# REVIEW OF THE 1987-1992 CENTRAL REGION ROCKFISH FISHERIES

## REPORT TO THE ALASKA BOARD OF FISHERIES

by
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**ABSTRACT**

The Central Region includes all state waters west of Cape Suckling and north of Cape Douglas; and includes Prince William Sound, Cook Inlet, and what is referred to as the North Gulf. Annual rockfish harvests since 1987 have been highly variable, ranging from 140,653 lb in 1989 to 529,045 lb in 1990. Based on a preliminary harvest of 504,424 lb through July, a record harvest is likely in 1992. Since 1987, Prince William Sound has produced 53% and the North Gulf 46% of all rockfish harvests. Longline gear has averaged 72% and jig gear 24% of all rockfish harvests since 1987. Rockfish tend to be slow-growing, long-lived, late-maturing, and have localized distributions. These factors make rockfish highly susceptible to overharvest. Recovery from overharvest is long-term. To address concerns for the long-term conservation of the nearshore rockfish resources, rockfish management plans are proposed for the North Gulf, Prince William Sound, and Cook Inlet areas. Proposed plans include trip limits, authority for the Alaska Department of Fish and Game to implement bycatch-only rockfish fisheries, and guidelines for the implementation of bycatch-only fisheries.

KEY WORDS: Rockfish, Central Region, North Gulf, Prince William Sound, Cook Inlet, trip limits, bycatch.

## INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) has management responsibility for groundfish resources in the territorial seas (0-3 miles from shore) off the coast of Alaska. Effort and harvest in groundfish fisheries has increased dramatically in recent years as traditional fisheries, such as salmon and crab, have experienced biological or economic declines (Bechtol 1992). Due to a lack of extensive groundfish research or management programs in territorial waters of the Central Region, the ADF&G, with a few exceptions, relies on inseason management actions announced by the National Marine Fisheries Service (NMFS) for the adjacent federal waters of the Exclusive Economic Zone (EEZ). Specifically, federal openings and closure are simultaneously implemented in the nearshore state waters. However, given area-specific stock characteristics, federal management strategies may be inappropriate for some species, notably nearshore rockfish inhabiting the territorial seas. The ADF&G is particularly concerned about a rapid increase in harvests of the Central Region rockfish resources. Equally disconcerting is the wide fluctuations in annual rockfish harvests.

To ensure long-term, sustainable yield, stock management needs to be appropriate to both the resource and the impacting fisheries. The ADF&G is requesting that the Alaska Board of Fisheries, the fishing industry, and the general public consider the development of a management plan to provide for long-term, sustainable yield from rockfish resources along the northern Gulf of Alaska. This report describes:

(1) the geographic area of concern;
(2) generalized rockfish life history;
(3) a review of commercial harvests of these resources;
(4) a review of stock composition data; and
(5) recommendations for future stock management.

## METHODS

### *Reporting Areas*

For this report, the Central Region includes territorial waters of Cook Inlet, Prince William Sound, and the Central Gulf of Alaska north of Cape Douglas and west of 147°W. long (Figure 1). Rockfish harvests can differ substantially between locales due to the dynamics of the fishing fleet(s), particularly in response to changes in resource abundance, allowable gear types, and seasons for alternative or co-occurring fisheries. To facilitate the presentation of harvest data and the identification of management options, the following geographic areas will be used (Figure 1):

Prince William Sound - waters enclosed by lines from Point Whitshed to Point Bentinck, from Cape Hinchinbrook to Zaikof Point, and from Cape Cleare to Cape Puget (5 AAC 28.200);

Cook Inlet - territorial waters enclosed by lines from Cape Douglas to Cape Elizabeth to Point Adam (5 AAC 28.300);

North Gulf - that portion of the Central Gulf of Alaska (5 AAC 28.400) located North of Cape Douglas, west of 147°W long. and excluding Cook Inlet and Prince William Sound.

### *Data Collection*

#### Commercial Harvests

Commercial harvest data was obtained from commercial fish ticket landing records for the years 1987-1992, as reported through July 1992. In all cases, harvests are reported as round weight in pounds (lb). In some instances, data was omitted

to protect confidentiality as per Alaska statute 16.025.815.

Stock Composition

Stock composition data was obtained from sampling of commercial rockfish landings to the ports of Seward, Whittier, Homer. The landings were sampled opportunistically in 1991 and 1992. These landings resulted from both directed rockfish fisheries and from incidental harvests (i.e., bycatch) associated with Pacific cod, sablefish, and halibut fisheries. Commercially landed rockfish were sampled for length, weight, sex, and age.

## GENERAL BIOLOGY AND DISTRIBUTION

Rockfish include fish of the genera *Sebastes* and *Sebastolobus*. Rockfish management is generally based on species assemblages defined by characteristic habitats (i.e., pelagic shelf, demersal shelf, and slope rockfish assemblages; Table 1). These habitats to some extent dictate the fisheries harvesting particular assemblages. Pelagic rockfish (5 AAC 39.975(37); e.g., black rockfish) are typically associated with nearshore, reef areas in the territorial seas and are harvested primarily in directed fisheries, often with mechanical and hand jigs. Demersal rockfish (5 AAC 39.975(34); e.g., yelloweye and quillback rockfish) are also associated with rocky, reef areas, but at greater depths than pelagic species. The distribution of demersal species extends beyond the territorial seas and harvests occur in directed or incidental fisheries. Slope species (e.g., rougheye rockfish) typically associate with deep areas along the break of the continental shelf. In the territorial seas, slope species are generally harvested incidental to other fisheries such as halibut or trawl shrimp. Rockfish species identification during harvest reporting has often been vague or inaccurate, particularly during 1987 and 1988. Because rockfish species composition can vary substantially over time, area, and target fishery, rockfish harvests identified simply as "red rockfish", "sea bass", or "snapper" have been

summarized as "unknown".

Rockfish have unusual reproductive patterns. For most non-rockfish species that reproduce in marine waters, free-floating eggs are released, externally fertilized, and undergo embryonic development as independent organisms. Egg hatching is generally followed by a yolk-sac period during which pigmentation and feeding mechanisms develop. Less than 20% of the eggs of most marine fish survive to become free-feeding larvae (Hempel 1979). In contrast, rockfish internally fertilize between 10,000 and 1 million eggs which develop and hatch inside the ovary. An estimated 75% of these eggs survive to be extruded as planktonic, free-feeding larvae (Boehlert, et al. 1987). Larval release for most rockfishes occurs during the first six months of the year, although the specific timing varies substantially within and between species (Wyllie Escheverria 1987). The duration of larval release varies from 1 to 9 months. The release period for a given species tends to be later and have a shorter duration in more northern latitudes (Kendall and Lenarz 1987).

The juvenile rockfish stage, determined when the count of fin rays, gill rakers, and lateral line pores is the same as in adults, begins at a length of 20-30 mm (~ 1 inch; e.g., Matarese et al. 1989). However, juvenile distribution and life history patterns are not well documented for most species. Juveniles of some species are either pelagic or associate with drifting objects such as kelp until about 1 year old when a benthic existence begins (Boehlert 1977). Other species do not begin a benthic existence until their second year of life (Carlson and Haight 1976). Juvenile settlement for some species is preceded by nearshore movement (Anderson 1983).

After settlement, juvenile rockfish resemble and may associate with adults. Rockfish, in general, grow slower, live-longer, and reach sexual maturity at a later age than other marine finfish (Archibald et al. 1981). In addition, individual rockfish often establish a very localized distribution where they remain for their entire adult lives. ADF&G SCUBA surveys conducted along the outer Kenai Peninsula in 1983 and 1984 observed black rockfish at the original site of tagging 2-3 years previously (R. Morrison, ADF&G, Homer, unpublished data). In southeast Alaska, yellowtail rockfish returned to a home reef after

being tagged and moved 22.5 km (~13 miles) from the reef (Carlson and Haight 1972). However, these homing and distribution characteristics can vary widely between species. The species-specific age of sexual maturity can range from 6 to 20 years, with longevity exceeding 120 years in some species (e.g., O'Connell and Funk 1986). In general, pelagic species tend to reach sexual maturity earlier and have shorter lifespans than demersal or slope species. These characteristics need to be considered when examining management strategies.

