooplankton and larval population dynamics are similar between Rogue and Yaquina ocean disposal areas.

Benthic Invertebrates

1.11 Benthic invertebrates play an important role in secondary productivity in nearshore marine systems. They are not only a direct source of food for many demersal fishes but play an active part in the shredding and breakdown of organic material and in sediment reworking.

TAXA	TOTAL RELATIVE DENSITY			FREQUENCY		
	1969	1970	1971	69	70	71
Calanus nauplii	119.5	695.5	172.7	21	40	28
Other Copepod nauplii	43.1	68.1	52.3	10	20	20
Amphipods	8.5	18.5	15.7	5	15	14
Euphausiid nauplii	46.3	85.9	84.0	5	26	18
Euphausiid calyptopis	13.3	14.5	17.2	4	17	11
Euphausiid furcilia	30.2	13.6	17.7	14	20	10
Thysanoessa spinifera	35.4	4.0	87.3	2	7	11
Evadne nordmanni	73.7	58.9	9.8	17	26	2
Podon leukarti	2.8	115.3	5.2	2	12	1
Pteropods	10.2	24.6	60.6	11	22	35
Chaetognaths	89.4	50.3	30.8	25	33	34
Oikopleura	69.2	85.7	66.5	11	15	21
Ctenophores	6.0	2.5	34.9	7	5	19
Scyphomedusae	22.9	70.9	22.8	13	28	22
decapod shrimp mysis	142.7	52.6	45.3	16	24	22
barnacle nauplii	59.3	168.3	231.4	8	32	28
barnacle cypris	4.4	64.0	8.3	2	19	10
polychaete post-trochophores	16.2	20.1	21.4	5	23	15
bivalve veligers	170.5	258.9	68.3	20	40	27
gastropod veligers	28.9	79.2	42.2	16	33	23
hydromedusae	6.1	3.2	10.3	2	2	11
unidentified annelid without parapodia	8.2	23.1	35.8	3	3	16
pluteus	0.0	16.0	117.6	0	5	11
large round eggs (fish)	36.8	25.0	17.8	11	13	12
Calanus eggs	870.1[a]	168.7	226.1	10	28	25
euphausiid eggs, early	55.0	686.1	449.6	11	29	24
euphausiid eggs, late	70.0	57.5	39.6	2	16	14
other fish eggs	19.1	35.1	34.3	12	18	18

a = biased by a single observation of 760 individuals/m^3.

The following taxa were found in less than five samples: radiolarians, foraminifera, siphonophores, planula larva, trochophores, *Tomopteris*, heteropods, *Clione*, phoronid larva, ascidian larva, salps, auricularia larva, imm starfish, decapod protozoeas, unusual barnacle nauplii, *Stylocheiron abbreviatum*, anchovy eggs, and four miscellaneous unidentified meroplanktonic taxa.

Total relative density and frequency of occurrence of other holoplanktonic taxa and meroplankton taken within 18 km of the coast during 1969, 1970 and 1971 upwelling seasons. Table entries are sums of average abundances at each of four stations.[1]

Table A-2
Other Taxa Collected

TAXA	TOTAL RELATIVE DENSITY			FREQUENCY		
	1969-70	1970-71	1971-72	69-70	70-71	71-72
Calanus nauplii	1188.7a	165.9	35.1	10	15	15
Other Copepod nauplii	29.1	122.5a	20.2	11	13	12
Amphipods	5.9	4.8	5.0	12	4	10
Euphausiid nauplii	2.8	108.4a	3.4	4	5	4
Euphausiid calyptopis	6.4	56.1a	14.5	13	4	8
Euphausiid furcilia	3.1	0.4	7.6	7	2	5
Evadne nordmanni	5.8	24.1	4.8	2	2	4
Podon leukarti	126.3a	27.3	116.4a	4	2	4
Pteropods (*Limacina*)	66.0	88.0	14.2	17	15	13
Chaetognaths	62.9	47.4	22.4	20	19	13
Oikopleura spp.	551.9	101.2	75.6	22	16	15
Ctenophores	7.0	6.2	10.3	8	8	9
Scyphomedusae	10.0	94.3	16.6	5	6	10
Salps	0.9b	***	***	9	0	0
Isopods	0.5	0.7	***	2	3	0
Mysids	0.2	3.3	2.1	2	1	2
decapod shrimp mysis	3.1	21.4	5.6	7	10	11
barnacle nauplii	309.1	192.7	77.9	11	6	12
barnacle cypris	8.7	188.1a	16.8	4	4	12
polychaete post-trochophores	41.5	13.5	70.8	12	8	11
bivalve veligers	87.8	98.2	118.4	20	18	15
gastropod veligers, assorted	31.3	27.6	37.2	19	18	15
gastropod A	***	1.0	***	0	6	0
hydromedusae	9.2	1.8	3.3	4	2	3
annelids lacking parapodia	40.0	74.9	21.9	5	4	11
echinoderm pluteus	41.7	0.8	22.1	5	2	4
large round eggs (fish)	9.0	5.5	4.9	6	11	8
Calanus eggs	36.5	36.7	4.7	10	11	4
euphausiid eggs	***	274.7a	2.8	0	6	3

a = high value the result of one station or sampling date
b = a value of 34.3/m^3 on 29 October 1969 was ommitted from the summation

The following taxa were found in less than five samples: The euphausiids *Thysanoessa spinifera* and *Euphausia pacifica*, amphipod larvae and eggs, ostracods, cumaceans, siphonophores, *Sagitta scrippsii*, *S. bierii*, *S. minima*, *Lepas* nauplii, other unidentified barnacle nauplii, echinoderm bipinnaria, imm. starfish, imm. sea urchins, planula larvae, trochophores, foraminifera, radiolarians, *Tomopteris*, cyphonautes larvae, other fish eggs, and six miscellaneous unidentified meroplanktonic taxa.

Total relative density and frequency of occurrence of other holoplanktonic and meroplanktonic taxa taken within 18 km of the coast during three winters. Table entries are sums of relative densities at each of four stations.[1]

Table A-3
Other Taxa Collected

Table A-4
Dominant Fish Larval Species During the Two Peaks of Abundance

Species	February to March	May to July
Smelt (Osmeridae)	1.51*	4.12
English sole (Parophrys vetulus)	4.09	
Sandlance (Ammodytes hexapterus)	1.76	
Butter Sole (Isopsetta isolepis)	1.73	2.21
Tom cod (Microgadus proximus)		2.03
Slender sole (Lyopsetta exilis)		1.07

* Biological index--Ranking method that averages abundance and frequency of occurrence in samples. 5 to 1 in decreasing order.

1.12 Knowledge of the nearshore benthic communities off the central Oregon coast is scant. A literature review conducted by Portland District indicated that only six quantitative benthic studies have been conducted in nearshore coastal waters off Oregon.

1.13 Investigations include evaluating offshore disposal sites near the mouth of the Columbia River by Richardson et al. (1977), a quantitative study of the meiobenthos north of Yaquina River (Hogue 1982) and an outfall study for the International Paper Company's outfall near Gardiner, Oregon (Unpublished, n.d.). In addition, site-specific studies of ocean disposal for the selection of the Coos Bay (Hancock et al. 1981; Nelson et al. 1983; and Sollitt et al. 1984) and Yaquina Bay ODMDS have been completed (COE 1985). These studies comprise the total benthic infaunal data base available for the Oregon coast. All but one of these benthic studies were sponsored by Portland District.

1.14 To provide site-specific benthic information to supplement these data and characterize the Rogue interim disposal site, Portland District collected and analyzed benthic samples as described below and observed bottom conditions via an underwater video camera.

1.15 Stations were located on the 70-, 80-, and 90-foot depth contours along a diagonal line through the interim disposal site. Two reference stations were sampled north and south of the disposal site in 80 feet of water depth as shown in Figure A-1. Six replicate bottom samples were taken from each station using a modified Gray-O'Hara box-corer which sampled a 0.096m area of the bottom. One sample from each station was sent to the COE North Pacific Division Materials Testing Laboratory for determination of sediment grain size and organic content. The remaining five box-core samples were sieved through a 0.5mm mesh screen. Organisms retained on the screen were preserved in 10 percent buffered formalin. Infaunal organisms were then picked from the sediment, counted, and identified to the lowest practical taxon.

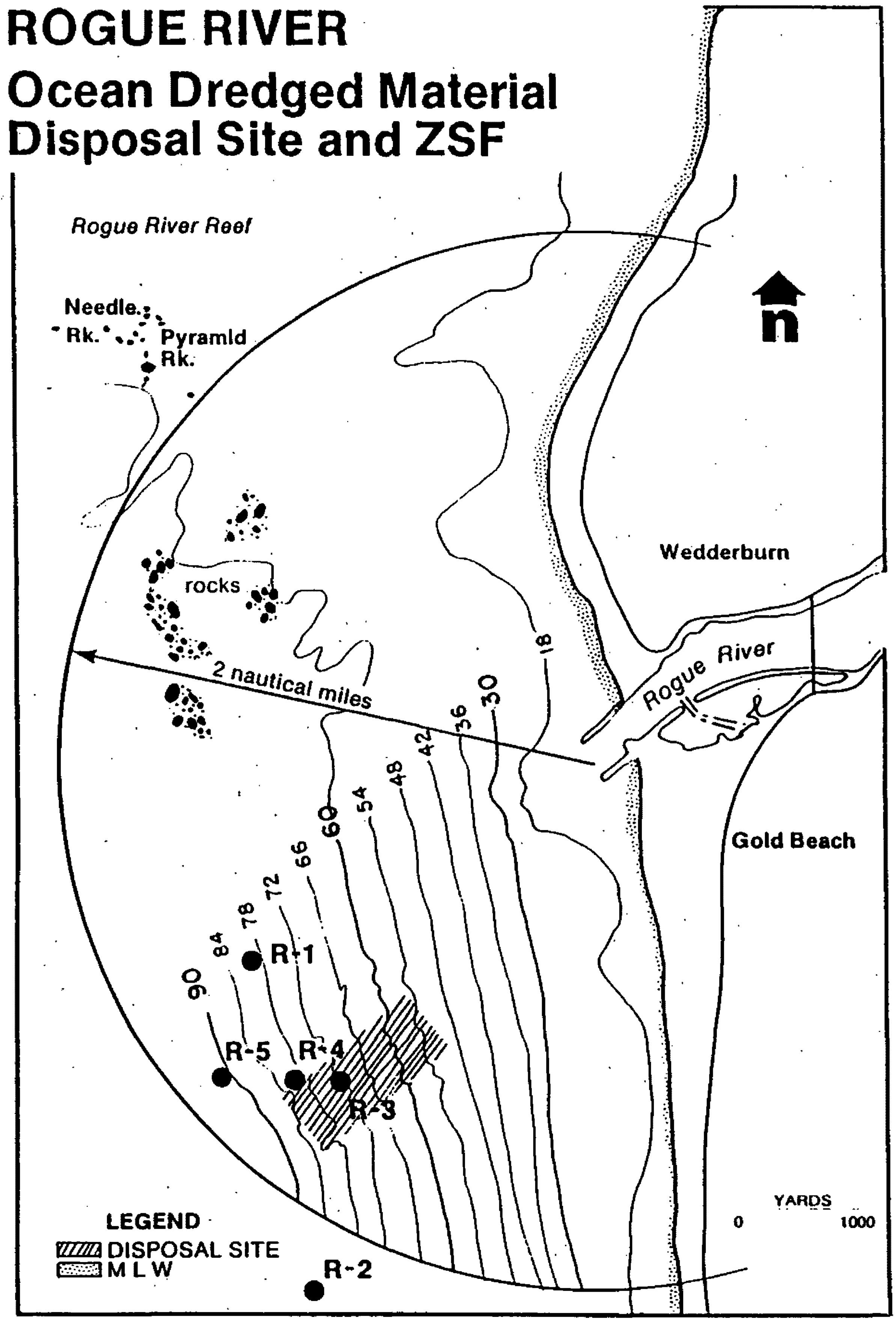


Figure A-1
Sampling Sites

Results

1.16 Sediments from the stations in the region of the Rogue Interim ODMDS consist of fine grained coastal sands (Table B-2). There was no evidence of rocky outcroppings in the study areas.

1.17 The benthos of the Rogue offshore disposal site is typical of other Pacific northwest nearshore high energy environments. The video reconnaissance of the interim disposal site depicts a sandy bottom with a distinct pattern of wave troughs. The snail, Olivella, was the dominant epibenthic form visible in the video photographs.

1.18 The infaunal community of the Rogue River study area is dominated by gammarid amphipods and polychaete worms (Figure A-2). The gammarid amphipods had higher densities than the polychaetes and belonged to a somewhat wider mix of genera than found at other Oregon interim disposal sites. These included members of the genera Ampelisca, Corophium, Eohaustorius, Mandibulophoxus and Rhephoxynius. Gastropods and cumaceans were consistently found in the samples (Figure A-3). For most species, higher abundances were present at stations in the interim disposal site. The species of invertebrates inhabiting the sandy habitat of the study area are the more motile psammnetic (sand-dwelling) forms which tolerate or require high sediment flux. They are typical of other shallow water disposal sites such as Coos bay sites E and F (Hancock et al. 1981).

1.19 The northern-most reference station, R-1, exhibited fewer taxa of both polychaete annelids and amphipods. The southern reference station, R-2, also exhibited fewer taxa of polychaetes, but the number of amphipods was similar to each of the mid-transect stations (R-3, R-4, R-5). This result is different from that in COE studies at other Pacific NW ocean disposal sites. The normal trend has been reduced faunal abundances in the area impacted by the dredged material disposal. The factors causing this trend cannot be ascertained because of this study's limited scope and duration.

1.20 In general, the mean density (#/m2) of benthic infauna were low compared to other coastal disposal sites that have been evaluated. Density at the 70- and 80-foot stations at the Rogue interim disposal were 416 and 466/m2 respectively (Figure A-4).

1.21 Diversity (H'), Species Richness and Equitability (J') of benthic infauna for the Rogue interim site are shown in Figure A-5. There is no significant difference between the stations located within the disposal site and the reference sites to the north and south.

1.22 The Rogue offshore disposal site received no dredged sediments in 1984 and 40,095 cy in 1985 from hopper dredges. The data on the abundances and diversity of benthic infauna, however, indicate no diminished values at the disposal site.

1.23 Although the interim disposal site off Rogue River has frequently received dredged sediments, the adjacent fauna show little evidence of impacts. In fact, they exhibit higher levels of abundance for some taxonomic groups than do the reference sites (Figure A-4). The higher densities may be caused by enrichment from the disposal site or just a natural variation.

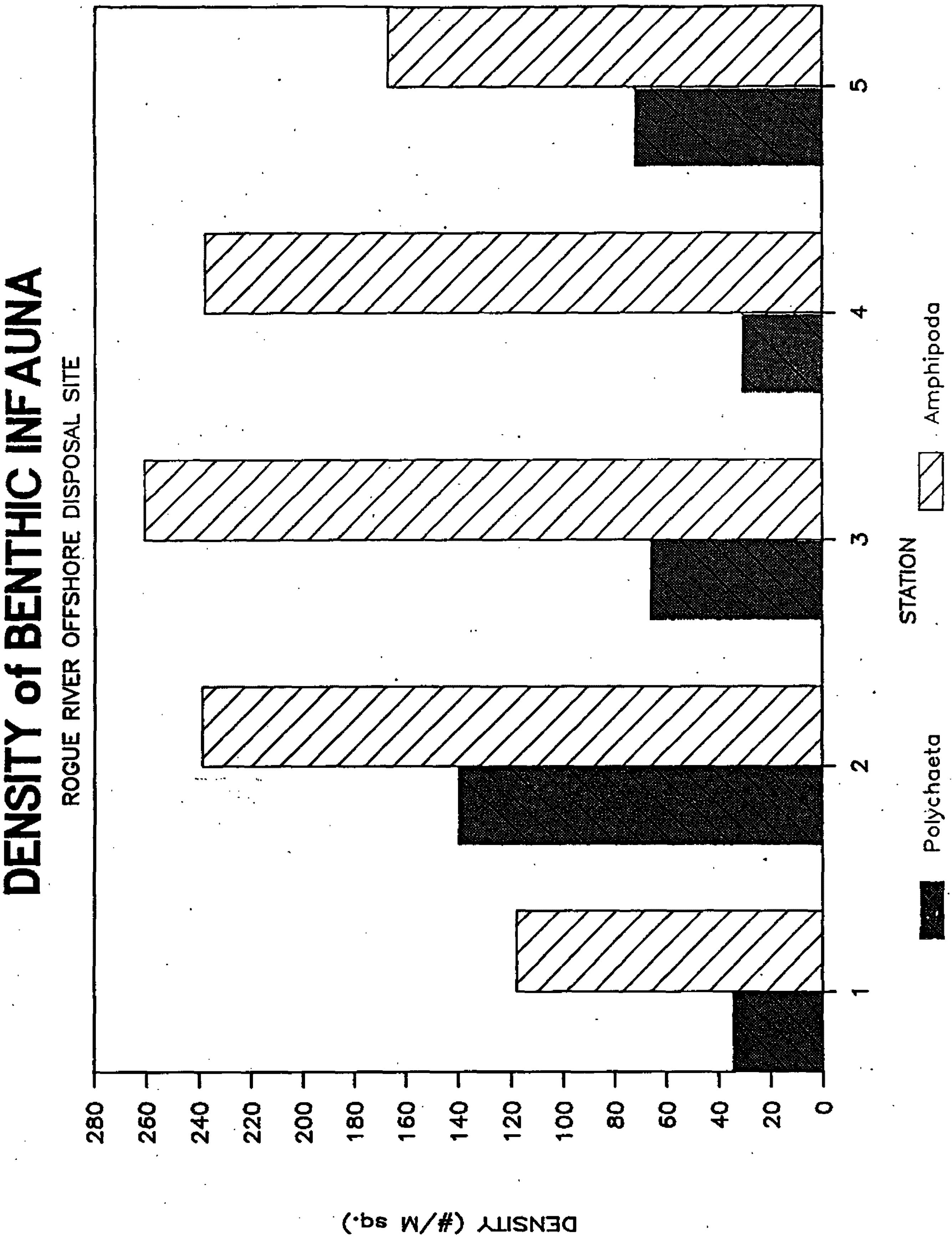


Figure A-2
Density of Polychaetes and Crustaceans
at the Rogue River Disposal Site (#/m2)

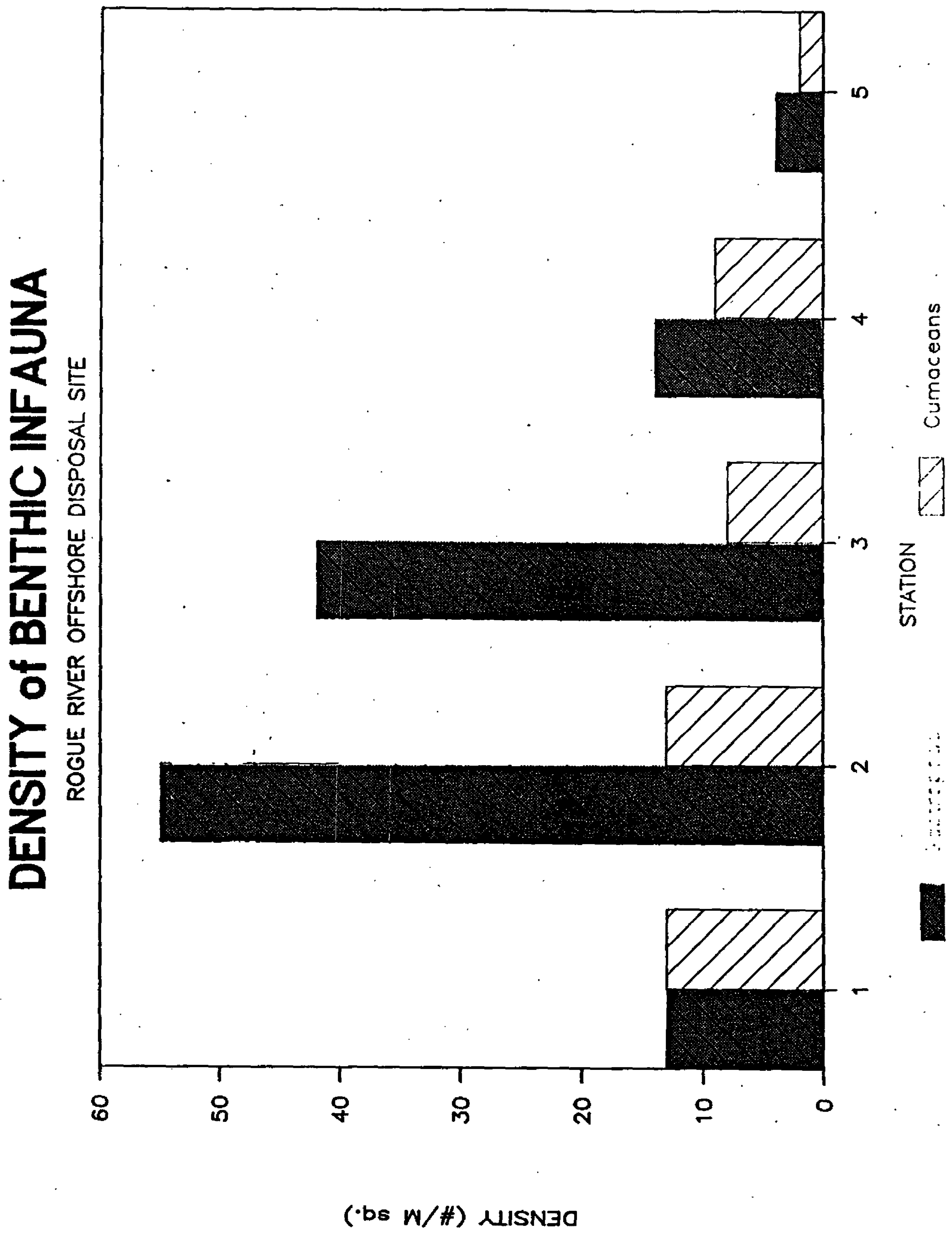


Figure A-3
Density of Gastropods and Cumaceans at the Rogue River Site (#/m2)

