

ALASKA DEPARTMENT OF FISH AND GAME  
DIVISION OF COMMERCIAL FISHERIES  
MANAGEMENT AND DEVELOPMENT

COOK INLET AREA  
ANNUAL SHELLFISH MANAGEMENT REPORT

1994-95



Regional Information Report No. 2A95-23

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
Management & Development  
333 Raspberry Road  
Anchorage, AK 99518-1599

Frank Rue - Commissioner  
Robert C. Clasby - Director of Commercial Fisheries  
Management and Development

May 1995

---

<sup>1</sup> Contribution from the Homer area office. the Regional Information Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries Management & Development.



TABLE OF CONTENTS

LIST OF TABLES.....iv

LIST OF FIGURES.....v

LIST OF APPENDICES.....vii

INTRODUCTION.....1

TANNER CRAB FISHERY.....2

    Introduction.....2

    1995 Season Summary.....6

        Southern District.....6

    1996 Season Management Outlook.....6

        Southern District.....6

        Kamishak and Barren Islands Districts.....7

        Outer and Eastern Districts.....7

KING CRAB FISHERY.....8

    Introduction.....8

    1994 Season Summary.....10

        Southern District.....10

        Kamishak Bay and Barren Islands Districts.....10

        Outer and Eastern Districts.....10

    1995 Season Management Outlook.....11

        Southern District.....11

        Kamishak Bay and Barren Islands Districts.....11

        Outer and Eastern Districts.....11

        Summary.....12

DUNGENESS CRAB FISHERY.....12

    Introduction.....12

    1994 Season Summary.....17

    1995 Management Outlook.....17

AREA H TRAWL SHRIMP FISHERY.....18

    Introduction.....18

    1994-95 Season Summary.....19

    1995-96 Management Outlook.....20

AREA G TRAWL SHRIMP FISHERY.....20

    Introduction.....20

    1994-95 Season Summary.....21

    1995-96 Management Outlook.....22

AREA H POT SHRIMP FISHERY.....22

    Introduction.....22

    1994-95 Season Summary.....23

    1995-96 Management Outlook.....24

TABLE OF CONTENTS  
(Continued)

AREA G POT SHRIMP FISHERY.....	24
Introduction.....	24
1994 Season Summary.....	25
1995 Management Outlook.....	25
SCALLOP FISHERY.....	26
Introduction.....	26
1994 Season Summary.....	28
1995 Management Outlook.....	29
HARDSHELL CLAMS AND MUSSELS.....	30
Introduction.....	30
1994 Season Summary.....	32
1995 Management Outlook.....	33
URCHINS.....	34
Introduction.....	34
1994-95 Season Summary.....	36
1995-96 Management Outlook.....	36
SEA CUCUMBERS.....	37
Introduction.....	37
1994-95 Season Summary.....	38
1995-96 Management Outlook.....	39
OCTOPUS.....	39
Introduction.....	39
1994 Season Summary.....	40
1995 Management Outlook.....	40
RAZOR CLAMS.....	41

TABLE OF CONTENTS  
(Continued)

AREA G POT SHRIMP FISHERY.....	24
Introduction.....	24
1994 Season Summary.....	25
1995 Management Outlook.....	25
SCALLOP FISHERY.....	26
Introduction.....	26
1994 Season Summary.....	28
1995 Management Outlook.....	29
HARDSHELL CLAMS AND MUSSELS.....	30
Introduction.....	30
1994 Season Summary.....	32
1995 Management Outlook.....	33
URCHINS.....	34
Introduction.....	34
1994-95 Season Summary.....	36
1995-96 Management Outlook.....	36
SEA CUCUMBERS.....	37
Introduction.....	37
1994-95 Season Summary.....	38
1995-96 Management Outlook.....	39
OCTOPUS.....	39
Introduction.....	39
1994 Season Summary.....	40
1995 Management Outlook.....	40
RAZOR CLAMS.....	41

TABLE OF CONTENTS  
(Continued)

AREA G POT SHRIMP FISHERY.....	24
Introduction.....	24
1994 Season Summary.....	25
1995 Management Outlook.....	25
SCALLOP FISHERY.....	26
Introduction.....	26
1994 Season Summary.....	28
1995 Management Outlook.....	29
HARDSHELL CLAMS AND MUSSELS.....	30
Introduction.....	30
1994 Season Summary.....	32
1995 Management Outlook.....	33
URCHINS.....	34
Introduction.....	34
1994-95 Season Summary.....	36
1995-96 Management Outlook.....	36
SEA CUCUMBERS.....	37
Introduction.....	37
1994-95 Season Summary.....	38
1995-96 Management Outlook.....	39
OCTOPUS.....	39
Introduction.....	39
1994 Season Summary.....	40
1995 Management Outlook.....	40
RAZOR CLAMS.....	41

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 Numeric listing of shellfish emergency orders, including personal use, issued for the Cook Inlet Management Area for the fisheries listed in the 1994-95 Cook Inlet Area Shellfish Annual Management Report.....	42
2 Hardshell clam harvest (pounds) by statistical area, Cook Inlet Management Area, 1994.....	44

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1 Cook Inlet Management Area.....	45
2 Cook Inlet Area ("H") and Outer Cook Inlet Area ("G") district location chart for shrimp management.....	46
3 Tanner crab catch by season, Cook Inlet Mgmt. Area, 1976-1995.....	47
4 Male Tanner crab catch, Southern District, 1994 Cook Inlet trawl survey.....	48
5 Male Tanner crab catch, Kamishak District, 1994 Cook Inlet trawl survey.....	49
6 King crab catch by season, Cook Inlet Mgmt. Area, 1960-1994.....	50
7 Dungeness crab catch by year, Cook Inlet Mgmt. Area, 1978-1994.....	51
8 Dungeness crab catch (percent) by month, Cook Inlet Mgmt. Area, 1978-1990.....	52
9 Male Dungeness catch, Southern District trawl survey, 1989-1994.....	53
10 Trawl shrimp catch by season, Kachemak Bay, Cook Inlet Mgmt. Area (H), 1969-94.....	54
11 Pandalid shrimp population est., Kachemak Bay trawl shrimp survey, Cook Inlet Management Area, 1972-94.....	55
12 Trawl shrimp catch by season, Outer Cook Inlet, Cook Inlet Mgmt. Area (G), 1977-1994.....	56
13 Pot shrimp catch by season, Kachemak Bay, Cook Inlet Mgmt. Area (H), 1970-94.....	57
14 Pot shrimp catch by season, Outer Cook Inlet, Cook Inlet Mgmt. Area (G), 1977-94.....	58
15 Weathervane scallop harvest by year, Kamishak District Cook Inlet Mgmt. Area, 1983-1994.....	59
16 Commercial catch size frequency, 1994 Kamishak District weathervane scallop fishery.....	60

LIST OF FIGURES  
(continued)

<u>Figure</u>		<u>Page</u>
17	Hardshell clam harvest, Cook Inlet Management Area, 1986-94.....	61
18	Southern District hardshell clam subdistricts.....	62
19	Green sea urchin harvest, Cook Inlet Management Area, 1987-94.....	63

LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
A Tanner crab catch (pounds) by season, Cook Inlet Management Area, 1968-95.....	64
B Average weight of Tanner crabs, by district, from the commercial fishery, Cook Inlet Management Area, 1974-1995.....	65
C Tanner crab population estimates in numbers by sex, size and age classes, 1994 Cook Inlet trawl survey.....	66
D King crab catch (pounds) by season, Cook Inlet Management Area, 1960-95.....	67
E Dungeness crab catch (pounds) by year, Cook Inlet Management Area, 1961-1994.....	68
F Dungeness commercial catch east and west of Homer Spit, Southern District, Cook Inlet Management Area, 1978-1994.....	69
G Shrimp catches (pounds) from the Kachemak Bay trawl shrimp fishery in the Cook Inlet Management Area, 1969-1994.....	70
H Trawl shrimp catches (pounds) in Outer Cook Inlet (Area G), Cook Inlet Management Area, 1977-94.....	71
I Pot shrimp harvest (pounds) Cook Inlet Management Area, Area H, 1970-94.....	72
J Pot shrimp catch (pounds) and effort in Outer Cook Inlet (Area G), Cook Inlet Management Area, 1977-94.....	73
K Pacific weathervane scallop catches, Cook Inlet Management Area, 1983-94.....	74
L Harvest (pounds) of hardshell clams, Cook Inlet Management Area, 1986-94.....	75
M Harvest (pounds) of blue mussels, Cook Inlet Management Area, 1986-94.....	76
N Green sea urchin harvest (pounds), Cook Inlet Management Area, 1987-94.....	77
O Sea cucumber catch (pounds) by permit season, Cook Inlet Management Area, 1990-94.....	78

LIST OF APPENDICES  
(continued)

<u>Appendix</u>	<u>Page</u>
P Octopus harvest (pounds) in the Cook Inlet Management Area (H) 1983-94.....	79
Q Harvest of razor clams Cook Inlet Management Area, 1919-1994.....	80

## INTRODUCTION

The Cook Inlet Management Area, Statistical Area H, is bounded on the east by the longitude of Cape Fairfield (148° 50' W. long.) and on the south by the latitude of Cape Douglas (58° 52' N. lat.). The management area is divided into six shellfish districts: Southern, Kamishak, Barren Islands, Outer, Eastern, and Central (Figure 1).

A discrete management area, Outer Cook Inlet, Statistical Area G, has been established specifically for the trawl and pot shrimp fisheries in the Outer and Eastern Districts (Figure 2). Area G has its eastern boundary at the longitude of Cape Fairfield and western boundary at a line drawn from the westernmost tip of Point Adam to the westernmost tip of Cape Elizabeth and south along 151° 53' W. longitude.

This report covers the most recent shellfish fisheries in Cook Inlet: 1994 hardshell clams, blue mussels (*Mytilus edulis*), octopus (*Octopus dofleini*), scallops (*Patinopecten caurinus*), 1994-95 green sea urchins (*Strongylocentrotus droebachiensis*), 1994-95 sea cucumbers (*Parasitichopus californicus*), 1994 razor clam (*Siliqua patula*), and the 1994-95 Area G trawl shrimp fishery. The 1994-95 seasons for Tanner crab (*Chionoecetes bairdi*), red king crab (*Paralithodes camtschaticus*), and Area H trawl and pot shrimp fisheries were closed due to low stock abundance. The catch data from the 1994 Dungeness crab (*Cancer magister*) and Area G pot shrimp fisheries are confidential. This is due to department policy making catch information confidential when the catch is taken by two or less fishermen. A summary of the Tanner crab, king crab, and shrimp stocks as well as historic fisheries are given in this report. Emergency orders affecting these fisheries are listed on Table 1.

Shellfish landings from the Cook Inlet Management Area (H) included 355,165 lb of razor clams, 44,291 lb of hardshell clams, 26,575 lb of sea cucumbers, 20,431 lb of lb of scallops, 80 lb of green urchins, 570 lb of blue mussels, and 1,064 lb of octopus. Area G trawl shrimp harvest was 34,301 lb. Area G pot shrimp harvest and Cook Inlet Dungeness are confidential because two or less fishermen participated in the respective fisheries.

The approximate exvessel value by species was \$178,000 for razor clams, \$1,300 for octopus, \$90,000 for hardshell clams (including mussels), \$27,000 for sea cucumbers, \$120,000 for scallops, \$160,000 for trawl shrimp, \$5,000 for pot shrimp, and \$25,000 for Dungeness. Value of the green urchin catch was less than \$100. Total estimated exvessel value of all shellfish species for the Cook Inlet Management Area for the 1994-95 seasons was approximately \$0.6 million.

## **TANNER CRAB FISHERY**

### **Introduction**

Tanner crab fishing has occurred in 6 of the districts in the Cook Inlet Management Area (H): Southern, Kamishak, Barren Islands, Central, Outer, and Eastern (Figure 1). Historical catch, since inception of the minimum legal size in 1976, has ranged from 285,000 lb in 1994 to 5.7 million lb in 1978-79 (Figure 3, Appendix A). The number of participating vessels has ranged from 7 in 1990 to 137 in the 1988 season. The entire management area was closed for the 1989 and 1995 season due to depressed stock conditions.

Average weight per crab from commercial deliveries has varied with time and district. The Southern District has the largest crabs with averages that have ranged from 2.30 to 2.82 lb per crab.

The Kamishak and Barren Islands Districts have had the smallest crabs with averages varying from 2.09 to 2.35 lb per crab (Appendix B) .

The Southern District is fished by both small and large vessels. The fishery occurs in the relatively protected waters of Kachemak Bay. Approximately 50 percent of the vessels do not have circulating crab tanks. The Homer and Seldovia boat harbors, home ports to most of the fleet, are no more than a 3 hour run from the geographic extremes of the district. Fishing depths range from 5 to 95 fathoms, but generally are between 30 and 65. Annual harvests have ranged from 270,000 to 2.9 million lb. The fishery was closed in both 1989, 1990 and 1995 due to depressed stock conditions. Recent vessel effort has been high with 136 boats fishing during the 1993 season and 110 boats in both the 1992 and 1994 seasons (Appendix A).

The Kamishak Bay and Barren Islands Districts are often considered one management unit, because survey, fishery, and tag recovery information show that these two districts contain a single stock of Tanner crabs. The fishery in the Kamishak and Barren Islands Districts occurs in open waters subject to severe weather and icing conditions, as well as extreme tides and seasonal ice flows from upper Cook Inlet and Kamishak Bay itself. All participating vessels have circulating sea water systems. The smallest vessels are generally 50 ft in keel length. These smaller vessels are often extremely limited in fishing time due to the weather conditions. Many fishermen generally fish around the clock; the boats jog while the gear soaks. Safe anchorage from storms is located behind Augustine Island or in Iniskin Bay. Fishing occurs in a 15 to 90 fathom depth range. Historical catch since full development of the fishery and implementation of the legal minimum size has ranged from 0.4 to 3.3 million lb. The fishery was closed in 1989, and 1992 through 1995 due to depressed stock conditions. Vessel effort has ranged from 7 to 28 boats (Appendix A).

The Outer and Eastern Districts are located in the Gulf of Alaska bordering the Prince William Sound Management Area (Statistical Area E) on the east at Cape Fairfield. Recently this fishery has occurred in or near the mouths of the many fjord like bays along the outer coast of the Kenai Peninsula; however, the exposed open waters in the Gulf of Alaska portion of these districts once provided significant portions of the catch. The fleet in these districts is characterized by both small and large vessels, the smaller boats fishing the bays and the larger vessel fishing both the bays and the open ocean. Poor weather conditions impact all of the boats because the smaller vessels must negotiate open ocean waters to reach gear placed in the bays both east and west of Seward, which is the delivery point for most of the crabs. Some crabs, however, are delivered to Homer resulting in an equally rough trip from the bays of the outer Kenai Peninsula.

This crab stock has suffered the same severe decline in abundance as the stocks as far east as Yakutat. Historical catch since implementation of the minimum legal size in 1976 has decreased from 800,000 to 50,000 lb. The fishery was closed from 1989 through 1991, and 1993 through 1995 due to depressed stock conditions. Vessel effort has ranged from 7 to 25 boats (Appendix A).

The regulatory season for the entire management area is from January 15 through March 31. The season may be terminated earlier by emergency order. The opening date of January 15 was first implemented in 1987. The season opening was November 1 from the periods 1983 to 1986 and 1972 to 1974. The opening was December 1 from 1974 to 1983. The season for the Southern District fishery may be delayed if weather conditions indicate potential damage to exposed crabs.

In the Southern and Kamishak/Barren Islands Districts the emergency order is utilized to close the fishery once the guideline harvest level is achieved. The Outer and Eastern Districts close based on

decline in catch per unit of effort (CPUE), termination of a fixed period of time, or by regulation on March 31.

The Department has tagged Tanner crabs for a number of years in the Southern, Kamishak Bay, and Barren Islands Districts. Thus far there has been no interchange of legal males between the Southern District and the Kamishak/Barren Islands; however, tag recovery has indicated the Kamishak Bay and Barren Islands Districts' Tanner crabs are one stock. Furthermore the legal males tagged in these two districts have been captured in Kodiak's North Mainland Section, but only on a regular basis as far south as Douglas Reef, which is approximately 5 mi south of Cape Douglas (Figure 1).

Regulations distinctive to the Cook Inlet commercial Tanner crab fishery are:

- 1) Superexclusive registration.
- 2) Registration prior to the season opening.
- 3) Gear storage in the Kamishak and Southern Districts in 15 fathoms or less, except in the eastern portion of the Southern District where it is 10 fathoms or less.
- 4) A 40 pot limit in the Southern District if the guideline harvest level is less than 800,000 lb. A 75 pot limit if it is more.
- 5) Buoy identification tags are required in the Southern District to assist with the pot limit enforcement.
- 6) A requirement for two 4 3/4 in escape rings on all gear.

### 1995 Season Summary

Due to continued low stock abundance the entire Cook Inlet Management Area was not opened to commercial Tanner crab fishing in 1995.

#### Southern District

The 1994 department Tanner crab trawl survey in the Southern District indicated that recruitment did not justify a commercial harvest for the 1995 season. Recruitment into the legal segment of the stock was 66,000 crabs. The recruits coupled with the 121,000 post recruits that survived the 1994 fishery, yielded a total legal male estimate of 187,000 crabs. The adult male (both legal and sublegal) estimate was 325,000 animals which is below the 395,000 adult male minimum threshold that would justify consideration of a commercial fishery.

### 1996 Season Management Outlook

#### Southern District

The Department will conduct a trawl survey for Tanner crabs during 1995 in the Southern, Kamishak Bay, and Barren Islands Districts. The results of this survey will determine the status of the 1996 seasons in the respective districts.

The number of prerecruit ones caught in the 1994 trawl survey in the Southern District indicates that 1995 recruitment will be poor (Figure 4). It likely will be below the level of the last 5 years. The 1994 prerecruit one estimate is less than the 1993 prerecruit one level, which did not provide sufficient recruitment in 1994 to justify a fishery in 1995.

### Kamishak and Barren Islands Districts

Two separate data sources indicate that the stock is recovering in the Kamishak and Barren Islands Districts: 1) the 1994 trawls survey catches of prerecruit ones, twos, and threes was the highest since inception of the survey; and 2) crab bycatch in the scallop fishery was substantially higher than in previous years.

A negative characteristic of the stock of Tanners in the Kamsishak/Barren Islands Districts is skipmolting in the prerecruit one size class and, to a lesser extent, the prerecruit two size class. It appears that once these animals skip a molt, the likelihood of them molting again is very small. Therefore, the documented buildup of old shell (skipmolt) crabs will not produce any future recruitment into the fishery, but will instead remain as sublegals until succumbing to natural mortality (Figure 5 and Appendix C). As a result of the aforementioned skipmolting, the 917,000 crab estimate of prerecruit ones may fall far short of translating into 917,000 recruits in 1995. Over time, survey data will allow estimates of skipmolting in the sublegal size classes. For 1995, however, management experience dictates an estimated recruitment of no more than 450,000 crabs, or 50 percent of the current prerecruit ones.

### Outer and Eastern Districts

Although the Department does not survey in the Outer, Eastern, and Central Districts, stocks here have been depressed similar to those in the adjacent Gulf waters of the Prince William Sound Management Area and Kodiak District. Some commercial pot cod and recreational pot fishermen have reported a recent increase of small Tanner crabs in their gear in 1994. This may be an indicator of a recovery similar to the one identified by the department's trawl survey in the Kamishak District. Although the aforementioned qualitative

data are of value, surveys in the remainder of Cook Inlet, as well as adjacent management areas, Prince Williams Sound and Kodiak, will continue to be utilized to estimate the conditions of the stocks in the Outer, Eastern, and Central Districts. If 1995 recruitment justifies a commercial fishery in the Kamishak and Barren Islands Districts for 1996, then the Outer and Eastern Districts will likely be opened as well. If this occurs, the fishery will be managed based on a fixed period of time, probably 30 days, as opposed to a harvest guideline, which is the strategy used for districts where trawl surveys generate population estimates. The ultimate season length will depend on anticipated effort.

In summation, there is a limited chance of a 1996 fishery in the Kamishak, Barren Islands, Outer, and Eastern Districts. Survey data, however, indicate a very small probability of a fishery in the Southern District. All 1995 department surveys from Cook Inlet and adjacent areas will be reviewed prior to final determination of the 1996 season.