## RESULTS

### *Commercial Harvests*

Central Region Summary

The aggregate harvests of all rockfish species in the Central Region have ranged from a low of 140,653 lb in 1989 to a high of 528,645 lb in 1990, three-fold larger than the lowest annual harvest (Table 2). Harvests have averaged 348,253 lb annually. Based on a preliminary harvest of 504,380 lb through July 1992, it is probable that a record rockfish harvest will occur in 1992. Prince William Sound has produced an average of 53% of all region rockfish harvests since 1987 (Table 3; Figure 2). The North Gulf has produced an average of 46% of all rockfish harvests. Monthly harvest rates have been highest in mid-summer with >50% of all annual harvests occurring from April to June (Table 3).

Longline gear has produced 72% of the Central Region rockfish harvests in all years except 1991 when longline produced only 41% and jig gear produced 58% of the annual harvest (Table 4, Figure 3). Longline harvests have ranged from 123,061 lb in 1989 to 466,929 lb in 1990. Hand and mechanical jig gear has generally produced <25% of the Central Region rockfish with annual jig harvests ranging from 16,600 lb in 1989 to 217,629 lb in 1991. Harvests by other gears have comprised ≤5% of all annual harvests, and have ranged from 36 lb in 1988 to

25,634 in 1992.

Rockfish catch composition has been highly variable over time (Table 5; Figure 4). Slope species have averaged 39% of all region rockfish landings since 1987, although the portion of the annual catch has ranged from 7% in 1987 to 87% in 1990. Pelagic species have averaged 34% of all landings since 1987, but ranged from 8% in 1990 to 54% in 1991. Demersal species have averaged 16% of all landings and ranged from 5% in 1990 to 30% in 1992. Because of reporting inconsistencies, the largest portion (40%) of rockfish harvests in 1987 and 1988 were unidentified species. Through better cooperation from most processors and ADF&G port sampling, the use of non-specific rockfish categories has been reduced in recent years.

Rockfish landings largely reflect market conditions and the availability of processors (Table 2). Ex-vessel values for all Central Region deliveries ranged from $57,668 in 1989 to $201,037 in 1990, with an average annual value of $114,655. The average price paid for all rockfish has ranged from a low of $0.28/lb in 1991 to a high of $0.41/lb in 1989, and has averaged $0.33/lb (prices are calculated for round weight in lb). Rockfish prices often vary with fish skin color; red-colored fish usually sell for $0.05-$0.20/lb more than non-red fish (personal observations). Thornyhead rockfish, a high-quality red-colored fish, are generally the highest priced. Thornyheads sold for a low of $0.40/lb in 1987 and a high of $0.59/lb in 1992.

North Gulf

Consecutive record harvests have occurred over the last two years in the North Gulf area (Table 6). Annual harvests ranged from 39,476 lb in 1990 to a preliminary 1992 harvest of 338,938 lb through July. Harvests in 1992 resulted from 116 vessels making 352 landings. A total of 40 processors, ranging form 11 to 18 in a given year, have purchased North Gulf rockfish. North Gulf harvests have been largely comprised of pelagic species, followed by demersal species, then slope species. The harvest of both pelagic and demersal species has increased sharply from 21,331 lb and 1,007 lb in 1990 to 206,582 lb and 117,297

lb, respectively, in the first part of 1992. Longline gear has produced from 53-76% of the annual harvests from the North Gulf area, except for producing only 8% in 1991. Jig gear has essentially produced the balance of North Gulf harvests, including 92% of the 1991 rockfish. For data pooled across years, monthly harvests by longline and jig gear have been reported in all months; longline harvests peaked in April whereas jig harvests peaked in June.

Prince William Sound

Rockfish harvests from Prince William Sound ranged from 93,047 lb in 1989 to 489,169 lb in 1990 (Table 2). In 1992, 93 vessels delivered 165,442 lb in 401 landings. A total of 46 processors, ranging from 13 to 23 a year, have reported deliveries of Prince William Sound rockfish. Monthly harvests in Prince William Sound peaked in May, due primarily to longline harvests during sablefish and halibut (Tables 3 and 7). Longline gear has produced 79-100% of the annual rockfish harvests from Prince William Sound. Harvests by jig and other gears were greatest between April and July, although further trends were not obvious. Slope species have comprised the greatest portion of rockfish harvests with the remainder being a mixture of pelagic and demersal species. Harvests of pelagic species from Prince William Sound have increased drastically in recent years, particularly longline harvests of pelagic species. While recent demersal harvests appear to have declined somewhat from a peak harvest in 1990, annual landings continue to be well above historical averages. Jig gear has typically harvested primarily pelagic species while other gears have harvested a greater proportion of slope species.

Cook Inlet

Cook Inlet has produced less rockfish than other Central Region areas, and harvests have declined from a peak harvest of 11,310 lb in 1987 to <500 lb annually (Tables 2 and 8). Some of the variability in Cook Inlet harvests may also reflect inaccurate reporting of North Gulf harvests. Peak Cook Inlet harvests in 1987 involved 9 vessels making 58 landings. At least 11 processors

have purchased Cook Inlet rockfish since 1987, although five or fewer have made purchases in any given year. Harvests in 1987 were primarily slope species taken by trawl gear. Harvests have since been a mixture of slope and demersal species taken by longline gear. Due to the limited landings, monthly harvest trends are difficult to determine for Cook Inlet waters. Cook Inlet appears to contain habitat that is not as productive for rockfish as other areas. However, limited markets have generally discouraged retention and reporting of rockfish harvests (personal observations).

*Fleet Composition and Individual Vessel Effort*

The composition of the rockfish fleet reflects the shore-based nature of this fishery in state waters of the Central Region. Vessels in the 31 to 40 ft size class comprised 53% of the fleet which reported rockfish landings during 1990 to 1992 (Figure 5).

Many of the Central Region rockfish landings, particularly from non-jig gear, are the result of incidental harvests during other directed fisheries. Under 20 AAC 05.120. INCIDENTAL TAKING OF FISHERY RESOURCES, fishermen are generally allowed a 20% retention of incidentally caught species, provided the gear is legal for the area, the season is open, and the species is not under limited entry restrictions. To avoid potential violations of bycatch landing regulations, fishermen who pursue non-rockfish species, such as halibut, sablefish, and trawl shrimp, have been encouraged to report rockfish harvests as a miscellaneous finfish landing. Therefore, it is difficult to determine the extent of directed rockfish effort for gears other than jig gear. Table 9 shows all Central Region groundfish harvests during the years 1987 to 1992. The primary fisheries in the Central Region which impact rockfish resources through incidental harvests include longline fisheries for halibut, sablefish, and Pacific cod, and trawl fisheries for shrimp. A peak monthly rockfish harvest during April to June may also indicate a large annual rockfish harvest is associated with sablefish and halibut fisheries typically occurring at that time (Tables 3).

That rockfish harvests are primarily incidental harvests is also supported by data on individual trip size (i.e., rockfish lb per landing). Although some annual variation has existed, 70-85% of the annual rockfish landings from the North Gulf and Prince William Sound have been ≤1000 lb "trips" (Table 10).

## SUMMARY AND RECOMMENDATIONS

Rockfish harvest reporting in the Central Region has been plagued by problems such as "unknown rockfish" species (e.g., "red snapper"), global reporting categories such as "red rockfish", and a lack of reporting when market conditions for rockfish are not favorable. Because of the dependency of rockfish catch composition upon co-occurring fisheries and prevailing market conditions, it is difficult to reconstruct historical harvest trends. Thus, historical harvests reflect only the reporting of harvests and may substantially underestimate actual resource removals. Port sampling in recent years, when cooperation has been obtained from the industry, has helped to resolve some of these problems.

Slow growth, late maturity, extended longevity, and localized distributions make rockfish highly susceptible to over-harvest. Because there is little geographic segregation between fish age classes, both mature and immature fish are harvested when market conditions are favorable. If a localized population becomes depleted, continued bycatch from non-directed fisheries may prevent the population from recovering (e.g., Pikitch 1987). Because of the slow recovery by rockfish to overharvest, it is necessary to prevent the resource from becoming severely depleted.

