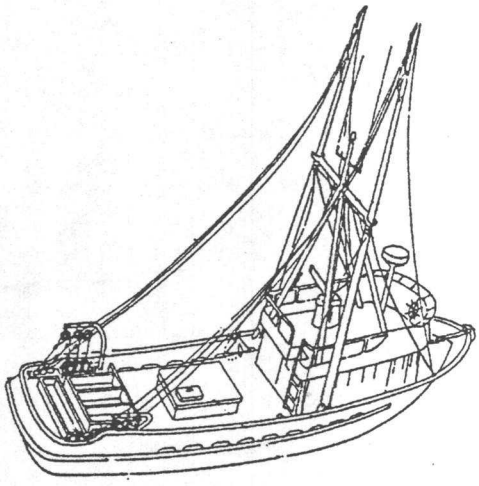
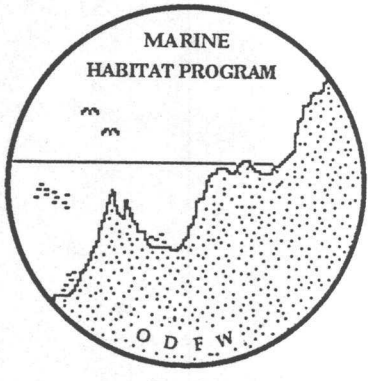
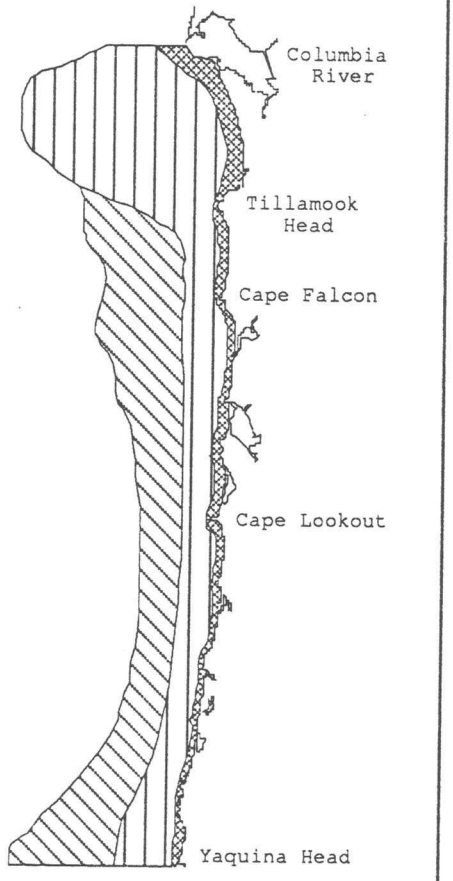
DISTRIBUTION OF SELECTED OREGON OCEAN FISHERIES







OREGON DEPARTMENT OF FISH AND WILDLIFE

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Fish & Wildlife

DISTRIBUTION OF SELECTED OREGON OCEAN FISHERIES

David S. Fox

Oregon Department of Fish and Wildlife
Marine Science Dr., Bldg #3
Newport, OR 97365

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INTRODUCTION

In 1987, U. S. Department of Interior's Minerals Management Service began a 5-year oil and gas leasing program for areas along the nation's outer continental shelf. Lease Sale #132 includes ocean areas off of Oregon and Washington. The 5-year program requires preparation of an Environmental Impact Statement for each Lease Sale area. In 1988, the Minerals Management Service contracted with the Pacific Marine Fisheries Commission, Oregon and Washington fisheries agencies, and the Northwest Indian Fisheries Commission to develop fisheries information needed for the Lease Sale #132 Environmental Impact Statement. The contract requires Oregon Department of Fish and Wildlife to develop quantitative and qualitative data bases describing the major fisheries occurring off Oregon. This report presents the qualitative fisheries information and is intended to fulfill Item 2c, Task 6 of the contract.

The goals of the qualitative portion of the fisheries data base project are:

1) To map selected commercial and recreational fishing grounds off Oregon, and

2) To describe factors influencing fisheries on the fishing grounds.

Information used to fulfill these goals was collected primarily through a series of interviews with knowledgeable fishers and biologists who mapped fishing locations and described the nature of the fisheries on each fishing ground.

This report was developed for use in offshore resource decision-making. The maps provide resource managers with a tool for identifying locations where potential resource use conflicts may occur and determining where to direct impact assessment and conflict resolution efforts. The primary users of the information will be Minerals Management Service for drafting their Environmental Impact Statement, the Oregon Ocean Resources Management Task Force in developing offshore management plans, and other state and federal agencies in reviewing offshore plans and development proposals. Use of the maps for fulfilling quantitative impact assessment requirements is limited because they were generated primarily from qualitative verbal communications. The Map Uses and Limitations section explains some of the maps' limitations.

This report presents qualitative fisheries map information for the following fisheries:

- commercial ocean salmon troll,
- commercial ocean Dungeness crab,
- commercial pot and longline groundfish,
- commercial sea urchin,
- commercial Pacific herring,

- commercial squid,
- commercial and recreational razor clam, and
- recreational charter.

Following the **Introduction**, the **Methods** section describes our procedures for gathering the qualitative data and developing the maps. The **Fishery Descriptions** and **Fishery Summaries and Maps** sections present and interpret the maps.

METHODS

We acquired information for the maps through a series of interviews with fishers and Oregon Department of Fish and Wildlife staff biologists familiar with the fisheries. The data acquisition process included identifying experienced individuals to interview, defining an interview format, and conducting the interviews. Oregon Department of Fish and Wildlife biologists, marine extension agents, and knowledgeable fishers suggested experienced individuals for our interview list. We focused on collecting information from a relatively small number of individuals with the greatest knowledge of the fisheries. We chose this strategy rather than a broad-based approach of interviewing a large sample of fishers because we felt that the fisheries could be adequately represented by the more experienced participants. During the interview process we usually observed that, after 2 or 3 interviews for a given area, additional contacts produced little or no new information on fishing locations. We interviewed individuals from the list who were available during the timeframe of the project and willing to participate. Many of the interview subjects had 20 or more years experience in the fishery. We conducted a total of 66 interviews for the fisheries included in this project.

The standard format of the interviews was to instruct the fisher as to the purpose of the project, and have them map the fishery of interest and complete a questionnaire about the fishery. In addition to, or instead of the questionnaire, the interviewer also kept notes to record information about the fishery. The map data produced by the fishers were in the form of hand-drawn polygons on photocopies of NOAA navigation charts (NOAA 1983, 1984, 1989) depicting primary fishing locations. The fishers selected primary fishing grounds by generalizing past years experience of where the fishery typically operates. We defined a fishing ground as any area where a fisher will typically attempt to fish based on a past record of catching an adequate amount of product to make fishing trips economically worthwhile.

Maps displayed in this report represent our compilation and generalization of the principal fishing grounds mapped by the fishers. Our compilation process involved hand transferring the interview map polygons for each fishery onto velum overlays registered to NOAA navigation charts. Compilation onto a single overlay for each fishery allowed comparison of different interview responses and

generalization of the interview polygons. The final fishing-ground polygons were drawn by evaluating individual interview map polygons with interview questionnaires and notes, physical factors such as depth and substrate type, and Oregon Department of Fish and Wildlife staff experience in the fisheries. We submitted copies of the final overlays to Minerals Management Service and digitized the information to prepare the maps presented in this report.

MAP USES AND LIMITATIONS

Maps presented in this report are useful for defining principal geographic locations of fisheries. Their uses for offshore planning and development review include identifying fisheries that are most likely to be impacted by proposed development, identifying potential space-use conflicts, and determining where to focus further research for assessing potential impacts. The maps, however, have several important limitations to their use. The following list briefly explains these limitations.

1) Interview data are subject to personal biases and limited knowledge.

Information gathered during interviews can be subject to personal biases, errors, limits on personal knowledge, and attempts to sway information for personal purposes. Individuals interviewed for this study were, in general, very knowledgeable and appeared entirely open and honest in providing fishing ground locational information. We therefore suspect little intentional biasing of the data. Abilities to generalize past fishing experience and represent the information on maps varied among the individuals interviewed. This resulted in some inconsistency in the data; the maps tend to be biased toward information gathered from individuals who were better able to represent their experience on maps.

2) Catch or effort levels cannot be associated with mapped fishing grounds.

Oregon organizes official landing records by port. Because boats often fish some distance from their home port, fishing locations cannot be easily correlated with port of landing. As a result, catch data derived from official landing records cannot be legitimately assigned to individual fishing grounds.

3) Relative importance of fishing grounds cannot be consistently determined.

The interviews made no attempt to systematically ascertain relative importance of fishing grounds. Individual perceptions of importance vary too widely to legitimately rank fishing grounds using interview data.

4) Maps do not represent the distribution of non-marketable life stages or conditions of the fishery species.

Fisheries target only marketable life stages or conditions of species. Size is generally the primary factor determining marketability. The maps, therefore, do not represent distribution of juvenile or other non-marketable life stages.

5) Maps represent principal fishing areas only.

The fishers interviewed mapped principal fishing areas only. Small or infrequently used areas were not mapped due to lack of consistent information about them. When fishers are unsuccessful in their usual fishing grounds, they search other areas and often make adequate catches in areas not shown on the maps. The maps should be viewed with the understanding that minor fishing areas may exist in addition to those mapped.

6) Maps represent current fishery only.

Generally, if fishers are successful on the currently used grounds, they will not expend significant effort exploring new grounds. When fishing success decreases or when fishing pressure increases on a ground, new grounds are opened up. Also, current gear or regulatory restrictions may influence the use of current fishing grounds. New grounds may be opened up as gear is improved or regulations change over time. The maps, therefore, represent a snapshot in time and make no attempt to anticipate future fishing grounds.

7) Maps do not provide all data needed for impact analysis.

Any assessment of impacts should not rely on the maps alone. The maps should be used as a first step toward identifying fisheries of concern for the impact assessment. Once these fisheries and areas are identified, the assessment should gather more detailed and up-to-date information about the fishery, biological information on all life stages of the species involved, and economic and fleet structure information specific to the area being examined.

FISHERIES DESCRIPTIONS

Ocean Salmon Troll Fishery

The primary targeted species of the ocean salmon troll fishery are Chinook and coho salmon (*Oncorhynchus tshawytscha* and *O. kisutch*); a small number of chum (*O. keta*) and pink salmon (*O. gorbuscha*) are also taken commercially. Incidental species to the fishery include rockfish (*Sebastes* spp.) and lingcod (*Ophiodon elongatus*). The Oregon ocean fishery uses only salmon troll gear (a series of lines and hooks towed through the water). Salmon fishing seasons are established based on stock timing and annual quotas, and vary significantly among years and between geographic management zones. The principal fishing seasons occur from May through September; some seasons extend into October and November. Figure 1 summarizes average monthly catch of the fishery.

The distribution of the ocean salmon troll fishery is determined primarily by fish population distribution and regulatory factors. Water column conditions and migratory timing influence offshore salmon population distribution. Salmon are a pelagic species that respond to habitat conditions within the water column and will group in areas of upwelling and other oceanic frontal conditions that tend to

concentrate prey. Because these oceanic conditions are spatially and temporally variable, population concentrations show similar variability. As a result, the fishery is not tied to specific locations, and can occur in any part of the nearshore area shown on Figure 2. Migrational behavior influences the distribution of individual salmon stocks in relation to their river of origin and the timing of their upriver run. Regulations have a strong influence on the location and timing of salmon fishing. Regulations vary widely from year to year; maps of individual years' fishing would be very dissimilar. Because Figure 2 represents a composite of many years' fishing locations, it masks individual effects of regulations.