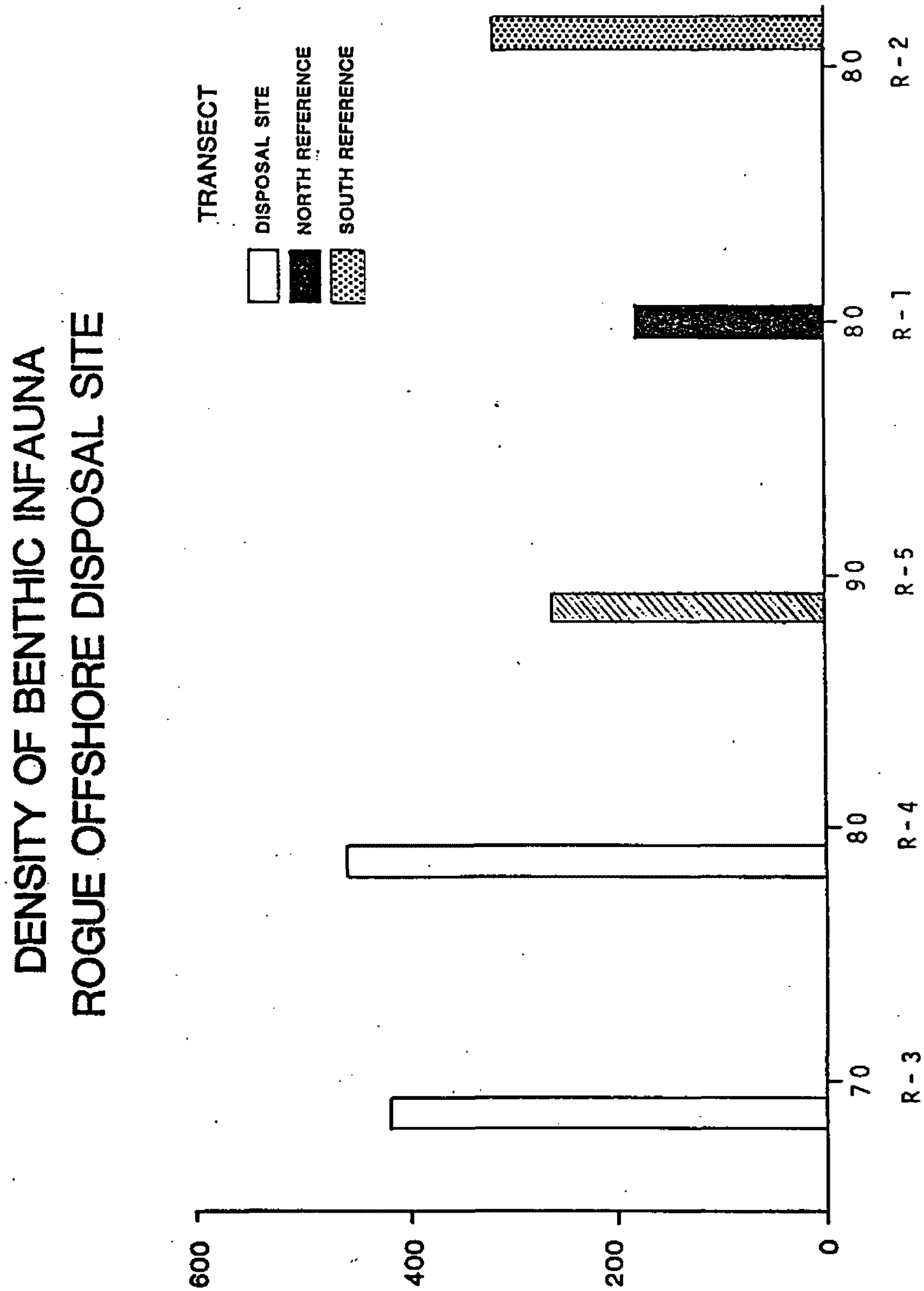


Figure A-4
Density of Benthic Infauna

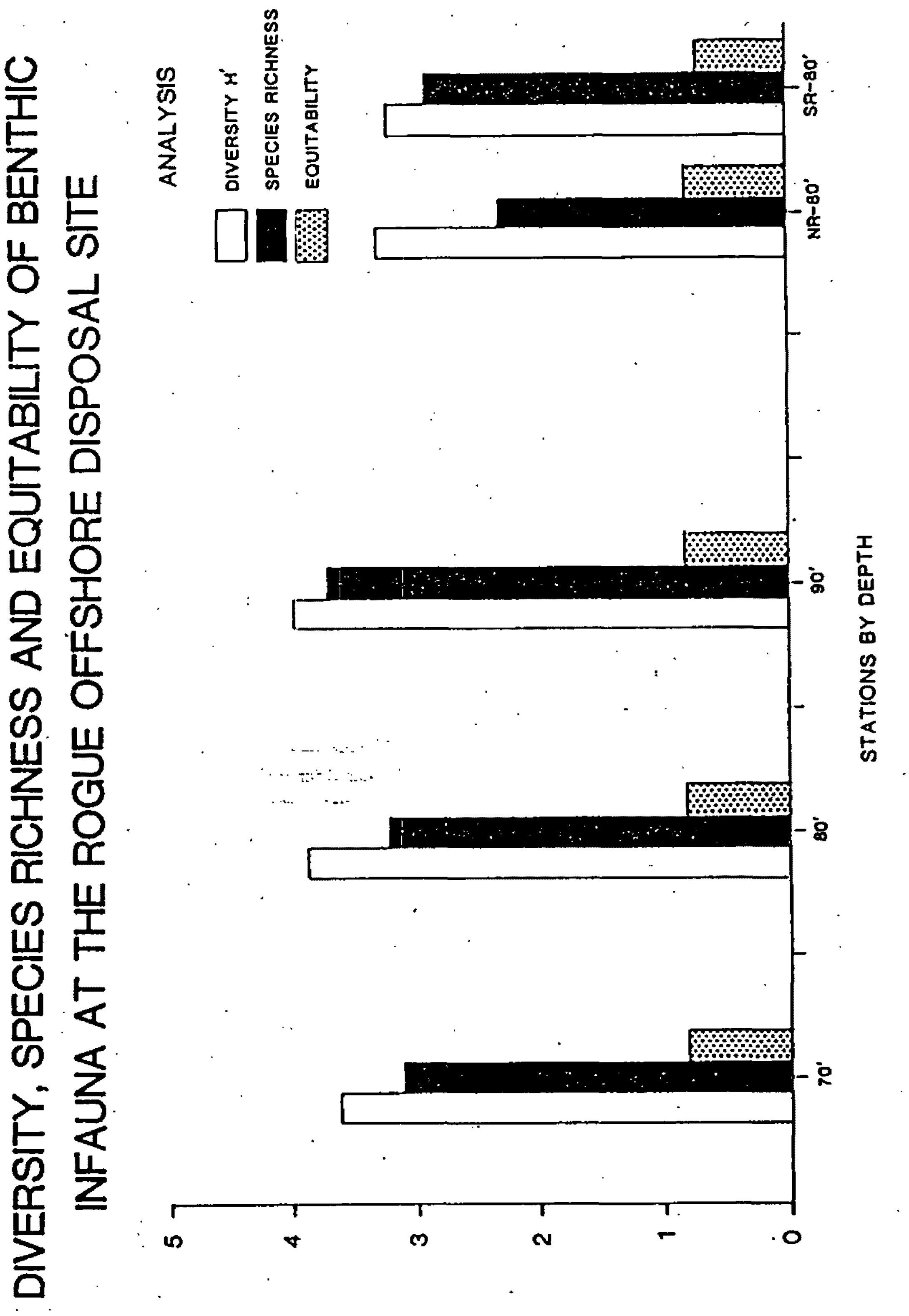


Figure A-5
Diversity, Species Richness and Equitability of Benthic Infauna

Macroinvertebrates

1.24 The dominant commercially and recreationally important macroinvertebrate species in the inshore coastal area are shellfish, Dungeness crab and squid. Shellfish distribution is shown in Figure A-6.

1.25 Razor clam beds are located north of the jetty along the beach. It is generally thought that recruitment of razor clams to the inshore beaches comes from subtidal spawning areas. Limited stocks of abalone may occur in the rocky areas northwest of the estuary. Existing stocks are thought to be remnants of an ODFW program to introduce abalone to central Oregon. The stocks are considered no longer viable due to inhibited natural spawning resulting from the colder water temperatures.

1.26 Gaper clams, cockles, and Pittock clams likely occur near the mouth and upriver in the estuary proper. Dungeness crab adults occur on sandflat habitat along the entire Oregon coast. They spawn in offshore areas and occur in the estuary when conditions are favorable in late summer and fall.

1.27 Although ODFW has not conducted any spawning surveys along the southern Oregon coast, market squid may spawn in the nearshore areas. Egg casings have been found attached to crab pots in the area. Squid spawning areas change yearly, however, depending upon nearshore oceanic conditions.

Fisheries

1.28 The nearshore area off Rogue River supports a variety of pelagic and demersal fish species. Pelagic species include anadromous salmon, steelhead, cutthroat trout, and shad that migrate through the estuaries to upriver spawning areas (ODFW, 1979). Other pelagic species include the Pacific herring, northern anchovy, surf smelt, and sea perch. Surf smelt, northern anchovy, pacific herring and shiner perch are abundant in the estuary in late summer and fall (ODFW 1979).

1.29 Though migratory species are present year around, individual species are only present during certain times of the year. Figure A-7 lists the species of anadromous salmonids and their periods of occurrence off the Rogue River.

1.30 Demersal species present in the inshore area are mostly residents and include a number of sculpins, sea perch and rocky reef fish that are associated with the reefs to the northwest of the estuary and the jetties, as well as flatfish species occurring predominantly over open sandflats. Flatfish species include English sole, sanddab, and starry flounder. The English sole and starry flounder, along with the sandsole, spawn in the inshore coastal area in the summer and juveniles of these, as well as other marine species, may rear in the estuary.

1.31 The rocky reef areas offshore from the Rogue River are a common feature of the southern Oregon coast. They are associated with (Macrocystis pyrifera) beds. These kelp beds provide important invertebrate and fish habitat and increase the overall productivity of the reef. A 1954 survey (Waldron 1954), indicated approximately 61 acres of kelp beds off Rogue River.

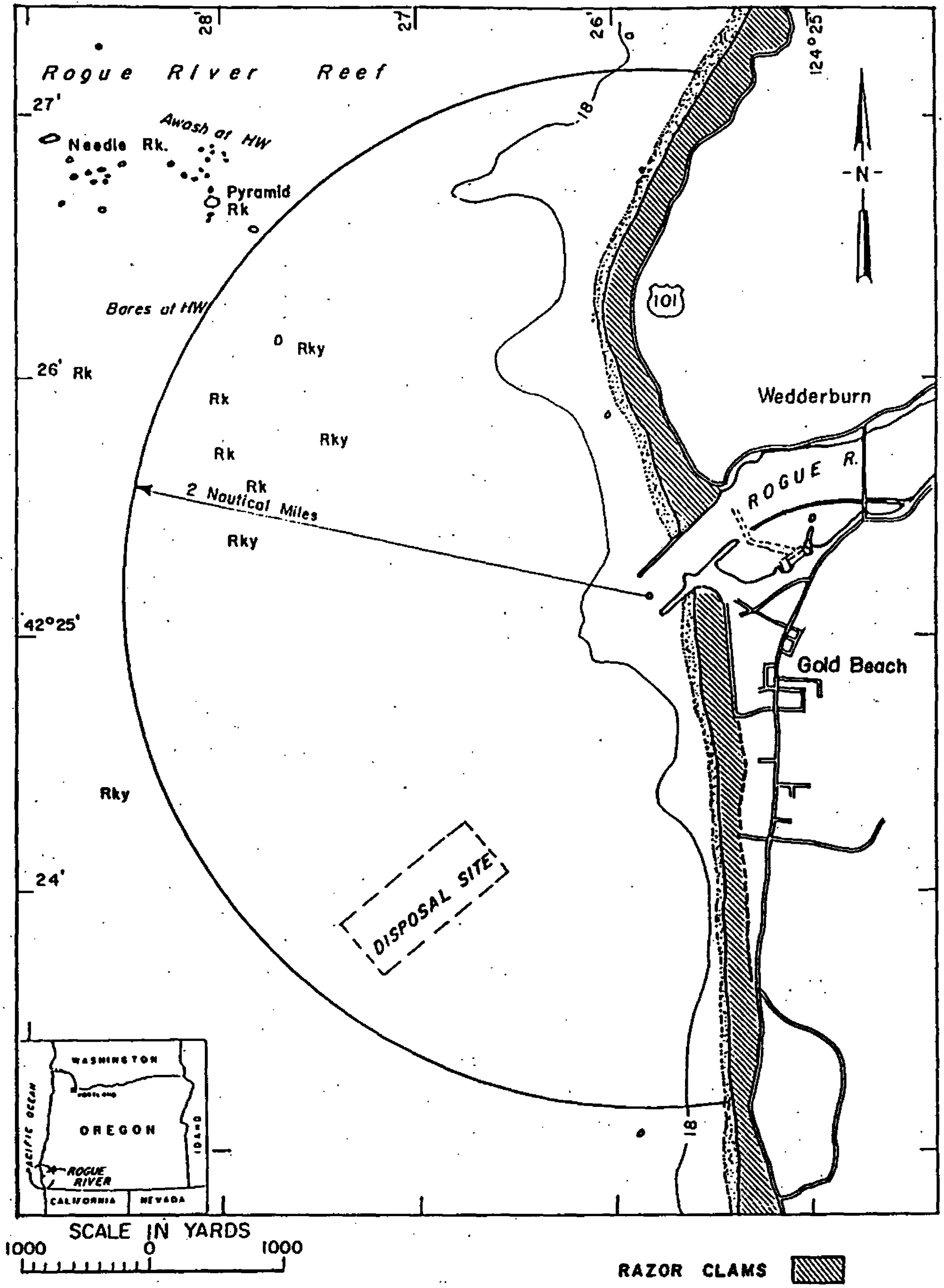
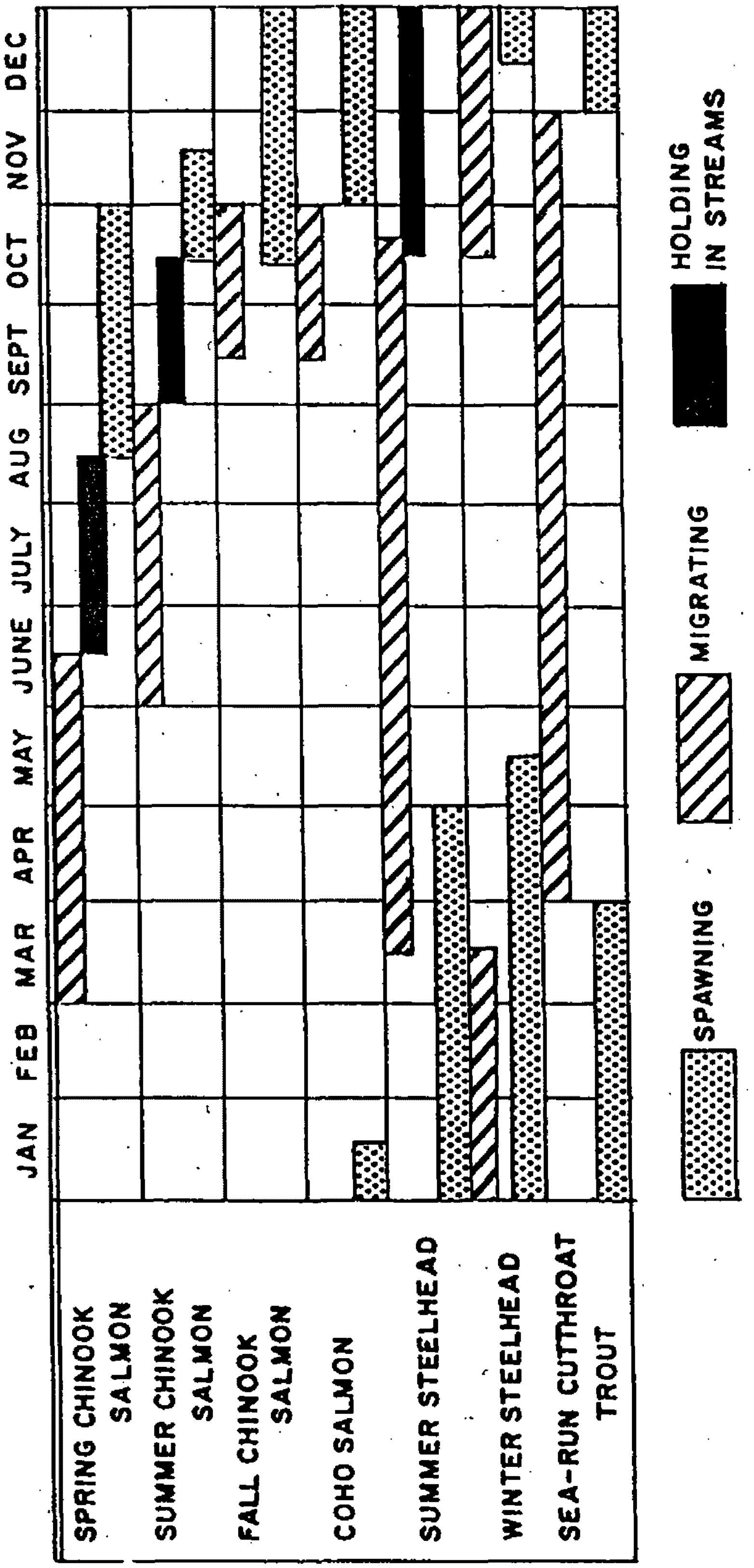


Figure A-6
Distribution of Macroinvertebrates



Spawning and migration of adult salmonids, Rogue Basin. Dotted lines indicate presence of adult fish in the streams. Crosshatched lines denote migration period. Spawning periods are indicated by a solid line. (Thompson and Fortune 1970).

Figure A-7
Salmonid Occurrence at Rogue River

1.32 The rocky reef fish community differs, depending on the depth of the reef below the water surface. The shallower reefs (<20-meter depth) are dominated by the black rockfish (Sebastes melanops), while the deeper reefs (20-50 meters) are dominated by lingcod (Ophiodon elongatus), yellow rockfish (Sebastes ruberrimus) and black rockfish. Fish found on the deeper reefs are generally larger than those found on the shallower reefs, presumably due to a generalized movement of individuals offshore as they mature. Species composition also changes, possibly due to an increase in number of lingcod on the reefs during their winter spawning period. Juvenile lingcod also occur in the estuary in the summer.

Commercial and Recreational Fisheries

1.33 Major commercial and recreational fishing areas are shown in Figures A-8 and A-9. The predominant commercial fishery is for salmon, Dungeness crab and bottom fish. Salmon trolling and crab fishing are done over much of the area offshore from the reefs. The actual location varies from year to year depending on the abundance of fish or crab. Some commercial Dungeness crab fishing occurs in the vicinity of the interim disposal site.

1.34 Commercial landings for 1986, as compiled by (Lukas and Carter,1988) were:

Bottomfish	48,879	lbs
Salmon (Chinook)	40,170	lbs
Dungeness crab	274	lbs
Total	89,323	lbs

1.35 The principal recreational fishing that occurs off Rogue River is for salmon and bottom fish. Salmon fishing is done by charter boat and private boat and occurs in the same areas as the commercial fishing, but generally closer to shore. Bottom fishing, primarily for black rockfish and lingcod, is done by private charter boat along reef areas to the northwest. Other recreational activities include clamming in the bay.

Wildlife

1.36 Numerous species of birds and marine mammals occur in the pelagic nearshore and shoreline habitats in and surrounding the proposed disposal site. Information on distribution and abundance of bird species is from the Seabird Colony Catalog (Varoujean 1976) and Pacific Coast Ecological Inventory (USFWS 1980), except as indicated. Information on most species of shorebirds is lacking. Therefore, their abundance and distribution can only be addressed in general terms--they occur along much of the coast primarily as migrants and/or winter residents.

1.37 A few species of shorebirds, including western snowy plover, black oystercatcher, killdeer, and spotted sandpiper, nest along the coast. Pelagic birds (e.g. common murres, auklets, pelagic, Brandt's and double crested cormorants) probably use the ZSF (Zone of Siting Feasability) and adjacent waters for foraging. Hubbard Mound is a nesting area for black oystercatchers, western gulls, Brandt's and pelagic cormorants, and 16000 common murres (Jon Anderson pers. comm.). About 45,000 Leach's storm-petrels and

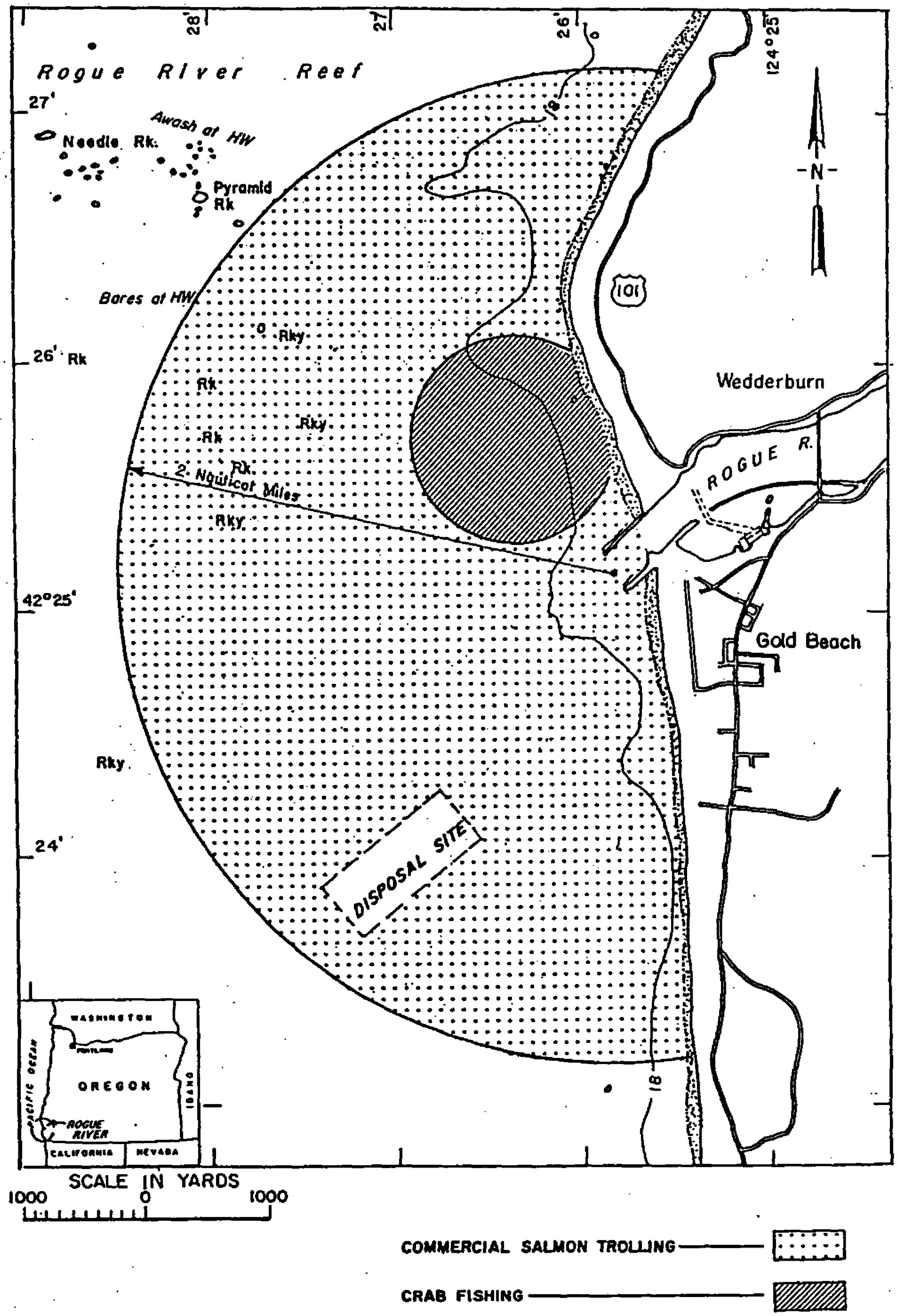


Figure A-8
Commercial Fishing Areas

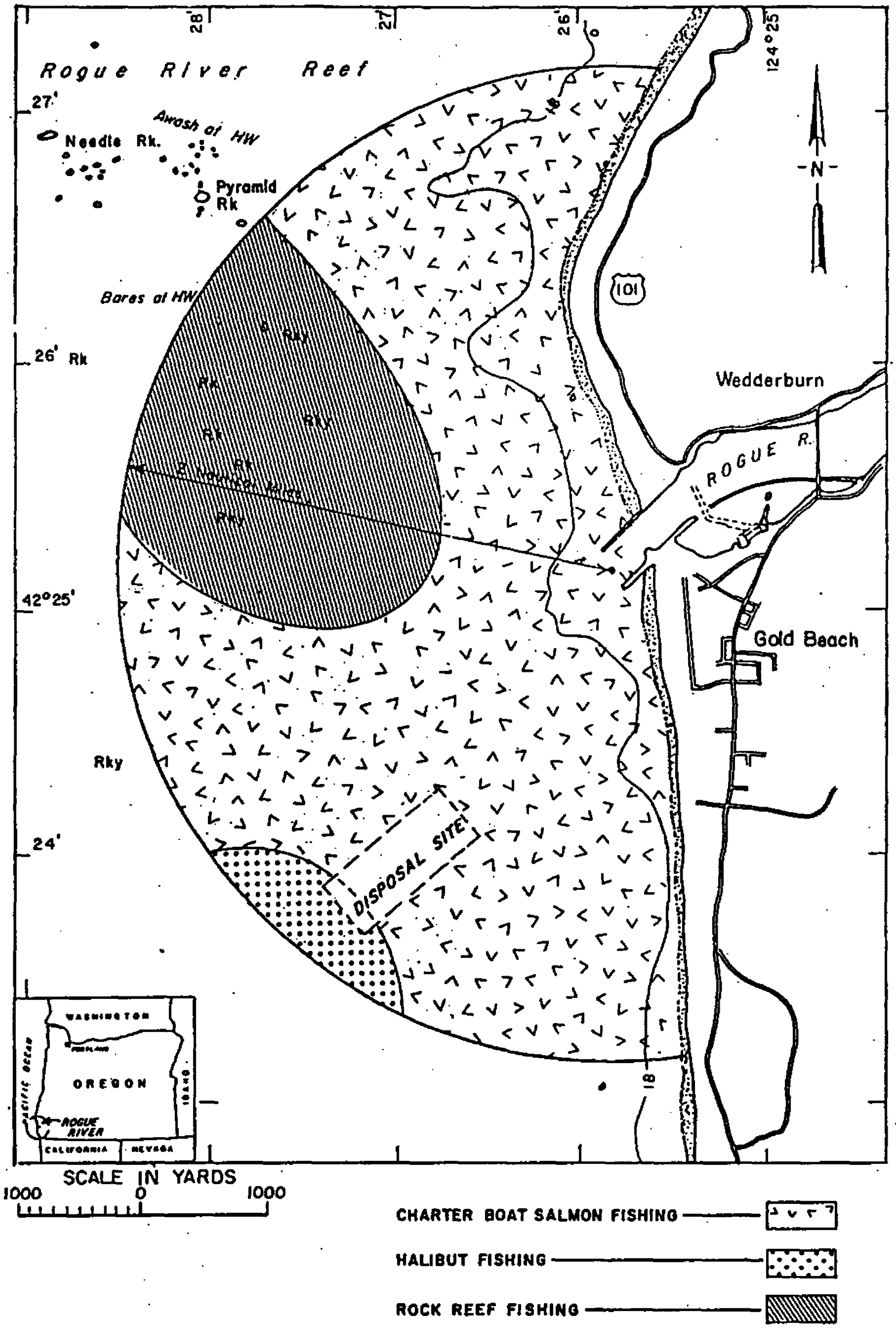


Figure A-9
Recreational Fishing Areas

several hundred double-crested and pelagic cormorants, as well as 1090 western gulls nest on Hunter's Island. Other species of seabirds that congregate and nest on Hunters's Island include fork-tailed storm petrels, Cassin's auklets, black oystercatchers, pigeon guillemots, rhinocerous auklets and tufted puffins. Double, Needle and Pyramid Rocks are small islands located in the Rogue River Reef Complex and provides nesting habitat for pelagic birds. Common murres and Brandt's cormorants are the most common of the six species observed nesting at Rogue River Reef.