## KING CRAB FISHERY

### Introduction

There are two species of king crabs found in the Cook Inlet Management Area (H), red and brown (Lithodes aequispina). Red is the dominant species with brown found only in a scattered distribution in the outer portion of the management area in the Gulf of Alaska. Most of the red king crab fishery has occurred either in the Southern District or the Kamishak/Barren Islands Districts. Very little catch has come from the Outer District and none has been documented from the Eastern District (Figure 1).

Earliest recorded commercial landings of king crab occurred in 1937 when crabs were canned at a Halibut Cove packing facility. Commercial fishing for this species remained at a relatively low level through the 1940's. By the mid-1950's harvest levels rose to approximately 2.0 million lb per year. During the 1960's fishing expanded to the Kamishak Bay District and boats were harvesting up to 8 million lb per year. In 1964-65 a significant drop in catch occurred in the Kamishak District primarily due to lack of processing facilities in the Seldovia area which was a result of earthquake damage in 1964. From the late 1960's through 1976 the seasonal catches ranged from 2.5 to 4.8 million lb. Since that time catches have generally declined (Figure 6 and Appendix D). The commercial fishery has been closed due to low abundance since the 1981-82 season in the Southern District and the 1983-84 season in the Kamishak/Barren Islands Districts.

The current season opens by regulation on August 1. From 1983 to 1987 the season opening date was July 15. Prior to 1983 the season opened on August 1.

The minimum legal size for all species of king crabs is 7.0 in carapace width with a provision for an 8.0 in season. The 8.0 in season, which may be opened and closed by emergency order, has been in effect since 1976. It was used during the 1976-77 season in all districts and during the 1977-78 season in the Kamishak/Barren Islands Districts only. The 7.0 in minimum legal size has been in effect since 1963.

Cook Inlet is a superexclusive registration area for king crab. The current pot limit is 75 if the management area guideline harvest level is greater than 1.5 million lb. If the guideline is less than 1.5 million, then the pot limit is 40. Similar to the Tanner crab fishery, there is a buoy tag requirement accompanying the pot limit.

## 1994 Season Summary

### Southern District

No king crab harvest has been allowed in the Southern District since the 1981-82 season. Extreme low abundance as well as heavy infestation of egg predators in the female clutches necessitated maximum protection of the stock. Although the incidence of egg parasitism seems to have abated; the overall measurable abundance of king crabs remains very low.

### Kamishak Bay and Barren Islands Districts

The Kamishak/Barren Islands Districts were first closed to commercial fishing due to low abundance prior to the 1984-85 season. The commercial fishery has remained closed through 1994.

The 1994 trawl survey catch of king crabs indicated a continued depressed stock. Similar to the Southern District, the stock of king crabs in the Kamishak/Barren Islands Districts was characterized by weak recruitment.

### Outer and Eastern Districts

Brown king crabs have never been found in high concentrations in the Outer and Eastern Districts. Regulatory fishing for brown king crabs was authorized, via commissioner's permit, coincidental to the Tanner crab season in the Outer and Eastern Districts in 1988. No catch occurred due to lack of abundance of this species. Two vessels received brown king crab permits incidental to the 1992 commercial Tanner crab fishery in the Outer and Eastern Districts. Neither vessel delivered brown king crabs.

## 1995 SEASON MANAGEMENT OUTLOOK

### Southern District

The department will conduct its annual Southern District king and Tanner crab trawl survey in July of 1995. It is improbable that the results from this assessment will indicate any significant increase in the legal segment of the stock, thereby justifying opening of the commercial, sport, and personal use fisheries.

### Kamishak Bay and Barren Islands Districts

The number of prerecruits caught in recent surveys does not indicate that recruitment will justify an opening of the commercial fishery in 1995. The Department will conduct the 1995 trawl survey in mid June.

There will be no further effort to justify an 8.0 in king crab season as provided for by regulation since research on the reproductive capabilities of male king crabs, conducted by the Institute of Marine Science in Seward, indicates that the large males are more important to the brood stock than small males. Although large skip molt males may appear to be too old to mate, the only conclusive method to determine breeding capability is examination of the gonads, which can only be achieved by killing the crab.

### Outer and Eastern Districts

These districts will remain closed to the harvest of red king crabs until the overall stock in the remainder of the Cook Inlet

Management Area recovers. Permits for brown king crab will be issued only if the Tanner crab season is opened.

### Summary

The condition of the red king crab stock in the Cook Inlet Management Area remains severely depressed. Although the fecundity of the females has improved since the 1980's when parasites infested the egg masses, the overall number of catchable crabs continues at historic lows. It does not appear that a commercial, sport, or personal use fishery is likely to occur at least for another three to four years, or more.

## DUNGENESS CRAB FISHERY

### Introduction

The majority of the commercial, sport, and personal use Dungeness crab fishing in Cook Inlet has occurred in the Southern District which includes Kachemak Bay (Figure 1). A small amount of crabs have been harvested in the Central and Kamishak Districts. During the 1960's and early 70's commercial catch and effort were usually not a function of resource abundance; the harvest instead was a result of opportune market conditions created by fluctuation in the catches from the west coast Dungeness crab fisheries.

Although low level, sporadic effort has occurred since statehood, catch and effort first increased significantly in 1978 when 1.2 million lb were taken by 49 vessels. Subsequently favorable market conditions and the need of fishermen to find alternative fisheries have kept effort high. Since 1978 annual harvests have ranged from a low of 29,502 lb in 1990 to a high of 2.1 million lb in 1979.

The commercial fishery has been closed in the Southern District from 1991 through 1994 due to low overall abundance. The average annual harvest for the entire management area since 1978 was 1.01 million lb (Figure 7). Effort has ranged from 1 vessel in 1993 and 1994 to 108 vessels in 1982 (Appendix E). After 1978, 92 percent of the crabs were harvested between the months of June and October (Figure 8), and 59 percent of the annual harvest was taken from the waters east of Homer Spit; however the proportion changed considerably on an annual basis, which was a result of varying recruitment between the waters east and west of the Spit (Appendix F).

Ninety percent or more of the Dungeness fleet were residents of Kachemak Bay communities of Homer and Seldovia. The fishing vessels were in the 40 ft and less size class. Smaller vessels without circulating tanks generally fished the waters east of Homer Spit while larger vessels with circulating tanks fished the deeper somewhat rougher waters west of the Spit.

The 1994 Board of Fisheries substantially changed the regulatory structure used to manage the Southern District as well as the remainder of the Cook Inlet Management Area commercial Dungeness crab fishery. A summary of these regulations is as follows:

- 1) The Southern District was divided into two subdistricts: Subdistrict 1 which includes the waters east of Homer Spit, and Subdistrict 2 which includes the waters west of Homer Spit.
- 2) Commercial fishing seasons and depth limitations for the Southern District as follows:
  - A) Subdistrict 1 is open August 1 through August 31 in waters of 10 fathoms or less only.

- B) Subdistrict 2 is open from July 15 through August 31 in waters of 40 fathoms or less only.
- 3) The season for the remaining districts of the Cook Inlet Management Area is June 1 through December 31, and from January 15, or the beginning of the commercial Tanner crab season, whichever is later, through March 15.
- 4) Pot limits with a buoy tag and color code requirement were established as follows:
  - A) Southern District: 150 pots.
    - 1) Subdistrict 1: 50 pots which are included in the overall district limit of 150 pots.
- 5) Dungeness crab line cannot be floating on the water surface unless it is the line connecting the main buoy to the auxillary buoy.

Statewide biological regulations for the commercial Dungeness fisheries consist of a males only harvest and a minimum legal size of 6.5 in carapace width. Gear regulations include a provision for two  $4 \frac{3}{8}$  in escape rings per pot and a biodegradable twine escape mechanism requirement.

Historically the Cook Inlet Dungeness fishery evolved into a summer event for the following reasons:

- 1) Salmon fishermen are occupied with salmon fishing, thus creating a niche for fishermen who do not hold permits for limited entry fisheries.
- 2) The weather is better.

- 3) The catcher/seller sales to the tourist industry are at their peak.
- 4) Recruitment (the molt) occurs.

Some level of fishing had occurred throughout the year. Catch and effort, however, increase significantly after the major molt, which provides new recruit crabs. The period of significant molting for adult males in Kachemak Bay can occur from late April through mid-September in any given year although the peak months are June and July. The molt is stimulated by water temperature and physiological condition of the crabs. The inconsistency in molt timing between years is partially explained by the significant annual spring-summer temperature variation in the shallower north temperate and subarctic waters of Alaska.

Within Kachemak Bay itself, molting generally occurs somewhat earlier in the waters east of Homer Spit than in the waters west of the Spit where the influence of Cook Inlet proper is much greater. Newly molted legal crabs are often caught east of Homer Spit one month or more before appearing in the gear west of the Spit. Crabs east of Homer Spit are most likely resident from the first post-larval instar up to legal size. Those legal crabs captured west of the Spit, however, may actually be reared as juveniles in the waters of Cook Inlet north of Anchor Point. Catches of small crabs by upper Cook Inlet salmon set netters and casual observations of molted exoskeletons by the general public indicate significant numbers of Dungeness reside in upper Cook Inlet.

Outside of natural population fluctuations, three fishing related factors have had a notable negative impact on this fishery:

- 1) Depression of the stock due to handling and trapping mortality that was the result of fishing during and immediately after the molting period.

- 2) Extremely high effort due to ease of access by both commercial and recreational fishermen.
- 3) Violation of the 150 pot limit by a portion of the fleet.

The combination of extended heavy fishing pressure, and fishing during and immediately after the major molting period for adult males has played the most significant part in the recent sharp decline in the Dungeness crab harvest. Mortalities associated with handling and trapping may not have been significant during the 1960's and early 70's when effort levels were low and stock abundance was high; however, since then the level of fishing accelerated not only in amount of vessels and pots, but also in the amount of time each year that the gear was deployed.

In 1990 the department began a survey to further document the molt timing of the catchable Dungeness crabs and to establish an index of abundance. This survey in tandem with the crab trawl survey indicated one or two significant year classes moving toward the fishery (Figure 9). Although these animals appear numerous, particularly when compared to the surrounding weak year classes, the following must be weighed when considering the magnitude of this group of crabs: 1) the crabs were only located in the portion of Kachemak Bay east of Homer Spit, and 2) they exhibited an extremely high level (approximately 50 percent) of skipmolting in 1992 and 1993, the years when they should have fully recruited into the fishery and provided significant numbers of both recruits and postrecruits available for harvest. These animals are now passing through the end of their life cycle as evidence by both a decline in the department's survey catches and harvest by recreational fishermen.

Considering the aforementioned two points and the absence of any other significant catchable year classes, the stock remains in a condition that will not tolerate a high level of fishing mortality

given that a substantial degree of reproductive success is necessary to take full advantage of the remnants of this once relatively large group of adult crabs in the upper portion of Kachemak Bay.

#### 1994 Season Summary

The commercial fishery was not opened in the Southern District (Kachemak Bay) in 1994 due to: 1) a relatively low number of legal males, and 2) the necessity to protect the remaining non-legal catchable crabs in the district from handling and trapping mortality.

Limited entry was adopted into the Cook Inlet Management Area Commercial Dungeness Fishery in 1993. The limit was set at 103 pot fishermen and 2 ring net fishermen. Limiting entry to this large number of participants will be of no inseason management value.

#### 1995 Management Outlook

The department will begin the 1995 Dungeness pot survey in late May 1995. The survey will be conducted on at least a monthly basis. The commercial fishery will remain closed until department surveys signify that sufficient recruitment into the adult and legal segments of the stock have occurred.

The commercial season in the remaining districts of the management area will be open in 1995. The only district likely to see any effort is the Central District which is in central Cook Inlet north of the Southern District. Although there are crabs resident at least part of the year in this area, fishing effort has been light as it is a difficult location to retrieve gear due to the tidal action and nature of the general outflow of Cook Inlet.

## AREA H TRAWL SHRIMP FISHERY

### Introduction

Cook Inlet is separated into two shrimp registration areas: Area H, which includes the Southern, Kamishak, and Barren Islands Districts; and Area G, which includes the Outer and Eastern Districts (Figure 2).

All of the commercial trawl shrimp fisheries in Area H have occurred in the Southern District. Harvests reached the 5 million lb level in the late 1960's and remained near that point through the early 1980's (Figure 10 and Appendix G). Low stock abundance resulted in partial closures of the fishery during the mid-1980's and total closure beginning in the fall of 1986. Effort has varied from a low of one vessel during 1968 to a high of 23 in 1981. Prior to 1983, most commercial fishing occurred west of Homer Spit, but between 1983 and 1986 virtually all effort shifted to the area east of Homer Spit. The fishery has been closed from 1986 through 1994.

The Southern District (Kachemak Bay) trawl shrimp fishery is characterized by superexclusive registration and management under the Kachemak Bay Trawl Shrimp Management Plan. This plan has three basic features:

- 1) An annual guideline harvest level determined from stock assessment surveys.
- 2) Annual harvest spread out over the entire fishing season utilizing three separate regulatory sub-seasons.
- 3) Subseason harvest spread out in equal weekly guideline harvests.

Also, 2 areas are closed to trawl shrimp fishing: the first includes the majority of upper Kachemak Bay east of Homer Spit, originally established because this area consistently contained small, juvenile pink shrimp; the second includes Tutka Bay and Sadie Cove, established because the area encompassed by these bays lent itself to the potential of overharvest.

Pink shrimp (Pandalus borealis) historically made up the bulk of the commercial harvest, with sidestripes (Pandalopsis dispar) seasonally making up a smaller but often significant portion of the catch. Humpy shrimp (Pandalus goniurus) have at times comprised up to half of the harvest, but this species appears to undergo erratic population fluctuations; contributions to the most recent fisheries have been negligible. Coonstripe shrimp (P. hypsinotus) consistently made up less than 5 percent of the catch.

Trawl shrimp surveys have been conducted in Kachemak Bay since 1971. These surveys, which determine each season's guideline harvest level, have indicated significant declines in abundance and distribution of all pandalid shrimp stocks in Kachemak Bay since the late 1970's (Figure 11). These declines led to the aforementioned commercial closures from 1986 to 1994.

#### **1994-95 Season Summary**

The fishery remained closed for the 1994-95 season based on the results of the 1993 department trawl shrimp survey. The 120,000 lb population estimate generated by the survey documented the smallest population of pandalid shrimp since the inception of the survey (Figure 12). To put these survey data into perspective: the commercial fishery averaged over five million lb annual harvest during its peak, the 1993 population estimate of 120,000 lb is two percent of that peak. Despite some shift in size composition and distribution, all information collected during this survey

indicated that the stocks remained depressed by historical standards. Based on the results of the 1993 survey, the commercial fishery was closed for the entire 1993-94 season. To reduce operational costs, the department did not conduct a survey in 1994. There were no data from the 1993 survey that indicated potential growth and recruitment to justify a fishery in 1994-95.

### 1995-96 Management Outlook

The department will conduct the Southern District trawl shrimp survey during May-June, 1995. Results from this assessment will determine management for the 1995-96 season.

## AREA G TRAWL SHRIMP FISHERY

### Introduction

Area G is a nonexclusive shrimp registration area encompassing the Outer and Eastern Districts of Cook Inlet (Figure 2). The first year of significant harvest occurred in the 1982-83 season when four vessels caught 239,584 lb (Figure 12 and Appendix H). The catch increased steadily for the next two seasons to a peak harvest of just under 2.0 million lb taken by 11 vessels during the 1984-85 season. Before 1992, pink shrimp comprised 90 percent of the harvests; the remaining 10 percent was sidestripes. Trawl CPUE was never high, rarely approaching 1,000 lb per hour. Logbook information collected over time indicates that fishermen in Area G made long tows, often with extremely low catch results. From 1992 through 1994 the catch was comprised entirely of sidestripes as the vessels targeted on these more valuable animals. Once again, long tows and low CPUE were characteristic of this fishery.

Prior to 1985, the season for shrimp trawling in Area G was open year-round. A regulatory season, beginning June 1 and ending February 28, was adopted by the Board for Area G in the spring of 1985.

#### 1994-95 Season Summary

The Area G season opened by regulation on June 1, 1994 and closed by emergency order in two parts: Eastern District closed on July 21, 1994, and the Outer District closed on August 12, 1994. The catch of 34,301 lb (includes 1,710 lb deadloss) was taken by 3 boats based out of Seward. Catch by district was: Outer - confidential, and Eastern - 25,979 lb. The entire catch was sidestripe shrimp.

In order to avoid overfishing of the sidestripe shrimp stock, the department set a 1994 harvest guideline for each district which was equal to the 1993 harvest which in turn was the estimated sidestripe bycatch from the directed pink shrimp fishery that occurred in Area G during the mid 1980's. These harvest levels were 100,000 lb of whole sidestripes per district. The department collected inseason logbooks, fisherman interviews, and catch samples.

Fishing began by regulation on June 1 in the Eastern District, mainly in Resurrection Bay. Catch per unit of effort dropped sharply from the 1993 level of 150 lb per hr. to a 1994 level of 33 lb per hr. Distribution of shrimp catches did not change from 1993. Although some of the decline in catch per unit of effort may have been a function of size selection by the fishermen, the decline was severe enough to justify a closure on July 21, 1994. Sorting of unretained small shrimp was also a factor considered in closure justification.

The season remained open in the Outer District to allow interested fishermen an opportunity to pursue the fishery. A single vessel fished virtually every bay in the district. Although catch data from this vessel are confidential, circumstances of the fishery were identical to that of the Eastern District: high percentage catch of small shrimp and unknown bycatch mortality of these animals. As a result the season in the Outer District was closed on August 12, 1994.

### **1995-96 Management Outlook**

Initial guideline harvest levels for the 1995-96 season will be set from 0 to 100,000 lb per district, or 0 to 200,000 lb for Area G. Natural and fishery induced fluctuations in sidestripe stock abundance remain poorly understood in the Outer and Eastern Districts. The presence of small shrimp in the bycatch from the 1994 fishery may indicate opportunity for recruitment this year. The recruitment however assumes substantial growth and survival; at this time, two unknown factors. The guideline harvest range is therefore set broadly at 0 to 100,000 lb per district. Fishery performance and dockside samples will again be significant factors in determining the status of the stock and ultimate management.

## **AREA H POT SHRIMP FISHERY**

### **Introduction**

Similar to trawl shrimp, the Cook Inlet Management Area is separated into two distinct registration areas for the pot shrimp fishery: Area H, consisting of the Southern, Kamishak, and Barren Islands Districts; and Area G, consisting of the Outer and Eastern

Districts (Figure 2). Historically the major pot shrimp fishery occurred in the Southern District.

Commercial catch figures show that the fishery suffered steep declines in annual harvest until the closure in 1988 (Figure 13 and Appendix I). Pot shrimp fishing in Kachemak Bay was primarily undertaken by small vessel fishermen that develop their own markets. The target species is the coonstripe shrimp, the most abundant pot caught shrimp in Kachemak Bay. Spot shrimp (Pandalus platyceros) also occur in the bay but their contribution to the fishery is generally negligible. Each regulatory fishing season, which began June 1 and ended March 31, was managed via three separate subseasons with appropriate guideline harvest levels set for each subseason.

Prior to 1986, guideline harvest levels were determined by the Department's two annual pot shrimp surveys as well as by voluntary commercial fishery performance information. All pot shrimp surveys were subsequently eliminated in the Cook Inlet Area. Fishery performance data in the form of voluntary logbooks were collected consistently during 1986 and 1987 and were the sole criteria used to judge stock status during those years. The department trawl surveys and information from local personal use fishermen continued to indicate that stock of coonstripe shrimp in Kachemak Bay was depressed. The fishery has been closed to commercial harvest since 1988.

#### 1994-95 Season Summary

To determine the status of the coonstripe shrimp stock the department relies on data obtained from the trawl shrimp surveys and voluntary information from personal use fishermen. The 1993 trawl survey indicated a population estimate of less than 20,000 lb of coonstripe shrimp for Kachemak Bay. These results showed a

depressed stock when compared to historical survey catches that generated population estimates up to 1.0 million lb. Furthermore, voluntary information offered by personal use fishermen since 1988 has indicated very poor catches when compared to historical averages.