Ocean Dungeness Crab Fishery

Dungeness crab (*Cancer magister*) are fished commercially in Oregon ocean waters primarily with anchored strings of crab pots. Incidental species to the fishery include box crab (*Lopholithodes foraminatus*), octopus (Octopoda spp.), cabezon (*Scorpaenichthys marmorataus*), lingcod, and rockfish; incidental landings make up less than 1% of the total catch (Brown, et al. 1981; Lukas and Carter 1982, 1983, 1984, 1985, 1986). The ocean crab fishing season runs from December 1 through August 15. Figure 3 summarizes average monthly catch for the fishery.

Principal factors determining the distribution of the fishery include crab population distribution, gear limitations, weather, time of year, and gear conflicts. Adult crab populations are most prevalent shoreward of 75 fathoms. For most of the coast, however, only the winter fishery extends to 75 fathoms (Figure 4). Adult crab tend to become more concentrated inside of 45 fathoms during the spring and summer months (Demory, ODFW, personal communication 1989). Juvenile crab concentrate in shallow nearshore waters, intertidal beach areas, and estuaries. Commercial crab gear are most efficiently fished in shallow water; beyond 75 fathoms fishing becomes inefficient. Also, the gear can only be fished on sandy or muddy bottoms. Although crab occur on rocky substrates, the rock areas are not fished due to increased chance of gear movement and loss. Many of the rocky areas, however, consist of a mosaic of rocky and soft substrates. A substantial amount of successful fishing occurs in sandy areas interspersed among the rock outcroppings. Weather limits the inside extent of the fishery. During rough winter months, gear is rarely set inside of 10 fathoms in order to avoid strong surges and surf. During summer, the gear can be set shoreward to 2 to 3 fathoms (Figure 4). The crab fishery experiences significant gear conflicts. Generally, crabbers avoid heavily trawled areas and tow boat lanes to decrease their gear loss. Increases in trawling and trolling pressure during summer contribute to the seasonal inshore shift of the crab fishery in some areas. Crabbers and towboat operators have set agreed-upon tow boat lanes to reduce gear loss problems (Appendix A).

Pot and Longline Groundfish Fisheries

The pot and longline fisheries are classified as fixed-gear groundfish fisheries. Both fisheries employ anchored gear; the pot fishery uses strings of fish traps or pots and the longline fishery uses strings of hooks. The pot fishery targets on sablefish (*Anoplopoma fimbria*) while the longline fishery consists of a series of smaller fisheries targeting on Pacific halibut (*Hippoglossus stenolepis*), sablefish, rockfish, or lingcod. Only the larger longline fisheries, halibut and sablefish, are represented in Figure 6. There are several other gear types used for catching groundfish, including groundfish bottom and midwater trawls, Portuguese (vertical) longline, and jig, that are not shown on the map. Timing of fixed-gear sablefish fishing is regulated by an annual quota. When the quota is reached, only incidental catch is permitted. In 1989 the quota was met in mid-July. Halibut fishing is regulated with a series of short seasons during the year based on annually established quotas. Figure 5 summarizes the monthly catch of the fixed-gear sablefish and halibut fisheries.

The principal factors affecting distribution of the fixed-gear groundfish fisheries include fish population distribution, regulations, gear limitations, and gear conflicts. The effects of these factors vary among species and gear types. Sablefish are fished primarily in deep water; the pot fishery generally utilizes areas between 200 and 800 fathoms, while the longline fishery targets on sablefish from 200 to 400 fathoms (Figure 6). Sablefish occur beyond these depths but gear limitations do not favor cost-effective fishing in deeper waters. The fisheries are generally located on hard mud or sand bottoms and at the edges of rock outcroppings, particularly in steeply sloped areas on the continental slope or in submarine canyons. Trawlers catch large amounts of sablefish in the 100 to 300 fathom range while fishing on the deepwater dover sole complex. The fixed-gear fisheries avoid these areas to reduce gear loss. Minimum size limits on sablefish and the market preference for larger fish also encourage pot and longline fishing in deeper waters where the larger sablefish occur. Halibut fishing areas are generally associated with rocky reefs or hard bottom areas. Some concentrations of halibut are also found in apparently featureless soft bottom habitat. The fixed-gear groundfish fisheries are very susceptible to gear conflicts, including activities that occupy ocean space or tow gear through the water in fishing areas.

Sea Urchin Fishery

The sea urchin fishery in Oregon employs divers using hand harvesting techniques. The targeted species is the red sea urchin (*Strongylocentrotus franciscanus*). Incidental species to the fishery include the purple urchin (*S. purpuratus*) and green urchin (*S. droebachiensis*). The fishing season for urchins is open all year. Figure 7 summarizes the monthly landings of the fishery in 1988.

The distribution of the urchin fishery is determined primarily by availability of suitable urchin habitat, regulations and physical restrictions on depth of harvest,

weather, and market factors. Red urchins inhabit rocky substrates with concentrations of kelp and other marine algae. In Oregon, these areas are restricted to a few nearshore rocky reefs, primarily on the south coast (Figure 8). Because habitat is so limited, an impact to one area cannot be mitigated by temporarily displacing the fishery to other areas. Regulations set the minimum harvest depth at 10 feet below Mean Lower Low Water. The maximum harvest depth is determined by lower limits of urchin habitat and maximum depth of efficient harvest using dive equipment. Urchins are currently harvested to depths of about 70 feet in Oregon. The dive equipment allows effective harvest to about 90 feet. Market factors affect both the distribution and timing of the fishery. The Oregon urchin fishery is young and, to date, markets have been very unstable. Timing of harvest has tended to coincide with availability of markets. Market demand and, consequently, fishing activity is intense when urchin gonads are full. Although the timing of peak gonadal condition varies geographically and annually, it is generally highest in the late fall and early winter months (McCrae, ODFW, personal communication 1989). Market price is generally lower in summer; however, fishing activity remains intense because of favorable weather conditions (Figure 7). Conversely, rough winter weather often restricts harvest even if market demand is high. Market instability slows the search for new fishing areas. As markets stabilize and the fishery matures, some new harvest areas are likely to open up.

Pacific Herring Fishery

The Pacific herring (*Clupea harengus pallasi*) fishery is small in Oregon relative to adjacent states. Herring are fished primarily for their roe in Yaquina Bay with purse and lampara seines, and as baitfish in the Umpqua Estuary with beach seines. The herring season is open year round except in Yaquina Bay where it is closed during January. Figure 9 summarizes average monthly catch of the fishery.

Primary factors affecting the location of herring fishing areas include timing and location of schools, regulations, and market conditions. The Yaquina Bay fishery targets herring which concentrate in the bay prior to spawning. The primary fishery occurs in February. The Umpqua Estuary fishery targets on sub-adult herring which school for feeding in the estuary during spring. Market conditions and regulations currently favor only the fisheries in Yaquina Bay and the Umpqua Estuary. Yaquina Bay is the only area in the state where the roe herring fishery is allowed. Other than this fishery, only a few small-scale isolated bait fisheries, of which the Umpqua Estuary's is the largest, offer adequate economic returns.

Squid Fishery

The squid fishery in Oregon experienced a period of high catch from 1982 through 1985. Gear used to catch squid includes purse seines, shrimp trawls, and lampara seines; most squid in the recent Oregon fishery were landed with purse

seines. The target species of the fishery is market squid (*Loligo opalescens*). Incidental catch is very low, consisting primarily of mackerel (*Scomber japonicus*). The squid fishery is open all year; however, most fishing occurs from March through June. During the period of intense fishing, temporary closures or limits may be placed on individual schools. Figure 11 summarizes average monthly landings of the squid fishery from 1982 through 1985.

The primary factors determining location and occurrence of the squid fishery include distribution of large squid schools and market demand. Squid school in nearshore areas prior to and during spawning. In Oregon waters, this occurs primarily from March through May (Starr and McCrae 1985). Figure 12 shows school locations that were fished from 1982 through 1985. Many other spawning schools have been observed but have not been fished. Changes in market demand have controlled the occurrence of the squid fishery in Oregon. The fishery expanded in the early 1980's in response to increased demand and availability of vessels idled due to poor shrimp fishing, and declined after 1985 due to severe price reductions and an increase in the shrimp fishery.

Razor Clam Fisheries

Razor clams are dug both commercially and recreationally on intertidal beach areas. Offshore (subtidal) populations are not harvested. Harvest is by hand using shovels or clam guns. The targeted species is the razor clam (*Siliqua patula*) and there are no incidental species to the fishery. The commercial and recreational fishing seasons are open year round except from July 15 through August 31 in the area north of Tillamook head. The recreational harvest comprises about 90% of the total clam catch. Recreational razor clamming occurs primarily from April through June. Figure 13 summarizes average monthly commercial landings. Monthly catch information is not available for the recreational harvest.

The distribution of the fishery is influenced primarily by the abundance and distribution of clams. About 90% of the recreational and nearly 100% of the commercial fishery occurs on beaches north of Tillamook Head (Figure 14). There is substantial year to year variation in both occurrence and distribution of clams on the beaches south of Tillamook Head. The large subtidal clam population north of Tillamook Head (Figure 14) is thought to produce enough new young to help replenish the heavily harvested intertidal populations. Any habitat disruption or water quality impacts to the large subtidal clam population on the north coast could have significant effects on intertidal populations and the clam fishery.

Charter Fisheries

The charter fishing map (Figure 15) shows location of the salmon, Pacific halibut, and other bottomfish sport fisheries. Other bottomfish include primarily

rockfish species, lingcod, cabezon, and flatfish species. At present, charter boats operate on a regular basis out of Columbia River ports, Garibaldi, Depoe Bay, Newport, Winchester Bay, Coos Bay, and Brookings, and, occasionally, out of Pacific City, Florence, Bandon, and Gold Beach. Fishing gear for all Oregon charter fisheries is hook and line. Recreational salmon and halibut fisheries have seasonal regulations. Seasons for both fisheries are based on annually established quotas and vary from year to year. Salmon fishing is generally most intense in late spring and summer, and halibut fishing from mid May through mid August.

The principal factors affecting location and timing of charter fishing grounds are fish population distribution, distance from port, and recreational market demand. The **Ocean Salmon Troll Fishery** section discussed factors that affect salmon distribution. The charter salmon fishery (Figure 15) utilizes much of the nearshore portion of the area used by the commercial salmon fishery (Figure 2). The outside limits of the charter salmon fishery are defined by the maximum fishing distance from port given the length of the trip. In general, salmon charters operate on 4 to 6 hour trips in Oregon. This allows for approximately a 10 mile fishing radius from port. Halibut and other bottom fishing areas are determined by the existence of rocky reefs or other hard substrate habitat. These are discussed more fully in the **Pot and Longline Groundfish Fisheries** section. The outer limits of halibut and other bottomfish fishing areas are defined by the maximum fishing distance for a 12 hour trip. Although current charter fishing operations in Oregon do not offer trips longer than 12 hours, overnight trips are a future possibility. Most of the demand for charter fishing occurs during the summer tourist season. Only Newport and Depoe Bay have active charter fleets during other times of the year.

FISHERIES SUMMARIES AND MAPS

Ocean Salmon Troll Fishery Map Summary Sheet

Targeted Species: Chinook salmon (*Oncorhynchus tshawytscha*); coho salmon (*Oncorhynchus kisutch*)

Incidental Species: Rockfish (*Sebastes* spp.); lingcod (*Ophiodon elongatus*)

Gear: Troll gear

Fishing Seasons: Seasons vary significantly among years and management zones. They are based both on stock timing and annually established quotas. The principal fishing seasons occur from May - September with some seasons extending to the end of November.