Currently, the ADF&G lacks specific strategies for the management of nearshore rockfish resources. These resources have been managed consistently with the adjacent federal waters of the EEZ. Federal management strategies, based on a Total Allowable Catch (TAC) applied to the Central Gulf of Alaska, may be insufficient for resource conservation in the nearshore waters. To provide for resource conservation and long-term, sustained yield, the ADF&G recommends that the Alaska Board of Fisheries adopt a North Gulf Coastal Rockfish Management

Plan. This plan needs to address several concerns for rockfish resources:

(1) rockfish are highly susceptible to over-harvest;

(2) over-harvested populations recover very slowly;

(3) groundfish fisheries, in general, and rockfish fisheries, in particular, are most intensively targeted when alternative fisheries, such as salmon and crab, are closed or offer relatively poor economic returns; and

(4) rockfish captured on commercial fishing gear suffer ~100% mortality (i.e., catch-and-release only results in wastage of the resource and an economic loss to the permit holder).

Draft regulatory language for a North Gulf Coast Rockfish Management Plan is attached as Appendix A. This plan includes the following components:

1. **Trip Limits.** The purpose of a trip limit is to (a) reduce the impact of a directed fishery and (2) allow the fishery to occur over a longer portion of the year. Landings in excess of 10,000 lb are most common with pelagic species caught by jig gear. Assuming a 3.75 lb (1.7 kg) average size for black rockfish, a 10,000 lb delivery represents a 2,667 fish removal. These fish, primarily ranging in age from 6 to 30 years, may have been from one or two reefs and could represent a substantial localized resource depletion.

2. **Inseason management authority for the department to establish a bycatch-only rockfish fishery.** Currently the incidental taking of fishery resources is regulated by CFEC regulation **20 AAC 05.120. INCIDENTAL TAKING OF FISHERY RESOURCES.**, which limits incidental take to 20% provided that the fishery is open, the fishery is not under limited entry, and the gear is legal in the area. State management of rockfish resources is currently limited to time and area closures. However, because rockfish cannot be discarded alive, a closure of the rockfish fishery results in resource wastage and an economic loss to permit holders. By authorizing the ADF&G to establish bycatch-only limits for rockfish, resource concerns can be addressed through a closure of the directed fisheries, and resource wastage is reduced. In the event that a complete collapse of the rockfish resource

is evident, the ADF&G would utilize traditional inseason management authority to implement a closure of all fisheries which have a major impact on the rockfish resource.

3. **Annual Harvest Guidelines.** Area-specific annual harvest guidelines would "trigger" the implementation of bycatch-only restrictions. These guidelines need to reflect historical trends in resource use. Guidelines need to include incidental as well as directed fishery harvests. If intensive incidental fisheries with a substantial removal of rockfish occur early in the year, then the guideline harvest level would be reached sooner and a bycatch-only rockfish fishery implemented.

The proposed plan is a preliminary draft to address both immediate and long-term conservation concerns for rockfish resources in the territorial seas on the North Gulf, Prince William Sound, and Cook Inlet. As these resources are monitored and data is collected over time, future modifications of this plan may address additional user group or resource needs through species, area, or gear provisions. It is important that the user groups recognize the delicate nature of the rockfish resources. Implementation of a management plan developed cooperatively between management and the user groups will allow for short-term utilization while providing for long-term stock conservation.

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Table 1. Species names and groups applied in Central Region rockfish management.

| Species Code | Common Name | Scientific Name |
|---|---|---|
| **Pelagic Rockfish** | | |
| 142 | Black Rockfish | *Sebastes melanops* |
| 154 | Dusky Rockfish | *S. ciliatus* |
| 155 | Yellowtail Rockfish | *S. flavidus* |
| 169 | Unspecified Pelagic Rockfish | |
| **Demersal Rockfish** | | |
| 145 | Yelloweye Rockfish | *S. ruberrimus* |
| 146 | Canary Rockfish | *S. pinniger* |
| 147 | Quillback Rockfish | *S. maliger* |
| 148 | Tiger Rockfish | *S. nigrocinctus* |
| 149 | China Rockfish | *S. nebulosus* |
| 153 | Redbanded Rockfish | *S. babcocki* |
| 168 | Unspecified Demersal Rockfish | |
| **Slope Rockfish** | | |
| 137 | Boccacio Rockfish | *S. paucispinis* |
| 141 | Pacific Ocean Perch | *S. alutus* |
| 151 | Rougheye Rockfish | *S. aleutianus* |
| 152 | Shortraker Rockfish | *S. borealis* |
| 157 | Silvergray Rockfish | *S. brevispinis* |
| 158 | Redstripe Rockfish | *S. proriger* |
| 159 | Darkblotched Rockfish | *S. crameri* |
| 144 | Unspecified Slope Rockfish | |
| 143 | Thornyhead Rockfish | *genus Sebastolobus* |
| **Unknown Rockfish** | | |
| 139 | Other Rockfish | |
| 140 | Red Rockfish | |

Table 2. Annual harvest, effort, and processing of all Central Region rockfish species during 1987-1992[a].

**North Gulf**

| | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | TOTAL |
|---|---|---|---|---|---|---|---|
| Vessels | 64 | 37 | 14 | 30 | 61 | 116 | 274 |
| Processors | 13 | 14 | 11 | 12 | 14 | 18 | 40 |
| Landings | 137 | 88 | 33 | 41 | 152 | 352 | 802 |
| Lb (round wt) | 169,109 | 149,894 | 47,606 | 39,476 | 218,231 | 338,938 | 963,254 |

**Prince William Sound**

| | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | TOTAL |
|---|---|---|---|---|---|---|---|
| Vessels | 56 | 64 | 35 | 93 | 88 | 84 | 237 |
| Processors | 14 | 20 | 13 | 17 | 23 | 18 | 40 |
| Landings | 119 | 174 | 98 | 401 | 242 | 231 | 1,263 |
| Lb (round wt) | 97,923 | 111,903 | 93,047 | 489,169 | 153,869 | 165,442 | 1,111,353 |

**Cook Inlet**

| | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | TOTAL |
|---|---|---|---|---|---|---|---|
| Vessels | 9 | 6 | 0 | 6 | 5 | <4 | 26 |
| Processors | 5 | 5 | 0 | <4 | <4 | <4 | 11 |
| Landings | 58 | 7 | 0 | 8 | 6 | <4 | 81 |
| Lb (round wt) | 11,310 | 2,887 | 0 | 400 | 269 | 44 | 14,910 |

**Central Region Total**

| | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | Average |
|---|---|---|---|---|---|---|---|
| Vessels | 121 | 96 | 44 | 117 | 139 | 170 | 115 |
| Processors | 23 | 25 | 18 | 22 | 26 | 25 | 23 |
| Landings | 314 | 268 | 131 | 450 | 399 | 584 | 358 |
| Lb (round wt) | 278,342 | 264,684 | 140,653 | 529,045 | 372,369 | 504,424 | 348,253 |
| Price/lb | $0.31 | $0.33 | $0.41 | $0.38 | $0.28 | $0.30 | $0.33 |
| Ex-vessel Value | $86,286 | $87,346 | $57,668 | $201,037 | $104,263 | $151,327 | $114,655 |

[a] Preliminary data processed through July 1992; processing refers to the number of processors accepting deliveries from a particular management area and not to the landing or processing site.

Table 3. Annual and monthly commercial rockfish harvests from the North Gulf, Prince William Sound, and Cook Inlet management areas during 1987-1992[a].

Percentage of Annual Harvest

| Year | North Gulf | Prince William Sound | Cook Inlet | Total Harvest (lb) |
|---|---|---|---|---|
| 1987 | 60.7% | 35.2% | 4.1% | 278,342 |
| 1988 | 56.6% | 42.3% | 1.1% | 264,684 |
| 1989 | 33.8% | 66.2% | 0.0% | 140,653 |
| 1990 | 7.5% | 92.4% | 0.1% | 529,045 |
| 1991 | 58.6% | 41.3% | 0.1% | 372,369 |
| 1992 | 67.2% | 32.8% | <0.1% | 504,424 |
| Average | 46.1% | 53.2% | 0.7% | 348,253 |

Percentage of Monthly Harvest

| Month | North Gulf | Prince William Sound | Cook Inlet | Monthly Total Percent | Monthly Total Lb |
|---|---|---|---|---|---|
| January | 37.4% | 51.7% | 10.9% | 1.6% | 34,077 |
| February | 76.1% | 16.2% | 7.7% | 2.5% | 51,850 |
| March | 78.5% | 20.5% | 1.0% | 7.1% | 148,404 |
| April | 63.0% | 36.4% | 0.6% | 15.4% | 322,087 |
| May | 34.0% | 65.7% | 0.3% | 20.0% | 418,164 |
| June | 44.2% | 55.7% | 0.1% | 15.4% | 321,628 |
| July | 31.6% | 68.4% | 0.0% | 10.5% | 218,563 |
| August | 33.2% | 66.2% | 0.6% | 6.1% | 128,428 |
| September | 41.3% | 58.2% | 0.5% | 8.1% | 169,114 |
| October | 39.4% | 60.3% | 0.3% | 5.9% | 123,449 |
| November | 61.2% | 38.8% | 0.0% | 4.8% | 100,028 |
| December | 30.0% | 69.8% | 0.2% | 2.6% | 53,725 |
| Average | 46.1% | 53.2% | 0.7% | | 174,126 |
| Total Lb | 963,254 | 1,111,353 | 14,910 | | 2,089,517 |

[a] Preliminary ADF&G fish ticket data through July 1992.