The aforementioned trawl survey and personal use fishery information demonstrated that the coonstripe stock in Kachemak Bay remained depressed, therefore the fishery was closed by emergency order for both the 1993-94 and 1994-95 season.

### **1995-96 Management Outlook**

All information collected during 1993 and 1994 indicated that stocks of pandalid shrimp continue to be depressed in Kachemak Bay. Pending the results of the May 1995 shrimp trawl survey, the fishery will remain closed for the entire 1995-96 fishing season in order to promote growth, recruitment, and reproduction in the coonstripe shrimp stock.

## **AREA G POT SHRIMP FISHERY**

### **Introduction**

Similar to the trawl shrimp fishery, Area G, or Outer Cook Inlet, includes the Outer and Eastern Districts (Figure 2). Currently there are neither season restrictions nor biological regulations governing the pot shrimp fishery. The target species is the spot shrimp; coonstripes and pinks are harvested to a lesser extent. Spot shrimp have comprised 57 to 94 percent of the catch averaging 83 percent. Since 1977, catch and effort have remained low, never exceeding a reported annual harvest of 20,500 lb whole shrimp

caught by 8 participating vessels in 1989 (Figure 14 and Appendix J). Despite the extensive coastal area, historical information collected from this fishery indicates that the measurable stocks of spot and coonstripe shrimp occur within some (but not all) bays and are of limited abundance.

#### **1994 Season Summary**

The commercial season was open by regulation for the entire 1994 calendar year. Catch data are confidential because only 1 fisherman reported commercial harvest. This fisherman reported to the department that catches in normally fished locations were as poor as he has ever seen.

#### **1995 Management Outlook**

The fishery will open by regulation. Fish ticket and voluntary fisherman interview information are the only sources of data used to evaluate the Area G pot shrimp fishery. This information will be evaluated inseason to determine if any restrictive management action is necessary.

Effective January 1, 1996, all commercial pots will be required to be partly constructed of rigid mesh which must have 7/8ths inch diameter openings. This regulation is designed to reduce handling of small non-marketable shrimp thereby decreasing avoidable fishing mortality. Similar regulations are utilized in the Prince William Sound Management Area, Southeast region, and State of Washington.

## SCALLOP FISHERY

### Introduction

The commercial scallop fishery in the Cook Inlet Management Area (H) began in 1983. The target species for the fishery is the Pacific weathervane scallop (Patinopecten caurinus). In 1983 and 1984, the Alaska Board of Fisheries responded to a public proposal by directing the department to allow restricted exploratory fisheries for scallops. These initial fisheries were characterized by low effort due to severe permit restrictions when compared with traditional scallop fisheries both inside and outside Alaska. The most important restrictions were:

- 1) Legal gear limited to a 6 foot wide dredge with minimum ring size of 4 inches inside diameter.
- 2) Only one unit of gear allowed on board at any one time.
- 3) Mandatory log book completion.
- 4) Contact with the Homer office prior to and at the completion of each trip.
- 5) An agreement to carry department observers on board if requested.

Except for some brief exploratory fishing elsewhere in the Kamishak District in 1984 and in the Outer District in 1987, a single bed of scallops near Augustine Island in the Kamishak District has sustained almost the entire harvest since the fishery began in 1983 (Figure 1). Using the state research vessel Pandalus, the department conducted an assessment survey in August, 1984 to define

the extent of this particular bed and to aid in establishing appropriate harvest levels.

Based on information from the 1984 survey as well as data from the initial fisheries, the 1985 Board of Fisheries adopted regulations for scallops in Cook Inlet. These regulations included a season in the Kamishak District from August 15 through October 31, a guideline harvest level of 10,000 to 20,000 lb (changed to 0 to 20,000 lb in 1994) of shucked meats, and the restrictions mentioned previously. Commercial fishery performance has been used inseason to adjust guideline harvest levels. Historic harvest and effort peaked fishery during 1994 when 4 vessels took 20,431 lb of shucked meats (Figure 15 and Appendix K).

By regulation the Southern District was not open to scallop fishing in order to protect crab stocks, while the Outer and Eastern Districts were opened year round to encourage exploratory fishing.

In 1987 review of inseason fishery performance data clearly demonstrated that the Kamishak District stock had taken an unexpected decline. Substantial undocumented information indicated that the Kamishak scallop bed had been fished illegally between the 1986 and 1987 seasons. Regardless of the reason for the sharp decline in abundance, the department closed the fishery.

No commercial effort occurred in Cook Inlet from 1988 through 1992. Although some local fishermen expressed interest in fishing during these years, the potential of a fishery closure after 1 trip did not warrant the investment in time and effort because the department told fishermen that their catch data would be used to justify continuance of the fishery. Fishermen speculated that the probability of good catches were low. Information required of the fishermen would have included logbooks, shell samples, interviews, and a potential for observers.

In 1993 the fishery was essentially redeveloped when a single fisherman took a chance and began fishing the Kamishak District scallops. After his initial trip it was apparent that the stock had recovered to near historic levels. Two other boats joined the fishery before the season was over. The resultant catch was 20,115 lb. Logbooks and shell samples indicated a small but healthy stock of weathervane scallops once again existed near Augustine Island.

### 1994 Season Summary

Four vessels registered for the 1994 Kamishak District fishery. The fishery opened by regulation on August 15 and closed by emergency order on September 5, a period of 21 days. The final harvest was 20,431 lb of scallop meats taken by 4 boats that made 11 deliveries. The entire catch was delivered to Homer for fresh market sales.

The department monitored the fishery via mandatory logbooks, shell samples, skipper interviews, and a trip by a staff biologist aboard one of the vessels. Interviews occurred at the end of each trip. Catch per unit of effort data (CPUE) and shell samples indicated that this stock of scallops compared favorably to the density and distribution of the stock prior to the decline in 1987, which was due to illegal fishing. The 1994 CPUE of 44.6 lb per hour towed compared favorably to the 1993 average of 38.1 lb per hour, and to the 1985 and 1986 CPUE of 39.5 and 36.2 lb per hour towed, respectively. Shell sampling indicated that age classes 7 through 11 provided the bulk of the animals for the fishery (Figure 16).

Crab bycatch limits were set at 29,000 Tanners and 60 king crabs. These limits were a function of 1/2 of 1 percent of the 1994 crab population estimate which was based on the 1994 department trawl survey. Actual bycatch from the 1994 Kamishak District scallop

fishery was 13,296 Tanner and 42 king crabs. Bycatch data collected directly by the department observer verified the logbook bycatch documentation from trips where no observer was present. Tanner bycatch jumped substantially from the 1993 level when 1,802 Tanners were caught. This was a direct result of the recovery of the Kamishak Tanner crab stock, which was documented by the department's 1994 crab/groundfish trawl survey.

Only 1 documented landing from the open waters of the Gulf of Alaska portion of the Cook Inlet Management Area has occurred: in 1987 a single vessel delivered 1,128 lb of scallops from the Outer District. In 1994, 2 vessels with observers fished for scallops in both the Outer and Eastern Districts. One of these vessels caught no scallops and the other caught 11. Likely these waters have been further explored in prior years with similar negative results.

#### 1995 Management Outlook

Scallop fisheries in federal waters (all waters outside 3 miles) will remain closed for 1995, because of uncontrolled but legal scallop fishing that occurred off Prince William Sound during January, 1995. The Kamishak scallop fishery takes place entirely within federal waters and will therefore not open by regulation on August 15, 1995. A portion of the Kamishak District, however, is within state waters. Although it is doubtful that substantial scallops exist within state waters of the Kamishak District, this area may be allowed to open by regulation.

In the unlikely event of a Kamishak fishery in either federal or state waters, the department will follow the same management strategy in 1995 that was utilized in both 1993 and 1994. The fishery would have been monitored via mandatory logbooks, shell samples, skipper interviews and if necessary a trip by a staff biologist aboard one of the vessels.

The probable strength of the market for scallops coupled with the apparent abundance, size, and age distribution of the animals remaining on the Kamishak District scallop bed, signify that the 1995 fishery may have achieved the 20,000 lb upper limit of the guideline again. Although a population estimate cannot be generated at this point for the Kamishak scallop bed, other indicators of abundance such as the stable 1993 and 1994 catches per unit of effort and age class distribution indicate a small, but healthy stock would have been available for the 1995 fishery.

## HARDSHELL CLAMS AND MUSSELS

### Introduction

Commercial hardshell clam and mussel harvests in the Cook Inlet Management Area began in 1986. The generic term, hardshell clams, generally refers to littleneck (*Protothaca staminea*) and butter clams (*Saxidomus giganteus*). From 1986 through 1993, the annual harvest of hardshell clams has ranged from 14,500 lb to 63,676 lb. In 1989 the bulk of the clam harvest went to sea otter food for a rehabilitation project resulting from the Exxon Valdez oil spill. In the remaining years the majority of the harvest was Pacific littleneck clams that went to Kenai Peninsula and Anchorage markets. Effort has ranged from 2 to 33 hand diggers (Figure 17 and Appendix L). The entire documented commercial harvest was taken from Kachemak Bay (Figure 1).

Before harvesting clams or mussels for human consumption, an area must be certified for water quality by the Alaska Department of Environmental Conservation (DEC) in accordance with the National Shellfish Sanitation Program. DEC must also check for paralytic shellfish poisoning (PSP). Lot sampling is the method that DEC utilizes to check for PSP. In 1986 DEC permitted the use of lot

sampling for Chugachik Island (near Bear Cove) in Kachemak Bay. Through 1989, Chugachik Island, Halibut Cove Lagoon, Kasitsna Bay, and Jakalof Bay, all in Kachemak Bay, were certified for lot sampling. At the end of 1989 Tutka Bay was also certified by DEC. The most recent certification occurred in 1994 when DEC, in an all encompassing move, approved all the Southern District hardshell clam subdistricts on the south side of Kachemak Bay essentially between Bradley River and Barabara Point (Figure 18).

Only 102 lb of blue mussels were commercially harvested prior to 1989. Annual mussel harvest rarely exceeds 1,000 to 2,000 lb. In 1989 the catch rose to over 167,000 lb. The mussels were utilized for food in an otter rehabilitation project which was a result of the Exxon Valdez oil spill (Appendix M).

Prior to 1994 Board of Fisheries action, regulations for the Kachemak Bay hard shell clam fishery were minimal. Minimum sizes were established by the board in 1990 for Pacific little neck clams at 1.5 in and butter clams at 2.5 in.

In 1994 the department developed a management strategy via proposals to the Board of Fisheries that looked to long term sustainable use of the hard shell clam resource in Kachemak Bay. Key to the management plan was an alternate year commercial harvest strategy which opens half of the certified beaches on 1 year, and the other half during the following year. Other features of the plan included the following commercial restrictions:

- 1) areas of high recreational value will be closed,
- 2) weekends will be closed from May 15 through September 15,  
and
- 3) a registration deadline of April 1.

The board adopted this plan which served to spread the catch and effort over a larger area, allow for a year of unfished growth and recruitment, provide noninvasive recreational opportunity, and permit the department to anticipate effort.

The plan also included regulations which affected the recreational users:

- 1) a minimum legal size for littleneck and butter clams of 1.5 and 2.5 in, respectively (both of these are the same as the commercial size limits), and
- 2) a bag and possession limit of 1,000 littleneck clams and 700 butter clams.

These recreational fishery regulations reduced waste of the resource, aided in maintenance of the reproductive segment of the stock, and most importantly allowed for enforcement of commercial closures.

#### **1994 Season Summary**

Total 1994 hardshell clam harvest was 44,291 lb hand dug by 32 permit holders. Littlenecks comprised 100 percent of the hardshell catch (Table 2). Harvesting occurred in every month of the year. The peak catch months were March and April when 7,000 and 11,000 lb were taken, respectively. For the remainder of 1994, catches ranged from 1,000 to 4,000 lb per month.

Chugachik Island, which in the past few years provided most of the harvest, was closed by emergency order in May. Department population assessment surveys of the Chugachik beach indicated that the number of clams had declined for the second straight year. Although the survey indicated that substantial densities and a

large number of clams remained, the commercial season on Chugachik was closed in order to reduce the risk of overfishing.

The major harvest beach on Ismailof Island, adjacent to Halibut Cove, was closed by emergency order in August. Although a department survey indicated densities on this beach similar to those on Chugachik Island, a combination of factors including the small size of the beach, commercial harvest, and recreational use warranted a conservation closure.

The Board of Fisheries specifically directed the department to allow only conservative development of the commercial hardshell clam fishery in Kachemak Bay. To that end, once the department discovered that no new DEC beach certifications would occur until later in calendar year 1994, commercial fishing time was reduced in August to 15 days per month. This decreased the rate of harvest to a degree that allowed the fishery to continue at a low level and kept the catch within the lower end of the recent historic range of 40,000 to 65,000 lb.

Blue mussel harvest for 1994 was 570 lb taken by 2 diggers.

### 1995 Management Outlook

Full DEC certification of the south side Kachemak Bay beaches between Bradley River and Barabara Point is in place for the beginning of the 1995 season. The department will manage for the upper level of the 40,000 to 65,000 lb guideline harvest range if survey and logbook data warrant. The department will survey Chugachik Island once again in April. Results of the survey will determine whether or not Chugachik beach will open in 1995. If catch escalates at the beginning of the year, in tandem with the industry, the department will explore methods of slowing the pace of the fishery such as the 15 day per month closure employed in 1994.

## SEA URCHINS

### Introduction

The green sea urchin, the smallest of the commercial urchins, is the only urchin species in Cook Inlet which occurs in quantities sufficient to support a commercial fishery. Green urchins, and commercial fisheries for them, occur along the U.S. and Canadian coasts including the Province of British Columbia, the Maritime Provinces of Eastern Canada and the States of Maine and Alaska. Fisheries also occur in the north temperate and subarctic waters of Europe including the Soviet Union. Green urchins are harvested solely for their gonads, considered a delicacy in the orient.

Although red urchins (*Strongylocentrotus franciscanus*) do occur in small, isolated beds within the Cook Inlet Management Area, their sparse abundance and distribution does not justify a commercial fishery; therefore, no permits are issued.

No commercial harvest for green urchins occurred in Cook Inlet prior to 1987. From 1988 to 1992 the harvest ranged from 224 to 20,445 lb of whole urchins. Catch and effort surged during the 1993-94 season when 195,403 lb were taken by 29 divers (Figure 19 and Appendix N).

By regulation each fisherman must obtain a Commissioner's Permit prior to harvesting urchins commercially. An additional regulatory requirement limits allowable methods of harvest to hand picking or the use of an abalone iron, both intended to minimize disruption of the substrate. Utilizing available published information on this species as well as the framework of current management practices for the red urchin in southeast Alaska, the department established the following permit restrictions for green urchin harvest within Cook Inlet:

- 1) A minimum legal size of 2.0 in measured across the test, which does not include the spines. The minimum size is intended to protect the broodstock and sufficient numbers of large urchins, which in turn may provide a canopy that helps protect the smaller urchins.
- 2) Permit duration from mid-September through mid-December, the time period when the gonads are fullest and therefore of highest market quality. The permit period may be extended past mid-December if recovery data are made available to the department.
- 3) Alternate year harvest strategy between that portion of Kachemak Bay east of Homer Spit and that portion west of the Spit, in order to reduce the probability of a recruits only fishery.

Although the historical harvest database is composed of only 7 years, an alternate year pulse in catch can be detected. The years of low harvest or no effort are the result of the alternate year closure that includes China Poot Bay, which up to this point is the most productive bay for commercial quality green urchins in Cook Inlet. It also appears that the urchins are capable of larger sizes in China Poot.

To this point, logistics have played a significant role in determining location of urchin harvest. Virtually all the fishing effort and all the reported harvest have come from Kachemak Bay. Because the season occurs during the fall/winter storm months, harvesting among the bays of the outer coast presents not only problems for the divers themselves, but also creates difficulty getting the urchins to market regularly. Timing of delivery to the processor is important because urchin buyers are very particular regarding both recovery percentage and overall quality. A recent

low level of effort, however, has not indicated any substantial urchin resource in the outer coast of the Kenai Peninsula.

#### 1994-95 Season Summary

The waters of upper Kachemak Bay, including China Poot, were closed during the 1994-95 permit season. Although there were 30 registrants for the fishery, the total catch was only 80 lb taken by 2 divers. Sporadic concentrations of urchins were found in the waters open to fishing; however, a combination of factors including small size and gonad condition precluded meaningful harvest. A few divers reconnoitered some of the bays on the outer coast with negative results.

#### 1995-96 Management Outlook

As long as a strong market exists for urchin gonads, the harvest of these invertebrates is expected to generate a considerable amount of interest. Under traditional management, the waters east of Homer Spit, which include China Poot Bay, would open by permit to commercial urchin fishing beginning September 15, 1995. For the 1995-96 permit season, however, the department will employ a different management strategy for the open waters of Kachemak Bay (Southern District). This is the result of the likelihood of substantial interest, equalling potential heavy fishing pressure, generated by what is now common knowledge regarding China Poot's importance in the urchin fishery.

For the 1995-96 permit season, the open area of the Southern District, which includes China Poot, will be open to fishing 3 days per week, Friday through Sunday, and close the remaining 4 days, Monday through Thursday. This approach will allow the department ample time to collect logbooks, fish tickets, and samples;

therefore, permitting inseason management using fishery data while reducing the risk of overharvest. The guideline harvest range will be 0 to 200,000 lb (the historic high annual catch); fishery performance data will determine where the fishery will close within the range. The fishery will still open, as before, on September 15 and close when the urchins reach spawning condition.

The aforementioned scenario assumes that virtually all initial diving effort will be focused on China Poot. The remainder of the management area outside the Southern District (Kachemak Bay) will open by permit on September 15 and remain open through January 31 depending on catch. The only part of the management area that will not open either via permit or emergency order are the waters of the Southern District essentially west of Homer Spit. This area will be opened during the 1996-97 permit season.

All other permit restrictions in Cook Inlet will remain in effect for 1995. Season extensions will be determined, as in the past, on a case by case basis using the best available information.

## **SEA CUCUMBERS**

### **Introduction**

Prior to 1990, the Cook Inlet Management Area had no documented harvest history of the sea cucumber. In 1990, 2 divers harvested 22,525 lb of cucumbers. The entire catch was taken from Sadie Cove in Kachemak Bay. Although there was sporadic effort with no catch from 1991 and 1992, the next commercial harvest did not occur until fall of 1993. The department began managing the fishery via a permit season (10/1-04/30) in 1993-94 (Appendix O).

No information is available regarding the extent, distribution, or life history of this species in the management area. No regulations or harvest guidelines specific to the commercial harvest of cucumbers are in effect for Cook Inlet. In the absence of biological information, the limited fishery for this species has been managed via Commissioner's Permit. The major provisions of the permit are mandatory logbooks, time and area restrictions.

Although sea cucumbers have been reported throughout Cook Inlet, particularly within Kachemak Bay, the limited commercial harvest as well as exploratory effort indicate that the stocks are neither dense nor extensive. There is another genus of sea cucumber, Cucumaria sp., which exists in noticeable abundance in portions of the Southern District. This animal however is of no commercial value.

#### 1994-95 Season Summary

The 1994-95 cucumber permit period extended from October 1, 1994 to April 30, 1995. Harvest occurred during the month of October when 22 divers took 26,575 lb from Tutka Bay and Sadie Cove. The department announced a preseason 10 day fishery for Sadie Cove. Based on the anticipated number of divers and results of the 1993-94 fishery, 10 days was sufficient time to allow for harvest within Sadie Cove. After Sadie Cove closed on October 10, effort switched to Tutka Bay. Diver logbooks indicated that catch per unit of effort was declining and, as a result, dive area and depth were expanding. The emergency order was utilized to close Tutka Bay on October 31, 1994.

Exploratory effort in the remainder of Kachemak Bay and portions of outer Cook Inlet have not yielded harvestable quantities of sea cucumbers. Permits expired on April 30, which, based on the best available information, is the beginning of the sea cucumber

spawning period. This closure coincides with both the Westward Region and Prince William Sound.

### **1995-96 Management Outlook**

The department is moving to an alternate year harvest strategy for sea cucumbers in the main harvest areas: Tutka Bay and Sadie Cove. These bays, therefore, will not be opened by permit for the 1995-96 permit season. Based on exploratory dives by experienced divers, it does not appear that a significant fishery for sea cucumbers will occur in the remainder of the management area for the 1995-96 permit season.