Monthly Landings:

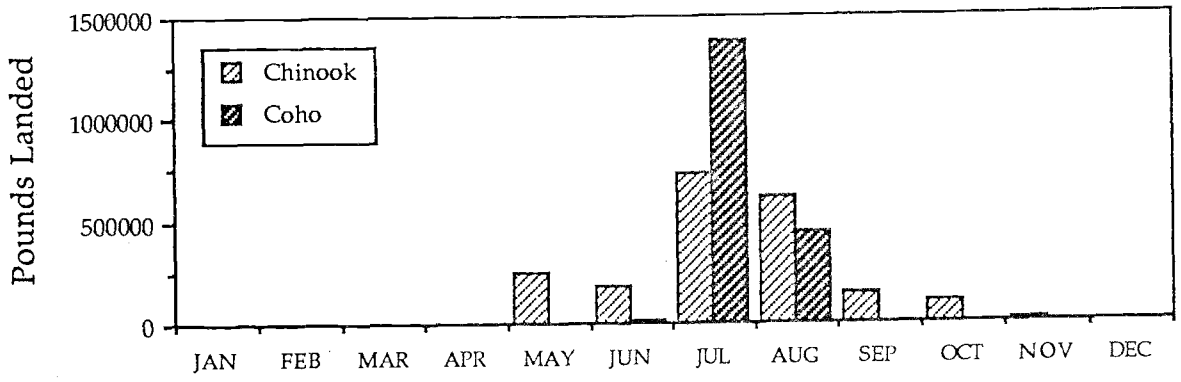


Figure 1. Average monthly landings (1981-1986) of Chinook and coho salmon (*Oncorhynchus tshawytscha* and *O. kisutch*) from the ocean troll salmon fishery for all Oregon ports (from Brown, et al. 1981; Lukas and Carter 1982, 1983, 1984, 1985, 1986).

Map Accuracy and Resolution Considerations: Figure 2 divides the salmon troll fishery into three categories of fishing intensity. Because salmon are a pelagic species subject to extremely variable oceanic frontal and circulation conditions, the size and shape of these mapped grounds can vary considerably from year to year.

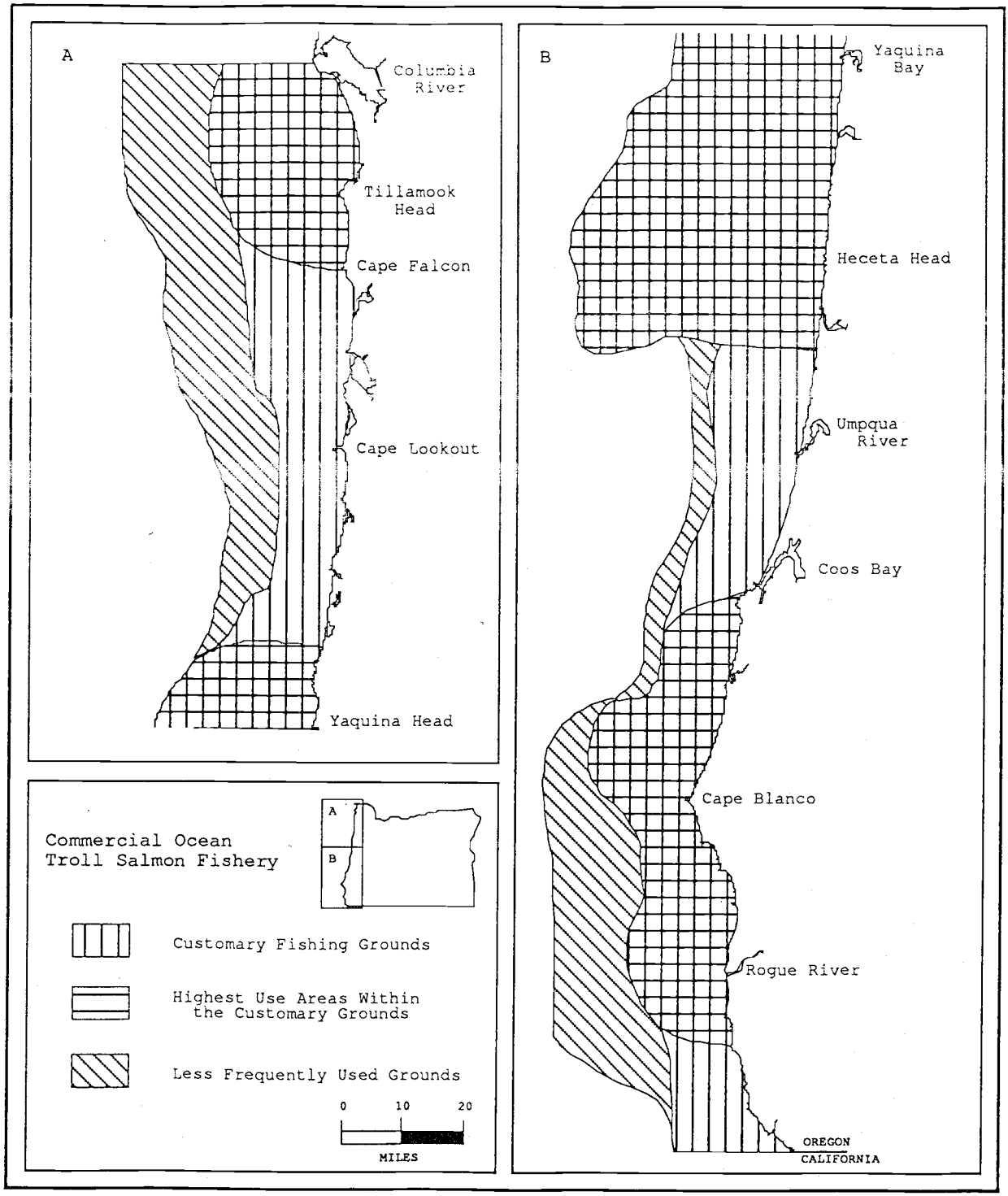


Figure 2. Principal ocean troll salmon fishing grounds.

Ocean Dungeness Crab Fishery Map Summary Sheet

Targeted Species: Dungeness crab (*Cancer magister*)

Incidental Species: Box crab (*Lopholithodes foraminatus*); octopus (Octopoda spp.); cabezon (*Scorpaenichthys marmorataus*); lingcod (*Ophiodon elongatus*); rockfish (*Sebastes* spp.)

Gear: Crab pots

Fishing Season: December 1 - August 15

Monthly Landings:

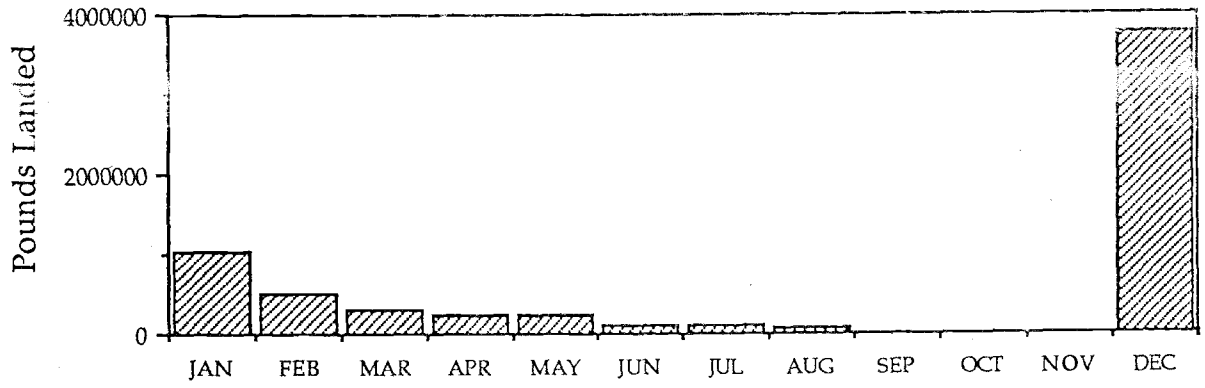
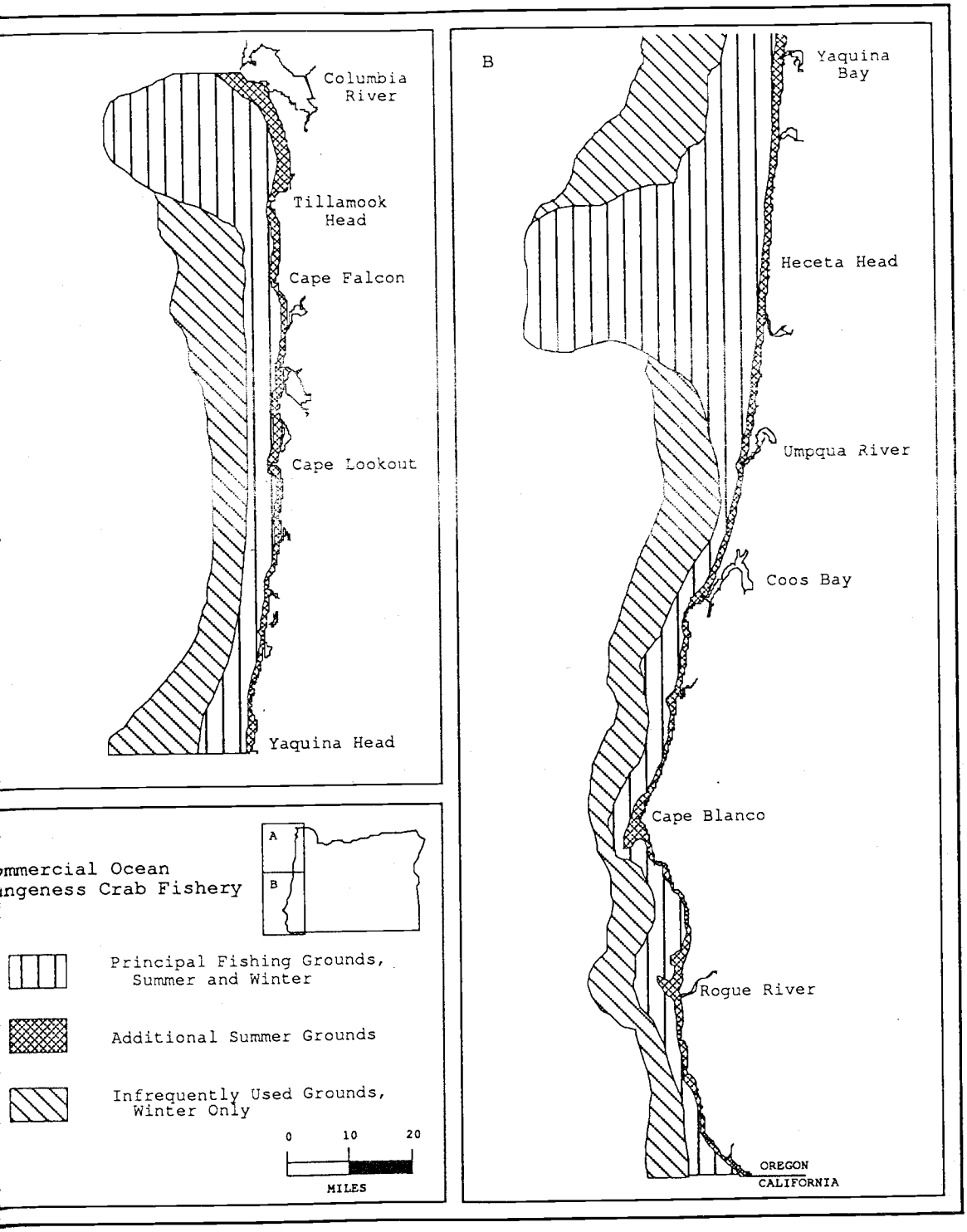


Figure 3. Average monthly landings (1985-1988) of Dungeness crab (*Cancer magister*) from the commercial ocean crab fishery for all Oregon ports (from Lukas and Carter 1985, 1986; Demory, ODFW, personal communication 1989).

