

# **INFORMATIONAL LEAFLET NO. 220**

THE PANDALID SHRIMP POT FISHERY OF COOK INLET, ALASKA  
FROM THE INITIATION OF THE FISHERY THROUGH THE SPRING OF 1983

By

Allen S. Davis

---

STATE OF ALASKA  
Bill Sheffield, Governor  
DEPARTMENT OF FISH AND GAME  
Don W. Collinsworth, Commissioner  
P. O. Box 3-2000, Juneau 99802



---

July 1983

THE PANDALID SHRIMP POT FISHERY OF COOK INLET, ALASKA  
FROM THE INITIATION OF THE FISHERY THROUGH THE SPRING OF 1983

by

Allen S. Davis

July 1983

## TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES . . . . .	i
LIST OF FIGURES . . . . .	ii
LIST OF APPENDICES . . . . .	iii
ABSTRACT . . . . .	iv
INTRODUCTION . . . . .	1
CHARACTERISTICS OF THE FISHERY . . . . .	1
Description of the Area . . . . .	1
Species of Shrimp Harvested . . . . .	1
History of Exploitation . . . . .	1
History of Management Regulations . . . . .	4
1982-83 Management Methods . . . . .	9
Description of Vessels and Gear . . . . .	9
Processing Characteristics . . . . .	10
Value of Catch . . . . .	10
SUBSISTENCE/PERSONAL USE FISHERY . . . . .	10
POPULATION INDICATORS . . . . .	12
Research Trawl Surveys . . . . .	12
Commercial Trawl Fishery . . . . .	15
Pot Index Survey . . . . .	15
Length Frequency . . . . .	18
DISCUSSION . . . . .	22
ACKNOWLEDGMENTS . . . . .	22
APPENDICES . . . . .	26

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Cook Inlet pot shrimp catches, boats, and landings by year, 1962-1982 . . . . .	5
2. Pot shrimp catches by guideline harvest level period in the Southern District only . . . . .	6
3. Percentage and total pounds of coonstripe shrimp incidentally harvested during the trawl shrimp commercial fishery in the Southern District . . . . .	7
4. Summary of regulations for the pot shrimp fisheries of Cook Inlet . . . . .	8
5. Annual commercial hrvest in pounds, ex-vessel price, and estimated total value of pot shrimp from Areas "H" and "G" combined, 1970 to 1981 . . . . .	11
6. Coonstripe shrimp catch composition (percent and pounds) of index cruises and population abundance index by month and year for the Southern District . . . . .	13
7. Percent of annual shrimp landings captured west and east of the Homer Spit by monthly period and year . . . . .	16
8. Average catch per pot of coonstripe shrimp catured during index surveys in pounds of shrimp in either 30" x 30" x 30" pots or 48" x 48" x 20" pots (in parenthesis) . . . . .	20

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Cook Inlet area ("H") and Outer Cook Inlet Area ("G") District location chart . . . . .	2
2. Major commercial pot shrimp fishing areas in the Southern District . . . . .	3
3. Comparison of trawl abundance index (spring and fall) and the harvest of coonstripe shrimp in the commercial trawl shrimp fishery 1970-1982 in the Southern District of Cook Inlet . . . . .	14
4. Comparison of trawl abundance index (spring) and the harvest of coonstripe shrimp east of the Spit . . . . .	17
5. Average catch per pot of coonstripe shrimp captured during index cruises to the Southern District of Cook Inlet May 1978 to March 1983 . . . . .	19
6. Growth information for coonstripe shrimp based on length frequency graphs from index and commercial fishing samples . . . . .	21
7. Carapace length frequency by percent of coonstripe shrimp ( <i>P. hypsinotus</i> ) sampled from October pot index surveys of Southern District of Cook Inlet . . . . .	23
8. Length frequency of pot shrimp from Southern District research samples, 10-13 March 1980 (coonstripe shrimp only) . . . . .	24

## LIST OF APPENDICES

<u>Appendix Table</u>	<u>Page</u>
1. Pot shrimp landings, by month, in pounds, Southern District of Cook Inlet (Area H), 1972-1982 . . . . .	27
2. Pot shrimp landings, by month, in pounds, Outer and Eastern Districts of Outer Cook Inlet (Area G), 1972-1982 . . . . .	28
3. Boats delivering pot caught shrimp from Area H during the 1979-80 season . . . . .	29
4. Boats delivering pot caught shrimp from Area H during the 1980-81 season . . . . .	30
5. Boats delivering pot caught shrimp from Area H during the 1981-82 season . . . . .	32
6. Boats delivering pot caught shrimp from Area H during the 1982-83 season . . . . .	33

### Appendix Figure

1. Carapace length frequency in numbers and percent for coonstripe shrimp ( <i>P. hypsinotus</i> ) sampled from spring research trawl surveys . . . . .	34
2. Carapace length frequency in deviation from average number and percent for coonstripe shrimp ( <i>P. hypsinotus</i> ) sampled from spring research trawl surveys . . . . .	35
3. Carapace length frequency in percent and deviation from average number and percent for coonstripe shrimp ( <i>P. hypsinotus</i> ) sampled from fall research trawl surveys . . . . .	36
4. Carapace length frequency in deviation from average number and average percent for coonstripe shrimp ( <i>P. hypsinotus</i> ) sampled from commercial catch deliveries . . . . .	37

## ABSTRACT

The pot shrimp fishery for coonstripe shrimp (*Pandalus hypsinotus*) of Lower Cook Inlet had a history of intermittent landings because of the lack of stable markets. When market demand, fishing effort, and stocks of shrimp were up the catch reached 801,346 lb (363,488 kg) during an unregulated season (1973-74). In recent years the fishing season was split into three fishing periods: 6/1-9/15, 11/1-12/31, and 2/1-3/31. Coonstripe shrimp stocks declined since the 1980-81 season based on pot index surveys and the incidental catch of coonstripe shrimp in the trawl fishery and surveys. The personal use fishery in Kachemak Bay harvested about 35,585 lb (16,141 kg) during 1981. This represented a fourfold increase over the personal use harvest in 1978. A history of management regulations along with present management techniques are discussed. Length frequency information from both trawl and pot caught coonstripe shrimp provided an estimate of age and growth. It appeared that coonstripe shrimp were captured in the pot fishery starting at age II but were most abundant in the landings at age III.

## INTRODUCTION

This leaflet summarizes information concerning the development of the Alaska commercial pot fishery for Pandalid shrimp in Cook Inlet (Area H) and Outer Cook Inlet (Area G) through the spring of 1983 (Figure 1). This fishery was generally exploited by relatively small vessels fishing in Kachemak Bay and adjacent protected waters. A fishery also occurred along the southern Kenai Peninsula coast near Seward.

Annual landings totaled as high as 685,000 lb (310,900 kg) in 1974. Since 1979, annual catches were about 200,000 lb (100,788 kg) with the majority delivered from the Southern District. Most of the information presented in this paper pertains to the Southern District pot shrimp fishery. Outer and Eastern Districts data are included where available.

## CHARACTERISTICS OF THE FISHERY

### Description of the Area

For purposes of shrimp management by the Alaska Department of Fish and Game (ADF&G), Cook Inlet is separated into two regulatory areas as shown on Figure 1: Cook Inlet "H" and Outer Cook Inlet "G".

The major pot shrimp fishery in Lower Cook Inlet occurs in the Southern District primarily within the Kachemak Bay area. Area G, which includes the Outer and Eastern Districts on the southern side of the Kenai Peninsula, was established by the Alaska Board of Fisheries in the spring of 1977.

Figure 2 shows the Kachemak Bay area of Lower Cook Inlet. The cross hatch areas indicate regions of known commercial pot shrimp fishing activity. The area east of a line from Anchor Point to Point Pogibshi is regulated by guideline harvest levels.

### Species of Shrimp Harvested

The pot shrimp fishery in the Southern District of Lower Cook Inlet primarily exploits coonstripe shrimp (*Pandalus hypsinotus*) with some spot shrimp (*P. platyceros*) landed. Incidental catches of pink shrimp (*P. borealis*) and humpy shrimp (*P. goniurus*) are also commonly made in shrimp pots.

### History of Exploitation

The earliest recorded commercial operation for pot shrimp occurred in the Halibut Cove to Tutka Bay area of the Southern District during the late 1950's (Figure 2). A single fisherman captured, processed, and shipped pot caught shrimp to Seattle by air freight. Some portion of the catch was sold in the local area. The majority of the shrimp harvested were coonstripe shrimp with some spot shrimp captured in the Tutka Bay area. Some of the most productive fishing grounds were the waters of Halibut Cove Lagoon (Moss, personal communication, 1982).

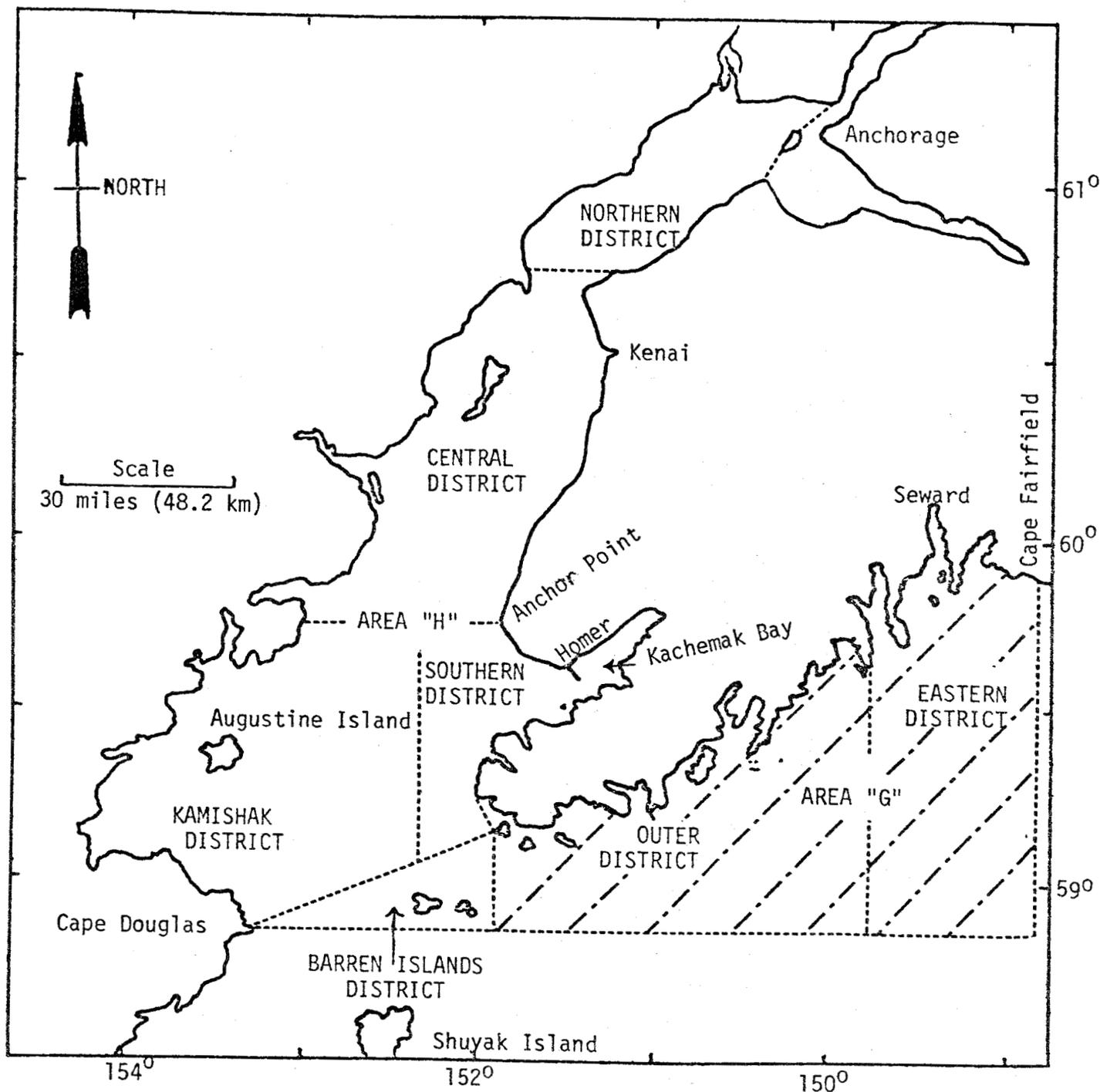


Figure 1. Cook Inlet Area ("H") and Outer Cook Inlet Area ("G") District location chart.