Table 4. Annual and monthly commercial rockfish harvests by jig, longline, and other gears from the Central Region during 1987-1992[a].

| Year | Annual Lb (round weight) Jig | Longline | Other | Total |
|---|---|---|---|---|
| 1987 | 67,842 | 198,066 | 12,434 | 278,342 |
| 1988 | 55,707 | 208,941 | 36 | 264,684 |
| 1989 | 16,600 | 123,061 | 992 | 140,653 |
| 1990 | 41,481 | 466,929 | 20,635 | 529,045 |
| 1991 | 217,629 | 152,204 | 2,536 | 372,369 |
| 1992 | 117,778 | 361,012 | 25,634 | 504,424 |
| Average | 24.4% | 72.0% | 3.6% | |

| Month | Percentage of Monthly Harvest Jig | Longline | Other | Monthly Total Percent | Lb |
|---|---|---|---|---|---|
| January | 6.6% | 82.5% | 10.9% | 1.6% | 34,077 |
| February | 32.8% | 59.6% | 7.6% | 2.5% | 51,850 |
| March | 38.3% | 60.4% | 1.3% | 7.1% | 148,404 |
| April | 22.6% | 74.9% | 2.5% | 15.4% | 322,087 |
| May | 14.3% | 83.0% | 2.7% | 20.0% | 418,164 |
| June | 35.5% | 63.4% | 1.1% | 15.4% | 321,628 |
| July | 15.1% | 75.2% | 9.7% | 10.5% | 218,563 |
| August | 19.3% | 71.2% | 9.5% | 6.1% | 128,428 |
| September | 27.5% | 71.6% | 0.9% | 8.1% | 169,114 |
| October | 28.7% | 66.3% | 5.0% | 5.9% | 123,449 |
| November | 29.1% | 70.3% | 0.6% | 4.8% | 100,028 |
| December | 35.5% | 64.4% | 0.1% | 2.6% | 53,725 |
| Average | 24.4% | 72.0% | 3.6% | | 174,126 |
| Total Lb | 510,694 | 1,504,438 | 74,385 | | 2,089,517 |

[a] Preliminary ADF&G fish ticket data through July 1992.

Table 5. Contribution by gear type and species assemblage to the monthly commercial rockfish harvest from state waters of the Central Region during 1987-1992[a].

| Year | Species as Percent of Annual Total | | | | Total Round Wt (lb) |
|---|---|---|---|---|---|
| | Pelagic | Demersal | Slope | Unknown | |
| 1987 | 30.2% | 22.6% | 7.2% | 40.1% | 278,342 |
| 1988 | 33.6% | 11.2% | 15.5% | 39.7% | 264,684 |
| 1989 | 22.8% | 19.9% | 56.8% | 0.5% | 140,653 |
| 1990 | 7.9% | 5.0% | 87.1% | 0.0% | 529,045 |
| 1991 | 54.0% | 10.9% | 35.1% | 0.0% | 372,369 |
| 1992 | 53.5% | 30.0% | 16.5% | 0.0% | 504,424 |
| Average | 33.7% | 16.5% | 39.4% | 10.4% | |
| | Round Weight (lb) | | | | |
| Average | 117,213 | 57,452 | 137,361 | 36,228 | 348,253 |
| Total | 703,276 | 344,712 | 824,164 | 217,365 | |

| Month | Species as Percent of Annual Total | | | | Total Round Wt (lb) |
|---|---|---|---|---|---|
| | Pelagic | Demersal | Slope | Unknown | |
| January | 16.1% | 31.7% | 43.9% | 8.3% | 34,077 |
| February | 2.8% | 14.5% | 16.6% | 66.1% | 51,850 |
| March | 56.4% | 24.6% | 15.9% | 3.1% | 148,404 |
| April | 43.8% | 27.3% | 21.3% | 7.6% | 322,087 |
| May | 35.7% | 17.1% | 40.7% | 6.5% | 418,164 |
| June | 34.8% | 17.8% | 39.9% | 7.5% | 321,628 |
| July | 22.2% | 17.2% | 53.9% | 6.7% | 218,563 |
| August | 27.0% | 5.0% | 54.9% | 13.1% | 128,428 |
| September | 17.7% | 1.3% | 59.4% | 21.6% | 169,114 |
| October | 30.3% | 6.6% | 51.9% | 11.2% | 123,449 |
| November | 44.6% | 17.1% | 20.6% | 17.7% | 100,028 |
| December | 28.9% | 2.6% | 67.7% | 0.8% | 53,725 |
| Average | 33.7% | 16.5% | 39.4% | 10.4% | |

[a] Preliminary data through July 1992.

Table 6. Gear specific harvests of rockfish assemblages from the North Gulf during 1987-1992[a].

| | Round Weight (lb) | | | | | |
|---|---|---|---|---|---|---|
| | Pelagic | Demersal | Slope | Unknown | Total | % Annual |
| | | | **Jig** | | | |
| 1987 | 34,939 | 888 | 0 | 32,015 | 67,842 | 40.1% |
| 1988 | 31,177 | 799 | 0 | 23,142 | 55,118 | 36.8% |
| 1989 | 5,160 | 6,250 | 163 | 0 | 11,573 | 24.3% |
| 1990 | 16,948 | 16 | 1,640 | 0 | 18,604 | 47.1% |
| 1991 | 182,702 | 4,966 | 13,022 | 0 | 200,690 | 92.0% |
| 1992 | 104,645 | 2,074 | 1,298 | 0 | 108,017 | 31.9% |
| | | | **Longline** | | | |
| 1987 | 49,036 | 8,622 | 932 | 42,677 | 101,267 | 59.9% |
| 1988 | 55,817 | 4,171 | 88 | 34,700 | 94,776 | 63.2% |
| 1989 | 17,171 | 17,387 | 735 | 740 | 36,033 | 75.7% |
| 1990 | 4,383 | 991 | 15,394 | 60 | 20,828 | 52.8% |
| 1991 | 1,144 | 2,223 | 14,137 | 0 | 17,504 | 8.0% |
| 1992 | 101,868 | 114,879 | 13,750 | 0 | 230,498 | 68.0% |
| | | | **Other Gears** | | | |
| 1987 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1988 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1989 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1990 | 0 | 0 | 44 | 0 | 44 | 0.1% |
| 1991 | 0 | 37 | 0 | 0 | 37 | 0.0% |
| 1992 | 69 | 344 | 10 | 0 | 423 | 0.1% |
| | | | **All Gears Combined** | | | |
| 1987 | 83,975 | 9,510 | 932 | 74,692 | 169,109 | 100.0% |
| 1988 | 86,994 | 4,970 | 88 | 57,842 | 149,894 | 100.0% |
| 1989 | 22,331 | 23,637 | 898 | 740 | 47,606 | 100.0% |
| 1990 | 21,331 | 1,007 | 17,078 | 60 | 39,476 | 100.0% |
| 1991 | 183,846 | 7,226 | 27,159 | 0 | 218,231 | 100.0% |
| 1992 | 206,582 | 117,297 | 15,058 | 0 | 338,938 | 100.0% |
| Average | 100,843 | 27,275 | 10,202 | 22,222 | 160,542 | |

[a] Preliminary data through July 1992.