Map Accuracy and Resolution Considerations: Figure 4 provides an accurate picture of the current bounds of the crab fishery. Some fishing can occur outside of the boundaries; however, gear and weather limitations keep most of the fishery within the mapped areas. Rock outcroppings occurring within the mapped areas are not fished; however, fishing occurs in sandy areas between rock structures.



e 4. Principal commercial ocean Dungeness crab (*Cancer magister*) fishing
ds.

Pot and Longline Groundfish Fisheries Map Summary Sheet

Targeted Species: Pot - Sablefish (*Anoplopoma fimbria*)
Longline - Pacific halibut (*Hippoglossus stenolepis*); sablefish (*Anoplopoma fimbria*)

Incidental Species: Pot - Rockfish; lingcod (*Ophiodon elongatus*)
Longline - Flatfish (Pleuronectiformes spp.); cabezon (*Scorpaenichthys marmorataus*)

Gear: Fish pot; longline

Fishing Season: Sablefish - Fisheries close to all but incidental catches when the annually established quota is met. In 1989 the quota was met in mid-July. Halibut - Short seasons are set annually based on quotas. 1989 seasons: June 27-29; July 24-26; August 28-30 (ODFW 1989).

Monthly Landings:

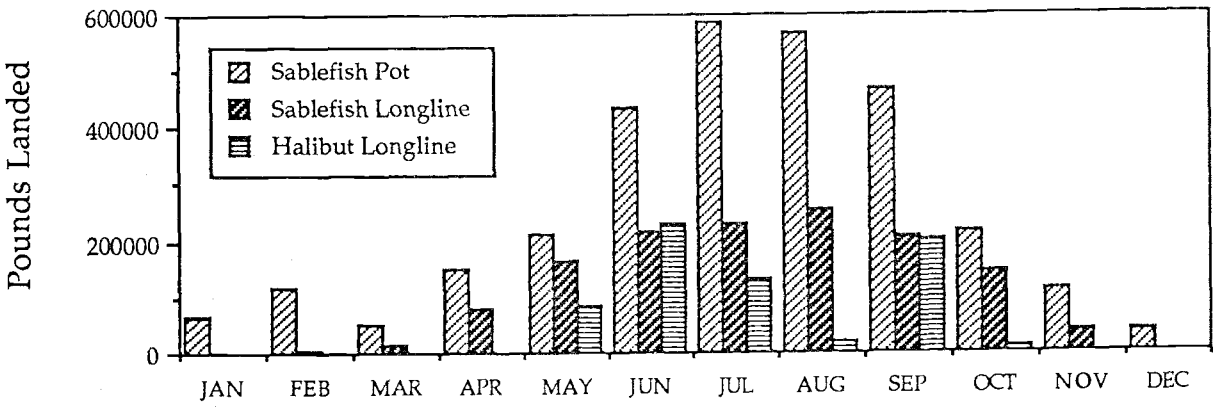


Figure 5. Average monthly landings (1981-1986) of sablefish (*Anoplopoma fimbria*) from the groundfish pot and longline fisheries, and of Pacific halibut (*Hippoglossus stenolepis*) from the groundfish longline fishery for all Oregon ports (from Brown, et al. 1981; Lukas and Carter 1982, 1983, 1984, 1985, 1986).

Map Accuracy and Resolution Considerations: Figure 6 represents the fixed-gear sablefish fisheries over large areas of the continental margin. Individual areas of intense fishing could not be mapped separately because most of the intense fishing sites vary in location from year to year and can occur anywhere within the mapped grounds. The mapped halibut fishing grounds may underrepresent the fishery potential because seasons are so short that fishermen cannot afford the time to search for new areas, thus fishing only in known spots.

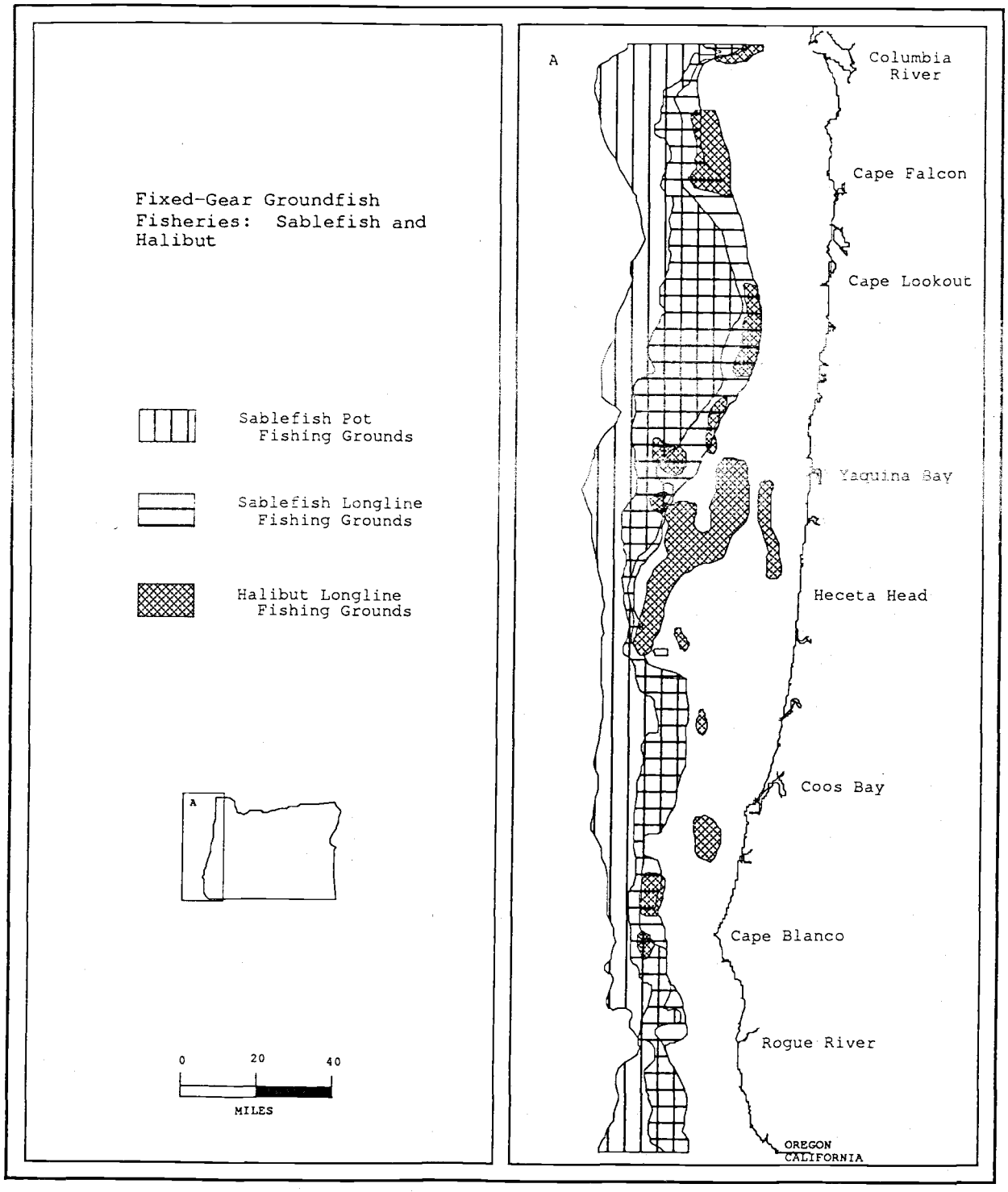


Figure 6. Principal pot and longline groundfish fishing grounds.

Sea Urchin Fishery Map Summary Sheet

Targeted Species: Red sea urchin (*Strongylocentrotus franciscanus*)

Incidental Species: Purple sea urchin (*S. purpuratus*); green sea urchin (*S. droebachiensis*)

Gear: Hand harvest with a short-handled rake

Fishing Season: Open all year

Monthly Landings:

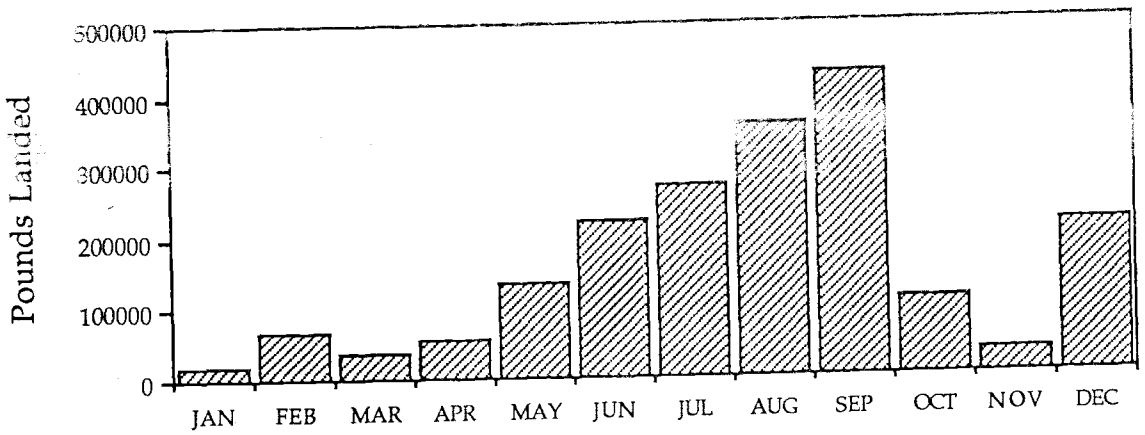


Figure 7. Monthly landings (1988) of the sea urchin fishery for all Oregon ports (ODFW 1989).

Map Accuracy and Resolution Considerations: Map representation of urchin harvest areas is relatively precise because the urchins are confined to a few distinct rocky reefs. The urchin fishery in Oregon is young. Although the mapped areas are accurate for the 1989 fishery, additional areas will likely appear over the next few years.