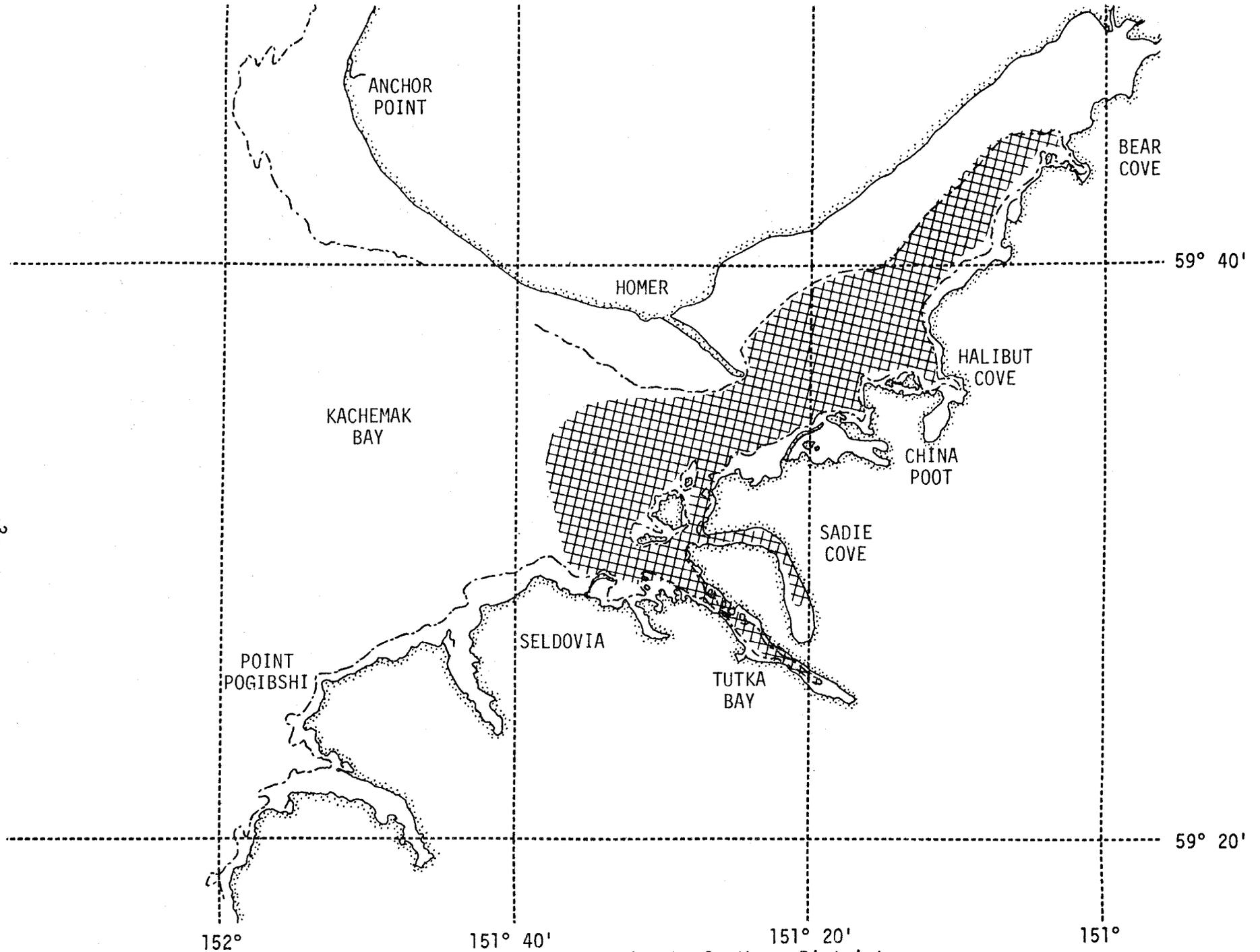


Figure 2. Major commercial pot shrimp fishing areas in the Southern District.

Pot shrimp harvest during the 1960's remained at a low level ranging from only 14 lb (6.4 kg) in 1963 to 23,700 lb (10,442 kg) in 1966 (Table 1). The number of boats and landings ranged from 1 each in 1963 to 4 with 50 landings in 1966. Starting in the early 1970's, the market demand for the relatively large pot caught shrimp increased and the unregulated annual harvest from 44 boats making 1,246 landings attained over a 685 thousand lb (310,806 kg) catch during 1974.

The seasonal catch was based on a 1 June to 31 May fishing season. The catch by month for the Southern District and the Outer and Eastern Districts is listed in Appendix Tables 1 and 2. Seasonal catches in the Southern District reached 800 thousand lb (363,488 kg) during the 1973-74 season (Table 2). The seasonal catch in the most recent seasons (1981-82 and 1982-83) was approximately 150 thousand lb (68,040 kg).

Starting with the 1977-78 season, pot shrimp closures were used to regulated each seasons catch. The harvest levels were based on pre-season pot index surveys along with other population indicators such as incidental harvests of coonstripe shrimp in the commercial trawl fishery and coonstripe abundance based on the trawl index surveys.

The commercial trawl shrimp fishery harvests primarily pink and humpy shrimp. Sidestripe (*Pandalopsis dispar*) and coonstripe shrimp are captured incidental to the major species. In the previous 12 seasons of the trawl fishery (1970-71 to 1981-82), the percentage of coonstripe shrimp varied between 2 and 5% of the total, amounting to between 119,181 and 312,242 lb (54-142 mt) seasonally (Table 3).

In the last 2 fishing years the pot harvest was held near the lower end of the guideline harvest level (approximately 50 thousand lb per season) because of the declining abundance of coonstripe shrimp (Table 3).

#### History of Management Regulations

From the beginning of the fishery through 1973 there were virtually no regulatory measures controlling the pot shrimp fishery in Lower Cook Inlet other than marking buoys with ADF&G numbers and proper licenses (Table 4). Starting in 1974 it was necessary for boats intending to fish for shrimp with pots to register prior to fishing. Guideline harvest levels were established in 1975 from the Kachemak Bay area of the Southern District. East of a line from Point Pogibshi to Anchor Point (Figure 2) two guideline harvest level periods were established, the first from 1 June through 30 September with 100 thousand lb (45 mt) and the second period from 1 October through 31 May with 500 thousand lb (227 mt). Outside of Kachemak Bay within the remaining districts of Area H there were no closed seasons or guideline harvest levels for pot shrimp.

During 1977, the Board of Fisheries separated Area "H" into two registration areas for purposes of shrimp management only (Figure 1). Area "G" seasons were open year around for pot shrimp with no guideline harvest levels.

The first fishing season closure occurred in the guideline harvest level area of the Southern District during the 1977-78 fishing season. Strong market demands by a floating processor, plus land based canneries along with relatively high

Table 1. Cook Inlet pot shrimp catches, boats, and landings by year, 1962-1982.

Year	Boats	Southern <sup>2</sup>		Boats	Outer-Eastern		Total Catch
		Landings	Catch (lbs)		Landings	Catch (lbs)	
1962	1	2	377				377
1963	1	1	14				14
1964	1	24	1,746				1,746
1965	2	2	704				704
1966	4	50	23,700				23,700
1967	1	1	8,550				8,550
1968	3	24	793		1	418	1,211
1969	2	3	131				131
1970	8	29	7,108		11	2,365	9,473
1971	13	186	55,665		1	225	55,890
1972	23	335	165,941		4	5,445	171,386
1973	49	750	324,111		11	2,889	327,000
1974	44	1,246	676,978		11	8,227	685,205
1975	30	920	224,495		12	1,685	226,180
1976	31	905	437,878		2	595	438,473
1977 <sup>1</sup>	51	1,154	463,030		7	1,840	464,870
1978 <sup>1</sup>	56	944	365,988		49	10,154	376,142
1979 <sup>1</sup>	48	607	237,890		14	4,504	242,394
1980	46 <sup>3</sup>	439	208,559	3 <sup>3</sup>	5	2,911	211,470
1981	45 <sup>3</sup>	552	193,153	5 <sup>3</sup>	10	2,031	195,184
1982	30	268	166,301	7	23	2,805	169,106

Data Source: ADF&G Statistical Catch Reports.

<sup>1</sup> Preliminary data.

<sup>2</sup> Season closures and catch restrictions were imposed in the Southern District during 1978 and 1979. Prior to 1978 the season was open all year.

<sup>3</sup> Boat totals for Area H and Area G.

Table 2. Pot shrimp catches by guideline harvest level period in the Southern District only.

Fishing Season	Pot Shrimp Catches			Total
	1 June - 30 September	1 October - 31 May		
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	52,115	199,929		252,044
1977-78 <sup>1</sup>	89,986	506,124		596,110
1978-79 <sup>1</sup>	49,080	121,234		170,314
1979-80 <sup>1</sup>	59,963	177,927		237,890
	<u>1 June - 15 September</u>	<u>1 November - 31 December</u>	<u>1 February - 31 March</u>	
1980-81	74,368	134,191	116,698	325,257
1981-82 <sup>1</sup>	56,092	47,859 <sup>2</sup>	49,855	153,806
1982-83 <sup>1</sup>	54,153	49,130	53,294	156,577

Data Source: ADF&G Statistical Catch Reports.

<sup>1</sup> Preliminary data.

<sup>2</sup> 1 November - 31 January season.

Table 3. Percentage and total pounds of coonstripe shrimp incidentally harvested during the trawl shrimp commercial fishery in the Southern District.

Fishing Season	Coonstripe		Total Harvest Pounds
	Percent	Pounds <sup>1</sup>	
1970-71	5	312,242	5,905,988
1971-72	5	217,717	4,520,906
1972-73	4	195,184	4,753,492
1973-74	3	131,079	4,805,632
1974-75	2	119,181	5,031,912
1975-76	3	145,072	4,419,009
1976-77	5	228,917	4,998,986
1977-78	4	193,056	5,037,946
1978-79	3	151,142	6,012,799
1979-80	2	143,526	5,797,426
1980-81	2	141,560	6,179,279
1981-82	3	120,781	4,995,499
1982-83	2	68,623	3,020,854

<sup>1</sup> Based on number/lb weighting (Davis 1982).

Table 4. Summary of regulations for the pot shrimp fisheries of Cook Inlet.

Year	District	Actual Season		Guideline Harvest Level	Registration	
		From	To			
1973-74	All	No Closed Season			Non-Exclusive	
1974-75	All	No Closed Season			"	"
1975-76	Southern	1 Jun	30 Sep	100,000	"	"
	Southern	1 Oct	31 May	500,000	"	"
	Other	No Closed Season			"	"
1976-77	Southern	1 Jun	30 Sep	100,000	"	"
	Southern	1 Oct	31 May	500,000	"	"
	Other	No Closed Season			"	"
1977-78	Southern	1 Jun	30 Sep	100,000	"	"
	Southern	1 Oct	10 Feb	500,000	"	"
	Rest of "H" "G"	No Closed Season			"	"
1978-79	Southern	1 Jun	6 Aug	100,000	"	"
	Southern	1 Oct	26 Oct	500,000	"	"
	Rest of "H" "G"	No Closed Season			"	"
1979-80	Southern	1 Jun	15 Aug	100,000	"	"
	Southern	1 Oct	20 Oct	500,000	"	"
	Rest of "H" "G"	No Closed Season			"	"
1980-81	Southern	1 Jun	27 Jun	50,000-100,000	"	"
	Southern	1 Nov	16 Nov	50,000-100,000	"	"
	Southern	1 Feb	23 Feb	50,000-100,000	"	"
	Rest of "H" "G"	1 Jun	31 Mar		"	"
1981-82	Southern	1 Jun	27 Jul	50,000-100,000	"	"
	Southern	1 Nov	31 Jan	50,000-100,000	"	"
	Southern	1 Feb	31 Mar	50,000-100,000	"	"
	Rest of "H" "G"	1 Jun	31 Mar		"	"
1982-83	Southern	1 Jun	7 Aug	50,000-100,000	"	"
	Southern	1 Nov	20 Nov	50,000-100,000	"	"
	Southern	1 Feb	26 Feb	50,000-100,000	"	"
	Rest of "H" "G"	1 Jun	31 Mar		"	"

prices (\$.70 to \$.91 per lb) prompted increased fishing effort. The guideline harvest level (500,000 lb, 227 mt) for the second season, which opened 1 October 1977 was harvested by 10 February 1978 and the district was closed. Two fishing seasons per year (summer and fall) were allowed through the 1979-80 fishing year. Starting in 1980-81 the seasons were changed to three with equal guideline harvest levels in each season. In recent years the pot shrimp market demand has lessened along with fishing effort. During the 1981-82 fishing year the seasons were relatively long. Many of the fishermen sold their pot caught shrimp directly to consumers in the Homer area.

### 1982-83 Management Methods

Techniques for managing pot shrimp in the Southern District included three annual fishing seasons starting in June, November, and February with guideline harvest level ranges of 50 thousand to 100 thousand lb (22-45 mt) during each season. The actual harvest level was determined prior to each season and depends on the results of pot index surveys conducted in May, October, and March. Other population abundance indicators included the incidental catch of coonstripe shrimp captured during trawl index surveys (May and October) and the coonstripe shrimp catch in the commercial trawl shrimp fishery which operates from July through February. Details of each population abundance indicator are discussed later in this paper.

