Report to the Board of Fisheries

SHELLFISH FISHERIES

Region I: Southeast Alaska-Yakutat

Alaska Department of Fish and Game
Commercial Fisheries Division
Juneau, Alaska

Regional Information Report No. 1J99-47

January 2000

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Section 1

Introduction to Shellfish Fisheries

REPORT TO THE BOARD OF FISHERIES,

INTRODUCTION TO SHELLFISH FISHERIES

By
Doug Woodby

Regional Information Report[1] No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

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INTRODUCTION

This report reviews the commercial fisheries for shellfish and miscellaneous dive species in Region 1, which consists of Southeast Alaska (Registration Area A) and Yakutat (Registration Area D). Area A encompasses all waters within the Alexander Archipelago and offshore waters from Dixon Entrance to Cape Fairweather, divided into Districts 1 through 16 (Figure 1.1). Area D encompasses state waters from Cape Fairweather to Cape Suckling, divided into Districts 81 through 91. Shellfish fisheries in these areas are primarily in state waters; however, a few fisheries with state management authority, such as weathervane scallops, extend into the Exclusive Economic Zone (EEZ). Data for king and Tanner crab fisheries are summarized in this introduction for comparative purposes, but are not described in later chapters. Fisheries for king and Tanner crab were considered by the board during the previous year (1998/99).

Shellfish harvests in Region 1 totaled over 12 million pounds valued at over $17 million during the last completed season or year (Table 1.1). In the top five fisheries, Southeast Tanner crab was the most valuable, followed by Southeast Dungeness crab, Southeast pot shrimp, sea cucumber, and sea urchins. In poundage, sea urchins were first, followed by Southeast Dungeness crab, then beam trawl shrimp, and Southeast Tanner crab.

Most of the shellfish fisheries are fully developed. Some stocks have been able to sustain consistent and significant harvests. The red king crab fishery was reopened in 1993 after eight years of closure and provided five years of harvests somewhat above the regulatory threshold of 300,000 pounds. The fishery was closed in 1998 due to low stock strength in a few harvest areas.

Other fisheries are in various stages of development. The pot shrimp fishery, limited to entry, has seen large increases in harvest and effort in the past decade. The sea urchin fishery is in its third year of operation with quotas remaining over 4 million pounds. Geoducks have had fairly stable landings, but their increased value, particularly for live shipments, is increasing the demand for expansion of the fishery. On the down side, the abalone fishery remains closed with little prospect for rebuilding, particularly with growing populations of sea otters in the region. Yakutat Dungeness and Tanner crab fisheries are in a collapsed state and will remain closed beginning in 2000 until they show signs of recovery and a management plan and research program are developed to provide for sustained yields.

Limited entry has played a significant role in harvest and effort trends. Recently limited fisheries include Southeast Dungeness crab, Southeast pot shrimp, Southeast trawl shrimp, and geoducks, pending approval of the Attorney General. The other dive fisheries, abalone, urchins, and sea cucumbers, are still under consideration for limited entry.

Shellfish Research and Management

The ability of the department to provide for large and sustained yields varies among the fisheries. Those fisheries with stock assessment programs and management plans are most adequately managed. These include red king crab, sea cucumbers, and sea urchins. Others lack developed management plans and stock surveys and are cause for concern. These include fisheries for Dungeness crab, golden king crab,

pot shrimp, and beam trawl shrimp. In between are fisheries having management plans, such as scallops (formal plan) and Tanner crab (draft plan) but no stock surveys.

Shellfish surveys include (1) an annual red king crab pot survey in northern Southeast Alaska, (2) annual sea cucumber dive surveys mostly in southern Southeast and the Sitka area, and (3) a sea urchin dive survey program. Pilot surveys were continued for Dungeness crab, pot shrimp, and Tanner crab, with each survey including several more districts in the latest surveys (1999). Prior surveys include a trawl survey to estimate stock abundance and size class composition of the Yakutat Bay pink and sidestripe shrimp, which was conducted on seven occasions, last in 1984. Population estimates of geoduck have been extended to include more beds, and the department has initiated reconnaissance surveys of green urchin populations under contract with industry divers.

Dockside sampling and skipper interviews are conducted for the crab and shrimp fisheries to gather a consistent time-series of data on size frequency, shell condition, average weight, sex (shrimp only), fishing location, effort levels, and estimates of average harvest per unit of effort (CPUE). These data provide the only biological information for those fisheries lacking stock surveys, which includes Dungeness crab, golden king crab, Tanner crab, trawl shrimp, and scallops. The collected information allows some assessment of relative strength of various portions of the commercially exploited populations, and a qualitative estimate of stock condition. Harvest and effort data is also collected through the fish ticket system.

Logbook information is collected from the red king crab, Tanner crab, and sea cucumber fisheries and for the shrimp trawl fisheries in non-traditional areas as well as directed sidestripe fisheries. This information is particularly valuable for management of the crab fisheries.

Staff

Regional fishery management (shellfish and other species) is under the supervision of Scott Kelley, regional management coordinator in Douglas. Marine fisheries research (non-salmon) is under the supervision of Doug Woodby, regional marine fisheries research supervisor, also in Douglas. The management and research programs for crab, shrimp, scallop, octopus, and littleneck clams are the responsibility of a shellfish staff (non-dive fisheries) with occasional participation by area management staff.

SHELLFISH STAFF			
Name	Title	Job Class	Location
Tim Koeneman	Regional Shellfish Biologist	Fisheries Biologist III	Petersburg
Catherine Botelho	Asst. Regional Shellfish Biologist	Fisheries Biologist II	Douglas
Gretchen Bishop	Asst. Regional Shellfish Biologist	Fisheries Biologist II	Douglas
Rexanne Stafford	Port Sampler	Fish and Wildlife Technician III	Petersburg
John E. Clark	Shellfish Biometrician	Biometrician II	Douglas

Research and stock assessment for the sea cucumber, sea urchin, abalone, and geoduck dive fisheries is accomplished by the dive fishery staff, with help from the area management staff.

DIVE FISHERY RESEARCH STAFF			
Name	Title	Job Class	Location
Robert Larson	Herring and Miscellaneous Species Project Leader	Fisheries Biologist III	Petersburg
Kyle Hebert	Asst. Herring and Miscellaneous Species Project Leader	Fisheries Biologist II	Petersburg
Jan Rumble	Regional Miscellaneous Species Biologist	Fisheries Biologist I	Douglas
Marc Pritchett	Miscellaneous Species Project Leader	Fisheries Biologist I	Douglas
John E. Clark	Shellfish Biometrician	Biometrician II	Douglas

Table 1.1. Registration Area A (Southeast Alaska) and Registration Area D (Yakutat): list of fisheries, harvest, and approximate exvessel values from the last completed season or calendar year.

Season or Year	Fishery	Harvest in Thousands of Pounds	Approximate Exvessel Value in Thousands of $$[a]
Southeast			
1998/99	Dungeness Crab	2,325.2	3,464.6
1998/99	Pot Shrimp	788.6	2,563.1
1998/99	Beam Trawl Shrimp	2,264.6	739.5
1998/99	Abalone	0.0	0.0
1998/99	Geoduck	111.3	236.0
1998/99	Sea Cucumber	1,055.6	1,636.1
1998	Sea Urchins	3,034.6	1,213.8
1998	Octopus	0.6	0.8
1998/99	Red and Blue King Crab	0.4	1.3
1998/99	Tanner Crab (bairdi)	2,164.1	4,795.7
1998/99	Golden king crab	367.8	1,084.6
	SUBTOTAL[b]	12,112.8	15,735.5
Yakutat			
1998/99	Dungeness Crab	65.4	132.3
1998/99	Pot Shrimp	5.2	19.8
1998/99	Otter Trawl Shrimp	0.0	0.0
1998[c]	Weathervane Scallops	275.4	1,105.6
1998/99	Red and Blue King Crab	2.1	10.1
1998/99	Tanner Crab	8.5	23.1
	SUBTOTAL[c]	356.6	1,290.9
GRAND TOTAL		12,469.4	17,026.4

* Where number of vessels participating is less than three, the information is considered confidential.

[a] This column is calculated from the average price per pound of all tickets having values indicated on them.

[b] Totals do not include confidential data.

[c] District 16 is included in Registration Area D for this fishery only.

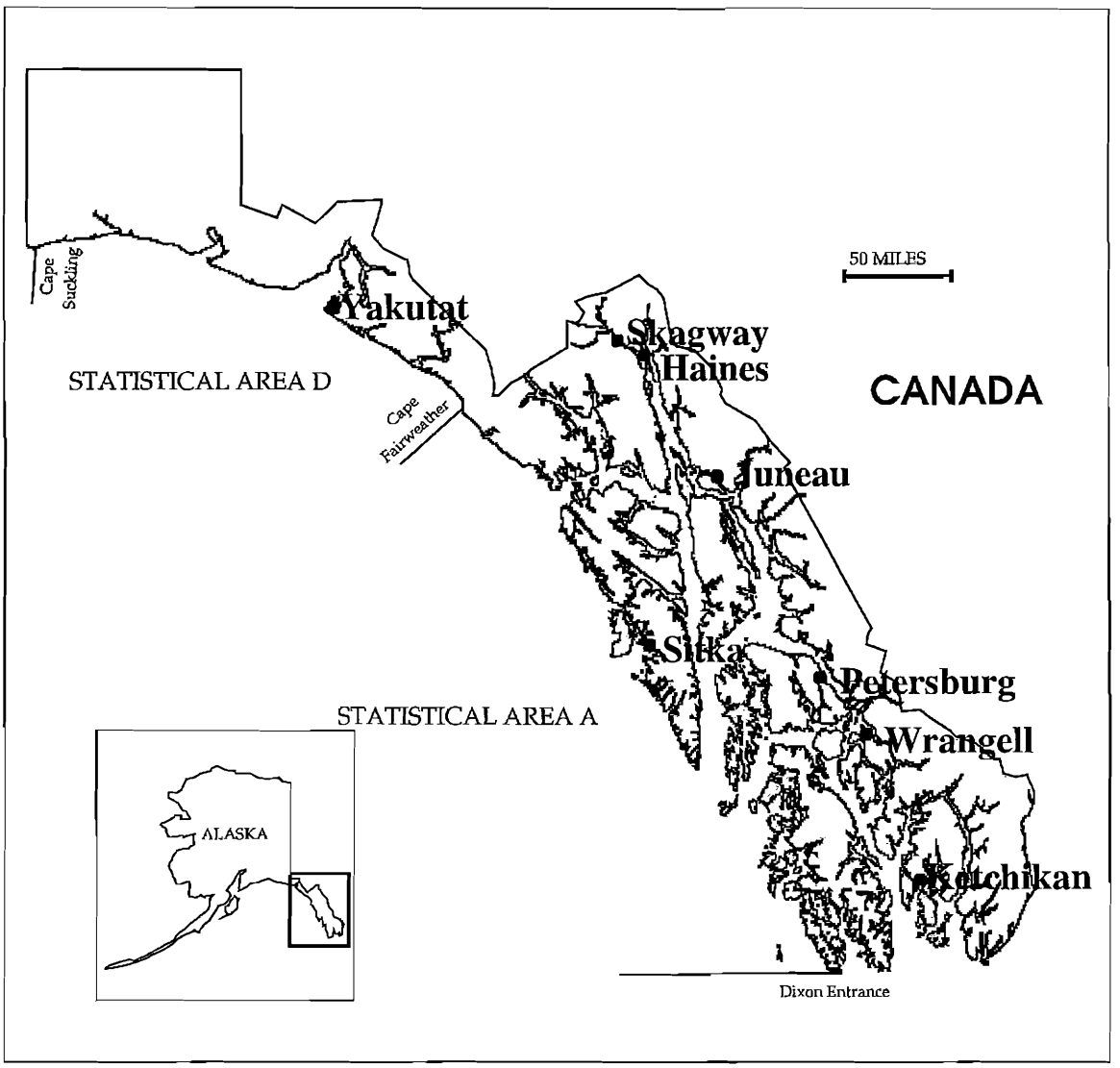

Figure 1.1. Registration Area A (Dixon Entrance to Cape Fairweather) and Registration Area D. (Cape Fairweather to Cape Suckling).

Section 2

Southeast Alaska Dungeness Crab Fishery

REPORT TO THE BOARD OF FISHERIES,

SOUTHEAST ALASKA DUNGENESS CRAB FISHERY

By

Timothy Koeneman
and
Catherine A. Botelho

Regional Information Report1 No. 1J99-47

Alaska Department of Fish and Game
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INTRODUCTION

Dungeness crabs *Cancer magister* are members of the highly evolved brachyuran (true crab) subgroup of the order Crustacea. They are commercially significant and widely distributed in coastal waters of the eastern Pacific Ocean from Baja California to the Aleutian Islands.

Southeast Alaska (Registration Area A) is near the northern limit of the range of Dungeness crab. In Southeast Alaska, Dungeness crabs are found throughout the reporting districts between Dixon Entrance and Cape Fairweather. They congregate in areas with mud and sand substrate and depths between two and 50 fathoms, generally in the northern half of Southeast Alaska. Southeast Alaska has produced a long-term average of about 2,190,00 pounds per season.

Southeast Alaska is a superexclusive registration area for Dungeness crab; a vessel registered to fish in this area cannot register or fish in any other area in Alaska during the same calendar year. The fishery is also under limited entry. In the past five seasons, an average of 212 permit holders have registered and fished in Southeast Alaska. Most vessels are below limit seiner length (58'), although they range in size from aluminum skiffs to over 90 feet long. Almost all participants use standard, hatbox-shaped pots constructed with steel frames and webbed with stainless steel wire. The maximum legal gear limit is 300 pots.

The summer fisheries overlap a portion of the male molting period, which extends into mid-summer, and the female molting period, which extends from August to October. The major mating period is during mid to late summer. Most of the product is marketed as whole-cooked and live crab during the summer tourist markets in Washington, Oregon, and California. Alaska is the only management jurisdiction on the West Coast that allows extensive summer fisheries for Dungeness crabs. This has been justified on the basis of the overriding economics of the summer fishery.

Fishing during the molting and mating period risks local depletion and general fishery collapse. This is exacerbated by a limited management program, which is comprised of port sampling and fish ticket data. The department has conducted two preseason pilot surveys, and on-board sampling during the early portion of the fishery in both the spring and fall openings. The risk of summer over-fishing have increased since the early 1980s when ample fishing grounds were available, seasons were longer, and fishers who encountering high percentages of soft-shelled crab, female crab, or mating pairs could move to grounds where better harvest conditions prevailed.

Many peripheral areas that once served as nursery or refuge areas that could buffer the effects of heavy harvest in adjacent areas are now heavily fished. Since the late 1980s, all available fishing grounds, even marginal ones, have been fully utilized, the exploitation rate has climbed, and the fishery is much more dependent on annual recruitment. The effect of poor recruitment of even a single year-class on the fishery would be much more pronounced now than it would have been prior to the mid-1980s.

Conflict between user groups is rising as competitive pressure and gear saturation crowds commercial gear onto grounds traditionally used by non-commercial fishers. This has resulted in commercial closures of small areas around many communities in Southeast Alaska, including Juneau, Gustavus, Tenakee Springs, Elfin Cove, Point Baker, Blank Inlet, Bostwick Inlet, Flat Bay, and Thorne Bay with continuing requests for commercial closures around more.

In keeping with a federal law that was passed in 1998, commercial Dungeness crabbing was closed in designated wilderness areas in the Glacier Bay National Park and Preserve beginning June 15, 1999. Non-wilderness portions of the bay closed to Dungeness crabbing on September 30, 1999. Permit holders will be given compensatory pay if they fished in either the Beardslee Islands or Dundas Bay wilderness areas for at least six of the years between 1987 and 1998. Processors may also apply by October 1, 1999 for compensatory pay to offset losses if they purchased crab from these areas during the same time frame.

Lastly, sea otter populations are expanding their range in Southeast Alaska. Their expansion into many areas has been accompanied by drastic declines in availability of many economically important invertebrate species, one of which is Dungeness crab.

FISHERY DEVELOPMENT AND HISTORY

The fishery dates back to the 1930s. Prior to the 1960s, harvests from much of the Gulf of Alaska coast were combined into a single total. Since 1960, harvests from Southeast Alaska have averaged about 2,190,000 pounds when annual (1960 to 1968) and seasonal (1969/70 to present) data are combined (Table 2.1).

The fishery in Southeast Alaska has evolved through three distinct periods since the early 1960s. From the early 1960s through the early 1980s, participation was so low that need for formal regulations and other restrictions were minimal. The 1960s were characterized by a few larger vessels in a directed fishery harvesting up to several million pounds per year. This was in response to high market demand caused by low harvests in Washington, Oregon, and California. The principal product was canned crabmeat.

During the 1970s, production in Washington and Oregon rebounded and demand for crab from Southeast Alaska declined. With little or no processor support, fishers had to either sell over the dock to the public or make complicated and risky arrangements to airfreight live crab out of state. Although the summer closure was rescinded, only a few dozen vessels in the 30' to 45' range fished primarily during the summer.

In the most recent period, since the 1981/82 season, the fishery has undergone sweeping change. Declining harvests in Pacific Coast states and changing markets increased demand for Alaskan frozen sections, whole cooked crabs, and airfreighted live crabs. More processors began purchasing crab and supporting the fishery through the entire summer season. Harvests increased, averaging 3,046,000 pounds per season, and the numbers of participants increased, climbing to a peak of 316 vessels. The fishery grew from a small group of 30' to 45' vessels to a larger fleet that included skiff-sized vessels up to 30' in length. This resulted in a defacto harvest reallocation from a primary fishery for a relatively small number of single-species participants to a secondary fishery for a larger number of new and often transitory entrants.

Most recently, interest in airfreighted live Dungeness crab is growing in the Orient. There has also been a growing demand from Canada for live Dungeness crab. In 1996, legislative changes allowed surface shipment of live crab from Southeast Alaska to Canadian markets.

Increasing numbers of participants led to a permit moratorium, imposed by the Commercial Fisheries Entry Commission (CFEC) in 1991. During the four years of the moratorium, the CFEC first conducted numerous studies and public meetings to evaluate the need for limited entry into this fishery. Subsequently, CFEC convinced the legislature to authorize use of tiered pot limits to accommodate the large number of

qualifying participants while limiting the effort to acceptable levels. In January 1996, the moratorium period ended and a tiered pot limit form of limited entry was adopted for implementation by June 15, 1997. As implemented, the maximum number of permits will eventually be set at 308 and the tiered permits system will be structured to provide a maximum of 48,750 pots to the fishery.

In the spring of 1996 and 1997, the department conducted preseason assessment surveys of the Dungeness stocks off the Stikine River flats in central Southeast Alaska. This stock is a consistently important contributor to the overall Southeast Alaska harvests. Using a random transect experimental survey design and commercially-configured pots with smaller than usual mesh, the department collected size, sex, and shell hardness data over a period of several days during late May, preceding the commercial fishery which started on June 15. After the season opened, research staff conducted on-board field observations of commercial fishing operations in the same general area. The goal of these initial projects was to develop a method for estimating the prevalence of sub-legal and legal-sized soft-shelled male crabs that would be vulnerable to handling by the commercial fleet early in the summer season. Preliminary examination of the experimental and observer data sets suggest that the two experimental methods are not comparable. Yet to be determined are whether a correlation exists between the experimental and observer data or whether the sampling design needs to be modified to better reflect the commercial harvest.

In 1999 the department conducted on-board sampling of Dungeness crab in the Stikine Flats, Thomas Bay, and Duncan Canal areas during the early portion of the summer fishery to estimate the prevalence of sub-legal and legal-sized soft-shelled male crabs that were vulnerable to handling by the commercial fleet. A subsequent on-board observer program sampled in the same areas during the beginning of the fall fishery. Preliminary data indicates that sorting of the non-legal and soft-shelled segments of the stock increases from June through the fall as the number of legal males diminishes due to harvest.

REGULATION DEVELOPMENT

All registration areas in Alaska apply generally passive management measures limiting size, sex, and to some extent, the season during which crab may be caught. In Southeast Alaska, seasons are timed to avoid some of the sensitive life history periods while maximizing economic returns.

The department is looking into implementing more active management alternatives to size, sex, and season methods than are used. In particular, guideline harvest levels would be useful for reducing the harvest rate to ensure that a significant proportion of the legal males remain unharvested and are therefore able to mate. This would be good insurance against recruitment failures, particularly if failures were to occur for more than one year in a row.

Fishing Seasons and Periods

From the early 1930s through 1955, regulations included a prohibition on the taking of females, a minimum size limit for males, and a closed season on the most important grounds for two to four months between May 1 and September 1. Available documentation from that period indicates that molting was thought to occur during the summer. The summer closure was generally acceptable to fishers because of other fishing opportunities in the salmon and halibut fisheries. The summer closure was revoked in the late 1950s.

Since the late 1960s, fishing season closures have been introduced, and then modified, to reduce fishing pressure during sensitive periods in the life history of the species. An example was the closure from March through May in 1976/77 to protect male crabs during their primary molting period. In the 1980s, management staff explored methods and means to further avoid sensitive life history periods to accommodate the increasing effort as the fleet slowly utilized more of the known habitat and range of the crabs. Management staff felt that as more of the available grounds were exploited, there would be fewer unfished stocks to act as reproductive buffers against local depletion in adjacent fishing grounds. Then, beginning in 1985, the commercial fishery was closed between August 16 and September 30 because field observations suggested that it was the major period when females molted and were mated. In response to increasingly high effort levels and high harvest rates, the season was further shortened in 1989 by reducing the winter season to October and November in most of Southeast Alaska. The split seasons have been in effect since then.

Size Restrictions

From 1924 to 1935, legal crabs were restricted to males over 6.5 inches in greatest width. From 1936 to 1962, only males over 7.0 inches in greatest width were legal. Since 1963, the legal size has been 6.5 inches in shoulder width, measured across the carapace immediately anterior to the tenth anterolateral spines. This is the current standard measuring point in all jurisdictions throughout the range of this crab and is used because the large tenth anterolateral spines are often broken or eroded in older shelled crabs.

Gear Definitions and Specifications

Since 1934, trawls have been prohibited in this fishery. Gear was further limited to pots or ring nets in 1954. A pot limit of 300 pots or ring nets was implemented in 1963. Diving gear was included as legal gear in 1966. Nearly all of the commercial harvest is currently taken with pots.

Starting in 1963, Dungeness crab buoys were required to display the registration number of the vessel fishing the gear. In 1988, the minimum size of buoy markings was set at one and one-half inches in height, in numerals at least one-fourth inch wide that contrasted with the color or texture of the buoy.

In 1977, two escape rings of 4 3/8" diameter were required in each pot, and a Dungeness pot was defined by its tunnel eye openings, which individually could not exceed 30 inches. In 1978, an escape panel secured by a maximum of 120-thread cotton twine was required. A minimum size for buoy numbers of one and one-half inch high and 1/4 inch wide numbers was implemented in 1989. In 1991, the breaking strap or biodegradable twine for the lid retainers was changed from 120 thread to 60 thread. The intent was to minimize untended ghost fishing of lost or derelict pots.

Dungeness gear development remained static for many years, with little change in configuration, materials, size, and weight to significantly affect pot efficiency. Within the last two seasons, trigger-enhancing devices that minimize escapement of crabs through entrance tunnels have been developed and are being installed on commercial gear. Future comparisons of historical harvest rates will need to account for the possible enhanced efficiency of pots with the new trigger designs.

Other Regulatory Changes

Vessel registration and hold inspection requirements started in 1974. Southeast Alaska was designated a superexclusive registration area in 1983. Hold inspections were rescinded in 1984.

1998/99 SEASON SYNOPSIS

The 1998/99 season was divided into summer (June 15 - August 15) and winter (October 1 - November 30) segments. The overall harvest was 2,325,236 pounds (Table 2.1), with an exvessel value of $3,464,602 ($1.49/lb). Summer season landings totaled 1,708,615 pounds, and winter season landings totaled 619,129 pounds (Table 2.2). Two hundred forty-four permit holders reported landings for either the summer or winter seasons (Table 2.1).

Districts 6, 8, 9, 10, and 14, with reported landings of 1,412,372 pounds, accounted for 60% of the total harvest (Table 2.2). Seventy-three percent of the harvest was taken during the summer season (Table 2.2). The winter harvest was much lower than the previous winter (Table 2.2).

Testing for paralytic shellfish poison (PSP) continued, with small samples representative of harvests from major fishing grounds sent to the Alaska Department of Environmental Conservation (ADEC) laboratories in Palmer. PSP levels were low and no restrictions were placed on the transport and sale of whole crabs.

1999/00 SEASON OUTLOOK

Preliminary harvest figures indicate that 2,693,547 pounds were harvested from June 15 through August 15, indicating a slight increase in recruitment entering the fishery this season. Number of permits fishing dropped significantly from the two most recent seasons to 195 permit holders. Distribution of the harvest indicated that production in central districts contributed most significantly to the total. Average price per pound was $ 1.62 per pound.

Winter fisheries contend with icing of productive areas at the heads of bays, shorter days, more inclement weather, and poorer market conditions. Through November 30, 1999, 99 fishers had harvested an additional 360,805 pounds. A small additional harvest may occur from Districts 1, 2, and a portion of District 13 before the winter portion of the 99/00 season ends on February 28, 2000.

Use of the newly authorized option for surface transport of live crab to foreign ports will bear some scrutiny as crabbers exploit this marketing option and take advantage of favorable prices being offered by Canadian buyers. It is likely the first foreign landings will be at British Columbia ports such as Prince Rupert. The Alaska Department of Environmental Conservation continued testing crabs for PSP before, and immediately following the summer 1999 fishery.

Table 2.1 Registration Area A (Southeast Alaska) Dungeness crab harvest, number of permits fished, number of landings, and average harvest per landing, 1961 to present.

Year/ Season	Harvest in Pounds	Number of Permits	Pounds per Permit	Number of Landings	Pounds per Landing
1960	1,449,405	-			
1961	671,455	-			
1962	2,985,939	-			
1963	3,296,362	-			
1964	3,996,100	-			
1965	2,392,395	-			
1966	1,968,117	-			
1967	2,033,156	-			
1968	1,900,690	-			
1969/70	1,149,111	24	47,880	392	2,931
1970/71	776,617	21	36,982	380	2,043
1971/72	452,681	23	20,576	315	1,437
1972/73	597,587	31	19,277	315	1,897
1973/74	748,519	41	18,257	483	1,549
1974/75	713,995	55	12,982	453	1,576
1975/76	611,621	36	16,989	344	1,177
1976/77	515,378	25	20,615	174	2,961
1977/78	127,345	12	10,612	87	1,463
1978/79	754,759	25	30,190	208	3,628
1979/80	801,753	37	21,669	313	2,561
1980/81	521,247	26	20,048	227	2,296
1981/82	2,932,427	75	39,099	749	3,915
1982/83	3,668,062	129	28,435	1,303	2,815
1983/84	2,150,692	131	16,417	1,530	1,405
1984/85	1,843,502	180	10,242	1,583	1,164
1985/86	2,314,618	216	10,716	2,073	1,116
1986/87	2,453,055	224	10,974	2,330	1,052
1987/88	3,391,699	241	14,070	2,746	1,235
1988/89	3,321,734	264	12,535	2,683	1,238
1989/90	1,918,880	245	7,831	2,096	915
1990/91	2,662,840	243	10,787	2,342	1,136
1991/92	4,705,314	316	14,890	3,379	1,392
1992/93	3,089,398	247	12,508	2,492	1,239
1993/94	2,536,701	198	12,812	1,956	1,296
1994/95	1,921,689	182	10,559	1,786	1,075
1995/96	4,404,519	201	21,913	2,737	1,609
1996/97	5,005,840	203	24,659	2,896	1,728
1997/98	4,062,423	232	17,510	4,042	1.005
1998/99[a]	2,325,236	244	9,530	3,127	743

[a] Most recent year's data should be considered preliminary.