1.38 Several species occur that are of special concern: the bald eagle, peregrine falcon, and brown pelican. The brown pelican, a Federally-listed endangered species, is known to use the ZSF or the surrounding areas. Pelicans and peregrine falcons are often associated with spits and offshore rocks, such as those found within the Rogue ZSF.

1.39 Data on marine animals is from the Natural History of Oregon Coast Mammals by Maser et al. (1981), Pearson and Verts (1970), and the Pacific Coast Ecological Inventory (USFWS 1980), except as indicated. Information on marine mammals is extremely limited, except for seals and sea lions. An estimated 300-500 harbor seals occur in the waters around the Rogue River and they use Hunters Island as a rookery (Figure A-10). The Rogue River Reef is the most important Stellar Sea Lion rookery in Oregon waters (R. Brown, pers. comm.). Approximately 1,500 adult and subadult Stellar sea lions use the reef. Sea lions also haulout on Hubbard Mound. Whales are known to occur throughout coastal waters, primarily during migrations, but population estimates and information on areas of special use generally are not available.

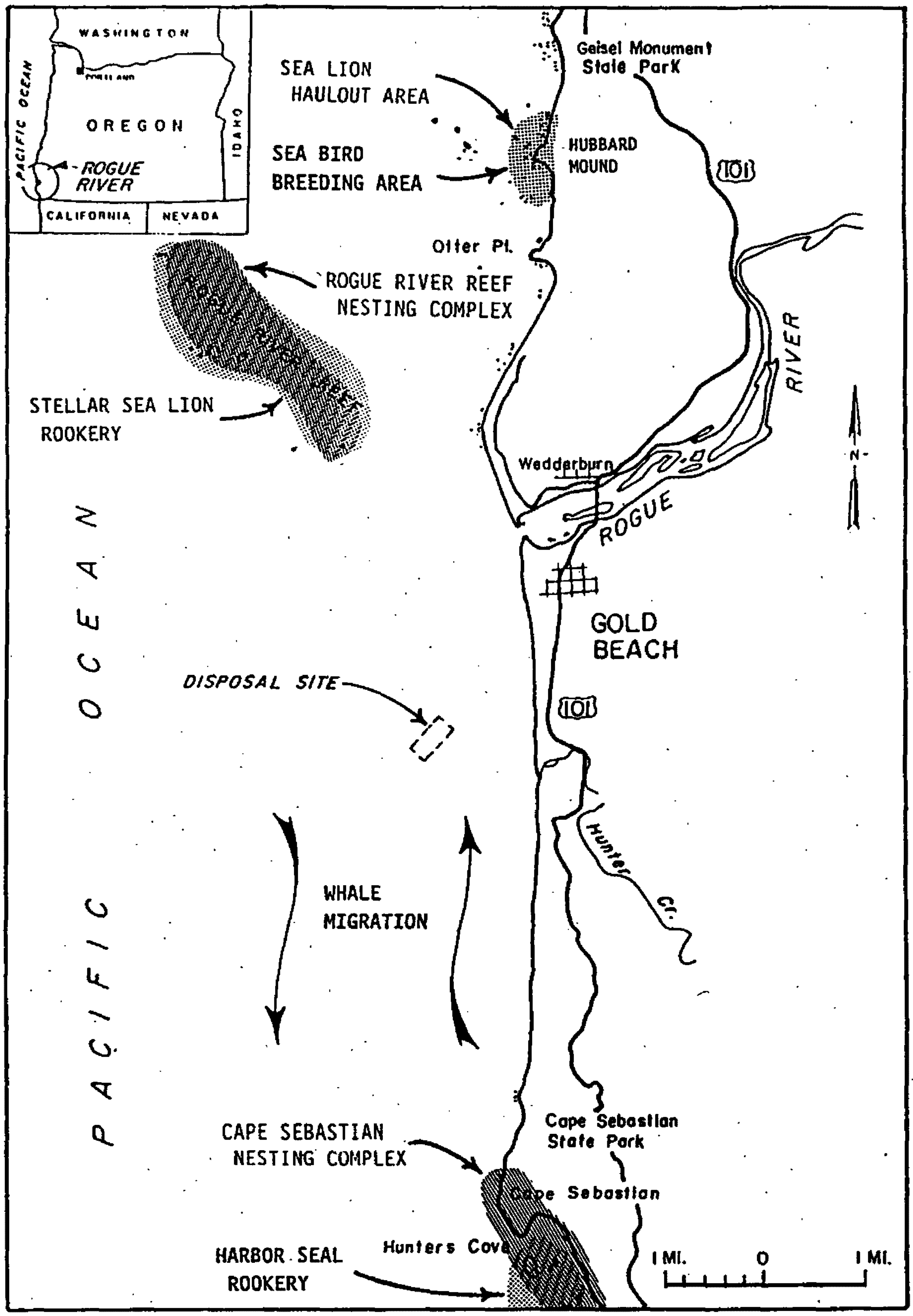


Figure A-10
Wildlife Areas

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APPENDIX B

APPENDIX B

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APPENDIX B

1.0 GEOLOGICAL RESOURCES

Regional Setting

1.1 The Rogue River empties into the Pacific Ocean about 264 miles south of the mouth of the Columbia River. It lies within the Humbug Mountain (Mt.) littoral cell, which extends for approximately 40 km from Humbug Mt. south to Cape Sebastian (Figure B-1). The Rogue River has an estuary of about 667 acres (Percy et al. 1974). The watershed includes parts of the Klamath Mountains and the Cascade Range. To the north and south of the river mouth, the beaches are several hundred yards wide before rising into steep rounded hills that reach an elevation of 700 feet within one half mile of the shore. There are numerous landslides along the coast south of Humbug Mt. No sand dunes of consequence are found in this area. The continental shelf bulges outward off the mouth of the Rogue River, extending approximately 30 km offshore. North of this bulge, the Rogue canyon descends down the continental slope to the abyssal plain. A band of fine sand about 5 km wide runs along the coast. After a zone of intermediate sediment, a layer of mud about 10 cm thick covers the surface of the central shelf, with sand exposed again on the outer shelf (Kulm 1977, Chambers 1968).

1.2 The coast bordering the Humbug Mt. littoral cell consists of about 18 km of slowly retreating rocky cliffs, 16 km of stable beach, and 5 km of generally prograding beaches surrounding the mouth of the Rogue. Smaller streams entering the littoral cell include Euchre, Brush and Hunters Creeks.

Regional Geology

1.3 The Rogue River is the major stream draining the western Klamath Mountains in Oregon. The Klamaths are made of Mesozoic marine sediments and igneous rocks that have been folded, faulted and subjected to varying degrees of metamorphism, and Tertiary igneous intrusives. The tectonic history of the Klamath mountains is complex, with several episodes of folding and faulting, which continue up to the present. Parts of the Klamath Range have been subjected to tectonic events since the late Jurassic. The late Cretaceous and early Cenozoic was a time of quiescence, but, since the end of the Eocene, faulting and uplift have affected the area (Baldwin 1981, Baldwin and Beaulieu 1973, Dott 1971).

1.4 Because the Rogue River originates so far east, it flows through a large number of different formations and rock types. Those closest to the mouth of the Rogue are the intensely folded and faulted mudstones, sandstones, and conglomerates of the Otter Pt., the Colebrook Schist, and the Dothan Formations of Jurassic age (Figure B-2). To the north and east lie more recent marine sediments from the Tertiary. Smaller outcrops of volcanics, serpentines and other sediments and meta-sediments are also encountered. Much of the coastline of the Humbug Mt. littoral cell up to Euchre Creek is Holocene and modern beach sand, with occasional exposures of Otter Pt. Formation rocks. Continuing north are outcrops of volcanics, Colebrook Schist, and Cretaceous Humbug Mountain Conglomerate (Dott 1971, McKee 1972).

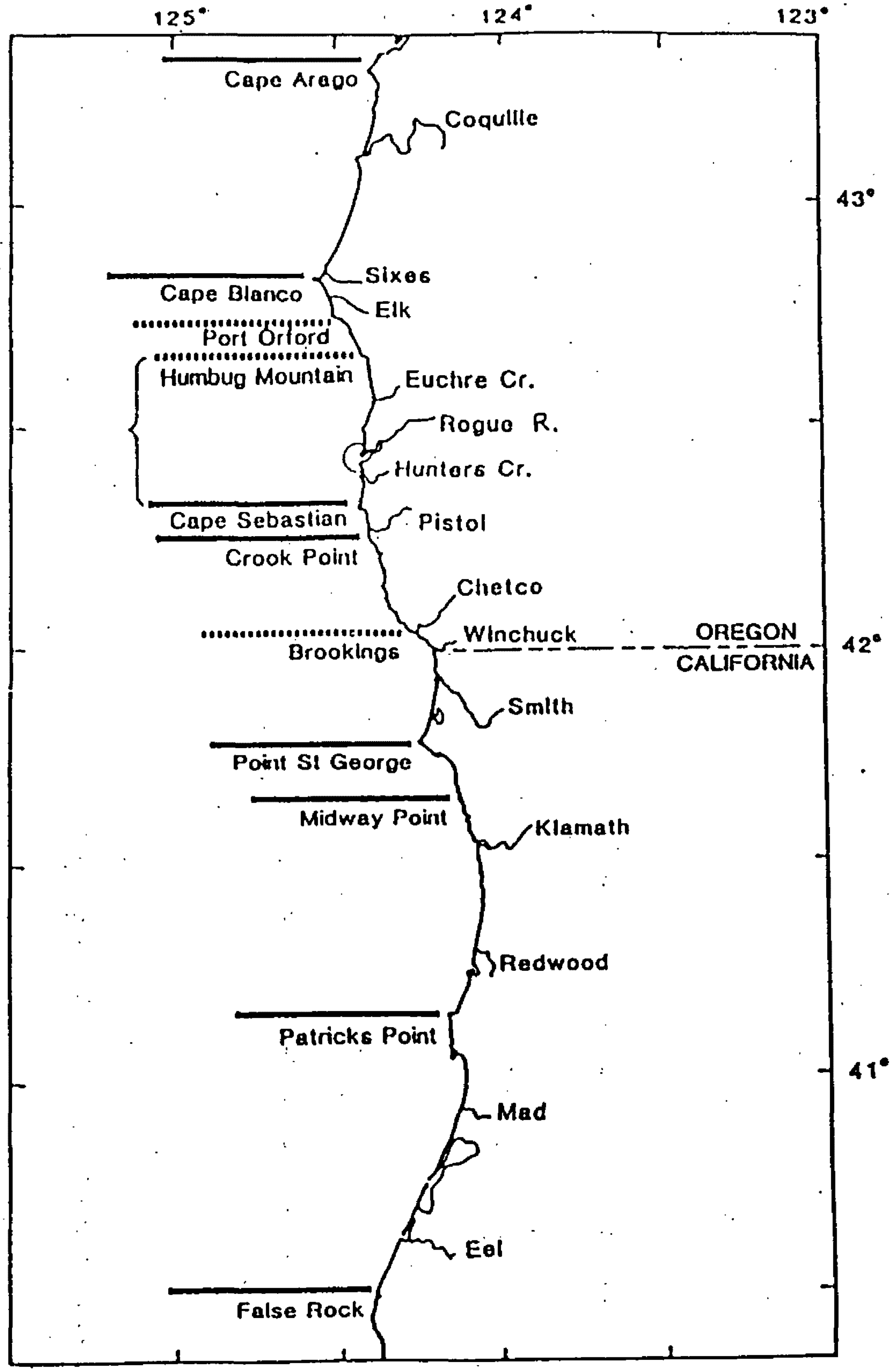
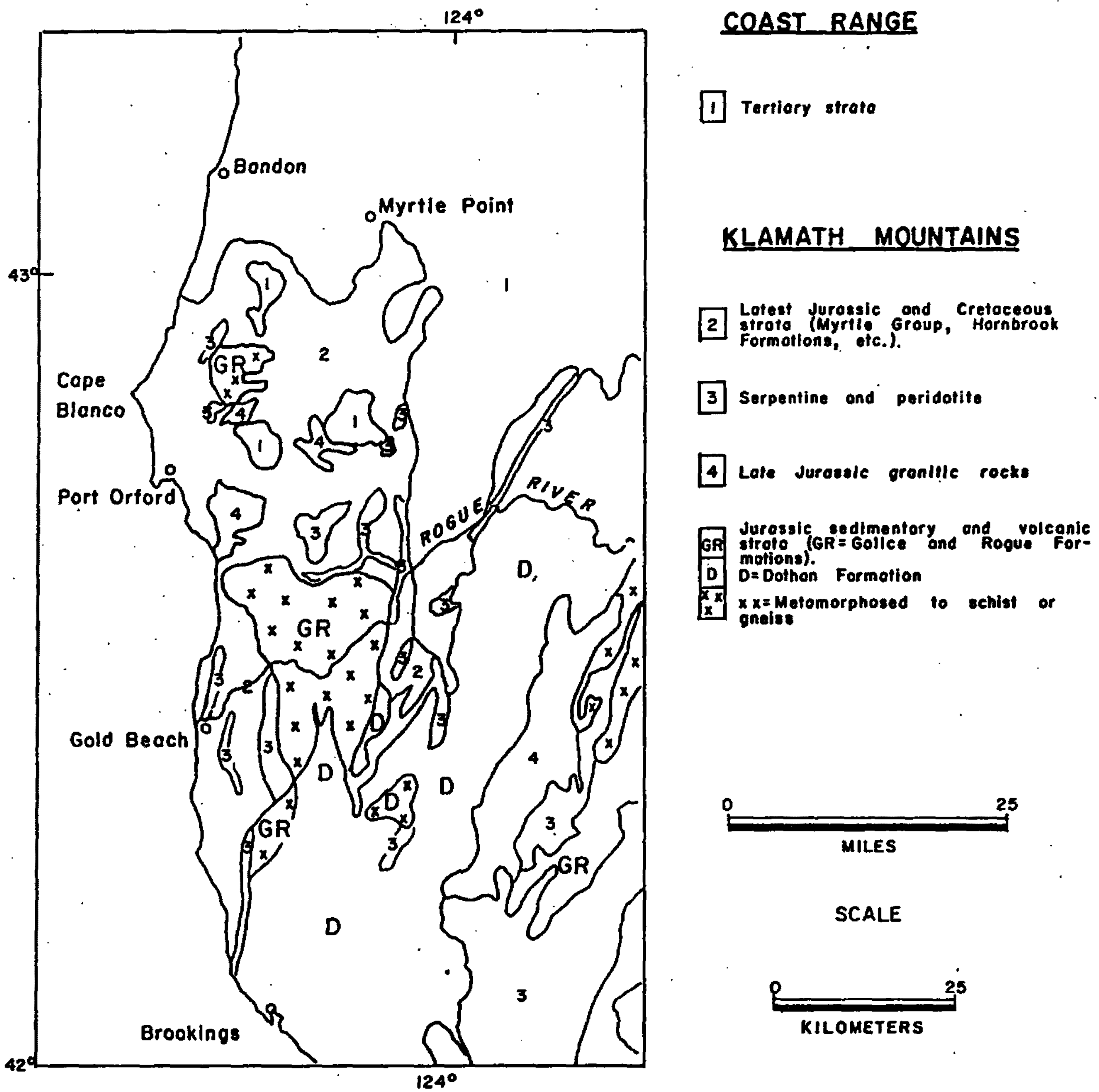


Figure B-1
Humbug Mt. Littoral Cell Location



From CASCADIA, B. McKee, 1972, McGraw-Hill, Inc. 394 p.

Figure B-2
Rogue Watershed Geology

1.5 The region is currently undergoing tectonic uplift, but that uplift has been surpassed by the post-Pleistocene rise in sea level. During the Pleistocene glaciations, the massive amount of water stored in the glaciers caused a drop in sea level. The end of the last ice age (melting of the glaciers) resulted in a global sea level rise of 125 m (Curry 1965). Fluctuating sea level, in conjunction with tectonic uplift of the Klamaths, led to the formation of several raised marine terraces, as well as the incision of valleys below the present sea level. Terraces are prominent along the coastal plain from the Rogue River up to Ophir (Dott 1971). Within that area, at least seven terraces have been identified (COE 1974). The rise in sea level "drowned" the river and stream valleys that had been incised in the Coast Range and coastal plain. This produced the large coastal estuaries and allowed the development of the alluvial plains bordering the lower reaches of the Rogue River.

1.6 The sand deposits that cover the nearshore sea bed were delivered by streams that eroded rocks in the coastal mountains, and by the sea attacking both bedrock and marine deposits left over from previous high stands of the sea. An undetermined amount of bedload material is currently escaping through the estuaries and eroding from the shoreline. Fine silts and clays supplied by these sources are removed or prevented from settling out in the nearshore zone by the high wave energy, leaving fine sand covering the sea bed for a distance of several kilometers offshore.

Economic Geology

1.7 The Rogue River and its tributaries flow through bedrock containing mineralized zones, and has several reaches containing gold placer deposits. The most prominent and extensive zones of heavy mineral concentrations on the continental shelf of the Oregon coast occur off the mouth of the Rogue River. The dominant mineral in both the offshore deposits and in beach placers is magnetite. Other economic minerals that are present in the deposits are gold, platinum, chromite and ilmenite. The beach placers at Gold Beach have been mined in the past for gold and platinum. Mining was done in the winter when the sand was stripped from the beaches, exposing the mineral rich gravels. Some placers were also found on uplifted marine terraces (Gray and Kulm 1985, Ramp 1973). The offshore deposits are not currently being mined. While there have been several attempts to find oil and gas along the Oregon coast, test wells have not found significant quantities of oil or gas. No test well had been drilled south of Cape Blanco on the Oregon coast as of 1985.

Sediments

1.8 There are three external sources for sediment in the littoral cell: fluvial, littoral, and coastal erosion. Dredging is not a source, but it facilitates the transport of material from the river into the littoral zone.

1.9 The estuary of the Rogue River covers an area of 667 acres and contains 149 acres of tidal wetland (Percy et al. 1974). The drainage basin covers 5,160 square miles. Mean annual discharge is 7,800 cfs with a maximum of 16,200 cfs in January and a low of 1,200 cfs in September. The mean annual six-hour discharge is 1.68 x 10^8 cf, which, with a tidal prism of 1.2 x 10^8 cf, gives a hydrographic ratio of less than 1. This means that the estuary is extremely fluvially-dominated and that most river sands should escape into the ocean (Peterson pers. comm.). Among the three other streams which enter the littoral cell, Euchre Creek and Hunters Creek have hydrographic ratios of about 1 (Chesser and Peterson 1987), but are so small that their contribution to the overall sediment budget is probably minor.

1.10 Sediment is also contributed by erosion of the coast. Surveys of erosion patterns along the Humbug Mt. littoral cell coastline are not in complete accordance. The National Shoreline Study (COE 1971) shows historic erosion from south of Humbug Mt. almost to the mouth of the Rogue River. A stretch several miles long north of the Rogue River mouth was identified as suffering from "critical erosion." The Beach and Dune Survey (USDA 1974) showed a similar pattern. Stembridge (1976), however, mapped the area from just north of Euchre Creek to Cape Sebastian in the south as stable, with the coast generally prograding for several miles on both sides of the mouth of Rogue River. The coast between Humbug Mt. and Euchre Creek, classified by Stembridge as "slowly retrograding rocky cliffs" is subject to landsliding. These slides move slowly and intermittently, their rate increased by heavy rainfall and the removal of their toes by wave action. The slides are continuous sources of sediment for the littoral zone. Unfortunately, none of the surveys provide any quantitative information on rates or volumes of erosion or accretion.

1.11 Dredging of the entrance of Rogue River began in 1962. Between 1976 and 1985, 474,891 cy of dredged material from the entrance channel were deposited at offshore disposal sites. An additional 193,720 cy of material from the boat basin have been pumped to onshore disposal sites by contract pipeline dredge. Other entrance shoals have been flushed out by the Corps' agitation dredge, Sandwick, on ebb tide without removing the material from the water. The maximum amount of material disposed at sea in one year was 142,260 cy (Table B-1), while four years had no offshore disposal. The authorized project is a channel 13 feet deep, 300 feet wide and 3500 feet long from the mouth of the channel to the boat basin entrance. The side channel to the boat basin, maintained by pipeline dredge, is 10 feet deep and 150 feet wide. Shoals form at the basin entrance and between the jetties during the spring and summer months. The entrance shoal forms in the late winter and spring.

Table B-1
Dredging Volumes Disposed Offshore at Rogue

Year	Cubic Yards (CY)
1976	101,197
1977	0
1978	35,807
1979	0
1980	42,614
1981	0
1982	112,918
1983	142,260
1984	0
1985	40,095
10 year average	47,489

* Includes both Corps and contract hopper dredging.

1.12 In determining the importance of the various potential sources, the mineral assemblages of the sediments and the sources can be useful. The clinopyroxene to orthopyroxene ratio (2:1) and the amphibole to pyroxene ratio (4:1), for instance, have been used to define the Humbug Mt. cell's boundaries. Unfortunately for sediment source determination, the mineral assemblages of the Rogue River, eroding marine terrace deposits, and littoral sands are all similar. Thus, while it is clear that both the Rogue and coastal erosion contribute sediment, it is not possible to evaluate their relative contributions (Chesser and Peterson 1987, Peterson pers. comm. 1986).

1.13 The surface sediments of the Rogue ZSF that were sampled in 1984 are uniformly fine sand. Mean grain size showed almost no variation, falling between 0.13 mm and 0.16 mm (Table B-2). The one possible exception is a band observed on the sidescan sonar that has been interpreted as a band of gravel or coarse sand. No samples were taken from the band, and it is possible that it is a sand dollar bed instead of gravel.

Table B-2
Rogue Offshore Sediment Samples

Sample	Mz (mm)	D50	D90	% fines	depth
R-1	0.13	0.15	0.19	4	80
R-12	0.16	0.16	0.21	5	80
R-21	0.13	0.15	0.21	2	80
R-30	0.14	0.16	0.20	1	90
001	0.13	0.13	0.19	2	77
002	---	---	0.18	77	33
004	0.14	0.15	0.19	0	100
005	0.14	0.13	0.22	2	66

Rogue Entrance Samples

Sample	Date	D50	D90	% Fines
A	2/81	0.47	1.4	0
B	4/85	0.91	5.0	0
C	4/85	0.6	1.8	0
D	4/85	0.27	0.39	0

Note: Grain size given in millimeters.
Mean grain size (Mz) calculated using D16 + D50 + D84/3.

1.14 Sediment taken from dredged portions of the Rogue River entrance channel are considerably coarser than the offshore sediments. Mean grain size ranged between 0.47 and 0.94 mm and is classified as medium to coarse sand. Samples contain as much as 10 percent gravel. The side channel leading to the boat basin consists of fine sand (0.21 mm) while the boat basin contains silt. The finest material is disposed on land by pipeline dredge. The material within the designated disposal site by now may be much coarser than the native sediment. However, no samples were taken from within the disposal site. The one sample taken at the edge of the site is identical with the other native sediments.