The management strategy for the fishery was to spread the harvest throughout the year so that most segments of the stock were harvested. Late winter and spring harvests were avoided to protect the female shrimp during the egg release time period.

The 12-year annual average commercial harvest of coonstripe shrimp by pots was about 300 thousand lb (136 mt). This information suggested that the population could sustain a harvest of this level without showing a decline in the total coonstripe shrimp population. The annual guideline harvest level of 150 thousand to 300 thousand lb (68-136 mt) was set considering the low figure to be a conservative harvest and the upper figure an average catch. If population abundance indicators remained static or above previous levels, the commercial harvest would have been held to 300 thousand lb (136 mt) annually. If the indicators declined, then the harvest levels would have been held near this lower figure.

### Description of Vessels and Gear

Pot shrimp was generally considered a supplemental income fishery. If market demand and ex-vessel price were both high, then fishermen would participate. Vessels participating in the 1979-80 through 1982-83 pot shrimp fisheries are listed in Appendix Tables 3, 4, 5, and 6. The fishing seasons that each vessel engaged in is also listed for reference. A total of 48, 51, 26, and 39 boats, respectively, fished in each of the four fishing years.

The average keel length of vessels in the fishery declined from 38.1 ft (11.6 m) in 1979-80 to 32.4 ft (9.9 m) in the 1982-83 fishing season (Appendix Tables 3-6).

Shrimp pot gear consisted of many sizes and shapes. Many of the vessels engaged in the pot fishery were relatively small, therefore, most of the pots were light

enough to be handled by hand on deck. Some gear was of conical shape with loose webbed bottoms so that pots could be nested together for transporting.

There were three types of rigid frame pots that were used most consistently in the fishery; 48 x 48 x 20 inch pots, 30 x 30 x 30 inch pots, and 18 x 18 x 30 inch pots (1.2 x 1.2 x .5 m, .8 x .8 x .8 m, .5 x .5 x .8 m). These pots all have either single or combination tunnel openings with 2-1/2 to 3 inch (6.3 - 7.6 cm) diameter rings in the opening. The pot tunnels were generally covered with 1-1/4 to 1-1/2 inch (3.2 to 3.81 cm) stretch measure mesh, some pots were partially covered with burlap type material which was tightly woven with no mesh openings.

The larger 48 x 48 x 20 inch (1.2 x 1.2 x .5 m) pots were normally fished on a single line leading to the surface buoy while the other pots were usually long-lined with between six to ten pots on a single line. During comparative soak times the 18 x 18 x 30 inch (.5 x .5 x .8 m) pots generally caught the least shrimp per lift, while the 30 x 30 x 30 inch (.8 x .8 x .8 m) pots fishing nearby normally caught twice the poundage of the smaller gear during the same time period. The 48 x 48 x 20 inch (1.2 x 1.2 x .5 m) pots caught about one third to one half more than the 30 inch (.8 m) square pots in the same soak time. In most cases bait used for shrimp was chopped herring in bait containers. Occasionally hanging bait was used such as flounder scraps or other fresh fish.

#### Processing Characteristics

During recent years the market demand for pot caught shrimp was low and commercial processing facilities purchased relatively few pounds of the product. Most of the shrimp were sold directly to consumers uncooked with no processing involved.

Those shrimp purchased by canneries were generally "individually quick frozen" (IQF) and sold as whole, uncooked, frozen shrimp in 5 lb (2.3 kg) packages. A small portion of the harvest was cooked and sold as unfrozen, cooked shrimp to local consumers.

#### Value of Catch

The ex-vessel price of pot shrimp varied considerably within any given year. Table 5 lists the average price paid to fishermen and total estimated value of the annual landings. During the first season of the 1982-83 fishery, prices ranged from \$.80 a pound (processor price) to \$1.50 a pound (direct sales from vessel to consumers). The annual total value is an estimate based on the average price. Values have ranged from a low in 1970 of \$4,300 to high values during 1977 and 1978 of over \$360 thousand. With declining catch and reduced guideline harvest levels of recent years (since 1979), the value has been in the \$135 thousand to \$200 thousand range.

### SUBSISTENCE/PERSONAL USE FISHERY

The Sport Fish Division of the ADF&G conducted catch surveys of sport boats operating out of the Homer small boat harbor during the 15 May to 15 September

Table 5. Annual commercial harvest in pounds, ex-vessel price, and estimated total value of pot shrimp from Areas "H" and "G" combined, 1970 to 1981.

Year	Total Catch "H" and "G"	Price per Pound \$	Total Value \$ <sup>2</sup>
1970	9,473	.45	4,300
1971	55,890	.35	19,600
1972	171,386	.39	66,800
1973	327,000	.35	114,400
1974	685,205	.39	267,200
1975	226,180	.42	95,000
1976	438,473	.42	184,200
1977	469,242	.79	370,700
1978	379,222	.95	360,300
1979	242,394	.80	193,900
1980	211,470	.85	179,700
1981	195,184	.90	175,700
1982	169,106	.80	135,300

<sup>1</sup> Values are approximate due to variability in price paid to fishermen by the different processors. Price per pound are estimates of an overall average paid by year rounded to the nearest whole cent.

<sup>2</sup> Rounded to nearest \$100.00.

1978 period. Aerial surveys of Kachemak Bay and adjoining bays were completed to estimate the number of vessels. Approximately 6% of the fishermen operating sport boats were interviewed at the Homer boat harbor. It was estimated that 27,525 angler days were expended in the Lower Cook Inlet area with an estimated harvest of 8,892 lb (4,042 kg) of shrimp along with harvest of crabs, clams, salmon, and halibut. The accuracy of these data was plus or minus 30% of the point estimate.

During the annual Sport Fish Division mail survey (Mills 1982), the shrimp harvest was added as a category for 1981. It was estimated that 60,336 angler days were spent in the Kachemak Bay area by personal use fishermen. These fishermen are generally opportunists and harvest or attempt to harvest several different species of fish and shellfish during any angler day. During 1981 it was estimated that 7,117 gallons of shrimp were harvested. Using 5 lb (2.3 kg) per gallon conversion, the estimated harvest was 35,585 lb (16,141 kg) of pot caught shrimp. Most fishing effort occurred in the area northeast of the Homer Spit adjacent to the Homer boat harbor.

## POPULATION INDICATORS

The relative abundance of coonstripe shrimp in the Southern District was measured by three separate methods; research index trawl surveys (conducted from 1971 to 1982), harvest of coonstripe shrimp in the commercial shrimp trawl fishery (1970-71 to 1982-83), and shrimp pot index surveys (1978 to 1982). The results from each method are presented separately in this section.

### Research Trawl Surveys

Index surveys of the relative abundance of Pandalid shrimp species in the Southern District of Cook Inlet were conducted from 1971 to 1982 during the spring and from 1976 to 1982 during the fall (Davis 1982). These surveys were aimed primarily at trawl shrimp species (pink and humpy), however, coonstripe shrimp were regularly captured during the surveys.

Even though the surveys were conducted by trawls, the sampling area encompassed a major pot shrimp fishing ground. The trawl indexes of abundance were not considered to be total available population estimates in pounds but rather indicators of population trends when compared to other surveys conducted during similar time periods.

Species composition of the surveys is listed on Table 6 as percentage of the survey and as an abundance index in pounds. The percentage of coonstripe shrimp ranged from a spring survey low of 1.3% to a high of 6.1%.

Fall survey percentages ranged from 0.7% to 3.0%. The abundance index values are plotted on Figure 3 by year. These data suggest the coonstripe population was relatively high from 1973 to 1977 and has generally declined in more recent years.

Table 6. Coonstripe shrimp catch composition (percent and pounds) of index cruises and population abundance index by month and year for the Southern District.

Year	Month	Species Composition %				Abundance Index (million lb)	Coonstripe Abundance Index (thousand lb)
		Pink	Humpy	Coon	Side		
1971	May	83.8	9.9	1.9	4.4	3.7	70.5
1972	May	62.0	33.2	1.3	3.5	7.7	100.4
1973	May	67.5	27.3	1.8	3.4	16.9	303.9
1974	Jun	81.6	7.9	2.2	8.3	13.6	298.6
1975	May	74.8	16.6	2.7	5.9	16.2	437.1
1976	May	82.6	5.3	3.6	8.5	7.7	277.5
1977	Jun	83.4	3.3	6.1	7.2	5.8	354.3
1978	May	67.9	24.8	1.3	6.1	11.5	150.1
1979	May	78.3	14.3	2.3	5.1	10.6	243.6
1980	May	63.4	23.6	1.9	11.1	7.3	139.0
1981	May	72.7	13.8	4.2	9.3	6.9	290.8
1982	May	73.2	12.6	3.4	10.8	4.4	148.5
1976	Oct-Dec	69.0	20.8	3.0	7.2	10.3	307.5
1977	Nov	58.1	29.2	2.0	10.7	10.5	210.2
1978	Oct	47.4	45.9	1.7	5.0	16.5	280.9
1979	Oct	45.2	50.4	0.7	3.7	16.1	113.0
1980	Oct	57.8	34.5	1.5	6.2	24.0	360.9
1981	Oct	57.8	30.4	1.6	10.2	7.9	126.0
1982	Oct	71.2	16.0	2.5	10.3	7.4	184.8

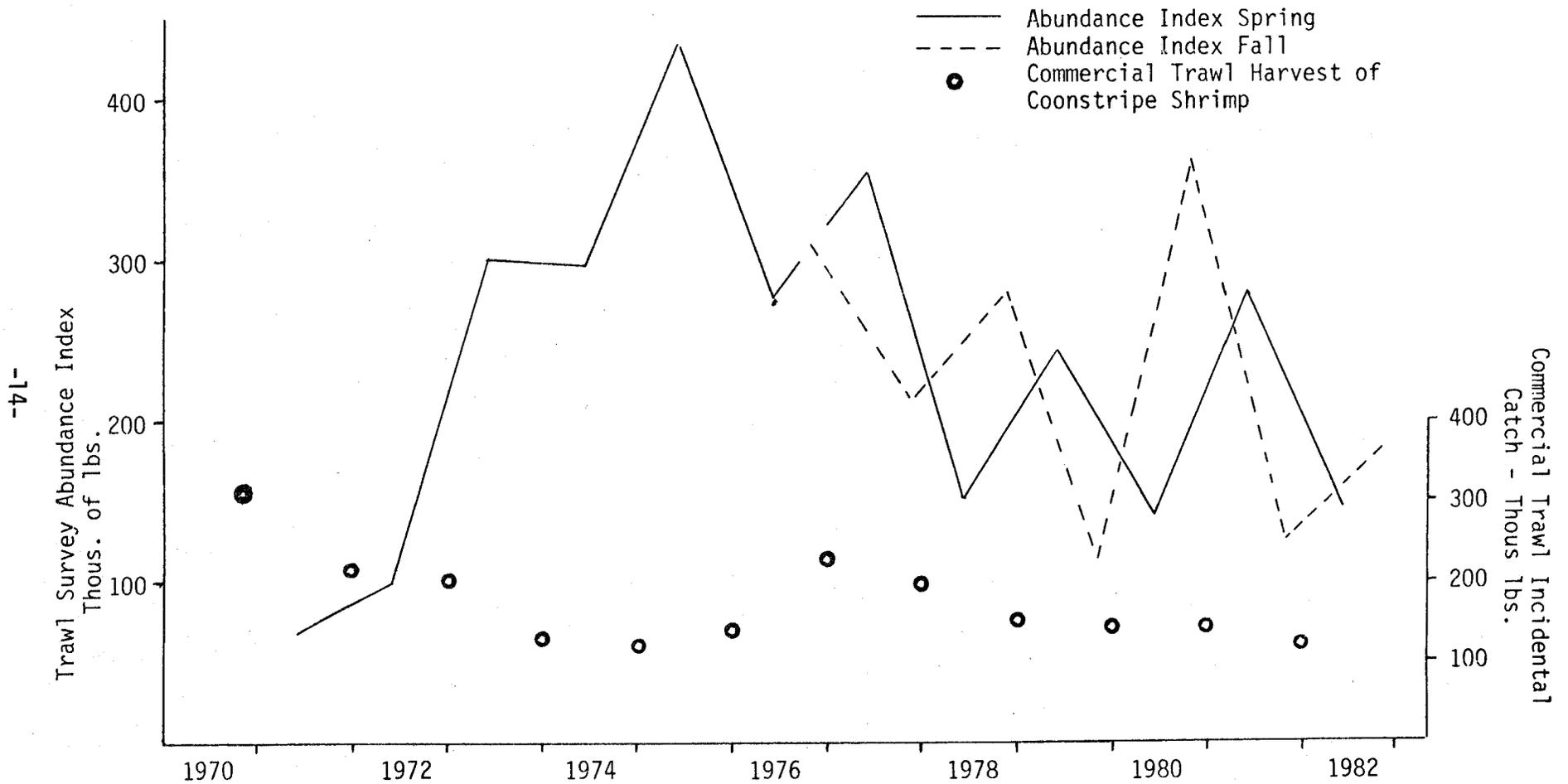


Figure 3. Comparison of trawl abundance index (spring and fall) and the harvest of coonstripe shrimp in the commercial trawl shrimp fishery 1970-1982 in the Southern District of Cook Inlet.