Table 7. Gear specific harvests of rockfish assemblages from Prince William Sound during 1987-1992[a].

| | Round Weight (lb) | | | | | |
|---|---|---|---|---|---|---|
| | Pelagic | Demersal | Slope | Unknown | Total | % Annual |
| | | | **Jig** | | | |
| 1987 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1988 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1989 | 0 | 0 | 5,027 | 0 | 5,027 | 5.4% |
| 1990 | 14,050 | 0 | 8,827 | 0 | 22,877 | 4.7% |
| 1991 | 14,246 | 2,299 | 394 | 0 | 16,939 | 11.0% |
| 1992 | 9,349 | 412 | 0 | 0 | 9,761 | 5.9% |
| | | | **Longline** | | | |
| 1987 | 0 | 53,249 | 10,250 | 31,916 | 95,415 | 97.4% |
| 1988 | 1,427 | 24,208 | 40,213 | 46,019 | 111,867 | 100.0% |
| 1989 | 9,757 | 4,297 | 72,974 | 0 | 87,028 | 93.5% |
| 1990 | 6,166 | 25,141 | 414,394 | 0 | 445,701 | 91.1% |
| 1991 | 3,098 | 30,873 | 100,460 | 0 | 134,431 | 87.4% |
| 1992 | 44,047 | 31,807 | 54,616 | 0 | 130,470 | 78.9% |
| | | | **Other Gears** | | | |
| 1987 | 48 | 0 | 0 | 2,460 | 2,508 | 2.6% |
| 1988 | 0 | 0 | 0 | 36 | 36 | 0.0% |
| 1989 | 0 | 0 | 992 | 0 | 992 | 1.1% |
| 1990 | 370 | 0 | 20,221 | 0 | 20,591 | 4.2% |
| 1991 | 0 | 24 | 2,475 | 0 | 2,499 | 1.6% |
| 1992 | 9,686 | 1,782 | 13,743 | 0 | 25,211 | 15.2% |
| | | | **All Gears Combined** | | | |
| 1987 | 48 | 53,249 | 10,250 | 34,376 | 97,923 | 100.0% |
| 1988 | 1,427 | 24,208 | 40,213 | 46,055 | 111,903 | 100.0% |
| 1989 | 9,757 | 4,297 | 78,993 | 0 | 93,047 | 100.0% |
| 1990 | 20,586 | 25,141 | 443,442 | 0 | 489,169 | 100.0% |
| 1991 | 17,344 | 33,196 | 103,329 | 0 | 153,869 | 100.0% |
| 1992 | 63,082 | 34,001 | 68,359 | 0 | 165,442 | 100.0% |
| Average | 18,707 | 29,015 | 124,098 | 13,405 | 185,226 | |

[a] Preliminary data through July 1992.

Table 8. Gear specific harvests of rockfish assemblages from Cook Inlet during 1987-1992[a].

| | Round Weight (lb) | | | | | |
|---|---|---|---|---|---|---|
| | Pelagic | Demersal | Slope | Unknown | Total | % Annual |
| | | | **Jig** | | | |
| 1987 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1988 | 589 | 0 | 0 | 0 | 589 | 20.4% |
| 1989 | 0 | 0 | 0 | 0 | 0 | - |
| 1990 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1991 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1992 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | | | **Longline** | | | - |
| 1987 | 0 | 47 | | 1,337 | 1,384 | 12.2% |
| 1988 | 0 | 567 | 641 | 1,090 | 2,298 | 79.6% |
| 1989 | 0 | 0 | 0 | 0 | 0 | - |
| 1990 | 0 | 246 | 154 | 0 | 400 | 100.0% |
| 1991 | 43 | 48 | 178 | 0 | 269 | 100.0% |
| 1992 | 0 | 0 | 44 | 0 | 44 | 100.0% |
| | | | **Other Gears** | | | |
| 1987 | 0 | 0 | 8,753 | 1,173 | 9,926 | 87.8% |
| 1988 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1989 | 0 | 0 | 0 | 0 | 0 | - |
| 1990 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1991 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| 1992 | 0 | 0 | 0 | 0 | 0 | 0.0% |
| | | | **All Gears Combined** | | | |
| 1987 | 0 | 47 | 8,753 | 2,510 | 11,310 | 100.0% |
| 1988 | 589 | 567 | 641 | 1,090 | 2,887 | 100.0% |
| 1989 | 0 | 0 | 0 | 0 | 0 | - |
| 1990 | 0 | 246 | 154 | 0 | 400 | 100.0% |
| 1991 | 43 | 48 | 178 | 0 | 269 | 100.0% |
| 1992 | 0 | 0 | 44 | 0 | 44 | 100.0% |
| Average | 105 | 151 | 1,628 | 600 | 2,485 | |

[a] Preliminary data through July 1992.

Table 9. Annual groundfish harvest and effort from Cook Inlet, Prince William Sound, and the North Gulf during 1987-1992[a].

| Year | Vessels | Landings | Round Weight (lb) Rockfish | Sablefish | Pacific Cod | Flounders | Other Groundfish | Lingcod | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Cook Inlet** | | | | | | | | | |
| 1987 | 178 | 731 | 21,541 | 2,359 | 870,530 | 135,059 | 56,472 | 103 | 1,086,064 |
| 1988 | 67 | 178 | 7,154 | 74,337 | 215,586 | 220 | 275 | 127 | 297,699 |
| 1989 | 11 | 20 | 1,736 | 5,400 | 8,363 | 11 | 2,620 | 0 | 18,130 |
| 1990 | 88 | 302 | 134,853 | 24,664 | 387,779 | 5,002 | 10,593 | 394 | 563,285 |
| 1991 | 86 | 414 | 302 | 132 | 2,011,379 | 0 | 1,612 | 0 | 2,013,425 |
| 1992 | 54 | 308 | 44 | 2 | 1,606,645 | 0 | 3,405 | 0 | 1,610,096 |
| **Prince William Sound** | | | | | | | | | |
| 1987 | 100 | 207 | 90,061 | 184,581 | 415,483 | 27,113 | 8,117 | 594 | 725,949 |
| 1988 | 79 | 265 | 109,611 | 211,769 | 319,202 | 15,287 | 13,655 | 1,338 | 670,862 |
| 1989 | 39 | 132 | 91,508 | 180,903 | 65,698 | 0 | 2,113 | 1,280 | 341,502 |
| 1990 | 110 | 416 | 355,284 | 185,670 | 1,069,004 | 67,971 | 1,085 | 7,906 | 1,686,920 |
| 1991 | 146 | 454 | 154,869 | 331,314 | 2,218,911 | 4,385 | 1,104 | 19,357 | 2,728,940 |
| 1992 | 142 | 602 | 165,442 | 432,676 | 1,744,309 | 1,169 | 7,500 | 2,342 | 2,353,438 |
| **North Gulf** | | | | | | | | | |
| 1987 | 117 | 312 | 169,147 | 36,797 | 790,633 | 877 | 5,138 | 25,522 | 1,028,114 |
| 1988 | 71 | 191 | 200,349 | 89,156 | 306,952 | 2,368 | 2,467 | 25,176 | 626,468 |
| 1989 | 25 | 56 | 50,089 | 3,739 | 30,789 | 0 | 389 | 7,026 | 92,032 |
| 1990 | 59 | 80 | 46,974 | 11,589 | 71,847 | 13 | 548 | 5,698 | 136,669 |
| 1991 | 113 | 261 | 219,151 | 127,283 | 968,455 | 175 | 1,238 | 65,256 | 1,381,558 |
| 1992 | 179 | 676 | 338,938 | 148,409 | 4,562,125 | 0 | 1,655 | 20,162 | 5,071,289 |
| **Central Region Total** | | | | | | | | | |
| 1987 | 324 | 1,250 | 280,749 | 223,737 | 2,076,646 | 163,059 | 69,727 | 26,219 | 2,840,137 |
| 1988 | 171 | 634 | 317,114 | 375,262 | 841,740 | 17,875 | 16,397 | 26,641 | 1,595,029 |
| 1989 | 60 | 208 | 143,333 | 190,042 | 104,850 | 11 | 5,122 | 8,306 | 451,664 |
| 1990 | 211 | 798 | 537,111 | 221,923 | 1,528,630 | 72,986 | 12,226 | 13,998 | 2,386,874 |
| 1991 | 273 | 1,127 | 373,322 | 458,729 | 5,198,745 | 4,560 | 3,954 | 84,613 | 6,123,923 |
| 1992 | 304 | 1,583 | 504,424 | 581,087 | 7,913,079 | 1,169 | 12,560 | 22,504 | 9,034,823 |

[a] Preliminary data through July 1992.
[b] Includes state and federal waters, except rockfish which are summarized only for state waters.