Conditions in the ZSF

1.15 Sea stacks and reefs at the mouth of the Rogue River consist of several formations of Mesozoic age. The rocks exposed adjacent to the communities of Gold Beach and Wedderburn at the mouth of the Rogue River consist of the Otter Point Formation of late Jurassic age and associated serpentinite (Beaulieu and Hughes 1976). The serpentinite is present in the Otter Point Formation primarily as fault-bounded sheets. A north-trending fault separates the Otter Point Formation on the coast from the sandstones of the Hunter Cove and Cape Sebastian Formations to the west. These Upper Cretaceous sandstones underly the northern and eastern parts of the Rogue Reef. The fault has been tentatively projected into the ZSF, but its existence has not been proven (Koch 1965, Hunter and others 1970, Beaulieu and Hughes 1976, USACE 1986).

1.16 The ocean bottom in the vicinity of the interim disposal site slopes seaward fairly evenly at 8/1000, between 36 to at least 72 feet. The bed is featureless except for what appears to be a 25-foot pinnacle a short distance beyond the southwest end of the disposal site. There is no mound of disposal material apparent within the disposal area. The May 1986 bathymetric survey showed a seaward displacement of the contours with respect to August, 1984. This aggradation is not caused by dredge material disposal, as the volume involved far exceeds that disposed of offshore during those years.

1.17 The results of the 1984 sidescan sonar survey of the Rogue River ZSF are shown in Figure B-3. The area surveyed by sidescan sonar is primarily fine sand. There are bare rock and scattered rock exposures in the middle of the southwest side, with a few small rock exposures elsewhere in the site. The band interpreted as coarse sand or gravel runs between the 36-and 42-foot contours. No samples were taken from within the band to confirm the presence of gravel or the possibility that it is a bed of sand dollars. The designated disposal site is situated with its southwest end within the bare rock/scattered rock area; otherwise, it encompasses fine sand.

1.18 Three sub-bottom seismic profiles cross the study area from northeast to southwest (Figure B-4). They show a slightly irregular bedrock surface overlain by a fairly uniform blanket of sediment that averages about 20 feet thick and varies from 10 to 40 feet. The sediment layer appeared to thin slightly in the seaward direction.

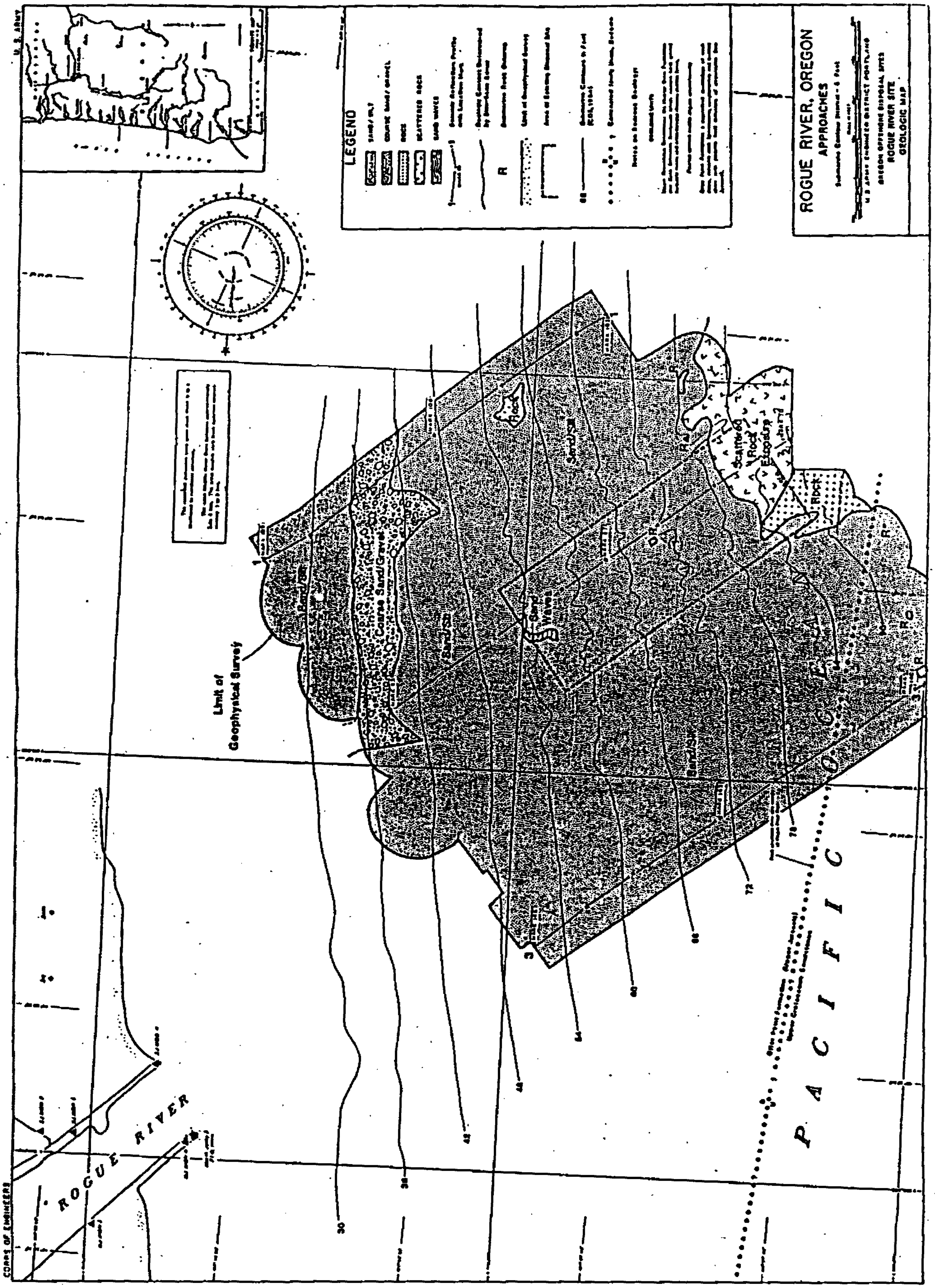
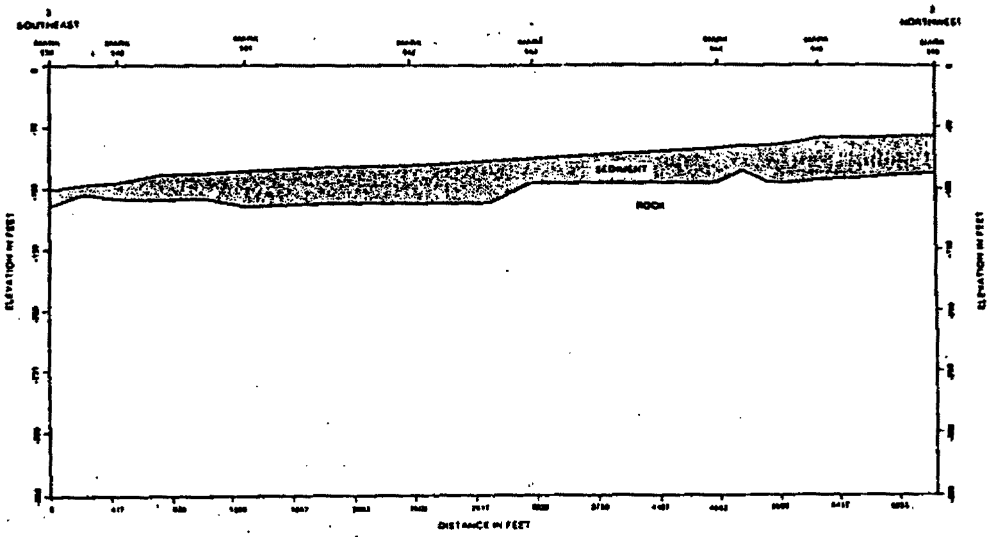
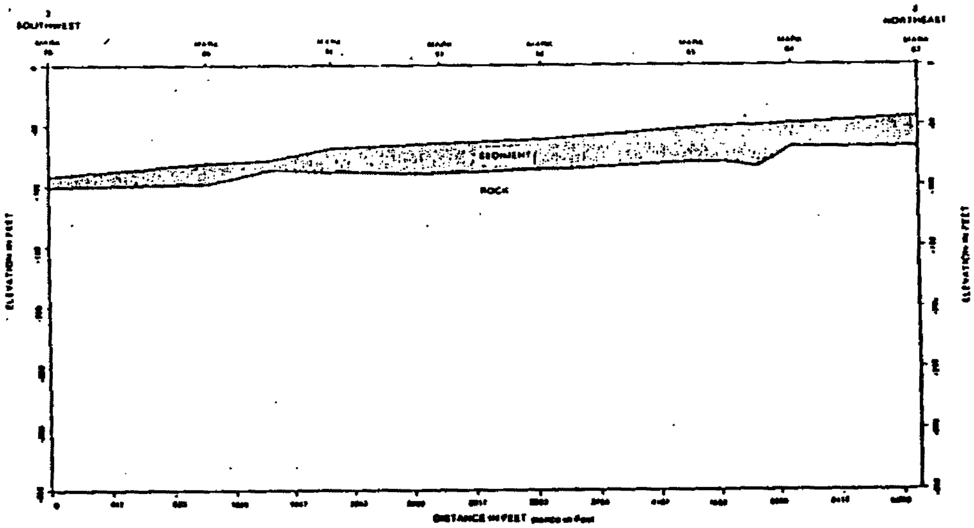
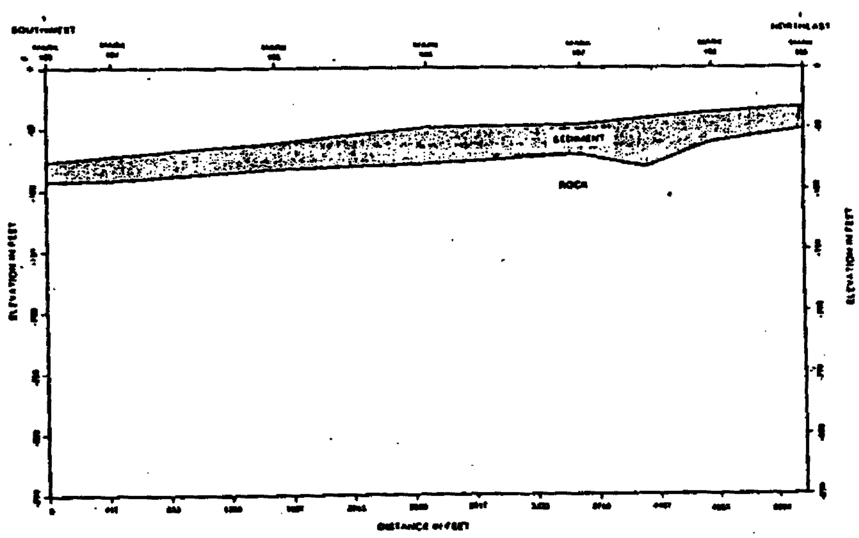


Figure B-3
Sidescan Sonar Map of Rogue ZSF







LEGEND

ELEVATION DATUM IS MLLW
FROM FATHOMETER RECORDINGS

US ARMY CORPS OF ENGINEERS

PORTLAND DISTRICT
ROGUE RIVER, OREGON OFFSHORE SURVEY

SUBBOTTOM PROFILES
PROFILE NUMBER 1, 2 and 3
SOUTHWEST—NORTHEAST

OCTOBER 1984 J84-293
GEO—RECON INT'L., SEATTLE, WA

Earth Sciences Associates
Palo Alto, California

Figure B-4
Rogue Seismic Profiles

2.0 OCEANOGRAPHIC PROCESSES

Coastal Circulation

2.1 Coastal circulation near the Rogue ZSF is directly influenced by large- scale regional currents and weather patterns in the northwestern Pacific Ocean. During the winter, strong low pressure systems--with winds and waves predominantly from the southwest--contribute to strong northward currents. During the summer, waves and winds are commonly from the north since high pressure systems are dominant. In both seasons, there are short-term fluctuations related to local wind, tidal and bathymetric effects. The offshore reefs at the Rogue River have an effect on nearshore circulation and waves. Along the southern Oregon coast, there is a southerly wind in summer which creates a mass transport of water offshore and causes the upwelling of bottom water in the nearshore area.

Ocean Waves and Tide

2.2 Ocean waves arriving at the Rogue are generated by distant storms and by local winds. Distant storms produce waves that arrive at the coast as swells which are fairly uniform in height, period and direction. The longer period swells generated by more distant storms generally approach from the WNW or WSW sectors. The swells with the longest periods generally occur during autumn while the shortest sea and swell periods occur during the summer. Local winds produce seas which contain a mixture of wave heights, periods and directions. Generally, local seas have higher waves and shorter periods than incoming swells. Local seas usually approach the coastline from the SSW sector during autumn and winter, but from the NNW sector in spring and summer. Figure B-5 shows nearshore circulation at the Rogue.

2.21 Wave hindcast predictions from meteorological records for the period 1956-1975 are available for deepwater stations off the Oregon coast. The largest waves are from the southwest, but only 7 percent of the time are waves from that quadrant. Sixty-one percent of the waves are from within 22 1/2 degrees of due west. Waves from the northwest occur 31 percent of the time. This is very generalized data, but useful in thinking of the seasonal wave patterns.

2.3 Superimposed upon the slowly-varying regional or seasonal circulation are tidal currents. These currents are very important in the nearshore area. Tidal currents are rotary currents that change direction following the period of the tide. Thus, the tidal currents generally flood and ebb twice daily. The direction and speed of nearshore tidal currents is highly variable. Tidal current speeds have been measured at lightships along the Pacific coast and reported by NOAA (1986). Hancock et al. (1984), Nelson, et al. (1984) and Sollitt, et al. (1984) summarize current meter data offshore from Coos Bay between May 1979 and March 1983. These reports substantiate the influence of tides on nearshore bottom currents. Bottom current records were found to be dominated by tidal influence. Maximum current velocities were associated with tides, including spring tide

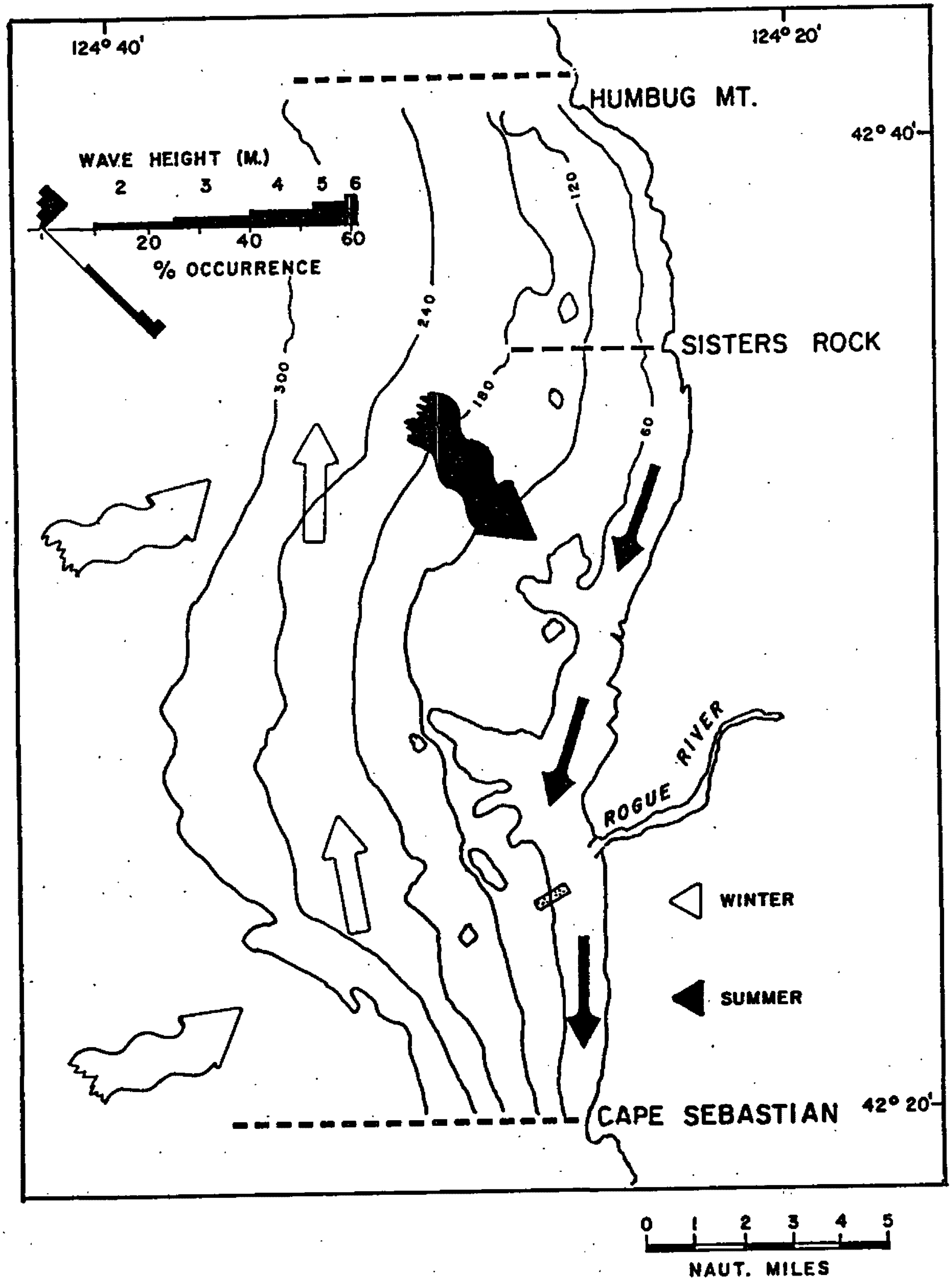


Figure B-5
Oregon Coastal Circulation at Rogue

effects. These tidal influences added to the currents produced by surface waves and winds. The station closest to the estuary, for example, was noticeably affected by the ebb current.

Local Processes

2.4 The Rogue ocean disposal site is within 1 mile of the estuary entrance. The Rogue River has the second largest drainage basin on the Oregon coast--after the Columbia River--and one of the smallest estuaries. As Table B-3 illustrates, the riverflow is highly variable. This constantly varying river outflow combines with tidal flows to produce a highly variable influence on the nearshore circulation. In the estuarine part of the river, the ebbing tide adds to the normal river discharge to produce a net ebb dominance. Thus, the Rogue shows little or no long-term accumulation of fine sediments in the estuary; instead, it allows sand-size sediments to bypass into the ocean.

Table B-3
Important Characteristics of the Study Area

Project	Rogue River
Drainage Basin Area (sq. mi.)	5,160
Estuary Surface Area (sq. ft.)	25 x 106
Mean Tide Range (ft.)	4.9
Diurnal Tide Range (ft.)	6.7
Mean Tidal Prism (cu. ft.)	122 x 106
Diurnal Tidal Prism (cu. ft.)	167 x 106
Minimum Annual Flow (cu. ft./sec.)	1,200 (September)
Maximum Annual Flow (cu. ft./sec.)	16,200 (January)
Mean Annual Flow (cu. ft./sec.)	7,800
Extreme Discharge (cu. ft./sec.)	350,000 (1964)
Mean Hydrographic Ratio (HR)	0.7
Maximum Hydrographic Ratio (HR)	6.7

* Note: the numbers are from Percy et al. (1974) and Johnson (1972). The Hydrographic Ratio is the tidal prism volume divided by the mean river discharge for a six-hour period. Peterson et al. (1984) used the Hydrographic Ratio to compare the tidal prism with the river discharge for the same six-hour period. The tidal prism is estimated as the volume of water brought into the estuary by each flood tide. The six-hour river discharge is estimated from the annual average discharge. The higher the HR, the more tidally dominated the estuary. For comparison, Table B-3 lists two values for HR. The maximum HR only occurs during extreme low summer riverflows. The dominance of the river has been demonstrated on several occasions. During the 1964 flood, the entrance channel was reportedly scoured to -44 feet (USACE, 1975) while the drought of 1976-77 produced a shoal 8 feet above mllw in the entrance (Hartman, 1977).

Site Monitoring

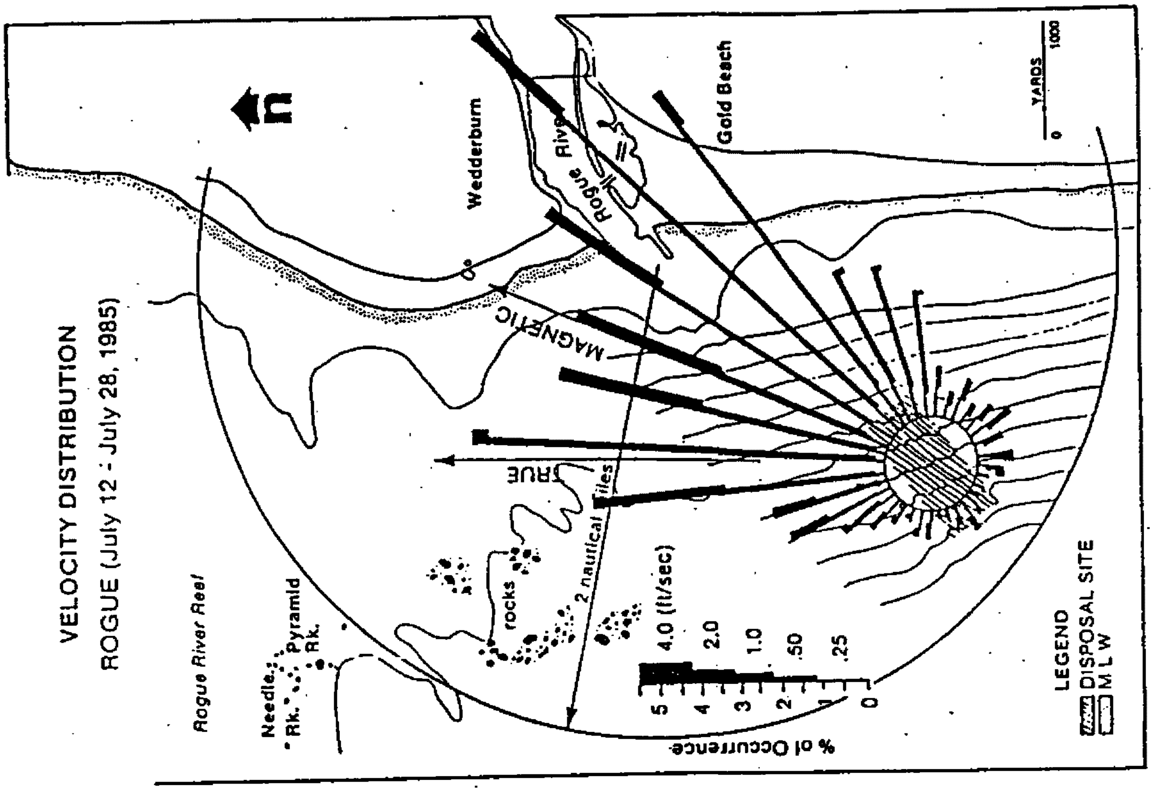
2.5 Current meters were deployed near the Rogue ocean disposal site in 1985. The meters were attached to moorings at depths from 66 to 73 feet. Bottom current records were obtained from April 13-May 7 and from July 13-28 in 1985. These periods were picked to represent typical winter and summer conditions. However, the transition to summer conditions can begin as early as April. Figure B-6 illustrates the daily average bottom current speed and direction for summer and winter records. In the current "rose," each bar represents the direction the current is moving. The length of the bar represents the percent of occurrence of the current in that direction and the width of the bar represents the range of velocity.

2.6 Because of the deployment schedule, the meters at Rogue were not in place until mid-April. As the two figures show, there is little difference in direction for the two deployments. Surprisingly, the dominant direction both times is generally north, with slightly more of an onshore component in July. For the April-May period, the strongest currents are usually north along the bottom contours. The currents in July are mostly onshore, across bottom contours and northward. Neither record shows any significant current southward.

2.7 Other sources of current data come from LEO observations. The Littoral Environment Observation Program, or LEO, collected visual observations of waves and currents in the surf zone on a daily basis from October 1977 through 1982. Wave direction and the direction and speed of the surface current were recorded at the same time each afternoon. Figure B-7 is a plot of the monthly and daily average current speed and direction with negative values indicating the current is to the south. During the five years of recording, the littoral current is predominantly to the south, with short 2-3 month periods each winter of currents to the north. The monthly average can be misleading, as shown by the plot of daily currents for the period October 1978 to February 1979. Although the monthly average is to the north, there are frequently strong currents to the south.