## Commercial Trawl Fishery

Another indicator of relative abundance of coonstripe shrimp was the pounds of the species harvested in the commercial trawl fishery (Table 3). This fishery was regulated on a guideline harvest level basis for a total Pandalid shrimp catch in a given season. Approximately the same harvest was landed from the Southern District (5.0 million lb) since the early 1970's, except for 1978 and 1980, when 6.0 million lb were landed. Species composition sampling of the harvest starting in 1970-71 provided an estimate of the seasonal take of each species of shrimp.

The total pounds of coonstripe shrimp harvested in the commercial trawl fishery are plotted by fishing season on Figure 3 along with the trawl survey abundance index values. The coonstripe harvest in the trawl fishery was relatively high in 1970 and declined until the 1974-75 season. The catch remained relatively stable since the 1978-79 season ranging between 121 thousand to 151 thousand lb (54.9 to 68.5 mt).

These data were based on total fishing seasons with no consideration given to the areas fished by the commercial trawl fleet or the time of year. Figure 3 suggests the coonstripe abundance based on coonstripe harvests in the commercial trawl fishery was declining through the early 1970's. Table 7 lists the percentage of shrimp by 3-month periods harvested east or west of the Homer Spit (Figure 2). During those years when minimal trawling occurred east of the Spit, the percentage of coonstripe shrimp in the trawl harvests should be low. The most consistent commercial trawling east of the Spit occurred during the October to December period from 1974 to 1981. The October to December percentage of coonstripe shrimp in the commercial samples multiplied by the harvest of shrimp east of the Spit during the fall period provided an indication of coonstripe abundance in the area. When these data are plotted (Figure 4) with the May abundance trawl index for coonstripe shrimp east of the Spit, the curves show a decline in abundance from 1976-77 on.

## Pot Index Survey

The shrimp pot index survey program is described in Davis 1979. The initial survey was conducted in May of 1978. Three annual surveys (March, May, and October) have been completed since then. The first surveys were conducted using shrimp pots with dimensions of 30 x 30 x 30 inches (.8 x .8 x .8 m) each pot had four tunnels and were covered with 1-3/16 inch (3 cm) mesh throughout. These pots were fished on a long line with either four or five pots per station. Beginning in the spring of 1980, 48 x 48 x 20 inch (1.2 x 1.2 x .5 m) pots were constructed and fished adjacent to the smaller strings of pots in the same fishing locations. A comparison of the two types of gear indicated that the larger pots usually out-fished the smaller pots on similar stations. It appeared that the smaller 30 x 30 x 30 inch (.8 x .8 x .8 m) pots had an upper catch limit, while the larger pots had the ability to catch larger poundages of shrimp. During the spring of 1982, 30 additional 48 x 48 x 20 inch (1.2 x 1.2 x .5 m) pots were constructed and the smaller pots were retired from the pot index program. The May and October 1982 surveys were conducted entirely with the larger pots.

Table 7. Percent of annual shrimp landings captured west and east of the Homer Spit by monthly period and year.

Year	WEST OF SPIT				EAST OF SPIT			
	Jan-March	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1969		21.2	29.6	6.4			1.7	41.1
1970		25.5	31.5	7.8	26.0	5.1		6.2
1971	20.2	16.4	27.3	20.7	15.0		0.5	
1972	15.5	12.8	40.6	31.2				
1973	12.4	9.4	33.0	45.2				
1974	21.4	12.0	44.7	21.6				0.2
1975	31.3	0.1	39.6	11.2				17.8
1976	21.8	.8	37.6	23.6	1.6		0.6	14.0
1977	9.8	closed	36.8	32.6	4.6	closed	5.9	10.4
1978	1.3	17.7	18.4	32.6	20.6	3.6	0.3	5.5
1979	closed	closed	54.6	41.0	closed	closed		4.4
1980	22.1	closed	26.7	28.7	15.9	closed	0.1	6.5
1981	26.6	closed	31.3	20.9	10.0	closed	0	11.2
1982								

Data Source: Commercial Trawl Logbooks.

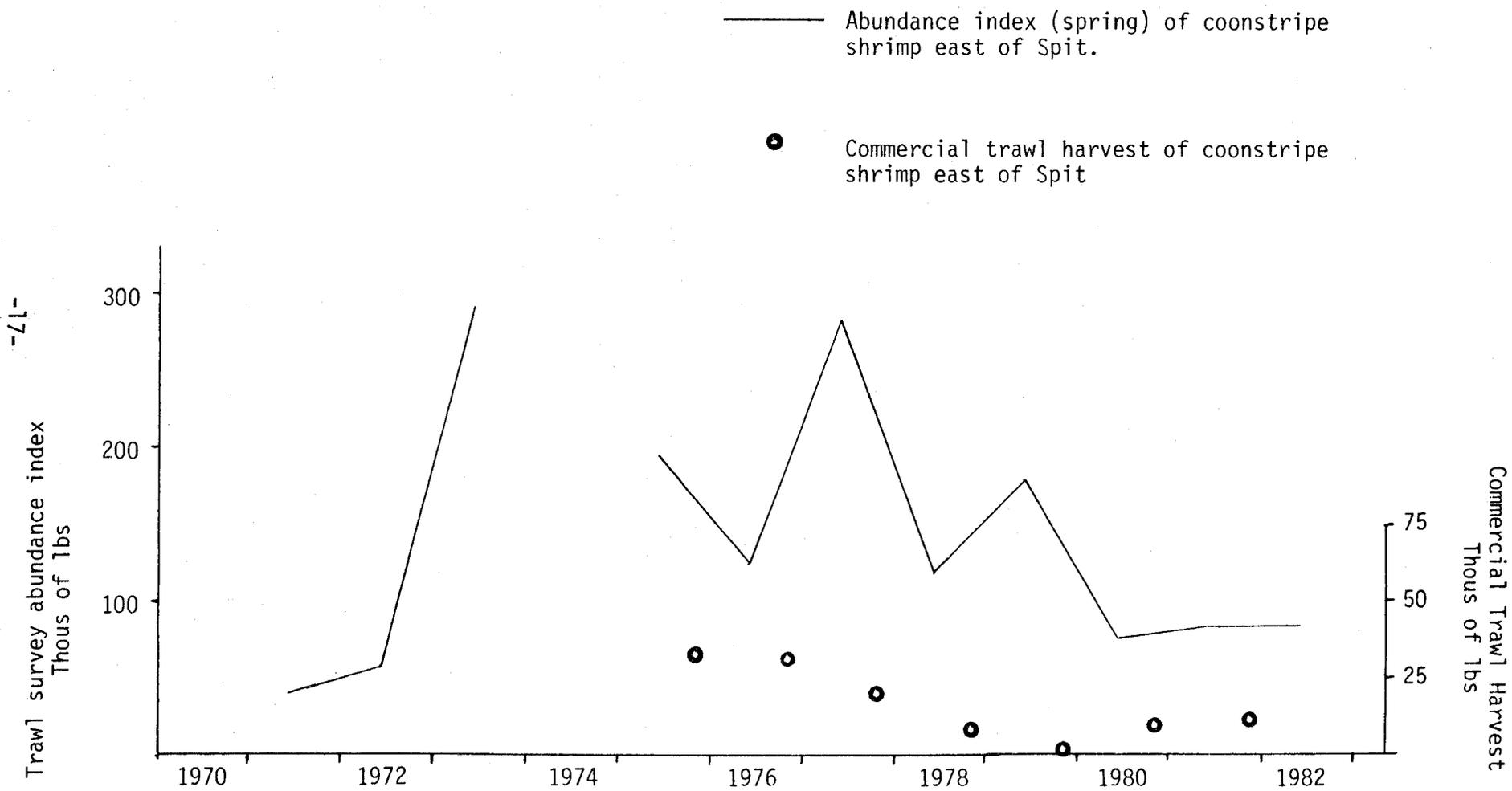


Figure 4. Comparison of trawl abundance index (spring) and the harvest of coonstripe shrimp east of the Spit.

Three 48 x 48 x 20 inch (1.2 x 1.2 x .5 m) pots were placed in each fishing station, spaced approximately 300 yards (274 m) apart. These pots were fished on individual riser lines and buoyed separately. Each pot was baited with two bait jars containing frozen chopped herring and soak times are kept as close to 24 hours as practical. The catch from each pot lifted was sorted by species and the coonstripe and spot shrimp were weighed. At the completion of each survey a summary of the results was made available to interested fishermen. These summaries are listed in the Lower Cook Inlet Data Report series.

The average catch per pot information was grouped into three areas for comparison purposes as follows: East of the Homer Spit, west of the Spit, and the Tutka-Sadie Cove area (Figure 2). A summary of the average catch per pot of coonstripe shrimp from May 1978 to March 1983 is shown on Table 8. During those surveys when two sizes of pots were fished, both average catches are listed in the table, with the larger pots data in parenthesis. In general, an overall decline occurred throughout most areas with the largest decline recorded west of the Spit. Figure 5 shows plots of the two types of gear by survey. The trend is generally down for the average catch per pot. The Tutka-Sadie Cove area appears to have the least decline for the three areas. A comparison of the surveys by time of year showed that the smallest catches generally occurred during the May survey (Table 8). In the spring of the year, pandalid shrimp species disperse throughout their range after the egg release period in the late winter or early spring. During the October and March surveys the shrimp are more concentrated which results in larger catches.

#### Length Frequency

The commercial pot fishery for coonstripe shrimp harvested the largest individuals of the population. The mesh size in many of the commercial pots allowed the smaller shrimp to escape. Length frequency sampling from the commercial pot fishery did not show long term trends such as strong or weak year classes passing through the fishery. Samples from the commercial trawl harvest and trawl index fishing provided a broader range of size frequencies and were not biased towards the larger shrimp. Carapace length frequencies from the research trawl surveys (May and October) are graphed on Appendix Figures 1, 2, and 3. These data are presented in four separate ways: (1) Carapace length in numbers of shrimp, (2) carapace length by percentage, (3) deviation of the average number, and (4) deviation from the average percentage (Davis 1982).

Commercial trawl fishery samples for the October through March period of each fishing season are also shown on Appendix Figure 4 for the deviation from average number and deviation from average percentage.

Growth estimates for coonstripe shrimp were estimated from the carapace length frequency graphs based on the research and commercial catch samples (Figure 6). These estimates suggest the upper and lower limits of the increments for each years growth. These arbitrary lines were also fitted on the length frequency graphs in Appendix Figures 1 and 2 to test for fit. It looks as if in most years the shrimp growth fitted the age lines. From these data, it appears that coonstripe shrimp entered the commercial pot fishery at age II but were most abundant at age III. These age and growth estimates were compared to data from British Columbia where Butler (1964) suggests that age I shrimp have an average carapace