Table 10. Percent composition of annual rockfish harvests from the Prince William Sound and North Gulf areas, summarized by individual delivery size during 1987 to 1991.

| Trip Size (lb) | Prince William Sound | | | | | North Gulf | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1988 | 1989 | 1990 | 1991 | 1987 | 1988 | 1989 | 1990 | 1991 |
| <500 | 59.7 | 70.7 | 46.4 | 46.9 | 66.5 | 65.7 | 70.5 | 66.7 | 70.7 | 57.9 |
| 1000 | 20.2 | 14.4 | 21.6 | 22.2 | 12.0 | 10.2 | 6.8 | 15.2 | 7.3 | 10.5 |
| 1500 | 8.4 | 8.0 | 11.3 | 8.2 | 9.5 | 3.6 | 1.1 | 3.0 | 4.9 | 5.3 |
| 2000 | 2.5 | 2.3 | 7.2 | 6.2 | 5.8 | 3.6 | 2.3 | 3.0 | 0.0 | 0.7 |
| 2500 | 2.5 | 4.0 | 6.2 | 4.0 | 1.7 | 2.9 | 1.1 | 0.0 | 2.4 | 2.6 |
| 3000 | 0.8 | 0.0 | 3.1 | 1.5 | 1.7 | 2.9 | 1.1 | 0.0 | 2.4 | 4.6 |
| 3500 | 1.7 | 0.0 | 1.0 | 2.2 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 |
| 4000 | 0.8 | 0.0 | 1.0 | 1.2 | 1.2 | 3.6 | 0.0 | 0.0 | 4.9 | 2.6 |
| 4500 | 0.8 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.7 |
| 5000 | 0.0 | 0.0 | 1.0 | 0.7 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 |
| 5500 | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 | 4.6 |
| 6000 | 0.0 | 0.0 | 0.0 | 1.2 | 0.4 | 0.0 | 0.0 | 3.0 | 0.0 | 1.3 |
| 6500 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.7 | 1.1 | 0.0 | 0.0 | 0.7 |
| 7000 | 0.8 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 1.1 | 3.0 | 2.4 | 0.0 |
| 7500 | 0.0 | 0.0 | 1.0 | 0.5 | 0.0 | 0.7 | 2.3 | 0.0 | 2.4 | 0.0 |
| 8000 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 3.4 | 0.0 | 0.0 | 0.0 |
| 8500 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 1.1 | 0.0 | 0.0 | 2.0 |
| 9000 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 | 0.7 |
| 9500 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| 10000 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15000 | 0.8 | 0.0 | 0.0 | 0.2 | 0.0 | 3.0 | 4.5 | 6.0 | 0.0 | 1.4 |
| 20000 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| >20000 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Lb | 97,923 | 111,903 | 93,047 | 489,169 | 153,869 | 169,109 | 149,894 | 47,606 | 39,476 | 218,231 |
| No. Landings | 119 | 174 | 98 | 401 | 242 | 137 | 88 | 33 | 41 | 152 |
| AVG(LB/trip) | 823 | 643 | 949 | 1220 | 636 | 1234 | 1703 | 1443 | 963 | 1436 |

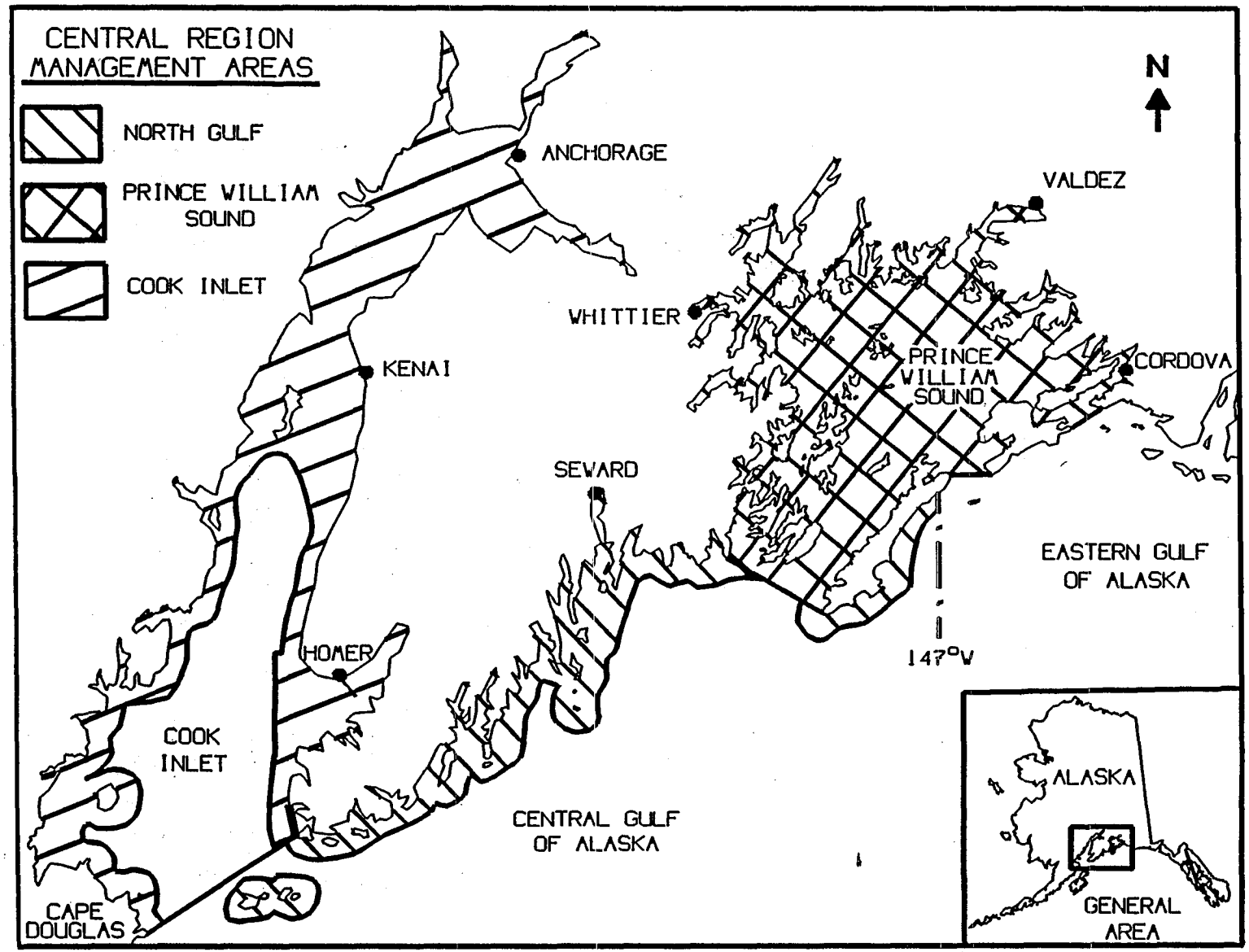


Figure 1. Rockfish harvest reporting areas of the Central Region.