2.8 Wave records near the ocean disposal site were obtained from April 13-27 and from July 14-28 in 1985. Significant wave heights were computed for the two periods. Monthly average wave heights have been computed from records at the Newport wavemeter between 1971 and 1981 from hindcast wind data (wis) and from the Coquille gage in 1985. In both April and July, the wave heights were below average at the Rogue, as compared to Coquille and Yaquina. Because the Coquille meter is in a similar water depth and sufficiently close to Rogue River, the periods of record are compared in Figure B-8.

2.9 LEO wave observations from October 1977 through 1982 were analyzed and compared to available aerial photos. Wave approach was characterized as from the north, from the south or parallel to shore. The photos showed general agreement with the LEO observations, and confirmed that the wave angle to the shore is generally small. This is due to shoaling and refraction effects in the surf zone. Figure B-9 shows the monthly and daily summary of wave directions as the percent occurring from the north (positive values) or south (negative values). Waves at Rogue are predominantly from the north, however, waves from the south occur frequently and are dominant for several months each winter. The daily variability of wave direction is shown for the period from October 1978 to February 1979. Although the monthly averages indicate waves predominantly from the south, there were several 2-4 day periods when waves were from the north.



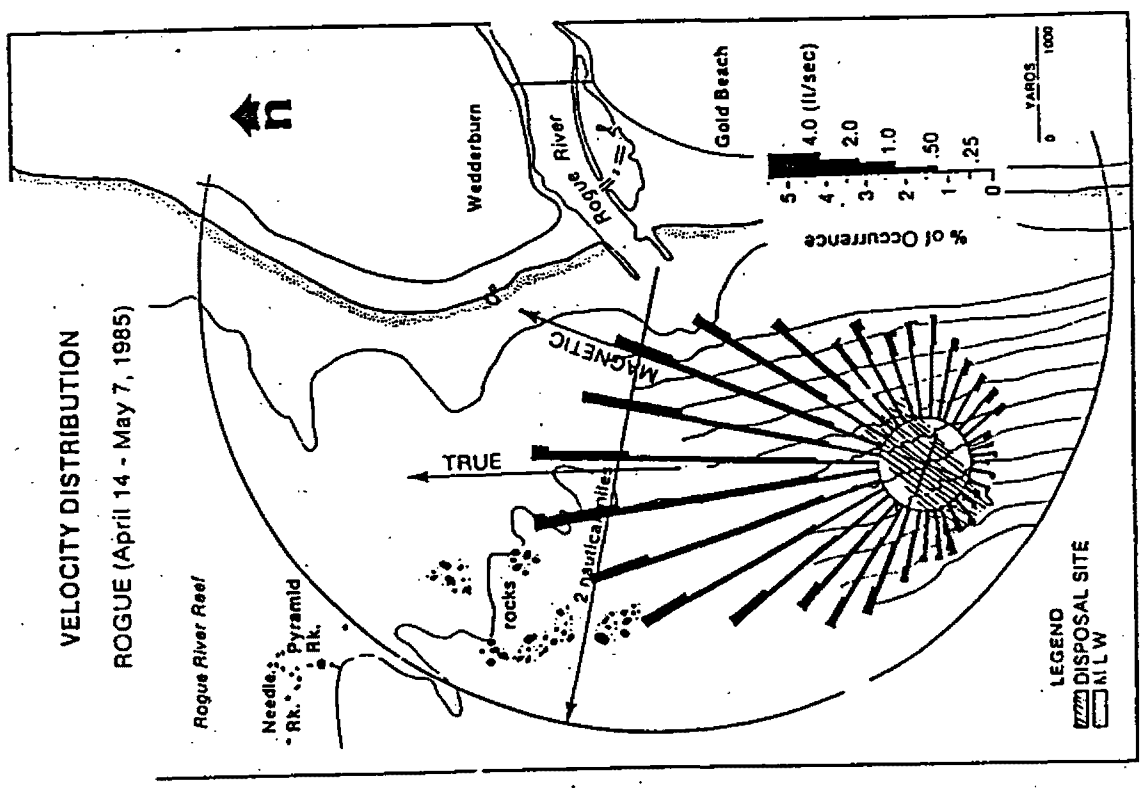
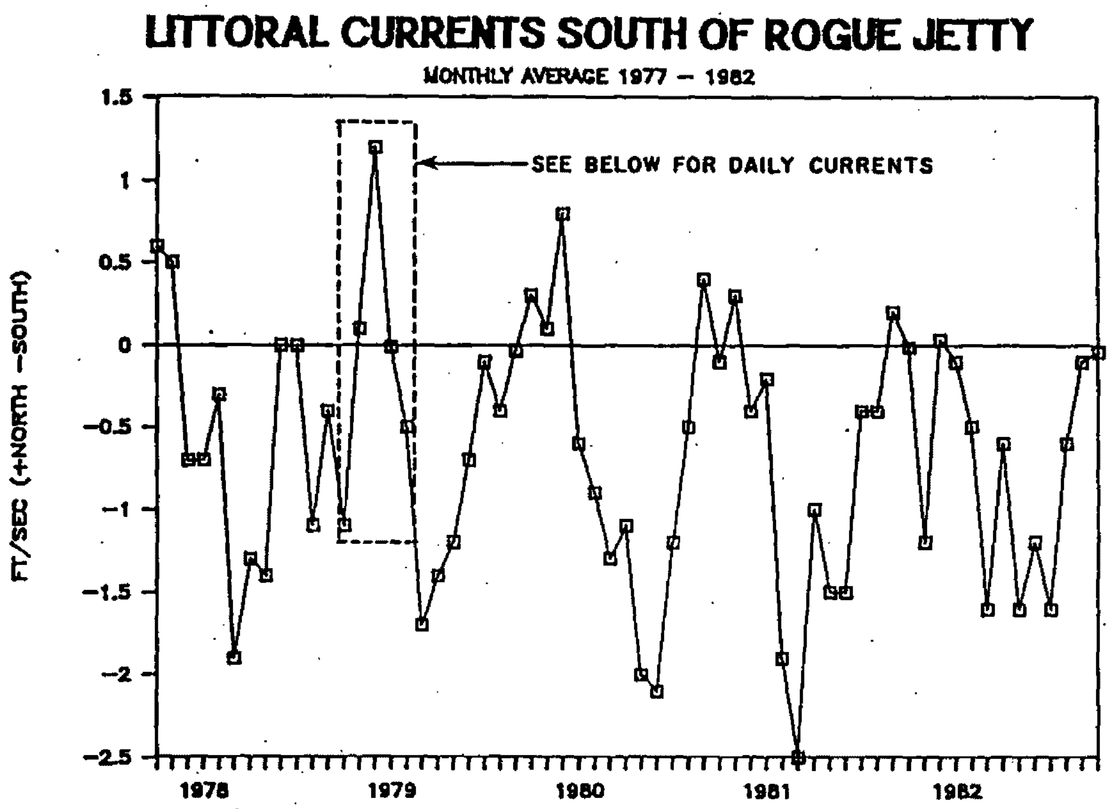


Figure B-6
Current Data at Rogue



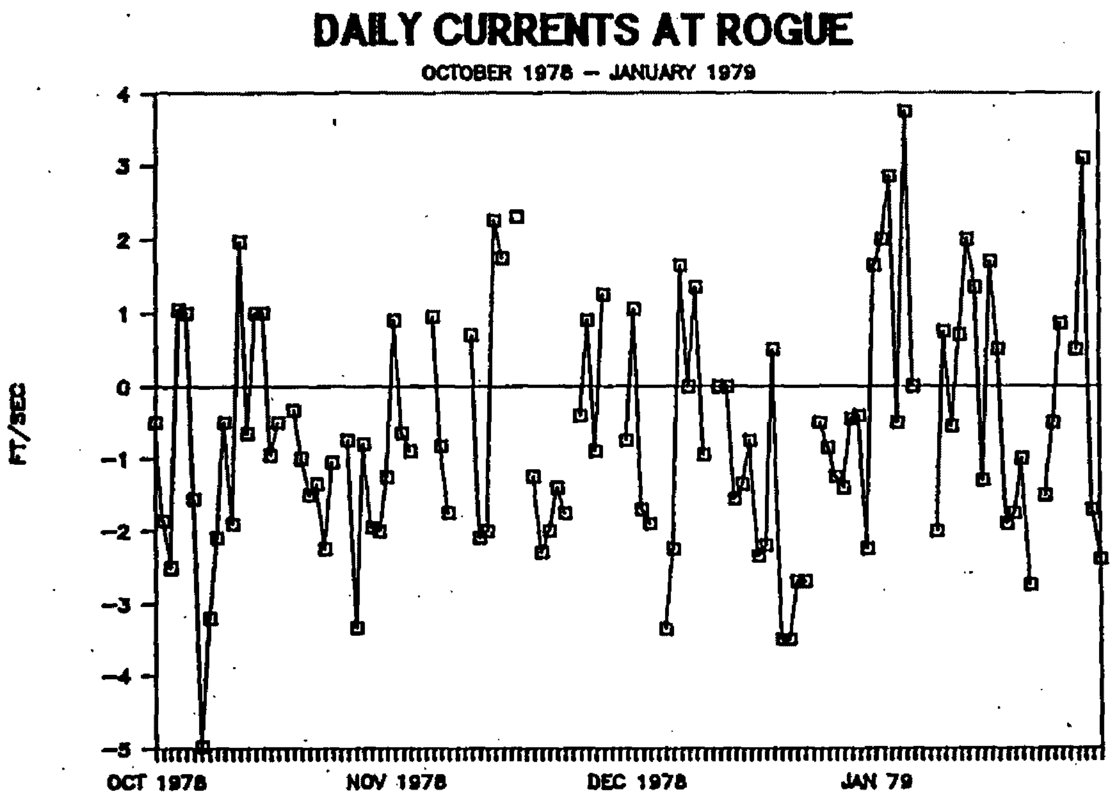
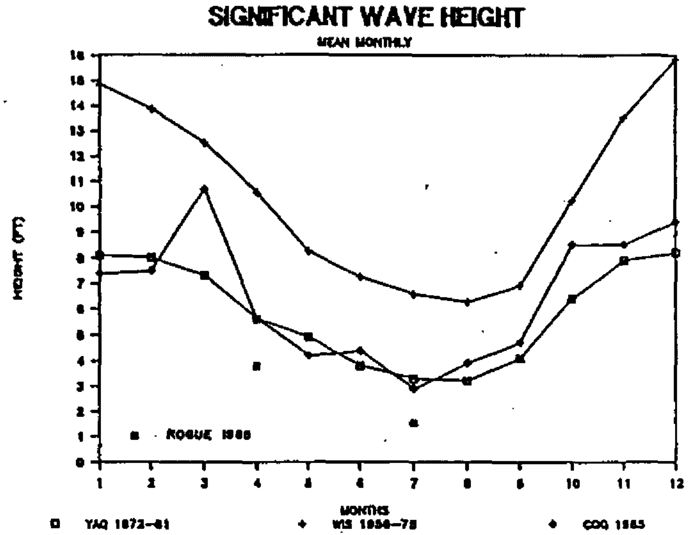
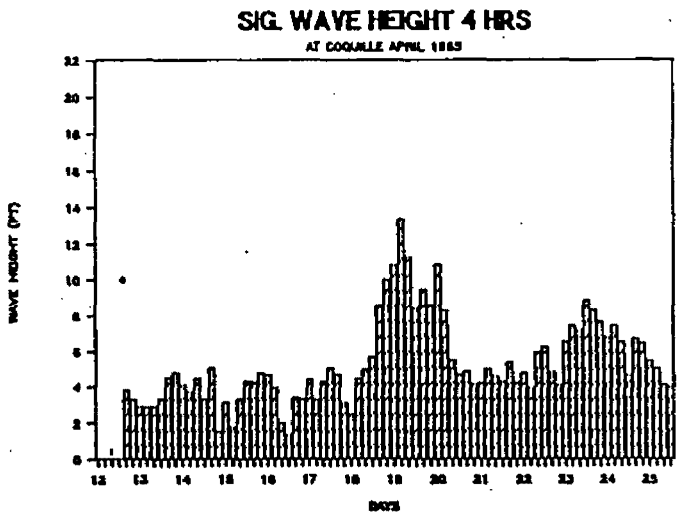


Figure B-7
LEO Monthly and Daily Average Currents





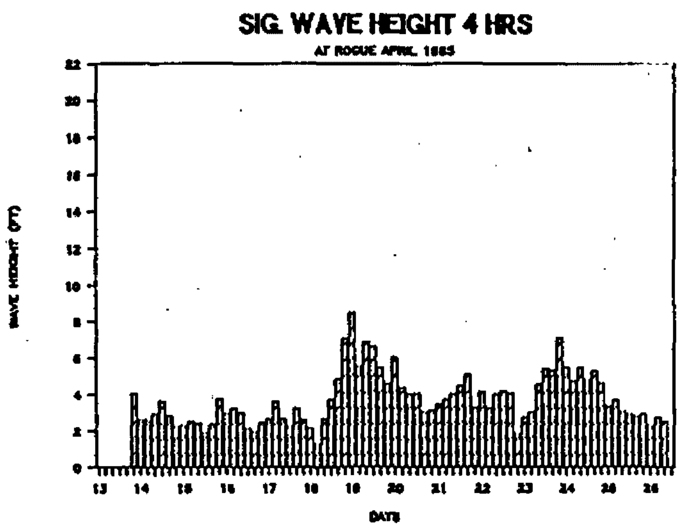
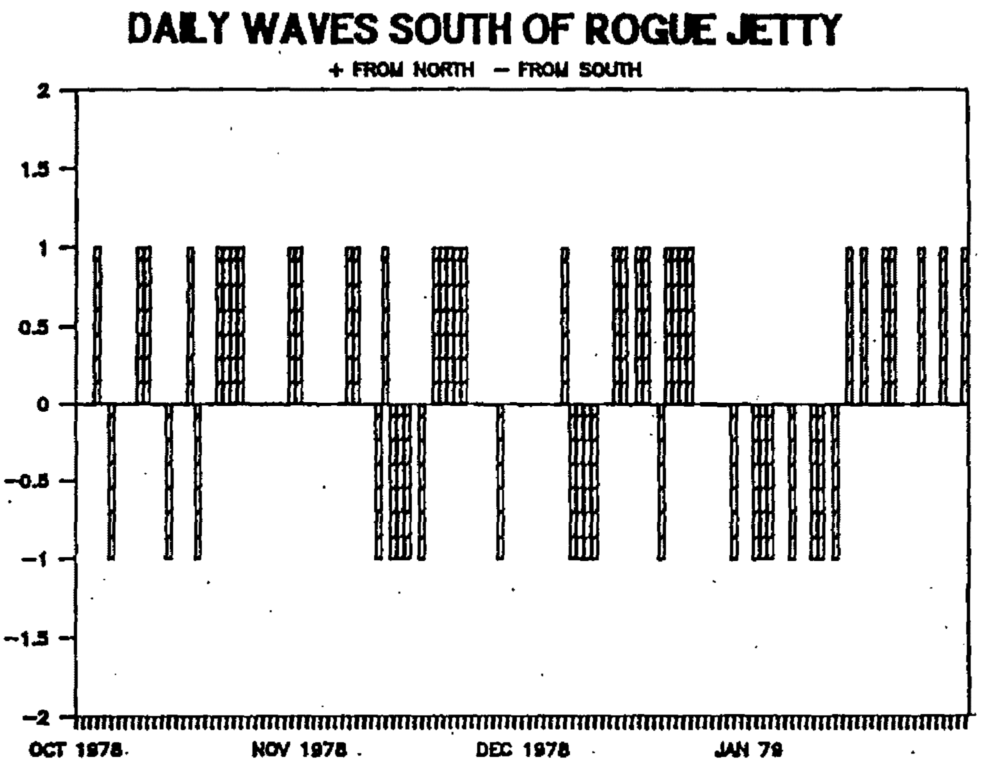


Figure B-8
Wave Height at Rogue Compared to Elsewhere



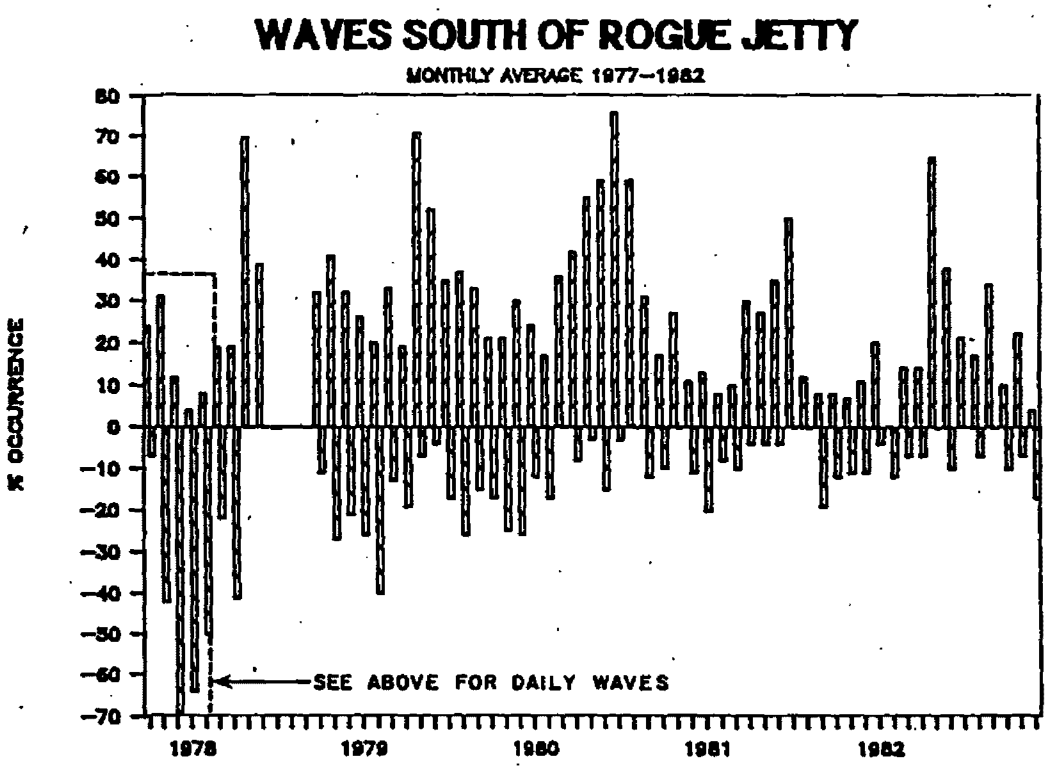


Figure B-9
LEO Monthly and Daily Average Wave Direction

2.10 Detailed current measurements have been obtained from other similarly situated Oregon nearshore dredge material disposal sites. The most thorough study has been conducted at Coos Bay, Oregon. Seasonal measurements made over two-week periods showed that currents at the 25 m-deep disposal site averaged between 20 and 30 cm/s at one-third the water depth during the summer and between 30 and 60 cm/s during the winter and spring. Near-bottom currents were generally between 10 and 20 cm/s with downslope flow components predominating over upslope components. Near-bottom waters exhibited downslope movement to depths in excess of 40 m during the summer and deeper than 70 m during the winter. Similar conditions are expected to exist at the interim Rogue disposal site since both sites are in similar depth regimes.

3.0 SEDIMENT TRANSPORT

The Littoral System

3.1 Any offshore disposal site for the Rogue dredging project needs to be located to prevent the dredged material from returning to the entrance channel. This requires knowledge about the direction and rate of alongshore transport as well as offshore transport. Sediment movement in the littoral zone consists of two mechanisms, depending upon the size of the sediment. Anything finer than sand size is carried in suspension in the water and is relatively quickly removed far offshore. The almost total lack of silts and clays within the Rogue ZSF attests to the efficiency of this mechanism. Sediments that are sand size or coarser may be occasionally suspended by wave action near the bottom, and are moved by bottom currents or as bedload. Tidal, wind and wave forces contribute to generating bottom currents which act in relation to the sediment grain size and water depth to produce sediment transport.

Depth-Limited Transport

3.2 Hallermeier (1981) defined two zones of sand transport based on wave conditions. The inner littoral zone is the area of significant year-round alongshore and onshore-offshore transport by breaking waves. The outer shoal zone is affected by wave conditions regularly enough to cause significant onshore-offshore transport. Using Hallermeier (1981) and long-term wave data from Newport (Creech, 1981), the limit for strong longshore transport varies from -28 feet in summer to -51 feet in winter. Significant onshore-offshore transport occurs to depths of -83 feet in summer and to -268 feet in winter. Hancock et al. (1984) calculated the probability for wave-induced current velocities at various depths off Coos Bay. From other studies, a critical velocity of 20 cm/sec has been shown necessary to erode sediment in the 0.2 mm sand size, common off the Oregon Coast. Using the Coos Bay data, the probability of wave-induced sand movement is very small beyond a depth of about 150 feet. Various sedimentologic studies have suggested an offshore limit of modern sand movement at the 60-foot depth, while others push this limit out to over 100 feet.

Rogue Littoral Cell

3.3 The Rogue Littoral Cell extends approximately 40 km north from Cape Sebastian to Humbug Mountain (Figure B-1). The Rogue is the dominant river entering this littoral cell, with only minor input from Euchre, Hunter and Brush Creeks. Mineral assemblages of the Rogue River correlate with littoral sand mineralogies as well as terrace deposits within the littoral cell (Peterson pers. comm.). This indicates that the primary source of sand within the cell is from the Rogue. Less is known about shoreline source contributions although seacliff retreat is apparent (Peterson pers. comm.). Table B-4 identifies the possible sources and losses of littoral sediments in the littoral cell:

Table B-4
Potential Sources and Losses of Sediments

Sources	Losses
1. Rivers Rogue Various Creeks	1. Estuaries 2. Dune Growth 3. Headland Bypassing
2. Erosion Dunes Terraces Seacliffs	4. Offshore Transport 5. Ocean Disposal
3. Headland Bypassing	
4. Onshore Transport	

Rogue Sediment Transport

3.4 The offshore bathymetry just north of the entrance to the Rogue River probably affects sediment transport, but the mechanism is unclear. The recorded bottom currents at the disposal site are contradicted somewhat by long-term LEO current observations. If we assume that the net transport is to the north at the depth of the disposal site, we need to concede that the nearshore or surfzone net transport is to the south. Stembridge (1978) discusses the rapid accretion of the shoreline 1-2 miles north of the Rogue entrance. There is no corresponding accretion to the south, although sand beaches are present. If the nearshore transport to the south is not balanced by a northward transport there should be more obvious accretion to the south. Figure B-10 illustrates the sediment transport system assumed to be active in the Rogue ZSF. Although the Rogue River must deliver a large sediment load, the bottom contours suggest a rapid distribution offshore. The beaches to the south seem to be in equilibrium, suggesting the littoral transport to the south is balanced by offshore transport. The prograding shoreline to the north suggests that Rogue sediments are being added in spite of the apparent littoral transport to the south. One possibility is that offshore sediments are moving to the north and then onshore due to wave and current refraction by the Rogue River Reef.