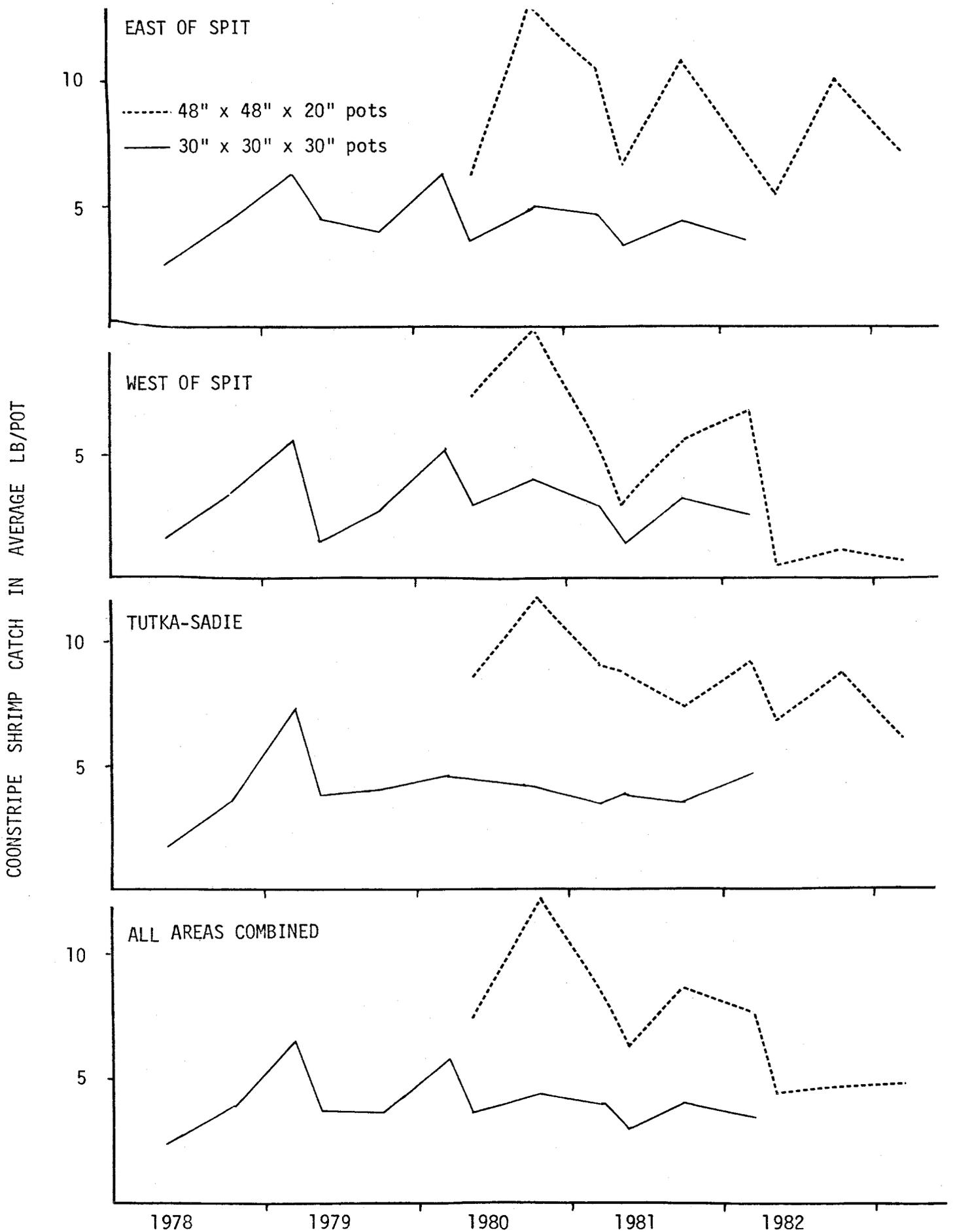


Figure 5. Average catch per pot of coonstripe shrimp captured during index cruises to the Southern District of Cook Inlet May 1978 to March 1983.

Table 8. Average catch per pot of coonstripe shrimp captured during index surveys in pounds of shrimp in either 30" x 30" x 30" pots or 48" x 48" x 20" pots (in parenthesis).

		<u>MARCH</u>	<u>MAY-JUNE</u>	<u>OCTOBER</u>
East of Spit (Upper Bay)	1978		2.7	4.3
	1979	6.2	4.4	3.9
	1980	6.1	3.4 (6.1)	4.7 (13.1) <sup>1</sup>
	1981	4.5 (10.4)	3.3 (6.6)	4.4 (10.8)
	1982	3.5 ( 7.0)	(5.5)	( 9.9)
	1983	( 7.1)		
West of Spit (Outer Bay)	1978		1.6	3.3
	1979	5.5	1.5	2.7
	1980	5.1	2.9 (7.1)	3.9 (11.0) <sup>1</sup>
	1981	2.7 ( 5.2)	1.4 (2.7)	3.2 ( 5.3)
	1982	2.5 ( 6.7)	(0.5)	( 1.0)
	1983	( 0.8)		
Tutka-Sadie	1978		1.7	3.5
	1979	7.2	3.7	3.8
	1980	4.5	4.4 (8.5)	4.1 (11.7) <sup>1</sup>
	1981	3.9 ( 8.7)	3.8 (8.7)	3.5 ( 7.3)
	1982	4.7 ( 9.2)	(6.6)	( 8.6)
	1983	( 6.0)		
All Areas Combined	1978		2.3	3.9
	1979	6.4	3.5	3.6
	1980	5.7	3.5 (7.3)	4.3 (12.2) <sup>1</sup>
	1981	3.8 ( 8.3)	2.9 (6.1)	3.9 ( 8.5)
	1982	3.5 ( 7.6)	(4.5)	( 7.0)
	1983	( 4.8)		

<sup>1</sup> November 1980

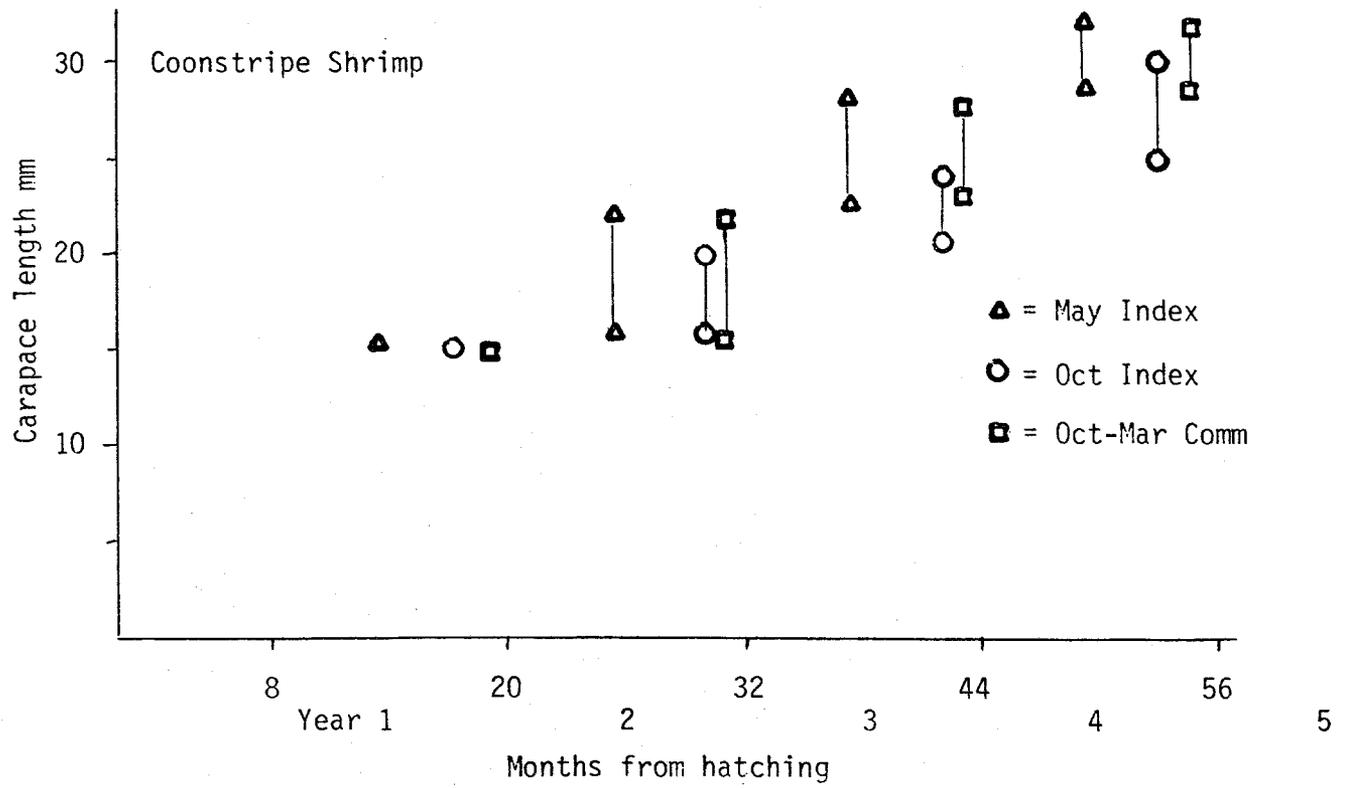


Figure 6. Growth information for coonstripe shrimp based on length frequency graphs from index and commercial fishing samples.

length of 17.4 to 21.1 mm at 12 months of age. At 24 months the average carapace length was 2.5 mm.

During the pot index surveys carapace length frequency sampling was completed for each survey. Figure 7 plots the carapace length by percentage for the fall surveys. These graphs show all sexes grouped together. The vertical dotted lines indicate the apparent age classes. These groupings vary somewhat with the age classes estimated from the trawl index surveys. It is obvious that index pots do not capture large numbers of shrimp in the smaller size classes.

As an example of the size frequency by area, Figure 8 plots carapace length frequency by percentage for three areas of the Southern District from the March 1980 pot index survey. These results are typical of pot index surveys in that the largest shrimp are captured west of the Spit, with the smaller size groups found in the upper bay (east of the Spit) and the Tutka-Sadie Cove stations.

## DISCUSSION

Based on the population abundance indicators of coonstripe shrimp in the Southern District of Cook Inlet the numbers of coonstripe shrimp appear to be declining. This reduction in population size of coonstripe shrimp parallels similar reductions in other pandalid shrimp species in the district. The largest decline occurred in the area west of the Homer Spit. It was observed that groundfish e.g., halibut (*Hippoglossus stenolepis*), gray cod (*Gadus macrocephalus*), pollock (*Theragra chalcogramma*) abundance increased considerably during the years the shrimp population declined.

The commercial pot shrimp harvest was regulated at a conservative level in recent years (since the 1980-81 fishing season), well below the historic average commercial pot catch. The subsistence/personal use fishery doubled in effort from 1978-1981 and the estimated harvest increased four times in the same period. If the decline in coonstripe shrimp continues in its present path, it may be necessary to further curtail the pot fisheries to an even lower harvest level.

Carapace length frequency studies suggest that coonstripe shrimp are most abundant in the commercial pot harvest at age III. Studies to date have not clarified the length of time coonstripe shrimp remain available for harvesting.

## ACKNOWLEDGMENTS

Doug Loshbaugh is commended for his work in completing the species composition and length frequency sampling of the commercial and research shrimp catches. The crew of the State vessel PANDALUS including Paul Desjardin, Craig Forrest, and Marge Lusby is thanked for their assistance in completing the shrimp abundance surveys. Robin Kelm is complimented for typing this paper.

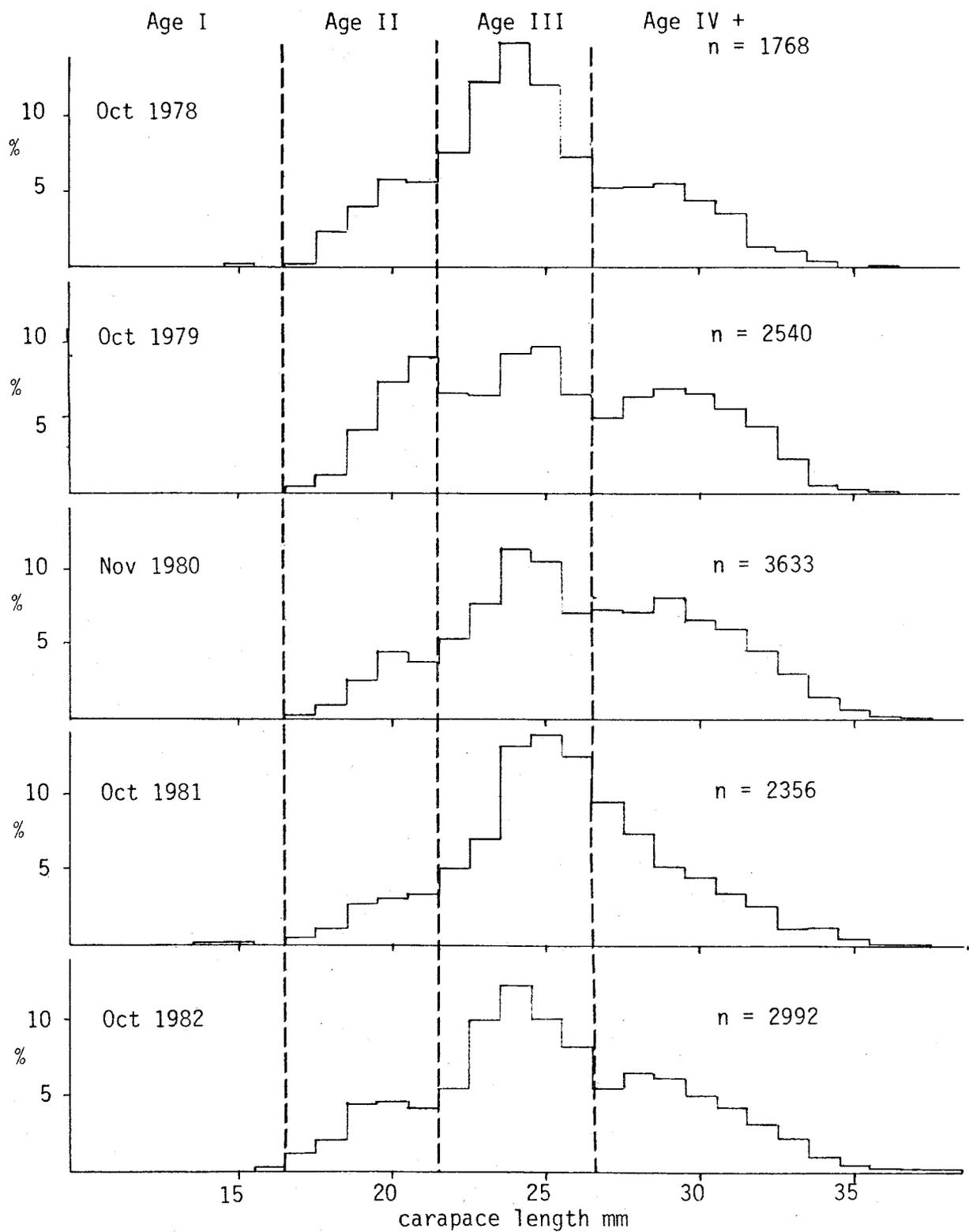


Figure 7. Carapace length frequency by percent of coonstripe shrimp (*P. hypsinotus*) sampled from October pot index surveys of Southern District of Cook Inlet.