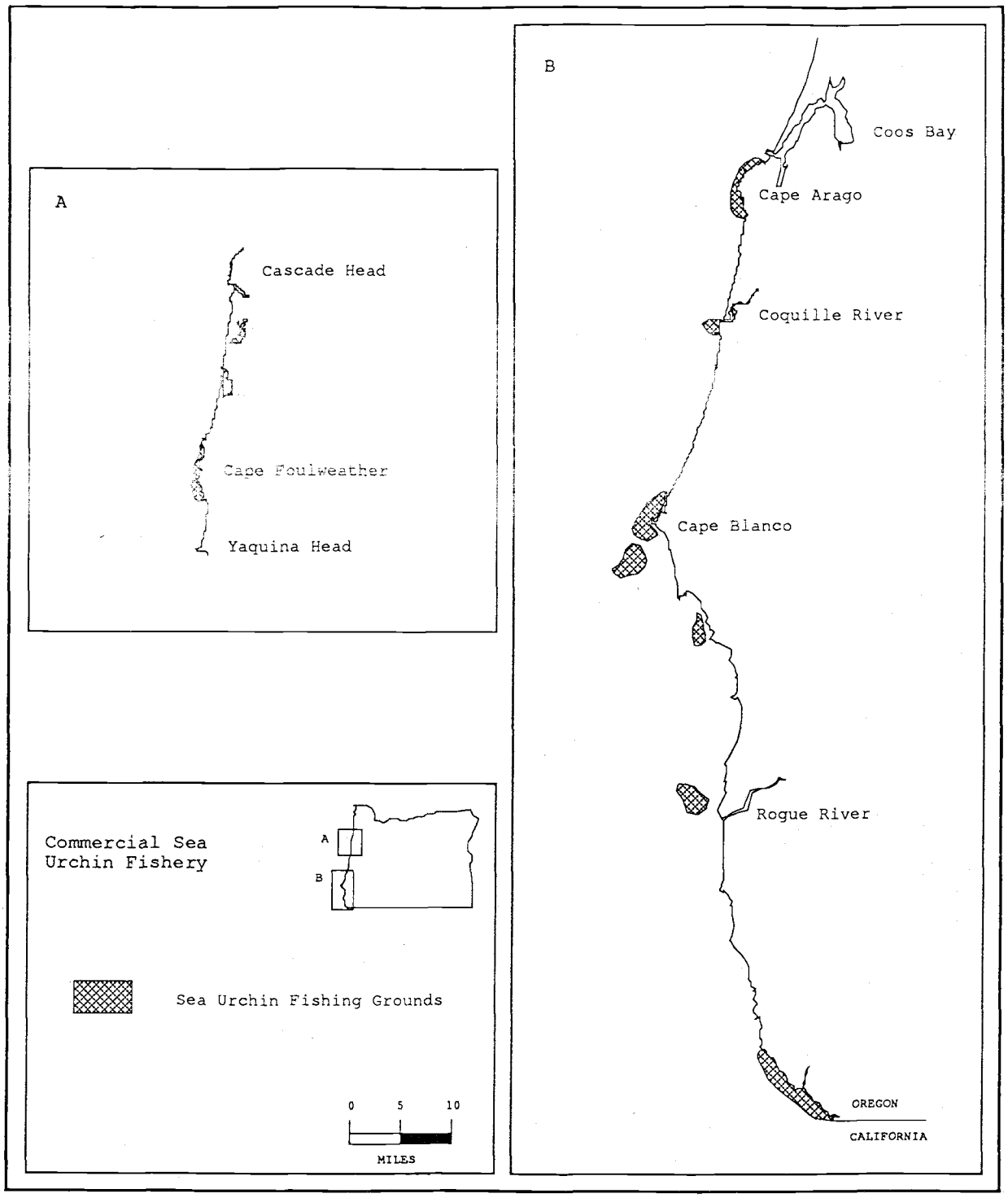


Figure 8. Principal sea urchin fishing grounds.

Pacific Herring Fishery Map Summary Sheet

Targeted Species: Pacific herring (*Clupea harengus pallasi*)

Incidental Species: Smelt (Osmeridae spp.)

Gear: Purse seine, lampara seine, beach seine

Fishing Season: Open all year except in Yaquina Bay where the season is closed from January 1 - 31

Monthly Landings:

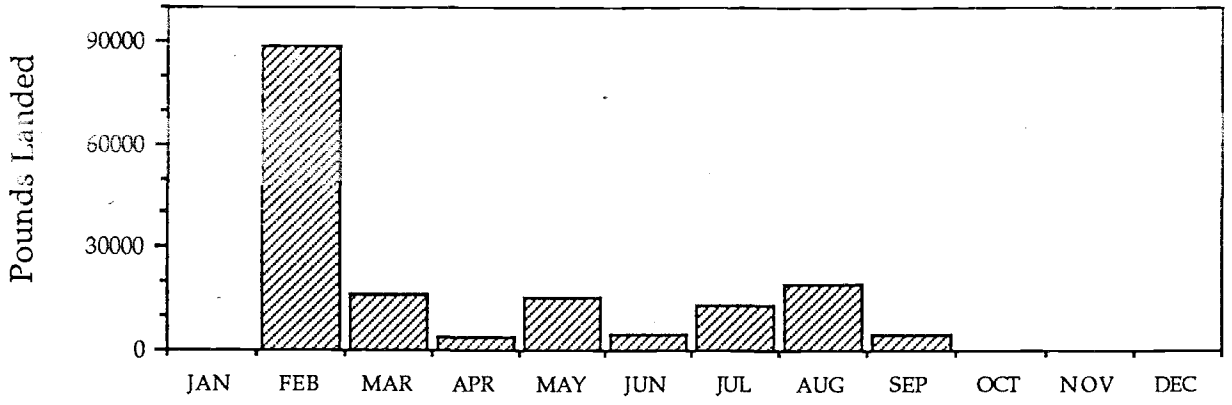
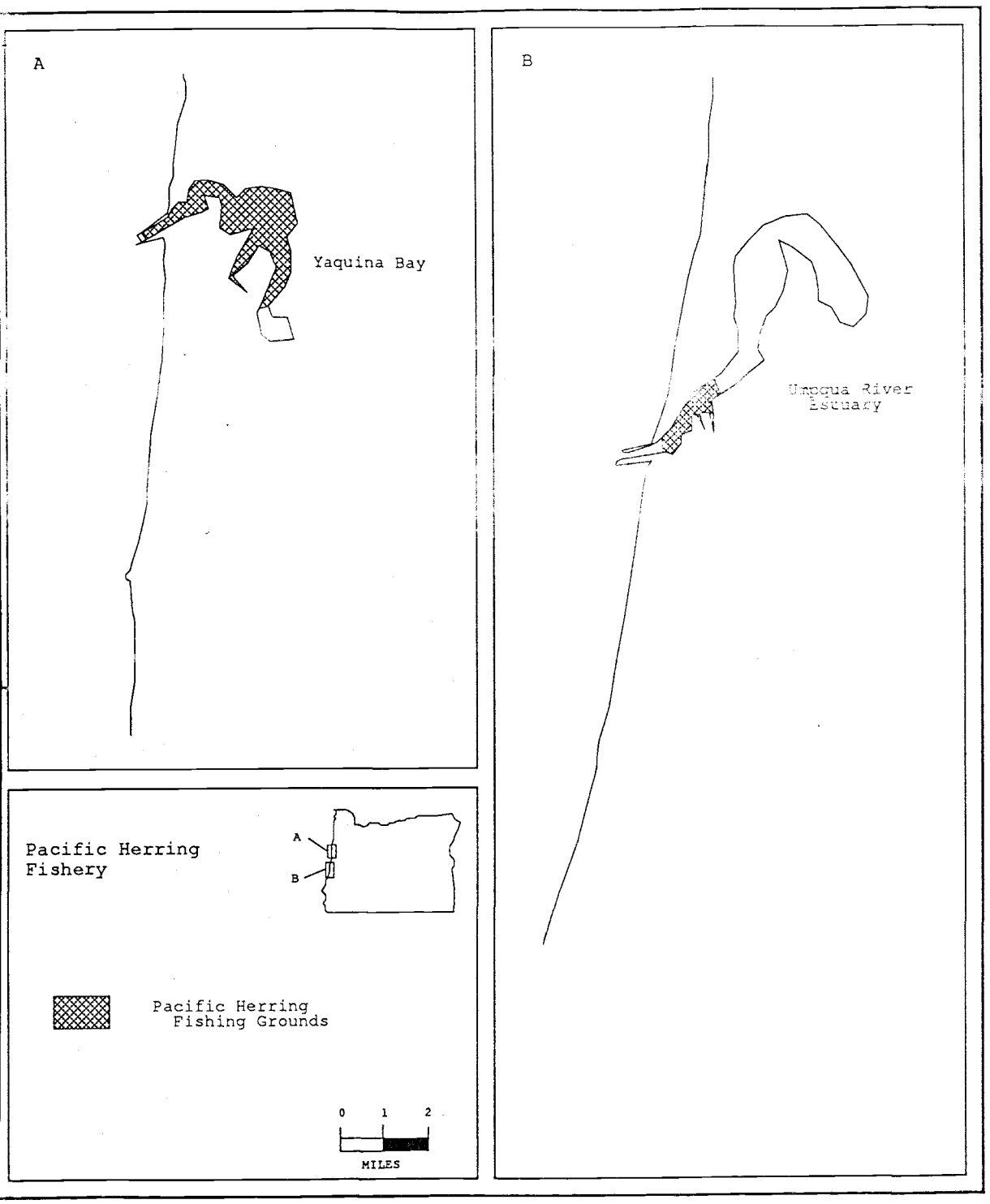


Figure 9. Average monthly landings (1981-1986) of the Pacific herring (*Clupea harengus pallasi)* fishery for all Oregon ports (from Brown, et al. 1981; Lukas and Carter 1982, 1983, 1984, 1985, 1986).

Map Accuracy and Resolution Considerations: The present fishery takes herring primarily from only two areas: Yaquina Bay and the Umpqua Estuary (Figure 10). Herring occur in schools in other areas of the coast but are currently not fished due to low market price and restrictions on roe herring harvest.



gure 10. Principal Pacific herring (*Clupea harengus pallasi*) fishing grounds.

Squid Fishery Map Summary Sheet

Targeted species: Market squid (*Loligo opalescens*)

Incidental Species: Mackerel (*Scomber japonicus*)

Gear: Purse seine; shrimp trawl; lampara seine

Fishing Season: Open all year

Monthly Landings:

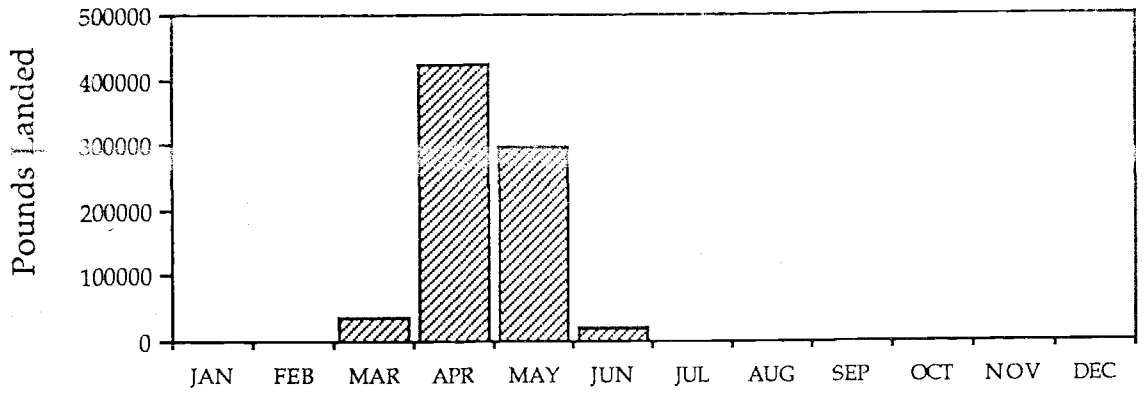


Figure 11. Average monthly landings (1982-1985) of the squid (*Loligo opalescens*) fishery for all Oregon ports (from Brown, et al. 1981; Lukas and Carter 1982, 1983, 1984, 1985, 1986).

Map Accuracy and Resolution Considerations: Figure 12 shows areas where squid schools were fished during a period of relatively intense fishing from 1982-1985. Fishing areas may change locations in the future due to squid movements in response to oceanic conditions. Also, new fishing areas may open up if the fishery utilizes previously unexploited schools.