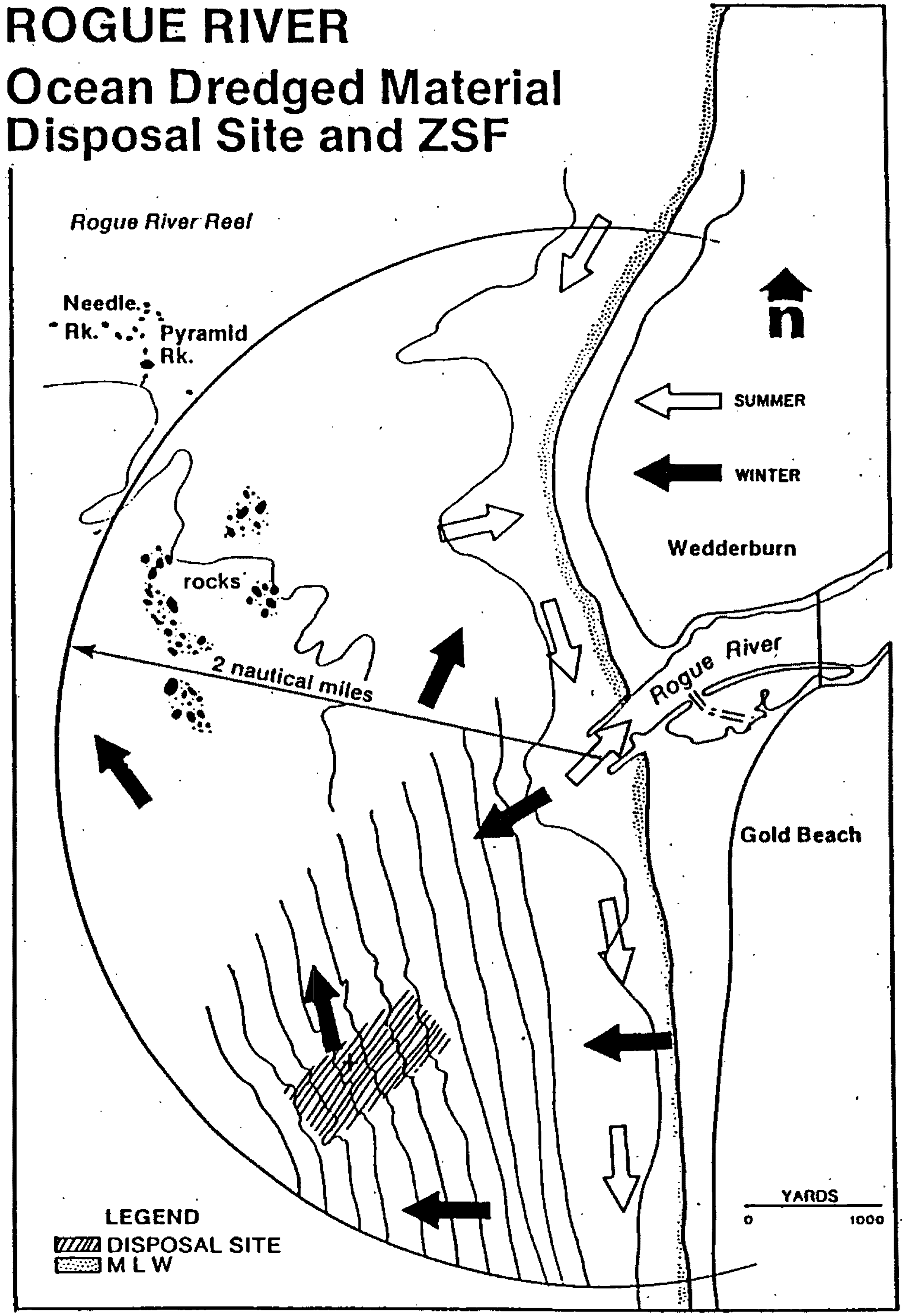


Figure B-10
Sediment Transport in Rogue ZSF

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APPENDIX C

APPENDIX C

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LETTERS

Concurrence Letter from Oregon Department of
Land Conservation and Development

Concurrence Letter from United States Department of Commerce

Concurrence Letter from Oregon State Department of Transportation
State Historic Preservation Office

APPENDIX C

COMMENTS AND COORDINATION

Comments

1.1 The Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA) requires that, for a site to receive a final ODMDS designation, the site must satisfy the general and specific disposal site criteria set forth in 40 CFR 228.5 and 228.6, respectively. The final designation procedures also require documentation of recommended disposal site compliance with MPRSA and with the following laws:

National Environmental Policy Act of 1969,
Endangered Species Act of 1973,
National Historic Preservation Act of 1966, and
Coastal Zone Management Act of 1972, all as amended.

1.2 The data provided in this document was compiled to satisfy these laws and has been coordinated with appropriate and necessary State and Federal agencies.

Coordination

1.3 The procedures used in this ODMDS final designation study have been discussed with the following agencies:

Oregon Department of Fish and Wildlife
Oregon Department of Environmental Quality
Oregon Division of State Lands
U.S. Coast Guard
U.S. Fish and Wildlife Service
National Marine Fisheries Service, and
U.S. Environmental Protection Agency.

1.4 Following completion of a preliminary draft of this document, statements of consistency or concurrence were sought regarding three State or Federal laws. The statutes and responsible agencies are:

Coastal Zone Management Act of 1972, as amended	Oregon Department of Land Conservation and Development
National Historic Preservation Act of 1966, as amended	Oregon State Historic Preservation Officer
Endangered Species Act of 1973, as amended	U.S. Fish and Wildlife Service National Marine Fisheries Service

1.5 Consistency or concurrence letters from these agencies are included in this appendix. State water quality certifications, as required by Section 401 of the Clean Water Act, will be obtained for individual dredging actions.

1.6 A formal public involvement program designed to receive comments from all State and local agencies, private groups and individuals will be accomplished by EPA upon submittal of the final Site Evaluation Report accompanying the request for final site designation.

NEIL GOLDSCHMIDT
GOVERNOR

Department of Land Conservation and Development

1175 COURT STREET NE, SALEM, OREGON 97310-0590 PHONE (503) 373-0050

September 20, 1988

Lauren J. Aimonetto
Acting Chief, Planning Division
Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

RE: Rogue River Ocean Disposal Site Evaluation

Dear Mr. Aimonetto:

Thank you for the opportunity to review the draft Ocean Disposal Site Evaluation for the Rogue River Navigation Project. You have requested that the Department concur with the Corps' determination that the project is consistent with the Oregon Coastal Management Program (OCMP).

The site evaluation report includes findings against Statewide Planning Goal 19, Ocean Resources, which is the most applicable policy of the OCMP. The report does a commendable job of assessing the compatibility of continued dredged material disposal at the interim site with Goal 19 requirements and the criteria of the Marine Protection, Research, and Sanctuaries Act. The Department concurs that final designation of the interim disposal site is consistent with the OCMP.

The Department understands that EPA will carry out a formal public involvement program during the final site designation process. The Department may reexamine the consistency of the project with the OCMP during the EPA process if new information is available at that time.

Thank you for the opportunity to review the document for consistency with the OCMP. Please contact Patricia Snow of my staff if you have any questions.

Sincerely,

James F. Ross
Director

JFR:PS/sp
<per>

cc: Steve Stevens, COE
Glen Hale, DLCD

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way NE
BIN C15700, Bldg. 1
Seattle, Washington 98115

DEC 23 1987

F/NWR3:1514-04 js

Mr. Richard N. Duncan
Chief, Fish and Wildlife Branch
Department of the Army
Portland District Corps of Engineers
P.O. Box 2946
Portland, OR 97208

Dear Mr. Duncan:

This is in response to your December 2, 1987 letter regarding an Endangered Species Act (ESA) biological assessment for the gray whale and other whales at the offshore dredged material disposal sites for Tillamook Bay, Depoe Bay, Siuslaw River, Port Orford, and Rogue River. We have reviewed the biological assessment and concur with your determination that populations of endangered/-threatened species under our purview are not likely to be adversely affected by the proposed actions.

This concludes consultation responsibilities under Section 7 of the ESA. However, consultation should be reinitiated if new information reveals impacts of the identified activities that may adversely affect listed species or their critical habitat, the identified activity is subsequently modified, or a new species is listed or critical habitat is determined that may be affected by the identified activity. If you have any new information or questions concerning this consultation, please contact Joe Scordino at FTS 392-6140.

Sincerely,

Rolland A. Schmitten
Regional Director

NEIL GOLDSCHMIDT
GOVERNOR

Department of Transportation
STATE HISTORIC PRESERVATION OFFICE
Parks and Recreation Division
525 TRADE STREET S.E., SALEM, OREGON 97310

November 7, 1988

Lauren J. Aimonetto
Portland District Corp of Engineers
PO Box 2946
Portland, OR 97208-2946

RE: Off-Shore Disposal Site
Rogue River and Bar
Cultural Resources Report
Curry County

Dear Mr. Aimonetto:

Our office has reviewed the cultural resource report for the disposal site located 1½ nautical miles southwest of the entrance of the Rogue River. Since the area was surveyed by site scan sonar and no shipwrecks discovered, the project should have "No Effect" on historic shipwreck archeological sites. We agree with the problems regarding potential prehistoric sites in the off-shore region. The only likely model for understanding their distribution would be based on analysis of subsurface landforms and a predictive model. Given the current problems our office concurs that no significant cultural resources will be affected by the proposed project. If you have any questions you can contact Dr. Leland Gilsen at 378-5023.

Sincerely,

D. W. Powers III
Deputy SHPO

DWP:jn
AIMONETTO.LTR

Form 734-807

APPENDIX D

APPENDIX D

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APPENDIX D

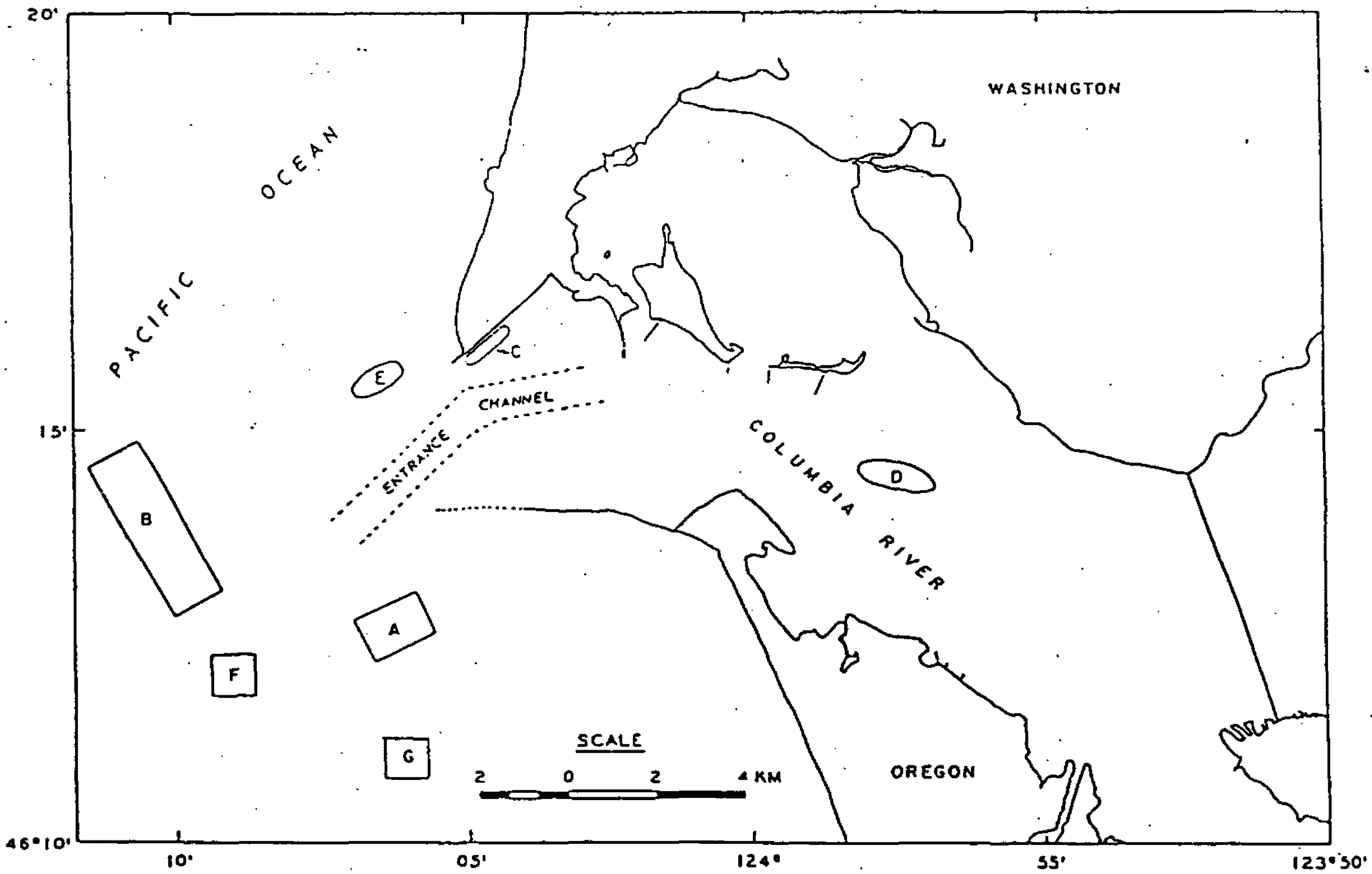
SEDIMENT CHEMISTRY AND WATER QUALITY

General

1.1 General criterion (b) and specific factors 4, 9, and 10 of 40 CFR 228.5 and 228.6, respectively, require sediment and water quality analyses of both the dredging and disposal areas. Dredged materials placed in interim-designated ODMDS along the Oregon coast usually consist of medium to fine sands taken from entrance bar shoals and deposited on slightly finer continental shelf sands. This is the case at the Rogue, with somewhat coarser sediments making up some of the disposed sediments. Because of their coarse nature, similarity to ODMDS sediments, isolation from known existing or historical contaminant sources, and the presence of strong hydraulic regimes, the dredged materials are exempt from further testing according to provisions of 40 CFR 227.13(b). Consistent with this EPA regulation, therefore, analyses of Rogue sediments have been limited to physical variables. However, water and sediment quality impacts associated with disposal of sands and silts at Oregon ODMDS have been studied in detail at the two largest navigation projects, the mouth of the Columbia River (MCR) and Coos Bay, as described below.

1.2 The MCR project was one of the Aquatic Disposal Field Investigations conducted as part of the Dredged Material Research Program (DMRP) in the mid-1970s (Boone et al. 1978, Holton et al. 1978). The DMRP was a nationwide program conducted by the COE to evaluate environmental impacts of dredging and dredged material disposal. The MCR studies included work at an experimental ODMDS, site G, located south of the MCR channel at an average depth of 85 feet (Figure D-1). Following baseline physical, chemical, and biological characterizations of the site, a test dumping operation disposed of 600,000 cubic yards of medium to fine sands (median grain diameter = 0.18 mm) during July - August 1975. Sediments at the disposal site were fine to very fine sand (median grain diameter = 0.11 - 0.15 mm).

1.3 Monitoring results indicated a mound of slightly coarser sediment within the site that gradually mixed with ambient sediments over several months and dissipated. Water quality monitoring during disposal did not show elevated levels of toxic heavy metals, including Cu, Zn, Cd, and Pb. There were some elevated levels of nontoxic elements, Fe and Mn. Nutrient fluctuations were associated primarily with tidal variations, as were chloryphyll a and particulate organic carbon. Dissolved oxygen remained high throughout disposal operations. Sediment quality remained good, with slight (but nontoxic) increases in Pb (from 2 to 4 mg/kg) and Hg (from 0.008 to 0.05 mg/kg) recorded before and after disposal at area G. Oil and grease values in the sediments decreased slightly after disposal, while there were no elevations in ammonia. The authors concluded that there were no adverse impacts in terms of water/sediment quality or toxicity from disposal of MCR sands at area G. They attributed fluctuations in tested variables primarily to sediment and suspended particulate input from the Columbia



Columbia River entrance channel and ODMDS, including experimental disposal site G (From Boone et al. 1978).

Figure D-1
Columbia River Entrance Channel and ODMDS

River, biological activity and processes, and laboratory difficulties associated with repeated measurements close to analytical detection limits.

1.4 An evaluation of areas offshore from Coos Bay was conducted under Corps contract by Oregon State University researchers pursuant to designation of a new ODMDS for fine grain sediments from upper Coos Bay and Isthmus Slough (Hancock et al. 1984, Nelson et al. 1984, Sollitt et al. 1984, USACE, Portland District 1984). The program, conducted in five phases during 1980-1984, included baseline physical, biological, and chemical surveys of offshore areas followed by selection of candidate sites and a test dump/monitoring study at proposed site H (Figure D-2). This site was subsequently designated by EPA as the final site for fine Coos Bay sediments (51 FR 29927 - 29931, dated 21 August 1986).

1.5 The dump/monitoring program at site H consisted of disposal of 60,000 cubic yards of fine sediments from Isthmus Slough, accompanied by water quality and benthic monitoring during disposal operations and followed by post-disposal monitoring of the site and adjacent areas over the next 18 months. Elevations in ammonia, Cu, and Mn were observed during disposal that in some cases were at the threshold of acute toxicity. However, these elevations were of short duration. No substantial elevations of other contaminants or changes in dissolved oxygen, oxy-redox potential, turbidity, or pH were observed. Sediments at the site showed elevated levels of volatile solids, fines, and heavy metals that gradually decreased over the next 18 months (Figure D-3). Total volatile solids was found to be the most sensitive and reproducible indicator of levels of contaminants and its use was suggested as a monitoring tool to utilize during further disposal operations at site H.

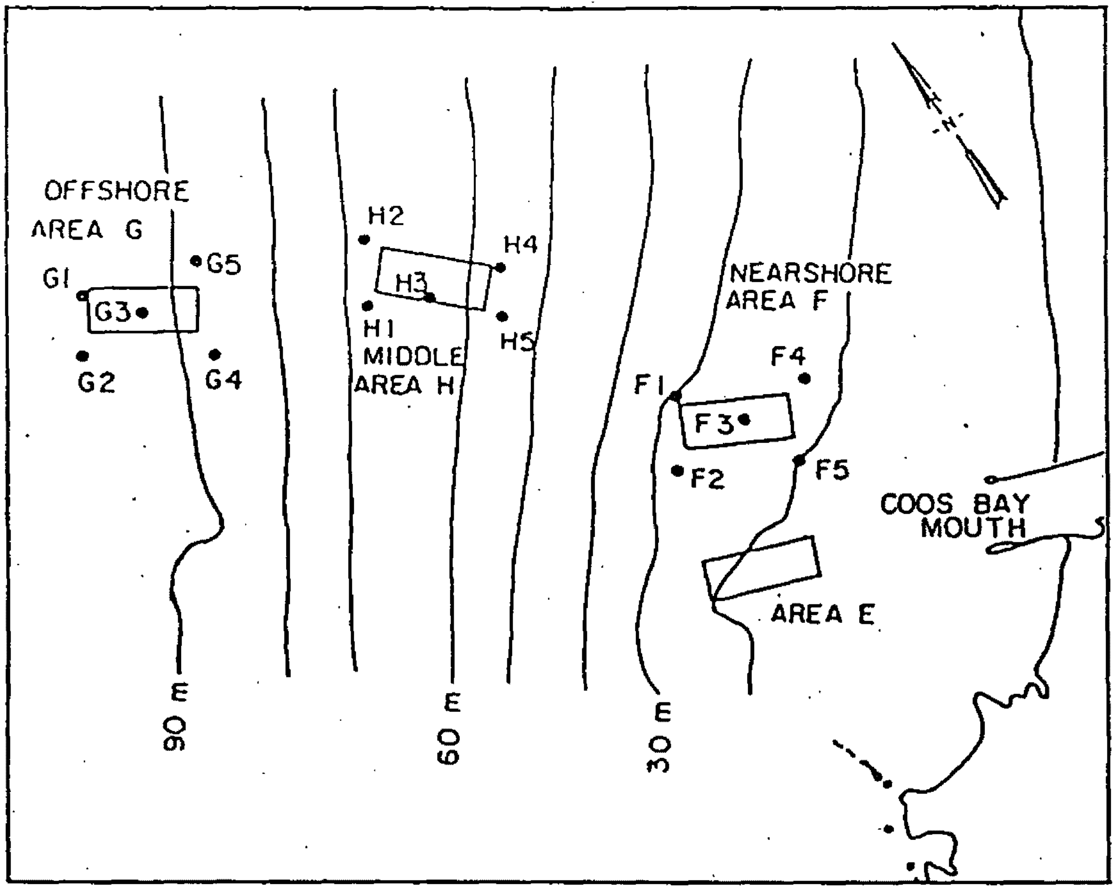
Current Study

1.6 Sediment samples from the channel and boat basin of the Rogue River Federal navigation project were collected by the COE, Portland District in April, 1982 and April-May, 1985. The offshore disposal site at the Rogue was sampled in August, 1985. Locations of the 1985 sampling sites are shown in Figure D-4. The sampling site for the 1982 elutriate tests was at the mouth of the channel connected to the turning basin.

1.7 Physical sediment and elutriate analyses were performed on the 1982 samples for several organic and inorganic parameters. Details of the sampling and lab analyses can be found in U.S. Geological Survey open file report 84-133. Test result summaries from that publication appear in the following sections.

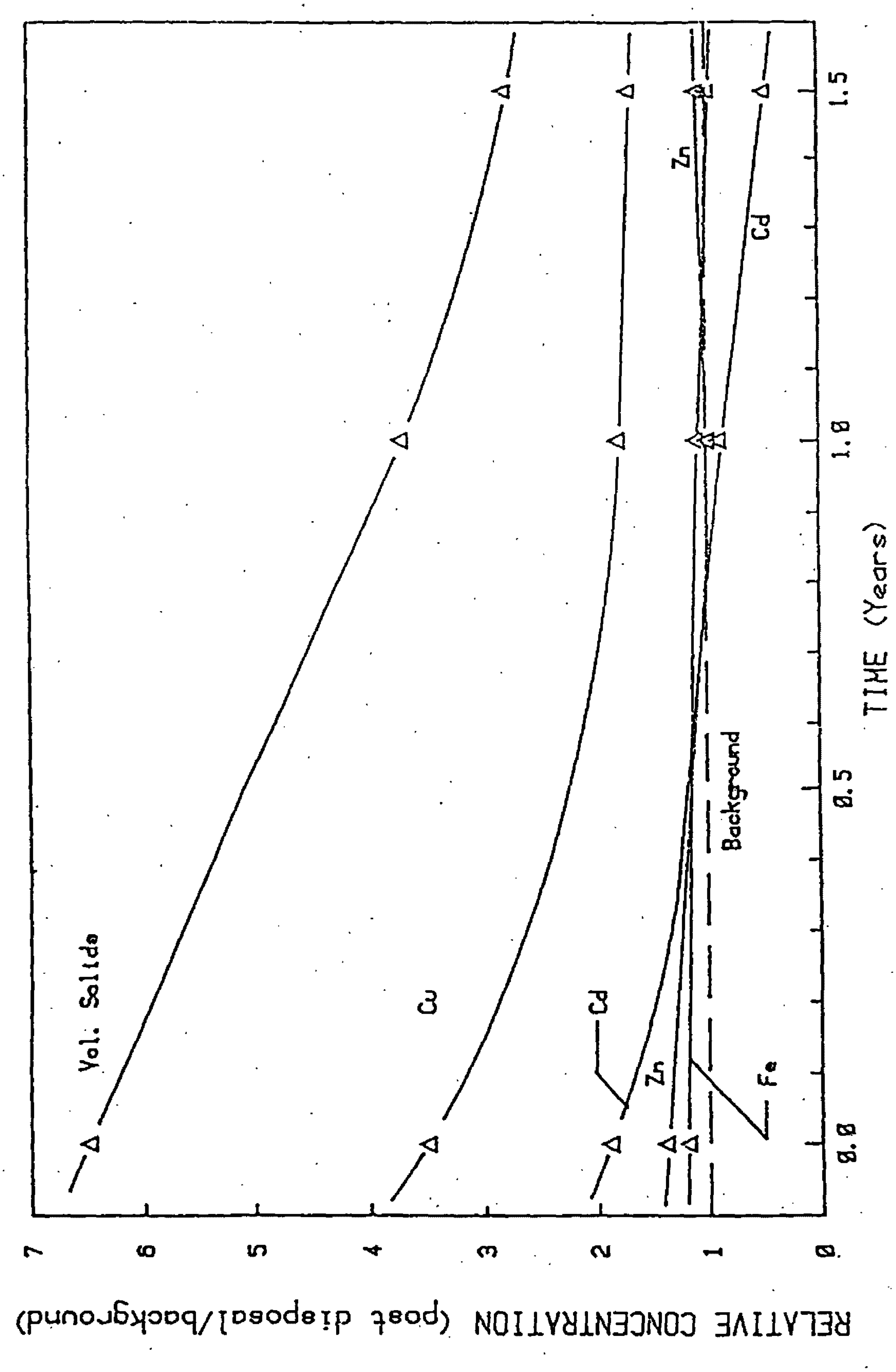
Water Quality

1.8 Basic water quality parameters were taken in the field during collections of sediment samples from the channel. Results of the field measurements, collected with an automated multi-parameter water quality analyzer, are given in Table D-1. Surface measurements were taken off the Coast Guard dock and bottom measurements were taken off the dock and from the river opposite the boat basin. All of the values are within normal ranges for the Oregon coast.



Coos Bay sample station locations for chemical, biological, and physical studies at interim-designated and candidate ODMDS (From U.S.A.C.E. Portland District 1984).