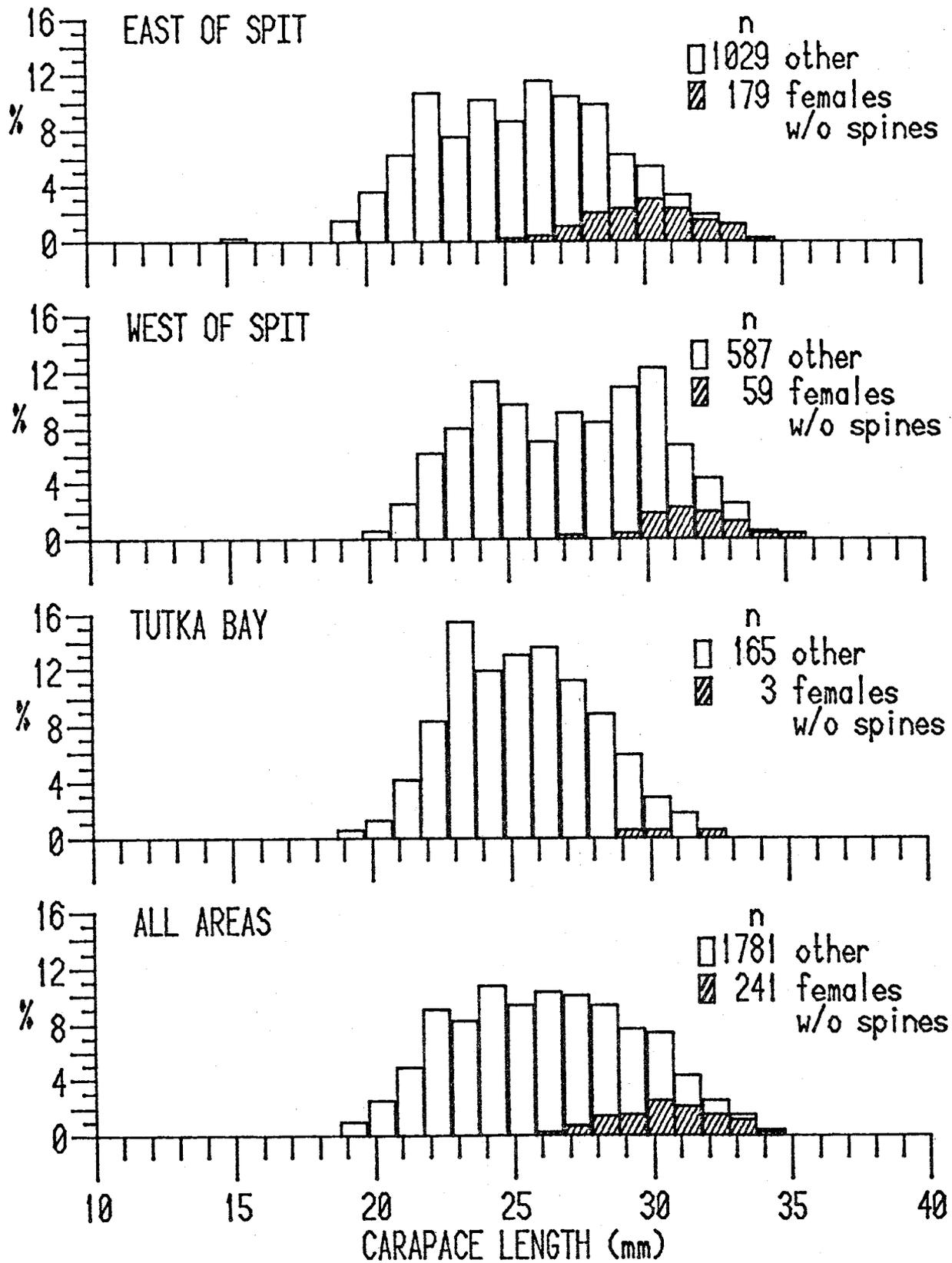


Figure 8. Length frequency of pot shrimp from Southern District research samples, 10-13 March 1980 (coonstripe shrimp only).

#### LITERATURE CITED

- Butler, T.H. 1964. Growth, reproduction, and distribution of Pandalid shrimps in British Columbia. J. Fish. Res. Bd. Canada 21(6), 1964.
- Davis, Allen S. 1979. Shrimp pot fishing in the Cook Inlet area, 1978-79 fishing season. LCI Data Report 79-1. ADF&G, Homer, Alaska. 38 pp.
- Davis, Allen S. 1982. The commercial otter trawl shrimp fishery of Cook Inlet. ADF&G, Commercial Fisheries Division, Juneau, Alaska. October 1982.
- Mills, Michael J. 1982. Statewide harvest study federal aid in fish restoration and anadromous fish studies. Vol. 23. Pg. 61-62.

#### PERSONAL COMMUNICATION

- Moss, Robert. 1982. Former Alaska Board of Fish and Game member (now Board of Fisheries) and pioneer Cook Inlet shrimp fisherman.

APPENDICES

Appendix Table 1. Pot shrimp landings, by month, in pounds, Southern District of Cook Inlet (Area H), 1972-1982.

MONTH	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
January											1,494	13,883
February											1,463	35,235
March											11,764	18,634
April					72					960	6,434	32,115
May					167				540	3,680	7,257	22,081
June					424			131	401	2,872	23,063	20,239
July						8,550			1,706	260	24,191	11,946
August			276						1,115	4,945	11,752	20,036
September			1,046				216		384	759	16,241	10,960
October	169	14	424	699			244		2,471	13,251	3,242	33,738
November				5	11,757		189		491	26,720	29,288	66,864
December	208				11,280		144			2,218	29,752	38,380
Total	377	14	1,746	704	23,700	8,550	793	131	7,108	55,665	165,941	324,111

	1974	1975	1976	1977	1978	1979	1980	1981	1982
January	60,793	6,894	30,060	9,870	186,046				13,133
February	47,955	11,776	55,515	10,896	7,189			104,716	12,975
March	203,161	33,370	91,994	8,949					36,910
April	259,209	18,657	57,073	17,164	342				
May	28,065	21,630	7,713	9,272					
June	14,278	22,823	8,676	11,041	19,405	11,470	74,368	31,384	22,668
July	15,517	28,639	10,282	9,022	25,046	20,901		24,708	24,568
August	8,645	28,775	14,007	21,388	4,296	27,592			8,680
September	5,210	20,528	19,150	47,094					
October	8,067	9,924	47,379	85,442	123,664	177,927			
November	10,898	12,483	84,885	134,090			134,191	18,988	
December	15,180	8,996	11,144	98,829				13,357	
Total	676,978	224,495	437,878	463,030	365,988	237,890	208,559	193,153	

Data Source: 1962-1978 Final ADF&G Statistical Reports.  
 1979-1982 ADF&G Preliminary Monthly Shellfish Report.

Appendix Table 2. Pot shrimp landings, by month, in pounds, Outer and Eastern Districts of Outer Cook Inlet (Area G), 1972-1982.

MONTH	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
January									120			
February									860			350
March									1,024		3,115	330
April									361		1,445	665
May											737	737
June							418				148	
July												
August												
September												457
October										255		350
November												
December												
Total							418		2,365	255	5,445	2,889

	1974	1975	1976	1977	1978	1979	1980	1981	1982
January	420		320		482				
February	335		275		2,327	231			
March				370	3,516	2,195			338
April					3,829				642
May	1,927	342						848	276
June	3,535	629		256					135
July	1,700	137		212			203		320
August	310	185				1,060			78
September						725	79	553	
October						293	576	410	
November		392		239			2,053		
December				763				220	
Total	8,227	1,685	595	1,840	10,154	4,504	2,911	2,031	

Data Source: 1962-1978 Final ADF&G Statistical Reports.  
 1979-1982 ADF&G Preliminary Monthly Shellfish Report.

Appendix Table 3. Boats delivering pot caught shrimp from Area H during the 1979-80 season.

VESSEL	79-80 <sup>1</sup>		ADF&G #	KEEL LENGTH	NET TONS	HORSEPOWER
	1	2				
Agathon		x	39014	32	4	85
Anna K	x	x	28371	26	4	190
Blue Mist		x	22150	32	12	
Carol Sea	x	x	15901	32	5	250
Chaira	x		33745	28	2	200
Claudia C		x	32521	31.9	11	420
Corrina Kay		x	35513	35	29	500
Crystal Dawn		x	06040	32	4	30
Dee Dee II		x	04932	32	7	150
Dunai	x		14450	30	5	210
Eleanor B		x	15884	32	4.5	40
Eleon		x	25671	22	10	210
Fairlead		x	36810	34	11	260
Goose		x	27877	39	12	240
Jimbo	x		03517	37		
Jordan		x	27772	37	12	210
King of Alaska		x	07825	26	2	170
Lady Jean		x	05633	32	4.5	75
Lester	x		07335	36	10	91
Lobo Delmar		x	32845	36	11	660
Midnight Sun	x		00708	33	10	130
Miss Arctic		x	06120	44	21	165
Miss Charlotte	x		10831	49	12	160
Mistress		x	11257	36	15	125
Mitsu Maru		x	05654	33	12	170
Moccasin		x	11258	32	5	230
Nenevia		x	25668	36	6	210
New Golub		x	35736	40	14	240
Northwind		x	28363	36	11	320
Okean		x	25673	37	10	210
Pearl		x	13496	33	5	85
Porky		x	15254	37.5	9	163
Puddle Jumper		x	39696	27	3	200
Raduga		x	37002	40	12	450
Roy	x	x	09051	29	10	160
Ruslan		x	36919	39	12	270
Scana		x	36933	40	17	400
Sever		x	28370	39	9	210
Slava		x	25701	26	5	210
Sockeye		x	08568	30	4	50
Stormy Marie	x		33967	34	2	350
The Go Get 'Em		x	36245	22	1	280
Tortuga		x	20416	42	17	165
Volga		x	22708	39	10	210
Vostok		x	25788	36	10	240
Wassilisila	x		38149			
Woodburn	x	x	29393	24	12	210
Wayward Wind		x	37951	47	21	375

<sup>1</sup> 1 - Jun. 1 - Aug. 15, 1979  
 2 - Oct. 1 - Oct. 20, 1979

Average 38.1 9.5

Appendix Table 4. Boats delivering pot caught shrimp from Area H during the 1980-81 season.

VESSEL	80-81 <sup>1</sup>			ADF&G #	KEEL LENGTH	NET TONS	HORSEPOWER
	1	2	3				
Argonaut		x		25755	30	8	210
Atlas			x	20543	23	13	290
Blue Mist		x		22150	32	12	
Canadian Sky	x			30977	20	1	120
Carol Sea	x			15901	32	4.5	
Claudia C	x			32521	31.9	11	420
Cold Duck			x	29042	24	4	210
Dunai	x	x		14450	30	5	210
Eleanor B	x			15884	32	4.5	40
Eleon		x	x	24671	22	10	210
Fairlead		x	x	36810	34	11	260
Favor		x	x	27713	33	10	270
Gemini		x	x	01518	72	65	350
Goose		x	x	27877	39	12	240
Halibut Warrior							
	x			35658	18	2	50
Jimbo	x			03517	37	7	
Jordan		x		27772	37	12	210
King of AK.	x	x	x	07825	26	2	170
Lobo Delmar		x		32845	36	11	660
Mallard	x			31563	19	1	75
Matros		x	x	36049	40	11	245
Midnight Sun		x	x	00708	33	10	130
Miss Arctic			x	06120	44	21	165
Miss Charlotte							
	x			10831	49	12	160
Moccasin		x	x	11258	32	5	230
Moroz		x	x	32666	33	11	210
Nenevia		x		25668	36	6	210
New Golub		x	x	35736	40	14	240
Nordyke		x		00147	36	12	
Okean		x	x	25673	37	10	210
Pearl	x			13496	33	5	85
Pobeda			x	25704	22	5	240
Pogoda		x	x	25705	22	10	240
Raduga			x	37002	40	12	450
Ruslan	x	x	x	36919	39	12	270
Sarah M	x			38240	38	13	250
Scana	x			36933	40	17	400
Sea Venture I		x	x	39907	43	17	385
Sever		x	x	28370	39	9	210
Slava	x	x	x	25701	26	5	210
Snug Nine	x	x	x	14159	32	6	85
Sockeye	x		x	08568	30	4	50
Svet			x	27716	39	12	230
Svoboda	x			27724	37	11	210

-Continued-

Appendix Table 4. Boats delivering pot caught shrimp from Area H during the 1980-81 season (continued).