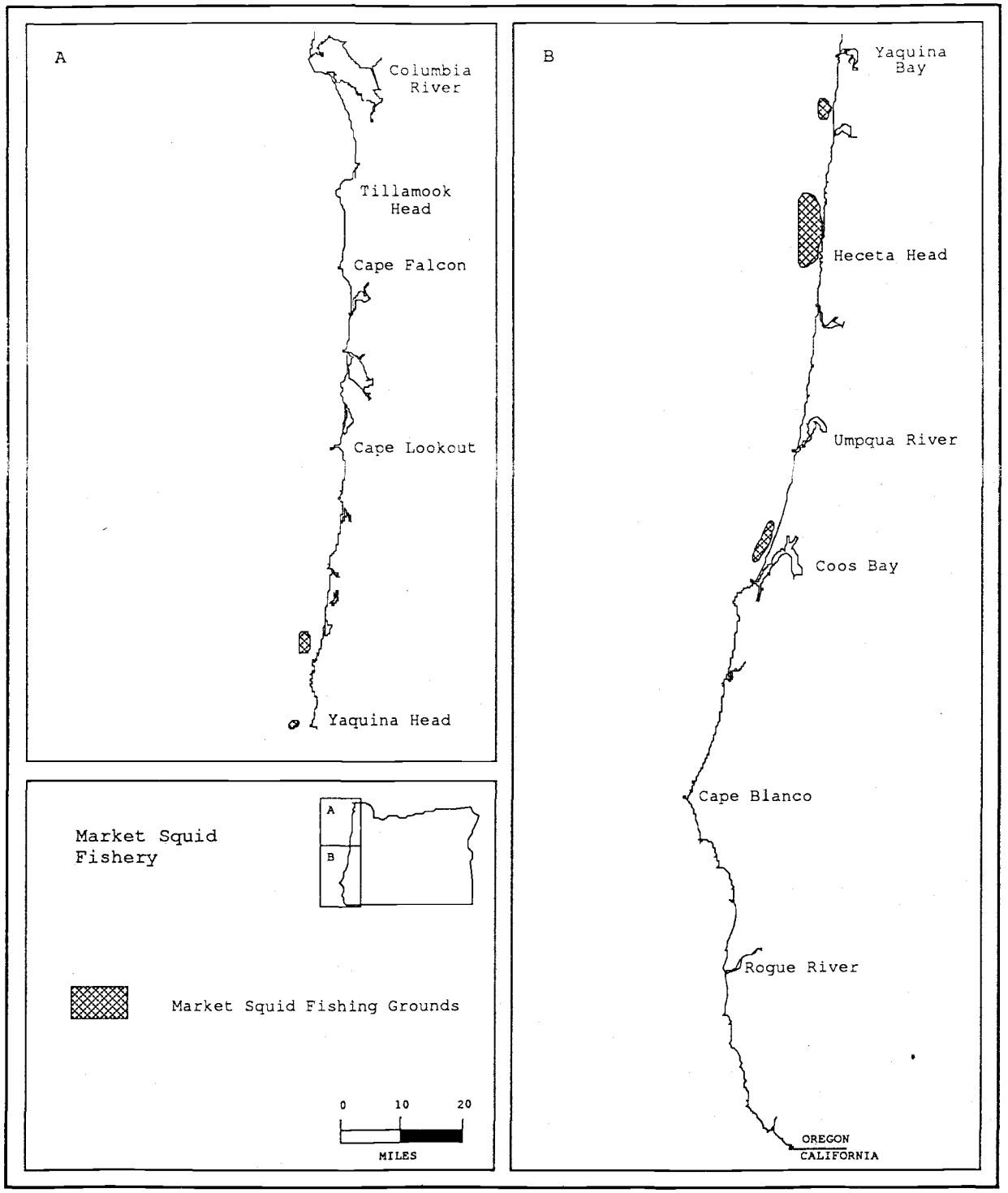


Figure 12. Principal squid (*Loligo opalescens*) fishing grounds.

Razor Clam Map Summary Sheet

Targeted Species: Razor clam (*Siliqua patula*)

Incidental Species: None

Gear: Hand harvest with shovel or clam gun

Fishing Season: Open year round except from July 15 through August 31 north of Tillamook Head

Monthly Landings:

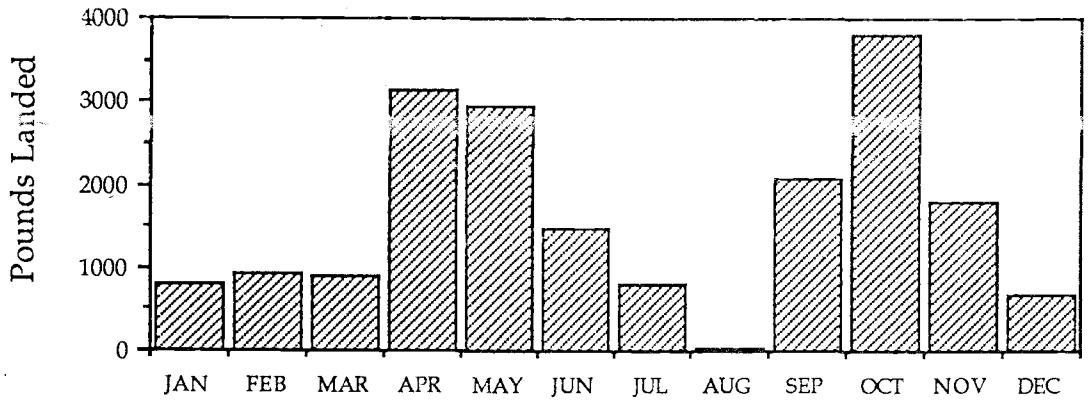


Figure 13. Average monthly landings (1981-1986) of the commercial razor clam (*Siliqua patula*) fishery for all Oregon ports (from Brown, et al. 1981; Lukas and Carter 1982, 1983, 1984, 1985, 1986).

Map Accuracy and Resolution Considerations: Figure 14 shows all known razor clam digging areas and approximates the large subtidal population north of Tillamook Head. Most of the clam digging in Oregon occurs north of Tillamook Head. Clam digging pressure and location varies from year to year on beaches south of Tillamook Head.

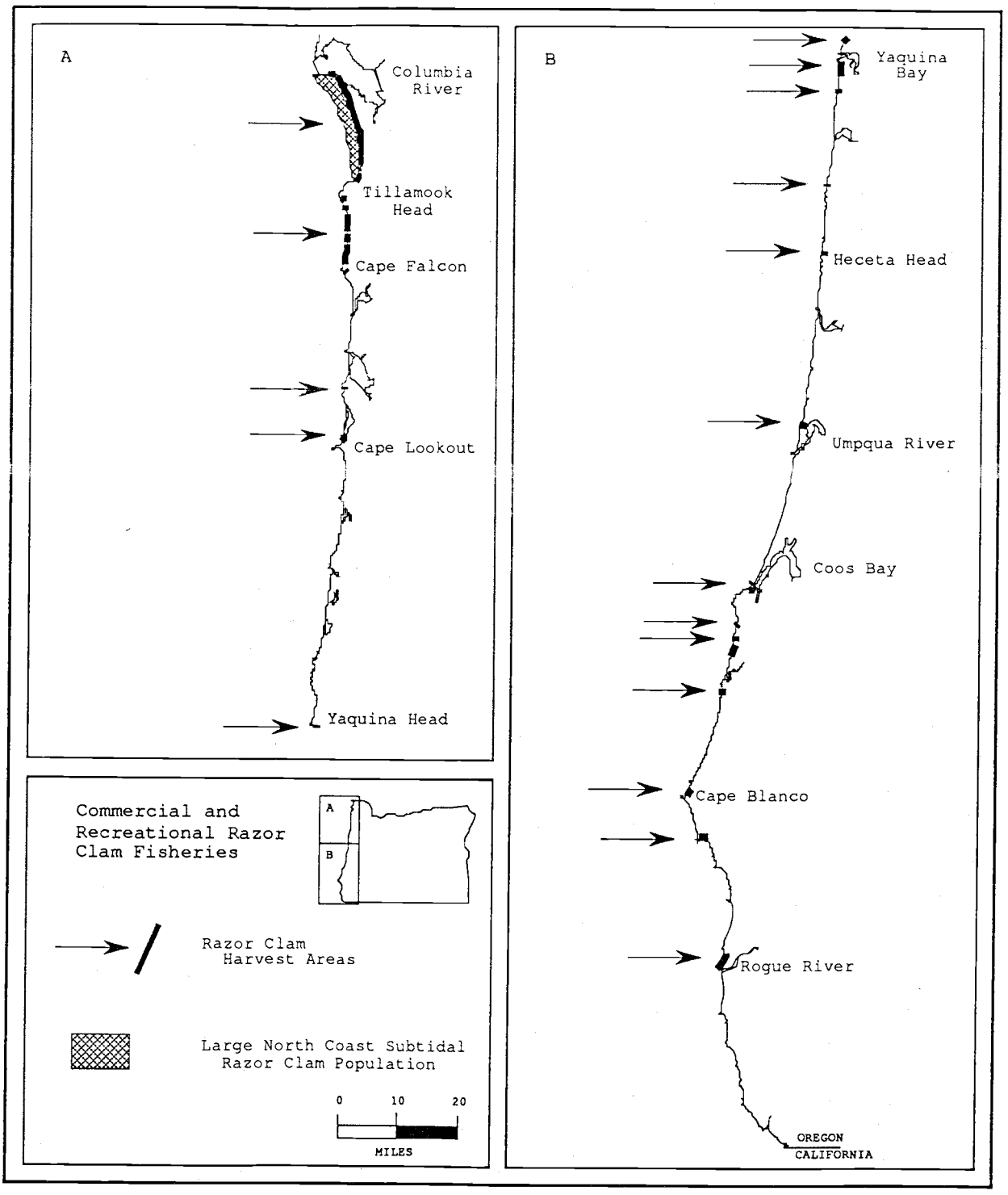


Figure 14. Principal commercial and recreational razor clam (*Siliqua patula*) harvest areas.

Charter Fisheries Map Summary Sheet

Targeted Species: Chinook and coho salmon (*Oncorhynchus tshawytscha* and *O. kisutch*); Pacific halibut (*Hippoglossus stenolepis*); rockfish (*Sebastes* spp.)

Incidental species: Rockfish (*Sebastes* spp.); flatfishes (Pleuronectiformes spp.); lingcod (*Ophiodon elongatus*); many others

Gear: Hook and line

Fishing Seasons: Salmon and halibut seasons are based on annually established quotas.

Map Accuracy and Resolution Considerations: Salmon - The mapped boundaries represent known fishing areas within an area limited by the maximum distance fished on 4 to 6 hour trips. If future demand favors longer trips, charter operators will fish outside the areas shown on Figure 15. Bottomfish - Mapped bottomfish fishing grounds are based on known fishing areas, usually associated with reef or hard bottom habitat. Most of the locations on the map are generalized; several small adjacent reefs may be enclosed by one polygon. The most distant reef areas mapped are fished during 12 hour trips. Some operators may begin offering overnight trips, opening up areas beyond those mapped.