Figure D-2
Coos Bay Sample Station Locations



Coos Bay ODMDS: Recovery of selected sediment chemical parameters at disposal site-samples containing dredged materials (From Sollitt et al. 1984).

Figure D-3
Coos Bay Site H Sediment Characteristics

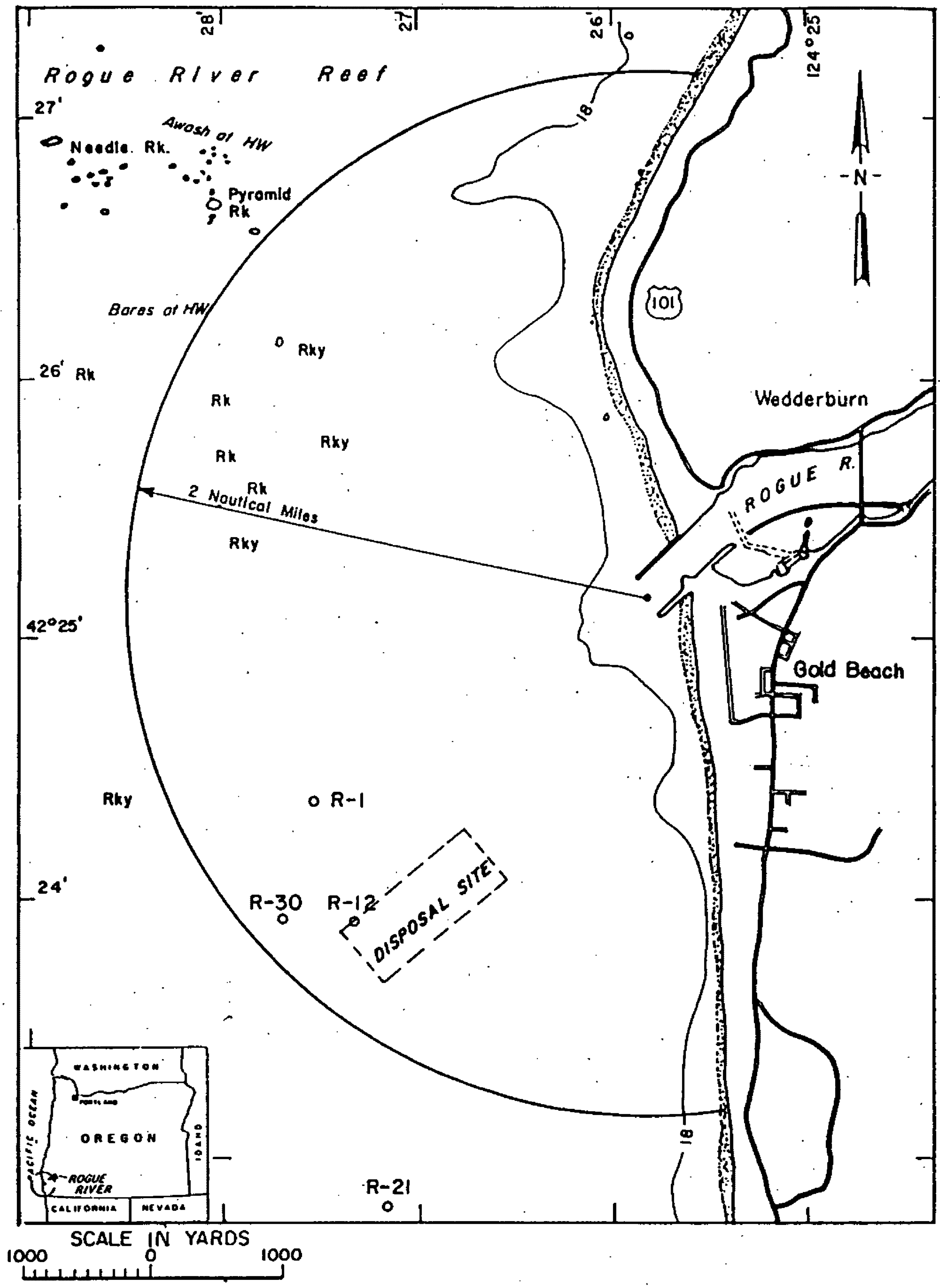


Figure D-4
Rogue 1985 Sampling Locations

Table D-1
Rogue Water Quality Data

Parameter	Off dock		In river opposite boat basin
Depth	surface	bottom	bottom
Dissolved oxygen	12.20	12.54	12.43
Conductivity	.002	.002	.001
ORP	591	573	542
Temperature	7.0	6.9	6.9
pH	7.64	7.73	7.68
Time	0950	0955	0957

Sediment Quality

1.9 Dredged materials deposited at the ODMDS come from the entrance bar and from the main channel up to the boat basin. The boat basin entrance is usually maintained by pipeline dredge and disposed onshore in the South Spit disposal area.

1.10 The grain size distribution curves for the Rogue River project are shown in Figure D-5. The sediments for the main channel, sampled in February, 1981, and May, 1985, are composed of poorly-sorted sand with small amounts of gravel towards the outer bar. The median grain size ranges from 0.2 mm at the upper end of the main channel (RM 0+07) to 0.9 mm at the end of the bar jetties. (The sediments in the Gold Beach boat basin are mainly silts with a median size ranging from 0.018-0.09 mm.)

1.11 Disposal site sediments were sampled in August of 1985. The sediments are all well-sorted, fine sands (Figure D-3). The sediments dredged from the channel in Rogue River are coarser-grained than those at the ODMDS, but their disposal should not cause adverse effects.

Chemical Analysis

1.12 The percentages of volatile solids in the dredged material was less than 3 percent in both 1981 and 1985. Those in the disposal area are all less than 2.5 percent (Table D-2).

Table D-2
Volatile Solids

Sample #	Date	Location	% Volatile Solids
1	2/23/81	300' from N. Jetty Entrance	1.20
2	2/23/81	entrance to boat basin	1.69
1	4/85	entrance of channel	2.8
2	4/85	mid-channel	2.9
3	4/85	entrance to boat basin	2.2
4	4/85	center of river and boat basin entrance	1.7
5	4/85	end of bar jetties	2.6

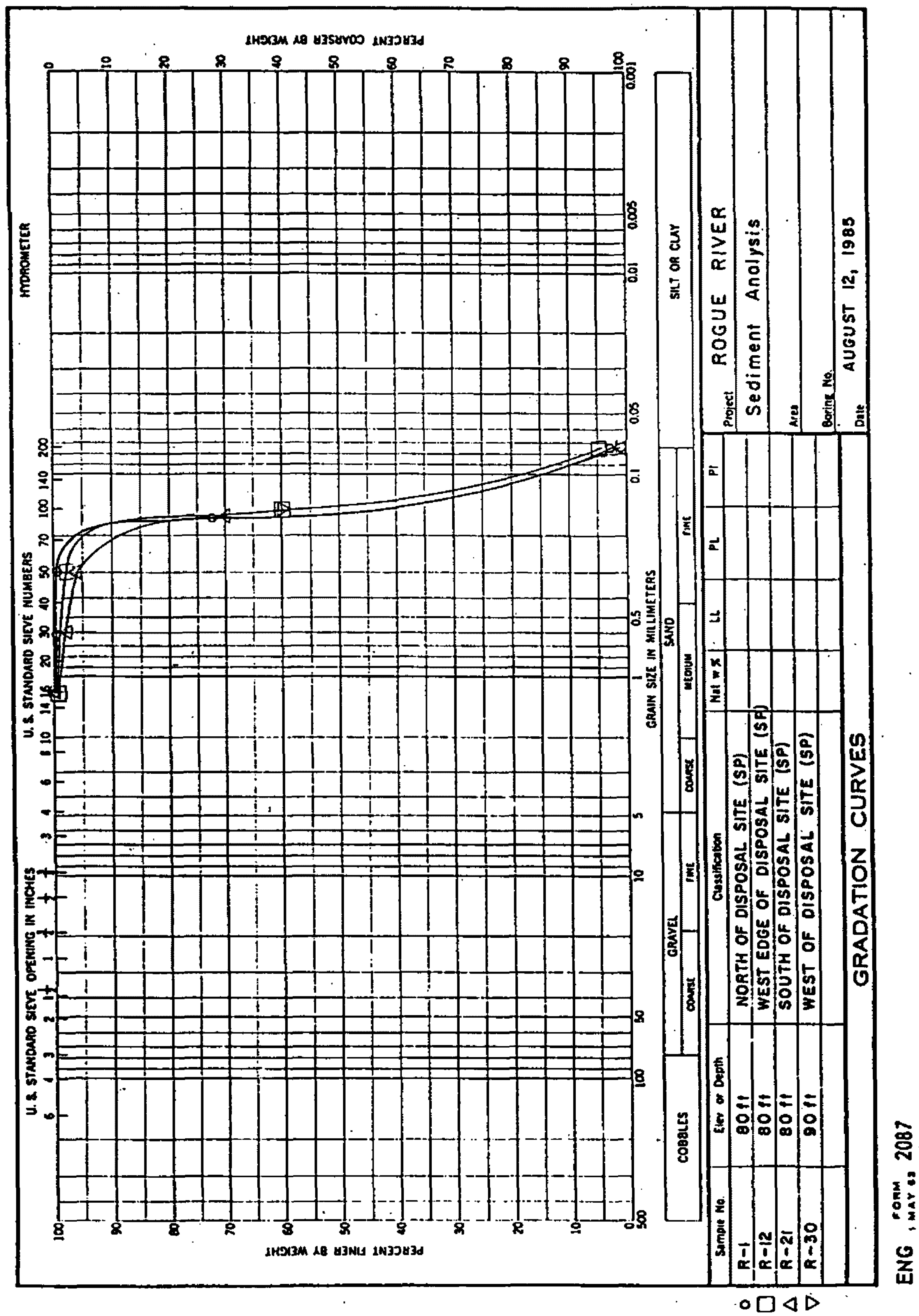


Figure D-5 a
Rogue Grain Size Distribution Curves

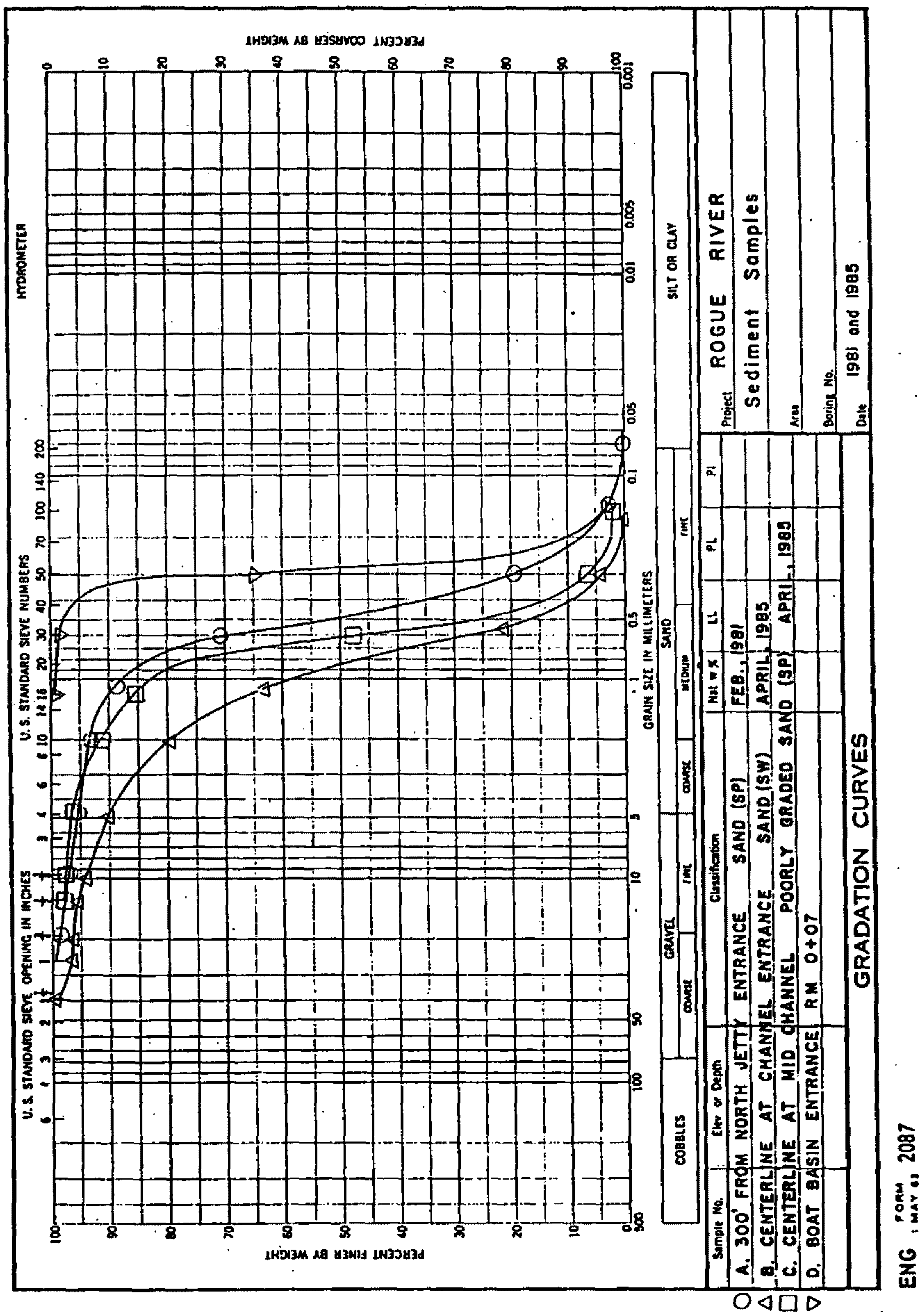


Figure D-5 b
Rogue Grain Size Distribution Curves

1.13 Elutriate analyses were run on only one sediment sample from the main channel. None of the elutriates exceeded allowable limits in this 1981 test (Tables D-3 and D-4). No bulk analysis of sediments from the main channel was done.

1.14 In summary, physical and chemical sediment from Rogue River show that dredged material disposed at the ODMDS is clean sand. It is coarser than that of the ODMDS but within acceptable limits. Based on this information, there should be no problem with continued disposal of these sediments at the offshore site.

Table D-3
Rogue Elutriate Analysis, 1981

DISSOLVED ORGANOCHLORINE AND CHLOROPHENOXY COMPOUNDS IN NATIVE WATER AND ELUTRIATES

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NH=NATIVE EURYHALINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EH=ELUTRIATE WITH EURYHALINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. VALUES = '—' INDICATE THAT ANALYSES HAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	ALDRIN (UG/L)	CHLOR-DANE (UG/L)	DDD (UG/L)	DDE (UG/L)	DDT (UG/L)	DI-ELDRIN (UG/L)	ENDO-SULFAN (UG/L)	ENDRIN (UG/L)	HEPTA-CHLOR (UG/L)	LINDANE (UG/L)	MIREX (UG/L)
1	ROGUE RIVER	NF	04/07/82	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

PCB (UG/L)	NAPH THA-LENES, POLY-CHLOR (UG/L)	PER-THANE (UG/L)	SILVEX (UG/L)	TOX-APHENE (UG/L)	2,4-D (UG/L)	2,4-DP (UG/L)	2,4,5-T (UG/L)
<0.1	<0.1	<0.1	<0.01	<1	<0.01	0.01	<0.01

Table D-4
Rogue Elutriate Analysis, 1981

DISSOLVED CHEMICALS IN NATIVE WATER AND ELUTRIATES

[FOR TYPE OF SAMPLE, REFER TO CODES: NE=NATIVE ESTUARINE WATER, NH=NATIVE EURYHALINE WATER, NF=NATIVE FRESH WATER, EE=ELUTRIATE WITH ESTUARINE WATER, EH=ELUTRIATE WITH EURYHALINE WATER, EF=ELUTRIATE WITH FRESH WATER, BM=BOTTOM MATERIAL. VALUES = '—' INDICATE THAT ANALYSES HAS NOT BEEN MADE.]

SITE NO.	SITE DESCRIPTION	CODE	DATE	CADMIUM[1/] (UG/L AS CD)	CHROMIUM (UG/L AS CR)	COPPER (UG/L AS CU)	IRON (UG/L AS FE)	LEAD (UG/L AS PB)	MANGANESE (UG/L AS MN)	MERCURY (UG/L AS HG)	ZINC (UG/L AS ZN)	CARBON, ORGANIC (MG/L AS C)	NITROGEN, AMMONIA (MG/L AS N)
1	ROGUE RIVER	NF	04/07/82	<3	2	2	78	<1	<10	<0.1	12	1.7	<0.06

ARSENIC (UG/L AS AS)	BARIUM (UG/L AS BA)	BERYL-LIUM (UG/L AS BE)	NICKEL (UG/L AS NI)	NITRO-GEN, AM-MONIA + ORGANIC (MG/L AS N)	PH (UNITS)	SPE-CIFIC-CON-DUCT-ANCE (MICRO-MHOS/CM)	REDOX[2/] CONDITIONS	HARD-NESS (MG/L AS $CACO_3$)	TEMPERATURE[3/] (CELSIUS)
<1	<100	<3	5	0.5	7.4	97	—	42	

1/ CADMIUM ANALYSIS HAS A DETECTION LIMIT OF 3 UG/L.

2/ THE LETTER ASSIGNED UNDER REDOX (REDUCING/OXIDIZING) CONDITIONS INDICATES THE OXYGEN CONDITIONS PREVALENT DURING THE 60 MINUTE QUIESCENT PERIOD FOLLOWING MIXING OF THE ELUTRIATE SAMPLE AND PRECEDING FILTRATION AND PRESERVATION; O = OXIDIZING CONDITIONS, AND R = REDUCING CONDITIONS.

3/ AVERAGE TEMPERATURE VALUES DURING ELUTRIATION TESTS.

LITERATURE CITED

Fuhrer, G.J., 1984. Analysis of Elutriates, Native Water, and Bottom Material in Selected Rivers and Estuaries in Western Oregon and Washington. U.S. Geological Survey Open File Report 82-922.

Hancock, D.R., P.O. Nelson, C.K. Sollitt, and K.J. Williamson, 1984. Coos Bay offshore disposal site investigation, interim report, Phase I. Oregon State University contract report. U.S. Army Corps of Engineers, Portland District, Portland, OR.

Holton, R.L., N.H. Cutshall, L.I. Gordon, and L.F. Small, 1978. Aquatic disposal field investigations, Columbia River disposal site, Oregon: Appendix B: Water column, primary productivity and sediment studies. DMRP Technical Report D-77-30. Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. 53 pp + appendices.

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Sollitt, C.K., D.R. Hancock, and P.O. Nelson, 1984. Coos Bay offshore disposal site investigation, final report, Phases IV, V. Oregon State University contract report. U.S. Army Corps of Engineers, Portland District, Portland, OR. 355 pp + appendices.

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APPENDIX E

APPENDIX E

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APPENDIX E

RECREATIONAL USE

Recreational Use Areas

1.1 The major recreational use areas within the Rogue ZSF are identified in Figure E-1. Although the Rogue River area receives recreational use year-round, the most popular months are from April through September. The salmon fishery accounts for the largest percentage of the recreational activity, although other forms of fishing, sightseeing, boating and clamming are also popular.

1.2 Most of the property along this portion of the coast is privately owned. Despite this, many facilities have been provided by the private sector to meet the needs of recreationists. Several RV parks and campgrounds are located on both sides of the lower river at Wedderburn and Gold Beach. These facilities provide overnight accommodations, boat ramps and access to the river.

1.3 Offshore fishing for salmon, rockfish and bottomfish is popular. Several reefs are located offshore from the Rogue River, including the well-known Rogue River Reef. These reefs provide recreational boaters one of the best sport fisheries along the Oregon Coast. During the summer months, most of the angling effort is for salmon. By August, most of the salmon have begun to move upriver and the offshore fishery is for bottom fish.

1.4 Angling from the jetty is popular throughout most of the year. Salmon fishing is popular during the summer, while perch fishing predominates in the spring and fall. The south jetty receives the majority of use, although, at times, the north jetty is heavily used as well. Jigging for smelt from the north jetty during the summer months is common. Trolling in the lower river and fishing along the north bank are also popular.

1.5 The beach area within the ZSF receives most of its recreational use from beachcombers, hikers, and sightseers. Clam digging is popular at a small, sandy beach located north of the Rogue River entrance. Overall, beaches near the Rogue River are used less than other Oregon beaches due to the limited public access.

Impacts of Disposal Operations

1.6 The disposal site identified on the map is located within a major salmon fishing area. Few conflicts are expected to occur between fishermen and dredge operations due to the availability of alternate salmon fishing sites. Conflicts between disposal operations and recreationists may occur as the dredge is enroute to the disposal site. These conflicts may include time delays for recreational boaters caused by the passing of the dredge or an increase in navigational hazards during congested periods. Conflicts such as these can be considered an inconvenience rather than a threat to recreational activity. The only serious problem would be a collision between recreational boaters and dredge

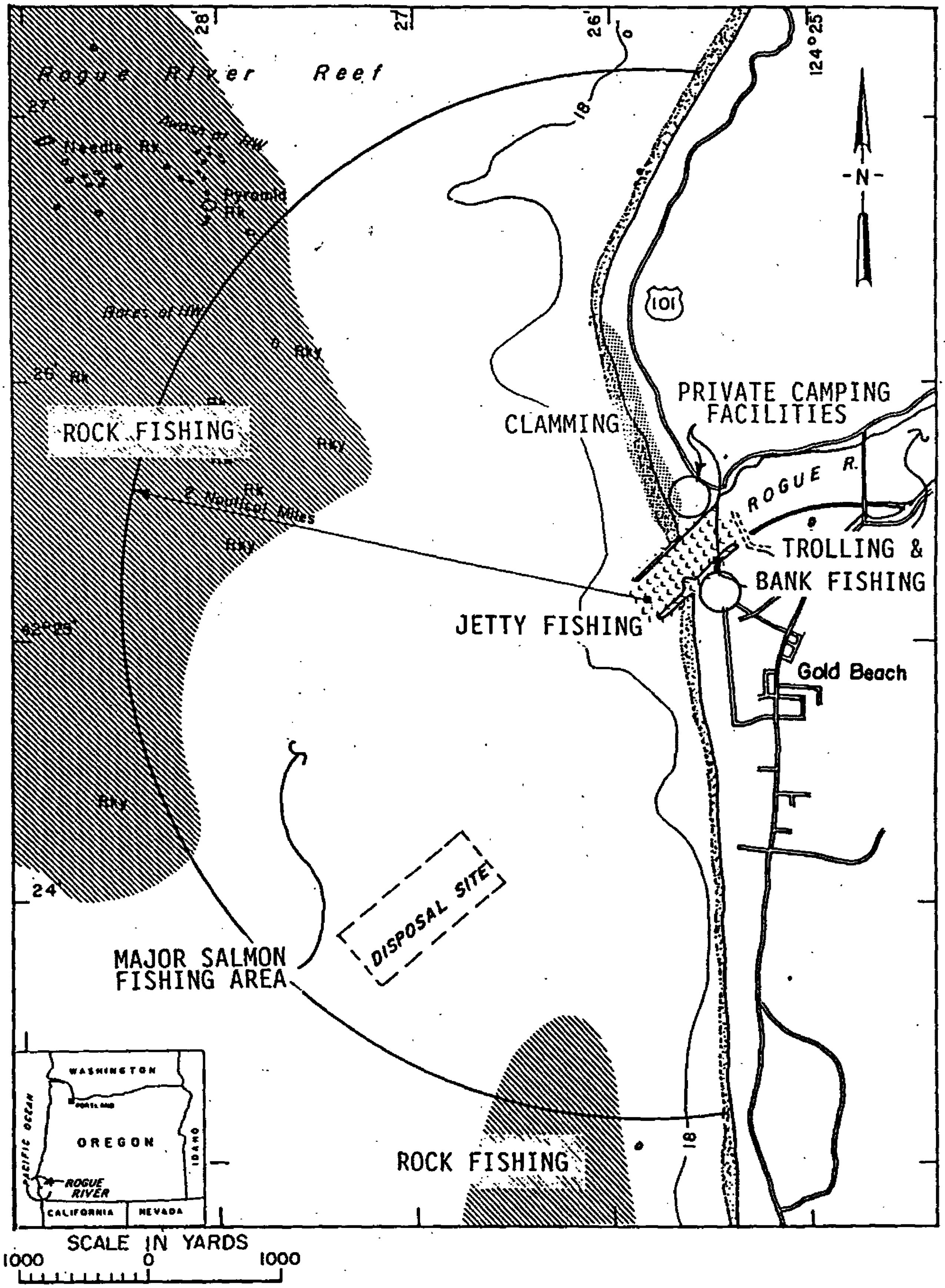

Figure E-1
Rogue Recreational Resources

traffic. Accidents of this nature are rare because the dredge moves at a slow speed. Unless there is a significant change in equipment or operational procedures, the potential for collisions is low.