Table 2.2a. Registration Area A (Southeast Alaska) 1997/98 season; Dungeness crab harvest by month and district.

	1997								1998		
Dist.	May	June	July	Aug	Sept.	Oct	Nov	Dec	Jan	Feb	Total
101	Closed	Closed	Closed	Closed	Closed	81,411	49,362	31,734	30,092	11,784	204,383
102	Closed	Closed	Closed	Closed	Closed	11,363	10,906	26,908	33,851	25,519	108,547
103	Closed	3,808	17,742	13,582	Closed	*	*	Closed	Closed	Closed	42,450
104	Closed	0	*	0	Closed	0	0	Closed	Closed	Closed	*
105	Closed	38,953	109,170	29,661	Closed	27,041	8,926	Closed	Closed	Closed	213,751
106	Closed	133,069	85,342	18,969	Closed	49,030	31,424	Closed	Closed	Closed	317,834
107	Closed	97,946	111,733	19,729	Closed	31,592	17,389	Closed	Closed	Closed	278,389
108	Closed	355,378	339,380	56,203	Closed	42,459	16,218	Closed	Closed	Closed	809,708
109	Closed	120,625	250,997	74,362	Closed	32,771	22,843	Closed	Closed	Closed	501,598
110	Closed	83,559	154,184	50,868	Closed	34,546	8,892	Closed	Closed	Closed	332,049
111	Closed	47,587	96,203	33,410	Closed	43,131	13,330	Closed	Closed	Closed	233,661
112	Closed	42,767	78,078	32,986	Closed	20,343	6,358	Closed	Closed	Closed	180,532
113	Closed	64,917	95,112	29,802	Closed	83,039	12,873	0	*	*	286,009
114	Closed	78,358	168,245	68,997	Closed	48,985	21,195	Closed	Closed	Closed	385,780
115	Closed	61,529	59,581	26,142	Closed	13,176	4,873	Closed	Closed	Closed	165,301
116	Closed	0	0	0	Closed	0	0	Closed	Closed	Closed	0
Total		1,128,496	1,568,198	454,711	Closed	524,626	219,601	65,279	64,055	37,457	4,062,423

*Where number of vessels participating is less than three, the information is considered confidential.

Table 2.2b. Registration Area A (Southeast Alaska) 1998/99[a] season; Dungeness crab harvest by month and district.

	1998								1999		
Dist.	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
101	Closed	Closed	Closed	Closed	Closed	55,514	37,370	15,306	9,166	*	118,623
102	Closed	Closed	Closed	Closed	Closed	57,753	6,296	8,434	6,037	*	81,310
103	Closed	6,253	9,725	4,617	Closed	0	*	Closed	Closed	Closed	22,551
104	Closed	0	0	0	Closed	0	0	Closed	Closed	Closed	0
105	Closed	34,979	49,602	15,805	Closed	5,255	9,800	Closed	Closed	Closed	115,441
106	Closed	172,569	120,224	36,776	Closed	84,689	24,885	Closed	Closed	Closed	439,143
107	Closed	113,624	58,567	14,661	Closed	16,016	19,472	Closed	Closed	Closed	222,340
108	Closed	170,904	87,588	15,650	Closed	52,692	30,342	Closed	Closed	Closed	357,176
109	Closed	82,733	77,597	21,920	Closed	35,658	22,452	Closed	Closed	Closed	240,360
110	Closed	54,343	45,384	11,563	Closed	8,863	4,132	Closed	Closed	Closed	124,285
111	Closed	46,108	41,030	8,770	Closed	10,427	*	Closed	Closed	Closed	107,593
112	Closed	37,516	51,523	11,375	Closed	15,397	5,957	Closed	Closed	Closed	121,768
113	Closed	49,518	37,151	10,708	Closed	12,370	10,685	1,474	1,067	*	123,445
114	Closed	39,790	58,720	20,884	Closed	25,345	8,614	Closed	Closed	Closed	153,353
115	Closed	44,242	35,877	10,319	Closed	3,356	4,054	Closed	Closed	Closed	97,848
116	Closed	0	0	0	Closed	0	0	Closed	Closed	Closed	0
Total		852,579	672,988	183,048	Closed	383,335	178,943	33,544	16,270	4,529	2,325,236

* Where number of vessels participating is less than three, the information is considered confidential.

[a] Most recent year's data should be considered preliminary.

Section 3

Southeast Alaska
Shrimp Beam Trawl Fishery

Section 4

Southeast Shrimp Otter Trawl Fishery

REPORT TO THE BOARD OF FISHERIES,

SOUTHEAST ALASKA SHRIMP BEAM TRAWL FISHERY

By

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and
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Regional Information Report[1] No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

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[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate 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.

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INTRODUCTION

The beam trawl fishery targets primarily pink shrimp *Pandalus borealis* and secondarily larger sidestripe shrimp *Pandalopsis dispar*. Other species incidentally captured and landed in smaller quantities are the coonstripe shrimp *Pandalus goniurus*, humpy shrimp *P. hypsinotus,* and the spot prawn *P. platycerous*.

Productive beam trawling has historically been limited to four major fishing areas in Southeast Alaska. These areas are District 8, portions of Districts 6 (Duncan Canal and Kah Sheets Bay), District 7 (Eastern Channel), and District 10 (Thomas and Farragut Bays), all located in the Petersburg-Wrangell Management Area (Figure 3.1). The concentration of the fishery in these areas is due to the abundance of the resource, the presence of the major processors, and limited vessel capabilities. Most vessels are less than 60' in length, utilize small horsepower engines, do not have refrigerated holds, and have a crew of two or three. Some vessels currently fishing have been participating since the inception of the fishery in 1915. Vessels strive to provide a high quality product through daily deliveries. Most of the participants are residents of Petersburg or Wrangell.

When compared to the more common otter trawl, the beam trawl is a relatively simple gear type in appearance and function. A strong wooden or metal beam acts as a head rope, and metal "shoes" connected directly to each end of the beam act as the breast of the trawl. Thus, two important net dimensions are controlled by rigid members: 1) the width of the mouth is determined by the length of the beam; and 2) the opening height of the net is determined by the height of the metal "shoes." Vessel length limits beam length. Most beam trawls are deployed with a single bridle and fish best on flat substrates. However, they can effectively fish some gradual side slopes and irregular bottoms. When not deployed, the beam trawl is stored on the vessel bulwarks, somewhat compromising the sea-keeping capabilities of the vessel.

Management is based on a closed season designed to prevent fishing on major stocks during the egg-hatch period from February 15 through April 30, guideline harvest levels determined by historic harvests, and three fishing periods in three of the major fishing areas. A fourth fishing period occurs in the Stikine Flats area. The fishing periods were based upon industry input to spread out the harvest and processing requirements. Multiple fishing periods also take advantage of growth and recruitment.

FISHERY DEVELOPMENT AND HISTORY

The first documented beam trawl harvest of shrimp in Southeast Alaska occurred in Thomas Bay (located in District 10) in 1915. This harvest was processed by floating canneries also located in Thomas Bay. By 1921 five processors were operating. Fleet size, production capacity, and expansion of fishing grounds occurred well into the 1950s. Prior to the development of the Westward Area (Statistical Area J) shrimp fisheries in 1959, the beam trawl fishery in Southeast Alaska was the major shrimp fishery in the state. Cook Inlet and Westward Region fisheries dominated the statewide production figures with harvests exceeding 100 million pounds through the 1970s. Cook Inlet and Westward harvests declined after that period and closed prior to the 1982/83 season and the Southeast Alaska beam trawl shrimp fishery is once again the major trawl shrimp fishery in the state.

From 1955 through 1967 annual beam trawl harvests ranged from 1,800,000 to 7,600,000 pounds, with an average of 3,600,000 pounds per year (Table 3.1). The number of vessels participating ranged from 10 to 22. The peak production year was 1958 when 14 vessels caught over 7,600,000 pounds. During the late 1960s and early 1970s harvest and effort declined. Seasonal harvests averaged 916,300 pounds and effort averaged 12 vessels during the 1970s. Through the 1980s the harvest and effort increased to an average of 1,409,500 pounds by an average of 19 vessels. During the 1990s the harvest has averaged 2,674,500 pounds. by an average of 34 permit holders. Some of the participants that were involved in the fishery between 1992 and 1997 were speculating on qualification into the limited entry program. Relatively few of the maximum of 51 vessels contributed substantially to the harvest or were dependent upon the fishery for a major portion of their fishing income. The effects of the limited entry program are evident in the 1998/99 fishery when only 24 permit holders participated. Recent fisheries have been worth approximately $1,000,000 per season. While the fishery continues to develop, fishing time is being reduced by premature closure of major fishing districts within each fishing period.

During the 1970s, harvest opportunities occurred in all major fishing areas throughout the year (Table 3.2). As substantial and consistent increases in effort began in 1980, guideline harvest levels were achieved quickly and it became necessary to close major fishing areas by emergency order. Fishing opportunities were no longer available in major fishing areas throughout the year, especially during the winter months. Typically, the months of May, July, and September received high effort, with each month providing harvests exceeding 500,000 pounds (Table 3.2). Seasonal harvests for the region approached 1,000,000 pounds prior to 1980 and now average about 2,700,000 pounds.

Prior to 1970 Districts 6 and 10 produced the majority of the beam trawl harvest and District 8 produced relatively low harvests. Harvests from District 10 occur in Farragut and Thomas Bays, and harvests from District 6 included Duncan Canal and Kah Sheets Bay. With the decline in abundance in District 10, the fishery became almost totally dependent upon District 6 and harvests from District 8 began to increase. From the 1969/70 through the 1978/79 fishing seasons, District 6 harvests averaged almost 600,000 pounds per season while District 8 harvests averaged less than 250,000 pounds per season (Table 3.3a). During this ten-season period, harvests from District 8 exceeded harvests from District 6 only once. Regulatory guideline harvest levels were increased in 1978. In the following decade through the 1988/89 season, average shrimp harvests from Duncan Canal were nearly 900,000 pounds, more than double that of the Stikine Flats area (Table 3.3b). Three fishing periods were established in regulations in 1989 for the four major fishing areas. During the last ten fishing seasons, the pattern of high harvests in District 6 relative to District 8 has continued but the total harvests from those districts have more than doubled (Table 3.3c.). Recent harvests from District 10 have increased and non-traditional fisheries in Districts 3, 5, 7, 9, 10, and 11 combined, have also produced significant harvests.

REGULATION DEVELOPMENT

Documentation describing shrimp fishing regulations is available since 1924. Regulations prior to that date are unknown. Regulations from 1924 through 1932 primarily concern fishing seasons. Size restriction regulations were first implemented in 1941. During the next decade closed areas were added and from 1947 through 1949 Duncan Canal, now a major shrimp fishing area, was closed to commercial fishing.

The beam trawl fisheries occur primarily in the vicinity of Petersburg and Wrangell. Until recently, most other areas were not significantly constrained by restrictive fishing seasons, fishing periods, or guideline harvest ranges (GHRs).

Fishing Seasons and Periods

Traditional Pink Shrimp Fisheries

A fishing season from May 1 through March 15 was established by 1924. A similar season has since been in place with some modifications to beginning and ending dates. The season is now May 1 to February 14. The purpose of the closed period is to protect female shrimp during the egg hatch period when fishing would reduce the reproductive potential of the stock.

As the fishery intensified during the 1980s, the GHR was taken in successively fewer days. In response, three fishing periods were established beginning in 1989. These periods were May 1 through June 30, July 1 through August 31, and September 1 through February 14. A fourth fishing period, December 1 through February 14, was added for District 8 only, Stikine Flats, in 1997. These periods were designed to lengthen the total season in major districts and to reduce fishing effort during periods of growth and recruitment.

Non-Traditional Pink Shrimp Fisheries

Prior to 1994 all fishing districts in Southeast Alaska, except District 8 and a portion of District 6 (Duncan Canal and Kah Sheets Bay), District 7 (Eastern Channel), and District 10 (Thomas and Farragut Bays), were open throughout the year. During the early 1990s large otter trawling harvester-processors requested permits to fish for shrimp in the region, leading to requests to the commissioner to close shrimp fisheries in outside waters. The controversy surfaced because some members of other fishing organizations felt that trawlers were using a loophole in the regulations to either prospect or target other species, like rockfish. Initial closures were made by either emergency regulation or emergency order. The issue was brought before the Board of Fisheries and resulted in the closure for Districts 1, 2, 4, and 12 through 16, which had low and sporadic historical effort and harvests.

At the request of industry in 1997, regulations were developed to provide additional fishing time during the egg-hatch period in most of the non-traditional areas if their respective guideline harvest levels have not been achieved during the normal fishing time of May through mid-February. Justification for the change was that these areas required more exploration, time, and expense than the traditional fishing areas, the months of March and April were generally free of commercial and personal use shrimp and crab pots, and weather was improved over the sometimes harsh winter conditions. The additional fishing time period is from February 15 through April 30.

Directed Sidestripe Shrimp Fisheries

In 1997, regulations were adopted to provide for directed sidestripe shrimp fisheries by beam trawl only during fishing seasons and periods and in areas established by the commissioner by emergency order. Additional conditions include limiting the vessel from participating at the same time in a directed pink shrimp fishery, a larger minimum mesh size, and mandatory logbook completion. To date, fishing opportunities have been provided during three seasons in District 8 only.

Size Restrictions

As early as 1941 regulations specified that not more that 50% of the shrimp harvested could be less than three inches total length. These regulations were altered to no more than 25% in 1942, and in 1948 the size was changed to less than 2.5" total length. By 1952 there were no size regulations and size of shrimp landed was only controlled by industry through price.

By 1979 the Board of Fisheries adopted a policy to discourage the harvest of shrimp less than two years of age. This policy exists today and instructs the department to take action when the fishery targets on segregated schools of small shrimp. Management measures are to optimize the harvest of larger female pink shrimp while minimizing retention of males, transitionals, and smaller females.

In 1997, new regulations in Southeast Alaska defined the minimum average size of shrimp that could be sold. Shrimp taken by beam trawl gear must be at least 150 count per pound. To determine the average count per pound, one sample of at least one pound in weight, must be taken from each 500 to 1,000 pounds of shrimp, up to a maximum of 20 samples.

Quotas and Guideline Harvest Ranges

Traditional Pink Shrimp Fisheries

In 1977, harvest quotas for each of the four major fishing areas (District 8 and portions of Districts 6, 7, and 10) were first established. These quotas were based on historical harvest records with potential adjustment based on stock conditions. Strict quotas were difficult to monitor and regulate. In 1978, quotas were replaced by GHRs that provided more flexibility for in-season management, which was based upon fishery performance and size-class distribution. The fishery continued to intensify through the influx of effort and increased processing capacity. In some districts, specifically Districts 8 and a portion of District 6, the seasonal GHR was achieved early in the fishing season, necessitating an emergency order closure for the remainder of the season.

In 1988 the GHRs were evenly distributed through three fishing periods to lengthen the fishery and to take advantage of growth and recruitment which occurred during the spring and summer months. Guideline harvest ranges for each of the three fishing periods were: a portion of District 6 from 80,000 to 400,000 pounds; a portion of District 7 from 15,000 to 50,000 pounds; a portion of District 10 from 5,000 to 75,000 pounds; and all of District 8 from 25,000 to 175,000 pounds. In 1997, with the addition of a fourth fishing period in District 8 and an increase in the upper GHR from 175,000 to 250,000 pounds. the seasonal harvest potential increased by half a million pounds.

Non-Traditional Pink Shrimp Fisheries

In 1994, seasonal GHRs of 0 to 100,000 pounds were established for Districts 3, 5, 9, and 11 and remaining portions of Districts 6, 7, and 10. In 1997, at the request of industry, the total District 11 GHR was increased and is now more than triple the 1994 GHR. Seasonal GHRs were established by section: 11-A, 11-B, and 11-C from 25,000 to 75,000 pounds in each; and 11-D from 50,000 to 150,000 pounds.

Directed Sidestripe Shrimp Fisheries

With the implementation of the directed sidestripe fishery in 1997, a limit of 50,000 pounds of shrimp may be taken from any district or section during a season. Participants can not concurrently participate in a pink shrimp fishery, must use a large mesh net, and complete logbooks.

Gear Restrictions

In 1962 regulations defining a minimum mesh size used in beam trawls were established for a portion of the Petersburg-Wrangell area. By 1969 similar regulations were in place for all areas. In 1997 the minimum mesh size was increased. The current regulatory mesh size is approximately 1.35" stretched measure. Due to the relatively low market value of small pink shrimp, many fishers are currently using web between 1.38" and 1.50" stretched mesh, to reduce their harvest of small pink shrimp.

Under the regulations provided in the directed sidestripe fishery that was adopted in 1997, all shrimp trawl webbing must be a least one and seven-eighths inch stretched measure.

In 1959 otter trawls were not allowed in the Petersburg-Wrangell area in major locations utilized by the beam trawl fishery. Prior to the 1963/64 fishing season this regulation was altered to the present district boundaries.

In 1980 beam trawling was prohibited in waters of Lituya Bay (District 16) by the Alaska Board of Fisheries and in 1985 trawling was prohibited in waters of Glacier Bay by the National Park Service. Beginning in mid 1986, trawling was prohibited in waters of Tenakee Inlet (District 12). During the 1997 BOF meeting, otter trawls were eliminated as a legal gear type in southeast Alaska, effective May 8, 1998.

Limited Entry

The Commercial Fisheries Entry Commission, in response to petitions received from beam trawl fishers during 1995 and 1996, established January 1, 1997 as the qualification date for limited entry with the four years immediately preceding being the qualification period. Therefore, to be eligible to apply for an entry permit, an individual would have had to been a permit holder during at least one of the years 1993-1996. The proposed maximum number of limited entry permits was set at 41. The application period for entry permits was between October 15, 1998 and March 1, 1999. CFEC received 65 applications so 24 should be denied.

1998/99 SEASON SYNOPSIS

The 1998/99 shrimp beam trawl fishery harvested 2,264,641 pounds of shrimp in 834 landings by 24 vessels. The maximum number of vessels that fished during any single month did not exceed 21 (Table 3.4). The harvest was comprised of 92% pink shrimp, 6% sidestripe shrimp, 1% coonstripe shrimp and a trace of spot prawns. Total value of this fishery was approximately $739,548. The fishery was characterized by intense effort during three of four fishing periods in District 8, an abundance of shrimp in the Duncan Canal and Kah Sheets Bay portion of District 6, an increased harvest from District 10, and significant harvest contributions from Districts 3 and 11. During the season, ten emergency orders were written to control the fishery. The major fishing areas are discussed below in order of descending contribution to the total harvest.

Duncan Canal and Kah Sheets Bay (Northern District 6)

The total seasonal harvest of shrimp from the Duncan Canal and Kah Sheets Bay portion of District 6 totaled 989,114 pounds in 285 landings. This harvest represented almost 44% of the total region trawl shrimp harvest. Sixteen of the 24 shrimp beam trawl vessels landed shrimp from this fishing area.

During the first fishing period, May 1 through June 30, the area remained open for the entire fishing period. This date was much later than normal because much of the early effort was concentrated in the Stikine Flats. Effort entered the Duncan Canal and Kah Sheets grounds after the closure of the Stikine Flats pink shrimp fishery (May 8, 1998) and the directed sidestripe fishery (May 15-June 23, 1998). The harvest was approximately 352,428 pounds from 114 landings.

The fishery remained open almost the entire second fishing period, July 1 to August 25 and during the entire third period, September 1 to February 14, 1999. Harvests totaled approximately 442,000 pounds and 194,656 pounds in 118 landings and 53 landings for the two periods, respectively. Effort was curtailed in the third fishing period because of plant processing closures with all deliveries but one made prior to December of 1998.

Stikine Flats (District 8)

Sixteen vessels made 368 landings from District 8 during the fishing season. The seasonal harvest of 816,465 pounds from the Stikine Flats represented 36% of the total regional harvest by beam trawl vessels. Approximately 88,400 pounds of this harvest was comprised of sidestripe shrimp, which sold for an average of $1.31/pound. The Stikine Flats provided more sidestripe shrimp than any other single fishing area during the season. This high sidestripe harvest was due to effort during the directed sidestripe fishery and by-catch of sidestripe shrimp during the directed pink shrimp fishery. It was necessary to close the fishery by emergency order during three of the four fishing periods in which pinks were the targeted species.

The first fishing period opened on May 1, 1998 and the harvest of about 223,388 pounds were harvested by the closure on May 8, 1998. The fishery was characterized by large harvests of good quality shrimp. Effort was high, partially due to improved prices and the lack of other fishing opportunities. A directed sidestripe fishery was opened and closed by emergency order from May 15 through June 23, 1998. Five permit holders landed approximately 26,100 pounds of shrimp. Sidestripe shrimp made up 88% of the landed catch. The fleet did not request further directed sidestripe fisheries this season.

The second fishing period was open for fourteen days and resulted in a harvest of 223,388 pounds. The slightly longer fishing period was because a portion of the fleet opted to participate in various salmon fisheries. The area was closed on July 14, 1998.

Twelve permit holders participated during the third fishing period, which extended from September 1 through October 31, 1998. The fishery was closed because the landed harvest of 260,092 pounds slightly exceeded the GHR.

A fourth fishing period established by the Board of Fisheries in January of 1997, opened on December 1, 1998 and remained open throughout the regulatory closure on February 14, 1999. Effort was limited due to plant processing closures. Seven vessels landed 24,215 pounds of product spread out over the entire fishing period.

Thomas and Farragut Bays (Southern District 10)

Thomas Bay shrimp stocks continued the improvement first seen during the 1991/92 fishing season. The total seasons harvest remains confidential due to limited participation. All three fishing periods opened by regulation and closed by emergency order.

Eastern Channel (District 7)

The total season's harvest from Eastern Channel was 62,689 pounds from 40 landings by 8 permit holders. This harvest was almost entirely made up of pink shrimp. Approximately 95% of the total harvest occurred during the first opening in May. As a result, the fishery in Eastern Channel was closed early by emergency order during the first fishing period on May 28, 1998. Effort and resulting harvests were relatively light during the second fishing period with five permit holders harvesting 3,726 pounds in six landings. There was no participation in the third open period, which by regulation extended from September 1 through February 14, 1999.

Other Fishing Districts

Beam trawl fishing has occurred at low and sporadic levels outside the Petersburg-Wrangell area since at least the 1969/70 season. Fishing opportunities exist in Districts 3, 5, 9, 11, and portions of Districts 6, 7, and 10 during the normal fishing season. These districts are managed with a single fishing season and generic guideline harvest levels not to exceed 100,000 pounds. Participants must notify the department prior to fishing and logbook completion and submission are mandatory. During this past season these other districts contributed a harvest of almost 120,000 pounds in 78 landings. The majority of this harvest was reported from Districts 3 and 11.

The fleet was provided additional fishing time in some portions of Districts 6 and 10 and sections 11-A and 11-C from February 15, 1998 through April 30, 1998 because GHR's had not been reached during the normal fishing season. Fishers were required to contact the department and submit completed logbooks with their harvest ticket. Three of the four areas were fished, with relatively insignificant harvest being taken. Information is confidential due to fewer than three permit holders making landings.

1999/00 SEASON OUTLOOK

Through November 1999, the 1999/00 seasonal harvest from 19 vessels totaled 1,824,203 pounds. Almost 52,500 pounds of sidestripe shrimp, 13,600 pounds of coonstripe shrimp and 5,300 pounds of spot prawns are included in the season harvest to date. The seasonal harvest for all fishing species and areas was the lowest during the 1990s. This harvest was low because of a reduction in available processing capabilities, and was not because of stock abundance.

Fishing intensity was concentrated in a portion of District 6 (Duncan Canal and Kah Sheets Bay), District 8 (Stikine Flats), and a portion of District 10 (Thomas and Farragut Bays). Eight emergency orders were written to manage the fishery within current regulations. The Stikine Flats and Thomas and Farragut Bays were closed early during the first two fishing periods. Harvests from the Duncan Canal and Kah Sheets Bay portion of District 6 were below the GHRs for each fishing period.

Markets appear to be reasonable for the near future. Effort levels declined significantly compared to the previous three seasons in terms of number of vessels and fishing intensity. Markets are developing for high quality sidestripe shrimp, coonstripe shrimp, and the few spot prawns that are taken incidentally during the pink shrimp fishery. Some fishers are modifying gear to target specific grounds during certain times of the year for larger shrimp, especially sidestripe and coonstripe shrimp.

Present information does not allow the department to project future abundance in a scientific manner. Stock assessment data is not available, and shrimp samples obtained through port sampling are not analyzed in sufficient time to effect management decisions. But, it is possible to make a general qualitative statement concerning stock strength. Relatively strong year-classes have been evident in major stocks and have supported relatively strong harvests during the past few fishing seasons. Major stocks are expected to remain strong for the near term.

The increased use of larger mesh web in trawl construction could increase the quality of the pink shrimp available, and possibly increase the exvessel value of the harvest. Even larger web is being used to target sidestripe shrimp, with some significant by-catches of coonstripe shrimp. However, the use of larger mesh web does have potential negative biological consequences. Larger web will tend to target more strongly on the female portion of the stock. The removal of female shrimp at an increasing rate could reduce the reproductive potential of the stock and result in smaller populations during future seasons. Without pre-season stock assessment methods, in-season monitoring tools, and with management based on historic harvests, which included a broader segment of all year-classes, it is possible to over-exploit some stocks prior to taking appropriate management action. Using beam trawls to target spot prawns could have detrimental effects on the habitat and future spot prawn production.

The continued development of beam trawl fisheries in districts outside the boundaries of the four major fishing areas could provide more product to the fishery, particularly with the high proportion of larger and more valuable sidestripe shrimp found in some locations. Regulation changes may be needed to adequately control the expansion of the fishery and to prevent high-grading of some species of shrimp while dumping the less desirable species or smaller shrimp.

Effort decreased from 24 vessels during the 1998/99 season to 19 vessels so far this season. A portion of this decrease is undoubtedly because the limited entry permit qualification is over. Another portion of the decrease is due to the reduction in processing capabilities, or the need to use existing facilities to process product from other fisheries. As the limited entry program is fully implemented, permits will be purchased by fishers desiring diversification. This may result in higher effort levels, more efficient and species-specific gear, and a continued development of the beam trawl fishery in non-traditional fishing locations. In turn, these changes identify the need to establish a research program for necessary biological information, a more active management program, and the development of a management plan to ensure future conservation goals are achievable.

