

SOUTHEAST ALASKA-YAKUTAT REGION

1989/1990

ALASKA DEPARTMENT OF FISH AND GAME

SHELLFISH

Report to the Board of Fisheries



Illustration by Susan R. Kiska

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DIVISION OF COMMERCIAL FISHERIES
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REPORT TO THE BOARD OF FISHERIES
1989/90 REGION 1 SHELLFISH FISHERIES



Edited By

Paul R. Larson

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February 1990

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REPORT TO THE BOARD OF FISHERIES
INTRODUCTION TO 1989/90 SHELLFISH FISHERIES



By

Timothy Koeneman

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

February 1990

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INTRODUCTION

This report is designed to provide the Alaska Board of Fisheries a review of the Southeast Alaska Region (Region I of the Division of Commercial Fisheries, Alaska Department of Fish and Game) commercial shellfish fisheries. The Southeast region consists of two shellfish statistical areas - Area A, Southeast Alaska and Area D, Yakutat (see Figure 1). Most of the shellfish harvesting is accomplished in state waters; however, some of the fisheries extend into the 3-200 mile Federal Exclusive Economic Zone (EEZ).

Distinct fisheries exist for king, Tanner and Dungeness crab, shrimp, abalone, scallops and other miscellaneous species. The various fisheries will be discussed separately. Management of the Southeast Alaska Region commercial shellfish fisheries is accomplished on a region level. The management program is headed by a Fisheries Biologist III stationed in Petersburg.

Statistical Area A encompasses all waters surrounding the Alexander Archipelago and the outer coastline northwest to Cape Fairweather. Statistical Districts 1 through 16 are utilized to report harvests in Statistical Area A. Statistical Area D includes all waters from Cape Fairweather to Cape Suckling, and encompasses Statistical Districts 181 through 191. Southeast Alaska and Yakutat waters have been exploited by a broad range of diversified shellfish fisheries utilizing methods ranging from hand-picking with diving gear to ring nets, pots, trawls, and dredges.

During the last completed fishery, on either a season or calendar year basis, the significant shellfish fisheries resulted in a harvest of 10.0 million pounds worth an estimated \$14.6 million to the fishermen (Table 1). In descending order, major fishery contributors on a poundage basis are; Southeast Dungeness crab, Yakutat Dungeness crab, Southeast Tanner crab, shrimp beam trawl, and sea cucumbers. In descending order, major fishery contributors on an ex-vessel value basis are; Southeast Tanner crab, Southeast brown king crab, Southeast Dungeness crab, and Yakutat Dungeness crab.

Many of the fisheries are in a fairly advanced stage of development, many important fisheries have been stressed by high effort levels, and a few are in the rebuilding stages. These fisheries include Yakutat Tanner crab and Southeast Alaska red king crab. Some fisheries are in very early stages of development, such as the sea cucumber fishery. In response to the harvests that some of these fisheries can reasonably sustain, regulations have become restrictive. In some fisheries, such as Southeast Alaska red king crab, it appears that management has not been adequately responsive or conservative.

During the past six seasons effort levels have increased significantly in most fisheries. This trend will probably continue. Representatives of the fishing industry and representatives of the public are concerned about stock conditions supporting existing fisheries, future fishery potential, and future

subsistence and personal harvests. These concerns are evident in some of the regulatory proposals for your consideration.

Shellfish research projects utilized to determine stock condition or to gain necessary biological information relative to Region 1 shellfish fisheries are limited in scope and number. An annual index of abundance survey has been accomplished on red king crab stocks in a total of 18 important bay areas of northern Southeast Alaska since 1978. However, funding constraints have limited our survey ability to 4 to 10 bay areas since 1986. Red king crab test fishing utilizing commercial vessels and skippers was initiated in 1988 in an attempt to validate department survey cruises. A pink shrimp and sidestripe shrimp population estimate using the area-swept method was accomplished biennially in Yakutat Bay from 1980 through 1984, with the exception of 1983.

Important fishery information is obtained on a regular basis for most fisheries from the dockside sampling and skipper interview program. Some Tanner crab information has been collected in conjunction with the red king crab index survey. Information on infection rates of Tanner crab by a systemic parasite (bitter crab disease) has been collected for three years from a number of important Tanner crab fishing grounds. Resulting information has provided infection rates and geographic distribution of the disease. Limited spot shrimp and pink shrimp data is being collected and analyzed through dockside sampling and on-board sampling. Dockside sampling and a limited amount of on-board sampling is important to data needs in the Dungeness crab fisheries.

Some information relative to various miscellaneous species has been collected. This data includes density and size frequency for abalone, sea cucumbers and geoducks. The resulting data is helpful to estimate population levels for geoducks and sea cucumbers. Additional projects have been developed and proposed to gather necessary information in the brown king crab, Tanner crab, Dungeness crab, shrimp trawl, shrimp pot and miscellaneous fisheries. A miscellaneous fishery project was partially funded by the legislature during fiscal year 1989. However, this funding is no longer available.

Management, to some degree, is conducted in all fisheries within staff and funding limitations. In those fisheries with available research data and long series of harvest data, concise management plans and strategies are developed.

In other fisheries with less data, management is limited to an analysis of limited historic fishery information, current effort levels, current market conditions, in-season harvest data, and a review of published information related to the species. In these fisheries management is usually limited to identification of serious problems or stock condition declines only after the condition has persisted. Management often entails reacting, within staff and funding constraints, to problems as appropriately and as quickly as possible to minimize potential resource problems. The current capabilities of industry to expand harvesting and processing in existing fisheries, or to capitalize into a new fishery, far exceeds the department's ability to gather data and manage conservatively as defined in Title 16.

Staff members whose normal full-time assigned duties relate to shellfish fisheries include: Timothy Koeneman, Region 1 Shellfish Biologist located in Petersburg; Catherine Botelho, Assistant Region 1 Shellfish Biologist, Fishery Biologist II located in Douglas; and Kenneth Imamura, Assistant Region 1 Shellfish Biologist, Fishery Biologist II, located in Douglas; and Rexanne Stafford, Fisheries Technician II port sampler for 8 months, located in Petersburg. Also, Kenneth Imamura has the various miscellaneous fisheries, and the Dungeness and Tanner crab fisheries as specific, assigned duties.

Staff assistance is received from: Paul Larson, Region 1 Fisheries Coordinator, Fishery Biologist IV, located in Douglas; Don House, Assistant Area Management Biologist, Fishery Biologist II, located in Ketchikan; Dennis Blankenbeckler, Herring Project Leader, Fishery Biologist III located in Ketchikan; Catherine Robinson, Stock Biology port sampler, Fishery Biologist I, located in Petersburg, and other regional and area staff members.

The introduction, king crab and shrimp reports under this cover were written by Timothy Koeneman. The Tanner, Dungeness crab, and miscellaneous fishery reports were written by Kenneth Imamura. Catherine Botelho completed the major portion of the data summaries and tables included within each report.

Table 1. Statistical Area (Southeast Alaska) and Statistical Area D (Yakutat) list of fisheries, harvest and approximate ex-vessel values from the last completed season or calendar year.

Season or Year	Fishery	Harvest in Thousands of Pounds	Approximate Ex-vessel Value in Thousands of \$\$ ^{a/}
1988/89	Red & Blue King Crab	8.1	34.4
1988/89	Brown King Crab	967.2	3,625.4
1988/89	Southeast Tanner Crab	1,645.6	4,227.1 ^{b/}
1988/89	Yakutat Tanner Crab	155.6	420.0
1989/90	Southeast Dungeness Crab	1,902.7	2,054.9
1989/90	Yakutat Dungeness Crab	1,699.8	1,835.8
1989/90	Shrimp Beam Trawl	1,586.2	354.2
1989	Pot Shrimp	254.3	780.7
1989/90	Abalone	61.8	247.8
1989	Weathervane Scallops	*	*
1989	Sea Urchins	142.1	38.4
1989	Octopus	5.7	6.3
1989	Geoduck	203.7	101.9
1989 ^{c/}	Sea Cucumbers	1,296.2	531.4
1989	Snails	*	*
Combined Scallops and Snails		74.1	247.6
Other Fisheries		9,929.0	14,318.0
Total		10,000.1	14,565.6

* Where number of vessels participating is three or less, 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/} Ex-vessel value does not include approximately 80,000 lbs. of deadloss.

^{c/} Number of pounds of sea cucumbers is approximated due to different processing methods. Number of sea cucumbers = 1,585,100.

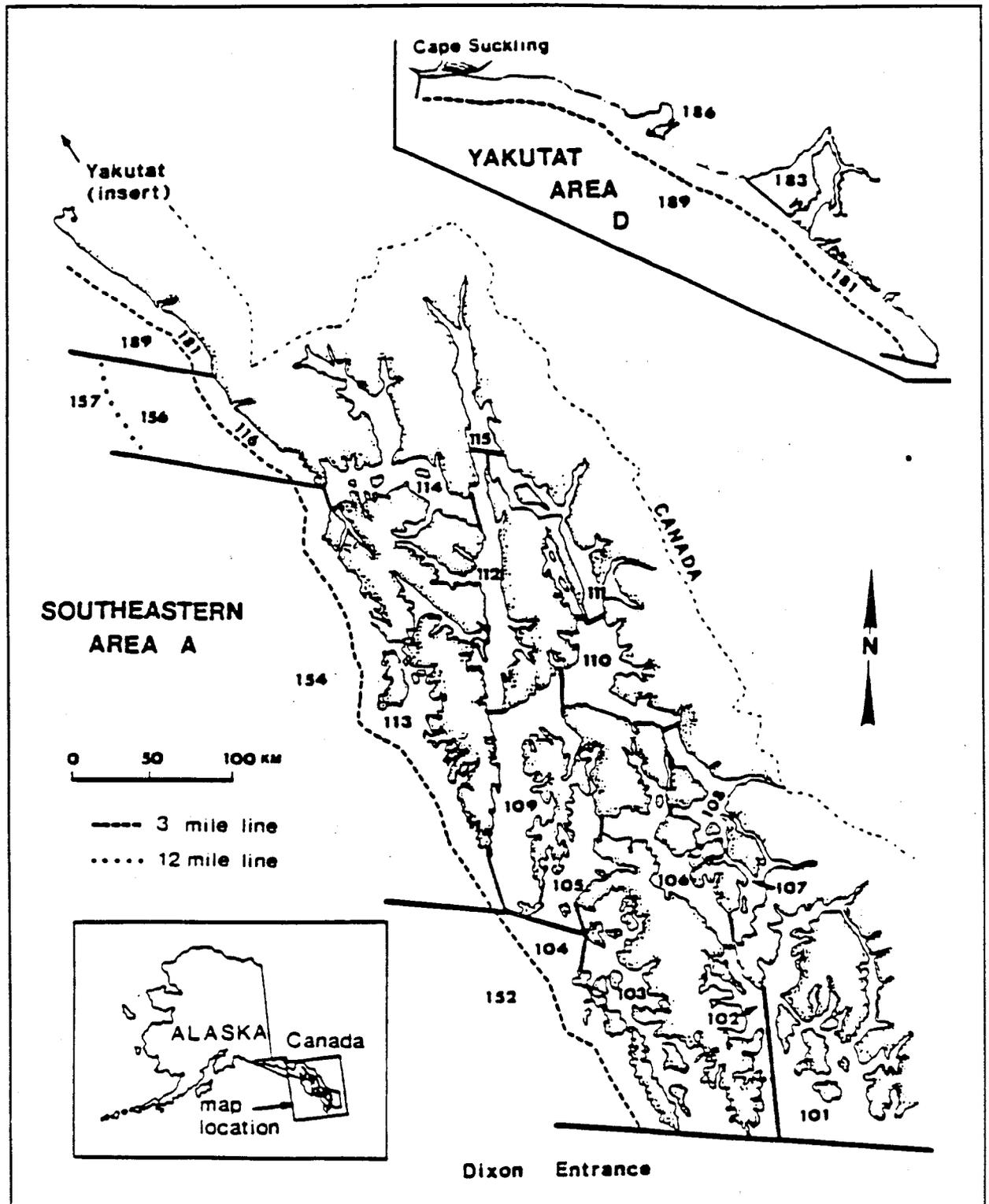


Figure 1. Map of Statistical Area A (Dixon Entrance to Cape Fairweather) and Statistical Area D (Cape Fairweather to Cape Suckling).

REPORT TO THE BOARD OF FISHERIES
1989/90. SOUTHEAST ALASKA-YAKUTAT KING CRAB FISHERIES



By

Timothy Koeneman
and
Catherine A. Botelho

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

February 1990

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INTRODUCTION

This chapter of the Region 1 (Southeast Alaska, Area A and Yakutat Area D) shellfish report describes the commercial king crab fisheries. A historical review of the king crab fisheries, including historical catch information, is presented.

The Region I commercial king crab fisheries exploits red, brown and blue king crab primarily in the northern portions of Southeast Alaska. Very small amounts of king crab are harvested in the southern portions of Southeast Alaska and the Yakutat Area. The major fishery has historically been targeted on red king crab; however, brown king crab has dominated the harvest in recent years.

The current king crab management approach is based on the concepts of seasonal guideline harvest limits, harvest of male only crab, minimum size limits (7 inches for red and brown and 6 1/2 inches for blue king crab), and timing of fishing seasons to avoid identified sensitive life history stages.

GENERAL BACKGROUND

Commercial king crab fishing in waters of Southeast Alaska was initially documented in 1960 when a small harvest occurred in the Petersburg-Wrangell Management Area. From 1961 through 1968, regulations provided for a male only harvest, a minimum legal size of 6.5 inches in carapace width, and no closed season. In 1968 a pot limit of 40 pots per vessel was established for Southeast Alaska waters. During the 1961 through 1968 period, harvests averaged 1.1 million pounds with an average of less than 10 vessels participating during each fishing season (Table 1).

Prior to the 1969/70 season, the minimum legal size was increased to 7.0 inches, a closed season from March 16 to August 14 was established, and pot storage in the water was allowed. In 1970 a quota of 1.5 million pounds was provided for all king crab species combined. The need for the first emergency order occurred in January 1971 when the harvest for the 1970/71 season totaled only 221,000 pounds after 4.5 months of fishing by 20 vessels.

In 1971 separate red and blue, and brown king crab fisheries were recognized with the adoption of distinct seasons and quotas. Fish ticket data prior to 1976 did not identify the species of king crab landed. However, area management reports allow an estimate of the species composition of the total harvest from the 1969/70 through the 1975/76 seasons.

Effective January 1, 1984 a limited entry program was established for the king crab fisheries in Southeast Alaska by the Alaska Commercial Fisheries Entry Commission, with maximum effort levels of 61 vessels

for the red and blue king crab fishery, and 57 vessels for the brown king crab fishery. Since the implementation of the limited entry program for pot fishing, a continued increase in the use of ring net gear has occurred in the fishery.

RED AND BLUE KING CRAB

Red and blue king crab, *Paralithodes camtschatica*, and *P. platypus*, are primarily harvested in the protected bays, inlets, and adjacent shorelines of the northern waters of Southeast Alaska at depths of less than 150 fathoms. Important red king crab fishing grounds are located in bays which open into Frederick Sound, Stephens Passage, Seymour Canal, Icy Straits, and Peril Straits. Red king crab are the target species, with small quantities of blue king crab harvested as an incidental species. From the 1970/71 through the 1984/85 seasons, annual harvests have averaged 427,000 pounds, with an average of 43 participating vessels. This average harvest of 427,000 pounds represented an approximate ex-vessel value of \$613,000 based upon average ex-vessel prices. The peak number of vessels was 103 during the 1983/84 season (Table 1).

Both standard side-loading king crab pots and top-loading Tanner crab pots are utilized in the fishery. With the exception of an increase from 40 to 60, and finally to 100 pots, regulations have gradually become more restrictive. During the spring 1988 Board of Fisheries meeting a modification of the pot limit occurred. This modification specified that when a minimal harvest of 300,000 to 400,000 pounds of red king crab was appropriate, the pot limit shall be 40 pots per vessel. When a harvest in excess of 400,000 pounds is appropriate, the pot limit shall be 100 pots per vessel.

A fishing season of September 1 through January 31 was established in 1971 to provide a closure during a portion of the aggregation period, the molting and mating season, and the major growth period when recovery rates would be unexceptionable to industry. Industry proposals in recent years resulted in a later opening date which is an attempt to further optimize meat yield or shell fullness. A later opening date, may have a tendency to provide for the fishery which targets on different stock segments due to migration differences, and tends to concentrate the fishery more towards the aggregation period. The minimum legal size for red king crab remains at seven inches of carapace width, with provisions for an eight inch season by emergency order if warranted by biological conditions and consistency with Board of Fisheries policy. The minimum legal size for blue king crab is currently six and one-half inches of carapace width. This smaller size limit reflects the slower growth rates characteristic of Southeast Alaska blue king crab.

From 1971 through the 1978/79 season the red king crab guideline harvest levels were based upon historic harvest information. Since the 1979/80 season, annual harvests have been based upon results of an annual red king crab stock index of abundance research survey.

Current regulations specify that a minimum 300,000 pound harvest must be available to initiate a commercial red king crab fishery.

Blue king crab have been taken primarily as incidental species while fishing for red king crab. In response to more restricted, and recent closed red king crab fishing seasons, exploratory blue king crab fishing opportunities in certain locations have been provided beginning with the 1983/84 season. The seasons have been set in conjunction with the Tanner crab and brown king crab fisheries. These locations are Glacier Bay, Upper Lynn Canal, Taku Inlet, Port Snettisham, and Holkam Bay. Harvests during the past three seasons have ranged from 1,200 to 3,200 pounds of blue king crab.

1989/90 Red King Crab Season

The red king crab fishery in Southeast Alaska was scheduled to open by regulation on November 1, 1989. A projected harvest to meet or exceed the 300,000 pound minimum guideline harvest level was not available and a closure of the fishery was maintained through the 1989/90 season. This represents the fifth consecutive season that the Southeast Alaska commercial red king crab fishery has been closed. The decision to continue the closure was based upon information collected during the red king crab stock index of abundance research survey conducted by the department and test fishing conducted with commercial vessels and skippers. This information indicated no appreciable improvement had occurred in general stock status throughout Southeast Alaska bays sampled.

The Yakutat red king crab season was open from November 15, 1989 through January 24, 1990, which represents the entire season allowed by the existing regulations. However, no commercial king crab landings were reported from the Yakutat Area; the last commercial landings occurred in the 1983/84 season.

Historic Region I red and blue king crab landing information is presented in Tables 1 through 3. A summary of the commercial catch sampling is shown in Table 4.

Red King Crab Survey

A red king crab population survey has been conducted in Southeast Alaska since 1979. The survey is not designed to provide an estimate of the total red king crab population. Instead, it provides an index of crab abundance based on the catch of crab per pot. This population index can be referred to as an index CPUE (catch-per-unit-of-effort) value.

A review of the historical survey results is presented in Tables 5 through 10. The overall index CPUE value has ranged from 5.1 legal crab per pot to 0.9 legal crab per pot (Table 9). The overall index CPUE value has been consistently low in recent years.

In 1989, the survey was limited to four major areas due to budgetary constraints. The four areas were selected because of their historic importance to regional red king crab production and/or because recent surveys indicated a potential for improvement in stock condition in the areas. The selected areas were Gambier Bay in District 10, Seymour Canal and Barlow Cove in District 11, and Deadman Reach in District 13. The survey was conducted during October, 1989. With the exception of Barlow Cove, the surveys indicated a continued low abundance of legal size male king crab.

As indicated above, the current regulations mandate that a minimum threshold harvest level of 300,000 pounds of red king crab be available for harvest before an open commercial season can be allowed. This required the development of forecast of the potential harvest.

An estimate of the 1989 potential available harvest was developed by combining the potential harvests, on a district by district basis, for surveyed and unsurveyed areas (Table 5). For the districts where no surveys were conducted, the average harvests for the 1971/72 through 1984/85 seasons, were used. For districts where surveys were completed, the potential harvest was estimated by multiplying the average harvests in the respective districts by the percentage that the district's most recent survey index catch per pot was of the historical index catch per pot in that district. For example, if the recent index value was 50% of the average in a district with a average catch of 100,000 pounds of crab, the potential harvest from that district would be 50,000 pounds of crab.

Because the most recent survey index values were well below historical index values, the potential harvest from the major surveyed districts were projected to be well below average harvest levels. When the current survey index values were considered in light of the average harvest levels, the potential 1989/90 seasonal harvest was estimated to be approximately 101,000 pounds of crab. When the current survey value were considered in light of the highest harvest on record for each district, the potential 1989/90 seasonal harvest was estimated to be approximately 234,000 pounds of crab.

A test fishing project utilizing commercial red king crab vessels and experienced skippers was conducted, in 1989 and 1990, to try and validate survey results. The skippers were requested to utilize their own fishing methods and pot setting locations. Skippers were requested to fish in a bay that was surveyed by the department and any other area in fairly close proximity that they wished. Department personnel were on-board each participating vessel. Results from this project were varied, but substantiated department survey results.

Exploratory Red King Crab Fishery

The Board approved regulations establishing an exploratory red king crab beginning in July of 1988. The season was approved to allow an opportunity for fishermen to conduct exploratory red king crab fishing in areas that have not traditionally been fished. These areas were primarily in the southern portions of Southeast Alaska. A permit was required to participate in the exploratory fishery; regulations specified the permits to be valid for a thirty day period.