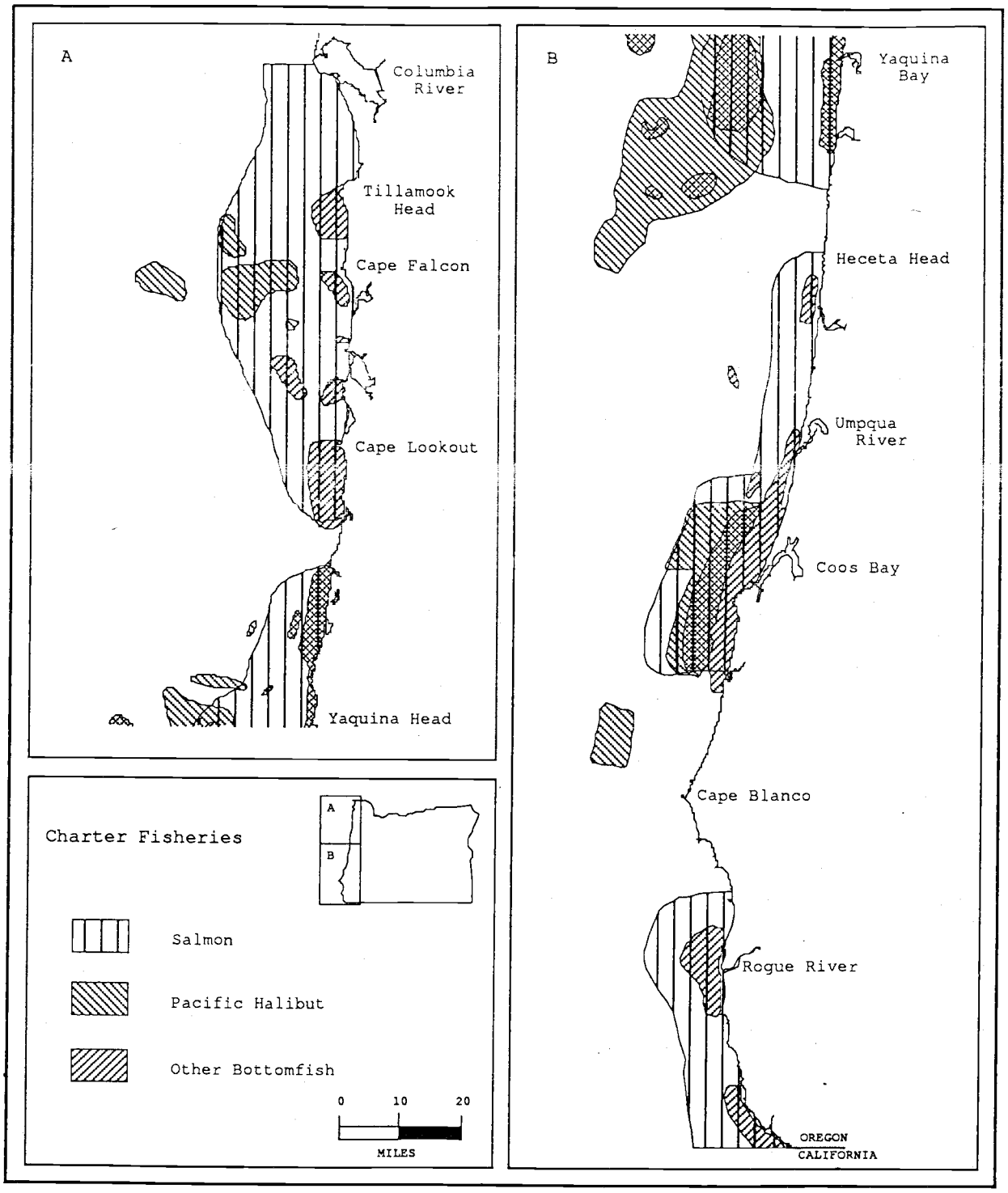


Figure 15. Principal charter boat fishing grounds.

ACKNOWLEDGEMENTS

Numerous people contributed to the successful completion of this project. The fishers who participated in interviews deserve special thanks for their willingness to take time out of busy schedules and convey their extensive knowledge of fishing locations. Their combined experience made development of the maps in this report possible. Bob Jacobson, Marine Extension Agent, provided fishery locational information and helped us make contacts with fishers.

Several Oregon Department of Fish and Wildlife staff provided assistance on the project. Terry Link and Neil Richmond devoted many hours conducting interviews with fishers. The following staff biologists provided fisheries locational information for the maps: Don Bodenmiller, Jerry Butler, Darrell Demory, Dave Douglas, Mike Hosie, Steve Jones, Terry Link, Jean McCrae, and Rick Starr. The experience of these biologists added significantly to the quality of the maps. Barbara Bond and Arelene Merems spent numerous hours drafting and digitizing maps. This project would not have been possible without their help. Several individuals reviewed and provided constructive comments on the draft report, including Clay Creech, Gary Hettman, Mark Saelens, and many of the staff listed above. Rick Starr provided essential guidance toward creating the maps and editing the report.

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APPENDIX A

Towboat Lanes Mutually Established by Crab Fishermen and Towboat Operators

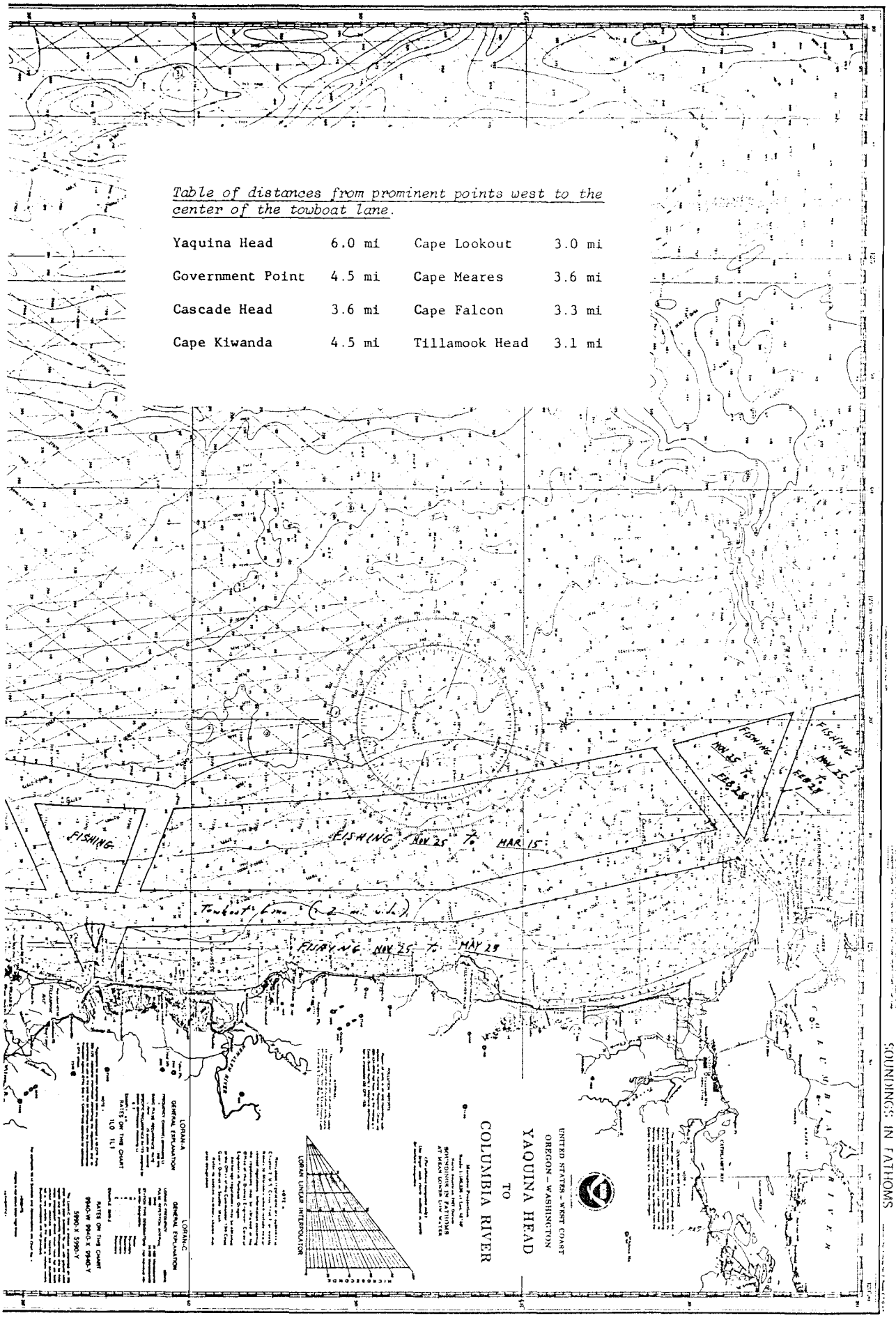
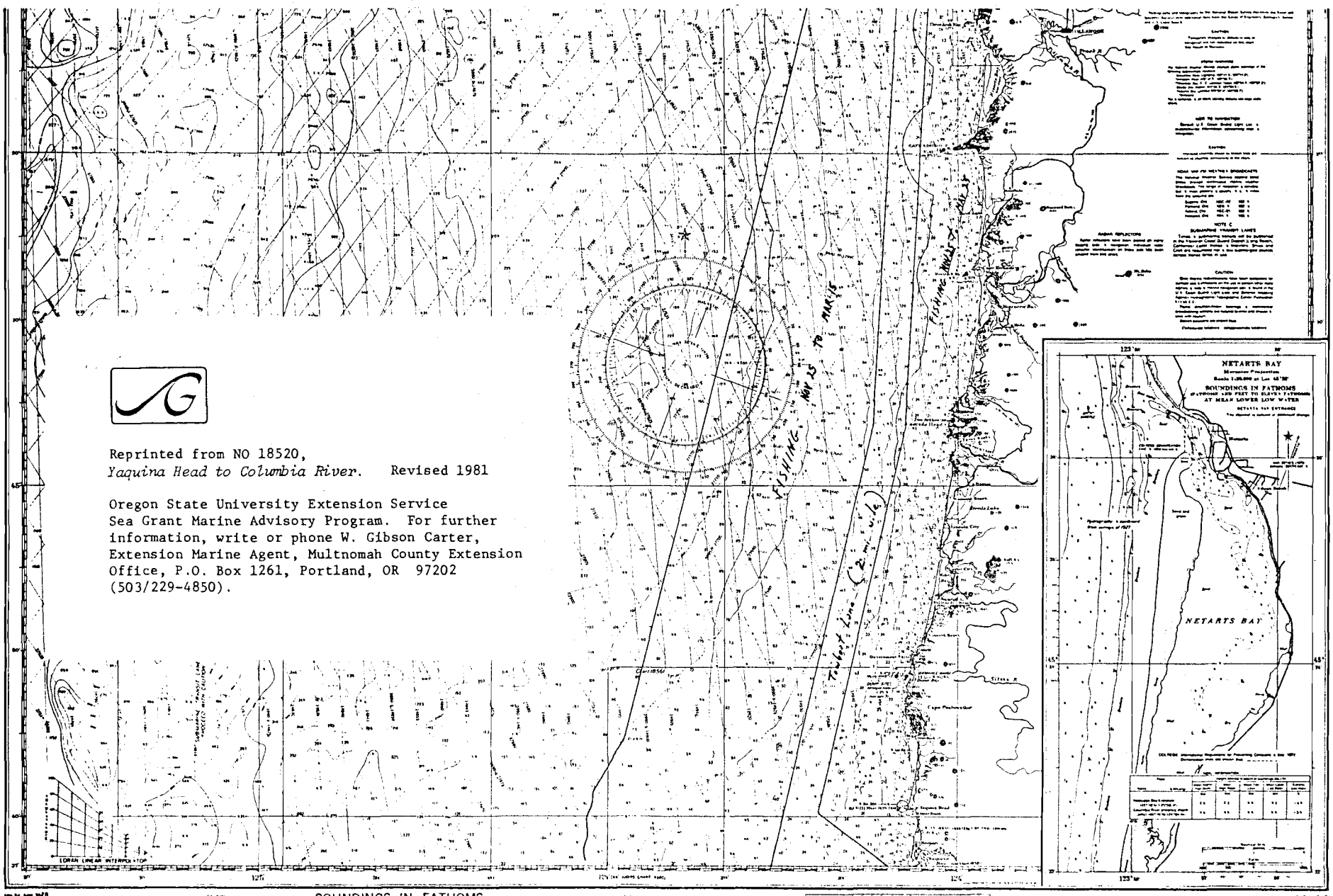


Table of distances from prominent points west to the center of the towboat lane.
Yaquina Head 6.0 mi
Government Point 4.5 mi
Cascade Head 3.6 mi
Cape Kiwanda 4.5 mi
Cape Lookout 3.0 mi
Cape Meares 3.6 mi
Cape Falcon 3.3 mi
Tillamook Head 3.1 mi
FISHING
NOV 25 TO MAR 15
FISHING NOV 25 TO MAY 29
Towboat Lane (2 n.m. wide)
YAQUINA HEAD TO COLUMBIA RIVER
SOUNDINGS IN FATHOMS



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SOUNDINGS IN FATHOMS

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NATIONAL OCEAN SURVEY

(Yaquina Head to Columbia River)