Table 3.1. Statistical Area A (Southeast Alaska) shrimp beam trawl harvest, number of permits, number of landings, pounds per permit, and pounds per landing, 1955 to present.[a]

Year/ Season	Harvest in Pounds	Number of Permits	Landings	Pounds per Permit	Pounds per Landing
1955	1,777,122	15		118,475	
1956	3,301,598	15		220,107	
1957	2,350,499	10		235,045	
1958	7,605,871	14		543,277	
1959	5,518,843	22		250,857	
1960	3,343,373	21	1,007	159,208	3,320
1961	4,212,300	20	1,394	210,615	3,022
1962	3,884,050	22	1,400	176,548	2,774
1963	3,110,340	20	1,080	155,517	2,880
1964	2,793,101	13	1,092	214,854	2,558
1965	2,941,429	13	1,338	226,264	2,198
1966	3,784,597	14	1,663	270,328	2,276
1967	2,203,753	13	1,105	169,519	1,994
1968/69	2,003,753	12	925	166,979	2,166
1969/70	1,840,727	11	952	167,339	1,933
1970/71	742,404	11	477	67,491	1,556
1971/72	1,050,978	9	592	116,775	1,775
1972/73	797,387	9	421	88,599	1,894
1973/74	674,386	8	460	84,298	1,466
1974/75	1,205,617	20	434	60,281	2,777
1975/76	983,609	12	450	81,967	2,185
1976/77	768,930	14	476	54,924	1,615
1977/78	949,043	10	404	94,904	2,349
1978/79	1,033,325	9	519	114,814	1,990
1979/80	956,927	17	982	56,290	974
1980/81	843,737	21	920	40,178	917
1981/82	919,275	15	524	61,285	1,754
1982/83	1,397,026	15	455	93,135	3,070
1983/84	1,756,533	18	667	97,585	2,633
1984/85	1,294,545	23	811	56,285	1,596
1985/86	429,224	16	252	26,827	1,703
1986/87	2,203,935	16	435	137,746	5,066
1987/88	1,761,636	25	388	70,465	4,540
1988/89	1,675,643	18	527	93,091	3,179
1989/90	1,813,032	21	645	86,335	2,810
1990/91	2,494,957	23	793	108,476	3,146
1991/92	2,934,341	28	1,036	104,798	2,832
1992/93	2,375,742	41	922	57,945	2,576
1993/94	2,135,500	25	705	85,420	3,029
1994/95	3,223,791	25	814	128,952	3,960
1995/96	3,053,316	48	793	63,611	3,850
1996/97	2,536,985	51	884	49,745	2,869
1997/98	3,051,197	42	983	72,648	3,103
1998/99[b]	2,264,641	24	834	94,360	2,715

[a] Data from 1955 through the 1968/69 seasons is from annual reports. Harvest and effort data from 1969/70 to the present is from Integrated Fisheries Data Base (IFDB).

[b] Most recent year's data should be considered preliminary.

Table 3.2. Statistical Area A (Southeast Alaska) shrimp beam trawl harvest in thousands of pounds by month and season, 1969/70 to present.

Season	Month												
	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
1969/70	326.7	280.2	78.8	129.1	184.7	241.2	119.6	165.2	160.0	100.6	32.4	22.4	1,840.7
1970/71	131.3	105.1	65.4	79.8	49.7	64.3	54.8	59.2	59.9	56.8	*	13.2	742.4
1971/72	139.0	106.3	144.5	106.5	69.7	78.3	101.6	71.1	66.0	121.1	38.7	*	1,051.0
1972/73	168.5	126.4	77.2	*	*	44.7	64.0	46.3	81.6	42.2	6.1	8.5	797.4
1973/74	96.3	124.1	*	*	*	*	59.1	64.8	60.3	29.2	*	8.4	674.4
1974/75	160.9	199.2	202.4	168.0	120.1	61.4	73.9	90.8	104.2	21.6	*	*	1,205.6
1975/76	180.7	130.3	67.2	*	112.3	154.5	73.0	77.8	38.9	46.1	*	6.7	983.6
1976/77	78.8	171.7	120.0	118.8	61.8	37.4	55.2	33.3	65.0	25.7	*	*	768.9
1977/78	73.7	235.3	147.9	166.6	126.2	48.3	29.5	18.7	81.2	21.7	0.0	0.0	949.0
1978/79	107.0	130.9	140.6	240.2	112.0	93.1	67.8	36.0	72.3	22.5	8.3	*	1,033.3
1979/80	98.2	154.9	146.6	177.4	104.2	55.1	58.4	39.6	66.3	48.1	*	*	956.9
1980/81	153.8	168.6	164.9	153.7	54.2	30.2	35.5	12.2	33.6	31.6	5.5	0.0	843.7
1981/82	165.1	183.4	124.0	168.8	81.1	52.7	36.5	48.3	33.0	22.3	0.9	3.1	919.3
1982/83	181.1	171.7	168.8	159.4	134.0	50.1	60.7	82.0	152.6	119.8	64.4	52.5	1,397.0
1983/84	436.3	249.0	287.0	218.2	127.5	132.0	83.3	86.9	101.7	16.2	9.0	9.6	1,756.5
1984/85	156.3	252.5	272.5	232.8	132.9	59.5	61.8	49.7	51.9	22.5	*	*	1,294.5
1985/86	125.6	105.3	46.1	23.2	39.1	13.8	31.3	27.0	*	7.7	*	*	429.2
1986/87	294.4	508.2	576.0	446.8	372.0	*	*	*	*	*	*	*	2,203.9
1987/88	634.0	721.0	291.2	90.8	*	*	*	*	*	6.0	*	*	1,761.6
1988/89	647.2	369.0	258.4	137.9	*	2.5	82.8	127.3	37.8	*	*	*	1,675.6
1989/90	473.6	236.2	259.0	173.4	224.3	115.8	*	38.4	167.8	53.4	*	*	1,813.0
1990/91	546.7	336.5	386.5	357.8	293.3	147.4	161.2	148.7	16.8	9.4	17.1	73.4	2,495.0
1991/92	611.6	325.5	887.2	79.1	336.4	219.0	167.2	165.6	113.6	14.8	*	13.8	2,934.3
1992/93	469.3	253.7	404.4	295.7	194.5	186.4	136.8	112.4	131.8	65.5	58.3	67.0	2,375.7
1993/94	548.0	215.4	372.0	239.2	121.3	86.9	104.5	100.3	147.4	85.7	112.1	*	2,135.5
1994/95	560.0	266.2	574.6	468.2	196.3	96.9	149.3	188.5	387.0	41.9	231.6	63.5	3,223.8
1995/96	686.6	338.2	522.3	344.7	515.0	66.7	137.8	55.8	62.7	157.9	104.1	61.3	3,053.3
1996/97	782.8	262.2	609.0	162.8	510.3	100.3	73.3	7.6	*	1.4	*	*	2,537.0
1997/98	727.8	237.8	637.6	183.9	677.6	142.2	129.0	260.6	0.0	43.3	*	0.0	3,051.2
1998/99[a]	524.8	260.8	501.3	317.7	348.7	138.8	102.6	3.4	22.3	15.5	*	*	2,264.6

[a] Most recent year's data should be considered preliminary.

* Where number of permits participating is less than three, information is confidential.

Table 3.3a. Statistical Area A (Southeast Alaska) shrimp beam trawl fishery harvest in thousands of pounds by season and district, 1969/70 through 1978/79.

	Year									
District	69/70	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79
1	0.0	*	*	0.0	*	*	*	1.6	0.0	*
2	0.0	0.0	0.0	0.0	0.0	1.3	0.1	0.0	0.0	0.0
3	0.0	*	*	*	0.0	0.0	*	*	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0
6: Duncan	865.5	344.4	442.4	450.3	260.0	973.2	554.2	610.2	669.7	625.0
6: Sumner	0.0	0.0	0.0	*	0.0	0.0	257.6	10.7	*	*
7: Eastern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7: Blake	0.0	38.1	67.0	35.7	48.7	10.4	14.6	29.2	40.3	140.1
8: Stikine	609.7	158.5	285.7	219.6	323.4	212.4	84.5	85.5	176.0	261.9
9	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10: Thomas	350.1	198.6	252.3	89.9	*	*	*	27.9	*	3.4
10: Upper Fred	0.0	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	*	0.0	0.0	0.0	0.0	*	*	*	*	*
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1,840.7	742.4	1,051.0	797.4	674.4	1,205.6	983.6	768.9	949.0	1,033.3
Landings	952	477	592	421	460	434	450	476	404	519
Permits	11	11	9	9	8	20	12	14	10	9

* Where number of permits participating is less than three, information is confidential.

Table 3.3b. Statistical Area A (Southeast Alaska) shrimp beam trawl fishery harvest in thousands of pounds, by season and district, 1979/80 through 1988/89 season.

	Year									
District	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89
1	*	*	*	*	*	*	*	*	0.0	*
2	1.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3	*	*	*	*	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
5	*	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0
6: Duncan	427.4	415.0	693.8	1,199.6	1,015.4	523.9	235.7	1,645.3	1,225.7	1,043.9
6: Sumner	0.0	*	*	0.0	0.0	17.7	*	*	*	*
7: Eastern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*
7: Blake	109.8	77.9	31.5	11.8	138.6	101.3	30.6	100.6	75.8	15.9
8: Stikine	405.7	342.5	88.6	51.0	545.0	610.8	160.9	432.4	436.3	590.0
9	0.0	*	0.0	*	*	0.0	0.0	0.0	0.0	0.0
10: Thomas	2.8	0.0	0.0	*	26.3	33.8	*	*	*	*
10: Upper Fred	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	*	*	0.0	0.0	0.0	0.0	0.0	*	0.0
12	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0
15	*	*	*	*	2.0	*	*	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	956.9	843.7	919.3	1,397.0	1,756.5	1,294.5	429.2	2,203.9	1,761.6	1,675.6
Landings	982	920	524	455	667	811	252	435	388	527
Permits	17	21	15	15	18	23	16	16	25	18

[a] Most recent year's data should be considered preliminary.

* Where number of permits participating is less than three, information is confidential.

Table 3.3c. Statistical Area A (Southeast Alaska) shrimp beam trawl fishery harvest in thousands of pounds, by season and district, 1989/90 to present.

	Year									
District	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99[a]
1	*	*	0.0	0.0	Closed	Closed	Closed	Closed	Closed	Closed
2	0.0	0.0	0.0	*	Closed	Closed	Closed	Closed	Closed	Closed
3	0.0	80.1	20.4	125.3	18.9	31.6	19.2	69.9	13.1	46.8
4	0.0	0.0	0.0	0.0	Closed	Closed	Closed	Closed	Closed	Closed
5	0.0	0.0	0.0	*	0.0	*	182.0	74.1	11.7	0.0
6: Duncan	1,006.9	1,565.5	1,680.5	1,184.8	829.0	1,406.7	1,355.6	1,285.2	1,250.6	989.1
6: Sumner	0.0	*	35.4	*	*	*	0.0	*	0.0	0.0
7: Eastern	17.5	55.5	74.1	34.7	*	232.2	168.1	115.2	174.7	62.7
7: Blake	70.5	40.4	96.9	58.1	50.7	0.0	3.6	8.4	*	0.9
8: Stikine	676.7	652.0	697.9	683.6	834.3	848.5	905.7	611.9	1,347.8	816.5
9	0.0	*	*	19.6	*	0.0	*	*	*	*
10: Thomas	*	*	321.3	148.7	219.7	241.7	239.7	280.8	240.1	*
10: Upper Fred	0.0	0.0	*	0.0	0.0	*	*	27.5	16.3	*
11	0.0	*	2.8	97.7	109.8	295.0	170.3	57.4	20.5	*
12	0.0	0.0	*	0.0	Closed	Closed	Closed	Closed	Closed	Closed
13	0.0	0.0	*	0.0	Closed	Closed	Closed	Closed	Closed	Closed
14	0.0	0.0	0.0	0.0	Closed	Closed	Closed	Closed	Closed	Closed
15	*	*	0.0	*	Closed	Closed	Closed	Closed	Closed	Closed
16	0.0	0.0	0.0	0.0	Closed	Closed	Closed	Closed	Closed	Closed
Total	1,813.0	2,495.0	2,934.3	2,375.7	2,135.5	3,223.8	3,053.3	2,537.0	3,051.2	2,264.6
Landings	645	793	1,036	922	705	814	793	884	983	834
Permits	21	23	28	41	25	25	48	51	42	24

* Where number of permits participating is less than three, information is confidential.

Table 3.4. Statistical Area A (Southeast Alaska) shrimp beam trawl harvest and landings ( ) by district and month, 1998/99.[a]

	Fishery								
Month	Duncan Canal	Sumner Strait	Eastern Channel	Blake Passage	Stikine Flats	Thomas Bay	all Others Southeast	Total Permits	Total Harvest
May	130,330 (46)		58,963 (6)		235,882 (106)	*	9,972 (13)	21	524,825
June	222,098 (69)			*	13,598 (22)		24,725 (14)	16	260,801
July	151,018 (41)		3,726 (5)	*	281,976 (96)	*	6,888 (11)	17	501,331
August	291,012 (77)			*		*	3,743 (6)	10	317,656
September	95,902 (27)				218,237 (100)	*	9,566 (7)	17	348,719
October	49,524 (13)				42,557 (21)	*	*	6	138,757
November	48,812 (12)					*	*	5	102,625
December	*				*		*	4	3,422
January							*	5	22,268
February							3,600 (1)	6	15,535
March	Closed						*	*	*
April	Closed						*	*	*
Total Harvest	989,114		62,689	863	816,465	*	119,524		2,264,641
Landings	285		40	4	368	*	78		834
Permits	16		8	3	16	*	8		24

[a] Recent season's data should be considered preliminary.

* Where number of permits participating is less than three, information is confidential.

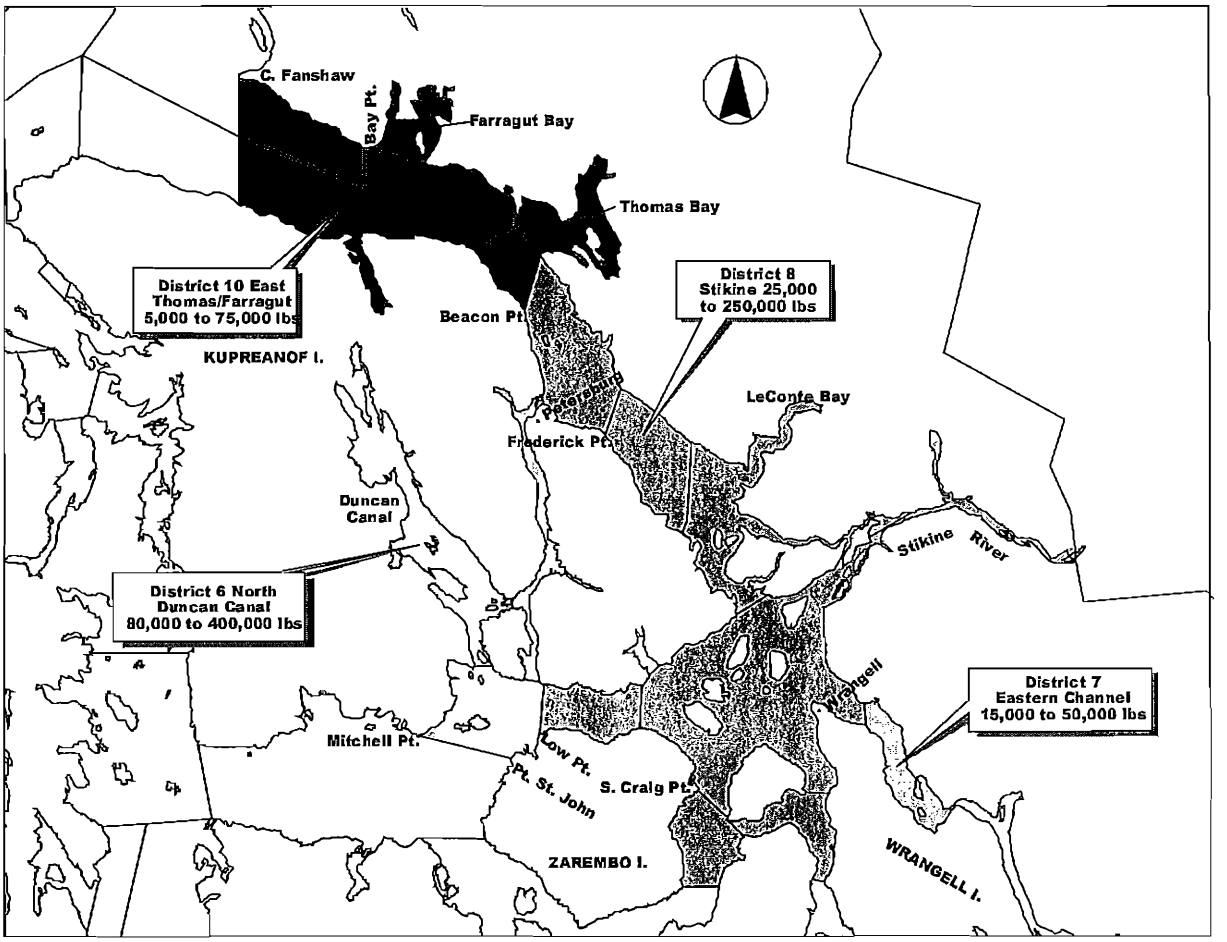

Figure 3.1. Traditional beam trawl shrimp regulatory areas and fishing period guideline harvest ranges for Southeast Alaska.

REPORT TO THE BOARD OF FISHERIES,

SOUTHEAST SHRIMP OTTER TRAWL FISHERY

By

Timothy Koeneman
and
Catherine A. Botelho

Regional Information Report[1] No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

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1 The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate 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.

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INTRODUCTION

The otter trawl fishery targeted primarily pink shrimp *Pandalus borealis,* and secondarily, the larger sidestripe shrimp *Pandalopsis dispar.* Other species captured incidentally and landed in smaller quantities were the coonstripe shrimp *Pandalus goniurus;* humpy shrimp *P. hypsinotus,* and the spot prawn *P. platycerous.* Otter trawl gear was prohibited in Southeast Alaska waters as of May, 1998 by action of the Alaska Board of Fisheries.

When compared to beam trawls, otter trawls are generally larger, more complex in construction, double-bridled, and fish best on smooth, level substrate. They are dynamic trawls which rely on bridle and "otter boards" to deploy, position, and maintain the opening dimensions of the net. "Roller gear" can be added, enabling otter trawls to fish on rougher habitat. The design and size allows much greater fishing power than beam trawls, considering similar length vessels. Otter trawl vessels are generally larger and more modern, with large hold capacities, and engines with larger horsepower ratings. Otter trawl vessels utilize many shrimp fishing grounds in the North Pacific. Most of the historical harvest in Southeast Alaska occurred in Glacier Bay and other portions of District 14. Smaller harvests occurred near Ketchikan, Juneau, and Petersburg. Major processors and markets were as distant as Kodiak and Seward. Large harvester-processors expressed interest in fishing both inside and outside waters.

FISHERY DEVELOPMENT AND HISTORY

The first recorded commercial shrimp otter trawl landing from Southeast Alaska waters occurred in 1975 (Table 4.1). Since then, there were eight seasons with no otter trawl harvests reported in Southeast Alaska, and eleven seasons when effort was so low that harvests are confidential. The peak harvest of 145,286 pounds from 11 landings occurred during the 1980/81 season. Most of this harvest occurred in Glacier Bay from larger vessels transiting through Southeast Alaska to the Westward Region to participate in spring shrimp fisheries. Most of the product was processed in Kodiak. Glacier Bay contributed the most significant portion of this harvest. During only two other seasons, 1993/94 and 1997/98 has effort been sufficient to provide significant harvests. The 1997/98 season was the last fishing period when otter trawling was legal. The lack of abundant resource and processing facilities slowed the expansion of the fishery into many geographic locations. With the exception of past fisheries in Glacier Bay by larger vessels, the majority of recent participants were relatively small vessels using small nets.

REGULATION DEVELOPMENT

Otter trawling was prohibited on some grounds traditionally utilized by beam trawl vessels (District 8, portions of Districts 6 and 10) and in Lituya Bay by state regulations through the 1997/98 season, and in Glacier Bay by National Park Service regulations. Until the 1995/96 season the remainder of Southeast

Alaska was open throughout the fishing year with no restriction on mesh size or maximum opening dimensions, or established guideline harvest range. Until the repeal of otter trawls as a legal gear type in Southeast Alaska, otter trawl fishing seasons began on May 1 and closed on February 14. Interest from larger harvester/processors and potential conflicts with other gear users were instrumental in the closure of all districts without a history of consistent and substantial effort or harvest. Open fishing areas and guideline harvest ranges were from 25,000 to 100,000 pounds for Districts 3, 5, and 6 south of a line from Mitchell Point to Point St. John; Districts 7, 9, and 10 west of the longitude of Cape Fanshaw; and District 11. All participants in this fishery had to register prior to fishing and complete logbooks.

LIMITED ENTRY

In late 1996, the Commercial Fisheries Entry Commission published a proposal to limit entry into the shrimp otter trawl fishery with a maximum number of permits of 6. To qualify for a permit, an applicant must have fished during at least one of the qualifying years from 1993 to 1996. The consideration to limit entry into the trawl shrimp fishery spawned participation in the fishery during 1996/97 and 1997/98 seasons, even though participation in 1997 would not qualify an applicant for more participation credit under a limited entry point system.

The BOF subsequently eliminated shrimp otter trawl gear as a legal gear in Southeast Alaska at the January 1997 meeting. In February, the CFEC decided to postpone its decision on entry limitation in the otter trawl fishery until late June 1997 and allow further public comment. In response to letters and petitions, the BOF considered their regulatory action again during an October 1997 work session but did not rescind their decision. The CFEC moved forward with limited entry, with a one-time only application period of December 1998 through March of 1999. A total of 5 applications were received.

FUTURE SEASON SYNOPSIS

Current regulations do not provide for a shrimp otter trawl fishery in Southeast Alaska. If the fishery is to be allowed at a future date, it would have to be well controlled, restricted to limited grounds, use habitat friendly gear specifications, and work under by-catch restrictions of other important commercial species. The potential for a large-scale in-side water fishery is very low.

Table 4.1. Statistical Area A (Southeast Alaska) shrimp otter trawl fishery harvest, number of landings, and CPUE (pounds-per-landing), 1975/76 to present.

Year/ Season	Catch in Pounds	Number of Landings	Pounds Per Landing	Number of Permits	Pounds Per Permits
1975/76	*	*	*	*	*
1976/77	*	*	*	*	*
1977/78	0	0	0	0	0
1978/79	0	0	0	0	0
1979/80	*	*	*	*	*
1980/81	145,286	11	13,208	3	48,429
1981/82	*	*	*	*	*
1982/83	*	*	*	*	*
1983/84	*	*	*	*	*
1984/85	0	0	0	0	0
1985/86	0	0	0	0	0
1986/87	*	*	*	*	*
1987/88	*	*	*	*	*
1988/89	0	0	0	0	0
1989/90	0	0	0	0	0
1990/91	0	0	0	0	0
1991/92	*	*	*	*	*
1992/93	*	*	*	*	*
1993/94	17,599	4	4,400	3	5,866
1994/95	*	*	*	*	*
1995/96	0	0	0	0	0
1996/97	3,801	22	173	9	422
1997/98[a]	66,381	34	1,952	9	7,376
1998/99	Otter Trawls Eliminated as a Gear Type in Southeast Alaska				

[a] Most recent season's data should be considered preliminary.

* Where number of permits participating is less than three, information is confidential.

Section 5

Southeast Alaska Shrimp Pot Fishery

REPORT TO THE BOARD OF FISHERIES,

SOUTHEAST ALASKA SHRIMP POT FISHERY

By

Timothy Koeneman
and
Catherine A. Botelho

Regional Information Report1 No. 1J99-47

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This chapter describes the commercial pot fishery for spot prawns in Southeast Alaska (Registration Area A) with emphasis on the 1998/99 fishing season. The events characteristic of this fishery are driven by the recent, large increase in effort and subsequent limited entry, significant regulatory changes and the developing program for shrimp management and research in the region.

Management is based upon a closed season to prevent fishing on major stocks during the egg-hatch or growth and recruitment periods, minimum mesh size restrictions intended to only capture and retain the larger size segment of the stock, a standardization of two sizes of pots with a maximum number of pots per vessel, restricted daily deployment and hauling times, and a guideline harvest level (GHL) for each fishing district. Regulations have also been adopted for permitting of shrimp floating processors, and reporting requirements for shrimp catcher processor vessels. Harvest is recorded and summarized through the ADF&G fish ticket system. Limited pre-season surveys, on-board and dockside sampling is conducted.

The spot prawn *Pandalus platycerous* is the target species for the shrimp pot fishery, with smaller quantities of coonstripe shrimp *P. hypsinotus* also harvested. Life history information concerning these species is limited. Canadian reports suggest the maximum age of the spot prawn is three to five years, while Alaskan tagging data suggests eight to ten years. All pandalid shrimp are protandric hermaphrodites, which means they first mature and spawn as males, transition to females, and spawn as females for the remainder of their lives. Spot prawns are functional males for one to three seasons (in their fourth year), then change sex and spawn as females for four or more years. The fecundity of a large female spot prawn has been estimated at 4,600 eggs per year. Literature reports that eggs hatch in late winter and early spring, followed by a growth molt for females. The transition from male to female occurs during the summer months. Females undergo another molt into "breeding dress" in the fall, after which they extrude their mature eggs from the internal ovaries. Eggs are fertilized externally when they are extruded. Developing embryos are carried on the external pleopods until they are fully developed. Hatching occurs during late spring through early summer.

Both species, *Pandalus platycerous* and *P. hypsinotus,* are harvested from rocky habitats, with the greatest portion of the harvest taken in Districts 1, 3, and 7. Smaller but significant historical harvests have also occurred in Districts 2, 6, and 8. More recently, harvests from Districts 9, 10, 11, 12, and 13 have become important.

Vessels used in the shrimp pot fishery generally range from smaller style gillnet or troll vessels to limit purse-seiners. At least two "catcher-processors" in the 60' keel length range also participate. Fishers use baited pot gear, which is either longlined or fished as single pots. In a longline system each pot is attached to the groundline with a snap or "c-links," similar to the longline system used in various groundfish fisheries. Pot construction is varied in size, shape, weight, and configuration. The most common pot used during the initial stages of the fishery was a rectangular pot approximately 30" x 18" x 18" with a tunnel at either end. Gear designs have rapidly changed to increase fishing efficiency. Pots that have been legal included those with a large bottom surface area, heavy pots, and pots with three to eight entrance tunnels. Small rectangular "king crab" style pots were also used by a number of fishers.

One of the most commonly used pots today is a "cone style" pot. This pot is constructed using two or three stainless steel rings, the top ring smaller than the bottom, with vertical bars welded between the rings forming six sides, at least three of which contain tunnels. These cone pots are also constructed of either rubber wrapped or "dipped" mild steel. This pot type has webbing tightly drawn in on the top with a

permanent closure. The bottom web is drawn in with a "pucker string" which is opened during baiting operations and to empty the pot of its harvest.

FISHERY DEVELOPMENT AND HISTORY

Harvest records dating from 1962 indicate that the pot shrimp fishery began with sporadic effort and low harvests through the mid- 1970s when the pot shrimp fishery served as a supplemental source of income to other fisheries, primarily salmon and halibut. Harvests and effort increased through the 1980s, and culminated in the 1990s with harvests averaging about 784,000 pounds caught by an average of 202 permit holders (Tables 5.1, 5.3, and 5.7).

Through the mid-1980s most of the product was sold over the dock to private individuals, restaurants, or other markets without passing through the traditional system of processors established for other fish and shellfish species. Vessels conducting business in this manner are termed "catcher-sellers." Primarily, picked "tails" were sold, and exvessel prices were dependent upon the size of the tails or count of tails per pound with the larger prawns commanding the highest price. Because the fishery was supported by relatively low volumes with moderate prices the fishery remained relatively slow paced.

From 1990/91 through the 1994/95 fishing seasons the character of the fishery underwent radical changes with permits fished as high as 248 and harvests exceeding 1 million pounds. In October 1994, the first floating processor entered the fishery, and the market product began to change towards unsorted, whole shrimp with a moderate increase in value. This change in market product meant that fishers no longer had to spend time sorting shrimp by size and picking tails on the ground, running to and from markets, or selling their own shrimp, effectively allowing them to spend more time fishing. Many fishers utilized this fishery as a significant source of their fishing income. Pot efficiency during this period and the pace of the fishery increased and the first emergency order was issued to close Districts 6 and 8 when the guideline harvest level was reached. The rapid escalation of effort and harvest evoked petitions for limited entry, which was put in place 1995. The maximum number of permits fished was 353 during the 1995/96 season.