From July, 1988, through January, 1990, a total of 19 different fishermen received permits to participate in the exploratory red king crab fishery. One fisherman had both ring nets and pot gear, twelve had pot gear, and six had ring net gear. Nine fishermen were permitted once, six were permitted twice, two were permitted three times, and one each was permitted four and five times. Permits were issued for a total of 36 statistical subdistricts. Of these 36 statistical subdistricts, small harvests were reported from ten. The specific landing information by area is confidential due to the low number of participants in an one area. The total reported harvest has been approximately 2,000 pounds of red king crab.

1989 (1988/89) Blue King Crab Fishery

The harvest of blue king crab has been considered primarily an incidental harvest during the red king crab fishery. As the red king crab season was closed during the 1989/90 season, a special exploratory season was authorized in portions of Southeast Alaska. This was done to allow an opportunity for the fishing fleet to evaluate the potential to develop a directed commercial blue king crab fishery.

The open fishing areas were limited to areas of known concentrations of blue king crab in Taku Harbor, Port Snettisham and Holkam Bay in District 11, Glacier Bay in District 14, and upper Lynn Canal in District 15. The season opened on February 15, 1989, corresponding to opening of the Tanner and brown king crab seasons.

The fishing season in Taku Inlet, Port Snettisham and Holkam Bay was closed on March 8, 1989, at the same time the general Tanner crab season was closed. These fishing areas were closed with the Tanner crab fishery since brown king crab were not normally harvested in the locations open to blue king crab fishing. The blue king crab fisheries in Glacier Bay and upper Lynn Canal remained open through January 29, 1990, corresponding to the closure of the brown king crab fishery in the same areas. The total season's blue king crab harvest was approximately 3,200 pounds.

The Yakutat Area blue king crab season was open from November 15, 1989 through January 24, 1990, which represents the entire season allowed by the existing regulations. As with red king crab, no commercial king crab landings have been reported from the Yakutat Area since the 1983/84 season.

General Red King Crab Outlook

The abundance of Southeast Alaska red king crab populations has dramatically decreased in recent years and there are no signs of a significant increase in the overall abundance in the immediate future. It is not possible to determine the cause and effect relationships that have influenced Southeast Alaska red king crab stocks. However, some general statements can be made based on the results of the annual population survey.

First, the adult female population is generally at a very low level. Unless exceptional survival and subsequent recruitment should occur, the population of legal crab would not be expected to increase for at least the next 4 to 6 years. The potential larval hatch is very low relative to the 1979 through 1981 period. In addition, it is apparent that some areas have significant environmental, disease, or parasite problems. Survey data from Port Frederick and Excursion Inlet indicate that a significant reduction in number of eggs per female clutch occurred between the summer and fall surveys in 1987. Many females in Port Frederick exhibited barren or very small clutches of eggs in the fall even after these females appeared to be relatively healthy the previous summer.

Second, it is obvious that either age at recruitment is considerable older than the 4 to 6 years previously thought, or survival of the potential larval hatch during the 1979 through 1981 period to future recruitment was very poor. This is evidenced by the lack of legal crab at the current time even though adult female abundance was relatively high prior to 1982. Preliminary information provided at the November 1989 International Symposium on King and Tanner Crab suggests that the age at recruitment of red king crab may be approximately 8 years of age. Additionally, the maximum age of red king crab held in captivity in Japan is 21 years of age. When both of these factors are considered, it is very possible that past management has been too liberal.

Third, survival and growth is variable between areas. Growth information from a 1970 through 1975 tagging program in Southeast Alaska indicates a difference in growth per molt of mature male red king crab between 13 to 20 millimeters, dependent on stock location. Since Seymour Canal and Deadman Reach populations were relatively healthy, and this health has occurred from relatively low numbers of adult females, conditions must favor growth and survival in these areas. Another possibility is that recruit per spawner relationships in these areas are fairly consistent from year to year. Other areas may exhibit more variability in recruit per spawner relationships.

Fourth, recruitment events are apparently rare and highly variable with respect to time. This is evidenced by the lack of prerecruit and recruit crab during the past 4 to 6 years (Table 5). Incidentally, an examination of the dockside sampling information suggests that good recruitment occurred during the 1978 through 1981 periods (Table 4). During these four seasons the harvest averaged 545,000 pounds

(Table 1), the average carapace length increased from 155.0 to 158.8 millimeters (Table 4), and the average weight per crab was about 7.3 pounds. Numbers of recruit size crab were available in fair numbers during these seasons. Prior to that time, and after that time, the crab were larger.

Fifth, when a significant recruitment event occurs, it will probably be the only significant recruitment event to occur in the fishery for a number of seasons. If continued fishing over time is an objective of management, then a significant recruitment event must be identified and managed conservatively for a number of seasons, at least until it is apparent that another recruitment event is ready to enter the fishery.

In summary, it is apparent that red king crab stock conditions are low and are likely to continue at a low level for a number of years to come. Some signs of recovery are evident, but this apparent recovery is limited to a few bay areas. Continued survey and test fishing should be continued to monitor the situation more closely. Data at this time supports a continued closure for the near future.

1990 (1989/90) Blue King Crab Outlook

Blue king crab fishing opportunities during the 1990 season began in portions of Districts 11, 14, and 15 during the brown king crab and Tanner crab fisheries, which opened on February 15, 1990. It is anticipated that harvests will be similar to that experienced last fishing season.

The fishing opportunities for blue king crab during the last four seasons have not appeared to identify stocks of sufficient size to warrant a significant directed fishery on this species, given present biological information and minimum legal size. It may be possible to maintain a small fishery in certain locations, in conjunction with other king and Tanner crab openings.

BROWN KING CRAB

Brown king crab, *Lithodes aequispina*, are harvested from deeper waters of the more exposed portions of straits and sounds of the inside waters of Southeast Alaska, generally at depths greater than 100 fathoms but less than 350 fathoms. Important fishing grounds are located at the confluences of Icy Straits and Lynn Canal and Chatham Straits, in Chatham Straits, and in Stephens Passage and Frederick Sound. Participation in this fishery is more demanding than participation in the red king crab fishery due to the factors of greater depths, strong tidal exchanges and currents, and more adverse weather conditions.

Brown king crab were undoubtedly harvested in significant quantities prior to the 1969/70 season, but to what degree has not been documented. Since the 1970/71 season, harvests of brown king crab have averaged approximately 477,000 pounds per season, by an average of 36 vessels during each fishing season (Table 1). There have been more than 36 vessels fishing for the past eight seasons. This average harvest had an ex-vessel value of approximately \$944,000 per season. Until the 1979/80 season, few vessels participated in this fishery on a regular basis.

Regulation development in the brown king crab fishery has generally paralleled that in the red king crab fishery. As with red king crab, the commercial harvesting is limited to male crab only and the current minimum size limit is seven inches. However, no population survey is completed to assess the abundance of brown king crab. The current regulations specify annual guideline harvest ranges for three separate areas; the Frederick Sound, Icy Strait, and Chatham Strait areas. The guideline harvest ranges are based on the historical harvest reported from each area.

Biological information is not available to define sensitive life history periods for brown king crab, and the establishment of open fishing periods has been based on other criteria. The current regulatory season opens on February 15 and remains open until closed by Emergency Order. The season opening date was set, by industry request, to correspond to the opening of the commercial Tanner crab season to spread the available fishing effort between both fisheries.

1988/89 Traditional Season

The total harvest for the 1988/89 traditional brown king crab fishery was 1,021,249 pounds (Tables 1, 11, and 12). Approximately 60 vessels participating in this fishery. The harvests and closing dates by fishing area were: Frederick Sound Area, 491,118 pounds, closed on March 19, 1989 (by Emergency Order 1-M-7-89); Chatham Straits Area, 359,475 pounds, closed on November 6, 1989 (by Emergency Order 1-M-30-89); Icy Straits Area, 170,656 pounds, closed on January 29, 1990 (by Emergency Order 1-C-1-90).

A total of 30 vessels participated in the Frederick Sound fishery, which harvested approximately 491,000 pounds of brown king crab in 32 days. Sampling from this intense fishery once again indicated that no new recruitment has entered the legal population. Harvests were good through most of the fishery with significant CPUE levels reported during the last landings. Additionally, crab appeared to be available in significant numbers throughout most of the grounds. Effort was steady, but relatively light during most of the Chatham Straits fishery. This resulted in a much longer fishery than occurred in Frederick Sound. Effort was sporadic and light during the Icy Straits area fishery. Although the harvest occurred in the low end of the guideline harvest range for the Icy Straits area, this area was closed to allow for enforcement of the opening for the 1989/90 Tanner and brown crab seasons.

1988/89 Exploratory Fishery

A specific exploratory brown king crab fishery has been allowed since the 1982/83 season. The special season has been allowed, outside of the general season, to allow fishermen an opportunity to conduct exploratory fishing outside of the traditional fished areas and seasons. These fisheries have identified previously unused stocks which have been incorporated into the traditional fishing areas and guideline harvest levels. The current regulations allow for the continuous opening of exploratory areas, except for a short period prior to the opening of the general Tanner and king crab to facilitate of these openings. No seasonal guideline harvest range is established for the exploratory fishing areas as these areas are open to allow an assessment of available resources.

The 1988/89 exploratory brown king crab fishery was open from February 15, 1989 through January 29, 1990. The season was closed to facilitate enforcement of the scheduled opening of the brown king and Tanner crab fisheries. Through January 15, 1990 the harvest from the exploratory fishery have totaled 52,680 pounds.

Traditional Fishery Outlook

Research projects to investigate various biological parameters, distribution and abundance have not been established to assist in developing a comprehensive management program for Southeast Alaska brown king crab resources. Information currently available as a basis for management is limited to dockside sampling of the landed commercial catch and the record of the commercial harvest information by area and time. Dockside sampling data can identify possible trends in recruitment and stock structure, and commercial harvest information data can be utilized to determine trends in stock strength by fishing location.

Dockside sampling information was initially collected during the 1969/70 season. Sample sizes and resulting average carapace lengths are provided by fishing season (Table 13). During the 1970/71 through 1975/76 period, larger crab represented the greater proportion of landed crab. During 1976 and in 1979 the average carapace length of crab landed dropped slightly, perhaps indicating some small level of recruitment in the fishery during those years. Crab landed during the 1982/83 through 1986/87 seasons have all averaged below 170 millimeters in carapace length, and average weight per landed crab was low. Specific landings with average weights below 6 pounds per crab occurred during these seasons.

The last significant recruitment to enter this fishery was observed during the 1984/85 through 1986/87 seasons when average carapace lengths averaged from 165.3 through 167.9 millimeters. This recruitment comprised the major portion of the total harvest of over 2.5 million pounds of brown king crab during

the seasons mentioned (Table 1). It now appears that this recruitment has supported the fishery, at least the Frederick Sound area fishery, for the past five seasons and may have contributed the most significant portion of the 4.6 million pound harvest that has occurred in Southeast Alaska beginning with the 1984/85 season.

Average carapace length and average weight were higher during the three most recent traditional brown king crab fisheries, in at least the Frederick Sound-Stephens Passage grounds. It appears that the smaller crab landed during previous seasons may have represented a fishery based on a relatively strong recruit size class. Small crab noted during the 1984/85 through 1986/87 seasons have now grown and have apparently fully recruited into the fishery with good strength. Data from 1987/88 suggests that the fishery may once again become dependent on post recruit crab. However, it must be remembered that effort and resulting harvests were much lower during the earlier fishing seasons. Future health of this fishery, in terms of harvests, may be dependent upon significant recruitment entering the fishery in the very near future.

In addition to an apparent dependency upon recruit size crab during some fishing seasons, the fishery is demonstrating an increased dependency upon the Frederick Sound-Stephens Passage stocks. The harvest in this area occurs from portions of District 9 and 11, and all of District 10. These fishing locations have been very consistent producers of brown king crab since the inception of the fishery, and particularly since the 1980/81 season (Table 12). Data currently available indicates that the Frederick Sound-Stephens Passage stock (Frederick Sound Area) is healthy. Landings and dockside sampling data from the early portion of the 1989/90 season will be important to determining an appropriate harvest level. Data from the Icy Straits-Upper Chatham Straits-Lynn Canal stock (Icy Straits Area) suggest that this stock has not recovered from extensive fishing during the 1980/81 through 1983/84 seasons, and a harvest in the mid-range of the guideline harvest level is appropriate this year. At this time, it is too early to determine an appropriate harvest level for the Lower Chatham stock (Chatham Area).

A conservative approach should be taken towards the management of this fishery with the present effectiveness of the fishing fleet. It is essential that in the near future management should attempt to provide improved stock management. This will require additional biological information, and may alter current fishing patterns. Care must be taken to identify strong recruit classes when they enter the fishery, and attempt to hold a portion of these classes for future fishing seasons. If management of this fishery does not become more conservative, then it is possible that the fishery will falter when the next recruit class fails to appear.

Exploratory Fishery Outlook

During past exploratory brown king crab fisheries, effort concentrated on the Point Gardner to Kingsmill Point line. This area was included in the traditional fishery and is now a significant contributor to the

harvests from the Chatham Straits area. Brown king crab have also been found in areas south of the current line at the latitude of Point Sullivan. Fishing conditions are more rigorous in the southern portion of Chatham Straits and an accurate indication of abundance is not available. Effort expended in this location in the future may be dependent upon price for brown king crab, other fishing opportunities, and other factors. Additionally, harvests in the Clarence Straits ground have become somewhat stable during the past three or four seasons. Harvests from the defined exploratory area is expected to remain relatively insignificant.

ISSUES

Biological Information

The lack of sufficient biological information to estimate stock abundance, annual recruitment levels, molt timing, and other important biological factors are hampering the development of comprehensive king crab management plans. As more information becomes available from the Region 1 king crab fisheries, and other king crab fisheries, it becomes apparent that survival and subsequent recruitment in king crab fisheries are highly variable. Additionally, when a year-class does enter the fishery, which might occur over a 2 to 3 year period, that year-class may be the only significant recruitment to enter the fishery for a period of years thereafter. When recruitment does occur, it must be managed wisely to ensure continued fisheries. Future management, out of necessity, will have to become much more precise, especially with respect to stock by stock management. Current staff and fund limitations will reduce our ability to adequately manage on a scientific basis. At the time of this writing, funds are not available to continue the red king crab index of abundance surveys during 1990. The last full survey was completed in 1986 and only partial surveys have been conducted since that time. Although data suggest that recovery of Southeast Alaska red king crab stocks will take a relatively long period of time, other biological data needs to be collected to further the available knowledge concerning red king crab stocks. Surveys or biological data projects for brown king crab have not been funded as yet. The effects of fishing on the non-legal portion of the stock must also be examined. The continued high levels of fishing effort that are available will continue to provide a risk of over exploitation to legal and non-legal crab when major biological factors are unknown.

Enforcement

Fishermen continue to be concerned about the level of enforcement available during critical times in the fishery. Items of expressed concern are season openings, season closures, and pot limits. Enforcement of minimum legal size limits in remote processing areas has also been expressed.

Ring Nets

The new king crab limited system is specific to pot gear. This left the door open for an increase in the use of ring net gear, which has been observed in recent years. Prior to the advent of the limited entry system, the use of ring nets was very low. Several proposals are before the Board to address the use of ring net gear in both the Tanner and king crab fisheries.

With an increase in the number of ring net permits issued, pot fishermen are concerned about the enforcement and allocation ramifications of increased use of ring nets. A potentially significant enforcement problem exists when fishermen operate pot and ring net gear from the same vessel simultaneously. The use of ring net gear by pot fishermen who hold a species specific pot entry permit will make it impossible to enforce the sale of both king and Tanner crab for which the individual fishermen to hold an entry permit. For example an individual with a Tanner crab pot permit could land king crab that were caught with Tanner crab pot gear on a ring net king crab permit. Additionally, the increase use of ring nets will reallocate crab away from the limited fisheries.

As of February 14, 1990, forty-six king crab ring net permits had been issued by the Commercial Fisheries Entry Commission for 1990. This is a significant increase over the 1988/89 season when 12 ring net permits were fished and a total of 2,275 pounds of brown king crab were landed. Several small landings of blue king crab were also made on ring net cards during the 1988/89 season. When the red king crab populations increase to the level that will allow commercial fishing again, a further increase in the number of king crab ring nets can be expected. The high value of king crab may make it very lucrative to fish with the less efficient ring net gear.

Regulations on maximum number of ring nets per vessel, distinct marking requirements, and storage provisions for ring net gear have not been promulgated.

Limited Entry

15

Fishermen continue to be concerned about the limited entry program for king and Tanner crab fisheries. A considerable amount of apprehension exists as the number of permanent permits issued, the number of non-transferrable permits issued, and the date of full implementation of the program. This concern has been exacerbated by the number of ring net fishermen entering the fishery.

Test Fishing

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The test fishing program utilized after the index of abundance survey this past fall appeared to work well. The test fishery was authorized at the request of the fishing industry after approval from the Board. Some fleet members that did not participate in the test fishing program feel that participants in the program obtain an advantage. The department has viewed the resulting data similar to survey data, and has not released detailed data to the fleet at large. The 1989 red king crab test fishing project has incurred a significant monetary deficit. Fishermen may be reluctant to allow the department to conduct additional test fishing to recover the monetary deficit. The deficit can not be eliminated without significantly effecting the capabilities of the Regional Shellfish Program to conduct normal fishery monitoring, data gathering, and research activities. Future test fishing will have to be conducted under a different charter cost-per-day basis, or test fishing will be eliminated as long as stocks continue to exhibit low abundance, and therefore are insufficient to pay for charter costs.

Exploratory Red King Crab

A proposal is before the Board to reevaluate the exploratory red king crab fishery. Exploratory red king crab fishing has not identified significant stocks of red king crab that could be added to the harvest during traditional fishing. Although the possibility of locating other stocks may be possible with additional effort, it is doubtful that other significant stocks will be found that could consistently add to the current potential harvest. A reassessment of the need for the exploratory red king crab fishery may be appropriate at this time. The fishery has the potential to create a serious enforcement problem to ensure the traditional stocks are not harvested and sold by reporting them as taken in the exploratory areas.

Parasitized Blue King Crab

Blue king crab stocks in many areas influenced by glaciers, which is the main blue king crab habitat type, have been reported to be heavily infested with a parasitic barnacle, *Briarosaccus callosus*, that could drastically reduce stock reproduction, growth, and maximum size. Infected crab are incapable of reproduction. These negative effects may tend to prevent the development of large stocks of blue king crab.

A proposal will be considered, by the Board, to allow the sale of infected female and undersize male blue king crab. The removal of infected crab from the population may lower overall infection rates. This may increase stock reproduction, growth, and other factors important to an increase in stock biomass.

Table 1. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) king crab harvest by species, number of landings and number of vessels by year or season, 1960 to present.

Year/ Season	Red/Blue King Crab	Number of Landings	Number of Vessels	Brown King Crab	Number of Landings	Number of Vessels	Total King Crab	Total ^{a/} Landings	Total ^{b/} Vessels
1960							3,424		
1961							429,600		3
1962							1,289,550		8
1963							1,112,200		8
1964							820,530		9
1965							579,300		7
1966							105,899		8
1967							599,078		7
1968							2,199,772		19
1969							1,899,930	122	39
1969/70	1,438,226			359,567			1,797,793	401	33
1970/71	221,369	151	20	181,142			402,511	150	20
1971/72	391,623	213	18	372,933			764,556	228	18
1972/73	476,761	161	17	265,310	113	10	742,071	236	20
1973/74	640,369	207	27	179,520	92	14	819,889	256	31
1974/75	537,189	201	28	34,451	35	7	571,640	211	30
1975/76	346,341	170	25	68,429	31	5	414,770	191	35
1976/77	328,682	171	36	74,941	30	6	403,623	184	37
1977/78	241,984	144	35	82,733	53	14	324,717	192	39
1978/79	452,064	168	35	49,679	65	10	501,743	213	35
1979/80	670,859	251	43	164,450	80	20	835,309	312	52
1980/81	521,114	199	38	683,298	147	30	1,204,412	307	48
1981/82	537,712	180	48	652,865	255	54	1,190,577	377	67
1982/83	456,907	165	72	799,578	273	69	1,256,485	396	100
1983/84	320,259	139	103	974,917	307	90	1,295,176	411	136
1984/85	276,710	136	98	848,818	277	64	1,125,528	366	165
1985/86 ^{c/}	1,886	18	16	698,078	211	61	699,964	217	64
1986/87 ^{d/}	1,179	15	13	1,015,586	221	51	1,016,765	221	53
1987/88 ^{e/}	1,519	36	19	947,873	223	56	949,392	247	63
1988/89 ^{f/}	8,130	19	14	967,225	229	59	975,355	245	61
1989/90 ^{g/}	3,058	13	6	106,978	32	10	110,036	41	15

^{a/} Total landings are the number of unique fish tickets reporting any king crab landings in any combination in a season.

^{b/} Total vessels are the number of unique CFEC numbers that made landings in a season.

^{c/} Red king crab season closed in Southeast Alaska, blue king crab open February 10-24, 1986.

^{d/} Red king crab season closed in Southeast Alaska, blue king crab open January 15-29, 1987.

^{e/} Traditional red king crab season closed in Southeast Alaska; experimental red king crab opened July 1, 1988; blue king crab open January 15-February 16, 1988.

^{f/} Traditional red king crab season closed in Southeast Alaska; experimental red king crab closed January 29, 1989; blue king crab and traditional brown king crab opened February 15, 1989.

^{g/} Traditional red king crab season closed in Southeast Alaska; experimental red king crab will close January 31, 1990, and blue king crab in the Icy Straits/Lynn Canal area will close January 29, 1990. The blue king crab fishery in Frederick Sound area closed March 8, 1989; blue king crab and traditional brown king crab will open February 15, 1990.