18520
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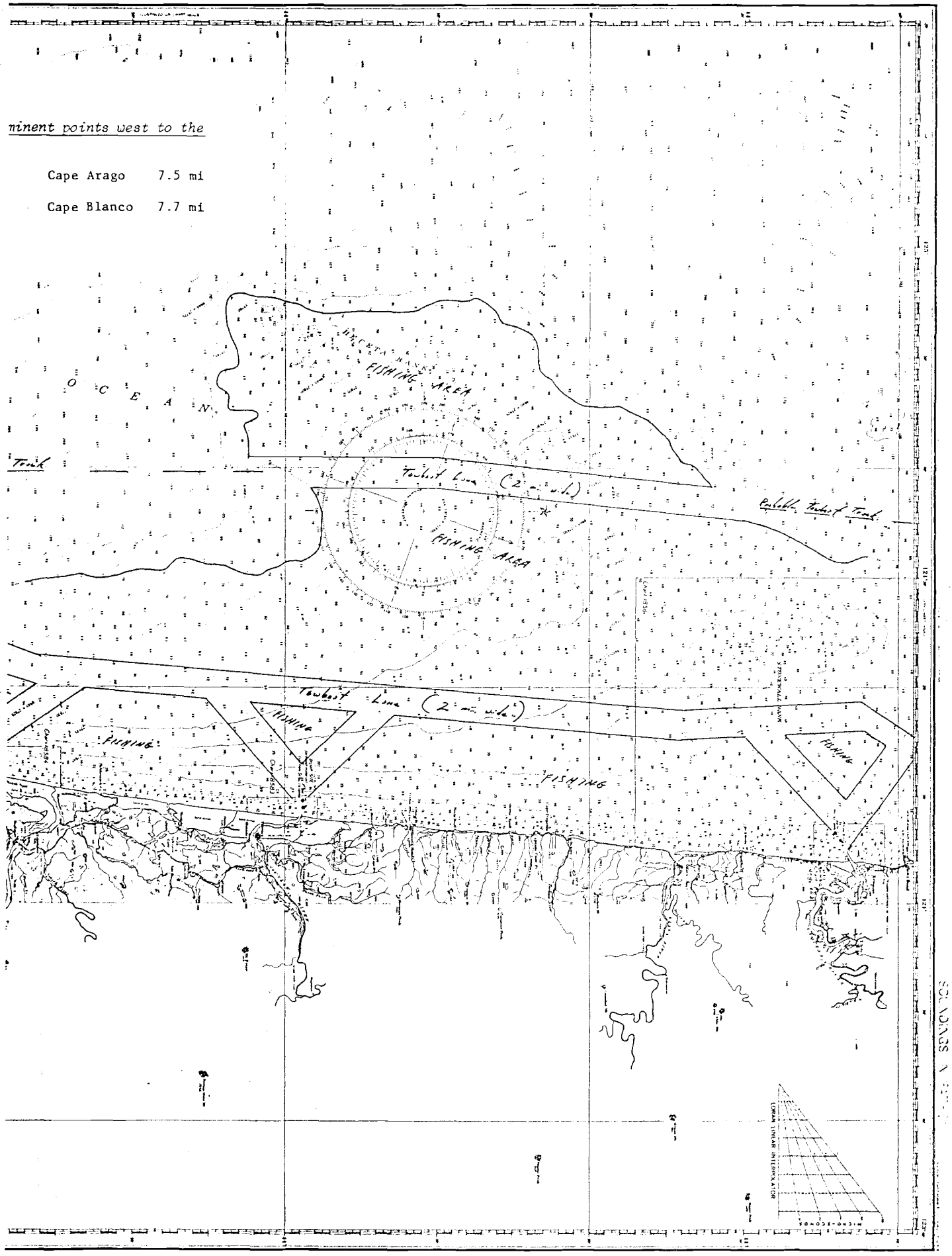
minent points west to the

Cape Arago	7.5 mi
Cape Blanco	7.7 mi



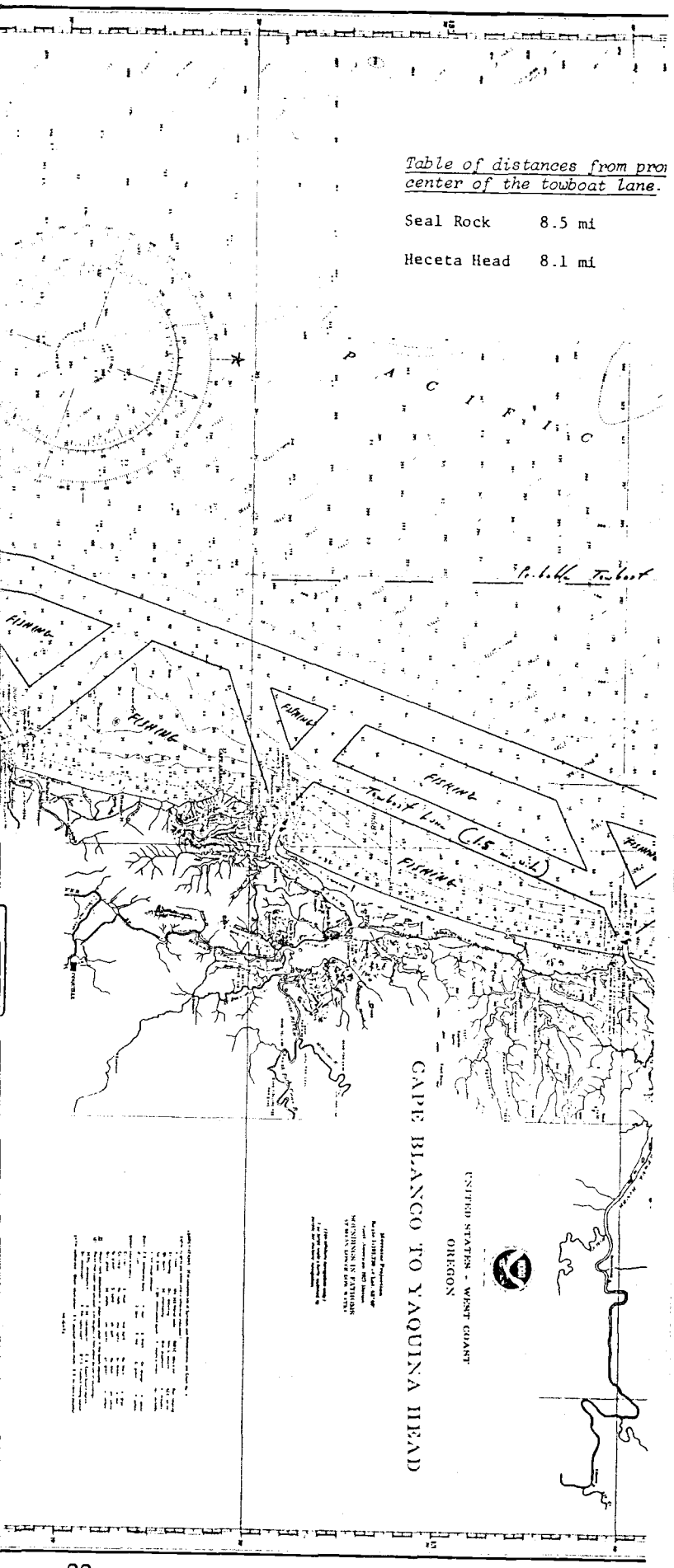


Table of distances from pro
center of the towboat lane.
Seal Rock 8.5 mi
Heceta Head 8.1 mi
P A C I F I C
FISHING
FISHING
FISHING
FISHING
FISHING
CAPE BLANCO TO YAQUINA HEAD
UNITED STATES - WEST COAST
OREGON

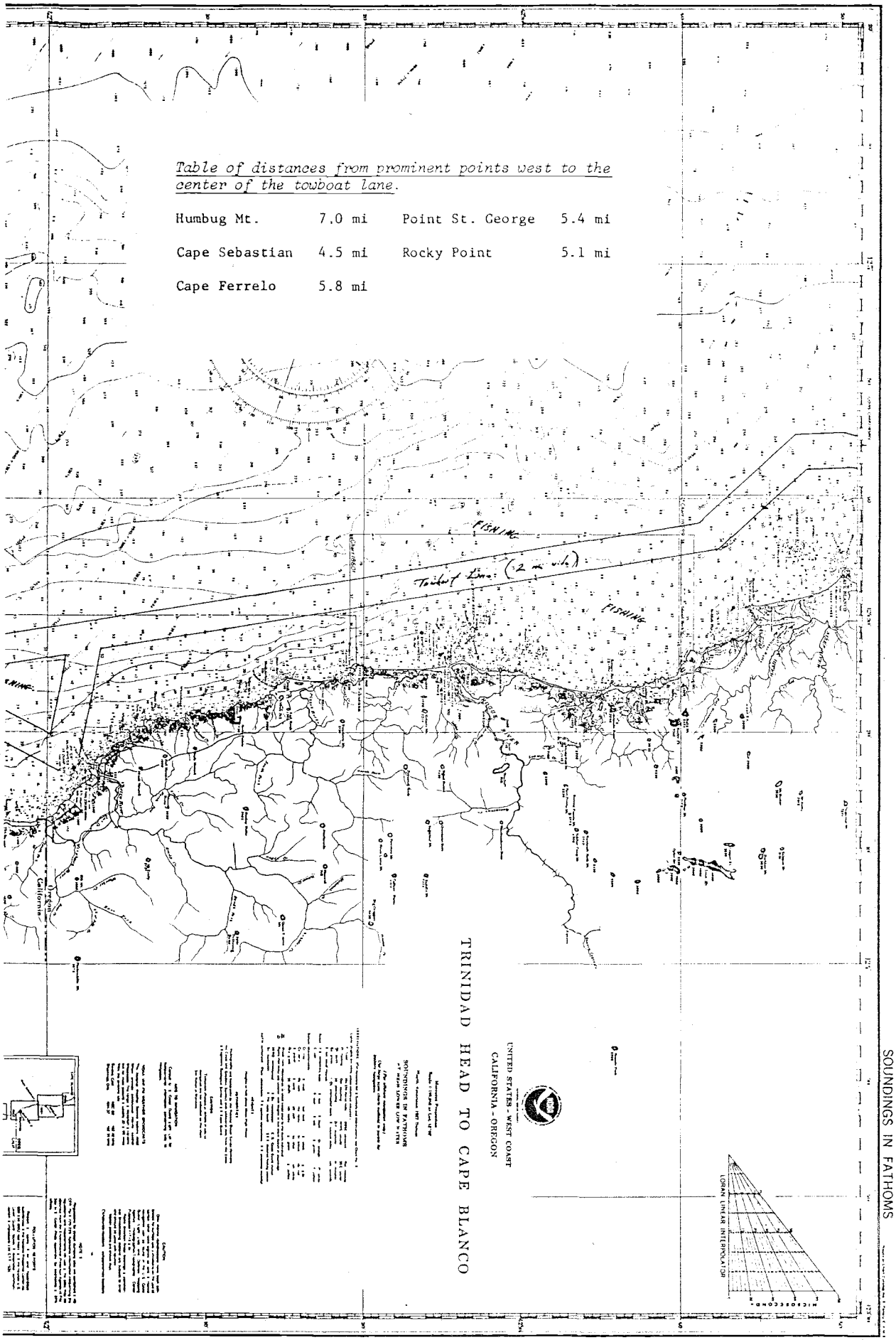


Table of distances from prominent points west to the center of the towboat lane.
Humbug Mt. 7.0 mi
Cape Sebastian 4.5 mi
Cape Ferrelo 5.8 mi
Point St. George 5.4 mi
Rocky Point 5.1 mi
FISHING
Trawl Line (2 n mi)
FISHING
TRINIDAD HEAD TO CAPE BLANCO
UNITED STATES - WEST COAST
CALIFORNIA - OREGON
SOUNDINGS IN FATHOMS
LORAN LINEAR INTERPOLATOR