## **OCTOPUS**

### **Introduction**

The harvest of octopus in the Cook Inlet area has historically occurred incidental to other directed fisheries such as the commercial Tanner crab, groundfish pot, and trawl fisheries. Cook Inlet octopus harvest records are currently available only since 1983. Catches have ranged from 435 to 48,000 lb with effort fluctuating from 8 to 41 boats (Appendix P). The catch from the high harvest years was the result of bycatch. In the past 5 years increased interest has occurred in directing effort specifically towards octopus. Many different gear types have been tried but the resultant harvest has been negligible. Most of the effort has focused on Kachemak Bay.

There are no closed seasons or size limits for octopus at the present time, but a Commissioner's Permit is required prior to fishing a given registration area. Cook Inlet permit restrictions

include short permit duration (typically one to four months), specific reporting requirements, and a detailed description of gear to be utilized. This last requirement prevents use of king, Tanner, Dungeness, or shrimp pots in order to reduce or eliminate the probability of bycatch of those species.

#### **1994 Season Summary**

Directed fishing by 3 vessels resulted in a catch of 1,064 lb taken by 3 fishermen entirely within the waters of Kachemak Bay. Bycatch and effort from the groundfish fishery are reported in the 1994 annual groundfish management report for Cook Inlet.

#### **1995 Management Outlook**

The high prices paid for octopus in recent years, publications promoting the potential octopus fishery in Alaska, and the attraction of an alternative fishery are all expected to produce a continued interest in octopus as a target species during 1995. Interest in the fishery will likely be somewhat tempered by the lack of substantial success by efforts in previous years.

The extent of this resource in Cook Inlet outside Kachemak Bay is undetermined and could ultimately affect any directed fishery. In the absence of an effective method of harvest, the Cook Inlet octopus catch is not expected to increase significantly in 1995 unless it is a result of bycatch from a groundfish pot or trawl fishery.

## RAZOR CLAMS

-Note- The razor clam chapter of this report is a contribution of the Soldotna Office, CFM&D Division, ADF&G.

The commercial razor clam fishery in Upper Cook Inlet dates back to 1919 with sporadic harvests occurring until 1977 when a stable fishery developed that has harvested an average of 250,000 lb annually. Since 1959 the east side of Upper Cook Inlet south of the Kenai River has been closed to commercial clam harvest. The remainder of the Upper Cook Inlet Management Area has no closed season and no overall harvest limits. Currently this fishery occurs primarily on the west side of Cook Inlet between the Crescent River and Redoubt Point. All clams harvested in this area are directed by regulation to be sold for human consumption, except for the small percentage (less than 10%) of broken clams which may be sold for bait. In the remainder of the Upper Cook Inlet Management Area there are no restrictions on the amount of clams that can be sold for bait. The minimum legal size for razor clams is four and one-half inches (114mm) in shell length.

The 1994 fishery began on May 11 and the last reported deliveries were made on August 23. The season's harvest of 355,165 lb was taken primarily from the Polly Creek/Crescent River area (Appendix Q). A total of 31 diggers made 2,074 landings over the course of the season. Diggers were paid an average of \$0.50 per lb for their harvest making the total fishery exvessel value \$178,000. Beginning in 1993 the Department of Environmental Conservation certified additional area for human consumption, north of the existing Polly Creek certified beach to Redoubt Creek. Plans for the 1994 season would extend this certification north to Harriet Point.

Table 1. Numeric listing of shellfish emergency orders, including personal use, issued for the Cook Inlet Management Area for the fisheries listed in the 1994-95 Cook Inlet Area Shellfish Annual Management Report.

<u>Emergency Order Number</u>	<u>Effective Date</u>	<u>Explanation</u>
2-S-H-01 through 05-94		Listed in 1993-94 Annual Management Report
2-S-H-06-94	05/21/94	Closed Chugachik to commercial clamming and closed season for last half of each month
2-S-H-07-94	06/01/94	Closed commercial Dungeness fishery in the Southern District
2-S-H-08-94	06/01/94	Continued closure of commercial pot shrimp fishery in the Southern District
2-S-H-09-94	07/01/94	Continued closure of commercial trawl shrimp fishery in the Southern District
2-S-H-10-94	07/21/94	Closed trawl shrimp in the Eastern District
2-S-H-11-94	08/12/94	Closed commercial trawl shrimp in the Outer District
2-S-H-12-94	09/01/94	Closed commercial clam digging on an Ismailof Island beach
2-S-H-13-94	09/01/94	Continued commercial closure for king crab in the Cook Inlet Management Area
2-S-H-14-94	09/05/94	Closed commercial scallop fishery in the Kamishak District
2-S-H-15-94	10/31/94	Closed commercial sea cucumber fishery in Tutka Bay and remaining open waters of Sadie Cove
2-S-H-16-94	01/01/95	Superseded emergency order no. 2-S-H-06-94 except Chugachik clam beaches remained closed
2-S-H-17-94	01/01/95	Closed commercial clam fishery in the eastern half of Bear Cove

Table 1. Continued

<u>Emergency Order Number</u>	<u>Effective Date</u>	<u>Explanation</u>
2-S-H-01-95	01/15/95	Closed commercial Tanner fishery in Cook Inlet Management Area

Table 2. Hardshell clam harvest (pounds) by statistical area, Cook Inlet Management Area, 1994.

District	Stat. sub-area	No. diggers	No. landings	Butter	Little-neck	Total hardshell	Pounds per hour (avg) dug
Southern	241-14	20	54	0	26,986	26,986	26.1
	241-15	6	15	0	5,957	5,957	46.9
	241-16	22	39	0	11,348	11,348	17.4
	Total	32	104	0	44,291	44,291	-

Statistical sub-area 241 - 14 includes Chugachik Island.

Statistical sub-area 241 - 15 includes Halibut Cove.

Statistical sub-area 241 - 16 includes Jakalof and Tutka Bays.

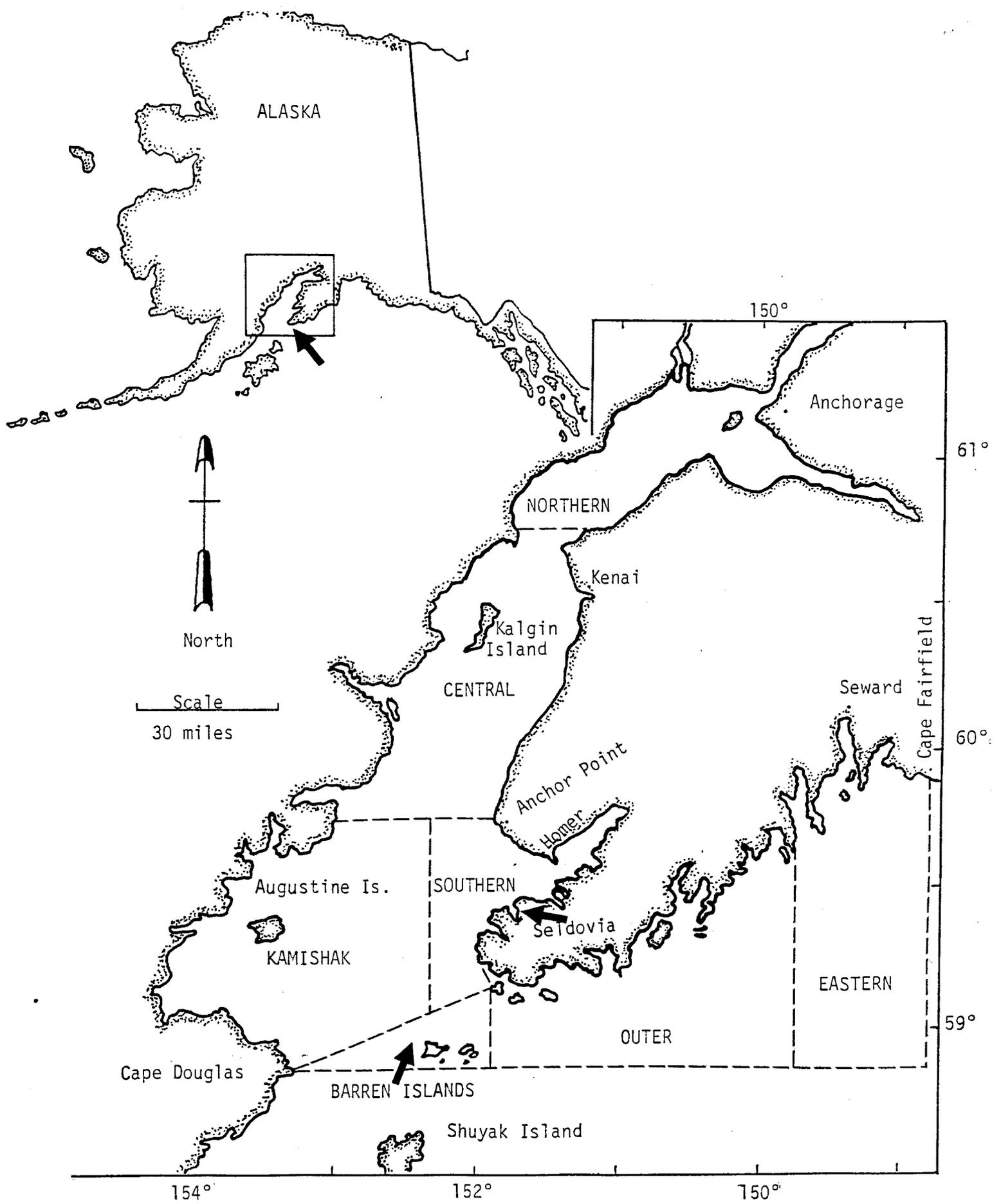


Figure 1. Cook Inlet Management Area.

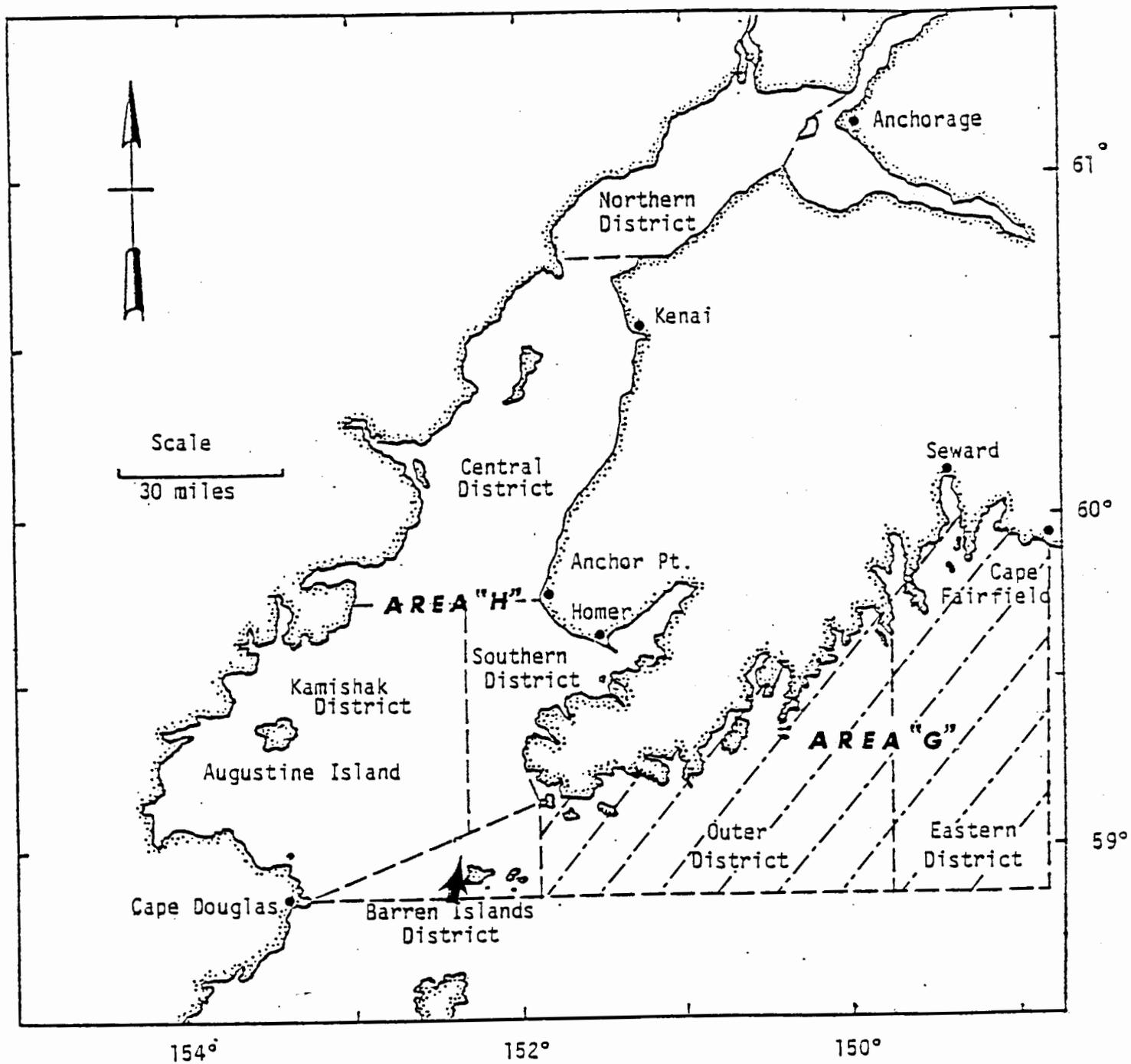


Figure 2. Cook Inlet Area ("H") and Outer Cook Inlet Area ("G") district location chart for shrimp management.

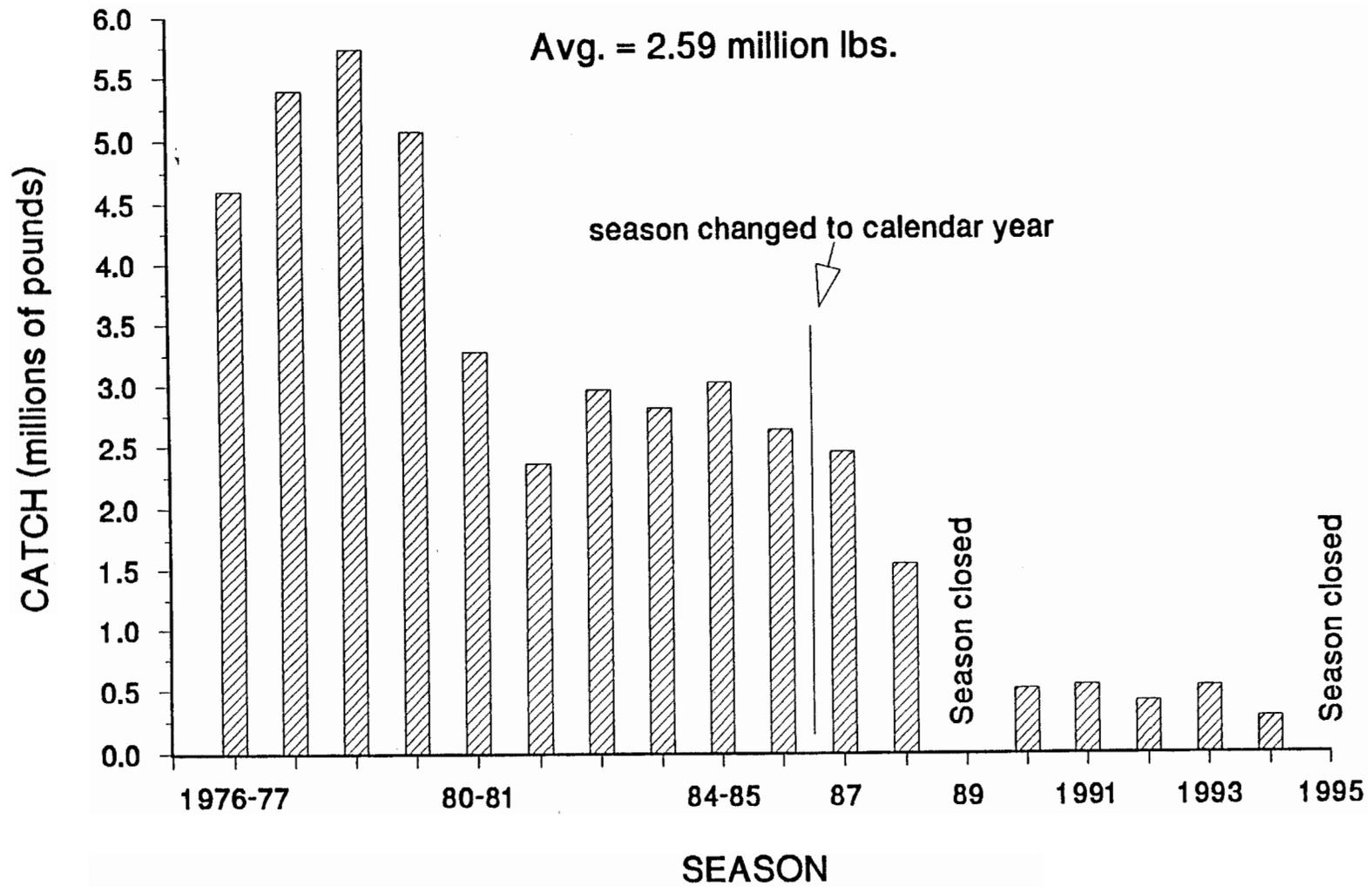


Figure 3. Tanner crab catch by season, Cook Inlet Mgt. Area, 1976 - 1995.

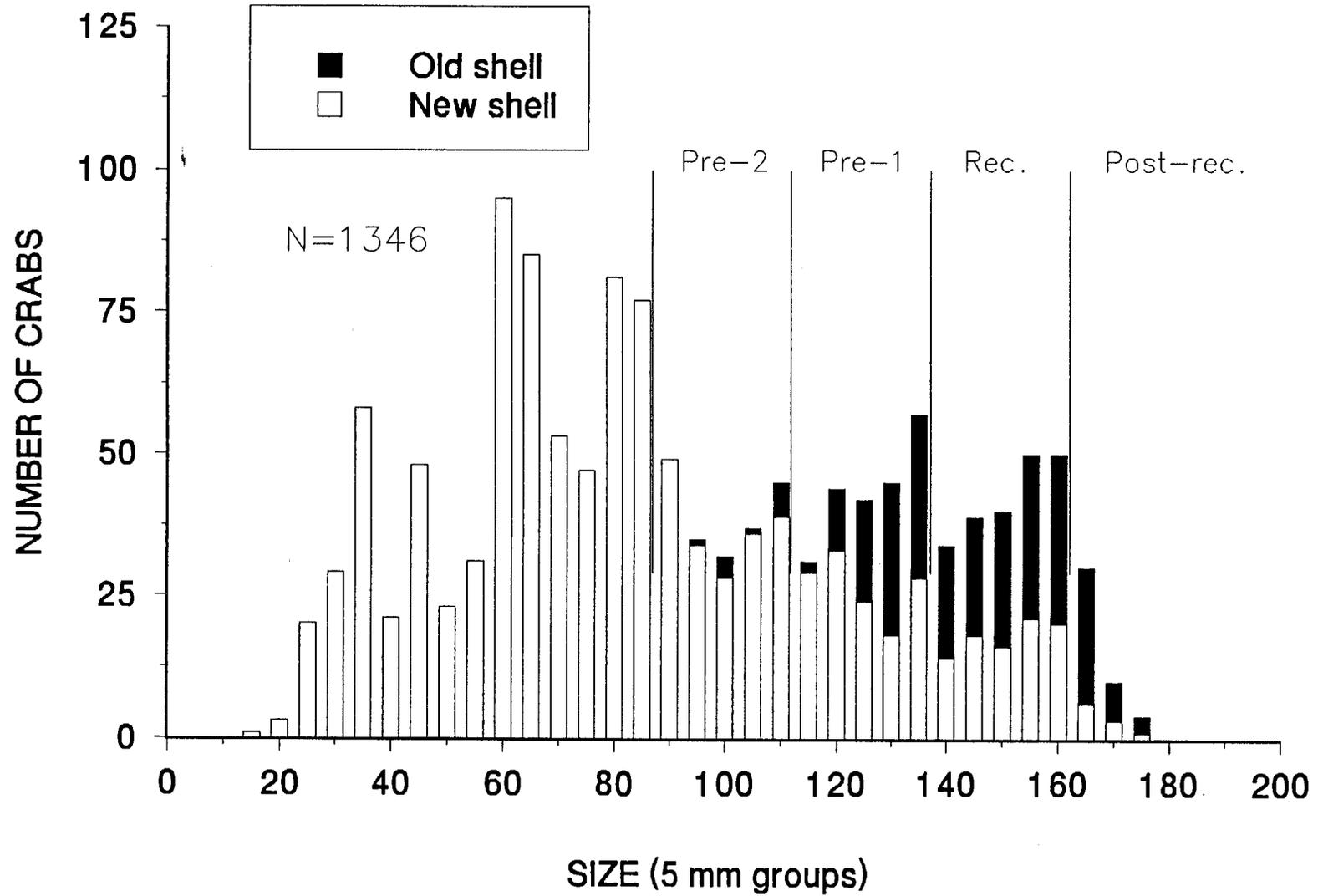


Figure 4. Male Tanner crab catch, Southern Distr., 1994 Cook Inlet trawl survey.