Table 2. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) red and blue king crab harvests in thousands of pounds by month and season, 1972/73 to present.

Season	Month												Total Landings	Total Vessels	
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.			
1972/73	83.9	117.4	136.2	116.7	22.4	Closed								161	17
1973/74	171.8	228.1	184.0	50.1	6.2	0.1								207	27
1974/75	68.9	117.0	125.4	132.9	92.6	0.3								201	28
1975/76	45.4	111.7	68.6	57.0	59.5	4.1								170	25
1976/77	32.9	94.1	57.4	69.7	67.7	6.9								171	36
1977/78	38.9	43.9	45.3	50.9	57.2	5.7								144	35
1978/79	82.0	105.2	99.2	110.1	55.7	Closed								168	35
1979/80	209.4	182.5	174.3	104.7	Closed	Closed								251	43
1980/81	209.3	147.6	78.1	86.1	Closed	Closed								199	38
1981/82	Closed	327.8	176.3	33.4	Closed	Closed								180	48
1982/83	Closed	420.7	20.3	15.7	0.3	Closed								165	72
1983/84	Closed	Closed	292.9	18.8	7.9	Closed								139	98
1984/85	Closed	268.7	7.0	Closed	Closed	Closed								136	98
1985/86 ^v	Closed	Closed	Closed	Closed	0.0	1.9								18	16
1986/87 ^w	Closed	Closed	Closed	Closed	0.9	0.3								15	13
1987/88 ^x	Closed	Closed	Closed	Closed	0.4	1.2								36	19
1988/89 ^y	0.0	3.9	0.4	0.5	0.2	0.2	0.1	1.1	1.5	0.2	0.0	0.0		15	9
1989/90 ^z	0.4	2.0	0.0	0.6	0.0	----- Season in Progress -----						13	6		

2.18

- ^v Red king crab season closed in Southeast Alaska; blue king crab open February 10-24, 1986.
- ^w Red king crab season closed in Southeast Alaska; blue king crab open January 15-29, 1987.
- ^x Traditional red king crab season closed in Southeast Alaska; experimental red king crab opened July 1, 1988, in Southeast Alaska; blue king crab open January 15-February 16, 1988.
- ^y Traditional red king crab season closed in Southeast Alaska; experimental red king crab open through January 29, 1989; blue king crab opened February 15, 1989.
- ^z Traditional red king crab season closed in Southeast Alaska; experimental red king crab open through noon, January 31, 1990; traditional blue king crab closed with Tanner in Frederick Sound on March 8 and will close in the Icy Straits/Lynn Canal area on January 29, 1990.

Table 3. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) red and blue king crab harvests in thousands of pounds by district and season, 1970/71 to present.

Season	District																Yakutat	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1970/71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	45.2	118.3	130.8	48.6	1.1	0.8	53.8	0.0	0.0	401.8
1971/72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	21.7	231.4	164.4	57.8	95.4	46.2	17.5	0.0	0.0	641.4
1972/73	0.0	0.0	0.0	0.0	0.0	2.1	0.0	16.8	11.2	183.0	109.1	19.0	34.5	95.4	0.0	1.3	4.5	476.9
1973/74	0.0	0.0	0.0	0.0	0.1	0.8	0.3	4.3	21.2	273.4	114.3	25.1	78.4	87.9	34.6	0.0	0.0	640.4
1974/75	0.3	0.0	0.0	0.0	0.0	1.5	0.1	7.6	30.2	124.5	74.1	64.6	102.2	117.0	8.5	0.0	6.6	537.2
1975/76	0.0	0.0	0.0	0.0	0.5	0.1	0.0	15.8	3.2	30.4	35.1	53.4	97.5	103.7	6.7	0.0	0.0	346.4
1976/77	0.0	0.0	1.8	0.0	4.3	6.5	0.0	15.6	17.5	49.3	82.0	12.8	48.7	65.4	24.7	0.0	0.0	328.6
1977/78	1.1	0.0	0.0	0.0	4.6	3.7	0.0	5.3	0.0	43.0	64.4	8.3	68.8	22.2	16.7	0.0	3.9	242.0
1978/79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	118.5	122.6	14.1	112.5	43.1	29.7	0.0	5.1	452.2
1979/80	0.6	0.0	0.0	0.0	3.6	14.3	0.2	0.5	30.2	168.4	220.2	39.5	79.4	89.1	12.2	0.0	12.5	670.7
1980/81	1.1	0.0	0.0	0.0	0.0	2.8	4.3	27.6	11.8	163.7	172.3	7.9	73.1	5.2	41.4	0.0	9.8	521.1
1981/82	0.0	0.0	0.0	0.0	13.2	4.5	15.0	6.6	0.1	114.4	135.9	32.7	117.5	34.6	53.8	0.0	9.5	537.8
1982/83	0.0	0.0	0.0	0.0	7.3	0.0	1.4	1.5	2.5	77.5	63.7	98.0	70.8	99.4	30.6	0.0	4.1	456.8
1983/84	0.9	0.0	0.6	0.0	1.8	0.9	0.1	0.0	32.1	79.5	37.1	31.3	46.7	81.4	6.6	0.0	1.3	320.3
1984/85	0.8	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.6	58.7	89.9	14.0	51.9	49.7	9.9	0.0	0.0	276.7
1985/86 ^{a/}	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.1	0.3	0.0	0.0	1.9
1986/87 ^{b/}	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.5	0.5	0.0	0.0	1.2
1987/88 ^{c/}	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.7	0.0	0.0	0.0	1.5
1988/89 ^{d/}	0.0	0.0	0.1	0.1	0.6	0.0	0.0	0.3	0.0	1.8	2.3	0.0	0.0	3.0	0.0	0.0	0.0	8.1
1989/90 ^{e/}	0.6	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.0	1.3	0.6	0.0	0.0	0.0	0.1	0.0	0.0	3.1

^{a/} Red king crab season closed in Southeast Alaska; blue king crab open February 10-24, 1986.

^{b/} Red king crab season closed in Southeast Alaska; blue king crab open January 15-February 29, 1987.

^{c/} Red king crab season closed in Southeast Alaska; experimental red king crab opened July 1, 1988, in Southeast Alaska; blue king crab open January 15-February 16, 1988.

^{d/} Traditional red king crab season closed; experimental red king crab fishery was open through January 29, 1989; blue king crab opened February 15, 1989.

^{e/} Most recent year's data should be considered preliminary. Traditional red king crab season closed; experimental red king crab will close January 31, 1990, and blue king crab in the Icy Straits/Lynn Canal area will close January 29, 1990. The blue king crab fishery in Frederick Sound area closed March 8, 1989; blue king crab will open February 15, 1990.

Table 4. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) summary of red king crab samples of commercial landings by age/size/class, 1968/69 to present.

Season	Number of Landings Sampled	Number of Crabs Sampled	Average Carapace Length	Percent Prerecruits	Percent Recruits	-- Percent Post Recruits --				Percent Skip Molts
						+1	+2	+3	+4	
1968/69	27	2,621	152.3	20.5	49.0	14.7	13.3	2.6	0.2	
1969/70	23	4,025	160.6	3.3	64.2	14.5	14.6	3.1	0.4	
1970/71	29	2,306	160.9	2.9	45.6	28.6	17.7	4.5	0.9	27.8
1971/72	9	849	160.5	4.5	53.7	19.9	14.0	4.8	3.1	23.1
1972/73	29	2,923	158.7	6.0	58.4	19.0	11.0	3.2	1.7	17.8
1973/74	15	1,445	160.9	3.0	35.6	40.4	15.3	4.6	1.4	38.1
1974/75	24	2,283	160.5	2.0	32.8	29.6	23.6	8.1	2.5	17.8
1975/76	23	2,044	160.5	7.4	49.3	18.8	14.5	7.0	2.6	20.2
1976/77	16	1,752	159.8	4.3	54.9	10.4	13.3	5.5	3.8	17.7
1977/78	34	3,121	156.9	8.5	29.2	33.6	17.7	6.6	3.7	54.9
1978/79	16	1,467	155.1	8.1	62.9	17.7	8.9	1.8	0.5	17.9
1979/80	33	2,551	156.3	4.9	58.1	22.4	11.9	1.9	0.5	25.6
1980/81	49	3,351	156.4	6.0	55.9	24.6	11.3	1.8	0.4	25.8
1981/82	37	3,320	158.8	3.4	48.9	26.0	16.8	3.9	0.9	29.4
1982/83	30	2,821	159.4	3.7	48.4	23.6	16.8	5.9	1.6	28.6
1983/84	40	3,488	158.4	4.3	54.9	22.9	13.0	3.7	1.2	24.0
1984/85	21	3,641	159.6	3.0	43.8	30.9	17.7	3.8	0.8	31.1
1985/86	Season Closed									
1986/87	Season Closed									
1987/88	Season Closed									
1988/89	Season Closed									
1989/90	Season Closed									

Table 5. Statistical Area A (Southeast Alaska) comparison of standardized index data and commercial sampling data of red king crab, 1979 to present.

Year	Standardized Index Data						Proportion of Recruits in Legal Pop.	Proportion of Postrecruits In Legal Pop.
	Sample Size	Number of Pot Lifts	Number of Sublegals	Number of Legals	Number of Recruits	Number of Postrecruits		
1979	4,288	320	3,154	1,134	707	426	0.6235	0.3765
1980	3,217	295	2,388	829	519	311	0.6261	0.3739
1981	4,475	371	3,477	998	670	328	0.6713	0.3287
1982	2,386	414	1,435	951	576	374	0.6057	0.3943
1983	2,439	389	1,611	828	474	354	0.5725	0.4275
1984	2,090	378	1,174	917	490	427	0.5344	0.4656
1985	1,490	385	963	528	267	261	0.5057	0.4943
1986	2,345	469	1,655	689	322	367	0.4673	0.5327
1987 ^v								
Summer	1,110	197	846	264	171	93	0.6477	0.3523
Fall	847	157	686	161	83	78	0.5155	0.4845
1988 ^w								
Summer	1,449	272	1,227	222	130	92	0.5856	0.4144
Fall	1,860	352	1,574	286	181	105	0.6329	0.3671
1989 ^x	1,928	180	1,822	106	79	27	0.7453	0.2547
Average							0.5949	0.4051
Season	Commercial Dockside Sampling Data						Proportion of Recruits in Legal Pop.	Proportion of Postrecruits In Legal Pop.
	Sample Size	Number Less than 145 mm	Number Greater than 145mm		Number of Recruits	Number of Postrecruits		
1979/80	3,495	170	3,325		2,032	1,282	0.6111	0.3889
1980/81	4,235	254	3,981		2,368	1,613	0.5948	0.4052
1981/82	3,413	117	3,296		1,670	1,626	0.5067	0.4933
1982/83	2,808	104	2,704		1,358	1,346	0.5022	0.4978
1983/84	3,566	154	3,412		1,956	1,456	0.5733	0.4267
1984/85	2,238	67	2,171		980	1,191	0.4514	0.5486
1985/86	Red King Crab Season Closed							
1986/87	Red King Crab Season Closed							
1987/88	Red King Crab Season Closed							
1988/89	Red King Crab Season Closed							
Average							0.5487	0.4513

^v In 1987, partial surveys were conducted during summer in four bays and during fall in two bays. These statistics cannot be directly compared to the full summer surveys of 1979-1986.

^w Only a partial survey of six bays occurred in summer 1988 and a full survey of ten bays occurred in fall 1988.

^x Only a partial survey of four bays occurred in the fall of 1989.

NOTE: Legal population is all males greater than or equal to 145 mm in carapace length.

Table 6. Statistical Area A (Southeast Alaska) comparison of historic red king crab indexing data, 1979 to 1985.^{a/}

	1979	1980	1981	1982	1983	1984	1985
Number of Pot Lifts	320	295	371	414	390	378	385
Red King Crab							
No. females captured	5,140	2,611	5,009	4,079	2,933	2,325	2,079
No. males captured	4,288	3,217	4,475	2,386	2,439	2,090	1,490
No. legals captured	1,134	829	998	951	828	917	528
No. sublegals captured	3,154	2,388	3,477	1,435	1,611	1,174	963
Tanner Crab							
No. females captured	902	732	977	2,026	1,322	683	1,278
No. males captured	1,628	3,309	5,771	4,819	3,695	2,464	4,834
No. legals captured	803	1,766	3,573	2,435	1,897	995	1,992
No. sublegals captured	825	1,543	2,198	2,384	1,798	1,468	2,842
Halibut ^{d/}							
No. captured	204	369	574	848	623	779	802
No. legals captured	86	163	248	320	203	316	285
Avg. length (cm)	78.2	79.1	79.1	77.4	75.7	77.8	78.3
Avg. weight (kg) ^{b/}	5.8	5.8	5.8	5.2	5.2	5.2	5.8
Pacific Cod ^{d/}							
No. captured	79	166	246	537	287	449	390
Avg. length (cm)	71.8	67.8	64.9	65.0	62.4	64.7	64.2
Avg. weight (kg) ^{c/}	4.5	3.7	3.3	3.3	2.9	3.2	3.2

^{a/} Crab data is standardized to 24 hour soak. The 1979 through 1985 surveys were conducted using fixed station locations with four pots per station.

^{b/} Utilized IPHC table to convert length in cm to round weight in kg.

^{c/} Utilized $\log_{10} W = 3.1 \log_{10} L - 2.103462$ from Ketchen, 1967 FRBC Tech. Report No. 23.

^{d/} Halibut and pacific cod catches are unstandardized.

Table 7. Statistical Area A (Southeast Alaska) comparison of historic red king crab indexing data, 1986 present.^{a/}

	1986	1987 ^{a/}	1987 ^{a/}	1988 ^{f/}	1988 ^{f/}	1989 ^{g/}
Number of Pot Lifts	469	197	157	272	352	186
Red King Crab						
No. females captured	2,396	1,647	740	1,255	1,754	2,024
No. males captured	2,345	1,110	847	1,449	1,860	1,928
No. legals captured	689	264	161	223	309	106
No. sublegals captured	1,656	846	686	1,227	1,551	1,822
Tanner Crab						
No. females captured	1,967	992	468	1,234	1,357	676
No. males captured	5,128	2,862	1,330	3,741	4,221	1,457
No. legals captured	2,000	1,365	531	1,867	2,393	746
No. sublegals captured	3,128	1,497	799	1,874	1,828	711
Halibut ^{d/}						
No. captured	785	307	158	332	305	40
No. legals captured	323	101	44	125	106	21
Avg. length (cm)	82.6	78.4	75.6	78.1	75.0	88.1
Avg. weight (kg) ^{b/}	6.8	5.5	5.1	5.7	5.0	10.1
Pacific Cod ^{d/}						
No. captured	390	225	326	235	395	186
Avg. length (cm)	62.7	62.1	58.4	61.8	60.1	56.4
Avg. weight (kg) ^{c/}	2.9	2.9	2.4	2.8	2.6	2.1

^{a/} Crab data is standardized to 24 hour soak. The 1986 through 1989 surveys were conducted using a stratified random sampling design where bays are divided into strata based on areas of high, medium, and low densities.

^{b/} Utilized IPHC table to convert length in cm to round weight in kg.

^{c/} Utilized $\log_{10} W = 3.1 \log_{10} L - 2.103462$ from Ketchen, 1967 FRBC Tech. Report No. 23.

^{d/} Halibut and pacific cod catches are unstandardized.

^{e/} Partial surveys were conducted in July and October of 1987.

^{f/} Partial survey in June and July of 1988 in six bays; full survey of ten bays in September and October 1988.

^{g/} Partial survey in September and October of 1989 in four bays.

Table 8. Statistical Area A (Southeast Alaska) summary of standardized red king crab index data in percent by size/age class, 1979 to present.

Year	Sample Size	Prerecruits				Recruits	Post-Recruits
		Fours	Threes	Twos	Ones		
1979	4,288	7.42	19.23	27.40	23.27	16.01	6.7
1980	3,217	7.19	12.19	20.40	30.46	19.66	10.1
1981	4,475	6.31	17.14	24.71	27.93	16.14	7.8
1982	2,386	3.41	10.53	19.63	27.60	19.49	19.4
1983	2,439	6.08	12.64	29.23	26.22	17.14	8.7
1984	2,090	3.46	9.93	16.58	32.98	22.16	14.9
1985	1,490	7.86	16.19	19.76	28.57	15.24	12.4
1986 ^{a/}	2,345	24.50	23.07	18.62	15.18	8.98	9.7
1987 ^{b/}							
Summer	1,110	8.19	20.97	24.74	20.76	15.87	9.5
Fall	847	26.17	22.00	20.05	15.48	9.24	7.1
1988 ^{c/}							
Summer	1,449	25.0	25.33	21.89	12.47	8.96	6.39
Fall	1,860	37.89	20.45	14.81	10.22	9.75	6.88
1989 ^{d/}	1,928	25.46	39.59	22.46	8.41	4.08	1.44

^{a/} The survey design was changed in 1986 and new areas added.

^{b/} These statistics are not directly comparable to 1979-1985 data because only partial surveys were conducted. Four bays were surveyed in the summer and two in the autumn.

^{c/} These statistics are not directly comparable to 1979-1985 data because only partial survey of six bays occurred in summer of 1988 and a full survey of ten bays occurred in fall of 1988.

^{d/} These statistics are not directly comparable to 1979-1985 data because only a partial survey of four bays occurred in fall of 1989.

Table 9. Average index survey CPUE values of legal (recruit plus postrecruits) male red king crab by bay and survey for the years 1979 through fall 1989. Data standardized for a 24-hour soak.

Location	1979	1980	1981	1982	1983	1984	1985	1986 ^{v/}	Sum.	Fall	Sum.	Fall	1989	Average Index Survey CPUE Value By Bay
									1987	1987	1988	1988		
Farragut Bay	7.73	.65	.10	.26	.03	.57	1.09	.25	-	-	-	-	-	1.34
Pybus Bay	4.87	4.03	3.19	4.03	4.09	1.85	.65	.16	.19	.41	-	.01	-	2.13
Gambier Bay	4.43	11.28	7.45	3.44	2.34	.52	.88	1.83	-	-	.74	.88	.24	3.09
Seymour Canal	2.10	1.55	2.13	1.09	1.61	2.89	4.9	1.48	-	-	1.10	3.16	.17	2.02
Young Bay	.72	.03	.82	.08	.16	.86	.23	-	-	-	-	-	-	0.41
Barlow Cove	7.37	14.65	4.68	.50	8.12	4.69	1.16	1.97	.86	2.48	.43	1.47	2.84	3.94
Eagle River	.89	1.63	5.27	.77	.95	3.37	.75	.69	.11	-	-	.09	-	1.45
St. James Bay	3.62	3.90	3.60	2.17	1.00	1.01	1.13	1.05	-	-	-	.95	-	2.05
Lynn Sisters	7.72	7.01	8.93	.44	.10	.80	.16	.63	-	-	-	.15	-	2.88
Funter Bay	12.12	-	-	9.15	4.40	4.15	9.49	4.82	-	-	-	-	-	7.36
Hawk Inlet	2.04	-	-	18.0	16.97	21.29	5.75	4.94	-	-	-	-	-	11.50
Excursion Inlet	3.00	1.72	1.63	.95	.43	1.72	.31	.83	.24	-	1.04	.04	-	1.08
Port Frederick	3.66	2.61	1.63	.95	1.49	3.16	1.22	.97	-	-	.63	.10	-	1.64
Iyoukeen Cove	20.01	0.00	.13	3.70	9.89	4.94	3.13	1.19	-	-	-	-	-	5.37
Freshwater Bay	3.15	.53	3.46	4.38	1.24	1.09	.11	-	-	-	-	-	-	1.99
Sitkoh Bay	7.64	-	3.73	7.37	.18	.00	-	.00	-	-	-	-	-	3.15
Rodman Bay	.03	-	1.04	7.86	4.46	3.46	1.48	.42	-	-	-	-	-	2.68
Deadman Reach	.70	.65	1.40	2.40	2.03	3.61	1.35	2.12	3.06	1.39	.48	.20	.35	1.52
Average Index CPUE Value For Total Survey	5.1	3.59	3.07	3.75	3.31	3.33	1.99	1.46	0.9	1.43	0.74	0.71	0.9	

^{v/} The survey design was changed in 1986 from a set station pattern to stratified and random pot sets.

Table 10. Statistical Area A (Southeast Alaska) summary of red king crab harvest data since 1970/71 season and projected harvests using data from last full abundance survey in fall 1988.

Dist.	High Harvest	High Year	Low Harvest	Low Year	Avg. Harvest	Index Bay Locations	Percent Relative Index Value	Potential Harvest High	Potential Harvest Low	Potential Harvest Average
1-7	32.7	81/82	0.6	75/76	8.4	None	100.00	32.7	0.6	8.4
8	27.6	80/81	0.5	79/80	9.1	None	100.00	27.6	0.5	9.1
9	45.2	70/71	0.1	81/82	17.5	None	100.00	45.2	0.1	17.5
10	273.4	73/74	30.4	75/76	122.3	Pyb/Gamb.	4.12	11.3	1.3	5.0
11	220.2	79/80	35.1	75/76	107.7	Sey/Bar/Eagle	28.90	63.6	10.1	31.1
12	98.0	82/83	7.9	80/81	35.1	Lynn Sis	5.21	5.1	0.4	1.8
13	117.5	81/82	34.5	72/73	71.9	Deadman	23.03	27.1	7.9	16.6
14	117.0	74/75	5.2	80/81	62.7	Exc/Port Fred.	4.90	5.7	0.3	3.1
15	53.8	81/82	6.6	83/84	24.8	St.James/Eagle	26.23	14.1	1.7	6.5
16	1.3	72/73	1.3	72/73	1.3	None	100.00	1.3	1.3	1.3
Total	986.7		122.2		460.8			233.7	24.2	104.0

ASSUMPTIONS: Stock condition in bays surveyed are representative of all bays in that district; where more than one bay represents a district they contribute equally to the commercial harvest. Where data is not available we assume a percent relative index of value of 100.