REGULATION DEVELOPMENT

Throughout most of the development of the shrimp pot fishery, management has generally been passive with only fish ticket data available to assist managers. Seasons have been set to prevent harvesting during the egg hatch period in major districts and mesh restrictions were set to allow the escapement of all shrimp below approximately 30 mm in carapace length. Mesh restrictions are not totally effective due to current regulations and fishing practices. Guideline harvest levels were established to limit the harvest in each fishing district. Guideline harvest levels are based on harvest history data, and not on information describing stock abundance or stock condition.

Nearby jurisdictions use more active management approaches than does Alaska. The management goal in British Columbia is to limit fishing mortality of the female spawner portion of the stock. British Columbia managers use a pre-season stock assessment program to determine the catch per unit of effort (CPUE) expressed as the average number of spawners per pot lift. An acceptable level of fishing mortality is applied to the average number of spawners per pot lift to determine a threshold. During the fishing season, enforcement officers and biologists collect CPUE data through mandatory logbook programs with frequent review on the grounds. Once the average CPUE dips below the threshold, the fishery is closed. The state of Washington uses a very short season, bases management on pre-season stock assessment, and specifies rigid mesh with a minimum mesh measurement as the only legal gear.

Fishing Seasons

Prior to 1970, pot shrimp fishing was allowed only during periods when the trawl shrimp fishery was open, (roughly May 1 through February 14). In 1970, pot fishing was allowed throughout the year; this liberal season existed through the 1981/82 fishing season. During the 1982/83 season, fishing was not allowed during May and June in Districts 1 through 8. This closure was intended to provide fecund, female shrimp protection from exploitation during the egg-hatch period in an attempt to maximize stock reproduction potential. The actual range of egg-hatch probably varies by location throughout the region but can safely be defined as from late February through the middle of May.

Prior to the 1983/84 season the District 1 fishery was restricted by BOF actions to a September 1 through April 30 season. This was an allocation for fishers who traditionally used District 1 as a supplemental income source during the fall and winter months. The closure during the summer provided the important biological benefits of allowing stock recruitment to occur through molting and growth processes.

By the 1986/87 season, major areas (Districts 1, 2, 3, and 7) were open only from October 1 through February 28 which was established for a combination of egg-hatch closure, growth and allocation for a fall/winter fishing season. The minor areas (Districts 6 and 8) were open from May 1 through February 28 with only an egg-hatch closure in place. All other areas (Districts 4, 5, and 9 through 16) remained open throughout the year without an egg-hatch closure.

In 1997, the BOF adopted a regulatory opening of October 1 and closure of February 28 for all districts. Recently, GHRs were not achieved in some districts by season's end. Managers reopened these districts after the egg-hatch period, and closed them by emergency order when GHRs were achieved. Districts where GHRs were not achieved were closed at least one month ahead of the October opening to allow for a fair start.

Size Restrictions

The Alaska Board of Fisheries policy on small shrimp, primarily developed for the trawl fisheries, also applies to the pot shrimp fishery. Specific regulations concerning a minimum legal shrimp size have not been developed. A mesh restriction specifying 1.75" stretch mesh was established in 1986 to assist in the escapement of shrimp less than 30 mm in carapace length and to reduce the potential for recruitment overfishing. This regulation provides for some protection for approximately two year-classes of small shrimp. Shrimp pots must be entirely covered with net webbing or rigid mesh. There is no mesh restriction for waters of Lituya Bay in District 16. The fleet testimony at the 1997 BOF meeting indicated that significant amounts of small shrimp were being discarded at the floating processors. The requirement for mandatory observer coverage was partially to verify fish ticket information and document possible discard.

Quotas and Guideline Harvest Levels

Prior to the 1983/84 season, a GHL of 125,000 pounds was established for each district in Districts 1, 2, 3, and 7, and 55,000 pounds for Districts 6 and 8. By the 1986/87 season the GHL for Districts 6 and 7 was altered to a range of 75,000 to 100,000 pounds and dropped entirely for all other districts. This situation existed until October 1, 1995 when the department implemented GHLs for each district by news release. This action was taken to maintain the fishery at a stable level and provide for some protection against overharvesting. For districts with a fairly consistent harvest history, guideline harvest levels are based on the average harvest for the five fishing seasons, 1990/91 through 1994/95. For districts with low and intermittent harvests, guideline harvest levels were arbitrarily set at 20,000 pounds. In January of 1997, the BOF adopted regulatory GHLs for each. Those GHLs were the same as those imposed by emergency order beginning with the 1995/96 season.

Gear Restrictions

With the exception of the minimum mesh size, no gear restrictions were implemented until the 1976/77 season when a pot limit of 150 pots per vessel was established for Districts 1 through 15. Until October of 1997, the 150 pot limit applied to all portions of Registration Area A. Minor regulations concerning a maximum tunnel perimeter (15"), pot marking requirements, prohibitions against simultaneously fishing shrimp pots and any other type of commercial, sport or personal use pot, escape mechanisms, and some clarification of mesh requirements had also been developed.

Not only did enforcement problems repeatedly demonstrate the need for clearer definitions of shrimp pot gear, but reduction in pot sizes would slow the fishery and could provide some CPUE data to the department if gear was standardized, and if a tiered pot system under consideration by CFEC was implemented. Coupled with the implementation of limited entry, the BOF in January of 1997, adopted gear regulations allowing for standardization during a number of years. Through September 30, 1998, the number of shrimp pots that could be operated from a registered shrimp fishing vessel was 140 small pots or 100 pots larger

than a small pot. If any pot operated from a vessel was larger than a small pot, the total number of pots that could be operated from that vessel was 100 pots.

In October 1998, a "small pot" was defined as having a bottom perimeter of no more than 124 inches and a "large pot" was defined as having a bottom perimeter of more than 124 inches, but not more than 153 inches. Perimeter measurements were selected over diameter measurements to reduce interpretation distortions. Further, all pots on board a vessel or operated from a vessel had to be of the same type and of the same size. Limits of 140 small pots or 100 large pots being operated from a registered shrimp fishing vessel continued.

Pots may not have more than one bottom, a vertical height of more than 24 inches, and more than four tunnel eye openings which individually do not exceed 15 inches in perimeter. The sides of the pot may only be at a right angle to the plane of the bottom of the pot or slanted inward toward the center of the pot in a straight line from the bottom to the top.

Other pot shrimp regulations adopted in 1997 include time limitations for deployment and retrieval of gear from 8:00 a.m. until 4:00 p.m. each day, restrictions on carrying pot gear owned only by the vessel operator, and unique identification tags for each pot.

Floating Processors

Since 1994 floating processors were increasingly available on the fishing grounds not only for transporting gear for a "mosquito fleet" that moves from one district as it closes to another, but also to purchase live shrimp. As a result, GHRs are achieved more quickly. In order to remain competitive, those fishers that wished to explore other grounds within a district were forced to remain in localized areas and sell to the floating processors. In an effort to slow the pace of the fishery, the 1997 BOF eliminated the ability of floating processors to transport pots for fishing vessels and implemented requirements that includes reporting processor location and any changes in location, reporting projected dates of operation, and daily reporting. The only practical way for the department to have verification of daily reporting was to implement mandatory observer coverage, the cost of which is borne by the processor.

Limited Entry

In April of 1995 the Commercial Fisheries Entry Commission received petitions from more than 70 people from Wrangell, Ketchikan, Craig, and the Tenakee Springs Fish and Game Advisory Committee requesting limitations to the number of participants in the southeast pot shrimp fishery. After the commission obtained and analyzed data concerning the fishery, their proposed regulations were consistent with what the petitioner's had suggested in that 1995 should not be included in the eligibility time frame. This would have capped the number of limited entry permit holders at 186 which was the highest participation level in any of the four years prior to the original qualification date. The commission held numerous public hearings throughout Southeast Alaska and announced in early November 1995, while fishing was in progress, that they had adopted a limited entry program that would include participation during 1995 towards

qualification. At the time, the effort level had increased to 234 fishers. And finally, by law, the commission was required to revise upward to the maximum number of permits to 332 that legally participated in calendar year 1995. In October, 1996 the commissioners adopted a point system for the fishery and by February of 1998 the commission began the process of issuing and denying permits for this fishery. To date, 301 permits have been issued with 73 additional applicants either undergoing hearings or administrative review for additional points or vying for the remaining 31 permits that will be available.

RESEARCH

Little research had been conducted concerning the distribution and abundance of spot prawns in Southeast Alaska prior to 1996. Information concerning pot efficiency and limited stock distribution data was collected by various agencies during the 1960s and early 1970s. Pot efficiency studies concerned various pot tunnel configurations in rectangular pots, and a comparison of covered versus uncovered pots.

In recent years, the department reviewed available CPUE data recorded on fish tickets and found it to be insufficient to provide a basis for management. During September, 1996 the department conducted a pilot study to obtain data on CPUE, size and weight, and size and sex of spot prawns and coonstripe shrimp in District 7. The major purpose of the study was to collect and evaluate data required for rational management, to understand the variability of various parameters associated with stock assessment, to investigate factors essential to establishing an appropriate stock assessment program, and to provide information necessary to develop a well founded management plan in the near future.

In 1997 the department began a pre-season survey in District 3. We also conducted dockside sampling of the landed catch. These programs have continued to expand. In 1998/99 the department conducted pre- and post-season surveys in District 3. Pre-season surveys were conducted in Districts 3 and 7 and Section 13-C prior to the 1999/00 fishing season. The dockside sampling program has been expanded to include most districts. In addition, managers now monitor the fishery on the fishing grounds, and collect samples of the landed catch. Results of this expanding research and management effort are beginning to yield benefits to the proper management of the pot shrimp resource.

1998/99 SEASON SYNOPSIS

In September 1998, the department provided a news release to the fleet announcing fishing seasons, fishing periods, lawful gear, GHRs, floating and catcher processor regulations, pot tendering, catch reporting requirements, and other restrictions. The fishery opened on October 1, 1998. Fishing effort was reduced due in part to the adoption of a limited entry program for this fishery. A total of 183 permits were fished, about half of the peak season of 1995/96, and 1,806 landings were made (Table 5.4). There was one floating processors and three registered tenders. A total of 788,644 pounds of shrimp were harvested by season's end. The majority of this harvest was composed of spot prawns. Approximately 93,000 pounds of

coonstripe shrimp were included in the total harvest. Average price of spot prawns is estimated at $3.25 per whole pounds. The estimated exvessel value for the 1998/99 season was about $ 2.6 million.

Effort was particularly high in District 3 with a closure on October 30, 1998 and in Districts 13-C and 12 where upper GHRs were reached and areas closed October 7 and 15 respectively. Districts 1, 2, 6, and 7, had significant effort during the month of October with diminishing catches in following months. By the end of the first week into calendar year 1999, Districts 1, 2, 3, 7, 8, 9, 10, 12, 13-C, and 16 were closed by emergency order with 94 percent of the total seasonal harvest taken. On average, published district GHLs were exceeded by 4 percent. Districts 4, 5, 11, 13-A and B, 14, and 15 closed by regulation on February 28, 1999. On May 1, 1999, with the exception of 13-A and 13-B, these areas were reopened to allow for continued harvest towards their respective GHRs. District 15 reached the upper GHR and was closed May 21, 1999. All other districts were closed by emergency order on August 1, 1999.

It is difficult to assess stock abundance, and the effects that intense fishing may have on current stock abundance, growth, size composition, reproduction, and future abundance. Information now available identifies a number of concerns to the department. Some serial depletion of stock segments may be occurring as evidenced by fleet movement between statistical sub-areas and survey information. It is possible that fishers are maintaining good harvests through improved gear and fishing techniques and by exploiting different grounds, or other means. The targeted harvest of the larger, older, and most fecund prawns may be reducing stock reproductive potential through removal. An inappropriately high harvest rate and the removal of the large females may be forcing females to produce their first clutch of eggs at a smaller size.

1999/00 SEASON NOTES

The 1999/00 fishing season opened on October 1, 1999. Market conditions were strong and available effort was initially high. The number of registered fishers is 219, but the actual number of permits fished through November 30, 1999 is 128. All fish tickets entered through December 2, 1999 totaled 492,468 pounds. The actual harvest will increase as fish tickets are received and entered. By season's end, the department expects the harvest will exceed 800,000 pounds.

This season there were no floating-processors buying and processing shrimp on the grounds. A number of tender operations registered to get product from the grounds to shore-based processing facilities. An increasing number of catcher-processors participated. The major product is whole, sorted, dipped and frozen prawns. Some catcher-processors are producing an undipped, frozen tail product. Prices remain high, and are estimated at $3.50 per pound, whole weight. By the end of the fishing season, the exvessel value of will be approximately $2.8 million.

The fishery began at a fast pace, with good prices, and fairly poor weather conditions. The department initiated on-the-grounds management teams for the first time this season. Managers boarded vessels, obtained direct information about the fishery and collected size-distribution samples. The information they collected increases the department's understanding of the fishery and allowed us to make timely decisions and closures. Section 13-C was closed by emergency order on October 5 when the GHR was caught. District 12 followed on October 9, and District 3 on October 12. By the end of October, Districts 8 and 10 were also closed. Guideline harvest levels were achieved in Districts 2, 7, and 9 and by November 26 these

districts were closed. Approximately 26 percent of the District 7 catch was comprised of coonstripe shrimp. As of December 2, Districts 1, 6, 11, 14, 15, and 16, and Sections 13A and 13B, all were fished but remained open with portions of the GHRs remaining to be caught. A portion of District 1 will be closed early by emergency order for conservation reasons. The other open districts will remain open until February 28 unless the GHL is caught or conservation concerns surface. Districts 4 and 5 have received no fishing effort and will remain open through February 28.

The management and research program will continue to develop. The department is in the process of hiring a shrimp biologist to direct and improve the research program, assist in the development of management tools based on historic harvest data, and coordinate the research program with management requirements. Additional grounds will be surveyed this coming fall and analysis of available data will continue in an attempt to better ascertain stock conditions. During the 2000/01 fishing season the department is planning to increase the on the grounds monitoring program to further improve management of this important fishery.

Table 5.1. Registration Area A (Southeast Alaska) shrimp pot fishery harvest, number of landings, and CPUE, 1968/69 season to present.

Season[a]	Harvest in Pounds	Number of Permits Fished	Number of Landings	Pounds Per Landing	Pounds Per Permit
1968/69	38,744	5	50	774	7,749
1969/70	19,928	3	25	797	6,643
1970/71	12,684	5	27	469	3,171
1971/72	28,053	7	50	561	4,008
1972/73	*	*	*	*	*
1973/74	*	*	*	*	*
1974/75	4,607	7	16	287	921
1975/76	12,573	5	29	433	2,515
1976/77	20,916	6	17	1,230	3,486
1977/78	23,559	10	76	309	2,356
1978/79	21,318	9	35	609	2,369
1979/80	51,621	19	124	416	2,717
1980/81	78,864	32	192	410	2,465
1981/82	138,630	49	377	367	2,829
1982/83	216,301	58	374	578	3,729
1983/84	233,312	93	653	357	2,509
1984/85	278,455	115	777	358	2,430
1985/86	183,590	82	495	370	2,239
1986/87	294,021	83	607	484	3,542
1987/88	313,556	96	688	455	3,266
1988/89	376,894	130	812	464	2,899
1989/90	365,898	110	815	448	3,326
1990/91	475,741	139	1,103	431	3,423
1991/92	657,727	175	1,480	444	3,758
1992/93	562,153	146	1,192	471	3,850
1993/94	790,018	181	1,602	493	4,365
1994/95	1,070,691	248	2,723	393	4,317
1995/96	917,802	353	2,854	321	2,600
1996/97	957,905	203	1,996	479	4,719
1997/98	838,256	197	1,753	478	4,255
1998/99[b]	788,644	183	1,806	442	4,310

[a] Pot shrimp seasons are October through September.

[b] Most recent year's data should be considered preliminary.

* Where number of vessels participating is less than three, information is confidential.

Table 5.2. Registration Area A (Southeast Alaska) shrimp pot fishery harvest in thousands of pounds by month, 1968/69 season to present.

Year	Month												Total	Landings	Permits
	October	November	December	January	February	March	April	May	June	July	August	September			
1968/69				4,246	5,669	13,475	5,471	*	*				38,744	50	5
1969/70			*	*	4,638	5,094	*	*					19,928	25	3
1970/71	*	*	3,213	*	3,520	*						*	12,684	27	5
1971/72	*	*	*	*	*	4,301	10,923	3,788	1,750		*		28,053	50	7
1972/73	*					*	*		*				*	*	*
1973/74			*		*	*	*		*				*	*	*
1974/75	*	*	*	*	*	*	*			*			4,607	16	7
1975/76		*	*	*	*	*	*	1,463	*	*	*		12,573	29	5
1976/77		*	1,646	*		*	*			*		*	20,916	17	6
1977/78	*	*		*	*	*	5,250	*	*	690	*	*	23,559	76	10
1978/79	*	*	*				*	5,109	3,168	*	*	*	21,318	35	9
1979/80	*	*		799	1,544	2,996	2,479	12,388	8,334	7,840	*	11,112	51,621	124	19
1980/81	9,410	3,149	706	*	1,373	4,041	7,178	6,463	7,238	21,946	9,964	5,717	78,864	192	32
1981/82	11,413	3,506	4,911	2,625	5,081	9,910	9,966	3,288	4,982	34,289	33,620	15,039	138,630	377	49
1982/83	20,566	7,042	16,187	9,214	25,817	7,468	*	4,354	3,142	44,570	41,698	35,574	216,301	374	58
1983/84	38,181	28,005	14,329	12,224	19,990	22,311	23,037	29,326	28,637	7,560	5,407	4,305	233,312	653	93
1984/85	32,313	36,059	26,421	29,615	35,238	8,312	8,459	29,614	20,274	15,909	17,290	18,951	278,455	777	115
1985/86	15,291	26,546	28,189	28,749	29,788	26,967	9,352	1,931	2,960	6,168	5,256	2,393	183,590	495	82
1986/87	45,647	44,510	39,352	45,460	60,328	24,912	9,884	5,294	2,709	6,682	4,172	5,071	294,021	607	83
1987/88	64,285	48,353	41,265	45,431	53,982	15,142	17,408	8,671	6,087	4,827	4,951	3,154	313,556	688	96
1988/89	72,296	82,230	63,238	47,771	52,524	19,997	10,641	2,057	5,041	6,755	8,372	5,972	376,894	812	130
1989/90	76,290	61,599	49,909	48,194	41,870	37,814	10,385	9,410	6,453	8,960	7,554	7,460	365,898	815	110
1990/91	110,159	64,453	56,460	68,781	86,453	24,032	18,073	3,330	10,522	14,371	10,196	8,911	475,741	1,103	139
1991/92	194,186	140,989	92,739	82,896	64,459	12,884	14,672	12,144	10,750	9,560	15,049	7,399	657,727	1,480	175
1992/93	109,844	77,768	55,533	101,117	114,294	37,279	13,489	19,613	7,129	9,497	9,116	7,474	562,153	1,192	146
1993/94	145,648	165,321	83,143	112,548	113,958	39,204	20,400	20,944	20,651	18,512	26,212	23,477	790,018	1,602	181
1994/95	167,378	124,113	90,660	182,144	177,685	56,001	31,150	112,617	59,025	22,061	22,397	25,460	1,070,691	2,723	248
1995/96	442,853	191,218	106,389	68,743	40,310	23,983	7,843	11,448	9,021	6,593	8,206	1,195	917,802	2,854	353
1996/97	747,527	119,195	20,867	18,087	20,403	7,229	4,503	5,530	3,001	3,227	3,844	4,492	957,905	1,996	203
1997/98	713,794	55,287	29,776	3,606	5,318	5,197	7,086	8,730	8,357	*	*	0.0	838,256	1,753	197
1998/99 [a]	573,888	120,708	43,732	17,553	14,075	*	15,465	2,844					788,644	1,806	183

[a] Most recent year's data should be considered preliminary; season in progress.

* Where number of vessels participating is less than three, information is confidential.

Table 5.3. Registration Area A (Southeast Alaska) shrimp pot fishery harvest in thousands of pounds by district, 1968/69 season to present.[a]

	District															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1968/69	31.4	*					*									
1969/70	11.9	*														
1970/71	3.7	*						*		*						
1971/72	10.1	14.8					*		*	*						
1972/73		*					*									
1973/74	*	*														
1974/75	2.4	*	*													
1975/76	4.3	7.7	*													
1976/77	*	11.7	*				4.8									
1977/78	5.6	13.1			*		*						*			
1978/79	4.2	6.7	*	*			3.6					*	*			
1979/80	14.9	12.4	*				16.8	*					*	*		
1980/81	14.9	14.6	25.0	*		*	15.5	*	*	*		*	*			
1981/82	21.3	15.2	51.7			8.5	14.5	2.0	3.6	*	*	*	12.3	*		4.5
1982/83	24.9	30.9	63.2	*		8.5	61.9	2.3	6.5	3.1		*	11.7	*		*
1983/84	39.1	20.8	34.1	*	*	6.7	77.5	14.5	*	12.0	*	2.9	19.1			*
1984/85	63.8	44.9	17.6	*	*	6.1	83.5	8.6	*	30.6	*	*	14.1	0.5		*
1985/86	37.9	31.5	61.7	*	*	5.1	19.1	2.6	*	10.8	*	0.3	8.9	*	*	*
1986/87	47.1	117.6	41.1		*	1.8	33..9	1.5	4.3	27.2	1.8	3.6	8.6	*	*	*
1987/88	98.9	71.4	22.0	*	*	0.5	43.0	2.4	15.8	24.4	2.0	11.9	17.9	1.7	*	*
1988/89	175.4	52.5	16.7	*	*	6.7	52.0	0.7	5.5	30.8	0.5	8.8	22.6	*		*
1989/90	142.1	58.0	23.6	2.2		7.0	37.8	15.6	*	43.1	*	5.5	25.9			*
1990/91	154.5	66.1	51.6	9.5		8.6	82.4	11.6	4.4	36.9	1.3	14.1	33.3		*	0.7
1991/92	145.6	70.0	213.8	*	*	18.5	99.8	13.0	1.9	41.8	*	5.4	40.2		0.9	4.1
1992/93	130.1	56.5	197.5	3.8	*	20.3	49.1	14.5	7.9	26.6	*	18.9	33.7		1.0	*
1993/94	127.7	102.6	246.6	4.5	*	35.2	102.7	19.9	32.8	31.0	1.9	27.9	52.6	*	1.5	*
1994/95	144.0	68.4	216.7	0.9	21.6	130.4	195.7	28.4	10.9	81.8	2.6	51.9	101.5	1.9	8.7	5.4
1995/96	165.0	77.0	238.0	22.7	21.9	75.6	117.4	9.1	22.6	41.2	21.2	26.1	45.4	17.0	8.7	9.0
1996/97	149.9	71.8	275.7	19.0	20.4	76.5	121.8	29.2	16.3	46.5	19.8	26.3	41.8	4.0	19.0	*
1997/98	130.8	77.0	223.3	8.8	5.9	70.4	118.0	19.5	19.7	33.0	16.6	24.2	39.7	11.5	19.0	20.8
1998/99[b]	145.9	66.5	192.9	3.2	4.8	66.2	101.7	20.5	18.1	31.8	5.1	28.5	58.7	6.2	21.8	17.6

[a] Pot shrimp seasons are October through September.

[b] Most recent year's data should be considered preliminary.

* Where number of vessels participating is less than three, information is confidential.

Table 5.4. Registration Area A (Southeast Alaska) shrimp pot harvests in thousands of pounds, number of permits, and number of landings by district by month, 1998/99 season.

District	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Harvest	Permits	Landings
1	78,641	42,933	23,524	826	Closed January 5, 1999								145,924	40	306
2	48,687	9,962	6,143	1,730	Closed January 5, 1999								66,522	26	177
3	192,891	Closed October 30, 1998											192,579	49	212
4	0.0	*			*	Closed by Regulation		*	*	*			3,220	5	19
5	*	*	*	0.0	3,097	Closed by Regulation		*					4,841	5	11
6	36,619	7,953	*	11,906	5,827	Closed February 14, 1999							66,177	15	137
7	84,031	11,916	5,705	Closed December 31, 1998									101,652	23	328
8	17,137	3,359	Closed November 13, 1998										20,496	13	94
9	9,717	8,339	0.0	Closed December 2, 1999									18,056	13	36
10	23,491	8,253	Closed November 20, 1998										31,744	17	81
11	0.0	1,187	0.0	*	*	Closed by Regulation		1,078	*	*			5,120	7	26
12	28,462	Closed October 15, 1998											28,462	13	32
13-C	45,507	Closed by Regulation											45,507	27	733
13-A, B	6,200	4,265	*	0.0	*	Closed by Regulation							13,189	10	39
14	0.0	825	*	*	*	Closed by Regulation		*	*				6,201	6	64
15	1,766	3,802	2,358	1,404	1,537	Closed by Regulation		10,969	Closed May 21, 1999				21,969	10	158
16	991	16,593	Closed December 1, 1998										17,584	344	43
Harvest	573,888	120,708	43,732	1,753	14,075	Closed by Regulation		15,640	3,320	*			788,644		
Permits	165	85	39	20	18	Closed by Regulation		14	5	*				183	
Landings	1,97	341	134	52	49	Closed by Regulation		101	31	*					1,806

* Where number of vessels participating is less than three, information is confidential.

Section 6

Yakutat Dungeness Crab Fishery

REPORT TO THE BOARD OF FISHERIES,

YAKUTAT DUNGENESS CRAB FISHERY

By

Timothy Koeneman
and
Catherine A. Botelho

Regional Information Report1 No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

I The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate 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.

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INTRODUCTION

Dungeness crabs *Cancer magister* are members of the highly evolved brachyuran (true crab) subgroup of the order Crustacea. They are commercially significant and widely distributed in coastal waters of the eastern Pacific Ocean from Baja California to the Aleutian Islands.

Fishing grounds in Yakutat (Registration Area D) are close to the northern limit of Dungeness crab distribution. They are widely distributed in Yakutat waters, but tend to concentrate off ocean beaches in two to 10 fathoms. Some of the most productive summer fishing occurs in the shore break of exposed beaches. Although the fishery extends along the entire coast, much of the total harvest each year is taken from four or five distinct, localized fishing grounds. Through the past forty seasons, Yakutat produced a long-term average harvest of about 1,370,000 pounds per season (Table 6.1) but with a downward trend occurring since 1992/93. Historically, the product was marketed as canned or frozen meat, sections, whole-cooked, or live crab. More recently, whole cooked or live crab has entered the summer tourist markets in Washington, Oregon, and California. Early indications during the last three seasons reflected low stock abundance and the seasons were closed by emergency order by the 4th week of the fishery. The department intends to keep this fishery closed beginning May, 2000, pending rebuilding of the stock and development of a management plan and research program designed to provide sustained yields.

Yakutat is a superexclusive registration area for Dungeness crab; a vessel registered to fish in this area cannot register or fish in any other area in Alaska during the same calendar year. The fishery is currently under open entry. Anyone with a permit and license can register a vessel to crab in this area. During the past decade, up to 67 permits have fished in the Yakutat area. During the past three seasons, an average of 23 permits were fished. Most vessels are 50 feet or larger, with some vessels up to 90 feet in length. As a rule, the fleet is composed of sturdy vessels designed to be operated in near-shore rollers and capable of open ocean transit. The 400 pot limit, open ocean conditions, and the remote nature of the fishing grounds favor vessels typical of Dungeness fisheries in the Pacific Northwest. In fact, most of the vessels fishing the more remote western and eastern grounds have homeports in the Pacific Northwest. Almost all participants use standard, hatbox-shaped pots constructed with steel frames and webbed with stainless steel wire.

Management of this fishery is problematic because collection of biological data is limited to port sampling of the landed harvest for size frequency information, and to harvest data reported through the fish ticket system. The wide range of landing ports, as far away as Cordova, and very sporadic deliveries make it difficult to schedule dockside sampling of deliveries. The remoteness of many of the grounds complicates understanding the effects of the fishery on crab stocks. Determining stock composition and abundance would require a much more extensive research and management program.