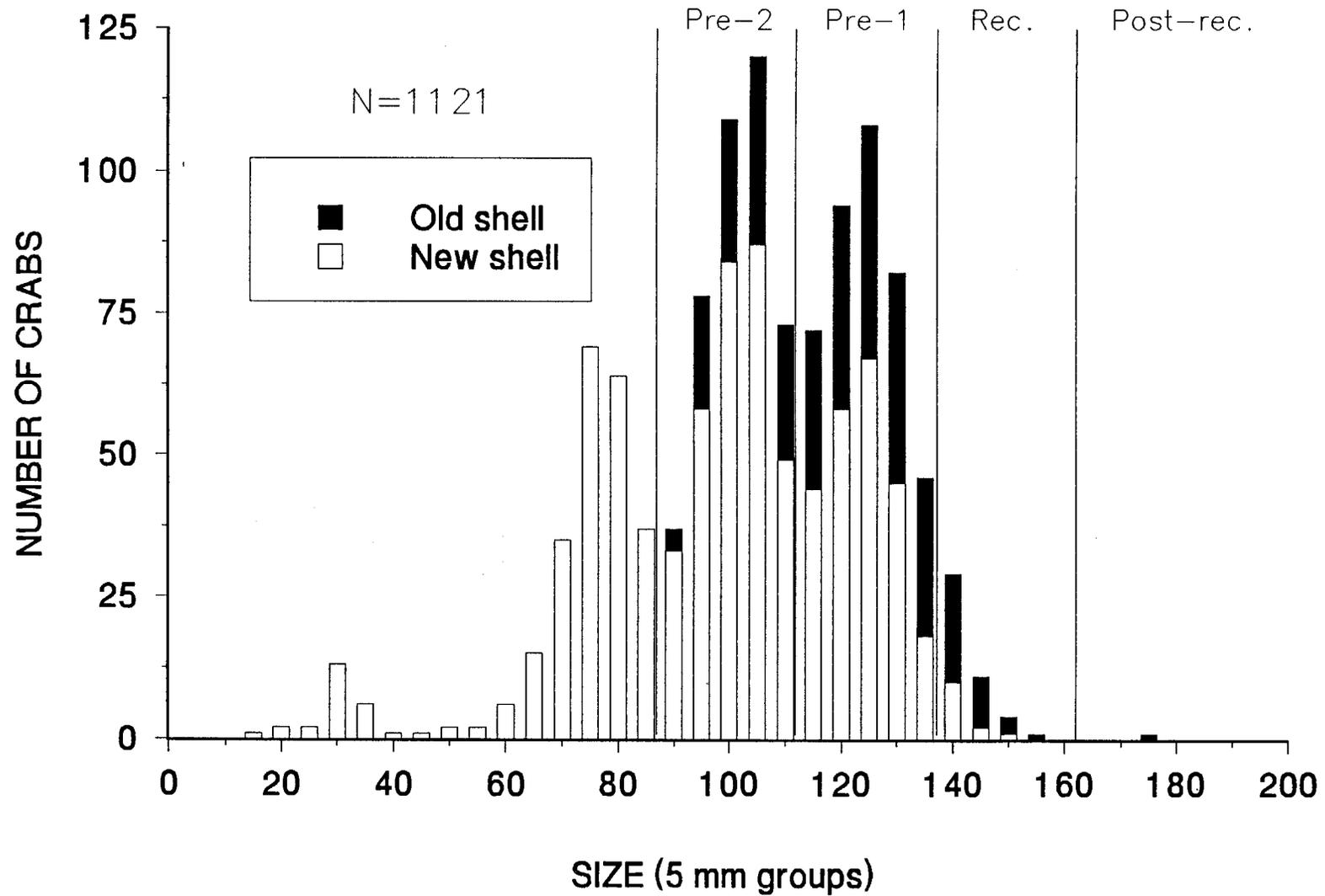


Figure 5. Male Tanner crab catch, Kamishak District, 1994 Cook Inlet trawl survey.

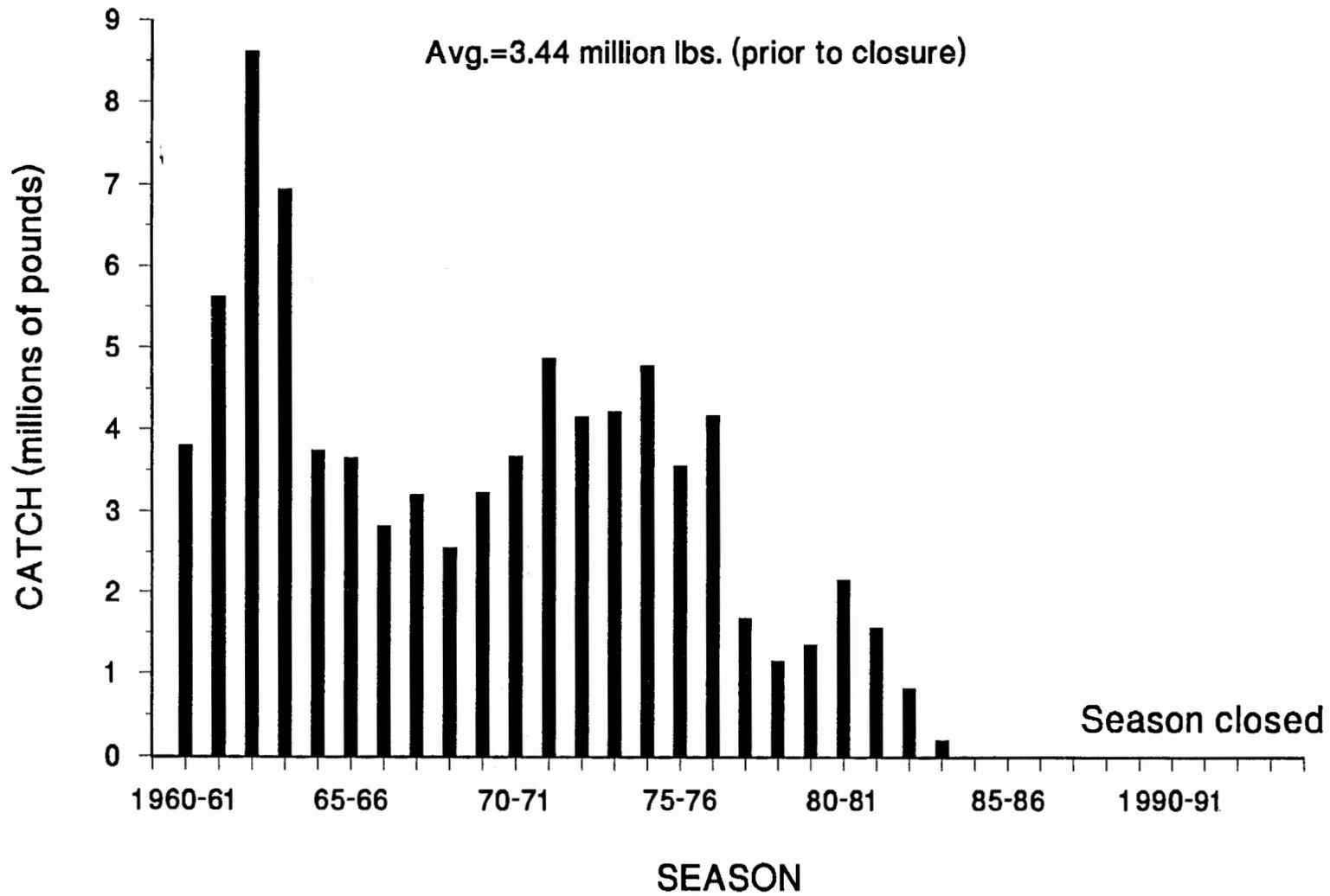


Figure 6. King crab catch by season, Cook Inlet Mgt. Area, 1960 - 1994.

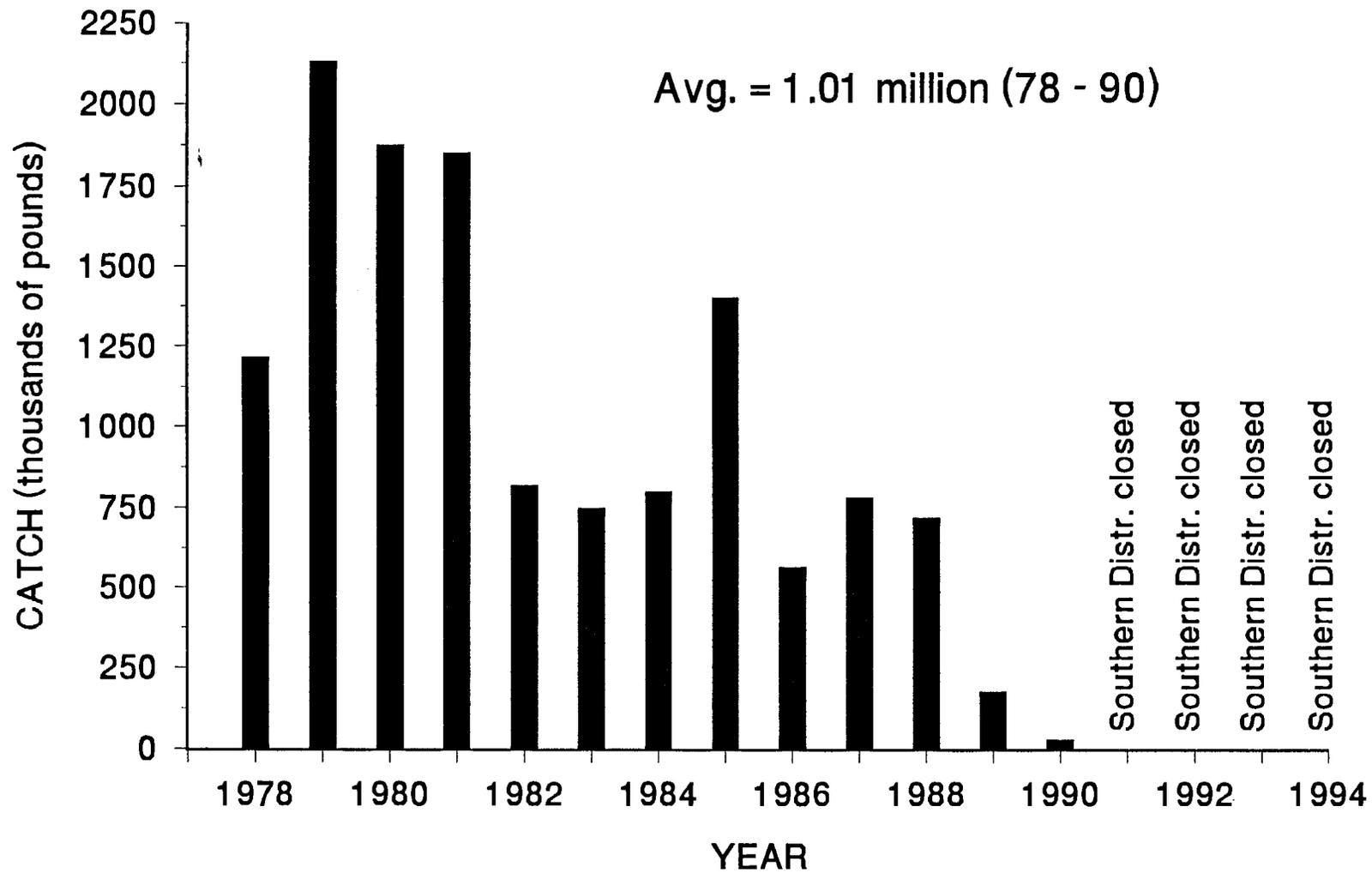


Figure 7. Dungeness crab catch by year, Cook Inlet Mgt. Area, 1978 - 1994

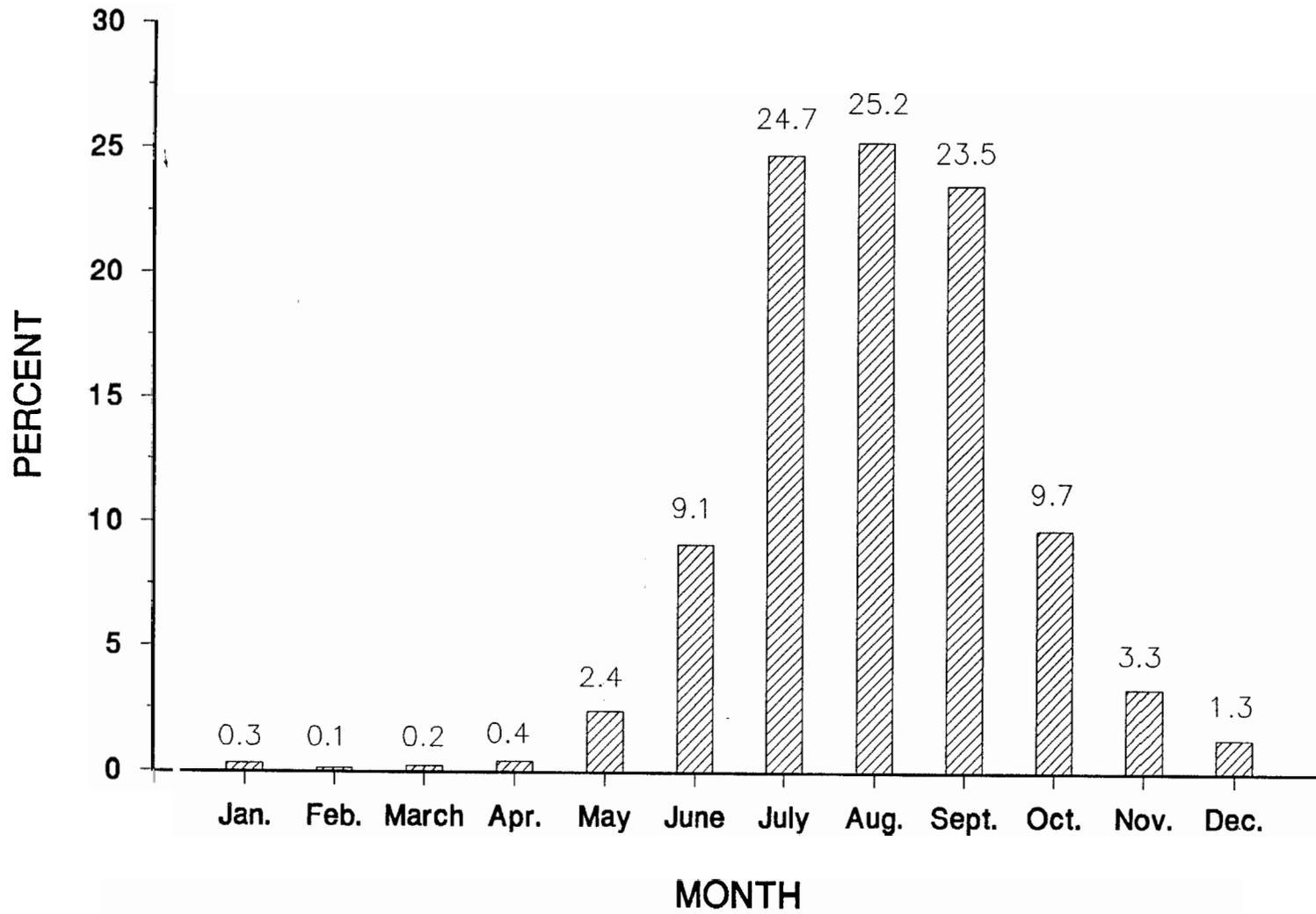


Figure 8. Dungeness crab catch (percent) by month, Cook Inlet Mgt. Area, 1978 - 1990.

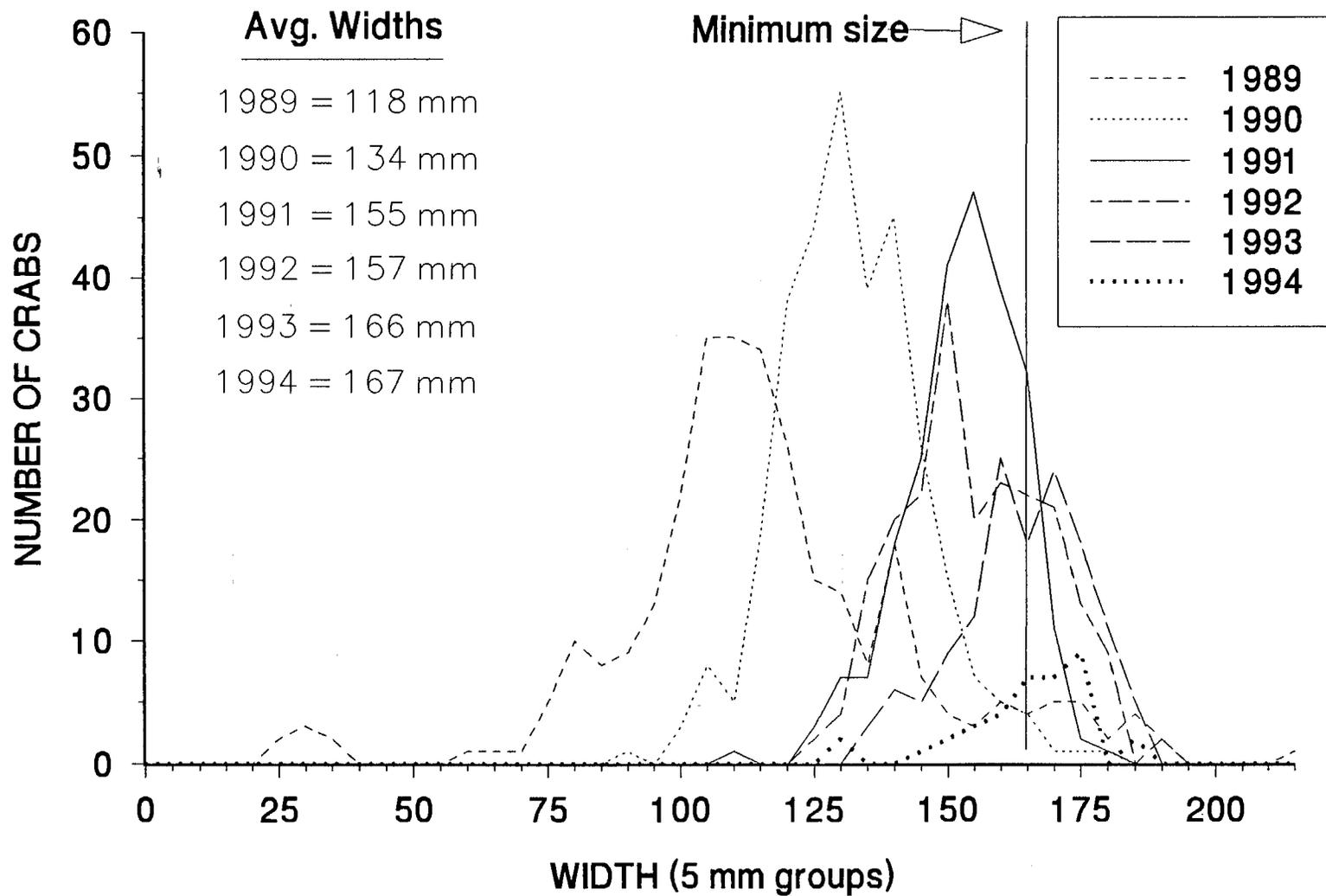


Figure 9. Male Dungeness catch, Southern District trawl survey, 1989 - 1994.