RELATIVE INDEX VALUE: Determined by formula: Last Index survey CPUE Value of Legal Crab - divided by - Average Index Survey CPUE Value - times - 100.

Bay Relative Index Value

Pybus Bay	=	.01/2.13	x	100	=	.47
Gambier Bay ^{1/}	=	.24/3.09	x	100	=	7.77
Seymour Canal ^{1/}	=	.17/2.02	x	100	=	8.42
Barlow Cove ^{1/}	=	2.84/3.94	x	100	=	72.08
Eagle River	=	.09/1.45	x	100	=	6.21
St. James Bay	=	.95/2.05	x	100	=	46.34
Lynn Sisters	=	.15/2.88	x	100	=	5.21
Excursion Inlet	=	.04/1.08	x	100	=	3.70
Port Frederick	=	.10/1.64	x	100	=	6.10
Deadman Reach ^{1/}	=	.35/1.52	x	100	=	23.03

District Percent Relative Index Values

District 10	Pybus/Gambier Average	=	4.12
District 11	Seymour/Barlow/Eagle Average	=	28.90
District 14	Exc/Port Frederick Average	=	4.90
District 15	St. James/Eagle Average	=	26.23

^{1/} Last survey occurred in fall 1989; all other values from the fall 1988 survey.

Table 11. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) brown king crab harvests in thousands of pounds by month and season, 1972/73 to present.

Season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Total	Landings	Permits Fished
1972/73	18.1	43.7	18.6	22.0	26.3	19.5	35.6	11.0	6.0	11.1	9.6	43.8	265.3	113	10
1973/74	25.6	21.4	15.6	16.5	12.2	24.6	30.9	15.5	0.0	0.0	3.2	13.9	179.4	92	14
1974/75	8.9	4.9	3.2	4.5	1.4	2.8	3.8	0.0	0.0	0.0	0.0	5.0	34.5	35	7
1975/76	16.1	4.8	7.9	13.2	1.4	13.2	1.7	0.3	0.0	0.0	2.6	7.0	68.2	21	5
1976/77	12.0	9.1	8.5	10.3	11.5	9.1	7.5	0.0	0.0	0.0	0.0	7.0	75.0	30	6
1977/78	9.6	7.2	15.1	13.5	10.0	11.7	14.3	0.0	0.0	0.0	0.0	1.3	82.7	53	14
1978/79	5.9	4.4	8.7	9.7	5.9	5.9	3.7	0.1	0.0	0.0	2.2	3.3	49.8	65	10
1979/80	4.7	8.9	5.6	9.0	16.5	34.8	44.9	10.4	6.8	8.8	0.0	13.9	164.3	80	20
1980/81	30.2	43.2	18.2	79.3	168.7	167.7	85.3	19.1	32.1	15.2	10.4	14.0	683.4	147	30
1981/82	43.0	41.7	44.0	17.9	65.8	80.9	70.7	20.9	82.0	70.0	55.8	60.2	652.9	255	54
1982/83	173.5	77.3	65.3	0.0	115.8	159.3	15.0	46.8	27.5	35.2	59.8	24.0	799.5	273	69
1983/84	23.7	52.8	11.0	33.7	152.7	303.5	287.7	53.4	32.2	11.0	6.9	6.3	974.9	307	90
1984/85	166.9	250.8	19.9	14.9	117.8	172.5	22.3	19.6	24.9	8.1	19.1	11.9	848.7	277	124
1985/86	39.8	53.8	41.1	32.1	240.4	249.5	8.6	4.5	14.7	1.4	3.4	9.0	698.3	211	61
1986/87	147.5	80.0	46.3	326.2	136.4	70.5	67.9	39.3	38.9	17.6	27.8	17.2	1,015.6	221	51
1987/88	13.1	15.2	10.3	264.0	297.2	80.2	64.0	79.0	63.3	29.3	20.1	12.2	947.9	223	56
1988/89	2.6	1.9	3.3	3.0	220.7	328.9	122.6	101.0	63.0	43.9	41.4	35.0	967.2	229	59
1989/90 ^u	78.5	28.5	----- Season in Progress -----										107.0	32	10

^u Most recent year's data should be considered preliminary.

Table 12. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) brown king crab harvests in thousands of pounds by district and season, 1972/73 to present.

Season	District																	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	183	
1972/73	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	10.5	186.5	36.2	5.8	0.0	2.6	23.4	0.0	0.0	265.4
1973/74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	149.2	24.6	0.0	0.6	4.1	0.4	0.0	0.0	179.5
1974/75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	14.9	12.3	0.7	5.2	0.0	1.4	0.1	0.0	0.0	34.7
1975/76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	58.8	0.0	1.3	3.5	0.8	3.5	0.0	0.0	68.5
1976/77	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	65.8	1.1	0.1	0.0	0.0	0.2	0.0	0.0	75.8
1977/78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	73.7	7.3	0.6	0.3	0.0	0.7	0.0	0.0	82.7
1978/79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.7	6.7	1.3	0.0	0.5	4.6	0.0	0.0	49.8
1979/80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	61.3	21.8	61.8	0.0	0.3	16.7	0.0	1.4	164.4
1980/81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	6.4	204.6	25.9	169.7	0.1	221.7	53.6	0.0	0.0	683.2
1981/82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	48.8	248.0	48.8	92.9	6.2	152.6	49.4	0.0	0.0	652.8
1982/83	0.0	0.0	0.0	0.0	0.0	13.9	10.2	7.3	109.2	185.7	52.6	225.8	12.9	144.0	37.9	0.0	0.0	799.5
1983/84	0.0	0.0	0.0	0.0	0.0	3.2	5.4	5.4	135.0	222.7	24.6	438.2	0.1	46.5	93.9	0.0	0.0	975.0
1984/85	0.0	5.1	0.0	0.0	0.0	4.5	14.1	0.1	192.3	375.9	34.5	153.3	2.5	52.8	13.1	0.6	0.0	848.8
1985/86	0.0	4.0	0.6	0.0	0.0	17.6	3.7	4.6	234.0	324.4	35.6	23.3	0.1	24.8	25.3	0.0	0.0	698.0
1986/87	1.6	0.0	0.0	0.0	0.0	10.1	12.4	0.0	608.9	298.8	43.8	22.4	0.0	1.5	16.2	0.0	0.0	1,015.6
1987/88	0.0	0.0	0.0	0.0	0.0	6.3	9.5	0.8	297.9	318.4	36.9	195.7	0.0	16.4	66.1	0.0	0.0	947.9
1988/89	0.0	0.0	0.0	0.0	0.0	5.2	1.3	10.3	412.8	338.5	9.1	140.2	0.0	37.5	12.4	0.0	0.0	967.2
1989/90 ^{a/}	----- Season in Progress -----																	107.0

^{a/} Most recent year's data should be considered preliminary.

Table 13. Statistical Area A (Southeast Alaska) summary brown king crab dockside samples from 1970/71 to present.

Season	Number of Landings Sampled	Number of Crab Sampled	Average Carapace Length (mm)
1969/70	4	172	163.2
1970/71	12	1,132	174.5
1971/72	18	1,894	175.2
1972/73	10	1,153	174.4
1973/74	8	605	173.6
1974/75	2	104	170.4
1975/76	9	940	171.8
1976/77	2	150	168.5
1977/78	8	727	170.0
1978/79	6	498	171.0
1979/80	6	478	169.8
1980/81	20	1,304	171.6
1981/82	5	712	175.4
1982/83	18	1,489	169.5
1983/84	10	703	169.6
1984/85	12	1,368	165.3
1985/86	17	1,765	166.6
1986/87	43	4,488	167.9
1987/88	58	5,338	173.4
1988/89 ^{4/}	75	7,308	173.4
1989/90	----- Season in Progress -----		
Average	17	1,616	171.5

^{4/} Most recent year's data should be considered preliminary; season scheduled to begin on February 15, 1990.

REPORT TO THE BOARD OF FISHERIES
1989 SOUTHEAST ALASKA-YAKUTAT TANNER CRAB FISHERIES



By

Kenneth K. Imamura
and
Catherine A. Botelho

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

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GENERAL BACKGROUND

This chapter of the Region 1 (Southeast Alaska, Area A and Yakutat, Area D) shellfish report describes the commercial Tanner crab fisheries. A historical review of the Tanner crab fisheries, including historical catch information and a summary of the most recent open season is presented.

Of the two commercially significant species of Tanner crab (*Chionoecetes bairdi* and *C. opilio*) harvested from Alaskan waters, only *C. bairdi* is known to be present in Region 1 (Statistical Areas A and D) (Figure 1). Any subsequent reference to Tanner crab in this report will be referring to *C. bairdi*.

Statistical Area A (Southeast Alaska) encompasses the state waters of the Alexander Archipelago between Dixon Entrance and Cape Fairweather. Statistical Area A is divided into Districts 1 to 16, generally distributed from the south to the north.

Statistical Area D (Yakutat) covers the state waters between Cape Fairweather and Cape Suckling. Statistical Area D is divided into Districts 181 to 191, located generally east to west.

Although the commercial shellfish fisheries in both these areas are managed by Region 1 staff, the character of the fishing fleets and the populations of Tanner crab in these two areas are distinctly different. In general terms, the fisheries for Tanner crab in these two Statistical Areas are based on harvest of males over 5 1/2 inches carapace width during a season intended to protect sensitive life history stages such as molting and mating periods. In addition, guideline harvest ranges (GHL) based on historic harvest trends, within which the harvest is constrained, have been established for both areas.

YAKUTAT FISHERY

The Yakutat (Statistical Area D) Tanner crab fishery is conducted in the exposed waters of the eastern Gulf of Alaska, generally along the exposed coasts, out to about the 100 fathom contour. In recent years, the season has opened on January 15 and has usually closed by regulation on May 1. Currently, the guideline harvest level is 1,000,000 pounds. Statistical Area D is a nonexclusive registration area, open to entry by new participants.

Historical Review

It was not until the early 1970's that significant Tanner crab fisheries developed in the Yakutat area (Table 1). As the demand for Tanner crab slowly grew, landings from the Yakutat area also rose, averaging about 1,500,000 pounds per season between the 1972/73 and 1979/80 seasons. Following the record 2,400,000 pound catch during the 1979/80 season the harvest steadily declined. Peak catches consistently occur between the months of February and April (Table 2) although the season was longer during the early years of the fishery.

During the 1970's, this fishery attracted large, long-ranging vessels with live tanks in which many tons of crabs could be kept alive for extended periods. Many vessels also participated in fisheries for this and other shellfish species in other areas of Alaska. A commonly used gear was a side-loading king crab pot wrapped with small mesh to retain Tanner crab.

With the prohibition of side-loading pots in the Yakutat area in 1983 to minimize the incidental halibut catch, and the declining numbers of crabs, many of the vessels using this gear left the fishery. Between 1984 and 1985 only small, local vessels operated by residents of Yakutat participated in this fishery. Reported landings were limited to the immediate vicinity of Yakutat Bay (Table 3).

In 1986, two larger crabbers entered the fishery along with the Yakutat vessels. The larger vessels experienced uniformly poor catches despite extensive exploratory fishing. In 1987, five large vessels based in Kodiak, Valdez, or Pelican registered for the fishery, along with the core fleet in Yakutat. Only two of these larger vessels actively participated in the fishery and their disappointing landings discouraged the remaining three from entering the fishery. In 1988, only one large vessel and several of the smaller vessels fishing around Yakutat Bay reported any landings.

Season Summary

Most recently, in 1989, one large vessel and several of the smaller vessels reported landings from the Yakutat area. Landings in the 1980's provide little indication of recovery of Tanner crab populations in the Yakutat area (Statistical Area D). Much of the detailed data from this fishery is considered confidential because of the very few vessels fishing in this area.

Port sampling for Tanner crab from the Yakutat area is very limited. The landings are very sporadic and occur in places and at times when department personnel are rarely able to sample them. In general, those samples available from past seasons suggest that Yakutat crab are generally smaller in average size than crab from Statistical Area A (Southeast Alaska area) (Table 4). There has also been a high incidence of skipmolt crab in catches from the Yakutat area in recent seasons. A high incidence of

skipmolt crabs are assumed to reflect poor habitat conditions in the area from which the crab were harvested. Such conditions could result in slower growth and possibly smaller size at maturity of stocks in these areas.

Issues

The Yakutat Tanner crab population has been at such a low level that active participation by large vessels since the early 1980's has been minimal. The fishery in Statistical Area D has been permitted for two principal reasons. The local fleet, made of up smaller and older vessels, has historically had insignificant landings. Most of these landings have been from the immediate vicinity of Yakutat Bay, a fraction of the total area of Statistical Area D. The other reason is that the state has no assessment or survey program for the Tanner crab stock(s) on more remote Statistical Area D grounds. Monitoring the catch of the occasional entry into the fishery by a larger vessel fishing more remote grounds unexploited by the Yakutat small vessel fleet is the only means available to the state to discern the probable status of the Tanner crab stock and to detect any major change in their status.

The difficulty associated with this management practice is that when stocks are definitely improving, it may be appropriate to close the fishery for a period to foster its recovery. This would then result in lack of information as to when stocks had recovered enough to allow a fishery once again. Recent season landings suggest that the beginnings of an improving recruitment trend may be occurring on some of the Statistical Area D grounds.

Outlook

Unless major changes occur in the Yakutat Tanner crab stocks, they will be managed to provide an opportunity for interested participants to enter this fishery. Catches will continue to be monitored for indications of significant changes in stock status. It is likely that indications of significant improvements in the stocks will require more restrictive management.

SOUTHEAST ALASKA FISHERY

The Southeast Alaska fishing area (Statistical Area A) consists of the relatively protected inshore waters south and east of Cape Fairweather and north of Dixon Entrance. Statistical Area A is a superexclusive registration area. The Tanner crab fishery in this area is under limited entry, with a maximum of 83

permits to be issued, some of which will be non-transferable. Most of the vessels used for this fishery are small, generally ranging between 35 and 50 feet keel length. There are a few vessels with keel lengths up to about 70 feet in the fishery. Most of these vessels are designed and used for other fisheries for salmon and halibut during the summer.

Winter crabbing for Tanner and other species of crabs is generally pursued as a secondary source of income during the off-season for salmon, halibut, and other groundfish. Most of the vessels are at least fitted with temporary live-tanks during the crabbing season. Much of the gear is cone or pyramid stacking pots that occupy less deck space than the more traditional seven-foot square pots originally designed for king crab. The effectiveness of the stacking gear is probably comparable to that of the heavier square pots for Tanner crab although there is a perception among some members of the fleet that the square pots fish better for king crab. The choice of gear may therefore be predicated on the species to be targeted during mixed species fisheries for Tanner and brown king crab. The recent trend to shorter seasons has favored the use of conical or pyramid pots. Soak times have also shortened to one or two days, particularly during the initial week or two of the fishery.

Historical Review

Although Tanner crab landings were reported in the Southeast Alaska fishing area since the early 1960's, it was not until the early 1970's that intensified fisheries were conducted. Tanner crab were commonly discarded by crabbers fishing for other species well into the mid-1970's.

The available historical record indicates that since the 1972/73 season, the Southeast Alaska fishery has produced an average of 1,700,000 pounds. Until the mid 1970's, the season was open all year. Even from the mid 1970's to the early 1980's, the season lasted from September through either April or mid May. Regardless of the length of the seasons, most of the harvest was taken during January through April of each year (Table 5) in Districts 110, 111, and 114 (Table 6). These districts correspond geographically to the waters of Frederick Sound, Stephens Passage, and Icy Straits. The timing and distribution of the fishery reflects a combination of crab and vessel availability, market acceptability, and other factors. As the fishery slowly grew in size and intensity, the seasons were correspondingly shortened. Pot limits were instituted, registrations and buoy stickers were required, and small areas around Juneau were closed to commercial harvest. The whole process was one of incremental fishery development and corresponding managerial response.

However, the pace changed with the shortened 1981/82 season, when 46 vessels landed a record 2.8 million pounds between December 1, 1981 and April 16, 1982. More than half this total was landed from the Icy Straits area, where the previous long-term seasonal average harvest had been about 725,000 pounds. Climbing demand for Tanner crab, an earlier season opening in Southeast Alaska than in other registration areas to the north and west, open registration, and the record landing in 1981/82 led to a

doubling of the number of vessels fishing in 1982/83. Many larger crab vessels on their way to Kodiak and Bering Sea fisheries registered for, and fished in, Southeast Alaska.

The effort expended by the fleet, primarily in Icy Straits, was unprecedented (Tables 1 and 6). The season, which lasted two weeks, was closed by emergency order based on expansion of early on-board observations of the fishery in Icy Straits. The fishing effort in bays and on the better grounds in Icy Straits was extreme. Landing of a floatplane in some bays to check gear was impeded by the number of buoys crowded into these areas. As a result of this barely manageable fishery and because of pressure from local Southeast Alaskan fishermen, several measures to prevent a recurrence were pursued by both the state and industry. Reports of Dungeness gear being used to catch Tanner crab led to investigation and citation of at least one vessel operator.

There was no fishery in calendar year 1983. During its Spring meeting in early 1983, the Board of Fisheries changed the season opening date in Southeast Alaska to correspond with that elsewhere in the state. This action in itself discouraged larger vessels from fishing in Southeast Alaska during the 1983/84 season, which opened on February 10, when more lucrative grounds to the north and west were opening at the same time.

By the 1984/85 season, a persistent problem of astringent taste in some Tanner crab section meat had been reported. It was thought to be associated with a normal pre-molt condition in Tanner crab. A small scale blood testing project was undertaken to study this problem during the 1985/86 season. It was discovered that the bitter crab syndrome was caused by a parasitic, systemic, dinoflagellate tentatively identified as *Hematodinium sp.*

Southeast Alaska was redesignated as a superexclusive registration area during the spring Board meeting in 1985. This action was an additional local reaction to the frantic 1982/83 season and was a further effort to stabilize vessel numbers likely to enter this fishery. Owners of larger vessels, who usually fished other crab fisheries, could not afford to forego fishing in more lucrative fisheries in more westerly or northerly registration areas by registering into superexclusive Southeast Alaska for the 1985/86 season.

Industry also supported an initiative to further restrict the possibility of a recurrence of the fishery of 1982/83 by requesting limited entry status for the king and Tanner crab fisheries. The state response was a moratorium, initiated on January 1, 1984, on issuance of new Tanner crab permits. The Commercial Fisheries Entry Commission instituted a complex system of combined permits for the three species of king crab and Tanner crab. The full impact of the moratorium was felt in the 1985/86 season because many prospective entrants to the 1984/85 fishery, which started on February 10, 1985, had obtained their permits prior to January 1, 1984.

These measures succeeded in stabilizing the number of vessels in these fisheries. However, the number of vessels allowed was set at a level about sixty percent higher than that before the 1981/82 season (Table 1).

In 1986, the Board adopted a regulation to restrict the boundaries of Statistical Area A to those waters of the state between Dixon Entrance and Cape Fairweather. A new statistical area, Statistical Area D, was established for those waters between Cape Fairweather and Cape Suckling. Major restructuring of the Administrative Code to accommodate this change delayed implementation of this Board action until early in 1987.

The 1987/88 season, which lasted about a month, was the shortest since that of 1982/83. Since the 1982/83 season, each opening has been restricted to less than two months. The general trend has been toward an opening lasting about a month, during which the catch has fluctuated between 1.0 and 1.5 million pounds. Port sampling during recent seasons suggested that these levels of harvest generally resulted in a potentially dangerous recruit fishery, sustainable only while recruitment levels remain stable. The risk to this management option arises from the current inability of the department to detect recruitment failure until it is demonstrated by the fishery. Given the available stock condition information, the generally decreasing lengths of recent seasons indicate the increasing effectiveness of the fleet.

Short recent seasons lasting little longer than a month resulted in a concentration of effort on grounds known to be the most productive. This fishing strategy was characteristic of an efficient fleet faced with a quota that could be harvested in an abbreviated season. Many peripheral areas and grounds with harvestable populations were foregone in favor of high production grounds, at least initially. Searching marginal areas became increasingly difficult for fishermen to economically justify. In response to requests by fishermen, the Board provided for exploratory fisheries for Tanner and red king crab. Starting in 1988, in areas from which little or no landings had been reported, fishing was allowed for these two species, under conditions of a special permit, from July 1 through March 31. Participation in these fisheries also required compliance with stringent regulations. Actual participation and landings in these fisheries have been low.

With the beginning of the pot permit moratorium on January 1, 1984, newcomers who wished to commercially harvest Tanner crab were limited to ring net gear, which was also defined in the regulations as legal gear. Ring net permits could be requested and issued because the permit moratorium was specific to pot gear. In the years since, the continued and increasing use of ring nets has been controversial. Since the spring meeting in 1986, ring net proposals affecting the Tanner and king crab fisheries have been a recurrent part of the Board deliberations. The Board has maintained the continued use of ring nets.