The summer fisheries overlap important parts of the male molting period, which extends into mid-summer, and the female molting period that extends through the summer. The major mating period is also during mid to late summer. The relative success of the summer fishery depends on sporadic major recruitment events that support the fishery for up to three years thereafter. Once a large recruit year-class passes through the fishery, the fishery is dependent on annual recruitment and is vulnerable to local depletion until another large year class enters the fishery. It has been at least six years since any significant recruitment occurred in the Yakutat area. Stocks are currently considered depressed.

Alaska is the only management jurisdiction on the West Coast of North America that allows major summer fisheries for Dungeness crabs, justifying the risks because of overriding economic considerations. The Yakutat summer fishery is considered a necessary concession to the extreme winter weather conditions on the open ocean fishing grounds.

FISHERY DEVELOPMENT AND HISTORY

Through much of its history, from the mid-1920s to the mid-1960s, Southeast Alaska and Yakutat were managed as a single unit. Prior to the 1960s, harvests from much of the Gulf of Alaska were combined into a single total; Yakutat contributions were significant, but the exact percentages are unavailable.

Since the early 1960s, the fishery in the Yakutat area has evolved through two major periods. Between the early 1960s and the 1981/82 season, the landings and participants fluctuated widely (Table 6.1). Until the early 1980s, demand for Dungeness crab from Yakutat was generally inversely related to the availability of crab from Washington, Oregon, and California and highly dependent on the willingness of one or two major processors to purchase crab during the summer. The fishery was market driven.

Between the 1981/82 and 1995/96 seasons, effort and participation generally increased. As the preferred product form changed from frozen or canned meat to air-freighted live crab, there was increasing interest from processors to handle Dungeness crab. For many crabbers from the Pacific Northwest, the Yakutat summer fishery was attractive because their home waters are closed during the summer. The rising demand in the early 1980s coincided with the entry of a huge recruit class into the fishery and a decline in harvests from Washington, Oregon, and California. The recruit year class supported increasing fishing effort through the next two seasons and set the pattern for development of the current fishery, which is driven by stock abundance.

REGULATION DEVELOPMENT

The documented regulatory history of this fishery started in 1924. Most management jurisdictions within the range of this species employ passive management measures such as size limits, restricting harvest to males, and specifying a season that avoids known sensitive molting and mating periods. In Yakutat, this management triad, called 3-S management (size, sex, and season), is actually 2-S management since the summer fishery occurs while males and females are molting and mating. The current May 15 to July 15 opening is a compromise developed over many years to avoid the major molts to the extent possible, while recognizing economic returns. There are few alternatives to a summer season in Yakutat because the most productive grounds are exposed to extreme weather conditions in the winter. Both classical 3-S and modified 2-S management usually does not effectively manage intensive, highly competitive fisheries. If the effort in Yakutat continues to climb, other management options will need to be considered.

There are more active management alternatives to 2-S methods currently used by the state. Some of these, such as harvest rates or guideline harvest levels based on stock assessment surveys, could structure harvest to protect weak stock segments or soft-shell crabs while optimizing exploitation rates and product quality.

Fishing Seasons and Periods

For most years and seasons before 1975/76, the fishery was open all year. The accounting period started on January 1 and ended on December 31. In 1975, following eight consecutive years of harvests between one and two million pounds and a rapid rise in the number of fishing vessels, the season was shortened to May 16 through February 28, 1976. It was then closed in the summer by emergency order because large numbers of soft-shelled crab were observed in the landed harvest. It was a season notable only because it marked the advent of short seasons and in-season management of the fishery based on stock conditions.

The 1976/77 season started on June 1, with a scheduled closure on February 28, 1977. The season opening and closing dates remained the same through the 1981/82 season, although several intervening seasons were closed by emergency order when large numbers of soft-shells were sampled at the dock. The season changed again in 1982, to May 1 through February 28, 1983. Each season from 1982/83 through 1984/85 was closed by emergency order at some point in the summer due to increasing numbers of soft shells in the landed harvest. In 1985, a split season was implemented from May 1 through July 14, and November 1 through February 28, 1986. Management of the summer fishery focused on avoiding major male molts, which frequently start on the western grounds around Icy Bay and move eastward through the summer. The summer season was generally tailored to start after the major molt on the western grounds, and end before the major molt in the Yakutat Bay stocks. By 1986, it was evident that the May 1 opening was too early and the season was shortened to start on May 15. For each season since, the summer segment of the season has started on May 15 and ended on July 14, and the winter segment has started on November 1 and ended on February 28. The timing of the winter segment was intended to provide a fishery for local residents fishing in Yakutat Bay.

Although there were no proposals before the BOF at their January 1997 meeting to deal specifically with Yakutat stock status, they directed the department to take action. In the first three weeks of the 1997/98 season, a large portion of the harvest was recruit size crab coupled with low abundance, both indicators of poor stock condition. An emergency order closure was issued for June 13, 1997 to foster recovery of the stock. By also closing the winter portion of the fishery, it was thought that there would be an accrual of benefits from the summer closure. However, the 1998/99 fishery indicated further recruitment failure and overall low stock abundance. On June 9, 1998 the fishery was closed for the second consecutive season. And on June 15, 1999, the fishery was closed by emergency order for a third season.

Size Restrictions

From 1924 to 1935, the legal size of male crabs was 6 ½" in greatest width of carapace. This changed in 1936 to 7" and remained unchanged until 1963, when the measurement was redefined as 6 ½" in width, measured immediately anterior to the tenth anterolateral spines. This was essentially the equivalent of a

seven inch total shell width measurement but more consistent since damage to the tips of the tenth anterolateral spines is common, particularly in older shell crabs. This measurement standard, often coined "shoulder width," has been in effect since then.

Gear Restrictions

In 1934, trawls were prohibited. Only pots or ring nets were allowed from 1954 to 1965. A gear limit of 300 pots or ring nets was implemented in 1963. In 1966, diving gear was legalized. The legal limit for pots and ring nets was raised to 600 pots in 1968. In 1995 the legal limit for pots was reduced to 400. This limit continues to the present. Two escape rings with a minimum inside diameter of 4 3/8" were first required in 1976. The intent of escape rings is to permit the escape of sublegal males and females, which are usually smaller than legal males. In 1977, a Dungeness pot was defined as a pot with tunnel eye openings, which individually do not exceed 30" in perimeter. A biodegradable natural fiber breaking strap for the pot tiedown has been required since 1978. Originally specified for a maximum of 120 thread, it was reduced in 1990 to 30 thread, then increased in 1991 to 60 thread.

Other Regulations

Registration and hold inspections were required starting in 1974. In midsummer 1983, Yakutat was designated a superexclusive registration district and vessels registering to fish in Yakutat were prohibited from fishing in any other area in Alaska for the calendar year. The hold inspection requirement was rescinded in 1984, although registration was still required. In the same year, the area between Sitkagi Bluffs and Cape Yakataga, the western half of the Yakutat fishing district, was designated a non-exclusive area. The partial non-exclusive area was difficult to enforce and other problems led to redesignation of the entire Yakutat fishing district as a superexclusive registration area in 1985. In 1986, Yakutat was designated as Registration Area D, distinct and separate from Southeast Alaska (Registration Area A).

1999/00 SEASON SYNOPSIS

Only ten vessels participated in the most recent season 1999/00 that ended by emergency order on June 15, 1999. Only 65,386 pounds was landed (Table 6.1) as the stocks continue their downward trend. Almost 75 percent of the low harvest were taken during the first two weeks of the season (Table 6.2). This was a clear indication that stock abundance continues to be dismal and recruitment into the fishery is poor. Fishing was so poor that three of the vessels left after the first few weeks to return to the Pacific Northwest.

2000/01 SEASON OUTLOOK

The department intends to close the Yakutat Dungeness fishery for the entire 2000/01 season. Information available indicated that a significant number of pre-recruit crab were not available during the 1999/00 fishery. Thus, no substantial recruit contribution to the Yakutat stock is expected for the coming season. The department will monitor events in the local sport, subsistence, and personal use fisheries for indications of stock recovery. The fishery will remain closed pending rebuilding of the stock and development of a management plan and research program designed to provide sustained yields.

Table 6.1. Registration Area D (Yakutat) Dungeness harvest, number of participating vessels, number of landings, and average harvest per landing, 1960 to present.

Year/ Season	Harvest in Pounds	Number of Permits	Pounds Per Permit	Number of Landings	Pounds Per Landing
1960	543,762	-			
1961	1,023,545	-			
1962	937,051	-			
1963	1,383,298	-			
1964	637,140	-			
1965	910,278	-			
1966	528,060	-			
1967	2,031,460	-			
1968	2,096,119	-			
1969/70	1,223,240	11	111,204	107	11,432
1970/71	1,508,561	10	150,856	83	18,175
1971/72	1,212,198	7	173,171	88	13,774
1972/73	1,992,574	9	221,397	85	23,442
1973/74	2,347,752	27	86,954	236	9,948
1974/75	1,031,573	22	46,890	154	6,698
1975/76	579,908	17	34,112	113	5,131
1976/77	537,543	7	76,792	28	19,197
1977/78	131,052	3	43,684	11	11,913
1978/79	1,799,403	12	149,950	122	14,749
1979/80	1,436,923	21	68,425	87	16,516
1980/81	895,220	10	89,522	63	14,209
1981/82	3,228,301	28	115,296	169	19,102
1982/83	5,160,135	35	147,432	305	16,918
1983/84	2,666,383	67	39,797	458	5,821
1984/85	774,828	39	19,830	228	3,398
1985/86	371,237	32	11,601	168	2,209
1986/87	755,912	22	34,360	111	6,810
1987/88	2,725,040	28	97,323	191	14,267
1988/89	3,494,368	32	109,199	220	15,883
1989/90	1,701,859	29	58,685	207	8,221
1990/91	2,101,676	36	58,380	320	6,567
1991/92	2,852,074	67	42,568	482	5,917
1992/93	1,392,700	49	28,416	257	5,419
1993/94	815,969	44	18,545	250	3,263
1994/95	915,523	47	19,479	240	3,814
1995/96	557,528	46	12,120	269	2,072
1996/97	244,425	26	9,401	152	1,608
1997/98	156,072	30	5,202	84	1,858
1998/99	121,478	29	4,189	84	1,446
1999/00[a]	65,386	10	6,539	51	1,282

[a] Most recent year's data should be considered preliminary.

Table 6.2. Registration Area D (Yakutat) 1998/99 and 1999/00 seasons: Dungeness crab harvest by month and district.

	1998								1999		
Dist.	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
181	88,380	25,666	----- Season Closed by Emergency Order at 11:59 p.m. June 9, 1998 ------						Closed		114,046
183	5,252	2,180	----- Season Closed by Emergency Order at 11:59 p.m. June 9, 1998 ------						Closed		7,432
191			----- Season Closed by Emergency Order at 11:59 p.m. June 9, 1998 ------						Closed		
Total	93,632	27,846	----- Season Closed by Emergency Order at 11:59 p.m. June 9, 1998 ------						Closed		121,478

	1999								2000[a]		
Dist.	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
181	43,795	13,067	----- Season Closed By Emergency Order at 11:59 p.m. June 15, 1999 ------						Closed		56,862
183	3,932	4,592	----- Season Closed By Emergency Order at 11:59 p.m. June 15, 1999 ------						Closed		8,524
191			----- Season Closed By Emergency Order at 11:59 p.m. June 15, 1999 ------						Closed		0
Total	47,727	17,659	----- Season Closed By Emergency Order at 11:59 p.m. June 15, 1999 ------						Closed		65,386

[a] Most recent year's data should be considered preliminary.

REPORT TO THE BOARD OF FISHERIES,

YAKUTAT SHRIMP OTTER TRAWL FISHERY

By

Tim Koeneman
and
Catherine A. Botelho

Regional Information Report1 No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

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INTRODUCTION

This report describes the commercial otter trawl fishery for shrimp in the Yakutat Area (Registration Area D) and reviews the history of the fishery and development of management regulations. The report emphasizes the otter trawl fishery; although beam trawls are also legal gear, their reported use has been insignificant. Many otter trawlers that participated in the Yakutat shrimp fishery also utilized shrimp fisheries in other registration areas. In the Yakutat Area most of the otter trawl harvest has occurred in waters of Yakutat Bay and Icy Bay. Major processors and markets have been in Kodiak, Seward, Valdez, and Astoria, Oregon.

The most significant historic harvests targeted pink shrimp *Pandalus borealis*, with smaller quantities of sidestripe shrimp *Pandalopsis dispar*, also retained. Other species incidentally captured and landed in much smaller quantities are the coonstripe shrimp *Pandalus goniurus*, humpy shrimp *P. hypsinotus*, and the spot prawn *P. platycerous*. Pink shrimp are harvested in large volumes but with a relatively low exvessel value. Significant quantities of incidentally captured sidestripe shrimp are normally retained because of their relatively high economic value. The adoption of restrictive monthly guideline harvest levels has forced industry to target the more valuable sidestripe shrimp in lower volumes during recent seasons.

Otter trawls are double-bridled and fish best on smooth, level substrate. They are dynamic trawls that rely on bridle and "otter board" arrangements to deploy, position, and maintain the opening dimensions of the net. Their design and size allows much greater fishing power than beam trawls, other vessel characteristics being equal. Otter trawl vessels are generally large and modern, with large holding or processing capacities and they have high horsepower ratings for their size.

FISHERY DEVELOPMENT AND HISTORY

The first recorded shrimp otter trawl landing from the Yakutat area occurred in 1976 (Table 7.1). During the past 23 seasons, there have only been six seasons when harvests exceeded 100,000 pounds and these all occurred between 1977 and 1987. Harvests are confidential for nine seasons when there were a limited number of boats and landings.

The highest harvest on record was in the 1980/81 season when a harvest exceeding 1,900,000 pounds was reported by 16 vessels making 23 landings (Table 7.1). Most of this volume was harvested in Yakutat Bay during the fall (Table 7.2) by larger vessels which also participated in various shrimp fisheries around Kodiak Island and further westward. Fish ticket data indicate the harvest was comprised of only pink shrimp, but undoubtedly some sidestripe shrimp were also harvested. Pink shrimp were the predominate species harvested through the 1987/88 season. No harvest was reported from the 1988/89 and 1989/90 seasons.

There was a small resurgence in the fishery from the 1990/91 through the 1993/94 seasons. Effort and harvests during this period were light, primarily due to restrictive monthly harvest levels, limitation of trawl fisheries to Icy and Yakutat Bays, closures of major portions of Yakutat Bay, and generally more conservative management. These harvests were almost evenly split between pink and sidestripe shrimp, but

the target species was sidestripe shrimp due to their higher value and the restrictive monthly harvest levels. Fishing occurred within, or immediately adjacent to, these two bays and will be limited by regulation to the bay areas in the future (Table 7.3). There were no harvests reported for the 1994/95 through 1998/99 seasons.

The department conducted stock assessment surveys in Yakutat Bay from 1980 through 1984 (Table 7.4). The fall 1980 and spring 1981 surveys were conducted in cooperation with the National Marine Fisheries Service. All subsequent surveys occurred with department vessels, equipment, and personnel. During some years, both spring and fall surveys were completed. Survey results indicated population estimates ranging from 1,840,000 to 6,460,000 pounds of all species of shrimp combined, and an average composition of 70% pink shrimp and 30% sidestripe shrimp. No surveys have been conducted since 1984. The department assumes that harvestable stocks of pink and sidestripe shrimp are present in Icy and Yakutat Bays, but the current abundance of either of these species is unknown.

REGULATION DEVELOPMENT

Initially, the entire Yakutat Area (Registration Area D, between Cape Suckling and Cape Fairweather) was open to trawling and there were no restrictions on season, harvest level, gear, or closed waters. After the intense 1980/81 season was closed by emergency order, regulations were developed in cooperation with the Yakutat Advisory Committee and brought before the board. The resulting regulations were a mixture of biological needs expressed by the department and desires by the community of Yakutat to continue to utilize the local resources through commercial, personal use, and subsistence fisheries. By the 1982/83 season, a 30,000 pounds monthly guideline harvest level, closed waters, and season opening and closing dates were implemented by regulation and emergency orders. In 1993, all waters except Icy Bay and specified areas in Yakutat Bay were closed to trawl fisheries, logbooks were made mandatory, and all participating vessels had to be registered prior to fishing. Gear regulations were liberal.

In 1997, the BOF eliminated trawl shrimp fishing in the contiguous waters of Yakutat Bay east of a line from the westernmost tip of Ocean Cape to the westernmost tip of Point Manby, including the waters of Russell and Nunatak Fjords.

Fishing Seasons

In 1981 a fishing season from June 21 through February 14, opened and closed by emergency order, was established for Yakutat Bay. The closed period was presumed to be the peak egg-hatch period, based on life history information from other fisheries around the Gulf of Alaska. The closure alleviated gear conflicts during the spring halibut openings. All other waters, including Icy Bay, remained open throughout the year. By 1993, the trawl shrimp fishery was restricted to Icy and Yakutat Bays and since 1997, the fishery has been further restricted to Icy Bay only.

Guideline Harvest Levels

Initial guideline harvest levels were estimated using average abundance per unit surface area from population estimates previously conducted on other Gulf of Alaska shrimp stocks, a preliminary survey conducted in Yakutat Bay by the National Marine Fisheries Service in 1953, and applying a fishing morality of approximately 0.30.

During September 1980, the first population estimate using modern nets and the area swept method was conducted. Another survey was conducted during the spring of 1981 and this information was used to establish a guideline harvest level of 1.28 to 2.0 million pounds for Yakutat Bay for the 1981/82 season. In 1982, the Alaska Board of Fisheries amended the harvest level to 30,000 pounds/month to prevent taking the entire GHL early in the season. This conservative monthly harvest level was also established to provide opportunities for local Yakutat residents to enter the commercial fishery. In 1997, trawl shrimping was eliminated from Yakutat Bay.

In 1997 a trawl shrimp GHR was established for Icy Bay for a harvest between 50,000 and 350,000 pounds for the entire fishing season. Permit holders must contact the department, obtain logbooks, and attach them to the fish ticket at time of delivery.

Gear Restrictions

Legal trawl gear is still broadly defined as trawls, including beam and otter trawls, with no restriction to the maximum opening dimensions of the trawl mouths. Board members at the 1997 meeting discussed limiting the gear to beam trawl only, as they had done in Southeast Alaska. During periods specified by emergency order when the fishery targets sidestripe shrimp, there are regulations defining the minimum mesh size that may be used to reduce the bycatch of other shrimp species. Incidental shrimp species retention was limited to 10 percent, by weight of target species.

Closed Waters

A considerable portion of Yakutat Bay, including protected waters in the vicinity of Yakutat and extending to Knight Island, and Russell and Nunatak Fjords were closed to commercial trawling through early 1997. At that point, all waters of Yakutat Bay east of a line from the westernmost tip of Ocean Cape to the westernmost tip of Point Manby were closed to shrimp trawling. The commercial closure protects important subsistence fishing grounds and prevents conflict with growing commercial pot shrimp fisheries in these areas.

1998/99 SEASON SYNOPSIS

No shrimp were reported taken with trawl gear in the Yakutat Registration Area during the past season.

1999/00 SEASON OUTLOOK

There has been little interest in this fishery during the past five seasons, but the markets for shrimp in general, and specifically sidestripes, are improving and this situation could change. If the market supports the operation of a harvester-processor or a floating processor, or if land based processing interest develops in the city of Yakutat, it may be difficult to effectively manage the fishery with existing regulations and programs. If the resurgence of the fishery targets sidestripe shrimp while discarding pink shrimp, accurate accounting for bycatch will be necessary. Trawlable grounds in Yakutat Bay are utilized by other important species which include Tanner crab, king crab, halibut, and scallops.

Stock assessment surveys have not been conducted since September 1984 (Table 7.4), and the current condition of shrimp stocks is unknown. Previous survey estimates and current regulations would support a seasonal harvest of up to 270,000 pounds from Yakutat Bay. An additional 350,000 pounds could be harvested from Icy Bay. Sustained harvests at these levels would require stock assessment surveys to verify seasonal abundance and new regulations to assure adequate monitoring and reporting of both the harvest of target species and incidental bycatch. It may be necessary to incorporate bycatch criteria into the management strategy for this fishery.

Table 7.1. Registration Area D (Yakutat) shrimp trawl harvest, number of vessels, number of landings, pounds per vessel, and pounds per landing, 1976/77 to present.[a]

Year/ Season	Harvest in Pounds	Number of Permits	Landings	Pounds per Permit	Pounds per Landing
1976/77	*				
1977/78	0	0	0	0	0
1978/79	0	0	0	0	0
1979/80	*				
1980/81[b]	1,906,680	16	23	119,168	82,899
1981/82	*				
1982/83	141,714	3	7	47,238	20,245
1983/84	426,649	5	10	85,330	42,665
1984/85	*				
1985/86	*				
1986/87	*				
1987/88	40,448	3	6	13,483	6,741
1988/89	0	0	0	0	0
1989/90	0	0	0	0	0
1990/91	*				
1991/92	*				
1992/93	34,875	3	3	11,625	11,625
1993/94	*				
1994/95	0	0	0	0	0
1995/96	0	0	0	0	0
1996/97	0	0	0	0	0
1997/98	0	0	0	0	0
1998/99[c]	0	0	0	0	0

[a] Almost all landings of trawl shrimp have been made using otter trawl gear.

[b] 1980/81 season includes 450,000 pounds caught by otter trawl out of Yakutat Bay during the fishery (August 1980), but not reported on fish tickets.

[c] Most recent year's data should be considered preliminary.

* Where number of permits is three or less, data is considered confidential.

Table 7.2. Registration Area D (Yakutat) shrimp trawl harvests in thousands of pounds by month and season, 1976/77 to present.[a]

Season	Month												
	May	June	July	August	September	October	November	December	January	February	March	April	Total
1976/77	0.0	*	0.0	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*
1977/78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1978/79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1979/80	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0	0.0	*	*
1980/81[b]	0.0	0.0	*	1,350.0	481.9	0.0	0.0	0.0	0.0	0.0	24.3	0.0	1,906.7
1981/82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	*
1982/83	*	*	*	*	*	0.0	0.0	0.0	*	0.0	0.0	0.0	141.7
1983/84	0.0	0.0	0.0	0.0	*	*	0.0	0.0	0.0	0.0	*	128.0	426.6
1984/85	0.0	*	0.0	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*
1985/86	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	*
1986/87	0.0	0.0	0.0	0.0	0.0	0.0	*	*	0.0	*	154.7	0.0	*
1987/88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	*	0.0	*	0.0	40.5
1988/89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1989/90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1990/91	0.0	*	0.0	*	*	0.0	0.0	0.0	0.0	0.0	0.0	*	*
1991/92	0.0	0.0	*	*	0.0	*	0.0	0.0	0.0	0.0	0.0	0.0	*
1992/93	0.0	0.0	*	*	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.9
1993/94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*	0.0	0.0	0.0	*
1994/95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1995/96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1996/97	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1997/98	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1998/99[c]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0

[a] Almost all landings of trawl shrimp have been made using otter trawl gear.

[b] 1980/81 season includes 450,000 pounds caught by otter trawl out of Yakutat Bay during the fishery (August 1980), but not reported on fish tickets.

[c] Most recent year's data should be considered preliminary.

* Where number of permits is three or less, data is considered confidential.

Table 7.3. Registration Area D (Yakutat) shrimp trawl fishery harvest in thousands of pounds, by season and district, 1979/80 to present.[a]

	Year										
District	76/77	77/78	78/79	79/80	80/81[b]	81/82	82/83	83/84	84/85	85/86	86/87
181	*	0.0	0.0	0.0	556.8	0.0	*	310.4	*	*	*
183	0.0	0.0	0.0	*	1,349.9	*	*	*	*	0.0	0.0
189	*	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	*	0	0	*	1,906.7	*	141.7	426.6	*	*	*
Landings		0	0		23		7	10			
Permits		0	0		16		3	5			

	Year											
District	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99[c]
181	40.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	0.0	0.0	0.0	*	*	*	*	0.0	0.0	0.0	0.0	0.0
189	0.0	0.0	0.0	*	0.0	*	0.0	0.0	0.0	0.0	0.0	0.0
191	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	40.5	0	0	*	*	34.9	*	0	0	0	0	0
Landings	6	0	0			3		0	0	0	0	0
Permits	3	0	0			3		0	0	0	0	0

[a] Almost all landings of trawl shrimp have been made using otter trawl gear.

[b] 1980/81 season includes 450,000 pounds caught by otter trawl out of Yakutat Bay during the fishery (August 1980), but not reported on fish tickets.

[c] Most recent year's data should be considered preliminary.

* Where number of permits is three or less, data is considered confidential.

Table 7.4. Summary of shrimp research cruises in Yakutat Bay, Alaska.

Begin Date	Vessel	Cruise Number	Gear	Strata	Tows	Shrimp per nm (pounds)	Percent Pink Shrimp	Percent Sidestripe Shrimp	Area Surveyed (nm^2)	Point Estimate (pounds x 10^6)	Range of Point Estimate (pounds x 10^6)
3/53	John N. Cobb	COBB15	20' Beam		26	297.42[a]			Unknown	Unknown	Unknown
9/80	Resolution	8008	32' NMFS[b]		9	680.56	91	8	50.01	6.46	4.73 to 8.19
3/81	John N. Cobb	JC81-01	32' NMFS		24	231.00	43	57	105.70	4.38	3.04 to 5.72
8/81	Pandalus		32' NMFS		22	196.27	72	27	50.01	1.86	1.13 to 2.60
9/82	Resolution		32' NMFS	2	14	141.53	47	53	50.01	1.43	1.05 to 1.64
9/82	Resolution		32' NMFS	3	5	206.00	65	35	12.89	0.50	0.30 to 2.13
9/84	Pandulus		32' NMFS	2	22	181.06	61	38	50.01	1.72	1.31 to 2.13
9/84	Pandulus		32' NMFS	3	3	230.33	93	7	12.89	0.56	0.24 to 0.89

[a] Figure in pounds of pandalids per trawl hour. Species composition unknown quantitatively. Report suggest preponderance of sidestripes.

[b] NMFS gear is an otter trawl.

Section 8

Yakutat Shrimp Pot Fishery

REPORT TO THE BOARD OF FISHERIES,

YAKUTAT SHRIMP POT FISHERY

By

Timothy Koeneman
and
Catherine A. Botelho

Regional Information Report[1] No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

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1 The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate 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.

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INTRODUCTION

The fishery targets spot prawns *Pandalus platycerous*, and harvests significant quantities of coonstripe shrimp *P. hypsinotus*. Life history information concerning these species is limited. Canadian reports suggest the maximum age of the spot prawn is three to five years, while Alaskan tagging data suggests eight to ten years. All pandalid shrimp are protandric hermaphrodites, which means they first mature and spawn as males, transition to females, and spawn as females for the remainder of their lives. Spot prawns are functional males for one to three seasons (in their fourth year), then change sex and spawn as females for four or more years. The fecundity of a large female spot prawn has been estimated at about 4,600 eggs per year. Literature reports that eggs hatch in late winter and early spring, followed by a growth molt for females. The transition from male to female occurs during the summer months. Females undergo another molt into "breeding dress" in the fall, after which they extrude their mature eggs from the internal ovaries. Eggs are fertilized externally when they are extruded. Developing embryos are carried on the external pleopods until they are fully developed. Hatching occurs during late spring through early summer.