VESSEL	80-81 <sup>1</sup>			ADF&G #	KEEL LENGTH	NET TONS	HORSEPOWER
	1	2	3				
Te-Ja		x		37910	22	4.5	185
Vesna		x	x	22710	21	15	210
Volga		x		22708	39	10	210
Volna		x	x	27715	22	12	270
Wayward Wind		x	x	37951	47	21	375
White Knight		x		36595	34	11	350
Woodburn	x		x	29393	24	12	210
Yor	x		x	39149	<u>42</u>	<u>26</u>	120
Average					34	11	

<sup>1</sup> 1 - 1 Jun - 27 Jun 1980  
 2 - 1 Nov - 16 Nov 1980  
 3 - 1 Feb - 23 Feb 1981

Appendix Table 5. Boats delivering pot caught shrimp from Area H during the 1981-82 season.

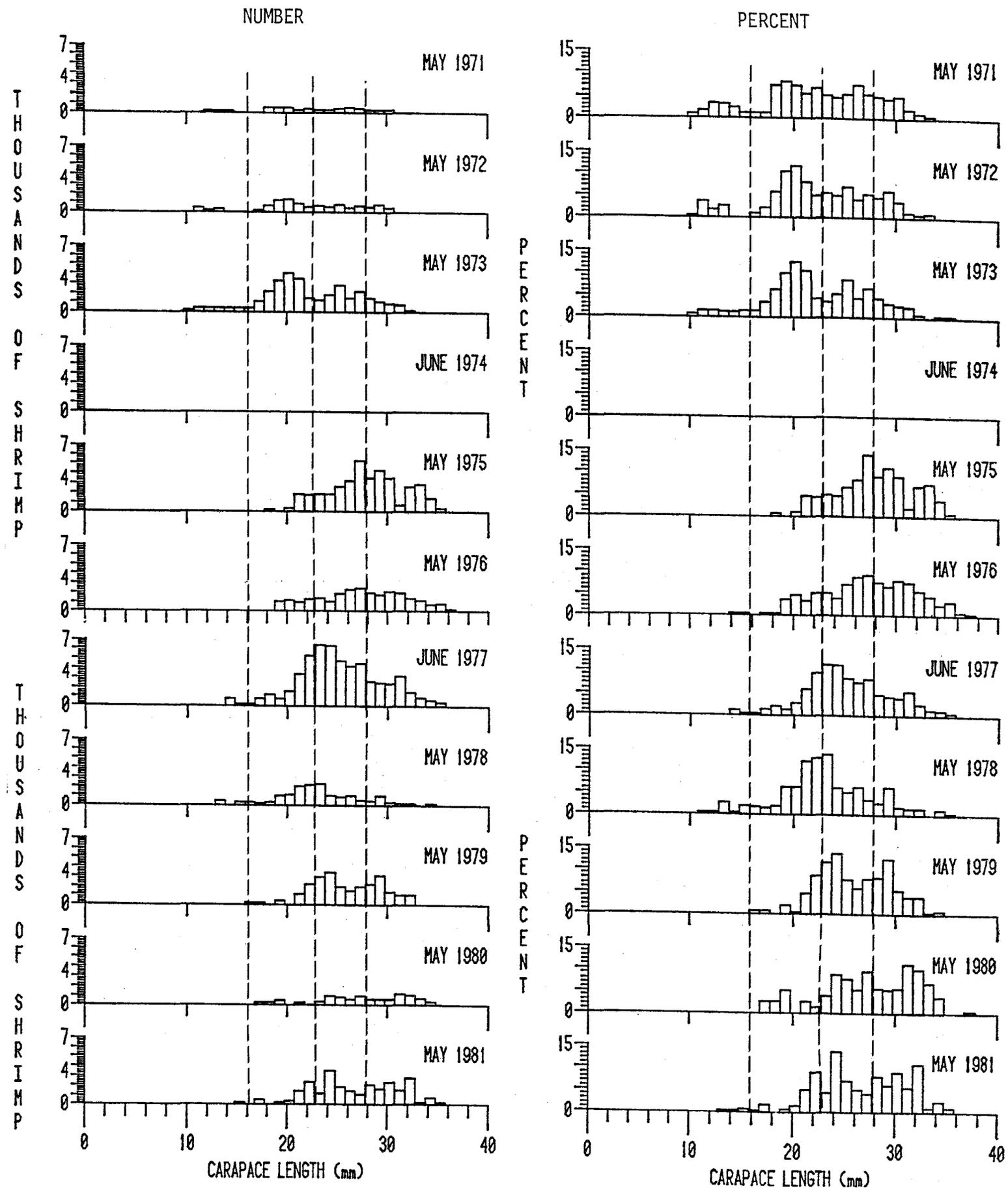
VESSEL	81-82 <sup>1</sup>			ADF&G #	KEEL LENGTH	NET TONS	HORSEPOWER
	1	2	3				
Canadian Sky	x			30977	20	1	120
Cape Kasilof	x		x	04010	36	5	190
Carol Sea	x	x	x	15901	32	5	250
Caviar	x	x	x	40846	28	2.5	130
Cockleshell	x			41640	22	2	130
Gee Jo II	x			41087	20	1	135
Jimbo	x			03517	37	7	200
Joleen			x	41774	34	19	185
King of Ak.	x			07825	26	2	170
Matros		x	x	36049	40	11	245
Midnight Sun	x	x	x	00708	33	10	130
Moccasin			x	11258	32	5	230
Molnia		x		41082	37	9	260
Okean		x		25673	37	10	210
Orel	x			27719	30	10	240
Pearl	x	x	x	13496	33	10	80
Peregrine	x			32976	28	5	200
Pussycat	x			39370	21	1	170
Sea Jay			x	12930	21	1	150
Sea Venture Ix	x			39907	43	17	385
Snug Nine			x	14159	32	6	85
Violet	x	x	x	11887	63	40	220
Warjack		x		12717	36	4	120
Wayward Wind	x		x	37951	47	21	375
Wilson		x	x	12973	45	19	165
Woodburn	x			29393	24	12	210
Average					33	10	

<sup>1</sup> 1 - 1 Jun - 27 Jul 1981  
 2 - 1 Nov - 31 Jan 1982  
 3 - 1 Feb - 31 Mar 1982

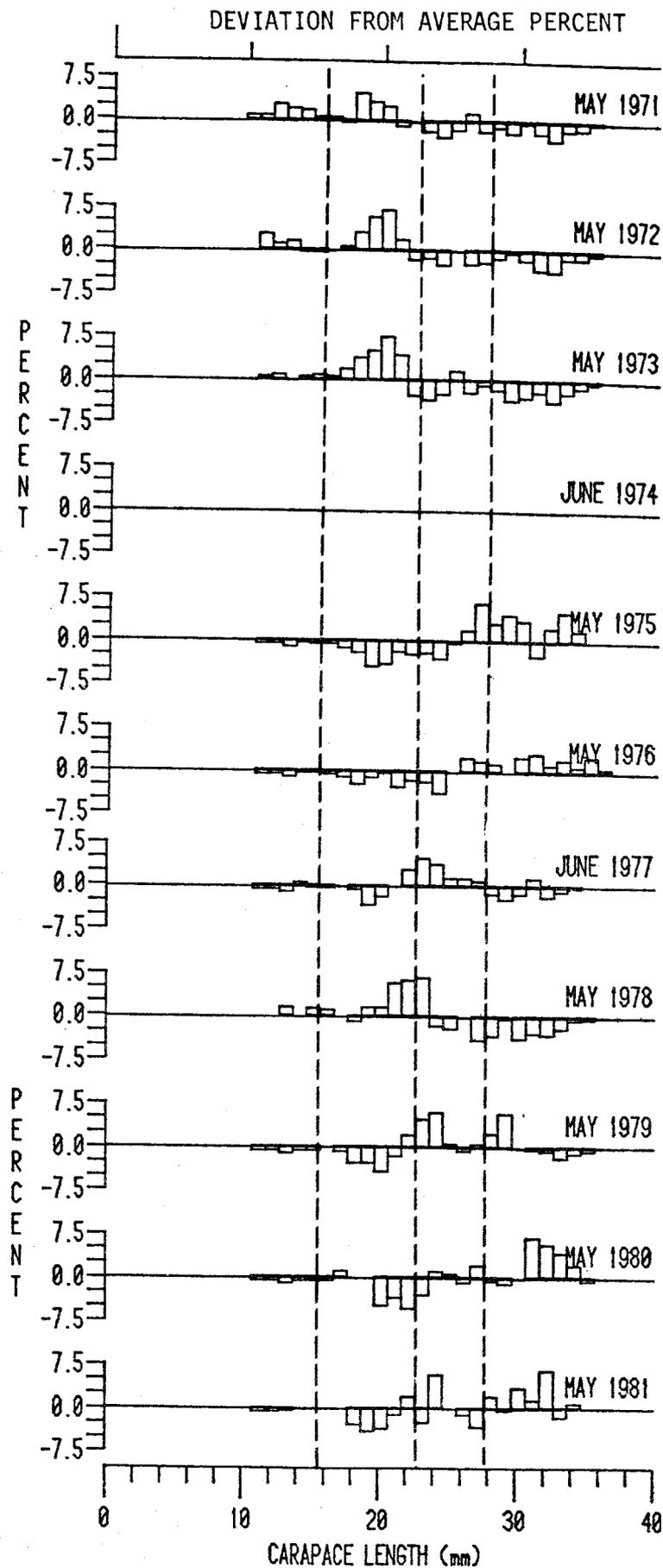
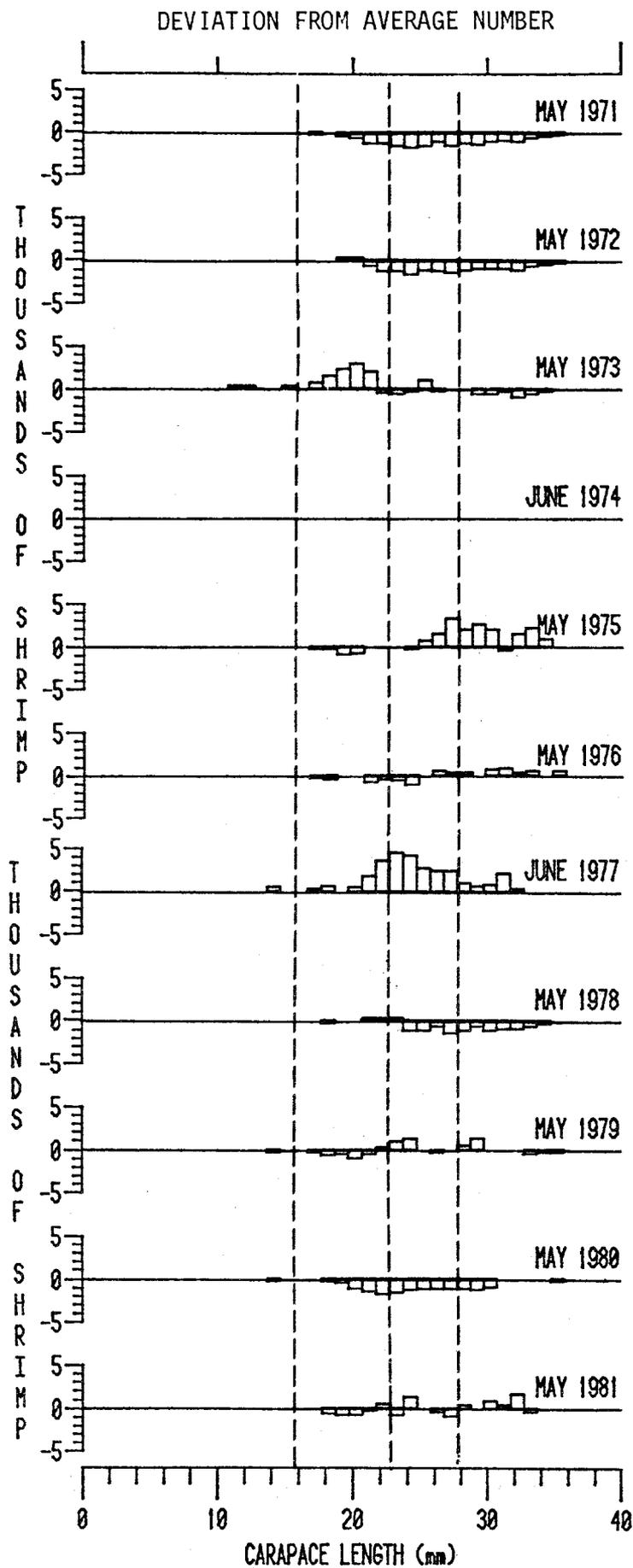
Appendix Table 6. Boats delivering pot caught shrimp from Area H during the 1982-83 season.