Season Summary

Traditional Fishery

The 1988/89 season opened at 12:00 noon AST, on February 15, 1989. It closed by Emergency Order (1-M-5-89) 21 days later at 12:00 noon AST, on March 8, 1989. The preseason harvest limit was set at 750,000 to 1,250,000 pounds, with a point target level of 1,000,000 pounds. At the end of the second shortest opening on record, 1,624,829 pounds, including 80,000 pounds of deadloss, had been caught. Most of the reported deadloss was attributable to rejected bitter crab. At \$2.75 per pound, the 1,544,641 pounds of good product was worth about \$4,247,763, ex-vessel.

A total of 135 permits were fished during the season. This included 72 pot permits and 63 ring net permits. Some vessel operators registered their vessels for both pots and rings. This may have been in response to the perception that ring net permits may someday also fall under limited entry. Continued and increasing use of ring nets has enforcement and allocative ramifications that have every indication of intensifying.

Slightly more than 80% of the entire Southeast Alaska catch was reported caught in Districts 110, 111, and 114 (Table 6). This distribution of catch is somewhat typical of catch distribution in recent seasons, with only small changes in relative catch by district from season to season. The success or failure of the fishery now hinges on these increasingly crowded, heavily fished districts.

Calm weather conditions persisted well into the second week of the fishery. By the end of the tenth day, it was apparent that although the catch rate seemed to be declining, the point harvest level of 1.0 million pounds had already been exceeded. By March 2, when the March 8 closure was announced, the projected total harvest for the season was well over the 1,250,000 pound upper guideline harvest level.

Also starting on March 2, high northerly winds and clear, cold weather associated with an intense arctic high pressure system settled over most of Southeast Alaska. Winds to storm force, 50 knots and higher, and freezing spray forced many vessels, particularly smaller ones in Lynn Canal and lower Stephens Passage, to seek sheltered anchorages. A few were stranded until about a week after the March 8 closure date.

Some vessel operators, particularly those with gear set in exposed locations, requested an extension to the fishery because of the weather. However, overflights of the most significant fishing areas by Fish and Wildlife Protection officers during some of the worst of the weather on March 7 indicated that many vessels were working their gear. The conditions were very unpleasant, but most vessel operators were preparing successfully for the closure. After considerable discussion the closure date was not extended.

Sixty-seven vessels registered for ring net gear. Sixty-three of these reported at least some landings. A total of 59,815 pounds, or about 3.8% of the Tanner crab catch, were reported landed with ring net gear. As ring nets are not under any limit nor moratorium, their use is expected to grow.

Detailed post-season examination of port-sampling data indicated that recruit crab still account for a high percent of the total catch (Table 6). Considered in conjunction with the fleet performance data, it appears that recruitment continues to be sufficiently successful to support the fishery at recent harvest levels.

Exploratory Fishery

Eighteen vessels registered for the exploratory red king and Tanner crab fisheries. The 1989/90 exploratory fishery began on July 1, 1989 and closed January 31, 1990. Of the 18, nine actual participants harvested an average of 2,400 pounds. This average is somewhat misleading because a small number of fishermen harvested a large fraction of the total catch from this fishery. Most of the harvest was reported from districts close to the northern edge of the area open to this fishery.

Interest and participation in these fisheries remains very limited. The fishery is conducted during periods of the year when crabs are not in optimum condition or are molting and mating. Regulatory oversight is minimal.

Issues

In-season Management

One of the questions that participants in the Tanner crab fishery often ask is how the harvest levels are determined. Without a department policy that provides for retention of a part of each year's recruitment, the present Tanner fishery is primarily a recruit fishery, which harvests nearly all the available crab as soon as they molt to legal size. Two essential pieces of information necessary for effective management of a recruit-only fishery are a pre-season estimate of recruit abundance and an index or indication of at least the strength of the pre-recruit-one age class and reproductive status of the female segments of the population. If these items were known or could be estimated, the appropriate harvest level for this season could be more exactly calculated and the long-term effects of that harvest level more accurately determined. Considering the lack of resources available to the department to obtain this information, the risks involved with a recruit-only fishery dictate cautious management.

With the available resources, pre-season estimators of recruitment strength and stock status of juvenile males and females are limited to qualitative analysis of Tanner crab caught incidentally during red king

crab stock assessment surveys conducted during the autumn by the department. Reports of abundance of pre-recruit Tanner crab encountered during the previous commercial Tanner crab season are often useful, as are reports of incidentally caught Tanner crab from the commercial Dungeness crab fishery of the prior summer and autumn. However, this information is insufficient to determine stock abundance.

In the absence of definitive preseason information, the department assumes that the Tanner crab stocks are fairly stable. If they are, then an annual harvest fluctuating around the long-term average harvest should provide for continued viability of the resource. The guideline harvest range specified in the regulations evolved in much this manner. The announced preseason guideline harvest range is usually narrower than that set by regulation. It is determined largely by more recent fleet performance and is considered to more closely reflect the current status of the stocks.

It is difficult to compare even recent season harvest statistics because of the rapidly improving fleet. The actual effectiveness or efficiency of the fleet is probably higher with each season because the permit holders have found it necessary to upgrade their vessels and deck equipment, deploy and work the maximum allowed units of gear, and obtain better electronics to maintain their share of the catch. Competition has fostered the use of tenders to transport fishing gear and crabs, thereby maximizing the time on the grounds by fishing vessels.

In-season management activities include a formal port sampling program that allows for examination of the size and shell condition of legal male crab. Tracking fish tickets provides an estimate of catch-per-unit-effort (catch per vessel per day), changes in this measure of relative abundance, cumulative catch rate, and total catch to date. On-board sampling opportunities to examine the relative abundance and sorting rates of juvenile males, females, legal though soft-shelled males, infected crab, and incidentally caught species are limited. Port sampling and fish tickets are the most important available sources of information on fleet performance. As the CPUE, catch rate, and participation in the fishery declines, a flattening of the cumulative catch indicates harvest of most of the available legal crab and possible increasing sorting of juveniles, females, and other species.

The department attempts to avoid pulse fisheries caused by district closures whenever possible, discouraging high levels of sorting of juveniles and females, and avoiding sensitive life history stages such as molting and mating. When a major district needs to be closed, the entire registration area is closed. It is unfortunate that the variability in stock status results in some districts reaching a harvest level that requires closing the season while others may still be fishable. As a result of conservative management there is a tendency to manage for stocks in the most heavily-fished districts, especially District 110, 111, and 114. Relatively strong stocks in these districts or those that inhabit more lightly fished districts may be harvested below appropriate levels. A preseason survey on known productive grounds in Districts 110, 111, and 114 would provide more definitive data for management of these crucial districts.

Until abundance estimators or at least an index are obtainable or the Board specifies otherwise, the Tanner fishery will most likely continue to be managed as it has been in the last few seasons. Statewide proposal number 69 discusses the need for better defined policies and management plans for Tanner and king crabs.

Bitter Crab Syndrome

Bitter crab syndrome has been documented since at least the early 1980's. It was initially thought to be a condition associated with the annual molting process. The causative agent, a parasitic dinoflagellate tentatively identified as *Hematodinium sp.*, was discovered in hemolymph smears by a department pathologist in 1986. It has since been reported from most major fishing grounds in Southeast Alaska. Its definitive identification in Bering Sea *C. opilio* stocks has accelerated research into its life history and the biochemical aspects of its association with Tanner crab because of the tremendous economic importance of these *C. opilio* stocks.

Bitter crab is an issue because it has biological and marketing implications that are somewhat interrelated. Biologically, the disease is important because it is thought to kill an infected crab within the life cycle of the infective organism, which is currently thought to be about a year. Also, it is probably spread by free-living, infective spores in the autumn and may be infective to some degree in the vegetative stage while it is resident within the host crab during other seasons of the year. Sick crab transported and released in previously unaffected areas could spread the disease. Simply killing the infected crab would not necessarily render it noninfectious because even the vegetative stage of the organism remains viable for a considerable period after the death of the host crab.

Heavily infected crab cannot be marketed because of the bitterly astringent taste and mushy texture of the meat. These crab can usually be identified on the fishing grounds by external signs of infection such as abnormal abdominal and walking leg ventral coloration. Infected crab continue to be transported out of the areas in which they are caught because of two primary reasons. The first is that many vessel operators or their crews cannot differentiate between infected and uninfected crab and retain all legal crab. The second is that the value of Tanner crab is sufficiently high now that even those fishermen who can sort infected crab retain all legal-sized male crab for the buyer to sort, rather than risk possibly discarding a crab that would be acceptable to the buyer.

At the present time, the season occurs during a period generally felt to be the time of optimum meat condition in the majority of heavily fished stocks. Unfortunately, the season also occurs during a period when crabs infected during the previous autumn have developed advanced symptoms of the disease, including the characteristic bitter taste. Infected crab, which can be graded visually with a high degree of accuracy at this stage, are unmarketable and are sorted and discarded by tenders or shore-based processors and some fishermen. Sorting rates as high as 80% from some areas and a total reported deadloss in excess of 80,000 pounds, mostly attributable to diseased crab, indicate the magnitude of the

problem. There are no industry-wide policies, regulations, or standard practices for safe disposal of these unwanted crab. Continued viability of the resource is being risked by the continued transport and often inadequate disposal, of infected crab.

A possible, at least partial, solution to the transport and disposal problem would be to schedule the season during an earlier stage of the course of infection. Presumably, there is a period during October or early November during which even infected crab have not yet developed an unacceptable bitter taste. This period is acceptable biologically for harvest of Tanner crab. Preliminary results from processor and department analysis of small samples from a limited number of bays suggests that meat recoveries are generally acceptable during this period. However, although the externally discernible signs, internal symptoms, and mushy meat texture associated with the disease are less pronounced during the October to early November period, they are not totally absent. Percent meat recovery is also lower during October and November than in February. From the vessel operator's perspective, crab are not as readily caught because they would be deeper and less aggregated during October and November. Still, from a biological standpoint, a season that minimizes waste and possibly hazardous disposal of infected crab, is preferable. Proposal number 101 addresses this problem.

Ring Net Fishery For Tanner Crab

Proposals related to ring net fisheries for Tanner and king crab continue to appear before the Board. Ring net gear is the only remaining legal commercial gear for which new permits can be issued since the moratorium on pot permits in 1984. As a result, the number of ring net fishermen reporting landings has increased from five in the 1984/85 season to 63 in the 1988/89 season. Total landings have increased from 1,451 pounds in the 1984/85 season to 60,011 pounds during the 1988/89 season. The fishery has seen a five to six-fold increase in terms of permits used and a four to five-fold increase in pounds landed in each of the last three seasons. As of mid-February 1990, 94 permits have been issued for ring nets for Tanner crab. If this trend continues, the ring net fishery will continue to harvest on increasing portions of the total Tanner crab harvest.

If ring net fisheries are allowed to continue, its relative share of the total allowable catch will probably increase. Some of the foreseeable problems involve gear definition and identification, standardization of numbers of ring nets per vessel, ramifications of use of both rings and pots by the same vessel operator, gear conflict, and comparable regulations for both gear types. Numerous proposals, generally from the public sector, address ring net fisheries. Most of the proposals concern allocation issues on which the department remains neutral.

Experimental Or Exploratory Fisheries For Tanner Crab

Experimental fisheries for Tanner and red king crab were authorized by the Board in 1988 in response to requests from fishermen. The intent was to provide the opportunity for assessing the status of stocks in peripheral or marginal areas that were not fished during the recent short seasons.

Procedures for managing these experimental fisheries, seasons, and other criteria were established by the Board. In general, these fisheries were allowed when potential for overlaps with traditional fisheries were minimal, that is, during periods between the traditional fishing seasons for red king and Tanner crab. A major assumption was that these fisheries would be of such low intensity that mortalities associated with fishing during known molting and mating periods would be minimal. A special permit and logbook was required because the primary purpose of this fishery was to provide assessments from areas that were not surveyed by the department.

Interest in these fisheries has been low and reported landings have not indicated any heretofore unknown quantities of either species of crab. These factors suggest that the intent of the experimental fisheries has been fulfilled, in terms of both fishing opportunity and resource assessment. The necessity and desirability for continuing these fisheries is debatable, particularly because of the potential for, and reports of, abuse. Proposal number 100 provides the basis for discussion on this issue.

Outlook

Improvements in the efficiency and effectiveness of the Tanner crab fleet will complicate the management of the fishery. Barring unexpected success in region-wide recruitment, the long-term allowable average seasonal harvest should fluctuate between 1.0 and 1.5 million pounds. The present fleet has demonstrated its ability to harvest this amount in less than three weeks. It is likely, from projections of recent season patterns, that the fishery will continue to be shortened and the ability of management to conduct in-season management will diminish. The potential for local depletion of stocks will increase.

It is likely that more effort will be devoted by researchers, managers, and industry to the study of bitter crab disease and best practices to minimize its affects to the fishery in the future.

Table 1. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) commercial Tanner crab catches in pounds, number of vessels, pounds per vessel, number of landings and pounds per landing, 1961 to present.

Season	Southeast					Yakutat					Total Statistical Area A & D	
	Catch in Pounds	Number of Vessels	Pounds Per Vessel	Number of Landings	Pounds Per Landing	Catch in Pounds	Number of Vessels	Pounds Per Vessel	Number of Landings	Pounds Per Landing	Catch in Pounds	Number of Vessels
1961	6,800	-	-	-	-	-	-	-	-	-	6,800	-
1962	7,820	-	-	-	-	-	-	-	-	-	7,820	-
1963	0	-	-	-	-	-	-	-	-	-	0	0
1964	13,940	-	-	-	-	-	-	-	-	-	13,940	-
1965	0	-	-	-	-	-	-	-	-	-	0	0
1966	-	-	-	-	-	-	-	-	-	-	0	0
1967	2,733	-	-	-	-	-	-	-	-	-	2,733	-
1968	109,220	-	-	-	-	-	-	-	-	-	109,220	-
1968/69	176,227	-	-	76	2,319	-	-	-	-	-	176,277	-
1969/70	660,337	-	-	347	1,903	-	-	-	-	-	660,337	-
1970/71	167,378	-	-	72	2,325	-	-	-	-	-	167,378	-
1971/72	656,661	-	-	274	2,397	-	-	-	-	-	656,661	-
1972/73	1,600,748	-	-	354	4,522	222,441	*	-	*	-	1,823,189	-
1973/74	1,309,673	-	-	419	3,126	1,872,357	-	-	110	17,021	3,182,030	-
1974/75	863,751	29	29,785	244	3,540	1,972,752	13	151,750	60	32,879	2,836,503	42
1975/76	2,149,397	31	69,335	369	5,825	1,762,589	5	352,518	35	50,360	3,911,986	36
1976/77	2,538,950	57	44,543	379	6,699	966,650	7	138,093	15	64,443	3,505,600	64
1977/78	2,138,088	44	48,593	337	6,344	1,003,116	8	125,390	103	9,739	3,141,204	52
1978/79	1,559,769	38	41,047	313	4,983	1,691,941	15	112,796	107	15,813	3,251,710	53
1979/80	1,781,923	53	33,621	355	5,020	2,427,860	23	105,559	114	21,297	4,209,783	76
1980/81	2,010,832	58	34,670	418	4,811	638,063	14	45,576	84	7,596	2,648,895	72
1981/82	3,306,990	74	44,689	443	7,465	71,302	7	10,186	32	2,228	3,378,292	81
1982/83	1,208,042	97	12,454	181	6,674	150,684	10	15,068	55	2,740	1,358,726	107
1983/84	1,629,076	104	15,664	338	4,820	11,142	4	2,786	13	857	1,640,218	108
1984/85	1,125,903	85	13,246	269	4,186	3,665	5	733	15	244	1,129,568	90
1985/86	997,306	84	11,873	320	3,117	2,379	4	595	9	264	999,685	88
1986/87	1,159,685	73	15,886	271	4,279	*	*	*	*	*	1,159,685	73
1987/88	1,330,155	85	15,649	366	3,634	*	*	*	*	*	1,330,155	85
1988/89 ^v	1,645,608	141	11,671	381	4,319	155,565	5	31,113	23	6,764	1,801,173	146
1989/90	Season in Progress					Season in Progress						

3.15

^v Most recent year's data should be considered preliminary.

* Where numbers of vessels participating is three or less, information is confidential.

Table 2. Statistical Area D (Yakutat) commercial Tanner crab harvest in thousands of pounds by month and season, 1968 to present.

Season	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
1968	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1970	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1971	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1972	0.0	*	*	0.0	0.0	0.0	0.0	*	*	*	0.0	*	*
1973/74	0.0	0.0	0.0	0.0	2.6	7.7	313.8	990.2	558.0	Closed	Closed	Closed	1,872.3
1974/75	0.0	0.0	0.0	0.0	27.0	32.3	592.1	839.4	481.9	Closed	Closed	Closed	1,972.7
1975/76	0.0	0.0	0.0	48.4	184.6	276.7	661.8	456.7	134.3	Closed	Closed	Closed	1,762.5
1976/77	0.0	0.0	0.0	0.0	2.1	343.2	486.1	135.3	0.0	Closed	Closed	Closed	966.7
1977/78	0.0	3.0	14.5	31.6	161.7	206.0	254.2	279.0	53.1	Closed	Closed	Closed	1,003.1
1978/79	2.1	0.2	0.0	23.8	63.7	185.1	412.8	766.3	238.1	Closed	Closed	Closed	1,692.1
1979/80	0.0	10.2	16.4	27.9	56.9	522.2	1,218.6	575.6	Closed	Closed	Closed	Closed	2,427.8
1980/81	0.0	0.0	0.0	1.0	6.2	181.9	389.6	59.5	0.0	Closed	Closed	Closed	638.2
1981/82	Closed	Closed	Closed	Closed	0.0	0.0	16.4	47.1	7.8	Closed	Closed	Closed	71.3
1982/83	Closed	Closed	Closed	Closed	Closed	50.2	73.5	27.0	0.0	Closed	Closed	Closed	150.7
1983/84	Closed	Closed	Closed	Closed	Closed	1.7	5.8	3.6	0.0	Closed	Closed	Closed	11.1
1984/85	Closed	Closed	Closed	Closed	0.0	0.0	0.0	3.7	0.0	Closed	Closed	Closed	3.7
1985/86	Closed	Closed	Closed	Closed	0.3	0.6	1.1	0.4	0.0	Closed	Closed	Closed	2.4
1986/87	Closed	Closed	Closed	Closed	0.0	*	*	*	*	Closed	Closed	Closed	*
1987/88	Closed	Closed	Closed	Closed	0.0	*	*	*	*	Closed	Closed	Closed	*
1988/89 ^v	Closed	Closed	Closed	Closed	*	*	*	*	47.1	Closed	Closed	Closed	155.6
1989/90	Closed	Closed	Closed	Closed	Season began January 15, 1990								

^v/ Most recent year's data should be considered preliminary.

* Where numbers of vessels participating is three or less, information is confidential.

Table 3. Statistical Area D (Yakutat) commercial Tanner crab, harvest in thousands of pounds by district and season, 1968/69 to present.

Season	District						Total
	181	183	184	186	189	191	
1968/69	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1969/70	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1970/71	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1971/72	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1972/73	2.9	102.2	12.8	104.6	0.0	0.0	222.5
1973/74	619.4	518.6	215.6	518.3	0.0	0.0	1,871.9
1974/75	1,135.1	193.7	118.7	97.2	0.0	428.0	1,972.7
1975/76	159.8	245.0	464.6	753.1	0.0	140.0	1,762.5
1976/77	0.0	452.7	167.8	346.2	0.0	0.0	966.7
1977/78	0.0	1,003.1	0.0	0.0	0.0	0.0	1,003.1
1978/79	0.0	350.9	589.2	207.9	0.0	544.0	1,692.0
1979/80	718.7	216.0	198.3	456.7	0.0	838.2	2,427.9
1980/81	20.3	156.1	122.8	78.1	0.0	260.7	638.0
1981/82	0.0	51.2	0.0	0.0	0.0	20.1	71.3
1982/83	60.7	83.3	1.6	0.5	0.0	4.5	150.6
1983/84	0.0	11.1	0.0	0.0	0.0	0.0	11.1
1984/85	0.0	3.7	0.0	0.0	0.0	0.0	3.7
1985/86	0.0	2.4	0.0	0.0	0.0	0.0	2.4
1986/87	0.0	*	0.0	0.0	0.0	0.0	*
1987/88	0.0	*	0.0	0.0	0.0	*	*
1988/89	*	*	0.0	0.0	*	*	155.6
1989/90	Season in Progress						

^{u/} Most recent year's data should be considered preliminary.

* Where numbers of vessels participating is three or less, information is confidential.

Table 4. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) commercial Tanner crab, commercial dockside size frequency sampling summary by size class in percent of sample, 1968/69 to present.