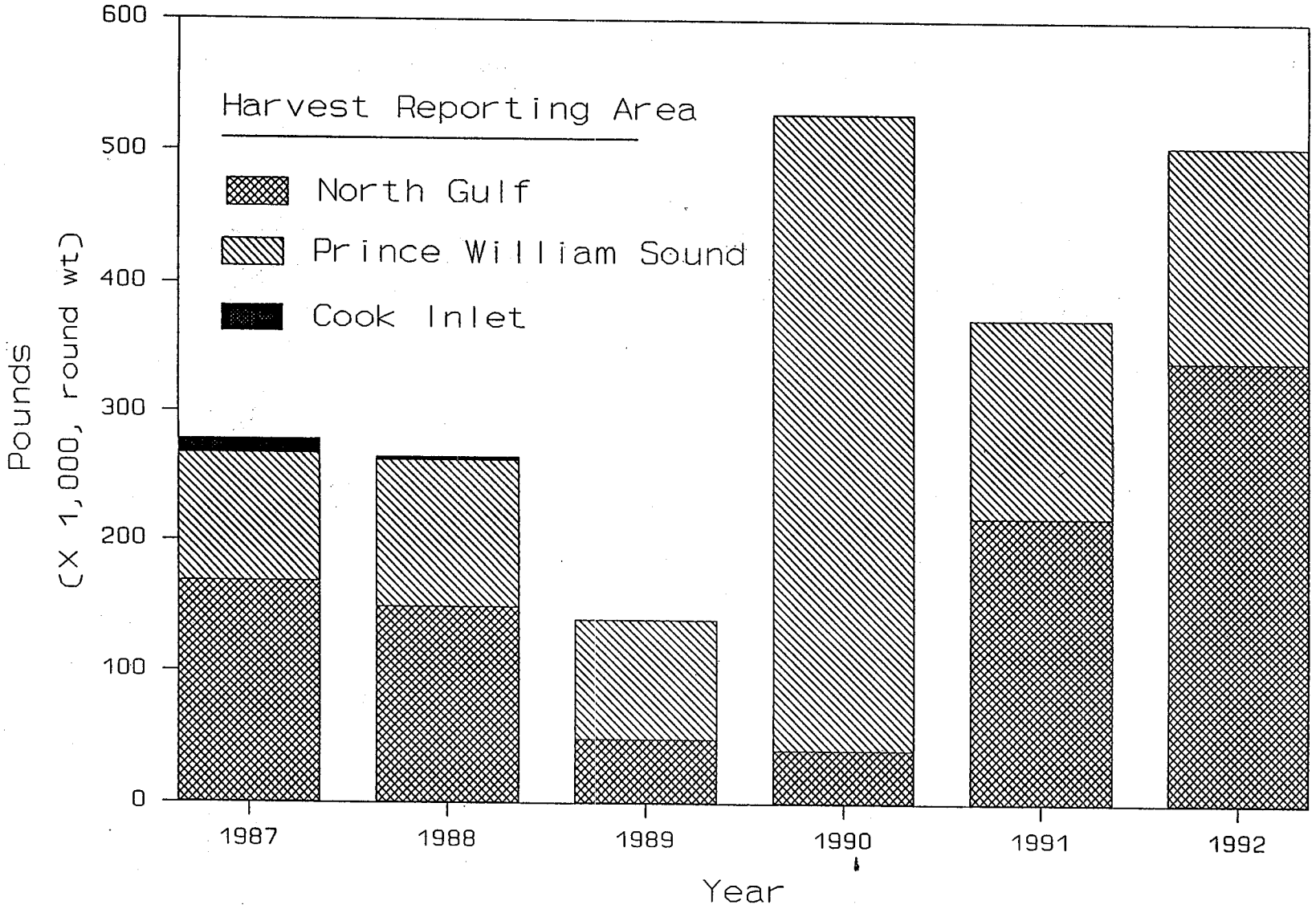


**Figure 2.** Annual commercial rockfish harvests from the North Gulf, Prince William Sound, and Cook Inlet management areas during 1987-1992.

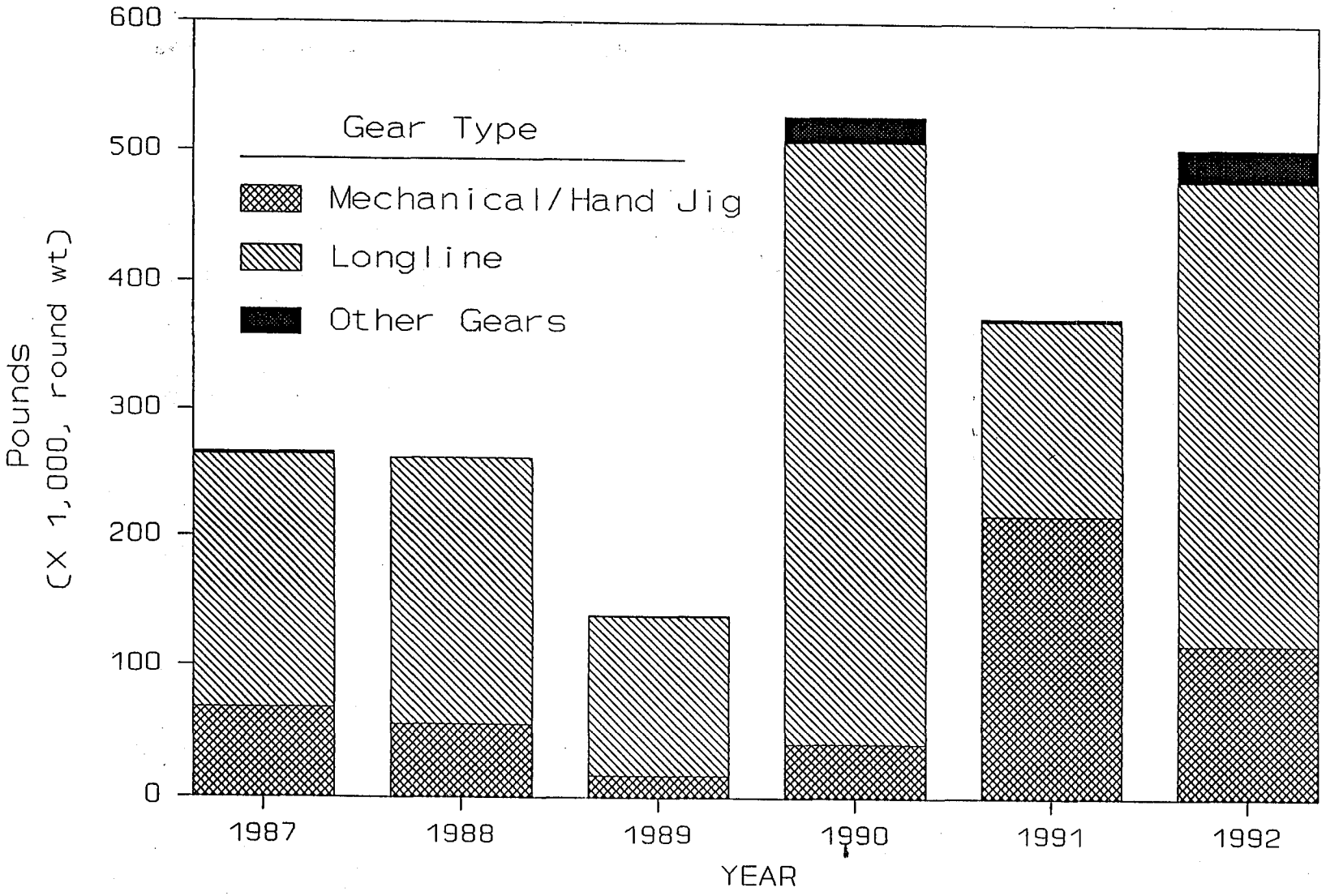


**Figure 3.** Annual commercial rockfish harvests by jig, longline, and other gears from the Central Region during 1987-1992.