1.7 When dredged material is deposited at the disposal site, the turbidity in the surrounding water increases. This results in reduced visual quality of the area and may disrupt the feeding patterns of sport fish. Both of these situations are temporary and normal conditions will return as soon as the sediment settles.

1.8 Sediment deposition along the beach is another possible consequence of disposal operations that could affect recreational activity. The accumulation of dredged material on the beaches could interfere with the free movement of sand which could affect the vegetative cover or topography of the beach. If the slope of the beach is altered significantly, it could interfere with the accumulation of driftwood and other items of interest to beachcombers. A change in slope could also affect local clam populations. These changes could result in reduced recreational opportunities for the area. Another potential problem with beach nourishment is the accumulation of foreign material on the beaches. If the dredge material has a different color or texture than the existing material, the results may be a reduction in the visual quality of the area.

Conclusion

1.9 Continued use of the current disposal site should have little impact on existing recreation. During disposal operations, the turbidity in the surrounding water increases. Any impact this may have on sport angling or visual quality of the area will be only temporary. Some inconveniences will be experienced by recreational boaters and fishermen. But, overall, disposal operations appear to pose no serious threat to recreation.

1.10 If future studies indicate that disposal operations are detrimental to ocean fauna, cause disruption of sediment deposition along the coastline, or are responsible for any longterm water quality problems, further information should be collected to determine more specifically what effect this will have on recreation. Until these impacts are observed, future disposal of dredged material at the existing site is not expected to have any substantial effects on recreation.

APPENDIX F

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APPENDIX F

CULTURAL RESOURCES

Introduction

1.1 The study area for the Rogue River ODMDS study encompasses an area 2 Nautical Miles in radius with its center point at the entrance to the Rogue River. The actual disposal site is located 1 1/2 Nautical miles SW of the entrance of the Rogue River. This element of the study evaluated the cultural resource potential of the project area.

Prehistoric Potential

1.2 Analysis of the prehistoric cultural resource potential suggests two possibilities: (1) Sites from the early colonization of the "new world" by the antecedents of the American Indians and (2); sites or artifacts reflecting the procurement of food resources by more recent Indians in the shallow near-shore environments.

1.3 The initial colonization of the North American continent is thought to have occurred during the last phases of the Pleistocene. During this time, approximately 12,000 to 60,000 years ago, the sea levels ranged from 60 meters to 300 meters lower than their present position, a consequence of the glacial phases of the Pleistocene. Lowering of the sea level left a broad exposed coastal plain which in many places extended miles beyond the present coastline. Archaeologists concerned with the problem of the arrival of humans in the North American continent point to a coastal route as a likely path for these early migrants (Fladmark 1983:1). It is possible that some of the earliest prehistoric sites maybe present on the seabed within the nearshore environment of the Oregon coastline.

1.4 The archeological characteristics (artifacts, features, site location in reference to topographic features, and chronology) of these sites is uncertain. They may include the tools and sites of wandering bands of big game hunters exploiting the resources of a broad coastal plain or members of a maritime based cultural group moving down the coast in boats with a technology oriented toward hunting sea mammals and procuring the other resources of the nearshore environment. A recent review of early prehistoric cultural resources suggest that on land sites from near the end of this period (ca.12,000 years ago) occupy small surface areas which are widely dispersed and have low artifact densities (Kelley and Todd 1988:2). Sites with these characteristics are difficult to locate on dry ground and would be extremely difficult to locate in an inundated environment in which the ground surface of that occupation is buried under relatively recent deposits of sand and silts. Thus, not only are there the basic archeological questions of identifying who these people were and speculating on their technology, but also identifying stable land areas from this period which would have survived both the rise in sea level, and the present regime of wave and current energy. Although the issue of submerged early prehistoric sites cannot be dismissed, at the present, demonstration of the presence of an early site in an offshore area is necessary before large scale survey work can be justified.

1.5 The probability is also remote that there are more recent prehistoric sites in the study area. Evidence gathered from archaeological sites located on coastal shorelines indicates that prehistoric Native Americans utilized the near shore ocean environments for subsistence activities. Prehistoric Indians gathered clams and mussels from the tidal zones and caught fish which inhabit estuaries and surf zones (Minor, Toepel, Greenspan, Barner 1985:3). In addition, recent archeological investigations has recovered evidence suggesting that certain coastal Indian groups utilized whales. Whether the whales were hunted or were scavenged from individuals stranded on beaches is uncertain based on the information recovered from the site (Minor, Toepel 1986:4). Regardless, the evidence of whale hunting or scavenging, as well as the procurement of shell fish and/or an offshore fishery, is unlikely to leave substantial archeological deposits; although it is possible that fishhooks, stone weights, and other non perishable elements of an offshore technology are present.

1.6 During the period of historic contact with the Indians of the Oregon Coast line, the Tututni Indians, who spoke a dialect of the Athapascan language, inhabited the land in the vicinity of the Rogue River mouth. The lifestyle of these people has not been discussed in any great detail. They were reported to have lived in semisubterranean planked houses in places along the shoreline of the river and along the ocean beaches. Tututni are reported to have made intensive use of the seasonal salmon runs and the resources of the estuary and headlands (Ruby, Brown 1977:5). As with the earlier prehistoric period, these activities are unlikely to have left significant cultural deposits within the disposal area; however, village sites, middens and related activity areas maybe present along the beaches and in the vicinity of the headlands. These areas will not be affected by the proposed project.

Historical Cultural Resources

1.7 The majority of our background research has been directed at documenting the presence of historic cultural resources, specifically shipwrecks within the ODMDS study areas. This documentary effort forms the essential background for evaluating potential project effects on cultural resources by defining the most likely cultural resource(s) within the project area. Based on investigations of Ports along the Oregon Coast including studies at the mouth of the Columbia River, Yaquina Bay, Coquille River and the Chetco River, historic shipwrecks are the most likely cultural resources present in the project area's offshore location (USACOE 1985, 1987:6).

1.8 A shipwreck data base has been developed from the information complied during background research. This data base contains records of shipwrecks from each coastal project area as they come under review and the Oregon coastline in general. The data base includes information on, vessel type, size, and cargoes. This information can be used as supporting evidence to confirm whether a wreck site is the vessel identified as wrecked in that location. In addition to the information on shipwrecks, our reports also include brief discussions on the historic communities that supported vessel use. This information is important for defining the broader context of vessels use and will support statements of significance should shipwrecks be discovered in project areas.

Shipwreck Locational Model

1.9 In addition too developing a database of known wreck sites, wreck site data has been used to develop a general model predicting the likely location of wrecks along the Oregon Coast line (Figure F-1). Compiling information on the seasonality of wrecks and analyzing specific wreck sites has produced the following wreck site distributions: (1) The areas with the highest likelihood of historic wrecks are the beaches and past surf zones. In some cases historic surf zones can be surprisingly distant from their current positions. In the Astoria area, the wreck sites of two vessels are considerably inland from the present surf zone. (2) The next most likely areas are located in the shallow near shore environments, for example the present surf zones and in the vicinity of navigation hazards, such as reefs and areas of shoalling. (3) The least likely areas are those beyond the nearshore environment in areas of increasing water depth.

1.10 Analysis of the distribution of shipwrecks suggests that wreck sites are a product of natural forces which operate on a vessel after it has been damaged, looses power and/or steerage. The majority of shipwreck occur during the late fall-winter-early spring storm season. Research suggests that vessels are typically damaged while approaching the entrances of river Ports and landings along beaches. When vessels are damaged or loose power near the shoreline they are trapped by nearshore ocean currents and pushed by the predominantly onshore winds of the late fall-winter-early spring storm period into the coast and toward the beaches.

1.11 These causal factors also operate on that small set of special cases, the derelict vessels that drift from their point of damage whether its along the coastal waters of Japan or along the ocean trade routes miles off the coast. Though the absolute number of derelict vesselscannot be determined, when these vessels appear along the Oregon

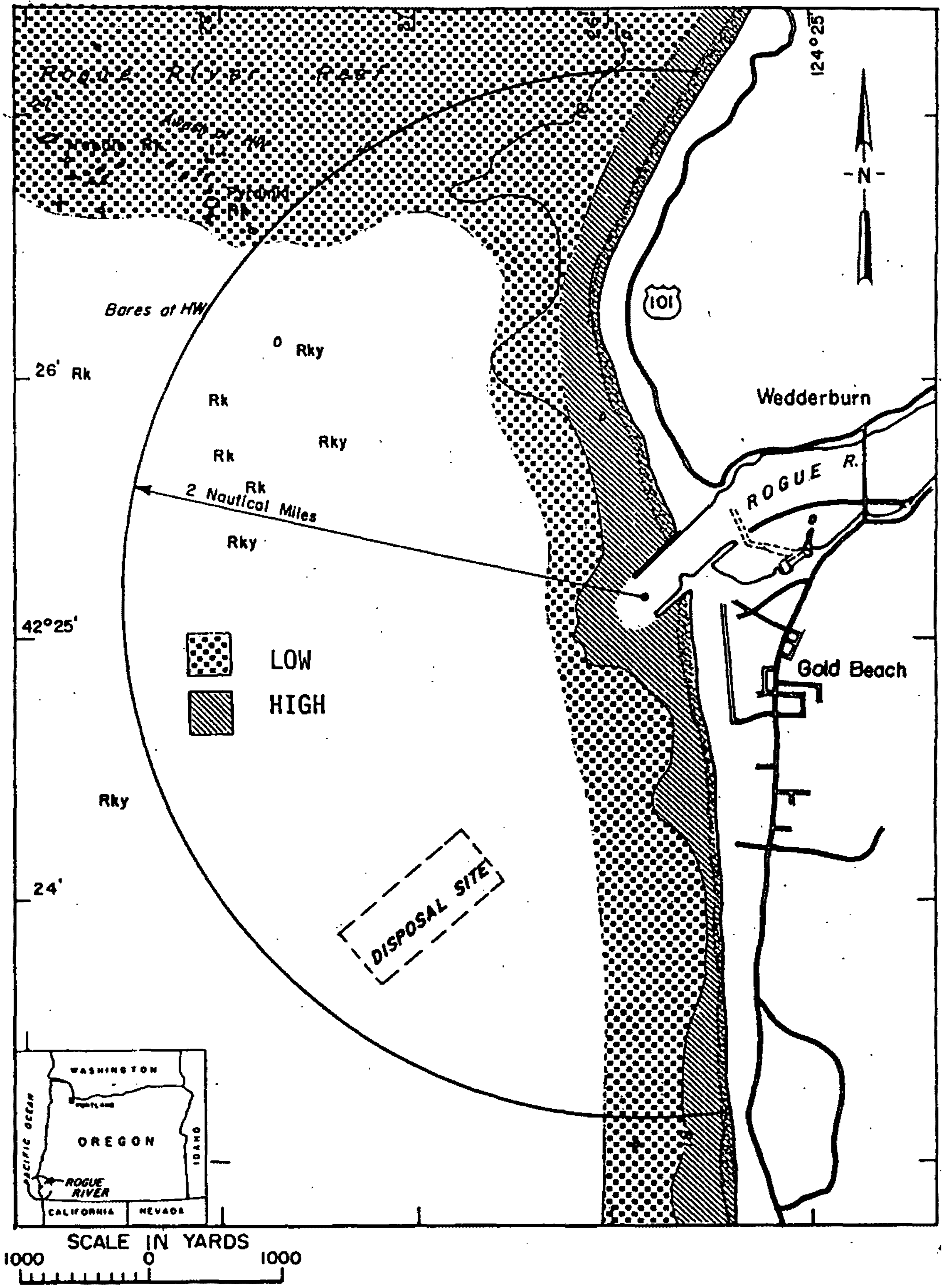

Figure F-1
Shipwreck Frequencies

coast during the storm season, they too drift towards the shore carried by coastal ocean currents and are brought into the beaches and surf zones by the on shore winds of the storm season. It is estimated that the majority of derelicts are beached during the late-fall/winter-early storm season, rather than being randomly distributed throughout the year.

1.12 Modeling shipwreck distributions and defining the causes is important for identifying the probable sites of undocumented wrecks. Though it is likely that the majority of wrecks sites are reported in the historic literature, it is certain that unidentified wreck sites are also present. The history of early exploration, fur trade and the colonization period indicates that many vessels operated under a set of conditions that did not always leave documentation of there presence in a specific area. As examples:

(1) Early exploring/fur trading expeditions operated along an unknown coast line. There may have been occurrences where these vessels, reconnoitering an unknown coast line, were wrecked and lost without witnesses or records.

(2) In some cases fur traders pursuing profits operated illegally in other countries territorial waters or without proper authorization from their own countries. Little if any documentation would be available to demonstrate the presence or loss of these vessels.

(3) In other cases treasure vessels moved secretly along shipping lanes carrying their cargoes; when lost no record of their final position is available (Beales and Steele 1981:7).

(4) In some cases vessels are lost along shorelines of their own coastal areas, become derelict hulks and drift on ocean currents to foreign coastlines and beaches (Brooks 1875:8).

1.13 Based on the locations of known wreck sites, the shipwreck model predicts a similar wreck pattern for undocumented wreck sites. In the case of undocumented shipwrecks the model assumes that the basic natural forces of ocean currents and winds as determined by the season are the primary causes of wreck distributions along the Oregon Coast. This pattern is probably a constant throughout the maritime history of the Northwest Coast.

Uses of the Model

1.14 The shipwreck model has two purposes: As a planning tool for the ODMDS projects or similar civil works the model can be used to guide the evaluations of work areas by excluding the high probability locations from planning studies. Used in this manner, the model can help reduce project costs by orienting work toward low probability areas and preserve cultural resources by avoiding them. In addition the model can be used as a locational device to focus historical archeological investigations in areas where wrecks are likely to occur, or if a researcher desires to locate wrecks with the densest level of information, to areas further offshore from the typical wreck site.

1.15 The model, however, cannot be used to avoid cultural resource investigations. Basically, the model predicts a general shipwreck distribution within each project area. However, each place has its own unique historic potential despite the fact that wrecks cluster on beaches and within shallow nearshore environments. Historic Preservation Legislation acknowledges the uniqueness of historic events by requiring evaluation of all project areas, not just the most likely areas. This requirement is important for the preservation of historical archeological resources. For example, shipwreck events are not as frequent as many popular accounts lead one to believe, especially when compared to the number of successful voyages. Commercial shipping was a very successful operation with thousands of tons of goods reaching their destinations, the benefits clearly offset the small number of vessels that were lost. For preservation values, the absolute number of potentially significant shipwrecks is probably small.

1.16 In addition, the likelihood that wrecks will be preserved and will be available for future study is not necessarily assured. Wrecks are not only preyed upon by professional salvors, treasure hunters and pioneers who saw wrecks as a source of "raw" materials, but are also lost to marine organisms and broken apart by the mechanical forces of wave energy and ocean currents. Most shipwrecks on beaches and in near shore environments are probably reduced to remnants of major structural elements (keels, frames), although it is possible that artifacts are present, distributed around the wreck buried under beach sands. At a minimum these wreck sites are significant as part of a comparative study collection with each wreck providing information on construction details of vessels of various classes. The offshore wrecks, however, maybe in a class by themselves. These wrecks, relatively fewer in number are generally beyond easy accessibility and maybe in a preservation environment superior to those wrecks in more exposed locations. Archeological data at these sites will probably be richer, including a higher density of artifacts and possibly, better of a vessels wooden structure.

A Sketch of Rogue River History

1.17 In July, 1817, Peter Corney, on the schooner Columbia, traded with the Indians in the vicinity of the Rogue River (Corney 1965:9). As the fur trade developed the area was visited by Alexander Mcleod of the Hudson Bay Company (1827) and American fur trader and explorer, Jedediah Smith (1828) (Douthit 1986:10).

1.18 Historic settlement at the Rogue River mouth occurred in the 1850s. The communities formed around the search for gold. By 1853 placer mining of the black sands on the ocean beaches adjacent to the Rogue River outlet and mining of gravel bars in the drainage of the Rogue was in full development. A substantial community developed at the mouth of the Rogue River in support of the miners. This was followed by an increase in farmers who saw the miners as a market for their agricultural products. Mining declined in importance during the late 1850s. Other aspects of the local economy included lumbering, a mill, and a salmon packing facility. Stewart and Michael Riley developed the commercial salmon fishery in the late 1850s. In 1876, D.H. Hume purchased the cannery operation. Hume recruited labors for his cannery in Astoria, Oregon. On one occasion Hume's vessel the Alexander Duncan, grounded on the south spit with 35 Chinese cannery workers aboard. By the 1870s the salmon fishery, canneries and lumbering were the main economic activities. As the main form of transportation sailing vessels and small coastal steamers brought miners, cannery laborers and settlers to the small harbor near the mouth of the Rogue River. On their return voyages, primarily to San Francisco, these vessels carried the export commodities, gold dust, lumber, agricultural products, and preserved salmon to California.

1.19 Although the salmon fishery and lumbering provided export commodities, their significance was primarily local. In 1879, Philip Eastwick, Assistant to the Portland District's Engineer, made a field reconnaissance of the Rogue River. He concluded that navigational improvements to the Rogue River to facilitate the local economy were not warranted as settlers were few in number and the value of their products was not sufficient to justify the costs of the improvements (Eastwick 1879:11).

1.20 With the decline in the salmon fishery during the early 1900s the town of Gold Beach remained in relative economic as well as physical isolation from other regional communities. In 1929 Highway 101 was finished tying Gold Beach by road to the other coast communities. Prior to the construction of Highway 101 the only alternative to transportation by sea was by pack train up the trails along the Rogue River.

Rogue River Wrecks

1.21 The first reported shipwreck within the study area was the wreck of an unidentified Russian Whaler, which occurred sometime during 1830 on the beaches of the mouth of the Rogue River (Ruby and Brown 1986:12). The first documented wreck, was that of the Wm. G. Hackstaff, aground at the mouth of the Rogue River, on September 9, 1849. Thirty-three additional wrecks occurred over the years following the wrecks of these two vessels.

1.22 The Shipwreck Data base for the Rogue River has information on 35 wrecks which have occurred between Cape Sebastian, seven miles south of the Rogue River mouth and Humbug Mountain, approximately 19 miles north of the Rogue (Table F-1). Of these, 28 wrecks have occurred within the ODMDS project area. Our data indicates that 20 of these wrecks were either refloated (12) or salvaged (8) leaving the possibility that 8 wrecks are still present within the study area. Further analysis of the 8 shows that 7 wrecked on beaches and one sank within the vicinity of the project area. The lumber schooner, San Buenaventura, was lost 1/4 mile SW of the mouth of the Rogue River (Buenventura 1910:13).

Testing the Shipwreck locational model

1.23 The Shipwreck model predicts that shipwrecks will be distributed with the following frequency: The majority of wrecks will be concentrated on the beaches and in the historic surf zones. The area with the next most frequent number of wreck sites will be the near shore environment, including the present surf zones and those areas with shallow or exposed navigation hazards such as, reefs and areas of shoalling. The area with the least frequent number of shipwrecks are the deeper offshore areas.

1.24 Our data supports these assumptions. Within the Rogue River Data Base (N=35), 28 wrecks have been deposited on the beaches, 2 wrecks in the surf zones (on the bar at the mouth of the Rogue River), and 5 offshore. The subset of wrecks within the ODMDS project area mirrors the distribution of wrecks within the Rogue river sample. Of the 28 wrecks in the study area, 25 have occurred on the beaches, 2 in the surf zone (on the bar) and 1 offshore.

1.25 The fact that fewer wrecks then expected have occurred in the surf zone and the overwhelming majority on the beaches reflects the historical navigational difficulties of identifying and crossing the channel over the Rogue River bar. Philip Eastwick remarked in his report for the Portland District Engineer, that the harbor entrance shifted seasonally. During the winter high flows in the Rogue River cut through the south spit letting the river empty into the ocean in a more direct manner; during the summer strong northwesterly winds slowed the flow causing the winter channel to fill which shifted the channel to a more southerly direction before it outlet into the ocean. In addition both Eastwick and the Oregon Coastal Pilot noted that the depth of the bar at the mouth of the Rogue River might be as shallow 4 to 5 feet deep during the winter. The unpredictability of the bars location and depth provided safe passage only during the summer (Eastwick 1879 and Denson 1889:14). The number of shipwrecks that lined the mouth of the Rouge River confirm the difficulties of navigating into the harbor at Gold Beach.

Project Site Evaluation

1.26 The disposal site for the Rogue River project was evaluated by using a side-scan sonar. Although the side scan sonar work was carried out primarily for environmental reason, any sonar images that indicated the presence of shipwrecks would have been noted. This evidence may include the presence of structural remains of ships, sediment mounding indicating the burial of vessels, and/or ballast or cargo remnants indicating the site of a decayed vessel. No shipwreck signature or other evidence of a shipwreck was recorded by the sonar investigation (ESA and GRI 1985:15).

Table F-1
Shipwrecks of the Rogue River

Date of Wreck	Name of Vessel	Site of Wreck	General Wreck Site Location	Distance/ Direction from Rogue River	
11/24/1874	ALASKA	GOLD BEACH	BEACH	0.00	
09/14/1879	ALEX.DUNCAN	SOUTH SPIT	BEACH	0.00	
05/02/1879	ANDREW JACKSON	ROGUE RIVER VICINITY	OFFSHORE	5.00	NORTH
05/02/1954	BERWICK	GOLD BEACH	BEACH	0.00	WEST
11/??/1904	BERWICK	GOLD BEACH	BAR	0.00	WEST
12/15/1907	BERWICK	GOLD BEACH, SPIT	BEACH	0.00	WEST
10/27/1949	CERES	ROGUE RIVER vicinity	OFFSHORE	9.00	WEST
01/21/1902	COPPER QUEEN	NORTH SPIT	BEACH	0.00	WEST
05/28/1903	COPPER QUEEN	GOLD BEACH	BEACH	0.00	
03/??/1891	DEL NORTE	NORTH SPIT	BEACH	0.00	
09/11/1891	DEL NORTE	BAR, ROGUE RIVER	BEACH BAR	0.00	
08/11/1908	ENTERPRISE	SPIT,??	BEACH	0.00	
10/21/1879	ESTER COBOS	SOUTH SPIT	BEACH	0.00	
11/18/1880	ESTHER COBOS	SOUTH SPIT	BEACH	0.00	
1850 SPG	FLAGSTAFF	GOLD BEACH	BEACH	0.00	
03/08/1878	JOHANNA M. BROCK	ROGUE RIVER, Vicinity	BEACH	15.00	NORTH
09/05/1919	MAGNOLIA	NORTH SPIT	BEACH	0.00	
11/21/1875	MILO BOND	ROGUE RIVER	BEACH	0.00	
01/03/1875	NOR'WESTER	NORTH SPIT	BEACH	0.00	
11/06/1921	OSPREY	SOUTH SPIT	BEACH	0.00	
06/??/1913	RANDOLPH	SOUTH SPIT	BEACH	0.00	
05/01/1914	RANDOLPH	SOUTH SPIT	BEACH	0.00	
07/26/1916	ROAMER	SPIT ??	BEACH	0.00	
01/28/1890	ROSALIND	ROGUE RIVER	BEACH	3.00	NORTH
02/24/1917	RUSTLER	ROGUE RIVER	BEACH	1.50	NORTH
01/15/1910	SAN BUENAVENTURA	ROGUE R.	OFFSHORE	0.25	WEST
09/02/1888	THISTLE	NORTH SPIT	BEACH	0.00	
12/??/1889	THISTLE	NORTH SPIT	BEACH	0.00	
03/25/1880	VERUNA	SOUTH SPIT	BEACH	0.00	
05/21/1911	WASHCALORE	HUNTERS IS.	OFFSHORE	7.00	SOUTH
05/21/1911	WASP	CAPE SEBASTIAN	OFFSHORE	6.90	
12/03/1941	WILLAPA	HUMBUG MTN	BEACH	19.00	
09/??/1849	WM G. HACKSTAFF	ROGUE RIVER MOUTH	BEACH	0.00	WEST
11/03/1875	WILLIMANTIC	GOLD BEACH	BEACH	0.00	
1830 ?	RUSSIAN WHALER	ROGUE RIVER MOUTH	BEACH	0.00	
				0.00	

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