Both spots and coonstripes are primarily harvested from rocky habitat located in Yakutat Bay by fishers using baited pot gear, which is either longlined or fished singly from vessels ranging in length from small skiffs up to about 40 feet. In a longline system each pot is attached to the groundline with a snap, similar to that used on longline snap-on groundfish gear. Pot construction is extremely varied in size, shape, weight and configuration, so it is difficult to describe a "standard" pot. Gear designs have rapidly changed to increase fishing efficiency. One of the most commonly available pots today is a "cone style." This pot is constructed using two stainless steel rings, the top ring smaller than the bottom, with vertical bars welded between the rings forming six sides, at least three of which contain tunnels. This pot type has webbing tightly drawn in on the top with a permanent closure. The bottom web is drawn in with a "pucker string" which is opened during baiting operations and to empty the pot of its harvest.

FISHERY DEVELOPMENT AND HISTORY

The first reported landings occurred in the Yakutat Area during the 1969/70 fishing season. For the next ten seasons, landings occurred during only two seasons. Participation and landings have been fairly consistent since the 1982/83 fishing season, with a peak landing of 29,830 pounds occurring during that season. The peak effort level of 15 permits occurred during the 1995/96 season when 13,418 pounds were landed. Average landings have totaled 7,539 pounds by eight vessels per season since 1982/83. Usually, only the tails are sold by the shrimper to private individuals, restaurants, or other specialty markets without passing through traditional processors. This is a low volume fishery with a relatively high exvessel value. The average price paid for tails has been about $5.00 per pound during recent seasons.

Peak effort and harvests normally occur during May and June. However, activity in this fishery can be highly variable. For example, the peak harvest during the 1982/83 season occurred during the month of September.

REGULATION DEVELOPMENT

Management of the commercial pot shrimp fishery in the Yakutat Area is largely passive, focusing on Yakutat Bay. Regulations specific to Yakutat Bay are limited to a closed season to prevent fishing during the egg-hatch period, a minimum mesh size to retain the larger female segment of the stock, a maximum number of pots per participant to limit effort, and prohibition of trawling in productive areas heavily utilized by the pot fishery. Fish ticket data assists tracking major trends or changes in stock status. The Yakutat Area has had a separate section in the regulatory code since 1985.

A guideline harvest level (GHL) of 10,000 pounds for the May through September period was established for Yakutat Bay in 1996, in response to increasing effort and higher harvest rates. The GHL was based on historical harvest data, and not on information describing stock abundance or stock condition. In 1997, the BOF adopted separate monthly GHLs for two portions of Yakutat Bay for each month the fishery is open. By doing so, the total seasonal harvest potential was effectively doubled to 20,000 pounds.

Fishing Seasons

Prior to 1985, the Yakutat Area was open throughout the year. In 1985, a May 1 through February 28 season was established for Yakutat Bay. The closed period coincided with the major egg-hatch period, which was assumed to be similar to that of Southeast Alaska for the spot prawn. In 1997, separate fishing periods were adopted for portions of Yakutat Bay. In the waters running east of a line from the northernmost point of Khantaak Island to Logan Bluff and east of a line from the northernmost point of Khantakk Island to the northernmost point of Doggie Island, the season runs from October 1 through February 28. The remaining waters of Yakutat Bay east of a line from the westernmost tip of Ocean Cape to the westernmost tip of Point Manby are open May 1 through February 28. The remainder of the Yakutat Area outside the bay remains open throughout the year.

Size Restriction

The Alaska Board of Fisheries policy on small shrimp discourages harvest of shrimp less than two years of age. A mesh size restriction is used in lieu of specific regulations for a minimum legal size to reduce the harvests of small shrimp. The mesh size assumes passive sorting through minimum mesh webbing minimizes the retention of smaller male, transitional, and female prawns and coonstripe shrimp.

Gear Restriction

A mesh restriction specifying 1 1/2" stretch measure was established in 1986 for all pots used in Yakutat Bay to reduce the potential for recruitment over-fishing in this area. This regulation provided some protection to approximately one or two-year classes of small shrimp. Prior to 1997, only a portion of the pot was required to have the minimum mesh panels. Current regulations require that the pot be entirely covered with net webbing or rigid mesh with at least two opposing sides of the pot having a webbed panel of minimum stretch mesh of the 1 1/2 inch stretch mesh if a permit holder is fishing inside Yakutat Bay. The 1-1/2 inch minimum mesh size allows the retention of smaller shrimp, compared to the Southeast Alaska fishery. The potential impacts on future stock condition will not be understood until size and sex data is collected and analyzed. The smaller mesh risks unintended harvest of smaller spot prawns than are considered appropriate.

A pot limit of 75 pots per vessel was established in 1985 for Yakutat Bay. Even with the relative stability with regard to the number of permit holders up until the 1995/96 season, fleet members considered the number of allowable pots to be more than the fishery could withstand. Current regulations allow for a limit of 30 pots per vessel inside Yakutat Bay. Along with the pot reduction adopted in 1997, trawling is prohibited within all waters of Yakutat Bay.

There are no pot limits, mesh restrictions, or other harvest-limiting gear regulations for all waters in the Yakutat Registration Area outside of Yakutat Bay. Additional regulatory requirements for commercial shrimp pot gear include maximum tunnel perimeters (15"), buoy markings, and escape mechanisms.

Quotas and Guideline Harvest Levels

In the mid-1990s, several larger southeast pot shrimp vessels and a floating processor entered the fishery in Yakutat Bay. Although their presence was transitory, it did lead to closure of the commercial fishery in the bay, changing in-season starting and ending dates and implementation of a GHL for the commercial harvest.

During the 1996/97 season, a GHL of 10,000 pounds was set for Yakutat Bay, north and east of a line from Ocean Cape to Point Manby, for the period between May through September. The harvest level for the winter fishery from October 1 through February 28 was unrestricted because potential effort was less in winter than in summer. The GHL capped the harvest at a level commensurate with those historically reported for this fishery and provided some protection against possible local depletion. The summer GHL represented a higher harvest than the prior ten-year seasonal average but was lower than the maximum historical harvests in the early 1980s.

While there had not been a consistent trawl shrimp fishery in Yakutat Bay, surveys in the early 1980s demonstrated harvestable stocks capable of supporting a fishery with a monthly quota of 30,000 pounds. In 1997, the BOF prohibited continuation of trawl shrimping inside Yakutat Bay. This prohibition to trawl gear may maximize availability of coonstripe shrimp to pot gear, but does eliminate harvest of pink and sidestripe shrimp. Coupled with this trawl prohibition, separate monthly GHLs were established for two portions of Yakutat Bay. In waters of Yakutat Bay east of a line running from the northernmost point of Khantaak Island to Logan Bluff and the waters east of line running from the northernmost point of Khantaak Island to the northernmost point of Doggie Island, the monthly GHL is 2,000 pounds for each month the fishery is open. This provides a potential season total of about 10,000 pounds. For the remaining waters of Yakutat Bay that are east of a line running from the westernmost tip of Ocean Cape to the westernmost tip of Point Manby, the monthly GHL is 1,000 pounds for a potential seasonal total of 10,000 pounds.

1998/99 SEASON SYNOPSIS

A harvest of 5,288 pounds was reported in 1998/99 by 9 permit holders making 104 landings (Table 8.1). Most of the harvest occurred during the months of May through August, although landings were also reported through the entire open season, except in September (Table 8.2). The majority of the harvest was reported taken in Yakutat Bay, District 83 (Table 8.2). The harvest level, number of participants, and the number of landings were much higher than average and the highest since the record setting seasons in the early 1980s (Table 8.1). No dockside sampling or skipper interviews were conducted and no fish ticket size data are available to assist managers.

1999/00 SEASON OUTLOOK

Recent effort levels are generally increasing above historical levels. Effort and harvests so far this season are confidential, but significant. It is likely that a maximum sustainable yield has not yet been reached for the Yakutat Bay stocks of spot and coonstripe shrimp, and the current GHL of 10,000 pounds per season will constrain the harvest at a reasonably conservative level. The major unforeseeable factors are the intensity of the summer segment of the fishery and the overall season length if GHRs are achieved and fisheries are closed prematurely by emergency order.

Table 8.1. Registration Area D (Yakutat) shrimp pot fishery harvest, number of landings, and CPUE, 1968/69 to present.

Season[a]	Harvest in pounds	Number of Permits Fished	Number of Landings	Pounds Per Landing	Pounds Per Permit
1968/69	0	0	0		
1969/70	*				
1970/71	0	0	0		
1971/72	0	0	0		
1972/73	0	0	0		
1973/74	0	0	0		
1974/75	*				
1975/76	0	0	0		
1976/77	0	0	0		
1977/78	0	0	0		
1978/79	0	0	0		
1979/80	*				
1980/81	*				
1981/82	*				
1982/83	29,830	4	63	473	7,458
1983/84	13,938	8	33	422	1,742
1984/85	2,475	6	35	70	413
1985/86	6,910	5	33	209	1,382
1986/87	2,421	5	10	242	484
1987/88	2,945	8	45	65	368
1988/89	2,995	6	16	187	499
1989/90	7,148	5	72	99	1,430
1990/91	10,711	7	70	153	1,530
1991/92	7,316	12	78	93	610
1992/93	2,999	4	40	74	750
1993/94	5,916	6	55	107	986
1994/95	5,738	6	64	89	956
1995/96	13,418	15	103	123	848
1996/97	20,862	14	218	96	1,490
1997/98	9,546	10	135	71	955
1998/99[b]	5,288	9	104	51	588

[a] Pot shrimp seasons are October through September.

[b] Most recent year's data should be considered preliminary.

* Where number of vessels participating is less than three, information is confidential.

Table 8.2. Registration Area D (Yakutat) shrimp pot harvests in pounds (landings) by district and month, 1998/99.[a]

Month	District 181	District 183
October	0	2,311 (37)
November	0	964 (19)
December	0	*
January	0	454 (9)
February	0	*
March	0	Closed
April	0	Closed
May	0	785 (17)
June	0	*
July	0	0
August	0	0
September	0	0
Total	0	5,288

[a] Most recent year's data should be considered preliminary.

* Where number of vessels participating is less than three, information is confidential.

Section 9

Yakutat Scallop Fishery

REPORT TO THE BOARD OF FISHERIES,

YAKUTAT SCALLOP FISHERY

By

Timothy Koeneman,
Catherine A. Botelho,
and
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Regional Information Report[1] No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

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INTRODUCTION

Scallop Registration Area D (Yakutat) includes Registration Area D (Yakutat) and District 16 of Southeast Alaska. Commercial dredging for the weathervane scallop *Pactinopectin caurinus* in the Yakutat area (Registration Area D) occurs in open coastal waters between Cape Fairweather and Cape Suckling. Known offshore beds are extensive and overlap state and federal Exclusive Economic Zone (EEZ) waters. Harvestable populations also occur in Yakutat Bay, but scallop dredging in the bay is prohibited by regulation.

Scallop dredging in Southeast Alaska is limited by regulation to District 16, with the exception of Lituya Bay in District 16 which is closed. The known offshore beds in District 16 are small in comparison to those historically fished elsewhere in Alaska and overlap state and EEZ waters. Many of the productive beds are discontinuous or dispersed between foul ground.

The fishery is managed by the State of Alaska according to guidelines in the Alaska Scallop Management Plan (ASMP), adopted in 1993. The major features of the plan are conservative guideline harvests ranges and a requirement for complete observer coverage on all participating vessels.

The determination of the number of vessels allowed to participate in the statewide fishery is under the jurisdiction of the North Pacific Fishery Management Council. That body set the maximum number of vessels as 9 in 1999, and identified the permitted vessels at that time. Most vessels working in this fishery are very seaworthy, in excess of 70 feet, and based in Kodiak, Seward, and ports in other states. The fleet is highly mobile. Most vessels fish New Bedford-type dredges, approximately 12 to 15 feet in width, with one set off each side of the vessel. These dredges have heavy, rectangular steel frames supporting a mesh bag made from heavy steel rings. Ideally, the dredge skims the bottom just deeply enough to flip scallops into the mesh bag without plowing into the substrate.

Scallop fishing, processing, and marketing operations are more vertically integrated than most other fisheries in Alaska. The same company that owns or operates the vessel also warehouses, transships, brokers, and sells the product to consumers.

The primary product is the major adductor muscle, with most processing, and freezing or icing, conducted aboard the harvester vessel on the fishing grounds. The current guideline harvest range (GHR) is zero to 250,000 pounds in Registration Area D and zero to 35,000 pounds in District 16. Landed product weight is reported in pounds of frozen or iced meat, which comprises 6 to 11% of the live whole weight. The average price in 1998 was about $6.36/pound.

FISHERY DEVELOPMENT AND HISTORY

Registration Area D

The first reports of scallop harvests in the Yakutat area were in 1968. Since then, harvests have varied widely (Table 9.1). The roller coaster highs and lows in the harvest reflect a largely unregulated fishery, driven by economics and market forces before adoption of the ASMP in 1993. Since scallops live for many years after reaching harvestable size and worldwide demand has generally outstripped supply, the recurring crashes in the historical harvest record were strong circumstantial evidence that exploitation rates during some years had been too high. There was little consideration for long-term reproductive viability. Combined with sporadic recruitment, heavy harvests did not leave enough scallops on the grounds to carry the fishery over poor years.

The earliest years of the fishery were very productive. Virgin biomass supported harvests of over 900,000 pounds in 1968 (Yakutat Annual Report, 1968) and 800,000 pounds in 1969, by up to 14 vessels (Table 9.1). These years were followed by two decades of reduced effort and harvests. A statewide trend in increasing interest and participation in scallop fisheries in the early 1990s culminated in a peak harvest of over one million pounds in Area D in 1992. In response, the department developed an interim management plan in 1993 under the High Impact Emerging Fishery regulation (5 AAC 39.210). The Alaska Board of Fisheries subsequently adopted plan (the ASMP) into regulation. Harvests in Yakutat have been constrained to approximately 250,000 pounds under the ASMP.

District 16

The fishery in Southeast Alaska started in the early 1980s as stocks in the Yakutat Area to the north and west were fished down. Interest and harvests have been generally low and intermittent. District 16 stocks have been spared much of the roller coaster highs and lows prior to implementation of the Alaska Scallop Management Plan in 1993. Only a few vessels fished in most seasons, with a maximum of nine vessels in 1994, and one to nine vessels in each of the other 14 years of record. The peak harvest of 148,624 pounds occurred in 1990, with an overall historical average of about 33,000 pounds (Table 9.2). Most of the effort in Southeast Alaska has occurred in District 16, although a few landings were reported during the 1982 season from three other districts around the outer coasts of southeast Alaska before limitation of the fishery to District 16 in 1993. Due to the low numbers of participants and landings, historical data for much of this fishery is confidential.

In recent seasons the harvest has usually been taken after the Yakutat fishery closed. The general pattern has been for vessels displaced by competition or closure from the more productive grounds in Alaska to prospect for product in Southeast Alaska.

REGULATION DEVELOPMENT

The weathervane scallop fishery evolved from a wide-open, almost unregulated fishery through the 1992 season into one of the most stringently controlled and managed fisheries in the state in little more than a single season. The speed of emergency order implementation of the statewide ASMP, the scope of regulations, and the stringent harvest conditions were unprecedented.

Guideline Harvest Ranges

A guideline harvest range (GHR) of zero to 250,000 pounds for Registration Area D and zero to 35,000 pounds for District 16 was established by the ASMP in 1993. The ceilings are the approximate long-term average annual harvests for each area up to 1992. Until a longer time series of data from the fisheries are available for analysis, these fisheries will probably be managed toward the upper end of these ranges, which are considered conservative.

Gear Restrictions

Scallops mature at approximately three inches, based on research conducted by department biologists from 1968 through 1972. Four-inch minimum ring diameters for scallop dredges, permitting the escape of juvenile and smaller sexually mature scallops, was the primary passive management tool from 1969 through 1992, and continues to be used as a conservation measure to the present time. Since 1993, the width or horizontal front opening of scallop dredge gear has been limited to 15 feet and use of any chaffing gear or device that would tend to restrict the size of the rings has been prohibited.

To further discourage the entry of ever larger vessels into the fishery, regulations adopted as part of the ASMP in 1993 restricted the number of dredges that may be deployed at any time from a scallop vessel to two. Daily production per vessel was limited by restricting crew size to a total complement of 12, excluding the observer. Mechanical or automated shuckers were prohibited. With the exception of experimental dredges operating under stringent permit conditions, only dredges as defined and restricted by regulation are legal gear.

Registration Area D

For much of its history, this fishery has been open all year, with no closures during sensitive spawning periods. In late spring of 1991, Yakutat Bay was closed to commercial scallop dredging by the Board of Fisheries. Closure of the bay alleviated conflicts with commercial and subsistence salmon fishers, Dungeness and shrimp pot fishers, and other miscellaneous interests. Season closures went into effect in 1993, with the winter fishery managed for a harvest of about 125,000 pounds. The opening lasted from January 1 through February 28. The ASMP, with its observer requirement and new regulations, went into effect before the summer fishery, which opened on July 1 and closed on July 11, 1993. The next season opened on January 10, 1994. The delay was due to problems in scheduling training and certification for observers. The season lasted eight days, closing on January 18, 1994. The summer season opened on July 1 and closed on July 12, 1994. The opening date for the winter fishery was formally changed by the Board of Fisheries in late 1994 from January 1 to January 10, and from a split season to a single winter season. The single winter season lasted through 1997.

In 1995, the season opened January 10 and closed on February 2. The season was shorter in 1996, opening on January 10 and closing on January 25. The last year for the winter fishery was in 1997 where the season opened on January 10 and closed on February 24. In 1998, the season opened on July 1 and closed July 29. In 1999 the season was July 1 to September 1.

District 16

Prior to 1993, this fishery was open all year, with an accounting period of January 1 through December 31. Starting in 1993, the statewide management plan was implemented. For Southeast Alaska, it specified a split season, with a winter fishery starting on January 1 and a summer fishery starting on July 1. In 1994, because of high anticipated effort and catch levels, the winter season opened and closed after a one-day fishery on January 20. The following summer season, opened by regulation on July 1 and closed by emergency order on October 31, was not as intense because productive areas in other parts of the state were also open concurrently.

In 1995, there was only a winter fishery which opened January 10 and closed on February 13. There were 2 seasons in 1996. The first one opened in state waters only on January 10 and closed on January 20. The summer fishery opened in federal waters on August 1 and continued through the fall to November 29. In 1997, there was a winter fishery lasting from January 10 and closing on February 24. At the Board of Fisheries meeting in 1997 regulations changed so that the season was opened on July 1 and extended to February 15. There was not a summer fishery in 1997, as the annual allocation had been taken in the winter. The next season began in 1998, opening July 1 and closed on October 6. In 1999, the season was shorter, opening July 1 and extending to September 1.

Size Restrictions

There are no size restrictions on scallops. Any scallop that is retained by four inch minimum-diameter, legal gear may be possessed and processed. In the past, a high percentage of the smaller scallops retained by this gear could not be economically hand-processed and were returned to the sea. These smaller scallops can now be processed and profitably marketed. Management assumes that adherence to the current GHR will be sufficient to insure overall stock viability despite retention of a larger percentage of smaller scallops.

Observer Program

Mandatory observers are required on each vessel fishing for scallops. The observer program has two main goals: to monitor bycatch and to collect biological and commercial fishing information about the weathervane scallop. There has been concern about the bycatch of crab and other important commercial species. The results from sampling from 1996-1998 show that there is minimal bycatch of crab and other species in Yakutat Registration Area D and District 16, especially when compared statewide.

The sampling of the scallop catch and of the scallops that are thrown back gives an idea of the composition of the stock. Shells are collected and aged to find out more about the age structure and population dynamics of the scallop populations.

Permits and Registration

Regulations specific to the Yakutat area date back to 1960. Between 1960 and 1969, the definition of legal gear was very broad; any device capable of being dragged on the ocean floor and taking scallops was legal, including longlines, trawls, and dredges. Declining harvest during the mid-1970s led to deletion of longlines as legal gear in 1976, and of trawls in 1981. Permits were required of scallop dredgers from 1979 to 1985. The first closure of Yakutat Bay by regulation occurred in 1992.

In 1995, all of Registration Area D and District 16 in Registration Area A were combined into Scallop Registration Area D to expedite scallop management. Before the areas were combined into a single registration area, vessel operators had to return to Yakutat, deliver scallops caught in an area, void their registration, and register for the new area before they could fish in it. With Registration Area D and District 16 combined into a single scallop registration area, vessels can fish in either area after reporting their intentions by radio to the management office in Yakutat.

1997 SEASON SYNOPSIS

Registration Area D

In 1997, the season started on January 10 and closed February 18. There were four vessels participating and eight total landings. The total catch for the season was 243,810 pounds just short of the 250,000 pound GHL. There were an average of 30,476 pounds per landing which is the second highest since the beginning of the fishery in 1969. This was a high catch per unit effort for this area.

District 16

The District 16 fishery began on January 10 and closed on February 23, 1997. The entire GHL was taken by a fleet of four vessels reporting a catch of 22,020 pounds of shucked meat and landings averaged 5,505 pounds.

1998 SEASON SYNOPSIS

Registration Area D

In 1998, the fishery was switched to one season beginning in the summer. The fishery was opened July 1 and closed July 29. Seven vessels harvested 250,785 pounds of shucked meat, very close to the GHL. There were 55 landings with an average of 4,560 pounds per landing. This is less than half of the average from 1969 to 1999.

District 16

The District 16 fishery opened on July 1 and was closed by emergency order on October 6, 1999 when the GHL was achieved. Because fewer than three vessels participated in the fishery the information on catch and number of landings is confidential.

1999 SEASON SYNOPSIS

Registration Area D

In 1999, the Registration Area D fishery was opened July 1 and closed by emergency order on September 1. There were three vessels that took 268,786 pounds. This was the farthest the catch had gone over the GHL since the ASMP was implemented. There were 25 landings with an average of 10,781 pounds per landing.

District 16

The District 16 fishery was open July 1 and was closed by emergency order on September 1, 1999. Because fewer than three vessels participated in the fishery the information on catch and number of landings is confidential.

Table 9.1. Registration Area D (Yakutat) historic commercial harvest and effort for weathervane scallops.

Season	Harvest (lbs. shucked meat)	Number of Permits	Number of Landings	Average lbs. per Landing
1969	837,087	14	59	14,187
1970	*	2	*	*
1971	84,948	3	10	8,494
1972	128,241	4	6	21,373
1973	173,700	4	4	43,425
1974	*	2	15	*
1975	139,022	6	11	12,638
1976	189,543	6	15	12,636
1977	*	2	3	*
1979	*	1	1	*
1980	255,667	8	22	11,621
1981	455,858	12	36	12,662
1982	168,353	7	24	7,014
1984	74,010	3	15	4,934
1985	*	2	14	*
1986	98,513	3	19	5,255
1987	*	1	14	*
1988	*	2	10	*
1989	*	2	7	*
1990	442,310	9	49	9,026
1991	402,571	5	55	7,319
1992	1,020,968	8	67	15,238
1993	264,193	10	16	16,512
1994	253,060	12	18	14,058
1995	242,491	10	18	13,471
1996	238,736	5	15	15,916
1997	243,810	4	8	30,476
1998	250,785	7	55	4,560
1999[a]	268,786	3	25	10,751
Average[b]	236,003	5	21	12,213

* Asterisks indicate confidential information where fewer than three permits were fished.

[a] Most recent year's data should be considered preliminary.

[b] Averages are calculated only from years where landings were reported. Differences between confidential and non-confidential data are insignificant.

Table 9.2. Southeast Alaska (District 16 only), historic commercial catch and effort for weathervane scallops.

Season	Harvest (lbs. shucked meat)	Number of Permits	Number of Landings	Average lbs. per Landing
1980	*	2	2	*
1981	*	1	1	*
1982	*	2	3	*
1983	*	1	1	*
1984				
1985				
1986				
1987				
1988				
1989				
1990	148,624	5	8	18,578
1991	39,817	3	9	4,424
1992	*	*	1	*
1993	*	*	9	*
1994	27,613	9	10	2,761
1995	33,302	7	8	4,162
1996	*	*	4	*
1997	22,020	4	4	5,505
1998	*	*	5	*
1999[a]	*	*	5	*
Average[b]	29,643	3	5	5,598

* Asterisks indicate confidential information where fewer than three permits were fished.

[a] Most recent year's data should be considered preliminary.

[b] Averages are calculated only from years where landings were reported.

Section 10

Miscellaneous Dive Fisheries

REPORT TO THE BOARD OF FISHERIES,

MISCELLANEOUS DIVE FISHERIES

By

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Regional Information Report[1] No. 1J99-47

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 2000

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate 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.

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INTRODUCTION

Southeast Alaska Dive Fisheries

This report provides a general overview of the dive fisheries in Southeast Alaska and Yakutat. Southeast Alaska dive fisheries harvest three species of invertebrates: geoduck clams (*Panope abrupta*), sea cucumbers (*Parastichopus californicus*), and red sea urchins (*Strongylocentrotus franciscanus*). All three fisheries occur primarily in southern Southeast Alaskan waters. The abalone (*Haliotis kamschatkana*) fishery is currently closed to commercial harvest. No dive fishery occurs in the Yakutat area.

The Southeast Alaska/Yakutat area (Region I) consists of Alaska waters between Cape Suckling on the north and Dixon Entrance on the south. The region is divided into two registration areas: Area A, the Southeast Alaska area, extends from Dixon Entrance to Cape Fairweather and Area D, the Yakutat area, extends from Cape Fairweather to Cape Suckling. Southeast Alaska dive fisheries occur in miscellaneous shellfish registration Area A. The Southeast Alaska area is divided into 16 regulatory districts (Districts 1 through 16) with each district divided into several statistical subdistricts for catch reporting. For management purposes, the Ketchikan area office is primarily concerned with fisheries that occur in Districts 1-4, the Petersburg and Wrangell area offices with Districts 5-10 (excluding Section 9-A), the Sitka area office with Section 9-A and District 13, and the Juneau area office with Districts 11-15.

Southeast dive fisheries are relatively recent entrants into the region's commercial fishing industry. The first commercial landings for abalone occurred in the mid 1960s, and red sea urchins, sea cucumbers, and geoduck clams in the early to mid 1980s. Participation in each fishery was often limited to just one or two divers initially and only recently has expanded to current effort levels. Fish ticket information indicates a total of 379 permits reported landings during the 1998/99 season including 219 sea cucumber, 98 geoduck, and 62 red sea urchin permits.

The exvessel value of the 1998/99 Southeast Alaska dive fisheries was estimated at approximately $3,085,960. This estimate is considered conservative as it is based on the price reported on fish tickets and does not include unreported price adjustments, or situations were price information was not reported. The actual exvessel value will not be known until final processor reports are received and analyzed through the Commercial Fisheries Entry Commission (CFEC). The harvest of sea cucumbers was valued at $1,636,137 (53% of total 1998/99 dive fishery value), followed by red sea urchins at $1,213,844 (39%), and geoduck clams at $235,979 (8%).

Commercial Fisheries Entry Commission

Prior to July 1, 1996, entry into Southeast Alaska's dive fisheries was open access, requiring a permit be issued by the CFEC for participation. Historically, most fisheries started off slowly with little effort but interest grew relatively quickly as exvessel value increased, new markets opened, and fishers explored for new ways to expand beyond the more traditional fisheries such as salmon or groundfish. Effort quickly soared to levels that made if difficult for the department to manage each fishery, and individual fisher's proceeds quickly diminished.

In 1996 the Alaska State Legislature established a four-year moratorium on interim-use permits for the Southeast dive fisheries. The legislation, HB 547, was incorporated into statue as AS 16.43.228. The moratorium specifies a cap on the total number of interim-use permits in the Southeast Alaska abalone, geoduck, sea cucumber, and sea urchin fisheries. The legislation temporarily halts growth in the number of participants in these fisheries and provides specific eligibility criteria to be used in each fishery.