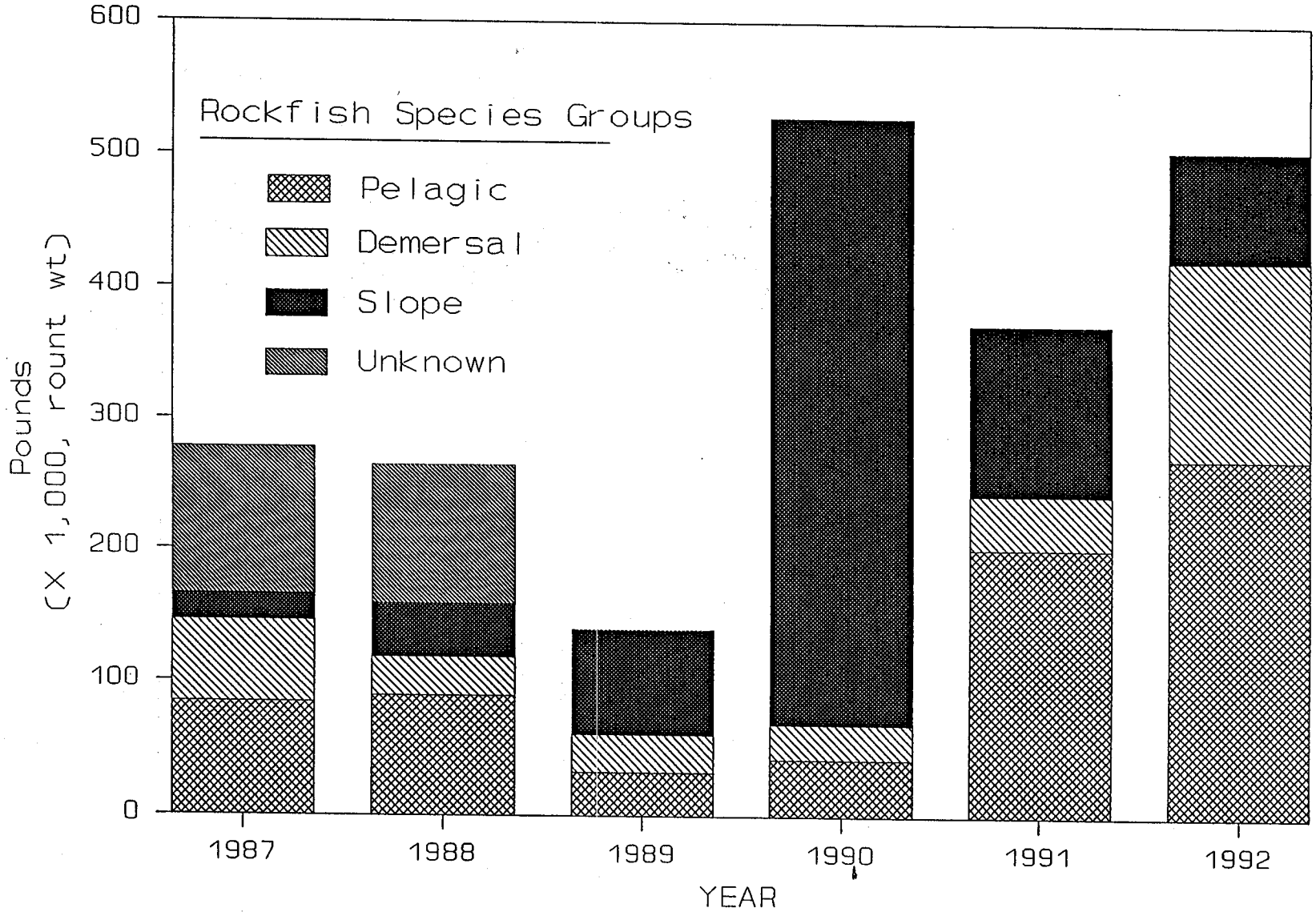


**Figure 4.** Annual commercial harvests of rockfish species groups from the Central Region during 1987-1992.

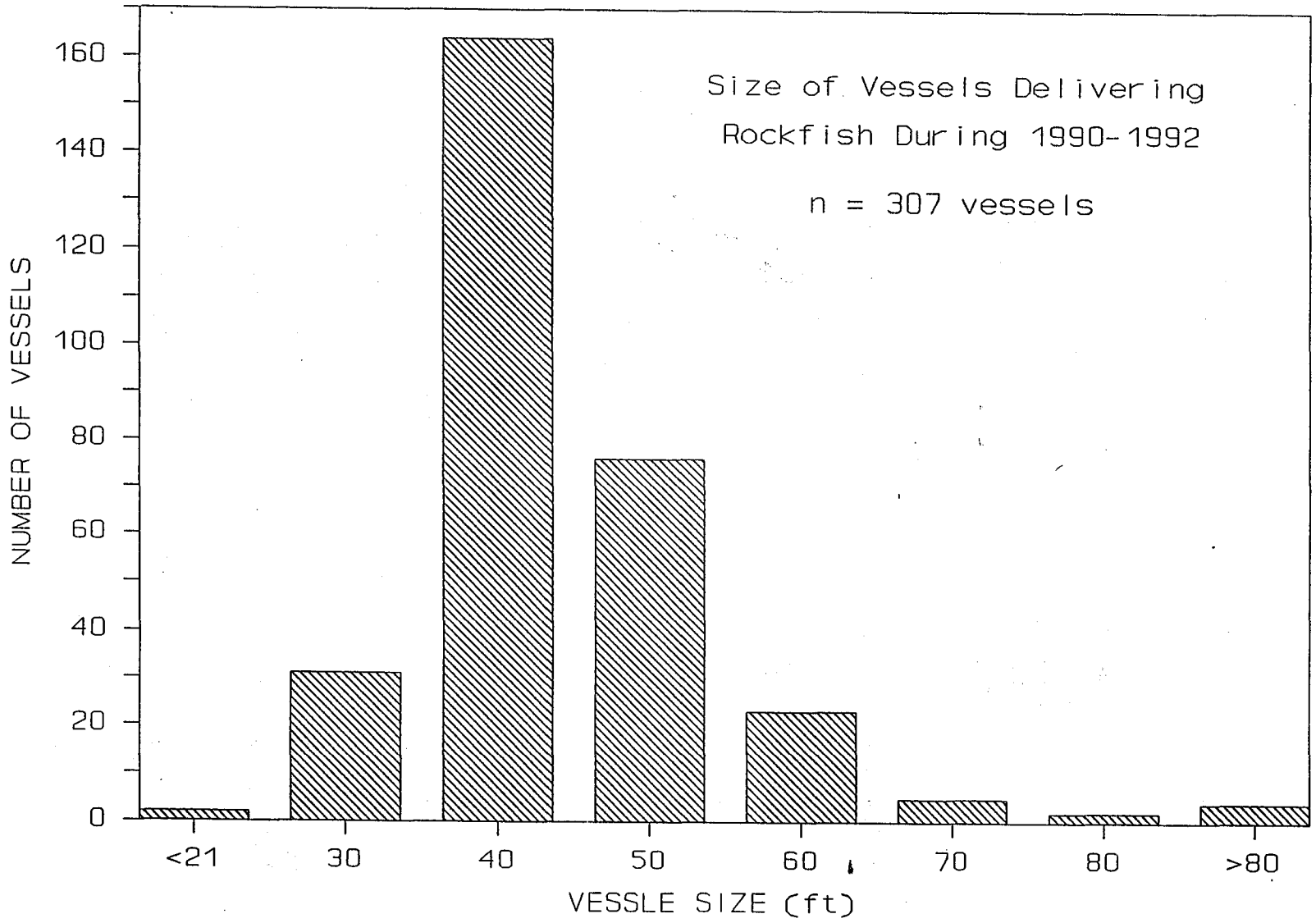


**Figure 5. Size distribution of vessels delivering rockfish from state waters of the Central Region during 1990-1992.**

**5 AAC 28.xxx. NORTH GULF COASTAL ROCKFISH MANAGEMENT PLAN.** This management plan is intended to protect and conserve the nearshore rockfish resources inhabiting the waters of Cook Inlet, Prince William Sound and the outer coast of the Kenai Peninsula, while providing for long-term sustained yield of these resources. Rockfish tend to be long-lived, slow growing, late maturing, and are thought to have very localized distributions. These characteristics make rockfish highly susceptible to over fishing. Recovery from over exploitation is long-term. With the overall goal of protecting the rockfish resources of these areas, the objectives of this plan are to: 1) stabilize harvest trends in the commercial fishery; 2) improve harvest reporting; 3) minimize wastage; and 4) provide the Department with tools to more actively manage this resource.

In the Prince William Sound Area:

- No groundfish vessel may land more than ****[1] lbs of rockfish within five consecutive days.

- When the total catch of rockfish is projected to exceed 100,000[2] lbs. for all gear types combined, the department shall close the directed fishery for rockfish and establish a bycatch limit of 20% of the gross weight of all species delivered.

In the North Gulf Coast District of the Central Gulf of Alaska Area:

- No groundfish vessel may land more than ****[1] lbs of rockfish within five consecutive days.

- When the total catch of rockfish is projected to exceed 150,000[2] lbs. for all gear types combined, the department shall close the directed fishery for rockfish and establish a bycatch limit of 20% of the gross weight of all species delivered.

In the Cook Inlet Area:

- No groundfish vessel may land more than ****[1] lbs of rockfish within five consecutive days.

- When the directed rockfish fishery is closed in the North Gulf Coast District, the department shall also close the rockfish fishery in Cook Inlet and establish a bycatch limit of 20% of the gross weight of all species delivered.

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[1] Public input is currently being solicited to determine trip limits which will provide for long-term, sustainable yield but allow economically viable commercial fisheries. The department is considering a limit within the range of 1,000-4,000 lb as acceptable.

[2] Public input is also being solicited to determine acceptable annual guideline levels which will trigger a closure of the directed rockfish fisheries and cause bycatch-only rockfish fisheries to be implemented.