SOUTHEAST						
Season	≤ 139mm	140-166mm	≥ 167mm	Average Carapace Width	Number of Interviews	Crab Sampled
1968/69	7.3	59.8	32.9	160.2	8	632
1969/70	9.3	72.4	18.3	155.1	10	1,574
1970/71	12.1	71.0	16.9	153.2	1	100
1971/72	22.0	66.0	12.0	147.4	2	150
1972/73	20.3	64.9	14.7	151.4	3	429
1973/74	16.7	65.7	17.6	152.8	9	1,668
1974/75	6.2	67.7	26.1	157.9	5	514
1975/76	8.0	77.3	14.7	154.1	14	1,657
1976/77	4.3	80.9	14.8	154.4	28	3,868
1977/78	4.3	80.4	15.3	155.4	38	4,881
1978/79	3.5	82.9	13.6	154.7	29	3,277
1979/80	2.9	84.5	12.6	154.7	45	4,834
1980/81	4.3	87.5	8.1	150.9	43	4,089
1981/82	10.5	84.3	5.2	149.7	62	6,758
1982/83	4.4	87.9	7.7	151.3	58	5,918
1983/84	2.4	92.9	4.8	151.8	26	2,687
1984/85	5.5	77.1	17.4	155.3	26	2,726
1985/86	6.2	86.0	7.8	154.7	51	5,453
1986/87	5.3	86.5	8.2	154.8	61	6,834
1987/88	6.4	87.9	5.7	150.9	96	9,936
1988/89	5.8	85.8	8.4	152.2	108	10,420
1989/90	Traditional Season Opened February 15, 1990					

YAKUTAT						
Season	≤ 139mm	140-166mm	≥ 167mm	Average Carapace Width	Number of Interviews	Crab Sampled
1973/74	42.6	56.9	0.5	144.8	6	1,480
1974/75	39.2	60.0	0.8	141.9	5	732
1975/76	45.2	52.3	2.5	140.8	12	1,083
1976/77	16.4	82.0	1.6	146.6	3	880
1977/78	20.1	79.6	0.3	145.1	9	2,275
1978/79	9.4	90.4	0.2	147.1	17	1,723
1979/80	10.3	88.7	1.0	147.5	23	2,396
1980/81	12.4	87.2	0.4	147.4	23	2,604
1981/82	1.0	99.0	0.0	146.6	1	99
1982/83	9.9	89.5	0.6	145.9	21	1,907
1983/84	No Samples Taken					
1984/85	No Samples Taken					
1985/86	No Samples Taken					
1986/87	15.7	84.3	0.0	146.6	3	396
1987/88	3.6	96.4	0.0	145.3	2	444
1988/89	13.4	85.8	0.8	146.4	4	366
1989/90	Traditional Season Opened January 15, 1990					

Table 5. Statistical Area A (Southeast Alaska) commercial Tanner crab harvest in thousands of pounds, by month and season, 1968/69 to present.

Season	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
1968/69	0.0	0.0	0.0	0.0	10.0	6.7	13.1	60.4	35.0	34.2	8.2	8.6	176.3
1969/70	24.4	30.6	17.5	18.7	19.7	97.2	214.4	149.6	21.1	27.1	32.5	7.5	660.3
1970/71	0.9	1.5	6.7	7.1	21.3	41.4	56.2	32.2	0.0	0.0	0.0	0.0	167.4
1971/72	0.0	29.9	31.0	39.0	29.4	17.9	91.6	203.5	148.5	58.5	6.3	1.0	656.7
1972/73	5.4	42.0	83.8	86.7	50.7	140.8	376.6	554.6	228.7	26.6	4.1	0.8	1,600.7
1973/74	29.4	91.8	94.8	87.3	69.5	126.3	314.7	406.2	89.8	0.0	0.0	0.0	1,309.7
1974/75	4.3	77.2	70.6	56.6	71.6	74.4	180.6	225.8	102.6	Closed	Closed	Closed	863.8
1975/76	13.3	110.3	125.4	107.1	159.7	367.4	634.6	460.0	171.5	Closed	Closed	Closed	2,149.4
1976/77	3.9	76.1	262.2	203.2	337.0	393.4	693.1	457.9	112.1	Closed	Closed	Closed	2,539.0
1977/78	29.4	160.8	138.9	175.1	149.8	303.6	592.1	588.5	Closed	Closed	Closed	Closed	2,138.1
1978/79	6.6	47.6	76.7	91.7	200.1	189.2	465.4	422.3	60.3	Closed	Closed	Closed	1,559.8
1979/80	60.7	55.7	74.5	61.0	153.9	440.0	607.2	282.4	37.5	Closed	Closed	Closed	1,781.9
1980/81	33.7	51.9	48.5	60.1	315.9	494.9	627.3	350.5	28.1	Closed	Closed	Closed	2,010.8
1981/82	Closed	Closed	Closed	870.8	597.7	708.9	809.4	315.2	Closed	Closed	Closed	Closed	3,307.0
1982/83	Closed	Closed	Closed	1,208.0	Closed	1,208.0							
1983/84	Closed	Closed	Closed	Closed	Closed	862.3	726.8	Closed	Closed	Closed	Closed	Closed	1,629.1
1984/85	Closed	Closed	Closed	Closed	Closed	531.3	593.0	Closed	Closed	Closed	Closed	Closed	1,125.9
1985/86	Closed	Closed	Closed	Closed	Closed	565.8	425.9	2.6	0.0	Closed	Closed	Closed	997.3
1986/87	Closed	Closed	Closed	Closed	634.2	525.5	Closed	Closed	Closed	Closed	Closed	Closed	1,159.7
1987/88 ^{a/}	Closed	Closed	Closed	Closed	787.7	542.8	Closed	Closed	Closed	Closed	0.0	0.0	1,330.2
1988/89 ^{b/}	0.0	*	*	*	*	1088.0	552.8	*	Closed	Closed	0.0	0.0	1,645.6
1989/90	Season in Progress												

3.19

* Where numbers of vessels participating is three or less, information is confidential.

^{a/} Experimental Tanner areas opened July 1, 1988 and closed January 31, 1989. Traditional fishery opened January 15, 1988 and closed February 16, 1988.

^{b/} Experimental Tanner areas opened July 1, 1989 and closed January 31, 1990. Traditional fishery opened February 15, 1989 and closed March 8, 1989. Most recent year's data should be considered preliminary.

Table 6. Statistical Area A (Southeast Alaska) commercial Tanner crab, harvest in thousands of pounds, by district and season, 1968/69 to present.

Season	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
1968/69	0.0	0.0	0.0	0.0	0.0	0.0	0.6	82.6	2.1	63.1	9.2	0.0	8.0	4.8	5.8	0.0	176.3
1969/70	0.0	0.0	0.0	0.0	0.0	0.7	0.0	78.4	0.0	179.0	227.6	4.8	28.6	96.9	44.4	0.0	660.3
1970/71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.3	31.7	0.6	75.7	2.9	10.6	0.0	2.6	0.0	167.4
1971/72	0.0	0.0	0.0	0.0	0.0	0.6	0.0	71.6	30.9	69.6	71.0	0.4	99.7	310.8	2.0	0.0	656.7
1972/73	0.0	0.0	0.0	0.0	0.0	37.5	0.0	69.2	37.3	55.0	436.9	23.3	58.3	505.2	59.6	318.4	1,600.7
1973/74	0.0	0.0	0.0	0.0	0.3	18.8	4.2	23.1	46.1	132.8	616.2	1.7	60.8	404.3	1.5	0.0	1,309.7
1974/75	3.5	0.0	0.0	0.0	0.0	0.9	10.6	22.0	40.0	67.3	211.2	3.6	100.7	371.1	8.4	24.4	863.8
1975/76	0.0	0.0	0.0	0.0	14.3	2.8	11.3	112.8	98.9	138.0	828.6	92.5	176.3	505.1	168.8	0.0	2,149.4
1976/77	0.0	0.0	0.2	0.0	71.8	115.3	0.0	104.0	62.6	217.5	694.4	52.7	91.2	1,015.6	113.6	0.0	2,539.0
1977/78	3.9	0.0	17.0	0.0	0.3	124.6	0.0	60.1	6.7	212.6	580.3	96.6	86.4	758.6	190.9	0.0	2,138.1
1978/79	2.1	0.0	0.0	0.0	1.5	21.8	0.0	19.3	0.0	303.5	425.6	3.6	55.0	655.0	72.2	0.0	1,559.8
1979/80	0.0	0.0	0.0	0.0	0.0	5.9	15.6	118.2	24.8	237.2	749.4	22.0	33.3	399.5	125.6	50.4	1,781.9
1980/81	3.9	0.0	0.0	12.5	8.2	20.3	37.5	229.1	49.0	282.2	422.2	83.5	53.9	672.8	77.3	58.4	2,010.8
1981/82	0.9	0.0	0.0	0.0	0.0	121.4	41.8	201.2	0.1	167.4	405.0	78.5	66.0	2,102.6	122.2	0.0	3,307.0
1982/83	0.5	0.0	0.0	0.0	3.1	45.2	0.0	0.0	6.4	171.3	108.0	26.3	0.4	820.9	25.9	0.0	1,208.0
1983/84	0.0	0.0	0.0	0.1	14.7	42.0	29.1	46.4	28.9	205.4	375.0	23.4	62.6	653.4	145.8	2.2	1,629.1
1984/85	0.3	0.0	0.0	0.0	0.9	7.8	14.3	40.6	37.8	136.7	368.3	66.9	45.4	224.1	182.8	0.0	1,125.9
1985/86	*	0.0	0.0	0.0	*	16.7	3.7	22.4	*	74.9	475.7	39.7	47.1	182.3	117.8	0.0	997.3
1986/87	0.0	0.0	0.0	0.0	*	31.5	0.0	40.2	32.7	81.0	562.6	34.6	44.2	241.9	80.4	*	1,159.7
1987/88	*	0.0	0.0	0.0	*	46.7	*	29.7	*	218.6	541.9	59.4	*	239.1	127.6	*	1,330.2
1988/89 ^{a/}	0.0	0.0	0.0	0.0	*	29.1	*	54.9	29.3	326.8	622.5	91.4	35.3	349.1	105.4	0.0	1,645.6
1989/90	Season in Progress																

^{a/} Most recent year's data should be considered preliminary.

* Where numbers of vessels participating is three or less, information is confidential.

REPORT TO THE BOARD OF FISHERIES
1989/90 SOUTHEAST ALASKA-YAKUTAT DUNGENESS CRAB FISHERIES



By

Kenneth K. Imamura
and
Catherine A. Botelho

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

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GENERAL BACKGROUND

This chapter of the Region 1 (Southeast Alaska, Area A and Yakutat, Area D) Shellfish Board Report describes the commercial Dungeness crab fisheries. A historical review of Dungeness crab fisheries, including historical catch information, is presented.

Dungeness crabs (*Cancer magister*), are members of the highly evolved brachyuran (true crab) subgroup of the order Crustacea. They are a highly prized, commercially significant species found in coastal waters from Baja to the Aleutian Islands. In terms of miles of coastline, about half the geographic range is in Alaska. Nearly half of the United States harvest is taken in Alaskan waters in some years.

Although Dungeness crabs are present in commercially harvestable quantities in many areas of Region 1 (Statistical Areas A and D), they are not uniformly distributed. Fairly limited areas of particularly suitable habitat account for a significant portion of the total catch.

Statistical Area A encompasses the state waters of Alaska's Alexander Archipelago between Dixon Entrance and Cape Fairweather. It is divided into Districts 1 through 16, generally located geographically south to north, and is colloquially known as Southeast Alaska.

Statistical Area D covers state waters between Cape Fairweather and Cape Suckling. Statistical Area D is divided into Districts 181 to 191, located generally east to west, and is colloquially called Yakutat.

Although the commercial shellfish fisheries in both these areas are managed by Region 1 staff, the character of the fishing fleets and the populations of Dungeness crab in these two areas are distinctly different. However, their historical development has had many parallels, and the factors that influence the abundance of crab in both areas are loosely correlated.

Since the mid 1970's, demand for Region 1 Dungeness crab has been inversely related to the availability of crab from Washington, Oregon, and California. Low catches to the south prompted greater efforts in Southeast Alaska and Yakutat to fill the demand for product. Conversely, as long as crab were available in the south, Alaskan crab was not competitive due to higher costs of fishing and processing. As a result, during the late sixties and seventies, a period of high catches to the south, Alaskan Dungeness crab stocks were not fully exploited.

During this period of the late sixties and the early seventies, the Dungeness crab fishery in Region 1 and other fishing areas of the State were nearly self-policing. Numbers of fishermen were low enough so informal possession of personal fishing grounds was tacitly recognized. Enough unfished grounds existed so an operator encountering soft-shelled crabs or experiencing low catches in one area could easily move to alternative fishing areas. While demand remained low, restrictions to the fishery were largely unnecessary.

This early pattern of fishing has undergone drastic change. Starting in the early 1980's, the decline of the Dungeness fisheries of other Pacific Coast States caused an increased demand for the Alaskan product. Concurrently, gradual changes in the marketing of Dungeness crab were occurring which also resulted in increased demand. The earlier practices of canning or freezing a meat pack gave way to frozen sections and whole crabs or transport of live crabs to southern markets. The physical facilities needed to prepare frozen sections or tranship live crab were much less complicated than the processing and packing plant necessary to freeze or can crab meat. Processors were more willing to purchase crab, establish markets, and provide support facilities for operators of Dungeness crab vessels.

Existence of a summer fishing season to supply the higher-priced, frozen-in-shell and live-crab tourist markets in more southern ports, ease of entry into the fishery, and availability of crabs have all resulted in intensely competitive fisheries. Informal arrangements for allocation of fishing grounds no longer exist. All available fishing grounds, even marginal ones, are fully utilized by fleets whose options no longer include relocation from areas of soft-shell crabs, mating crabs, or low catches to more suitable areas.

SOUTHEAST ALASKA FISHERY

Background

Statistical Area A (Southeast Alaska) is a superexclusive registration area for Dungeness crab. A Dungeness crab fishing vessel registered for a superexclusive area cannot register nor fish in any other registration area in the same calendar year. Dungeness crab are harvested in Districts 1 through 16 in bay areas with mud or sand bottoms, generally at depths less than 15 fathoms.

The vessels in this fishery vary greatly in size and condition. The protected waters, the generally inshore fishery, and the availability of numerous marketing opportunities and options allow great variability in the condition and seaworthiness of vessels engaged in the fishery. Vessels generally range in size between small, outboard-powered skiffs and a few large Bering Sea-class crabbing vessels. However, most are below limit seiner (58 feet) length. The present 300 pot limit, discontinuous nature of crab habitat, and convenient support infrastructure in Southeast Alaska favor smaller vessels. They are much smaller than those typically fishing this species in the Pacific Northwest and the open water of the eastern Gulf of Alaska.

Regardless of vessel size or condition, the pots employed are similar to those used throughout the West Coast for this species. They are round, hatbox-shaped, stainless steel wire meshed pots ranging in

diameter to about 40 inches and in weight to about 80 pounds. By regulation, each pot has two 4 3/8 inch escape rings to facilitate escape of sublegal male crabs (those narrower than 6 1/2 inches in carapace width) and females (usually less than 6 1/2 inches in width).

Considerable local variability is evident in the molting and mating periods and the stock abundance and structure of this species in Southeast Alaska. This observed areal and interseasonal variability may be caused in part by local variations in such factors as food availability and water temperature, as well as differences in fishing pressure.

While closed periods provide some protection during the peak molting and mating periods, the wide local variability in timing probably results in fishing on some stocks during at least portions of these sensitive life history periods. There are major concerns with fishing during these sensitive periods. Mortalities associated with sorting soft-shelled crab during molting periods is higher. Light weight crab which have not totally regained prime condition may be retained by less experienced fishermen and rejected by processors. Disruption of mating activities could conceivably affect subsequent recruitment.

Historical Review

Since 1960, the harvests have averaged about 1.75 million pounds when annual (1960 to 1968) and seasonal (1969/70 to present) data are combined (Tables 1-5). Between the 1970/71 and 1980/81 seasons the catches averaged 0.60 million pounds. Since the 1981/82 season, catches have been at relatively high levels and have averaged 2.66 million pounds.

From the early 1930's 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. Research to specifically determine molting periods has yet to be conducted. However, a limited amount of tagging work done in the early to mid-sixties suggested that the major molting period for male crab lasted from late winter through mid-summer. The same study suggested that females molt and mate through the summer months and carry eggs from September through March.

The summer closure was generally acceptable to the fishermen because other fishing opportunities such as salmon and halibut fisheries prevailed during this time. The summer closure was revoked during the late 1950's. Until 1969 a prohibition on the taking of females, a minimum legal size for males, and a liberal limit on the units of gear were the only regulations governing the fishery.

Since the late 1960's, fishing season closures have been introduced, then modified to reduce fishing pressure during sensitive periods in the life history of the species. For example, prior to the 1976/77

season, a closure from March through May was established. The closure was based on limited data which indicated that it was an important molting period, particularly for male Dungeness crabs.

In 1985, the latter half of August and the entire month of September were removed by regulation from the traditional season. A closure was instituted for this period because qualitative information suggests that it is the major mating period. This action was a further step in the gradual reduction of fishing time during periods that are believed to be important for the continued commercial viability of this species.

Season Summary

Commercial Fishery

The 1989/90 fishery was divided by regulation into two segments. The first lasted from June 15, 1989 through August 15, 1989. The second started on October 1, 1989 and ended on November 30, 1989. This represents three less months for the winter season than were allowed the previous season. Two hundred and forty-five vessels registered to enter the fishery this past season, compared to 259 that registered in 1988/89. The season landings totalled 1,902,709 pounds. The total season catch was worth about \$2.1 million to the fishermen (ex-vessel price).

Districts 6, 8, 14, and 16, with reported landings of 217,923, 410,828, 281,276, and 410,029 pounds, respectively, accounted for about 69% of the total catch (Tables 3 and 4). Within these major districts, four or five subdistricts, including 106-43 (Duncan Canal), 108-40 (Stikine River mouth), 114-70 (Glacier Bay), and 116-41 (Cape Fairweather), accounted for 764,060 pounds or 40% of the total.

Eighty-three percent of the total catch was taken during the summer season (Table 3). This follows the historical trend; seasonal harvests have historically occurred from June through September (Table 3). The winter catch, 0.32 million pounds, was a little lower than last winter's season (Table 2). The decline in winter harvest suggests a behavioral change in the crab.

Dockside sampling levels were lower this season than last in response to other priorities and funding constraints. The average shoulder width of the 5,546 crabs measured was 181.0 mm (7.1 inches). The average width of sampled crab has remained fairly constant during the past four seasons with season to season variations within 0.2 millimeters (Table 6). One of the implications is that the stocks being harvested are composed of the crabs which have just molted to legal size and entered the fishery. It is very suggestive that the Dungeness crab fishery is a recruit fishery.

The major harvests will probably be confined to the summer segment in the future, much as they have been concentrated during the summer months in the past. It is likely that effort will intensify in the summer to compensate for the shorter season.

Winter fisheries are forced to contend with icing of bay fishing areas and inclement weather. A recent trend toward higher effort levels through the end of the winter season has been accentuated by mild winters, strong markets, and the willingness of shorebased processors to purchase crab late into the winter.

Studies and Surveys

The second department sponsored survey of Dungeness crab populations in areas inhabited or likely to be colonized by sea otters was conducted in June 1989. Sea otters are of concern because of their competition with man for commercially important shellfish species and their approximately 20% real rate of increase. This rate doubles their numbers about every four years. Their current population in Southeast Alaska is conservatively estimated at 5,000 animals.

As in 1988, a commercial Dungeness crab vessel was contracted to conduct the survey. Preliminary indications are that sea otters do affect Dungeness crab populations. Future investigations should include other commercial crab species, such as Tanner and red king crab, which are vulnerable to sea otter predation during some stages in their life cycles.

It has also been reported by personnel from the Alaska Department of Fish and Game, Division of Wildlife Conservation, that sea otters are colonizing outer Sumner Straits, with the vanguard now entering Keku Straits. The continuing commercial abundance of many species of shellfish may depend on what types of management and control programs are instituted for sea otters.

In early June, the department also let a contract to test fish Duncan Canal, one of the most heavily fished, well-defined fishing grounds in Southeast Alaska. The intent was to characterize pre-season stock structure. The sampling design was determined to be feasible and should future preseason surveys be funded, could provide a good indication of the expected harvest for the ensuing season.

Issues

Risks of Continued 2-S Management

The primary issue in Dungeness crab management, specifically in Southeast Alaska and more generally in Yakutat, is the clarification of management goals. This is increasingly pertinent because, at least in the Statistical Area A fishery in Southeast Alaska, it is likely that all stocks are being exploited at a very high rate, with most legal males harvested in their first year of availability. It is likely that sorting of

sublegal male and female is occurring at unprecedented rates as high prices allow economical harvest at catch rates as low as one legal crab per pot per day.

The primary problem is that Dungeness crab are currently managed using size, sex, and season (3-S) criteria that was originally developed for this species in the lower West Coast fisheries decades ago. Even strict adherence to 3-S has not guaranteed continued high levels of abundance. However, it does provide for a minimum level of protection during particularly sensitive life history stages.

In order for this management concept to work, a summer closure is necessary. The Board has continued to provide at least a short two-month summer fishery in Southeast Alaska because of economic concerns expressed by a number of fishermen. This has resulted in at least partial compromise of one of the legs of the classical 3-S management strategy. In essence, Dungeness crab management in Southeast Alaska is more 2-S than 3-S. However, the most urgent concern is that this fishery is currently extremely intensive and probably overdeveloped.

Continuing High Entry and Effort Levels

For the first time since 1980, the number of permits fished declined in 1989. However, a decline in number of permits fished was also accompanied by a decline in average pounds per vessel and pounds per landing.

The decision of the Commercial Fisheries Entry Commission to not limit the Dungeness crab fisheries in Southeast Alaska while limiting entry into the Tanner and king crab fisheries will contribute to some undesirable short-term interest in Dungeness crab. Many people are attempting to establish a fishing history in order to qualify for permits in the event that the Dungeness fishery in Southeast Alaska is someday limited.