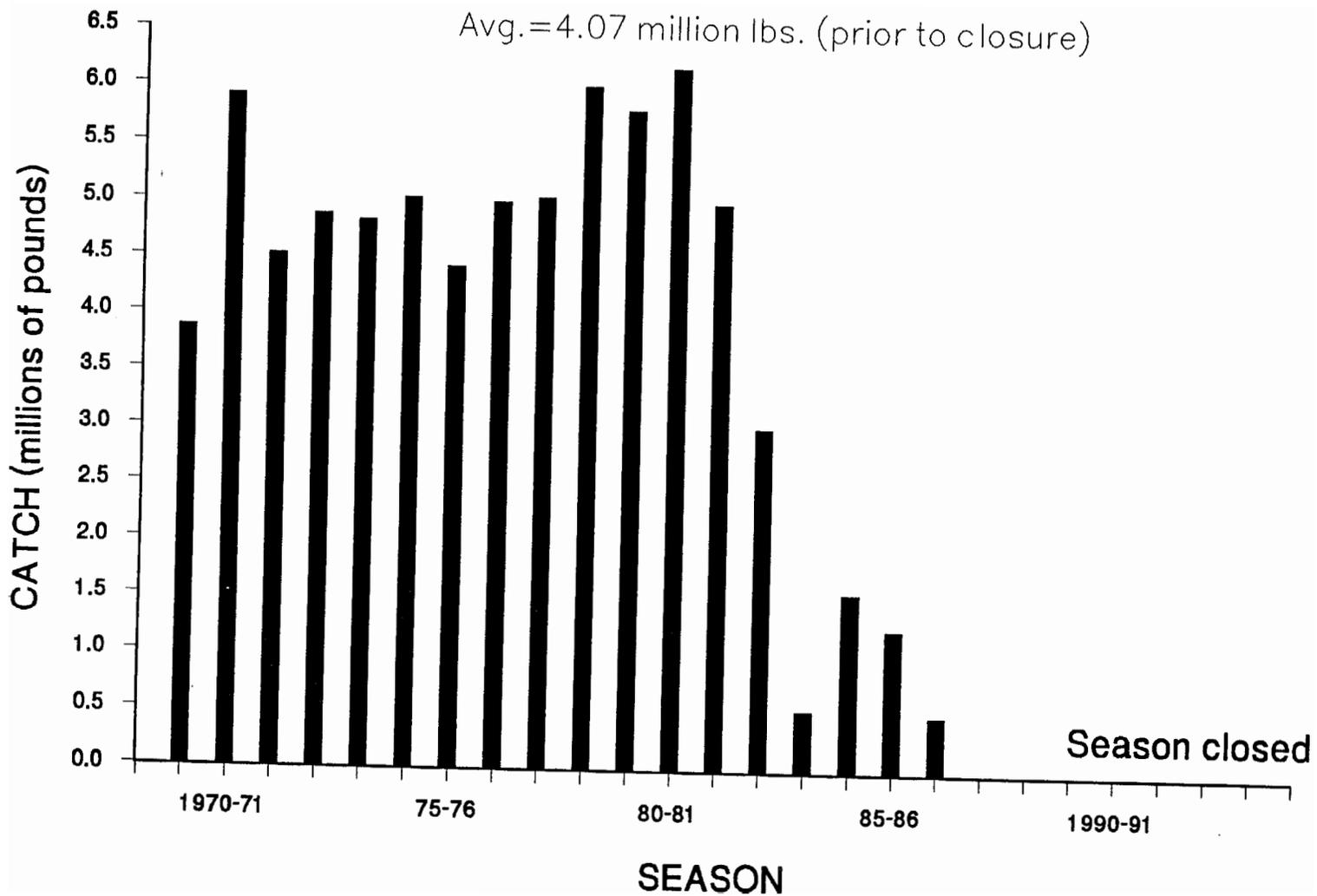


Figure 10. Trawl shrimp catch by season, Kachemak Bay, Cook Inlet Mgt. Area (H), 1969-94.

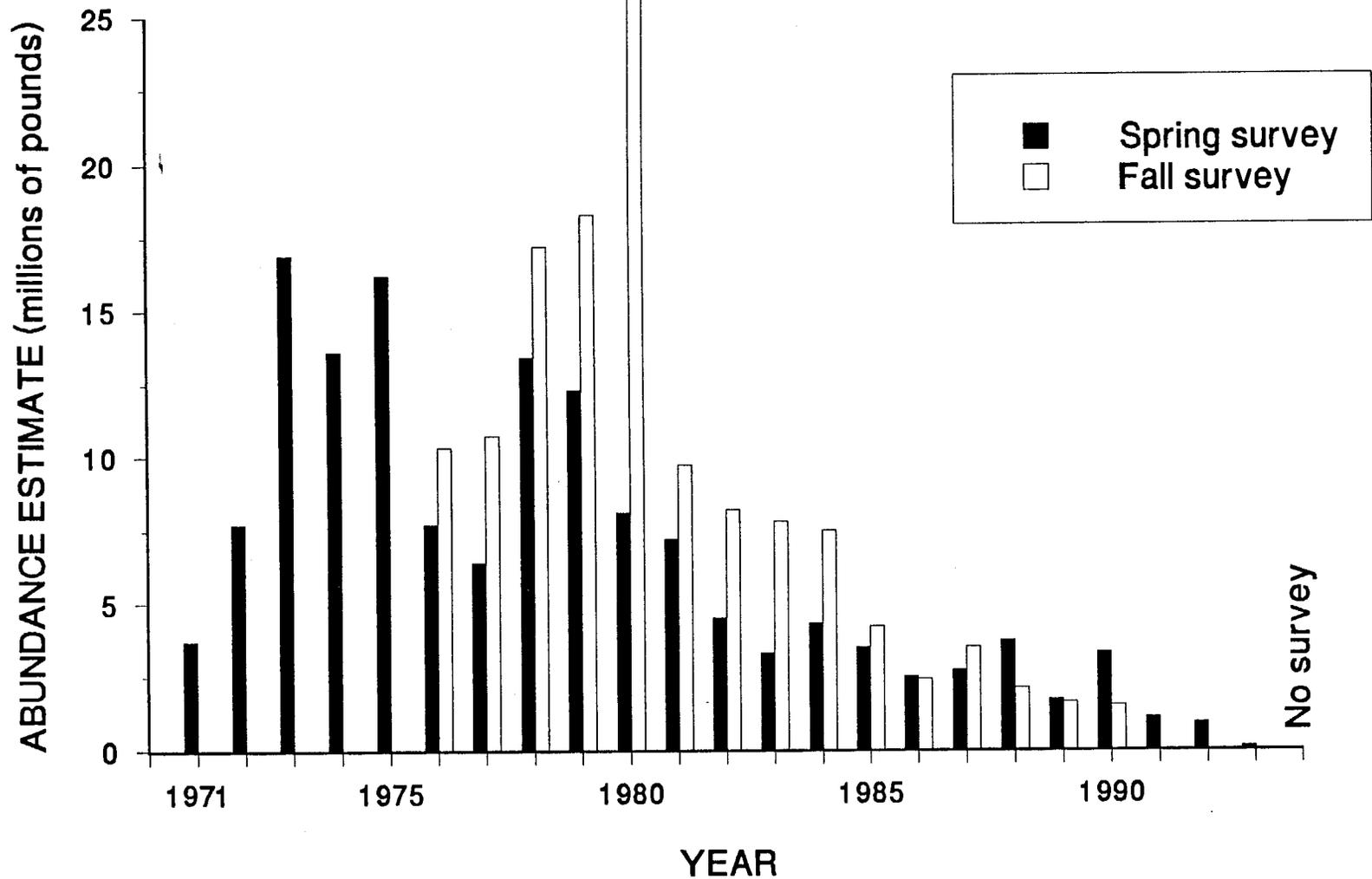


Figure 11. Pandalid shrimp population est., Kachemak Bay trawl shrimp survey, Cook Inlet Management Area, 1972-94.

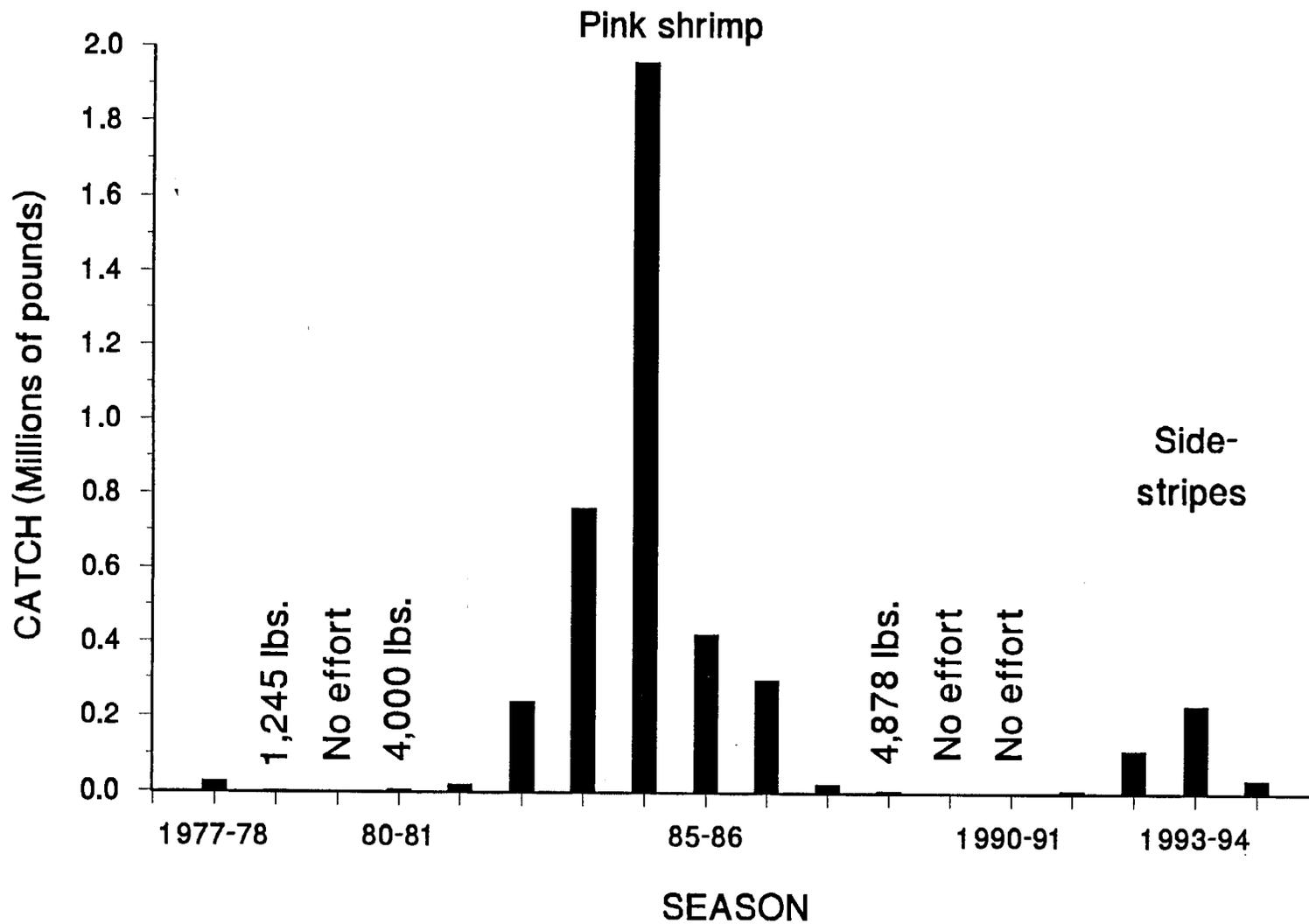


Figure 12. Trawl shrimp catch by season, Outer Cook Inlet, Cook Inlet Mgt. Area (G), 1977-1994

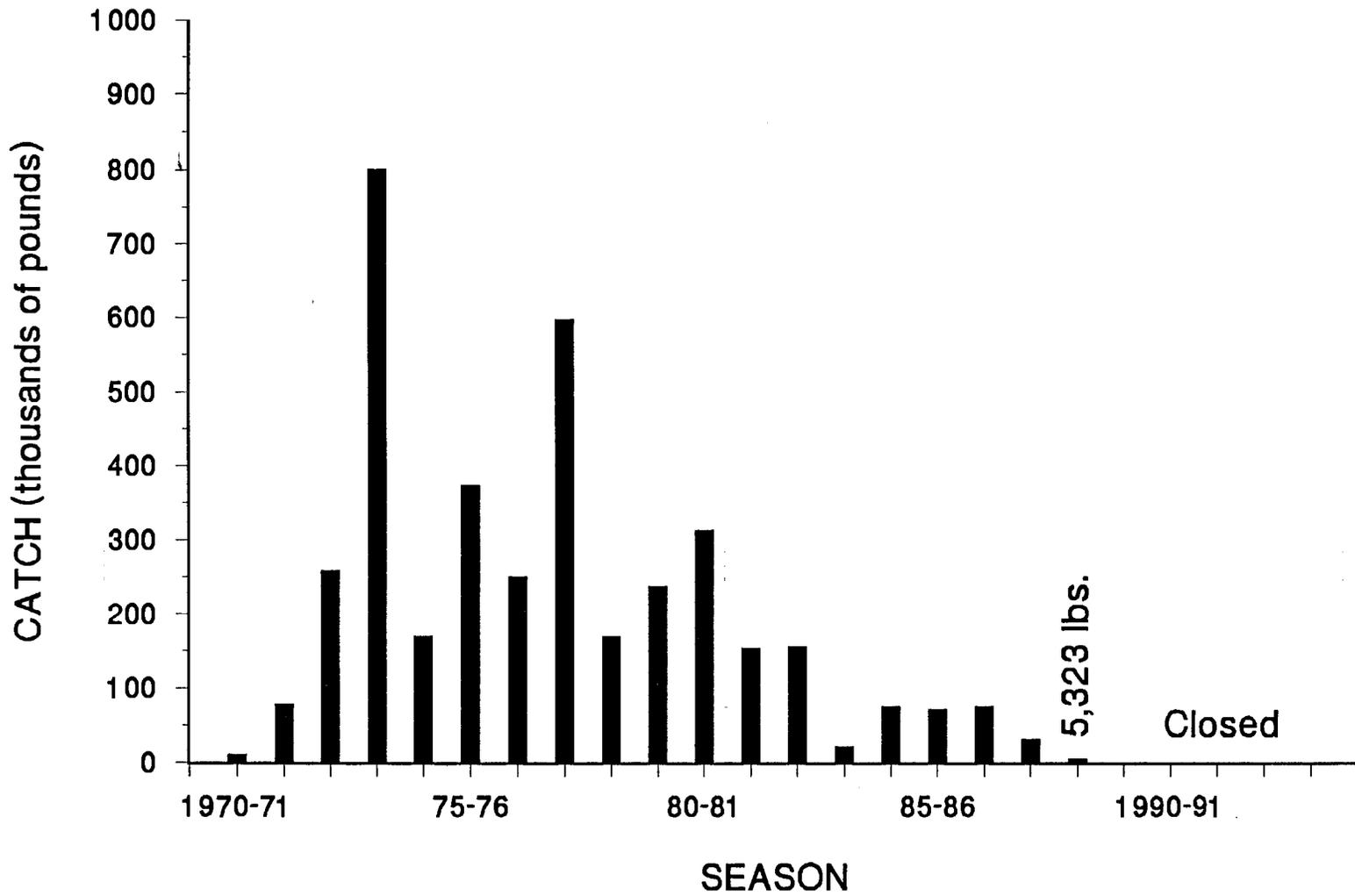


Figure 13. Pot shrimp catch by season, Kachemak Bay, Cook Inlet Mgt. Area (H) 1970-94

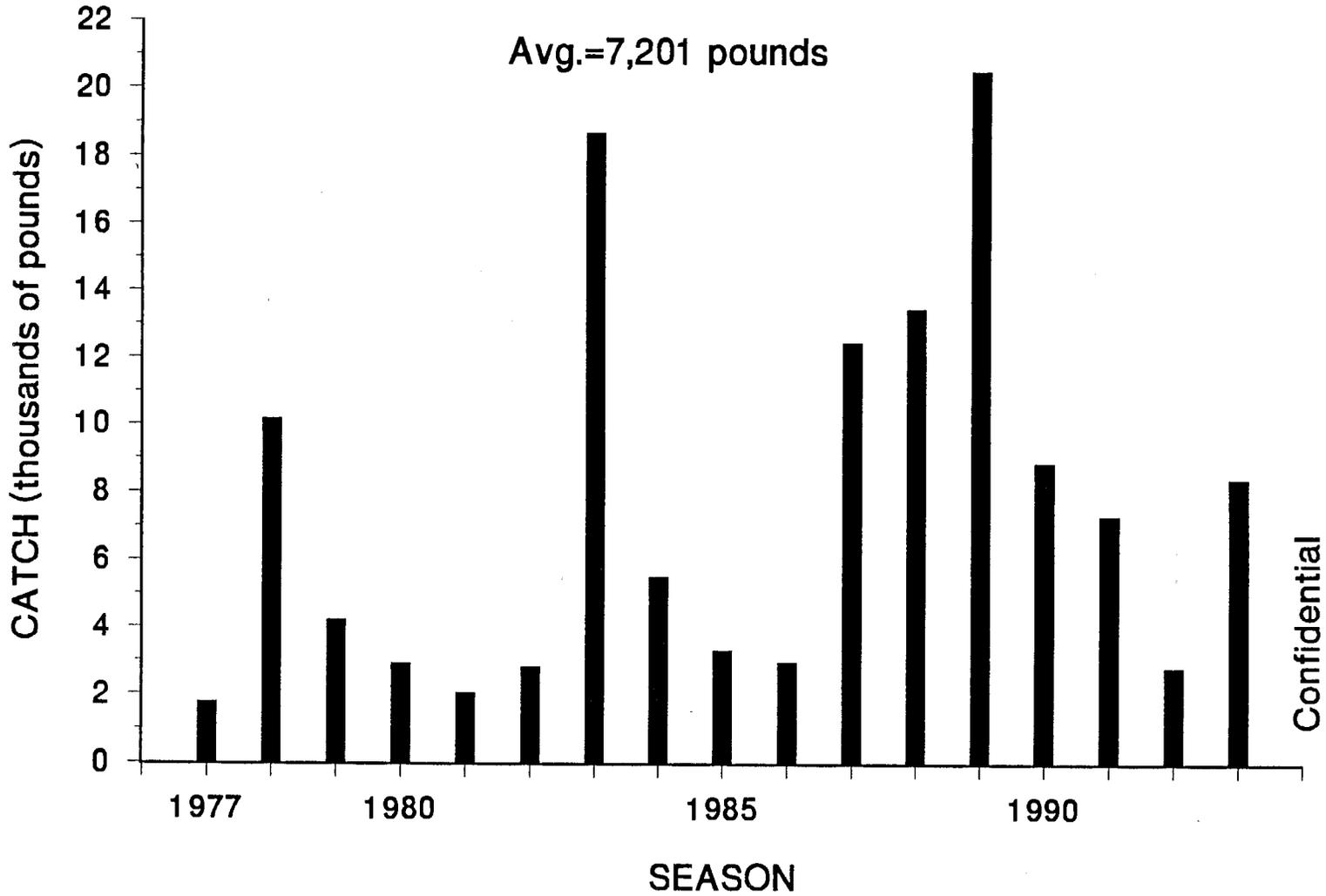


Figure 14. Pot shrimp catch by season, Outer Cook Inlet, Cook Inlet Mgt. Area (G), 1977-94.