The effective date of the moratorium was July 1, 1996 and is scheduled to expire automatically on June 30, 2000. During the moratorium, the legislation directs the CFEC to consult with the Board of Fisheries, the Alaska Department of Fish and Game (ADF&G), and the participants in these fisheries about a permanent limited entry program. The legislation also directs the CFEC to determine the type of limited entry program that would be most appropriate for these fisheries. These fisheries will return to open access on the expiration date unless the CFEC limits these fisheries under the current limited entry law.

In September 1999, the CFEC proposed to adopt regulations for limiting entry into the geoduck and sea urchin dive fisheries. For these fisheries, the CFEC proposed to establish: 1) the maximum numbers of permits to be issued for each fishery; 2) July 1, 1996 as the date for determining an applicant's qualifications for a Southeast Alaska geoduck or sea urchin dive entry permit; 3) time periods for each fishery in which an individual must have participated in the fishery as an interim-use permit holder to be eligible to apply for an entry permit; and 4) definitions for the proposed limitation of the geoduck and sea urchin dive fisheries. The CFEC originally proposed a return to open access status for the sea cucumber and abalone dive fisheries at the end of the current moratorium with public comment due November 8, 1999. As per a December 1, 1999 CFEC news release, the CFEC met in a public meeting on November 30, 1999 and adopted regulations to limit entry into the geoduck clam dive fishery to a maximum of 104 permits. By adopting these regulations, the CFEC has established a limited entry program to be in place for the geoduck clam fishery when the moratorium ends. The CFEC voted to take no action, at that time, on the proposal to limit entry in the Southeast Alaska sea urchin dive fishery and directed staff to develop alternative options for the CFEC to consider. The CFEC also directed staff to develop proposals for limiting entry in the sea cucumber and abalone dive fisheries for the CFEC to consider.

Southeast Alaska Regional Dive Fisheries Association[2]

State general funds have not been sufficient to fund the costs of management and research activities required for the dive fishery program. This funding gap has been filled through financial contributions by industry processors, local municipalities, voluntary diver assessments, and test fishing projects in which the resource was harvested and sold by the State. These were ad hoc attempts to keep the dive fisheries open. The industry divers throughout Southeast saw a need to establish an organization and provide for a funding mechanism to meet the funding gap and continue to expand the dive fisheries. Through municipality funding, industry divers hired a project coordinator to develop and promote State legislation addressing this need. The legislation, CSHB 198, passed unanimously in the House and Senate, was signed by the Governor June 20, 1997 and became effective June 21, 1997. CSHB 198 allowed for the creation of the Southeast Alaska Regional Dive Fisheries Association (SARDFA), which is empowered to enact taxes on dive fishery landings to help pay for fishery development.

[2] Excerpted and summarized from the SARDFA mission statement.

SARDFA is a non-profit, economic development corporation, whose voting members are all licensed Southeast divers (currently approximately 560 industry divers). SARDFA is managed by a Board of Directors, which is elected by the membership. The board is composed of one member from each of five Southeast communities (Ketchikan, Craig, Sitka, Petersburg, and Wrangell), one at-large director, one municipal director, and one processor director, for a total of eight directors.

SARDFA has also created committees to focus on the individual needs of each of the dive fisheries. Currently, the urchin, geoduck, and sea cucumber committees each consist of one member from each community and the at-large position, including one board member. These committees add another eighteen voices with diverse opinions to the management of the fisheries. This diversity helps to air all concerns, ideas, and information about the management of the dive fisheries and allows for public input.

Establishing a democratic, procedural structure has been important to the efficiency and effectiveness of SARDFA. The SARDFA administration collects objectives from individual committee members and supplies the committees with current information concerning dive fisheries throughout North America. The committees then meet and develop recommendations based on this information concerning annual operating plans, survey techniques, and areas, and management plans for the individual fisheries. The committees then report these recommendations to the board of directors. The board reviews and votes on the recommendations. The board then takes approved recommendations to be negotiated with ADF&G dive fisheries managers. The ADF&G is required by the State of Alaska to protect the integrity of the State's fisheries, therefore ADF&G managers will not approve any recommendations which they do not feel coincide with a sustainable fishery.

SARDFA's broad goals are to develop, expand, and enhance new and existing dive fisheries in Southeast Alaska in a sustainable and economically feasible manner. This will be accomplished through several steps: 1) implementation of a dive fisheries landing tax and acquisition of other appropriate funds; 2) utilization of local knowledge and experience of the industry divers as a primary resource to be used and coordinated by ADF&G to help manage the dive fisheries; and 3) creative use of computers and the internet as a management tool.

Sea Otters

The growing population of sea otters (*Enhydra lutris*) in outer coastal waters of Southeast Alaska is having serious negative effects in the region's dive fisheries. In the mid to late 1960s sea otters were captured near Amchitka Island and in Prince William Sound and transferred to various locations where it was hoped they would subsequently establish new populations. The successful release of 412 otters on the outer coast of Southeast Alaska has resulted in a current population well in excess of 10,000 sea otters. Aerial surveys flown in May of 1997 show a 32% increase in the sea otter population over the previous year in Cross Sound and Icy Strait near Glacier Bay (O'Clair and O'Clair 1998). It can be assumed that similar increases are occurring elsewhere in Southeast. Sea otters are continuing to expand their range and may eventually be common in inside waters.

The diet of male sea otters at the Beardslee Islands in Glacier Bay is composed of clams (70%), crabs (10%), and various invertebrates such as sea urchins and mollusks (15%). In California, sea otters were found to select smaller clams that have shallower burrows rather than larger ones that burrow more deeply. The same researchers found that otters preferred abalone, rock crabs, and sea urchins, but when these became rare they broadened their diets to include less desirable prey such as mussels, sea stars,

chitons, and snails. Studies on captive sea otters have shown that they are able to detect and avoid those butter clams containing high levels of toxins responsible for paralytic shellfish poisoning (O'Clair and O'Clair 1998).

In Southeast Alaska, sea otters prey most heavily on butter clams, but also on barnacles, Dungeness crabs, king crabs, Tanner crabs, hair crab, abalone, Kennerley venus clams, mussels, soft-shell clams, geoduck clams, horse clams, gumboot chitons, sea urchins, and sea cucumbers. At Torch Bay in Southeast Alaska, red, purple, and green sea urchins were plentiful and kelps were rare from 1976 to 1978 in the absence of sea otters. Otters were introduced at nearby Surge Bay and urchins were gone but kelps were abundant during 1978 to 1988 (O'Clair and O'Clair 1998).

The commercial harvest of sea urchins in Sitka Sound has been eliminated by sea otter predation. Sea otters moved into the southern Sitka Sound red sea urchin fishery area in 1992 and, over the next year, apparently removed about 16,000,000 urchins or the majority of the standing stock. This area is currently closed to the harvest of red sea urchins due to lack of available product. The Southeast Alaska abalone population is at very low levels; due in large part to continued predation by sea otters.

With sea otters at or nearing historic population levels, competition for shellfish, crabs, and other subsistence species is high, and native people have expressed concerned about those resources. Many people have indicated that sea otters have dramatically and negatively affected their subsistence harvest of shellfish. It is expected that the outer coastline will eventually become continuously populated with sea otters from Dixon Entrance to well north of Cape Spencer (Kelley 1995).

ABALONE

Background

The Alaskan abalone fishery targeted the pinto, or northern abalone (*Haliotis kamschatkana*), which inhabits the rocks, lower intertidal, and subtidal surge zones of the outer coasts of Southeast Alaska. Commercially harvestable quantities of abalone occurred in parts of Districts 1, 2, 3, 4, 5, and 13. Life history information for this species in Alaska is very limited. Information from other North Pacific locations is useful in understanding the basic biology of this species. Tagging studies indicate it is a slow growing, long-lived species. Spawning occurs during the summer and through early autumn in the most productive areas. Size frequency information indicates that, in at least some areas, a climax population may have existed prior to recent commercial exploitation. Recruitment levels appear to be low and sporadic and fecundity increases greatly with increasing shell length. Known predators include rockfish, starfish, octopus, sea otter, and man. Throughout the range of this and various other abalone species, exploitation has usually resulted in stock depletion and restrictive management.

Abalone can be picked by hand from the shoreline during extreme low tides. However, until recently, most of the subsistence and personal use and all of the commercial fishery utilized scuba or hookah umbilical diving gear and most of the harvest occurred subtidally. Current subsistence and personal use regulations prohibit the use of compressed gas systems (e.g. scuba or hookah).

Fishery Development and History

The abalone fishery was marked by a boom in harvests and effort in the late 1970s followed by declining harvests and increasing effort (Table 10.1). The decline in harvests may be attributed to a mix of excessive fishing, predation by a growing sea otter population, and apparent low productivity of abalone stocks when heavily harvested. Driving the effort changes was an increase in value from one dollar a pound in the early 1970s to more than ten dollars a pound in the last four seasons.

The marked increase in harvests and effort came in the 1978/79 season, when effort increased more than three-fold and harvests jumped to 180,000 pounds from a long-term average of about 6,000 pounds. Harvests peaked at 378,685 pounds in the next season, the first of the seasonal accounting year. This peak exceeded the quota of 250,000 pounds adopted by the board in the spring of 1980 and the fishery was closed by emergency order for the first time.

High harvests continued through the 1981/82 season when 371,000 pounds were landed, despite a further reduction in the guideline harvest range (GHR) to a maximum of 125,000 pounds and a season shortened to two months. By the 1984/85 season, it was apparent that the resource might be in trouble when the lower end of the GHR (86,000 pounds) was not reached despite 151 days of fishing.

The 1990/91 through 1995/96 seasons opened on October 1 and with the exception of District 13, which was managed separately and closed by emergency order, the length of the season for the rest of Southeast Alaska was set prior to the opening to avoid overharvest. A harvest of 68,400 pounds during the 1990/91 season was the beginning of a second downward trend that was to continue through the most recent seasons.

As the 1994/95 season progressed, it became apparent that harvests were much lower than anticipated, and dramatically lower than historic levels. Fish ticket data indicated that 15,055 pounds had been harvested during the eight-day opening. Despite requests from harvesters to reopen the fishery, the southern Southeast fishery was not reopened. The District 13 fishery was open from October 1-5, 1994 and October 12-14, 1994 for a total of eight days. A total of 7,824 pounds of abalone were harvested from a Guideline Harvest Level (GHL) of 8,000 pounds. Anecdotal information from harvesters indicated that good harvest areas were difficult to find. Harvest per unit effort for the fishery (lb/diver/day) declined to 64% of the 1993 level.

The 1995/96 southern southeast abalone fishery extended from October 1 - 6, 1995 with an upper GHR of 10,000 pounds. A total of 8,524 pounds was taken by 44 divers with 48 landings in six days. The average price per pound was $8.99 giving the fishery an exvessel value of $74,074. Due to poor harvest rates and a concern by some harvesters that abalone populations were greatly reduced from historic levels, the fishery was not reopened despite not reaching the upper end of the GHR. The District 13 fishery extended from October 1 – 5, and from October 15-16, 1995. with an upper GHR of 6,000 pounds. Harvests of 3,833 pounds and 1,995 pounds occurred, respectively, during the two openings (5,828 pounds total). A total of 56 divers made 73 landings with an approximate exvessel value of $52,452 in the District 13 fishery.

In response to a dramatic decrease in harvest rates observed during the past several seasons, the apparent lack of abalone in many of the important traditional harvest areas as noted by department divers conducting sea urchin assessment surveys, and the numerous comments from subsistence users and commercial divers regarding the diminishing numbers of abalone, the department closed the 1996/97 abalone season by emergency order (1-M-05-96). The emergency closure is consistent with 5 AAC

38.035. AREA CLOSURES. (b) which states "When the commissioner finds that continued fishing effort would jeopardize the viability of miscellaneous shellfish resources in territorial waters of Alaska within any statistical area, he shall close such waters by emergency order." The closure applied to all of Southeast Alaska including both the Sitka area and southern Southeast fisheries.

Regulation Development

Prior to the boom in harvest and effort in the late 1970s, abalone harvests were regulated primarily by response to local market conditions. Quotas, season limitations, and guideline harvest ranges were not imposed until 1980 after harvests began to soar.

The major fisheries are divided into District 13 (northern outer coast) and Districts 3, 4, and 5 (southern outer coast) fisheries. This division was established historically by early fishing and landing patterns that generally persisted throughout the fishery's history. Closed waters around Craig/Klawock, Ketchikan, Sitka, and Coronation Island were adopted to protect stocks used for subsistence and personal use from commercial exploitation.

Size limits have undergone several increases prior to reaching the present four-inch minimum. The size limit was raised from 3 inches to 4 inches in 1968 for Districts 1 through 6 in 1968 and from 3 inches to 3½ inches for Districts 9 through 14 to in 1976. A general change for all districts to 3½ inches occurred in 1977. The board adopted an increase in minimum size to 3¾ inches in the spring of 1979. In November 1993 the board again increased the legal size limit to 4.0 inches due to concerns that abalone stocks were declining. The intent of the larger size limit was to reduce the harvest rate on mature abalone thereby increasing the potential for improved stock abundance. The board also adopted a regulation prohibiting diving for fourteen days before and after the fishery.

Guideline harvest ranges and season length have dropped in several steps. In 1980 the harvest limit was set at 250,000 pounds and the season was reduced from all year to September 1 through May 31. In the spring of 1981, the GHR was reduced to 100,000-125,000 pounds, and the season was shortened to September 15 through May 15. In 1982 the board split the existing guideline harvest range, allocating 86,000-107,500 pounds to the Ketchikan area, and 14,000-17,500 pounds to the Sitka area. In 1983 the board split the season into autumn and spring segments in each of which 50% of the allowable harvest was to be taken. The BOF restricted the 1985/86 harvest to a range of 25,000-50,000 pounds in the Ketchikan area and a maximum of 8,000 pounds in the Sitka area. The District 13 season was reduced to November 1 to May 15 and all other areas were changed to October 1 to May 15. In 1986 the season was changed to October 1 through May 15 for all areas. The upper GHR was further reduced for the 1995/96 season to 10,000 pounds for southern Southeast and to 6,000 pounds for the Sitka area. The reduction was due to a continued apparent decline in abalone abundance in many areas, especially southern Southeast Alaska, and also to increased otter predation. These conservative GHRs were intended to provide a limited commercial fishery while increasing the potential for increased stock abundance.

Fishery Outlook

The department believes that the current population is far below its historic level because of overfishing and predation by sea otters. As this low level does not promote significant recruitment, we are unsure when, or if, the population will rebuild to a level needed to allow a commercial fishery. A fishery will not be opened until a management plan is developed that addresses the issues and information identified in 5 AAC 39.210, Management Plan for High Impact Emerging Fisheries. As part of that process the department would require: 1) a plan for determining productivity and abundance of abalone, and 2) a harvest strategy that would ensure a sustained fishery. Both of these elements would be difficult to achieve. Even with that information available, the department would be very concerned about local and serial depletion under any kind of open access or limited entry fishery. The department believes that it is highly unlikely that stocks will recover sufficiently to allow commercial fishing to resume.

SEA CUCUMBER

Background

The commercial species of sea cucumber harvested in Southeast Alaska is the giant red sea cucumber (*Parastichopus californicus*). It is a common species distributed from Mexico to Southeast Alaska and has been observed at least as far west and north as Cook Inlet and Kodiak Island. It occupies a broad range of subtidal habitats from nearshore shallows to over 100 fathoms. The sea cucumber's primary food is detritus which it ingests along with significant amounts of fine substrate. Its ecological function seems to include recycling detrital material into nutrients for the primary producers in the marine food chain. *P. californicus* appears to favor locations with moderate current, avoiding mud bottoms and areas subject to inundation by freshwater or glacial runoff. The abundance of sea cucumbers in Southeast Alaska is greatest in the southern and western portions in areas not directly exposed to the open ocean.

Fishery Development and History

The first experimental fishing permits for sea cucumbers were requested in 1981. One or two permits were issued each year between 1981 and 1986, with only one vessel reporting landings during this period. The first fisheries were based in Ketchikan and, over the years, evolution of management strategy resulted in a partition of most of the statistical subdistricts into one of three seasonal rotations. The initial fishery had no established season; harvests are reported in Table 10.2 on an October to September basis for consistency with years since 1990.

Most of the vessels pioneering this fishery were small skiffs of limited range and capability operating in the vicinity of either Ketchikan or Sitka, mostly as a day fishery. Larger vessels with two divers and a crewman

with living quarters and the capability of transporting product and divers during typical fall and winter weather conditions are now the norm. Harvest is conducted by scuba or hookah diving gear usually at depths of 10 to 60 feet. The number of hours each diver can work each day depends on the maximum working depths and may be as little as three or four hours. Harvest consists of collecting sea cucumbers in large mesh bags and transporting the filled bags to the tendering vessels.

Processing is currently conducted in a two step process. The freshly caught animal is eviscerated on the fishing grounds. Drained sea cucumbers are then placed in buckets or totes and transported to the processing facility where they are processed immediately or held for up to two days in a refrigerator, or on ice. Sea cucumbers have been purchased by the bucket in previous years but are now sold exclusively by drained weight. Holding times for the eviscerated, densely packed sea cucumbers are limited by their rapid decomposition even when refrigerated.

Processing at the plant consists of separating the muscle bundles from the skin with a scraper or knife. The major products from this fishery are the longitudinal and transverse muscle bundles or meat, and the skins. Skin processing involves cooking or boiling the skins to a specific texture and drying the product. The dried skins are a preferred item in upscale oriental cuisine. The dried skin product, known in the industry as *trepang* or *beche de mer*, has only been acceptable to the local processing industry during the past few years.

Most of the harvest in Southeast Alaska occurs near the communities of Ketchikan, Sitka, and Craig. Sea cucumbers harvested in Southeast Alaska are processed in Ketchikan, Craig, Petersburg, and Sitka with a significant amount of product processed in British Columbia.

Effort increased in the fishery to a maximum of 424 divers during the 1995/96 season. This high number can be attributed to high prices the previous year and concerns that the fishery was to be limited by the CFEC. Beginning July 1, 1996 the CFEC imposed a moratorium into Southeast dive fisheries that limited the number of divers able to participate in the sea cucumber fishery to 472. The CFEC moratorium is scheduled to end July 1, 2000. The GHL has been approximately 1 million pounds (drained weight) in each of the most recent three seasons (Table 10.2). A decreasing number of divers has taken these harvests in an increasingly shorter season indicating an intensification of the fishery.

Management Strategy and Regulations

The fishery expanded rapidly in the late 1980s and in 1989 the fishery exceeded the ability of the department to manage by the permit system. The department closed the fishery in May 1990 and reopened it in October 1990 following development of the Southeast Alaska Sea Cucumber Commercial Fisheries Management Plan (5 AAC 38.140). This plan seeks to protect subsistence opportunities and provides for sustained commercial fishing harvests. To protect subsistence opportunities, the cucumber management plan established 18 areas closed to commercial fishing (5 AAC 38.140 (k)). There are also provisions to prevent the use of diving gear in the subsistence (5 AAC 02.020 (1)) and personal use (5 AAC 77.010 (l)(3)) fisheries in those areas. Annual commercial fishery guideline harvest levels are approximately 5% of the total sea cucumber biomass taken on a three-year rotational basis (i.e. 15% on a three-year basis). Rotational fisheries have the advantage of lowering overall departmental assessment survey and management costs.

Initially the Sea Cucumber Management Plan provided for a season that began October 1 in 1990 with two 48-hour openings per week. The season was changed to a November opening in 1993, and in order to

extend the season, weekly fishing periods were reduced to seven daylight hours on Mondays in November, plus an additional four daylight hours on Tuesdays from December through March. The current version of the Sea Cucumber Management Plan was amended by the board for the 1997 season. The plan provides for an October 1 opening date with weekly fishing periods of seven daylight hours on Mondays in October, plus an additional four daylight hours on Tuesdays from November through March. There are also provisions for limiting the numbers of divers per vessel to two, providing fishing period trip limits of 2,000 pounds per person, and limiting gear to scuba, surface-supplied systems, or snorkels.

1998/99 Season Summary

The 1998/99 season opened by regulation on October 5, 1998. A combined total of 965,345 pounds was available for this season. A total of 1,055,572 pounds of sea cucumbers were harvested by 219 divers with a total exvessel value of $1,636,137. Average exvessel value per pound was $1.55. The number of divers and number of open periods decreased from the 1997/99 season's fishery while the average pounds harvested per diver increased indicating increasing effort within this fishery.

1999/2000 Season

Biomass estimates made during the summer of 1999 indicate a harvestable surplus of 1,580,000 pounds of sea cucumbers is available for the 1999/2000 season. This is the highest GHL on record and is partly due to the inclusion of two wholly new areas and the expansion of two previous fishing areas. The two new areas collectively added an additional 118,000 pounds to the GHL. The fishery opened by regulation 8:00 a.m., October 4, 1999.

GEODUCKS

Background

Known geoduck clam (*Panopea abrupta*) beds have a patchy distribution in the central and southern portions of Southeast Alaska, primarily in protected waters near the outside coast (Figure 10.2). Studies conducted in Washington State, British Columbia and more recently in Southeast Alaska indicate this clam may live to be over 100-years old. Southeast Alaska is the extreme northern limit of the geographic range of this species and recruitment is sporadic or very low seasonally. Sporadic recruitment, low growth rates, and high maximum age makes this species susceptible to overharvest.

A troubling problem is the tendency for geoduck clams to bioaccumulate undesirable microorganisms or compounds. In particular, high levels of paralytic shellfish poisoning (PSP) have been found in geoducks in Southeast Alaska, most strongly associated with the viscera. However, the mantle and necks are the usual body parts consumed and PSP concentrations are lower in these parts. Though this situation permits the sale of processed clams with viscera removed, exvessel value for processed clams is significantly less than that for whole, live product.

In order to protect consumers, the state requires that each individually delivered lot of commercially harvested clams be tested by the Alaska Department of Environmental Conservation (ADEC) laboratory in Palmer and certified to be within acceptable levels of PSP prior to release for marketing. In addition, water quality for commercial beds is tested for human pathogenic microorganisms and certified safe by the ADEC. Waste portions of the clam must be disposed of safely. The need to securely quarantine lots subject to approval for sale, the time required for transport and testing of samples, and the relatively short shelf life of the fresh product, require a closer working relationship between government and industry to successfully market the product than is necessary for most other seafood products.

Fishery Development and History

Starting in 1978 with the Noyes Island survey, state grants were used to find and qualitatively assess commercial beds in the Ketchikan, Craig, Petersburg-Wrangell, and Sitka areas. A number of potential commercial beds were located near Ketchikan, Craig, and Sitka. Procedures for testing and certifying the product for human consumption were established by the ADEC. Population assessment surveys were conducted on three beds on Noyes Island near Craig, a harvestable biomass estimated, and the ADEC completed sanitation surveys on these areas. Two processors conducted the required modifications to their facilities and procedures to handle batch processing, lot testing, and product quarantine and were certified to process geoducks. In late 1985, the first permit was issued for the commercial harvest of geoduck clams. During the 1985/86 season almost 144,000 pounds of the 300,000 pounds five-year quota (Table 10.3) were harvested by eight divers in the Noyes Island area. During the 1986/87 season, only 28,191 pounds were harvested by only three divers. The decline was mainly due to poor marketing conditions and high operational costs. Increased interest in this fishery began after the department completed a population estimate on the west side of Gravina Island in 1987. During the 1987/88 season all harvest occurred in the spring of 1988 with a harvest of 124,568 pounds from Vallenar Bay on Gravina Island, and 60,577 pounds from Noyes Island. Biorka Island near Sitka was included in the geoduck fishery during the 1989/90 season, Kah Shakes was included in the 1990/91 season, and the Goddard area entered the fishery during the 1998/99 season. Pending ADEC water quality testing, Nakat Bay and Sea Otter Sound will enter the fishery during the 1999/2000 season.

The 1991/92 geoduck fishery saw an increased interest in participation and harvest by divers from Washington State. Prior to the 1991/92 season non-resident participation was minimal. Exvessel value and the number of divers began to increase with the 1992/93 season. Approximately 100 divers currently participating each season though exvessel value has decreased. All miscellaneous shellfish dive fisheries in Southeast Alaska are currently under a limited entry moratorium (July 1996 through June 2000) with 169 divers eligible to participate in geoduck fisheries. Each diver is required to have a current Interim Use Permit and a Miscellaneous Shellfish Species Registration/Permit Form during fishing operations.

Management Strategy and Regulations

The objective of geoduck fishery management is to allow only a very low exploitation rate because the species is long-lived and recruitment is sporadic and low. Harvests are by permit only and have been allowed from October through May 31, to avoid the summer spawning and recovery period and to minimize PSP toxin levels.

Harvests are restricted to beds for which biomass estimates are available. Only four areas had been surveyed prior to 1997: Symonds Bay on Biorka Island in the Sitka Management Area, West Gravina Island, Kah Shakes, and northern Noyes Island (Ulitka Bay, Little Steamboat Bay, and Steamboat Bay) in the Ketchikan Management Area. The GHL for each area is estimated as 2% of the harvestable adult population. Following reassessment dive surveys during the summer of 1997, it became apparent that the abundance of geoducks in areas currently being fished was much lower than expected and the distribution of geoduck clams more limited than previous surveys had indicated. These preliminary results suggested that previous GHLs established for the geoduck clam fishery may not be sustainable. As a result, the department delayed the opening, originally scheduled for October 1, 1997, until further analysis and review of the survey results were completed.

The department held public meetings to discuss possible management options for the fishery including a season opening date. Representatives of the CFEC, Fish and Wildlife Protection (FWP), and the ADEC also attended. These meeting were held in the Ketchikan ADF&G office but were teleconferenced by numerous individuals (e.g. Sitka and Petersburg area offices). An opening date and daily open hours were agreed on as well as a GHL for each area. Generally, the 2% per year harvest rate was maintained for all areas but the number of years an area would remain fallow was increased to four years in Symonds Bay and 13-16 years on west Gravina Island with Big Steamboat Bay and Kah Shakes remaining on a two-year rotation. This expanded rotational cycle in Symonds Bay and west Gravina Island allowed for a viable fishery and provided an opportunity for industry self assessment; potentially providing funds for future reconnaissance and assessment surveys (see below).

As a result of the meeting held prior to the 1997-98 season, the Southeast Alaska Geoduck Task Force was formed. During the January 7, 1998 meeting, the task force voted to assess themselves $0.25 on the pound for the February 1998 commercial opening. Through a cooperative agreement between ADF&G and SARDFA, portions of funds generated through the voluntary self-assessment were used to estimate the geoduck clam biomass in Port Alice (summer 1998), and Turn Point, Cone Bay, and Nakat Inlet (Summer 1999). Port Alice was scheduled to open during the 1998-99 season but ADEC water quality sampling was not available in time for the general opening on November 15, 1998 and this area was therefore not opened. Without ADEC approval for Port Alice for the 1998-99 season, the general industry consensus during the October 14, 1998 Geoduck Task Force meeting was to delay opening Port Alice until the 1999-2000 season.

A cooperative agreement was also entered into between the ADF&G and the Sitka Harvest Divers Association (SHDA). Using funds provided by the SHDA, ADF&G conducted a survey of the geoduck clam populations on the west coast of Baranof Island and nearby islands in portions of Subdistricts 113-31 and 113-41. This area has since become know as the Goddard area due to the proximity of the Goddard Hot Springs.

Reconnaissance surveys within Sea Otter Sound, Nakat Inlet, and the Goddard area were conducted by SARDFA and SHDA prior to population assessment surveys by the Department of Fish and Game. The purpose of the reconnaissance surveys was for industry to identify the most likely sites capable of

supporting commercial geoduck fisheries. This data was then given to the ADF&G for use in preparing biomass assessment surveys. The department does not have the funds to provide for reconnaissance of new areas and therefore must rely on industry to provide accurate, preliminary surveys of areas they expect may have commercial potential.