For some newcomers, it is the only crab fishery that remains open to entry in Southeast Alaska because pot permits for Tanner and king crab are unavailable for purchase pending final assignment of limited entry permits by the Commercial Fisheries Entry Commission to current interim-use permit holders. It is likely that with the continued depressed nature of some lower West Coast Dungeness crab stocks, high fishing pressure will continue on Southeast Alaska and Yakutat stocks.

In all fairness, it is likely that the threat of limited entry is not the only or primary motivation for increased numbers of vessels entering the fishery. The last few seasons have been very lucrative, with crab prices high enough to be economically attractive to new entries. The past five seasons have also seen the development of a marketing infrastructure that provides nearly year around support for the Dungeness crab vessel operator. This development reached a point about three years ago that allowed the Southeast Alaskan Dungeness crab industry to nearly drive its own market. Hence, participation in the Dungeness fishery is now more independent of market effects of Pacific Northwest crab landings than

at any time in the past. With their proximity to major markets and history of relative stability, Southeast Alaska stocks are likely to be particularly affected by the consistent, unprecedented demand for crab.

If some means of moderating fishing intensity is not implemented soon, it is possible that the stocks in some of the most productive areas will either be fished out during a shorter period each summer or respond to overfishing by collapsing. This fishery is still largely a local fishery, employing mostly residents and using local processors. Its collapse or decline would affect local economies to a greater extent than collapse of fisheries of comparable worth in which fewer residents have an economic interest.

The high effort levels also have another, more direct consequence for those in the fleet with longer fishing histories or larger vessels because declining catch per vessel and shorter seasons favor use of smaller vessels. This forces larger, single species Dungeness crab vessel operators to either diversify into other fisheries, accept declining returns, or leave the fishery. This situation results in reallocation to smaller vessels, largely by default.

Possible Alternate Management Strategies

Establishment of guideline harvest ranges for Dungeness crab should allow managing for some stock retention during periods of abundance. This may lessen the magnitude of the depression of stocks which seems to occur after periods of high abundance and high harvest rates. This management scheme is not generally adhered to by managers of more southerly stocks of Dungeness crab. There is some port sampling evidence that supports multiple year management for this species.

Rescheduling seasons to late autumn or winter openings to more closely approximate classical 3-S strategy has been a recurring theme. There will be some reluctance on the part of fishermen to be restricted to a winter season. Prices are depressed then by landings from concurrently opened fisheries further south, crab are less actively attracted to pots, and icing conditions close many productive fishing areas.

However, management on the fringes of the species range seems to call for development and implementation of more conservative practices. Possible further curtailment of the summer season, further splits in the seasons, and establishment of separate summer and winter guideline harvest ranges could be considered. Other management options initiated by industry could also be considered.

Outlook

Regardless of how the high effort problem is addressed, the management program will continue to collect baseline fishery performance information and react to emergencies as they occur. There may be some

adjustments in an attempt to provide the information necessary to implement some of the changes in management suggested above.

The dockside sampling program for Dungeness crab will concentrate on landings from high use or high production areas to document the size composition of the catch by month and fishing district. Catch sampling is not as extensive in the Southeast Alaska fisheries as in Yakutat because of the more diffuse nature of the fishery and the numerous marketing options exercised by the many operators in the Southeast Alaska fishery. As a result, Southeast Alaska port landings are probably not sampled at the rate they should be nor are some districts sampled at rates comparable to their contribution to the catch.

We will pursue on-board sampling in the future to the extent possible. It provides otherwise unattainable information on size, condition, and relative abundance for females and sublegal males. In addition, on-board sampling is the most cost-effective means of measuring sorting rates for soft-shelled crab discarded on the grounds and assessing the suitability of season opening and closing dates. While unlikely, increasing this segment of the sampling program would provide valuable insights into the status of heavily fished stocks.

Historical trends, in-season observations, and subjective evaluation of test fishing data suggest that stocks are declining. Unless exceptional recruitment occurs in early 1990, next season catches may be as low as 1.0 million pounds.

YAKUTAT FISHERY

Background

Statistical Area D (Yakutat) is a superexclusive registration area for Dungeness crab. The Dungeness fishery in the Yakutat area occurs primarily in the surf zone along the miles of productive sand and gravel beaches of the exposed outer coastline. The spits and channels that form at the mouths of rivers cutting through these beaches also provide good habitat for Dungeness crab. Fishing occurs at depths between four and fifteen fathoms.

The summer season opens on May 15 and closes on July 15. Most of the annual catch is landed in the summer. The winter season opens on November 1 and closes on February 28 of the following year.

Environmental conditions along the outer coast appear to be more uniform than along the convoluted shorelines of Southeast Alaska. Based on sampling information that indicated that molting follows a somewhat regular pattern, the Board approved a proposal for the current May 15 to July 15 summer

season. However, molting does not consistently occur during the same period each year and the relative numbers of males molting during the period varies from year to year.

It is possible that molt timing and proportion of the stock affected by molting are related to the size and structure of the population and availability of food. Lower numbers of crabs may result in less competition for food and higher growth rates, which in turn result in more frequent, less predictable molting patterns.

The general class of vessels actively engaged in this fishery range in size from 40 to 60 feet. A few skiffs and larger vessels also usually enter the fishery each season. As a rule, the fleet is composed of sturdy vessels in good operating condition designed to be operated in near-shore rollers and capable of open ocean transit. The 600 pot limit, open ocean conditions encountered, and remote nature of the fishing grounds favor larger vessels typical of Dungeness fisheries in the Pacific Northwest. In fact, most of the vessels fishing the more remote western and eastern grounds have home ports in the Pacific Northwest.

During those seasons which are predicted by the industry as likely to be especially productive, the fleet is often accompanied on the fishing grounds by tenders for the more distant processors. Occasionally, floating processors have been situated in Icy Bay to expedite handling and processing of crab.

Historical Review

The average historic catch from the 1960 season through the present approximates 1.5 million pounds (Tables 7-10). Historically, the largest proportion of the catch has been taken during the months of June and July even during those years when the fishery opened earlier and lasted longer than it currently does (Table 8).

Season Summary

As in the Southeast Alaska fisheries, the 1989/90 fishery was divided into two segments. In the Yakutat fisheries, the summer segment extended from May 15 to July 15, 1989 and the winter segment opened on November 1, 1989 and will close on February 28, 1990. Vessels registered into this fishery numbered 29, fewer than in 1988/89. Approximately 1.7 million pounds were landed. This catch was worth about \$0.84 million to the fishermen (ex-vessel price).

At the beginning of the summer season, an observer was placed aboard a vessel fishing the Icy Bay grounds. Observations suggested that the May 15 opening had, once again, avoided the spring molt in this heavily fished district.

Partly because deliveries to the shore-based plant in Yakutat were unpredictable, fewer crabs were sampled than were statistically desirable. A total of 1,800 crab were sampled for width and shell condition (Table 7). Average sizes were higher than the previous four seasons. This increase suggests that a year-class of moderate strength is progressing through the fishery. Unless there is significant recruitment into the fishery this coming summer, landings could easily be much lower this summer than in the prior three seasons.

Issues

The major issues in the Yakutat Dungeness fishery in the past evolved around the question of local fleet share versus non-resident fleet share of the commercial harvest, possible local depletion of stocks also harvested for subsistence use, and occasional deliveries of newly-molted crab. Most of these issues have been resolved over time with regulatory adjustments or more informal means. Issues associated with this fishery have not been seriously contentious for a number of years.

Outlook

Management of Yakutat Dungeness crab stocks will be limited to analysis of fish ticket information, on-board sampling as opportunities arise, and port sampling throughout the summer season. Unless significant recruitment occurs in Yakutat, it is possible that the summer season catch will be lower than last season while the average size of the crabs caught may be higher. It is possible that the number of vessels entering the fishery this summer will be higher than last, despite the possibility of lower catches, depending on the outcome of the on-going winter fishery in Washington State.

GENERAL ISSUES

The dwindling historical role of self-management has necessitated an increased state involvement, in terms of increasingly restrictive regulations, to control resource use and provide for continued harvest. Allocative questions regarding personal use or subsistence harvest remain a recurrent issue. Much discussion involves the role of commercial harvest in the observed variability in stock abundance.

That is, how much of the variability in the numbers of crab in a stock is due to fishing pressure and how much is due to natural factors? This is a question of some interest to both harvesters and managers because Alaska is the upper latitudinal limit of the range of the species and the factors which govern abundance can be expected to have more accentuated effects here than in more favorable parts of its range.

Of particular concern is the severity and longevity of depressions in stock conditions. There is little experience of truly depressed conditions in these stocks with which to gauge the effectiveness of current management practices. However, the Yakutat stock will provide some insight in the next few years because it has now cycled through a period of low abundance following a period of high abundance characterized by one or two extremely strong year classes. The stock now appears to be rebuilding.

Table 1. Statistical Area A (Southeast Alaska) Dungeness crab catch, number of participating vessels, number of landings, and average catch per landing, 1961 to present.

Year/ Season	Catch in Pounds	Number of Vessels	Pounds per Vessel	Number of Landings	Pounds per Landing
1961	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	20	57,456	392	2,931
1970/71	776,617	21	36,982	380	2,044
1971/72	451,281	23	19,621	315	1,433
1972/73	597,587	30	19,920	315	1,897
1973/74	748,519	41	18,257	483	1,550
1974/75	713,668	43	16,597	453	1,575
1975/76	611,621	36	16,989	346	1,768
1976/77	515,378	25	20,615	174	2,962
1977/78	127,201	12	10,600	87	1,462
1978/79	749,683	25	29,987	207	3,622
1979/80	801,753	37	21,669	313	2,562
1980/81	512,247	26	19,702	226	2,267
1981/82	2,935,110	76	38,620	748	3,924
1982/83	3,646,882	128	28,491	1,306	2,792
1983/84	2,150,205	133	16,167	1,533	1,403
1984/85	1,833,250	179	10,242	1,564	1,172
1985/86	2,311,556	215	10,751	2,072	1,116
1986/87	2,454,550	223	11,007	2,328	1,054
1987/88	3,383,537	241	14,040	2,809	1,205
1988/89	3,320,336	259	12,820	2,678	1,240
1989/90 ^u	1,902,709	245	7,766	2,094	909

^u Most recent year's data should be considered preliminary.

Table 2. Statistical Area A (Southeast Alaska) 1988/89 season; Dungeness crab harvest by month and district.

Dist.	1988						1989		Total		
	May	June	July	Aug	Sept	Oct	Nov	Dec		Jan	Feb
101	Closed	0	0	0	Closed	33,158	21,820	4,598	1,738	1,351	62,665
102	Closed	0	0	0	Closed	3,298	1,890	0	0	0	5,188
103	Closed	0	0	0	Closed	*	*	0	0	0	*
104	Closed	0	1,240	0	Closed	*	0	0	0	0	*
105	Closed	30,270	63,485	22,746	Closed	5,331	4,668	2,353	585	1,760	131,198
106	Closed	275,788	298,653	94,012	Closed	80,180	25,022	7,201	3,535	2,425	786,891
107	Closed	14,572	22,954	16,624	Closed	15,088	4,998	1,616	1,143	443	77,438
108	Closed	184,478	346,654	106,719	Closed	50,327	24,986	8,364	2,117	6,019	729,664
109	Closed	22,627	78,101	32,677	Closed	5,603	4,210	1,499	0	*	144,743
110	Closed	55,561	135,009	38,059	Closed	19,104	5,755	4,743	2,137	868	261,236
111	Closed	7,510	39,045	19,489	Closed	13,505	7,272	*	*	1,094	88,504
112	Closed	2,149	31,962	14,233	Closed	17,000	9,633	1,779	*	*	77,156
113	Closed	8,930	24,796	7,772	Closed	2,698	3,050	*	*	0	47,830
114	Closed	93,902	221,279	105,054	Closed	52,400	11,959	2,001	494	5,737	492,826
115	Closed	3,016	4,510	1,317	Closed	789	*	*	1,243	0	11,537
116	Closed	75,488	133,105	114,381	Closed	13,221	52,365	9,523	3,837	0	401,920
Total		774,291	1,400,793	573,083		311,899	178,232	44,780	17,378	19,805	3,320,336

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

Table 3. Statistical Area A (Southeast Alaska) 1989/90 season; Dungeness crab harvest by month and district.

4.16

Dist.	1989									1990 ¹		Total
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb		
101	Closed	0	0	0	Closed	17,636	10,366	6,028	0	0	34,030	
102	Closed	*	0	0	Closed	*	*	0	0	0	1,735	
103	Closed	*	969	0	Closed	*	*	0	0	0	969	
105	Closed	11,114	19,288	8,540	Closed	0	0	0	0	0	38,942	
106	Closed	98,091	86,737	18,872	Closed	7,563	6,660	0	0	0	217,923	
107	Closed	13,665	15,812	2,926	Closed	2,457	1,182	0	0	0	36,042	
108	Closed	125,180	184,385	57,762	Closed	29,058	14,443	0	0	0	410,828	
109	Closed	10,475	27,861	10,247	Closed	1,390	1,397	0	0	0	51,370	
110	Closed	34,018	63,632	19,378	Closed	11,721	9,593	0	0	0	138,342	
111	Closed	2,383	11,044	5,494	Closed	22,333	8,125	0	0	0	49,379	
112	Closed	8,256	35,981	10,617	Closed	9,593	11,932	0	0	0	76,379	
113	Closed	10,468	45,104	12,983	Closed	5,839	7,042	0	0	0	81,436	
114	Closed	42,659	119,562	69,088	Closed	28,495	21,472	0	0	0	281,276	
115	Closed	18,337	28,903	14,968	Closed	6,501	5,320	0	0	0	74,029	
116	Closed	125,005	178,872	35,348	Closed	63,579	7,225	0	0	0	410,029	
Total		500,136	818,150	266,233		207,015	105,157	6,028	0	0	1,902,709	

¹ Most recent year's data should be considered preliminary.

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

Table 4. Statistical Area A (Southeast Alaska) Dungeness crab harvest in thousands of pounds by district and season, 1969/70 to present.

Season	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	Total
1969/70	12.6	0.0	0.0	0.0	27.8	44.0	9.9	230.1	154.7	103.4	9.7	100.9	28.6	404.7	22.6	0.0	1,149.0
1970/71	16.7	0.0	0.0	1.9	8.1	33.2	5.8	92.5	183.7	72.7	0.0	77.2	12.0	178.4	13.2	81.4	776.8
1971/72	15.7	0.0	0.0	0.0	0.0	60.6	5.3	45.3	54.7	46.8	0.0	35.0	14.5	118.1	16.6	37.9	451.2
1972/73	11.4	0.0	0.0	0.0	8.1	30.8	11.8	40.3	41.9	36.9	0.0	49.8	14.6	106.0	31.7	214.5	597.8
1973/74	11.0	0.0	0.0	0.0	5.5	21.1	36.2	21.4	27.8	50.1	65.6	84.0	39.4	137.1	63.9	185.4	748.5
1974/75	28.5	0.0	0.0	0.0	20.5	96.4	86.9	41.6	16.2	47.9	46.1	62.7	11.6	147.3	41.9	65.9	713.5
1975/76	43.4	0.0	1.9	0.0	47.9	21.6	100.6	17.1	8.1	53.4	2.4	17.4	72.1	165.3	11.5	49.0	611.7
1976/77	20.2	0.0	5.5	0.1	14.4	15.2	19.7	8.2	0.2	49.2	8.2	41.3	29.7	138.1	1.3	163.9	515.2
1977/78	21.1	0.0	1.1	0.0	18.4	21.3	6.9	11.2	0.0	30.2	1.1	14.7	0.1	1.2	0.0	0.0	127.3
1978/79	36.9	0.0	0.0	0.0	73.4	110.9	28.8	32.8	17.1	93.8	2.3	10.3	57.5	195.3	1.4	89.3	749.8
1979/80	23.6	0.0	0.6	0.0	52.4	101.9	63.3	54.8	2.6	50.9	0.2	63.0	27.3	279.5	0.1	81.4	801.6
1980/81	28.5	0.0	2.2	0.0	73.2	166.4	0.0	19.8	25.9	48.6	0.6	61.2	7.0	76.9	2.0	0.0	512.3
1981/82	13.9	0.0	3.8	0.0	238.2	762.2	119.3	225.3	42.8	66.8	16.9	113.2	201.7	945.6	15.4	170.1	2,935.2
1982/83	53.0	2.4	15.7	0.0	294.2	467.2	165.1	790.2	20.7	144.1	39.8	356.5	227.8	523.2	9.0	537.9	3,646.8
1983/84	71.8	1.0	13.9	3.9	85.7	142.6	70.9	591.7	79.9	137.7	6.2	77.0	116.2	251.0	8.5	492.1	2,150.1
1984/85	111.8	11.2	11.3	0.2	131.7	399.6	99.8	265.4	171.6	47.8	21.4	137.5	112.3	197.6	26.4	87.5	1,833.1
1985/86	66.3	7.1	6.5	3.9	137.9	492.2	177.8	374.9	255.5	69.1	15.7	183.2	120.0	262.6	9.0	129.6	2,311.3
1986/87	53.8	0.4	11.0	1.0	98.1	351.9	83.5	352.4	257.9	315.8	27.4	174.3	99.7	471.1	36.1	120.1	2,454.6
1987/88	57.6	5.9	14.9	1.8	161.6	507.8	79.6	534.5	297.6	376.6	118.5	148.4	76.7	562.8	32.6	406.7	3,383.5
1988/89	62.7	5.2	0.3	1.2	131.2	786.9	77.4	729.7	144.7	261.2	88.5	77.2	47.8	492.8	11.5	401.9	3,320.3
1989/90 ^v	34.0	1.7	1.0	0.0	38.9	217.9	36.0	410.8	51.4	138.3	49.4	76.4	81.4	281.3	74.0	410.0	1,902.7

^v Most recent year's data should be considered preliminary.

Table 5. Statistical Area A (Southeast Alaska) Dungeness crab catch in thousands of pounds by month and season, 1969/70 to present.

Season	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
1969/70	21.3	84.9	201.0	217.5	225.5	210.9	106.2	47.3	14.2	5.0	7.1	8.1	1,149.1
1970/71	11.1	37.0	168.5	150.4	157.1	122.6	68.6	35.9	9.3	5.6	4.6	5.9	776.6
1971/72	7.4	27.4	43.6	97.8	79.3	88.9	63.3	23.3	9.5	7.0	1.8	2.2	451.3
1972/73	4.2	30.5	38.6	167.2	167.7	83.6	49.5	31.5	16.7	3.5	1.4	3.2	597.6
1973/74	16.9	40.9	142.4	205.8	129.3	87.3	71.6	27.5	8.8	3.5	4.7	9.9	748.5
1974/75	24.8	21.5	135.5	167.1	135.0	85.0	53.9	27.6	26.5	6.3	13.7	16.8	713.7
1975/76	18.1	35.9	110.2	136.8	120.8	82.8	49.7	25.9	11.7	6.9	2.9	9.9	611.6
1976/77	Closed	Closed	105.9	206.1	89.9	46.1	32.0	13.2	11.7	4.1	6.1	Closed	515.4
1977/78	Closed	Closed	2.3	8.5	29.6	31.4	15.9	25.0	6.2	0.5	8.0	Closed	127.2
1978/79	Closed	Closed	126.4	206.9	152.6	104.6	70.3	43.3	18.2	18.2	9.1	Closed	749.7
1979/80	Closed	Closed	165.7	184.6	137.0	137.5	75.1	52.1	30.1	12.7	6.9	Closed	801.8
1980/81	Closed	Closed	62.7	157.1	122.2	69.9	36.3	30.2	15.1	8.6	10.1	Closed	512.2
1981/82	Closed	Closed	460.6	899.5	560.3	427.1	292.9	164.2	67.7	28.4	33.9	Closed	2,934.6
1982/83	Closed	Closed	936.7	1,047.5	735.3	450.1	219.7	145.9	68.2	16.3	22.9	Closed	3,642.5
1983/84	Closed	Closed	772.0	451.0	334.5	267.5	146.5	84.4	45.8	30.9	14.7	Closed	2,147.4
1984/85	Closed	Closed	0.0	670.8	494.4	272.4	154.4	138.2	58.6	27.0	15.1	Closed	1,833.3
1985/86	Closed	Closed	362.5	847.8	438.5	Closed	379.6	177.6	55.5	29.7	20.1	Closed	2,311.6
1986/87	Closed	Closed	270.1	795.9	446.3	Closed	460.7	274.5	100.3	58.0	48.9	Closed	2,454.6
1987/88	Closed	Closed	571.6	1,179.8	639.3	Closed	478.5	281.6	109.5	63.0	60.2	Closed	3,383.5
1988/89	Closed	Closed	774.3	1,400.8	573.1	Closed	311.9	178.2	44.8	17.4	19.9	Closed	3,320.3
1989/90 ^u	Closed	Closed	500.1	818.2	266.2	Closed	207.0	96.0	15.2	0.0	0.0	Closed	1,902.7

^u Most recent year's data should be considered preliminary.

Table 6. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) summary of commercial dockside samples of Dungeness crab, 1976/77 season to present.