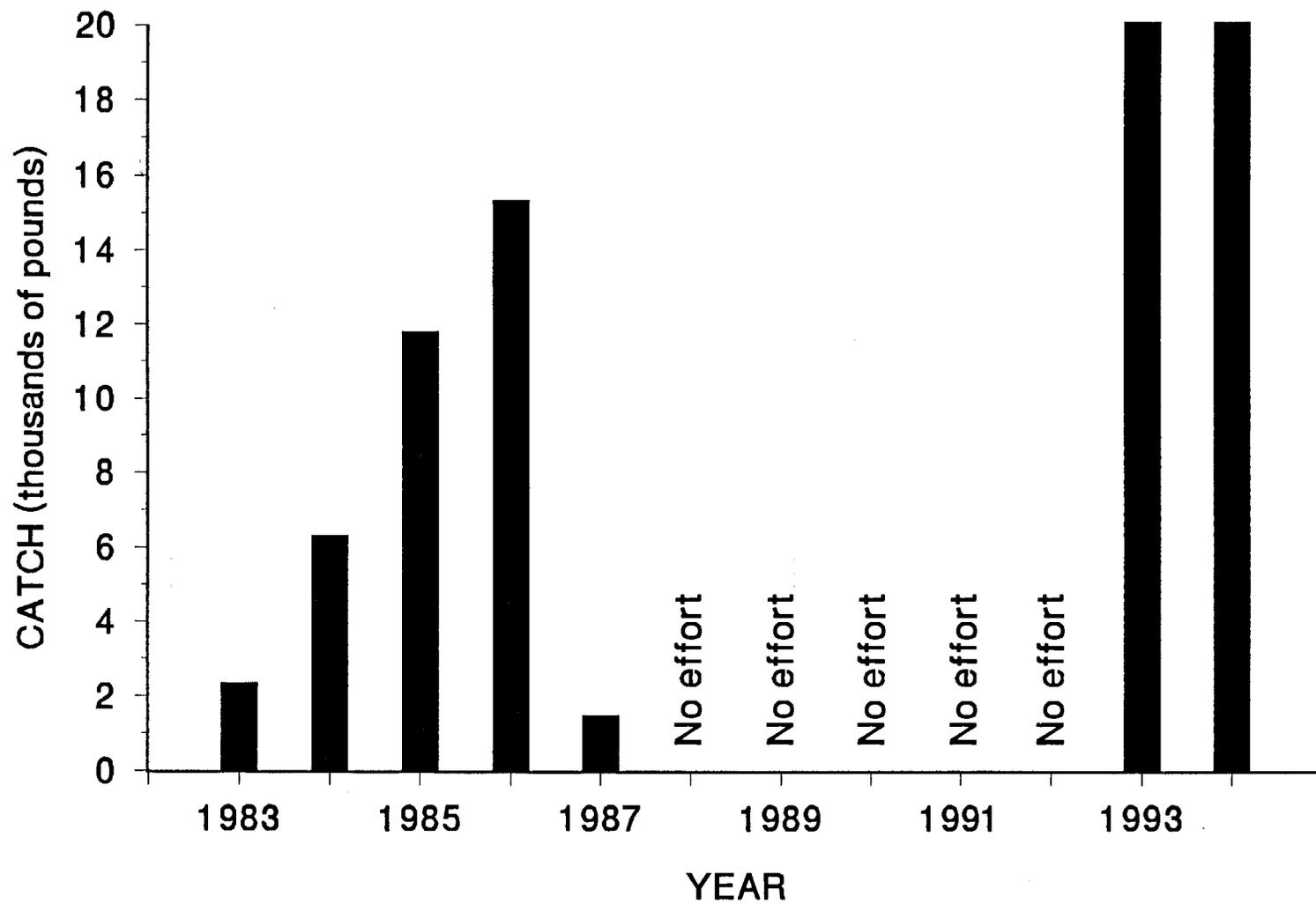


Figure 15. Weathervane scallop harvest by year, Kamishak Distr.,  
Cook Inlet Management Area, 1983-1994.

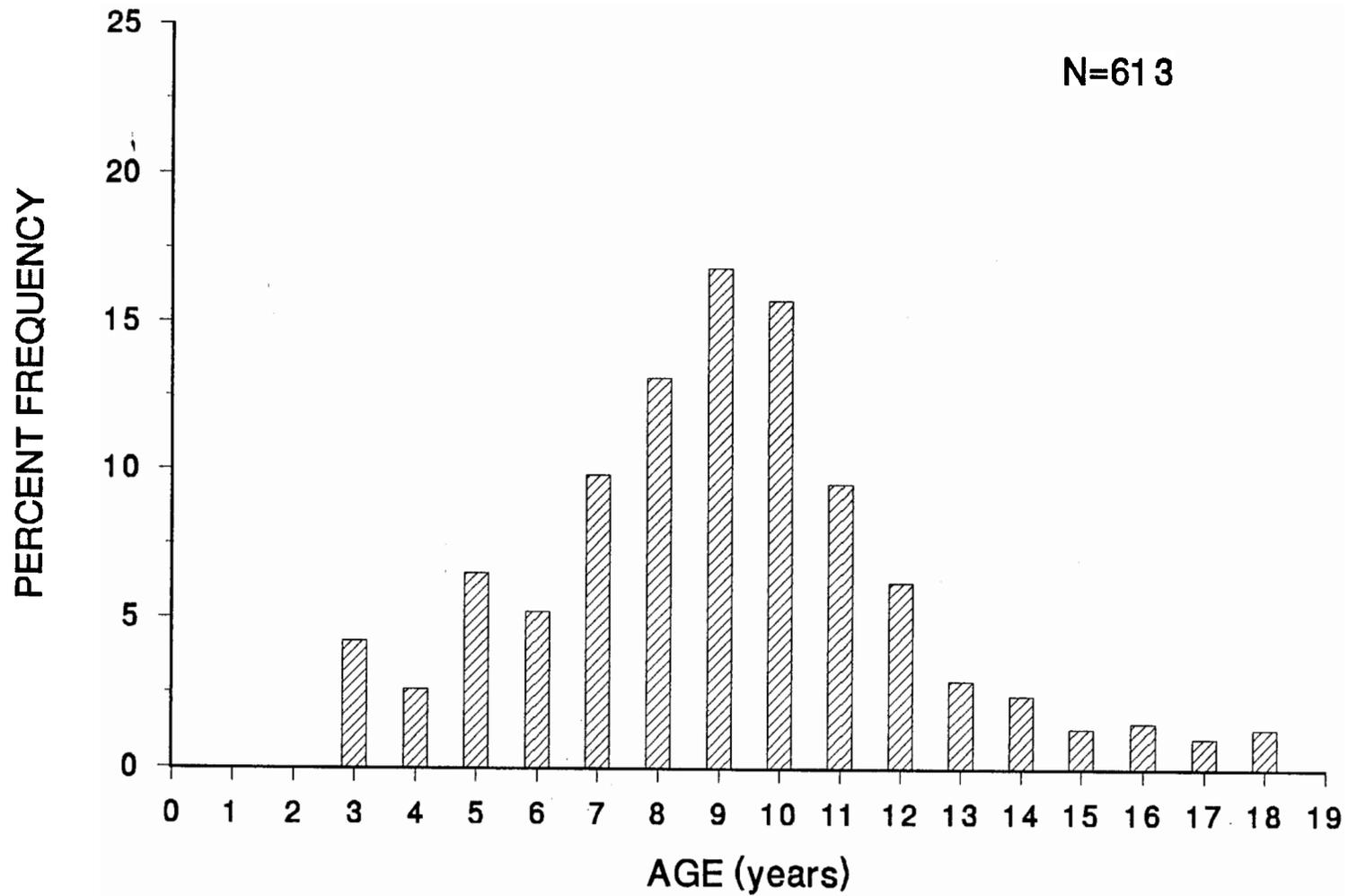


Figure 16. Commercial catch size freq., 1994 Kamishak District weathervane scallop fishery.

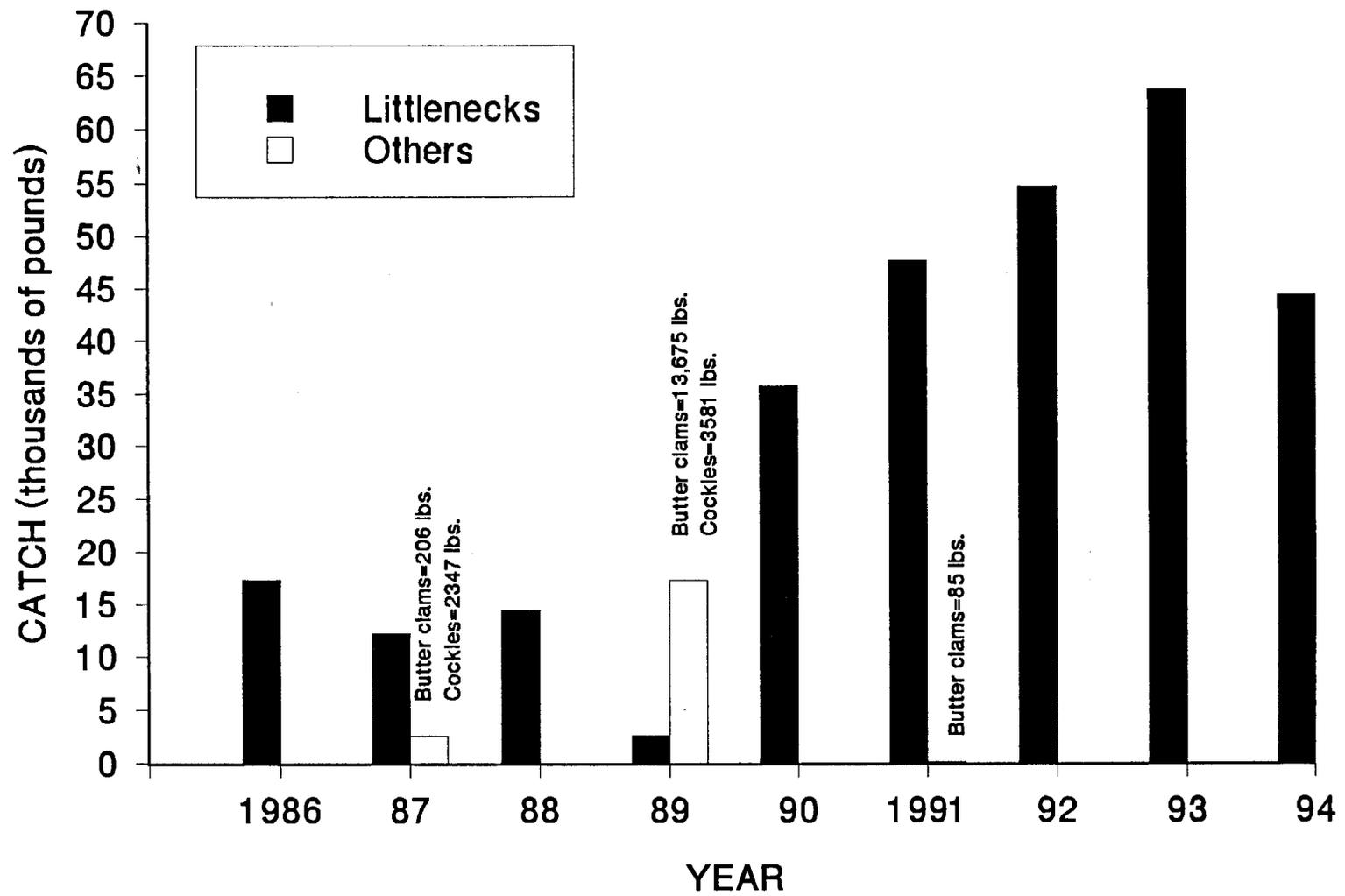


Figure 17. Hardshell clam harvest, Cook Inlet Management Area, 1986-94.

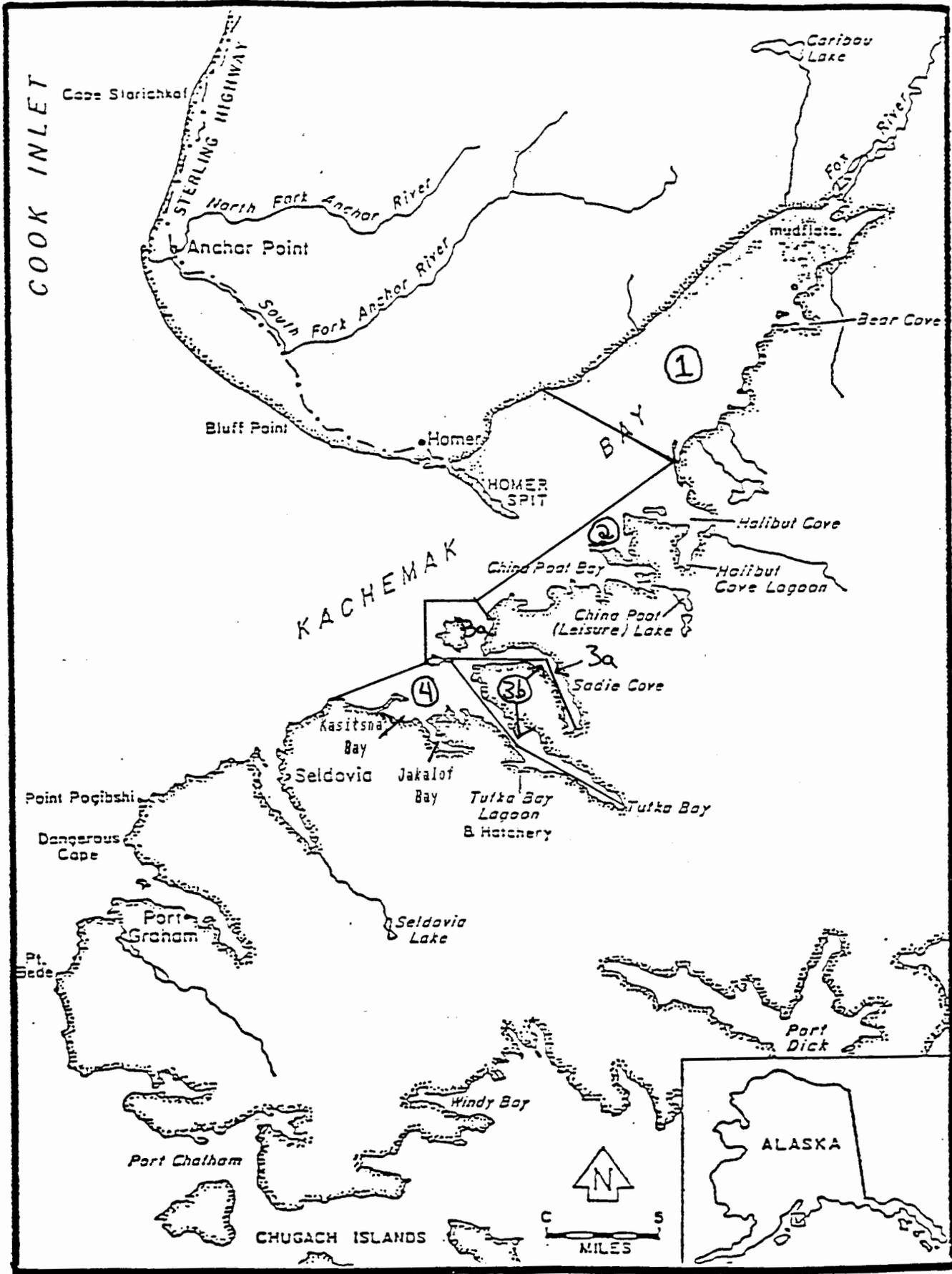


Figure 18. Southern District hardshell clam subdistricts.

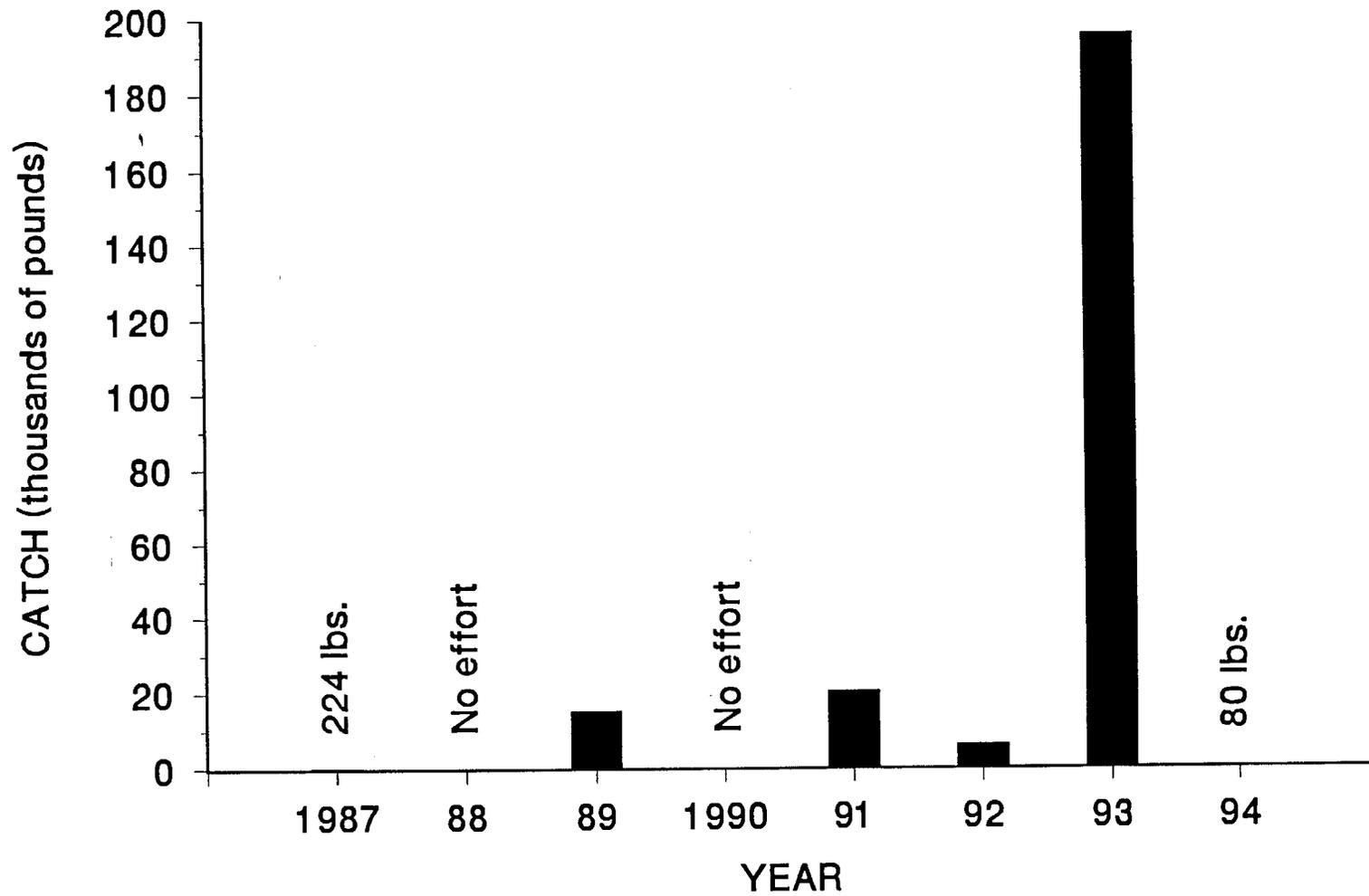


Figure 19. Green sea urchin harvest, Cook Inlet Management Area, 1987-94.

Appendix A. Tanner crab catch (pounds) by season, Cook Inlet Management Area, 1968–95.