Current regulations (5 AAC 38.110.) refer to the general harvest of clams; requiring a permit that specifies the species, method of fishing, area of operation, and harvest levels. There are no regulations that specifically address the Southeast geoduck clam fishery. Board Proposal 281, submitted by the department for the January 2000 Board of Fisheries meeting, attempts to address this problem.

1998/99 Season Summary

During the 1998/99 season, all geoduck clam fisheries were under a limited entry moratorium with 169 divers eligible to participate. Each diver was required to have a current Interim Use Permit and a Miscellaneous Shellfish Species Registration/Permit Form during fishing operations. Working from a total of 56 boats, 98 divers landed an estimated 111,311 pounds of whole geoduck clams with an estimated exvessel value of $235,979 (Table 10.3).

The SARDFA Geoduck Committee requested the department start the 1998/99 season as of Sunday, November 15, 1998 and fish one day each week to avoid conflicts with the sea cucumber and sea urchin dive fisheries. Initial openings were limited to 9:00 a.m. to 3:00 p.m. as suggested by the geoduck task force. By mid-November, when the geoduck fishery started, the majority of the sea cucumber GHL had been reached. Initial effort resulted in a limited number of open fishing periods: Foggy Bay (3 openings, 16 hours total), Nehenta Bay (1 opening, 6 hours), Little Steamboat Bay (1 opening, 6 hours), and Goddard (10 openings, 60 hours total). In the Ulitka Bay area the open fishing period was expanded later in the season due to inclement weather affecting harvest and subsequent low effort levels. The Ulitka Bay GHL was eventually taken after the area was opened for a total of 399 hours, closing 10:00 a.m., February 2, 1999.

1999/2000 Season

The department has established a total GHL for the 1999/2000 season of 250,400 pounds of whole geoduck clams, assuming all areas to be opened by the department meet ADEC water quality standards. The fishery opened November 28, 1999 and as of December 1999 the Sea Otter Sound area remained to be certified by the ADEC. The GHL minus the Sea Otter Sound area is 204,900 pounds of whole geoduck clams.

SEA URCHINS

Background

Two commercial species, red sea urchins *Strongylocentrotus franciscanus* and green sea urchins *S. drobachiensis*, are common in Southeast Alaska. The red sea urchin occurs primarily on rocky shorelines of the outside coast with largest concentrations in southern Southeast Alaska. Green sea urchins are most common in protected waters of Southeast Alaska in a wider variety of habitats. The red sea urchin population is kept at very low levels by sea otters on many areas of the outside coasts, including Chichagof Island, the Maurelle Islands, the Barrier Islands, southern Prince of Wales Island, and nearby areas. The only commercial fishery for urchins in recent years in Southeast Alaska has been for red sea urchins. Urchins are harvested for their gonads, commonly called roe or uni, with no distinction made between males or females. The product is most valuable fresh and is marketed primarily in Japan.

Fishery Development and History

Harvests of red sea urchins in Southeast Alaska began in 1981 near Ketchikan, primarily around Gravina Island. Both red and green sea urchins were harvested, with the vast majority of the harvest comprised of red urchins. Participation and harvest built through the mid-1980s (Table 10.4), expanding to include Districts 1, 2, 3, and 4. Harvests peaked at 890,092 pounds in 1986-87 and then tapered off due to difficulties in marketing. In 1988, harvests were restricted to District 1, Gravina Island, and District 3, the West Coast of Prince of Wales Island due to lack of staff time and budget support. Once the major processor ceased operations in 1989 the fishery was closed.

Interest in establishing a commercial urchin fishery in Southeast Alaska resurged in 1990 due to the success of urchin fisheries in California, Washington, and British Columbia. This interest was directed towards the Sitka area; however, lacking basic stock information, further commercial harvest was postponed until completion of a test fishery there in late 1990 and early 1991 to estimate population size and to gather size frequency data. A limited commercial fishery opened in southern Sitka Sound in January 1991 with a harvest of 174,233 pounds by closure in April. Subsequent fisheries were opened in 1992 and 1993, and then closed indefinitely due to extreme predation by sea otters. All other areas of Southeast Alaska remained closed pending development of a management plan, stock assessments, harvest quotas, and means of monitoring and managing the fishery.

The department initiated a test fishery in District 1 near Ketchikan during the 1995-96 season as a method to pay for population assessment surveys. The test fishing contract was awarded to Ocean Fresh Seafoods of Fort Bragg, California, the sole bidder. Under the contract, Ocean Fresh paid the department $139,567 in exchange for the opportunity to harvest 3,000,000 pounds of red sea urchins. The test fishery spanned 14 months from March 1995 through April 1996, and harvested 2,988,647 pounds of red sea urchins (Table 10.4). Monthly roe recovery averaged between 5.5% and 12.2%. The average price per pound ranged from $0.29 to $0.81. The test fishery provided considerable employment and revenues to Southeast Alaska, and was estimated to have an exvessel value of $1,400,000 paid to dive harvesters.

Since the test fishery, regular population assessment surveys have been completed in parts of Districts 1, 2, 3, 4, and 13 on a three-year rotational basis. Surveys are conducted only in subdistricts where commercially viable populations exist. Fully developed red sea urchin fisheries have been conducted during the 1996-97, 1997-98, and 1998-99 fishing seasons. The overall quota has remained stable between 4.4 and 6.1 million pounds, however, selected areas have seen reductions in biomass due to sea otter predation. Most areas in Southeast Alaska supporting red sea urchin populations are threatened by the rapidly expanding sea otter population. The numbers of participating divers and landings have decreased over the past three years (Table 10.4), most likely due to poor market conditions in Japan and Asia.

One of the most notable changes affecting the red urchin fishery has been the formation of the Southeast Regional Dive Fishery Association (SARDFA) in February 1998. Industry divers in Southeast Alaska recognized the need for a mechanism of funding newly established dive fisheries, funding that the ADF&G was unable to provide. SARDFA was formed by legislative action (CSHB 198) to allow taxation of dive-harvested product, to be used primarily for funding management and research activities of dive fisheries. Prior to the SARDFA formation, funding of the sea urchin fishery was obtained through industry processors, local municipalities, and test fishing conducted by the state. Currently, sea urchin landings are assessed by SARDFA at 7%.

Regulation Development

Prior to 1996, permits to fish for sea urchins were given under authority of 5 AAC 38.062. In 1984, the first year with significant landings of red urchins, there was a size limit of 3-5 inches test diameter to protect small urchins for recruitment, to provide large urchins as a protective spine canopy for small urchins, and to give processors the desired size urchin. An interim management plan was in place in 1987 for the Ketchikan area with a 3-year area rotation and size limits modified slightly to 3-4.5 inches. A second interim plan was developed for 1991 through 1993 for the Sitka area. The Sitka area plan included a 3.2% annual harvest rate on the estimated biomass, 3-year area rotations, weekly fishing periods of noon, Saturday through noon Thursday, and no size limits.

In 1996, the department, in cooperation with the sea urchin fishing industry, developed interim regulations and a management plan for a commercial fishery in Southeast Alaska beginning with the 1996/97 season. The regulations were adopted by the commissioner under authority of 5 AAC 39.210 for High Impact Emerging Fisheries and became effective in December, 1996. The Alaska Board of Fisheries formally adopted the red sea urchin management plan during their regular meeting in January 1997. The core elements were:

1. Annual guideline harvest levels are 6% of the biomass estimate, which is the lower bound of the 90% confidence interval for biomass. Fisheries will only be opened where biomass surveys have been conducted in the previous three years.

2. Harvest opportunities are to be distributed to each week of every month that the fishery is open. The fishery is to be managed to span approximately four months, subject to needs for conservation, law enforcement, reducing waste, and promoting fishery development. Size limits and trip limits may be imposed if needed to slow the pace of the fishery.

3. Processing vessels must carry observers, and vessels transporting unprocessed product out of Registration Area A must first obtain a transport permit.

4. In addition to fish ticket requirements, processors must submit records of the roe recovery within 30 days of landing.

Since the management plan became effective in December 1996, no major regulatory changes have been made to the red urchin fishery.

1998/99 Season Summary

The 1998/99 season opened by regulation on October 1, 1998, however the fishery did not begin until November 22, 1998 due to lack of management funds. The combined total guideline harvest level was 4,843,610 pounds. A total of 3,034,610 pounds of red sea urchins were harvested by 62 divers with an estimated exvessel value of $.40 per pound for a total exvessel value of $1,213,844. The number of divers decreased from 129 during the 1997-98 season, probably due to continued poor market conditions in Japan. The inability to harvest the total quota may have been a combination of market conditions and a late fishery opening.

1999/00 Season Outlook

The 1999/00 season is the fourth under the current management plan. The GHL for the 1999/00 season is 4,958,678 pounds for Districts 1, 2, 3, 4, and 113. Biomass surveys were conducted in the portions of those districts with commercially viable red urchin populations between April 1997 and July 1999. Under the 4-year moratorium on entry to dive fisheries in Southeast Alaska, effective July 1, 1996-June 30, 2000, there are 557 eligible participants in the urchin fishery. The CFEC, as per a December 1, 1999 news release, voted to take no action at this time on the proposal to limit entry in the Southeastern Alaska sea urchin dive fishery and directed staff to develop alternative options for the CFEC to consider.

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Table 10.1. Registration Area A (Southeast Alaska) commercial abalone harvests, effort, value, and season length, 1970/71 through 1996/97.

Season	Guideline Harvest Range or Quota (lb)	Southern Southeast Harvest (lb)	District 13 Harvest (lb)	Total Southeast Harvest (lb)	Number of Divers	Exvessel Value	Season Length (days)
70/71							365
71/72	Confidential Data – Less than 3 divers reporting landings						365
72/73		65	2,610	2,675	6	$2,675	365
73/74			3,000	3,000	3	$4,500	365
74/75			13,826	13,826	3	$20,739	365
75/76		55	8,497	8,552	8	$17,104	365
76/77	Confidential Data – Less than 3 divers reporting landings						365
77/78		805	10,861	11,666	10	$14,816	365
78/79		130,607	49,320	179,927	35	$253,697	365
79/80		316,952	61,733	378,685	43	$408,980	287
80/81	250,000	233,589	18,382	251,971	40	$420,792	273
81/82	100,000-125,000	338,305	32,589	370,894	54	$445,073	59
82/83	100,000-125,000	100,458	12,826	113,284	41	$240,162	36
83/84	100,000-125,000	99,294	8,735	108,029	31	$302,481	126
84/85	100,000-125,000	59,237	8,379	67,616	25	$165,659	151
85/86	25-58,000	32,817	7,720	40,537	18	$117,963	71
86/87	25-58,000	47,404	13,820	61,224	24	$168,366	146
87/88	25-58,000	57,209	10,406	67,615	42	$208,930	36
88/89	25-58,000	65,928	10,172	76,100	45	$307,444	33
89/90	25-58,000	57,784	4,020	61,804	67	$330,651	40
90/91	25-58,000	62,779	5,607	68,386	97	$374,071	9
91/92	25-58,000	35,987	8,095	44,082	95	$267,578	35
92/93	25-58,000	26,905	9,083	35,988	99	$386,151	19
93/94	25-58,000	27,680	7,172	34,852	85	$487,928	7
94/95	25-58,000	15,055	7,824	22,879	101	$330,373	8
95/96	0-16,000	8,524	5,828	14,352	101	$125,580	7
96/97	closed						

Table 10.2. Southeast Alaska historic seasonal sea cucumber harvests, effort, and value.

Season[a]	Guideline Harvest Level (lb)	Total Pounds Landed	Average Price Per Pound[b]	Estimated Exvessel Value[b]	Number of Divers	Number of Landings	Total Days Open	Average Pounds per Diver	Average Earnings per Diver[b]
Data prior to 1986/87 season is confidential.									
86/87		34,043	$0.21	$7,149	7	44	na	4,863	$1,021
87/88		65,056	$0.21	$13,662	11	143	na	5,914	$1,242
88/89		801,405	$0.21	$169,096	57	922	na	14,060	$2,967
89/90		2,318,305	$0.42	$969,142	205	2,263	na	11,309	$4,728
90/91	704,491[c]	804,184	$0.59	$472,386	143	890	80	5,624	$3,303
91/92	839,160[c]	869,988	$0.80	$697,970	187	704	56	4,652	$3,732
92/93	1,100,440	1,249,621	$0.79	$988,628	240	1,003	29	5,207	$4,119
93/94	799,235	964,343	$1.03	$995,783	320	949	18	3,014	$3,112
94/95	1,351,000	1,322,219	$1.79	$2,361,541	261	1,379	39	5,066	$9,048
95/96	1,157,500	1,332,095	$1.39	$1,846,556	424	1,582	13	3,142	$4,355
96/97	939,300	909,789	$1.29	$1,169,612	294	1,234	14	3,095	$3,978
97/98	892,410	894,739	$1.63	$1,458,425	226	976	10	3,959	$6,453
98/99	1,026,345	1,055,572	$1.55	$1,636,137	219	971	9	4,820	$7,471

[a] Season = October 1 thru September 30. Experimental fishing program prior to 1990/91 season.

[b] Based on CFEC data except 1998/99 based on fish ticket data

[c] Quota originally calculated in numbers of sea cucumbers.

Table 10.3. Southeast Alaska historic seasonal geoduck harvests, effort, and value.

Season[a]	Guideline Harvest Level (lb)	Total Pounds Landed	Average Price per pound[c]	Estimated Exvessel Value[c]	Number of Divers	Number of Landings	Total Days Open	Average Pounds per Diver	Average Earnings per Diver[c]
1985/86	[b]	143,868	$0.20	$28,774	8	40	240	17,984	$3,597
1986/87	[b]	28,191	$0.25	$7,048	3	9	240	9,397	$2,349
1987/88	125,000	185,674	$0.30	$55,702	6	156	240	30,946	$9,284
1988/89	189,232	143,188	$0.30	$42,956	9	127	240	15,910	$4,773
1989/90	199,000	207,083	$0.51	$105,612	18	165	240	11,505	$5,867
1990/91	196,000	189,585	$0.51	$96,688	15	130	176	12,639	$6,446
1991/92	219,000	193,074	$0.63	$121,637	20	131	33	9,654	$6,082
1992/93	196,000	189,379	$1.12	$212,104	22	109	19	8,608	$9,641
1993/94	219,000	209,322	$1.48	$309,797	39	115	10.5	5,367	$7,944
1994/95	195,000	197,246	$1.64	$323,483	64	190	14	3,082	$5,054
1995/96	209,000	229,681	$2.25	$516,782	109	401	10	2,107	$4,741
1996/97	196,000	203,017	$2.55	$517,693	97	359	6	2,093	$5,337
1997/98	196,000	180,440	$4.00	$721,760	110	312	3	1,640	$6,561
1998/99	112,500	111,311	$2.12	$235,979	98	206	66	1,136	$2,408

[a] Season = October 1 thru September 30.

[b] Only Noyes Island open (Subdistrict 103-70). Five-year GHL established of 300,000 pounds for all three areas. Separate GHLs first established for 1988/89 season. Therefore, 1987/88 GHL does not include remaining GHL from Noyes Island (e.g. 125,000 for Gravina Island only).

[c] Based on CFEC data except 1998/99 based on ADF&G fish ticket data.

Table 10.4. Registration Area A (Southeast Alaska) red sea urchin harvest, permits, landings, and value, 1980-1999.

Year	Harvest	Permits	Landings	Value
1980-81[a]		Confidential		
1981-82[a]		Confidential		
1982-83[a]		Confidential		
1983-84	23,303	4	9	$2,796
1984-85	188,023	16	84	$31,906
1985-86	58,303	8	32	$7,288
1986-87	890,092	26	459	$125,335
1987-88[a]		Confidential		
1988-89	223,883	11	128	$91,106
1989-90	23,617	9	33	$5,833
1990-91	174,233	6	91	$45,823
1991-92	428,220	37	256	$128,894
1992-93	143,485	17	108	$41,467
1993-94	0	0	0	0
1994-95[b]	2,088,395	1	1,391	$944,329
1995-96[b]	877,212	1	705	$458,508
1996-97	4,929,280	150	3,483	$1,878,056
1997-98	4,083,877	129	2,465	$1,408,397
1998-99	3,034,610	62	1,510	$1,213,844

[a] When number of permits participating is three or less, the information is considered confidential.

[b] Department test fishery.

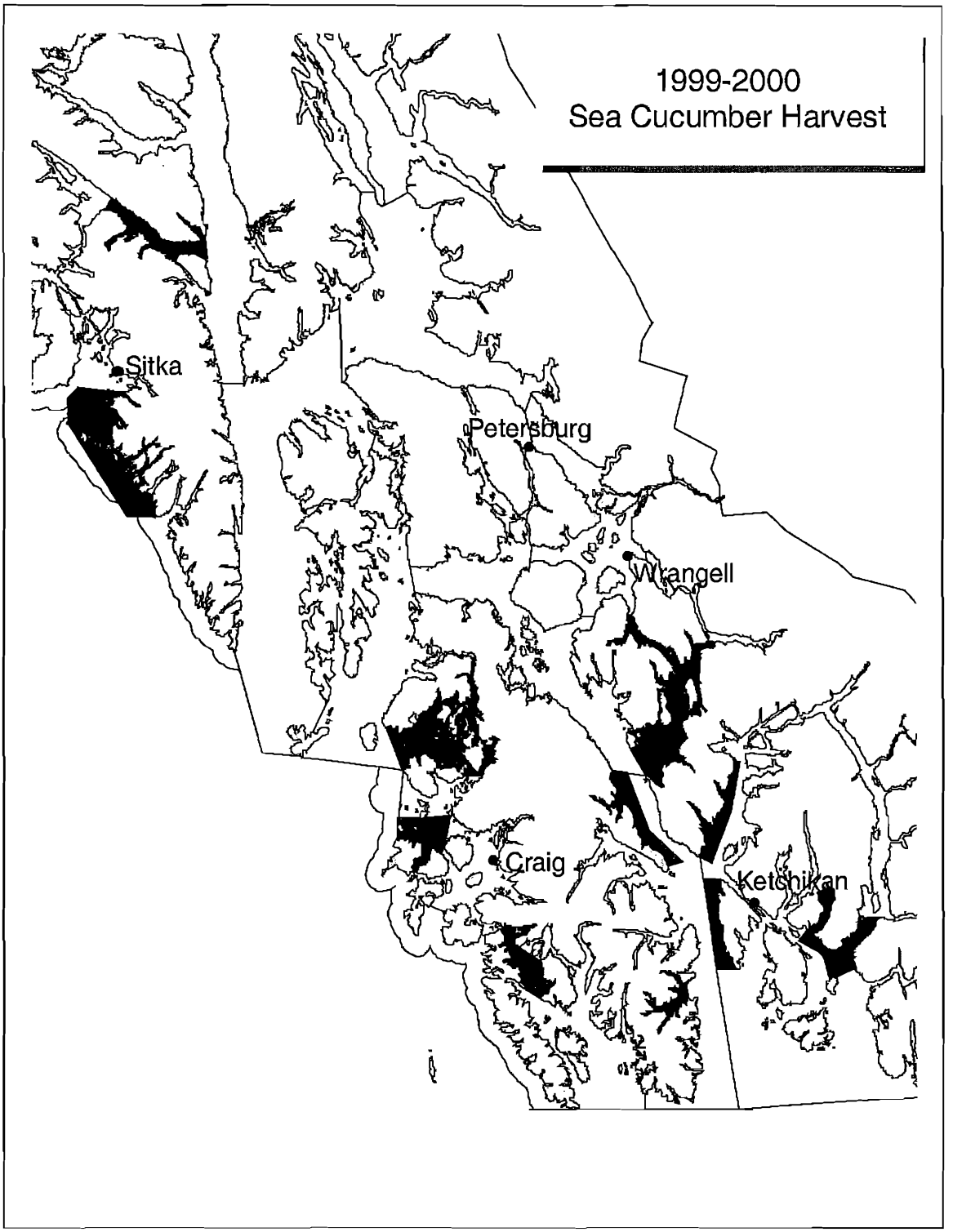

Figure 10.1. Sea cucumber fishery open areas in Southeast Alaska during the 1999/2000 season.

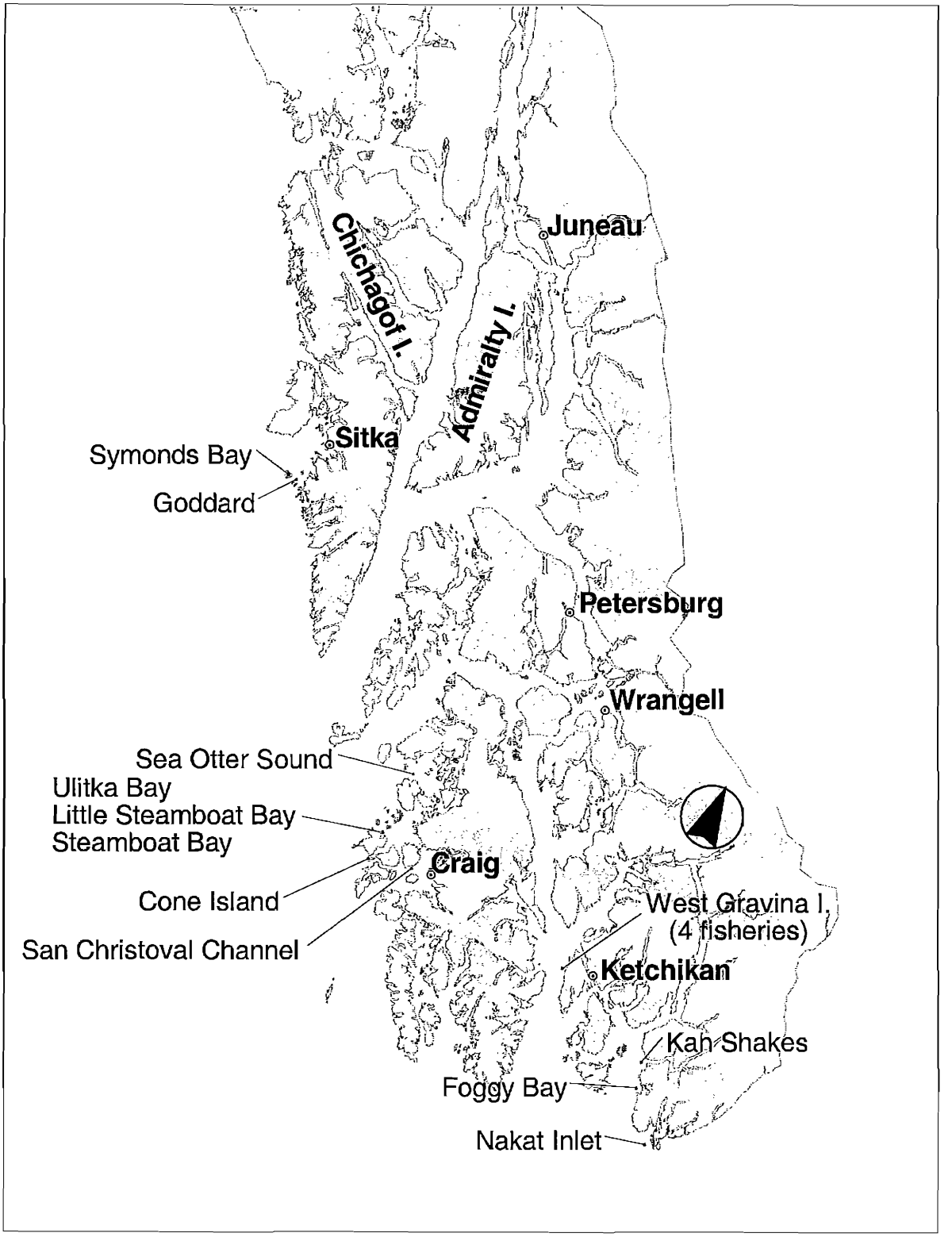

Figure 10.2.Geoduck clam bed locations and fisheries in Southeast Alaska.

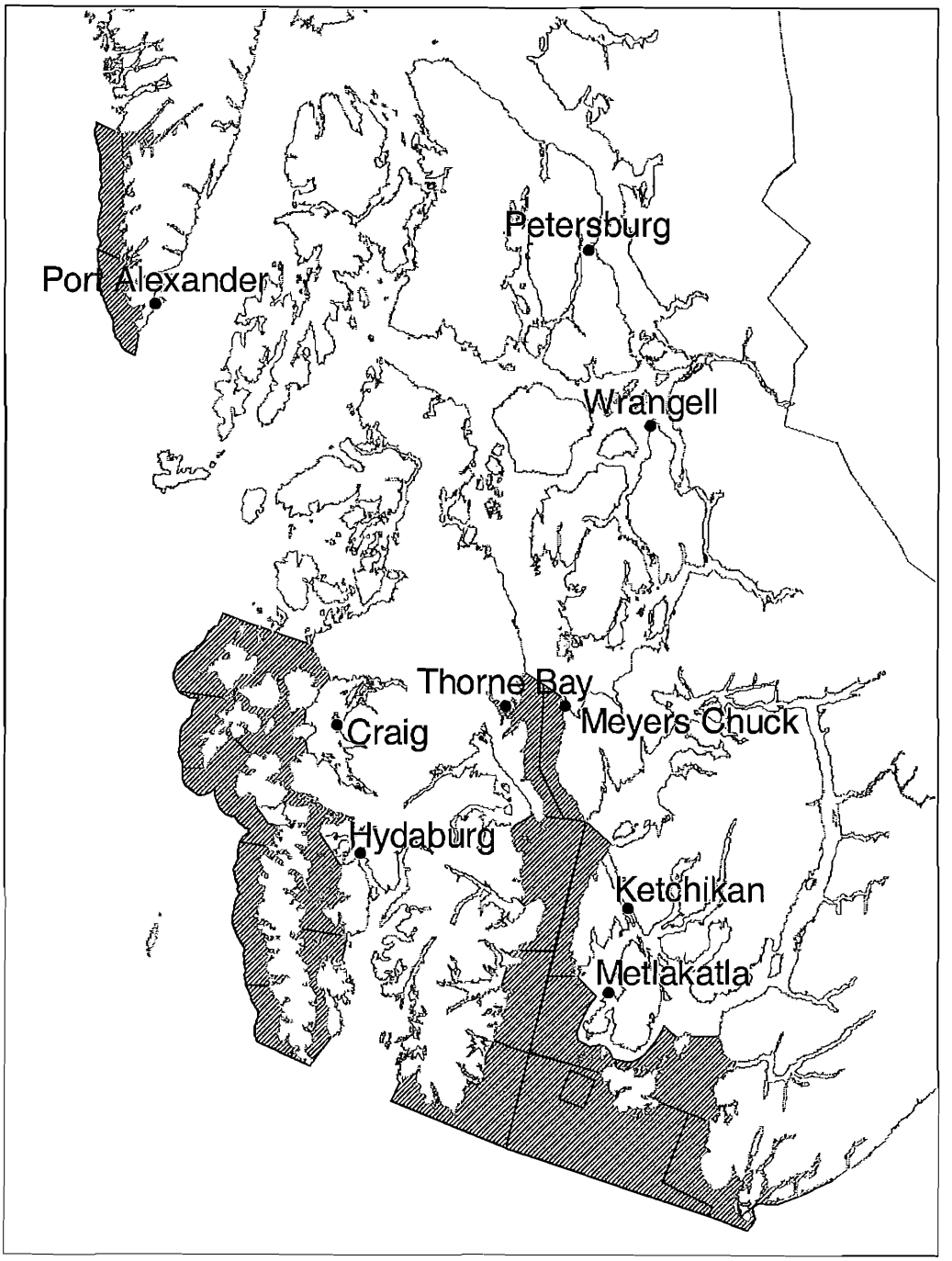

Figure 10.3.Red urchin fishery open areas in Southeast Alaska during the 1999-2000 season.