VESSEL	82-83 <sup>1</sup>			ADF&G #	KEEL LENGTH	NET TONS	HORSEPOWER
	1	2	3				
Aialik Cape	X			22461	32	5	150
American Eagle			X	21849	48	11	150
Argonaut			X	25755	30	8	210
Atlas			X	20543	23	13	290
Autumn Mist		X		16112	32	7	165
Blue Goose			X	09234	32	15	40
Canadian Sky	X			30997	20	1	120
Cape Kasilof	X			04010	36	5	190
Coral Sea		X		15901	36	12	200
Caviar	X			40846	28	2.5	130
Cornflake	X			31494	22		70
Eider	X			04200	23.5	1.5	85
Eleon			X	25671	37	10	210
Favor			X	27713	22	10	270
Gee Jo II	X			41087	20	1	135
Jordan			X	27772	30	12	320
Lois		X		01222	36	5	65
Matros			X	36049	35	13	210
Midnite Sun	X	X		00708	33	10	130
Mocassin	X	X	X	11258	32	11	200
Malnia			X	41082	37	9	260
Nenevia			X	27668	24	5	210
Oppekiss	X			40293	32	2	400
Pearl	X			13496	33	5	85
Peregrine	X			32976	28	5	200
Polaris	X			41640	22		130
Ribbak			X	25871	36	5	240
Robby	X			03550	33	8	300
Scandia	X	X		44022	38	14	285
Sea Venture I	X			39907	43	27	385
Snug 9	X	X	X	14159	32	6	59
Stariski Star	X			39407	32	4	260
Tigger II		X		15645	30	3	190
Vagrant	X			27705	32.5	12	140
Vesna			X	22710	21	15	210
Violet	X	X	X	11887	60	25	200
Volga			X	22708	39	10	210
Volna			X	27715	37	8	270
Wayward Wind		X		37951	47	25	375
Average						32.4	9.2

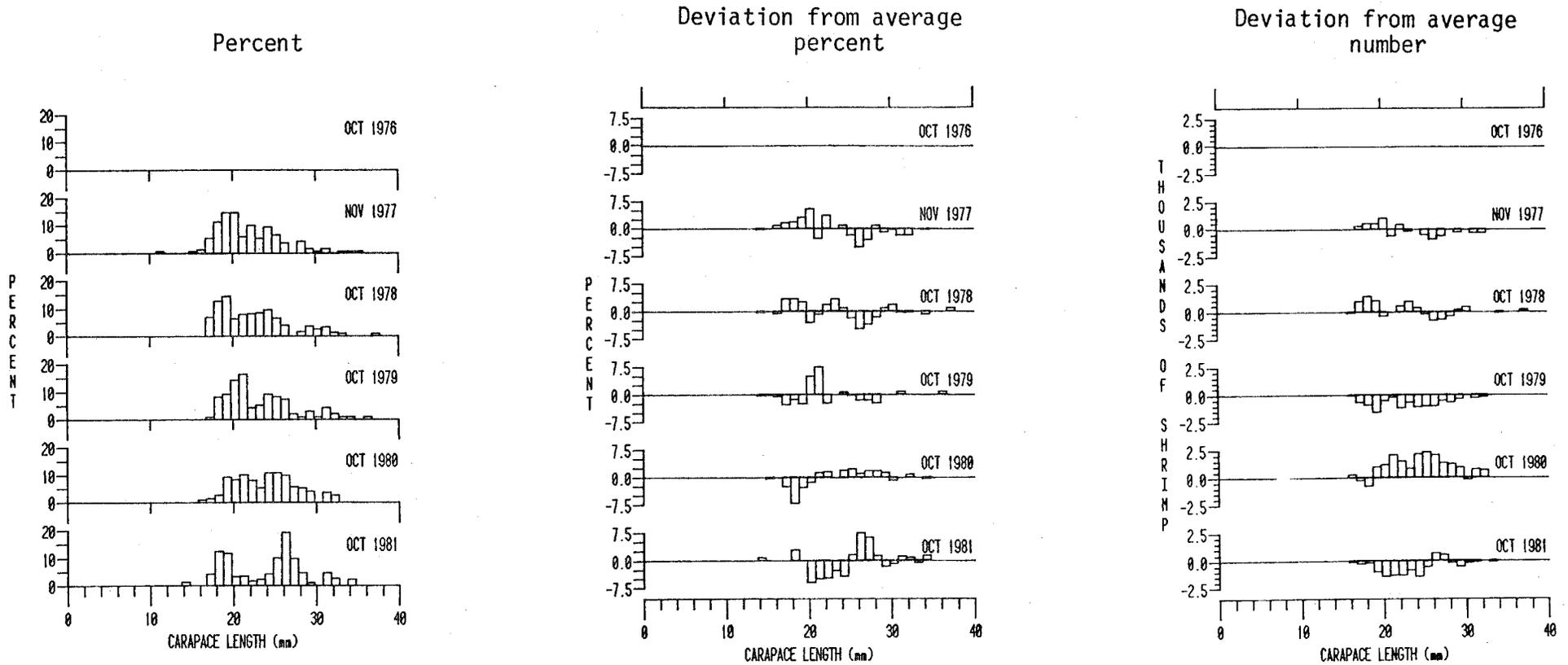
<sup>1</sup> 1 - 1 Jun - 7 Aug 1982  
 2 - 1 Nov - 20 Nov 1982  
 3 - 1 Feb - 26 Feb 1983



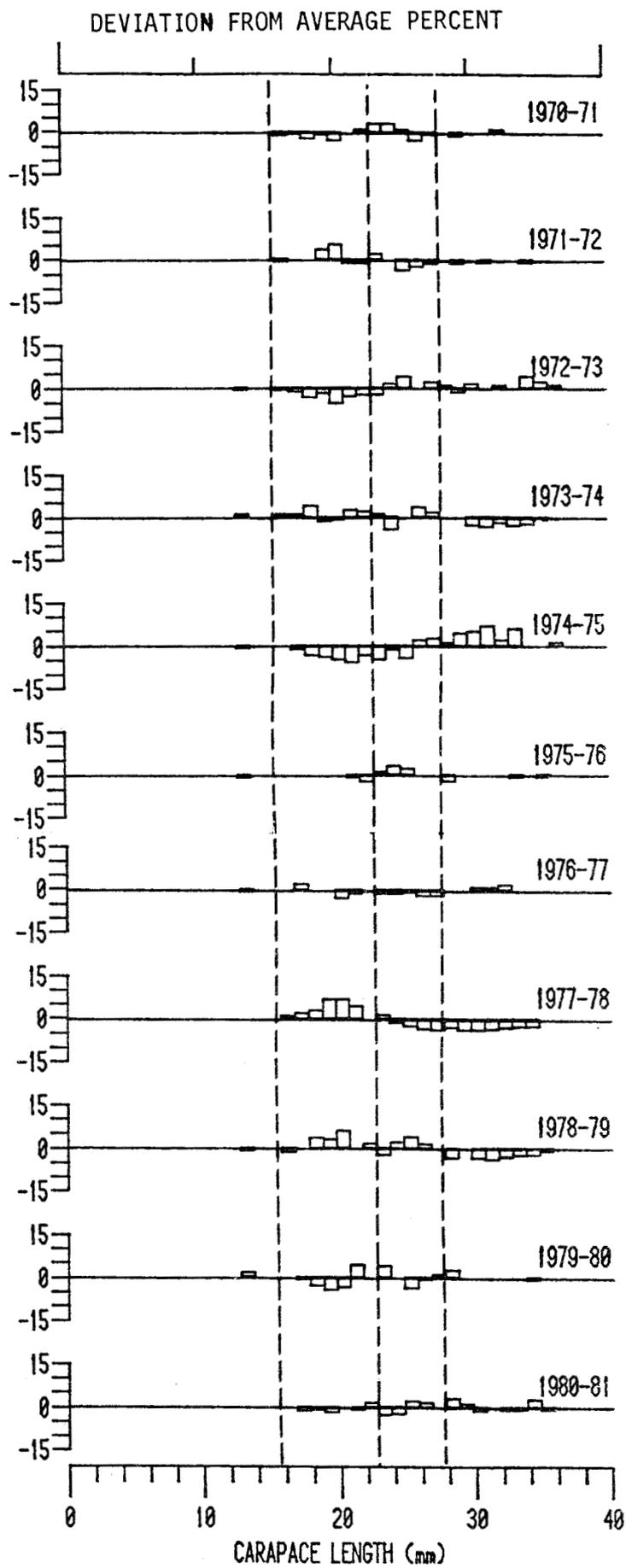
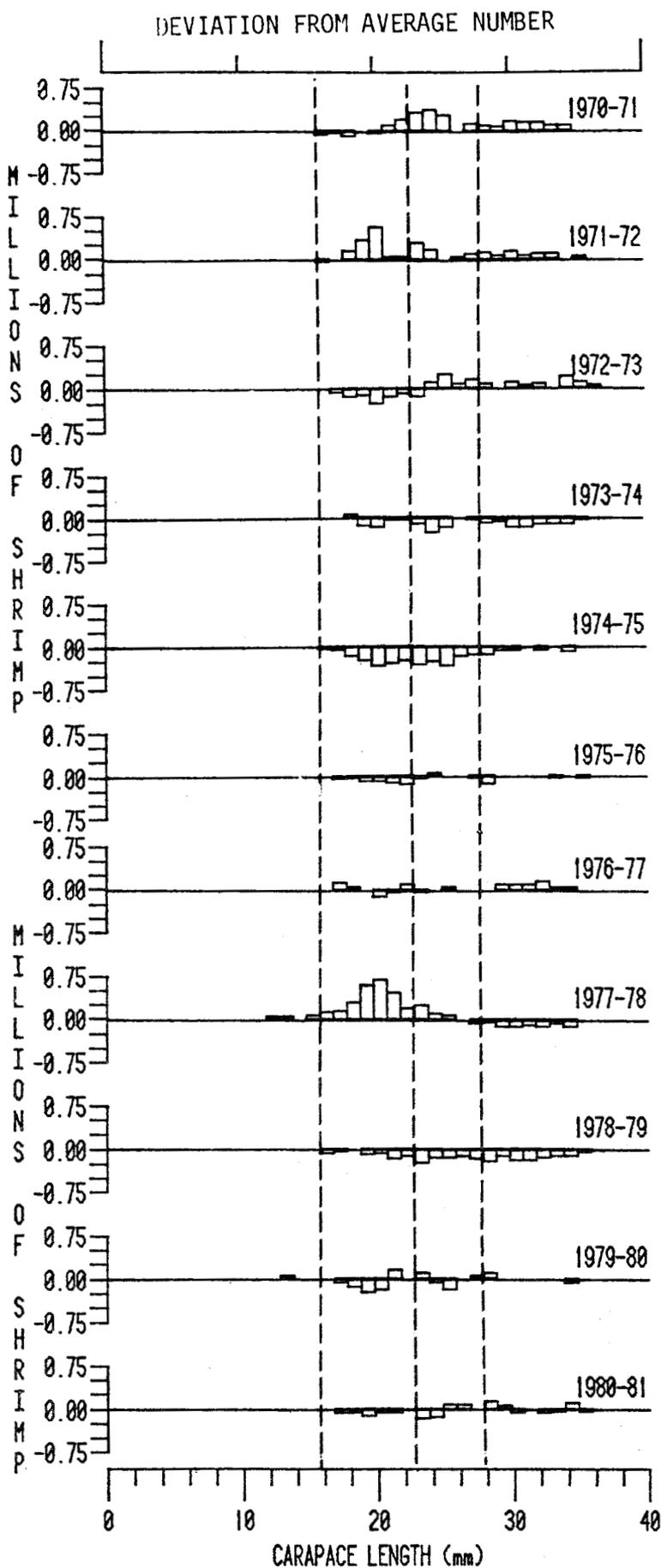
Appendix Figure 1. Carapace length frequency in numbers and percent for coonstripe shrimp (*P. hypsinotus*) sampled from spring research trawl surveys.



Appendix Figure 2. Carapace length frequency in deviation from average number and percent for coonstripe shrimp (*P. hypsinotus*) sampled from spring research trawl surveys.



Appendix Figure 3. Carapace length frequency in percent and deviation from average number and percent for coonstripe shrimp (*P. hypsinotus*) sampled from fall research trawl surveys.



Appendix Figure 4. Carapace length frequency in deviation from average number and average percent for coonstripe shrimp (*P. hypsinotus*) sampled from commercial catch deliveries.

The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-6077, (TDD) 907-465-3646, or (FAX) 907-465-6078.