Season	Southern	Vessels	Kamishak/ Barren Is.	Vessels	Outer/ Eastern	Vessels	Central	Vessels	Total catch	Total vessels
1968–69	1,388,282		12,398		816				1,401,496	
1969–70	1,147,154		71,196		104,191				1,322,541	
1970–71	1,046,803		541,212		3,000				1,591,015	
1971–72	2,462,956		974,962		804,765				4,242,683	
1972–73	2,935,662		3,361,023		1,266,023				7,562,708	
1973–74	1,387,535		4,689,251		1,891,021				7,967,807	
1974–75	967,762		2,150,462		656,660				3,774,884	
1975–76	1,339,245		3,281,084	17	850,964				5,471,293	57
1976–77	2,009,633	35	1,765,926	24	824,520				4,600,079	67
1977–78	2,806,568	55	2,077,092	28	502,049				5,385,709	92
1978–79	2,323,420	75	2,713,339	27	694,728				5,731,487	77
1979–80	1,134,940	68	3,338,623	24	595,645				5,069,208	68
1980–81	1,047,630	46	1,757,331	20	463,201				3,268,162	52
1981–82	548,529	41	1,286,332	18	524,897	9			2,359,758	51
1982–83	584,908	48	1,693,794	20	682,919	20			2,961,621	65
1983–84	996,763	45	1,373,674	17	443,384	14			2,813,821	71
1984–85	1,229,298	83	1,535,547	19	259,083	7			3,023,928	86
1985–86	1,164,261	103	1,288,711	24	177,041	5			2,630,013	109
1987	1,077,379	87	1,111,339	21	251,174	13	7,771	2	2,447,663	95
1988	944,763	127	417,182	24	168,969	23	8,396	3	1,539,310	137
1989	CLOSED	--	CLOSED	--	CLOSED	--	CLOSED	--	0	--
1990	CLOSED	--	422,037	7	CLOSED	--	CLOSED	--	422,037	7
1991	271,379	68	266,106	8	CLOSED	--	CLOSED	--	537,485	71
1992	354,868	110	CLOSED	--	53,049	16	CLOSED	--	407,917	121
1993	534,003	136	CLOSED	--	CLOSED	--	CLOSED	--	534,003	136
1994	284,676	110	CLOSED	--	CLOSED	--	CLOSED	--	284,676	110
1995	CLOSED	--	CLOSED	--	CLOSED	--	CLOSED	--	CLOSED	--
Average <sup>a</sup>	1,082,064	77	1,509,645	20	433,897	13	8,084	3	2,594,404	83

64

a/ Since inception of minimum legal size between the 1976–77 season.  
Does not include closed seasons.

Appendix B. Average weight of Tanner crabs, by district, from the commercial fishery, Cook Inlet Management Area, 1974–1995.

Season	Southern District	Kamishak/Barren Is. Districts	Outer/Eastern Districts	Central District
Prior to 1974	No data available			
1974–75	2.85	N/A	N/A	
1975–76	2.65	"	"	
1976–77	2.79	"	"	
1977–78	2.65		2.35	"
1978–79	2.64		2.25	"
1979–80	2.60		2.23	"
1980–81	2.75		2.20	"
1981–82	2.50		2.29	"
1982–83	2.47		2.29	"
1983–84	2.51		2.23	"
1984–85	2.49		2.29	"
1985–86	2.30		2.17	2.16
1987 <sup>a</sup>	2.31		2.26	2.23 2.33
1988	2.46		2.29	2.17 2.14
1989	CLOSED		CLOSED	CLOSED CLOSED
1990	CLOSED		2.13	CLOSED CLOSED
1991	2.56		2.09	CLOSED CLOSED
1992	2.57		CLOSED	2.16 CLOSED
1993	2.54		CLOSED	CLOSED CLOSED
1994	2.58		CLOSED	CLOSED CLOSED
1995	CLOSED		CLOSED	CLOSED CLOSED
Average	2.57		2.24	2.19 2.24

a/ Season opened by regulation 1/15/87. Prior to 1987, the season overlapped two calendar years.

Appendix C. Tanner crab population estimates in numbers by sex,  
size and age classes, 1994 Cook Inlet trawl survey.

Males	Southern District	Kamishak and Barren Is. District
<u>Sublegal</u>		
<70 mm	258,118	200,254
70 – 91 mm	169,986	852,801
91 – 114 mm		
new	114,102	1,168,971
o & vo	8,572	431,425
115 – 139 mm		
new	95,260	916,511
o & vo	58,967	673,005
<u>Legal</u>		
140 – 164 mm		
new	65,675	51,582
o & vo	94,138	126,964
>166 mm		
new	6,726	0
o & vo	20,633	3,968
<u>Total legals</u>	187,172	182,514
<u>Total Males</u>	892,177	4,425,481
<u>FEMALES</u>		
Juveniles	515,136	490,030
Adults	373,041	944,491
<u>Total Females</u>	818,177	1,434,521

Appendix D. King crab catch (pounds) by season, Cook Inlet Management Area, 1960–95.

Season	District			Total Catch	Number of Vessels
	Southern	Kamishak/ Barren Is.	Outer/ Eastern		
1960–61	2,699,680	986,551	118,067	3,804,298	
1961–62	1,619,642	3,642,500	368,909	5,631,051	
1962–63	2,769,343	5,509,708	343,505	8,616,556	
1963–64	1,960,426	4,915,303	59,352	6,935,081	
1964–65	1,892,479	1,850,572	963	3,744,014	
1965–66	1,948,012	1,684,346	14,491	3,646,849	
1966–67	1,347,904	1,386,008	89,510	2,823,422	
1967–68	1,117,394	1,883,605	239,518	3,240,520	
1968–69	750,906	1,711,296	87,302	2,549,504	
1969–70	1,464,721	1,688,803	73,644	3,227,168	
1970–71	1,540,018	2,115,991	9,468	3,665,477	
1971–72	1,992,224	2,868,315	12,657	4,873,197	
1972–73	1,391,024	2,756,023	1,966	4,149,013	
1973–74	1,971,841	2,236,131	5,613	4,213,585	
1974–75	1,816,512	2,965,310	2,035	4,783,857	
1975–76	1,674,872	1,832,484	45,293	3,552,649	
1976–77	1,035,316	3,103,895	16,384	4,155,595	
1977–78	584,090	1,099,279	1,350	1,684,719	74
1978–79	664,388	480,261	1,753	1,146,402	89
1979–80	853,584	489,365	4,871	1,347,820	82
1980–81	508,670	1,635,922	8,022	2,152,617	50
1981–82	183,899	1,371,821	4,142	1,559,863	53
1982–83	CLOSED	807,079	15,280	822,359	27
1983–84	CLOSED	188,027	4,504	192,531	17
1984–85	CLOSED	CLOSED	CLOSED	0	--
1985–86	CLOSED	CLOSED	CLOSED	0	--
1986–87	CLOSED	CLOSED	CLOSED	0	--
1987–88	CLOSED	CLOSED	CLOSED	0	--
1988–89	CLOSED	CLOSED	CLOSED	0	--
1989–90	CLOSED	CLOSED	CLOSED	0	--
1990–91	CLOSED	CLOSED	CLOSED	0	--
1991–92	CLOSED	CLOSED	CLOSED	0	--
1992–93	CLOSED	CLOSED	CLOSED	0	--
1993–94	CLOSED	CLOSED	CLOSED	0	--
1994–95	CLOSED	CLOSED	CLOSED	0	--

Note: Average pre 1984–85 closure catch = 3.44 million pounds per year.

Appendix E. Dungeness crab catch (pounds) by year, Cook Inlet Management Area, 1961 – 1994.

Year	Southern district catch	Other districts catch	Total catch	No. of vessels	No. of landings
1961	193,683	0	193,683	12	189
1962	530,770	0	530,770	15	269
1963	1,665,599	11,605	1,677,204	50	1,360
1964	417,005	6,036	423,041	22	341
1965	74,211	0	74,211	14	105
1966	12,523	117,037	129,560	5	28
1967	7,168	0	7,168	2	13
1968	484,452	3,407	487,859	7	224
1969	49,894	0	49,894	9	41
1970	209,819	0	209,819	10	50
1971	97,161	0	97,161	22	136
1972	38,930	0	38,930	24	206
1973	308,777	1,271	310,048	54	625
1974	718,729	2,514	721,243	38	619
1975	361,893	922	362,815	34	402
1976	118,903	395	119,298	19	123
1977	74,195	510	74,705	18	94
1978	1,212,571	3,208	1,215,779	49	668
1979	2,130,963	0	2,130,963	72	1,485
1980	1,875,281	0	1,875,281	54	1,183
1981	1,850,977	0	1,850,977	88	2,047
1982	818,380	505	818,885	108	2,310
1983	746,585	834	747,419	71	1,194
1984	799,638	570	800,208	102	1,687
1985	1,389,891	12,511	1,402,402	106	1,768
1986	550,968	12,894	563,862	83	1,069
1987	761,423	21,753	783,176	100	1,377
1988	677,334	41,941	719,275	84	1,305
1989	170,266	7,798	178,064	43	455
1990	28,938	564	29,502	23	112
1991	CLOSED	0	0	0	0
1992	CLOSED	7,108	7,108	1	20
1993	CLOSED	CONFIDENTIAL	CONFIDENTIAL		
1994	CLOSED	CONFIDENTIAL	CONFIDENTIAL		

Note: Average catch 1978–1990 = 1.01 million pounds per year.

Appendix F. Dungeness commercial catch east and west of Homer Spit,  
Southern District, Cook Inlet Management Area, 1978–1995.

Year	East of Spit		West of Spit	
	Catch (lbs)	Vessels	Catch (lbs)	Vessels
1978	107,470	21	1,105,101	54
1979	290,829	54	1,840,134	81
1980	375,056	44	1,500,225	61
1981	1,237,694	84	613,283	65
1982	636,789	100	181,591	71
1983	463,968	62	282,617	43
1984	563,659	82	235,979	65
1985	783,607	93	606,284	60
1986	249,183	57	301,785	34
1987	291,206	67	470,217	38
1988	426,531	55	250,803	39
1989	98,215	36	72,051	15
1990	10,495	18	18,433	10
1991 <sup>a</sup>		CLOSED		
1992		CLOSED		
1993		CLOSED		
1994		CLOSED		
1995		CLOSED		
Average	425,746	59	575,269	49

a/ 1991–95 seasons not included in average.

Appendix G. Shrimp catches (pounds) from the Kachemak Bay trawl shrimp fishery in the Cook Inlet Management Area, 1969–94.

Season	Number of vessels	Catch			Total
		Jun 1–Oct 31	Nov 1–Mar 31	Apr 1–May 31	
1969–70 <sup>a</sup>	7	1,289,656	1,692,854	889,330	3,871,840
1970–71 <sup>a</sup>	3	3,211,924	2,076,228	617,836	5,905,988
1971–72 <sup>a</sup>	7	2,618,630	1,761,569	140,707	4,520,906
1972–73 <sup>a</sup>	10	2,772,422	2,109,660		4,882,082
1973–74 <sup>b</sup>	13	2,502,154	2,323,780		4,825,934
1974–75	4	2,512,764	2,519,148		5,031,912
1975–76	4	1,997,563	2,421,456		4,419,019
1976–77	5	2,545,885	2,453,101		4,998,986
1977–78	7	2,490,969	2,546,977		5,037,946
1978–79	6	2,952,733	3,060,066		6,012,799
		<u>Jul 1–Sep 30</u>	<u>Oct 1–Dec 31</u>	<u>Jan 1–Mar 31</u>	
1979–80	7	2,013,298	2,052,646	1,731,483	5,797,427
1980–81	15	1,780,677	2,691,746	1,704,706	6,177,129
1981–82	23	1,614,868	1,686,781	1,693,850	4,995,499
1982–83	15	998,522	1,012,388	1,009,857	3,020,767
1983–84	10	CLOSED	CLOSED	525,508	525,508
1984–85	10	519,651	528,506	518,529	1,566,686
1985–86	5	488,606	257,782	503,340	1,249,728
1986–87	3	504,206	CLOSED	CLOSED	504,206
1987–88	0	CLOSED	CLOSED	CLOSED	0
1988–89	0	CLOSED	CLOSED	CLOSED	0
1989–90	0	CLOSED	CLOSED	CLOSED	0
1990–91	0	CLOSED	CLOSED	CLOSED	0
1991–92	0	CLOSED	CLOSED	CLOSED	0
1992–93	0	CLOSED	CLOSED	CLOSED	0
1993–94	0	CLOSED	CLOSED	CLOSED	0
1994–95	0	CLOSED	CLOSED	CLOSED	0

<sup>a</sup>/Catches listed for comparative purposes by seasons established in 1973.

<sup>b</sup>/June 1 – October 31 and November 1 – March 31 seasons with respective guidelines established.

Appendix H. Trawl shrimp catches (pounds) in Outer Cook Inlet  
(Area G), Cook Inlet Management Area, 1977–94.

Season	Number of vessels	Catch <sup>a</sup>
1977–78	2	26,556
1978–79	1	1,245
1979–80	0	0
1980–81	1	4,000
1981–82	2	19,454
1982–83	4	239,584
1983–84	7	760,430
1984–85	11	1,957,959
1985–86 <sup>b</sup>	4	421,063
1986–87	2	297,762
1987–88	1	22,231
1988–89	1	4,878
1989–90	0	0
1990–91	0	0
1991–92	2	6,196
1992–93	2	111,709
1993–94	2	CONFIDENTIAL
1994–95	3	32,591

a/ Catches from 1982–1987 were predominantly pink shrimp. Catches from 1991–1994 were mostly sidestripes.

b/ Regulatory season of 1 June through 28 February adopted by the Alaska Board of Fisheries in spring, 1985.

Appendix I. Pot shrimp harvest (pounds) Cook Inlet Management Area, Area H, 1970–94.

Season	Number of vessels	Jun 1–Sep 30	Oct 1–May 31	Total	
1970–71		3,606	7,602	11,208	
1971–72		8,836	70,601	79,437	
1972–73		75,247	184,230	259,477	
1973–74		63,181	738,165	801,346	
1974–75		43,650	126,472	170,122	
1975–76		100,765	273,758	374,523	
1976–77	26	52,115	199,559	251,674	
1977–78	51	85,511	511,938	597,449	
1978–79	41	49,080	121,234	170,314	
1979–80	49	59,963	177,927	237,890	
		<u>Jun 1–Sep 15</u>	<u>Nov 1–Dec 31</u>	<u>Feb 1–Mar 31</u>	
1980–81	30	74,368	134,275	104,716	313,359
1981–82	45	56,092	47,859	49,885	153,836
1982–83	40	54,153	49,130	52,339	155,622
1983–84	15	21,438	CLOSED	CLOSED	21,438
1984–85	22	25,874	28,151	22,080	76,105
		<u>Jun 1–Sep 15</u>	<u>Oct 1–Dec 31</u>	<u>Feb 1–Mar 31</u>	
1985–86	25	27,312	20,737	24,048	72,097
1986–87	37	24,844	20,188	30,257	75,289
1987–88	30	26,216	5,416	CLOSED	31,632
1988–89	9	5,323	CLOSED	CLOSED	5,323
1989–90		CLOSED	CLOSED	CLOSED	0
1990–91		CLOSED	CLOSED	CLOSED	0
1991–92		CLOSED	CLOSED	CLOSED	0
1992–93		CLOSED	CLOSED	CLOSED	0
1993–94		CLOSED	CLOSED	CLOSED	0
1994–95		CLOSED	CLOSED	CLOSED	0

Appendix J. Pot shrimp catch (pounds) and effort in Outer Cook Inlet  
(Area G), Cook Inlet Management Area, 1977–94.

Season	Number of vessels	Catch
1977	6	1,776
1978	11	10,157
1979	5	4,211
1980	3	2,911
1981	5	2,031
1982	7	2,805
1983	13	18,679
1984	5	5,504
1985	6	3,305
1986	4	2,967
1987	9	12,458
1988	7	13,445
1989 <sup>a</sup>	8	20,500
1990	5	8,853
1991	8	7,315
1992	3	2,804
1993	3	8,356
1994	1	CONFIDENTIAL

Average = 7,201

a/ Season closed from April 30 through July 7 due to Exxon Valdez oil spill.

Appendix K. Pacific weathervane scallop catches, Cook Inlet Management Area., 1983–94.

Year	District	Number of vessels	Catch in pounds of shucked meats
1983	Kamishak	1	2,346
1984	Kamishak	3	6,305
1985 <sup>a</sup>	Kamishak	1	11,810
1986	Kamishak	3	15,364
1987	Outer	1	1,128
	Kamishak <sup>b</sup>	2	360
	'87 Total	2	1,488
1988		NO	EFFORT
1989		NO	EFFORT
1990		NO	EFFORT
1991		NO	EFFORT
1992		NO	EFFORT
1993	Kamishak	3	20,115
1994	Kamishak	4	20,431

a/ Season and harvest guideline set by regulation.

b/ Season closed by E.O. on August 21, 1987, one week after opening, due to low cpue.

Appendix L. Harvest (pounds) of hardshell clams, Cook Inlet Management Area, 1986–94.

Year	No. of permits	No. of landings	Pacific little necks	Butter clams	Cockles	Total
1986	5	18	17,303	0	0	17,303
1987	8	69	12,214	206	2,347	14,767
1988	2	32	14,449	0	0	14,449
1989	9	41	2,584	13,675 <sup>a</sup>	3,581 <sup>b</sup>	19,840
1990	19	62	35,744	0	0	35,744
1991	19	78	47,486	85	0	47,571
1992	21	117	54,631	0	0	54,631
1993	33	159	63,676	0	0	63,676
1994	32	104	44,291	0	0	44,291

a/ Includes 13,348 pounds sold as otter food as a result of Exxon Valdez oil spill.

b/ Includes 1,981 pounds sold as otter food as a result of Exxon Valdez oil spill.

Appendix M. Harvest (pounds) of blue mussels, Cook Inlet Management Area, 1986–94.

Year	No. of permits	No. of landings	Total
1986	0	0	0
1987	1	2	102
1988	0	0	0
1989	9	98	167,243 <sup>a</sup>
1990	2	10	10,600
1991	3	11	16,485
1992	3	11	2,501
1993	2	4	1,083
1994	2	3	570

<sup>a/</sup> Includes 165,268 pounds sold as otter food as a result of Exxon Valdez oil spill.

Appendix N. Green sea urchin harvest (pounds), Cook Inlet Management Area, 1987–94.

Year	No. of divers		Total
1987	1		224
1988		NO EFFORT	
1989	1		15,181
1990		NO EFFORT	
1991	4		20,445
1992	7		6,119
1993	29		195,403
1994	2		80

Appendix O. Sea cucumber catch (pounds) by permit season, Cook Inlet Management Area, 1990–94.

Permit season	No. divers	No. landings	Total
1990	2	14	22,525
1991		N O C A T C H <sup>b</sup>	
1992		N O C A T C H <sup>b</sup>	
1993–94 <sup>a</sup>	16	40	30,940
1994–95 <sup>a</sup>	22	93	26,575

a/ Permit season established 10/1 – 4/30.

b/ Divers did not find commercial quantities of sea cucumbers.

Appendix P. Octopus harvest (pounds) in the Cook Inlet Management Area (H) 1983–94.

Year	No. of vessels	No. of landings	Total
1983	41	101	32,841 <sup>a</sup>
1984	36	77	46,698 <sup>a</sup>
1985	40	70	48,067 <sup>a</sup>
1986	8	16	435
1987	21	57	4,512
1988	17	43	5,569
1989		NO REPORTED LANDINGS	
1990	3	6	1,343
1991	8	21	2,088
1992		NO DIRECTED FISHERY	
1993 <sup>b</sup>	3	6	475
1994 <sup>b</sup>	3	9	1,064

a/ Bycatch from shellfish pot fisheries.

b/ Directed fishery catch and effort only.

Appendix Q. Harvest of razor clams Cook Inlet Management Area, 1919–1994.

Year	Pounds	Year	Pounds
1919	76,963	1960	372,872
1920	11,952	1961	277,830
1921	72,000	1962	195,650
1922	510,432	1963	0
1923	470,280	1964	0
1924	156,768	1965	0
1925	0	1966	0
1926	0	1967	0
1927	25,248	1968	0
1928	0	1969	0
1929	0	1970	0
1930	0	1971	14,755
1931	No record	1972	31,360
1932	93,840	1973	34,415
1933	No record	1974	No record
1934	No record	1975	10,020
1935	No record	1976	No record
1936	No record	1977	1,762
1937	8,328	1978	45,931
1938	No record	1979	144,358
1939	No record	1980	140,240
1940	No record	1981	441,949
1941	0	1982	460,639
1942	0	1983	269,618
1943	0	1984	261,742
1944	0	1985	302,934
1945	15,000	1986	258,632
1946	11,424	1987	312,349
1947	11,976	1988	392,610
1948	2,160	1989	222,747
1949	9,672	1990	323,533
1950	304,073	1991	201,320
1951	112,320	1992	296,727
1952	0	1993	310,289
1953	0	1994	355,165
1954	0		
1955	0		
1956	0		
1957	0		
1958	0		
1959	0		

*The Alaska Department of Fish and Game conducts all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood, or disability. For information on alternative formats available for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 1-800-478-3648 or (FAX) 907-586-6596. Any person who believes he or she has been discriminated against should write to: ADF&G, P.O. Box 25526, Juneau, Ak. 99802-5526; or O.E.O., U.S. Department of the Interior, Washington, D.C. 20240.*