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Southeast Fishery	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^u
No. of samples	3	6	11	4	5	7	9	10	3	24	29	56	76	59
No. of crab measured	295	624	1,124	420	445	715	840	1,103	302	2,414	2,906	5,508	6,309	5,546
Average shoulder width, mm	177.7	178.7	180.0	181.2	180.6	184.0	187.0	186.5	175.9	175.2	180.2	177.8	181.8	181.0
Average shoulder width, inches	7.0	7.0	7.1	7.1	7.1	7.2	7.4	7.3	7.0	6.9	7.1	7.0	7.1	7.1
Range shoulder width, mm	159-204	159-211	161-213	160-217	161-207	165-215	164-218	159-225	164-205	157-228	156-228	160-213	157-219	157-220

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Yakutat Fishery	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^u
No. of samples	3	2	27	3	2	10	16	31	41	61	30	27	40	17
No. of crab measured	327	188	4,491	437	494	1,077	1,700	2,473	3,593	6,729	2,224	4,080	4,869	1,800
Average shoulder width, mm	176.3	182.4	182.4	184.6	175.8	175.7	182.4	184.6	190.6	180.0	176.4	181.1	182.9	185.8
Average shoulder width, inches	6.9	7.2	7.1	7.4	7.1	6.9	7.2	7.6	7.5	7.1	7.1	7.1	7.2	7.3
Range shoulder width, mm	157-207	161-211	156-221	166-221	161-215	160-218	158-222	163-231	162-232	156-226	158-226	159-224	153-222	159-223

^u Most recent year's data should be considered preliminary.

Table 7. Statistical Area A (Southeast Alaska) Dungeness catch, number of participating vessels, number of landings, and average catch per landing, 1960 to present.

Year/ Season	Catch in Pounds	Number of Vessels	Pounds Per Vessel	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	1,207,397	-		107	11,284
1970/71	1,508,561	-		83	18,175
1971/72	1,212,198	-		88	13,775
1972/73	1,992,574	-		85	23,442
1973/74	2,347,752	-		236	9,948
1974/75	1,031,573	-		154	6,699
1975/76	579,908	17	34,112	113	5,132
1976/77	529,470	7	75,639	28	18,910
1977/78	116,052	-		11	10,550
1978/79	1,799,403	12	149,950	122	14,749
1979/80	1,436,923	21	68,425	87	16,516
1980/81	883,633	11	80,330	63	14,026
1981/82	3,228,301	28	115,296	169	19,102
1982/83	5,158,111	35	147,375	305	16,912
1983/84	2,663,520	67	39,754	458	5,816
1984/85	773,356	39	19,830	227	3,407
1985/86	371,114	32	11,597	168	2,209
1986/87	757,257	22	34,421	112	6,761
1987/88	2,711,818	28	96,851	191	14,198
1988/89	3,489,519	32	109,047	220	15,861
1989/90 ^u	1,699,809	29	58,614	201	8,457

^u Most recent year's data should be considered preliminary.

Table 8. Statistical Area D (Yakutat) 1988/89 and 1989/90 seasons; Dungeness crab harvest by month and district.

Dist.	1988						1989		Total		
	May	June	July	Aug	Sept	Oct	Nov	Dec		Jan	Feb
181	317,530	726,044	134,668				29,374	12,372	0	0	1,219,988
183	45,087	67,300	4,104				0	2,062	*	0	118,553
184	86,291	126,466	56,122	Season Closed			0	0	0	0	268,879
186	496,688	193,401	80,645				0	0	0	0	770,734
191	57,189	739,370	314,751				0	0	0	0	1,111,310
Total	1,002,785	1,852,581	590,290				29,374	14,434	*	0	3,489,464

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Dist.	1989						1990 ^{*/}		Total		
	May	June	July	Aug	Sept	Oct	Nov	Dec		Jan	Feb
181	518,049	636,662	116,749				0	*	0	0	1,271,460
183	45,346	18,944	*				0	*	0	0	64,290
186	1,699	11,958	0	Season Closed			0	0	0	0	13,657
191	81,983	192,987	72,912				0	0	0	0	347,882
Total	647,077	860,551	189,661				0	*	0	0	1,697,289

^{*/} Most recent year's data should be considered preliminary.

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

Table 9. Statistical Area D (Yakutat) Dungeness crab catch in thousands of pounds by month and season, 1969/1970 to present.

Season	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
1969/70	0.0	87.7	254.7	529.0	336.1	0.0	0.0	0.0	0.0	0.0	0.0	1,207.4
1970/71	0.0	40.3	386.6	426.1	511.9	143.6	0.0	0.0	0.0	0.0	0.0	1,508.6
1971/72	0.0	8.6	407.8	572.4	223.4	0.0	0.0	0.0	0.0	0.0	0.0	1,212.2
1972/73	0.0	100.7	653.7	842.1	392.7	3.4	0.0	0.0	0.0	0.0	0.0	1,992.6
1973/74	18.5	205.4	679.7	1,079.5	195.2	88.3	80.9	0.0	0.0	0.0	0.3	2,347.8
1974/75	16.3	141.0	476.0	213.3	113.3	37.4	34.3	0.0	0.0	0.0	0.0	1,031.6
1975/76	Closed	84.3	239.5	256.1	Closed	579.9						
1976/77	Closed	Closed	132.2	234.3	163.0	0.0	0.0	0.0	0.0	0.0	0.0	529.5
1977/78	Closed	Closed	0.0	0.0	33.7	72.9	0.0	1.6	0.6	7.2	0.0	116.1
1978/79	Closed	Closed	738.1	816.3	245.0	Closed	Closed	Closed	Closed	Closed	Closed	1,799.4
1979/80	Closed	Closed	840.1	563.9	32.9	Closed	Closed	Closed	Closed	Closed	Closed	1,436.9
1980/81	Closed	Closed	404.4	318.3	139.6	18.7	0.5	0.0	0.0	0.5	1.5	883.6
1981/82	Closed	Closed	2,467.7	634.9	125.7	Closed	Closed	Closed	Closed	Closed	Closed	3,228.3
1982/83	Closed	0.0	3,090.9	1,856.6	210.7	0.0	0.0	0.0	0.0	0.0	0.0	5,158.1
1983/84	Closed	969.1	1,197.4	201.7	42.6	183.2	55.8	2.6	5.6	2.6	2.9	2,663.5
1984/85	Closed	402.8	316.5	54.1	Closed	Closed	Closed	0.0	0.0	0.0	0.0	773.4
1985/86	Closed	158.2	160.5	49.1	Closed	Closed	Closed	1.3	1.0	0.6	0.5	371.1
1986/87	Closed	195.2	395.3	123.0	Closed	Closed	Closed	24.8	16.6	1.3	1.0	757.3
1987/88	Closed	845.7	1,280.0	464.6	Closed	Closed	Closed	41.8	44.3	8.5	27.0	2,711.8
1988/89	Closed	1,002.8	1,852.6	590.3	Closed	Closed	Closed	29.4	14.4	0.1	0.0	3,489.5
1989/90 ^v	Closed	647.1	860.6	191.4	Closed	Closed	Closed	0.0	0.8	0.0	0.0	1,699.8

^v Most recent year's data should be considered preliminary.

Table 10. Statistical Area D (Yakutat) Dungeness crab harvest in thousands of pounds, by district and season, 1969/70 to present.

Season	District					Total
	181	183	184	186	191	
1969/70	0.0	481.3	18.9	442.5	264.7	1,207.4
1970/71	362.4	6.0	58.0	370.9	711.2	1,508.5
1971/72	405.3	133.7	276.1	355.5	41.6	1,212.2
1972/73	879.0	52.0	273.5	727.8	60.4	1,992.7
1973/74	950.8	108.0	306.5	652.8	329.7	2,347.8
1974/75	182.8	35.0	237.7	514.6	61.5	1,031.6
1975/76	166.8	28.3	81.7	283.2	19.9	579.9
1976/77	67.3	37.7	63.3	361.3	0.0	529.6
1977/78	0.0	9.4	0.0	106.6	0.0	116.0
1978/79	426.2	209.2	289.7	797.9	76.4	1,799.4
1979/80	201.2	108.6	218.3	599.2	309.7	1,437.0
1980/81	243.2	72.3	20.1	425.0	123.0	883.6
1981/82	829.3	237.3	681.7	994.0	485.9	3,228.2
1982/83	691.5	404.2	1,715.0	784.5	1,563.0	5,158.2
1983/84	774.8	333.5	499.6	714.5	341.2	2,663.6
1984/85	249.0	135.6	53.6	306.4	28.7	773.3
1985/86	138.5	78.8	17.9	112.2	23.7	371.1
1986/87	245.5	49.8	16.3	369.9	75.7	757.3
1987/88	565.3	44.7	541.0	1,119.9	441.0	2,711.8
1988/89	1,220.0	118.6	268.9	770.7	1,111.3	3,489.5
1989/90 ^{4/}	1,271.6	65.2	0.0	13.7	347.9	1,698.4

^{4/} Most recent year's data should be considered preliminary.

REPORT TO THE BOARD OF FISHERIES
1989/90 SOUTHEAST ALASKA-YAKUTAT SHRIMP FISHERIES



By

Timothy Koeneman
and
Catherine A. Botelho

Alaska Department of Fish and Game
Division of Commercial Fisheries
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INTRODUCTION

This report concerns the various commercial shrimp fisheries of Region 1. Fisheries occur in both Southeast Alaska (Statistical Area A) and in Yakutat (Statistical Area D). A review of the commercial shrimp fisheries in narrative and tabular form is provided. A number of species are harvested using shrimp beam trawls, shrimp otter trawls, and shrimp pots. The target species of the beam and otter trawl fisheries are pink shrimp (*Pandalus borealis*), with significant portions of sidestripe shrimp (*Pandalopsis dispar*) caught. Other species harvested in small quantities are coonstripe shrimp (*Pandalus goniurus*), humpy shrimp (*P. hypsinotus*) and spot prawns (*P. platycerous*). The spot prawn is the target species in the pot shrimp fishery. Lesser quantities of other species, particularly coonstripe shrimp are also taken in the pot shrimp fishery. The combined harvest and value for the last completed year or season is 1,840,500 pounds worth \$1,134,900.

The beam trawl fishery has the longest history in Region 1, with initial harvesting occurring in 1915, and good documentation available since 1955. The otter trawl fishery has been documented since the 1975/76 season. Pot shrimp fishing has been documented since 1962. Fishery development, and subsequently regulation development, have occurred independently in each fishery.

This report is organized into chapters and headings which describe each fishery. Major headings include background, season summary, and outlook. The final portion of the report describe significant issues of concern to the shrimp fisheries of the region.

SHRIMP BEAM TRAWL

The beam trawl fishery began in 1915 when harvesting and processing was initiated in Thomas Bay (a portion of District 10). Four additional processors were established by 1921 and the fishery continued to expand with respect to fleet size, production capabilities, and geographic fishing area well into the 1950's. Until the development of the Westward Area (Statistical Area J) shrimp fisheries in 1959, the beam trawl fishery of Southeast Alaska was the major shrimp fishery in Alaska.

From 1955 through 1967 annual beam trawl harvests ranged from 1.8 to 7.6 million pounds and averaged 3.3 million pounds. The number of participating vessels ranged from 10 to 22 during this period (Table 1). The annual harvests prior to 1959 were heavily dependent upon production from District 10. Beam trawl harvest began to decline during the 1960's and continued at lower effort levels and harvests through the 1970's. Harvests since the 1968/69 season, harvests have ranged from 0.4 to 2.2 million pounds and averaged 1.2 million pounds. The low harvest of 0.4 million

pounds occurred during the 1985/86 season when the major processor rebuilt after a fire consumed the processing plant. The number of participating vessels has ranged from 8 to 26 during the past 21 seasons.

Prior to 1970, two geographic areas produced the major portion of the beam trawl harvest. These were District 10, which included Thomas Bay and Farragut Bay, and District 6, which includes Duncan Canal and Kah Sheets Bay. District 10 has decreased in documented importance from producing 53% of the total harvest in 1960 to less than 1% at the current time. Conversely, District 6 contributed 23% of the total harvest in 1960 and now contributes 61% (Tables 2-4).

During the early years of the fishery there were more than 20 active processors. Processing during this era was characterized by cooking and hand-peeling the harvest. The number of processing facilities has declined since peak harvests occurred in 1958. However, a reduction in processing capacity has not occurred with a decline in the number of processors. In 1957 the first machine shrimp peeler was installed in Wrangell. Numerous plants utilizing exclusively hand-peeling have been gradually replaced by relatively few plants which utilize machine peelers. Some hand-peeling is still accomplished for the larger shrimp and for specialty markets.

Management has been restricted to the collection of fish ticket information, comparison of season harvests to published guideline harvest ranges (GHR), limited skipper interviews, limited logbook information, and samples of commercial landings to determine relative year-class strength.

Gradual regulation development in the traditional heavily fished locations has culminated in a season closure during the egg-hatch period (February 15 through April 30), a restriction to only beam trawl gear for trawling, the establishment of fishing area GHR's based upon historic harvest data, and mesh restrictions to provide some escapement of smaller shrimp to reduce the risk of recruitment overfishing. The traditional areas are major portions of Districts 6, 7, 8, and 10.

Regulatory changes made during the 1989 Alaska Board of Fisheries meeting established three fishing periods, with specific guideline harvest ranges for each season and each district. The seasons are May 1 through June 30, July 1 through August 31, and September 1 through February 14. The GHR's for each of these seasons by district are: District 6, 80,000 to 400,000 pounds; District 7, 15,000 to 50,000 pounds; District 8, 25,000 to 175,000 pounds; and District 10, 5,000 to 75,000 pounds. These regulations were intended to allow harvesting throughout the biological fishing season, and to reduce the harvest during the major portion of the growth and recruitment period.

Since the 1969/70 season, the average harvest of 1.2 million pounds was worth an average of \$291,000 to the participating vessels. Ex-vessel price ranged from \$115,000 to \$705,000 during this same period. Since the 1982/83 season the average harvest has been 1.5 million pounds worth approximately \$412,000 per season.

1989/90 Season Summary

The 1989/90 shrimp beam trawl fishery harvested 1,586,210 pounds of shrimp, as reported on fish tickets compiled through December 1989. Twenty-one different vessels participated and made a total of 578 landings (Table 1). The ex-vessel value was approximately \$354,000. The final harvest will be somewhat higher when all information through February 14, 1990 is available.

Fishing intensity was high during each open fishing period in District 8. The first season occurred from May 1 through June 30. On May 12, 1989 it was necessary to close the District 8 fishery after a harvest of 278,622 pounds, which exceeded the upper portion of the GHR by over 100,000 pounds. Emergency Order 1-M-15-89 was issued to close District 8. This closure was a result of heavy effort on the Stikine Flats portion of District 8 where 17 different vessels made a total of 122 landings. All other districts remained open through the end of this first fishing period. Resulting harvests in pounds, number of landings and number of vessels by district were:

<u>District</u>	<u>Pounds</u>	<u>Landings</u>	<u>Vessels</u>
6	370,117	78	8
7	31,087	24	6
10	* * * * * Confidential * * * * *		

The second fishing period was also characterized by initial heavy fishing effort in District 8. It was obvious that some vessels had exited the beam trawl fishery to participate in the salmon fisheries. District 8 was closed by Emergency Order 1-M-20-89 on August 14, 1989. The total harvest did not exceed the GHR, but reached 164,238 pounds from 51 landings by 8 vessels. All other districts remained open through the end of the second fishing period. Resulting harvests in pounds, number of landings, and number of vessels by district for the second fishing period were:

<u>District</u>	<u>Pounds</u>	<u>Landings</u>	<u>Vessels</u>
6	253,746	66	5
7	* * * * * Confidential * * * * *		
10	* * * * * Confidential * * * * *		

The third fishing period opened on September 1, 1989. District 8 received the majority of effort. Emergency Order 1-M-28-89 closed District 8 on October 10, 1989 after a harvest of 236,152 pounds. Nine vessels made 129 landings from this period during the open fishing period. The harvest exceeded the GHR by approximately 61,000 pounds. All other districts remained open until the final season closure on February 14, 1990. Resulting harvests in pounds, number of landings, and number of vessels by district for the other districts during the third fishing period were:

<u>District</u>	<u>Pounds</u>	<u>Landings</u>	<u>Vessels</u>
6	175,920	53	6
7	28,362	34	5
10	***** Confidential *****		

Of the total season harvest, District 6 provided 799,783 pounds, District 7 contributed 67,439 pounds, District 8 yielded 679,012 pounds, and the harvest from District 10 is significant but confidential. The harvest was comprised of approximately 94% pink shrimp. Dockside sampling of the harvest is yielding data on contribution to the fishery by year-class and sexual condition. Preliminary information available indicates that two year-classes of males and two or more year-classes of females were available in the harvested population this past season. Additional information resulting from dockside sampling continues to indicate that a significant portion of the harvest in some districts is occurring during the growth, transition, and recruitment period which extends from May through August.

Fish ticket information reported a harvest of 37,690 pounds of sidestripe shrimp, which is about 5.9% of the total harvest. The reported sidestripe shrimp harvest is a conservative estimate of the actual sidestripe shrimp catch. Fish tickets usually reflect those large sidestripe shrimp that are sorted from the catch and sold for a higher price. The catch also includes significant quantities of sidestripe that are smaller in size and sold along with the pink shrimp. The majority of the sidestripe shrimp harvest during the 1989/90 season occurred from Districts 7, 8, and 10. The most significant portion of the sidestripe shrimp harvest occurred during the months of May, October, and December.

This was the first season under the new regulatory system that provides for three open fishing periods and GHR for each district for each fishing period. The new regulatory system was generally well accepted by the fleet and processors.

Outlook

It is probable that strong year-classes apparent in major stocks and the relatively strong harvests experienced during the past few fishing seasons will provide for strong stocks during the 1990/91 fishing season. Given the success of the present regulatory structure this past season it is estimated that the total 1990/91 harvest will be similar to last seasons' harvest, which was approximately 1.6 million pounds. If all districts were to produce maximum harvests for each fishing period the total harvest would be 2.1 million pounds. Current information is not available to determine harvests beyond the 1990/91 fishing season with any degree of scientific certainty.

SHRIMP OTTER TRAWL

The first significant otter trawl landings were reported during 1975. The fishery gradually expanded until the peak harvest of 2.1 million pounds, which occurred during the 1980/81 fishing season (Table 5) when 19 vessels made 38 landings. Harvests since the 1980/81 fishing season have averaged 163,000 pounds with an ex-vessel value of approximately \$51,000. No harvest has been reported in this fishery since the 1987/88 fishing season. With the lack of shrimp processing facilities in the Yakutat area shrimp harvested in this fishery were landed in many ports. These ports included Kodiak, Seward, and Washington and Oregon ports.

Locations producing significant harvests included Yakutat Bay, Lituya Bay, Glacier Bay, and Icy Bay. The most significant and consistent fishery has occurred in Yakutat Bay (Table 6). The most recent effort has been expended in the Icy Bay area where no GHR exists. The major species harvested in this fishery is the pink shrimp. However, certain portions of Yakutat Bay produce good drags of predominantly sidestripe shrimp.

Regulations pertinent to the shrimp otter trawl fishery include: a prohibition to shrimp trawling in Lituya Bay to protect personal use of coonstripe shrimp in this location; a prohibition to shrimp trawling in Glacier Bay (emplaced by the National Park Service); prohibition to shrimp otter trawling in traditional beam trawl shrimp areas; a prohibition to shrimp trawling in portions of Yakutat Bay utilized by subsistence fishermen and shrimp pot fishermen; a fishing season in Yakutat Bay from June 21 through February 14 based upon a monthly GHR of 30,000 pounds. This restriction in Yakutat Bay may be inhibiting effort from exploiting the Yakutat Bay shrimp stocks.

Stock abundance estimates for pink and sidestripe shrimp populations in Yakutat Bay have been accomplished through a series of shrimp research cruises conducted by the department and the National Marine Fisheries Service. The first research cruise was conducted in 1953. Beginning in September 1980 research cruises were initiated using a standard area swept sampling method. Point estimates provided from the five cruises accomplished since September 1980 have ranged from 1.84 to 6.46 million pounds. Stock composition has ranged from 43 to 91% pink shrimp. Sidestripe shrimp make up the major portion of the remainder of the stock. Stock abundance cruises have not been accomplished in other fishing grounds.

1989/90 Season Summary

There was no reported harvest of shrimp utilizing otter trawl gear from Statistical Areas A and D during the 1989/90 fishing season.

Shrimp Otter Trawl Outlook

Research cruises have not been accomplished since September 1984. Therefore, it is difficult to estimate the condition of shrimp stocks at the present time. Previous estimates of population abundances in Yakutat Bay and existing regulations provide for potential conservative harvests in that area. Under current regulations it would be possible to harvest 270,000 pounds of shrimp from Yakutat Bay if sufficient effort was available. Maximum harvests allowed by current regulations should not negatively impact stock conditions in Yakutat Bay.

Information is not available for other stocks previously utilized by the commercial otter trawl fleet. However, should unrestricted fishing occur in areas such as Icy Bay, it may be possible that overexploitation could occur prior to appropriate management or research activities. At the current time, processing capabilities are very limited, markets for some Alaskan trawl caught shrimp are relatively poor, and no significant effort or resulting harvesting is expected.

SHRIMP POT FISHERY

The shrimp pot fishery targets on the large spot prawn. Harvest records indicate that this fishery was in early stages of development from 1962 through 1968. Until 1980 effort and resulting harvests had been sporadic (Table 7). During the early years of the fishery, perhaps through 1980, participants primarily utilized the fishery as a supplemental income source. 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 species. In many cases, only "tails" were sold and ex-vessel prices were high, dependent upon the size or count of tails per pound.

Since 1980 effort and resulting harvests have increased steadily. Harvests since 1980 have averaged over 230,000 pounds, worth an average of \$696,000, annually. The peak harvest occurred in 1988 when a harvest of 381,000 pounds was worth approximately \$1,100,000. The 1988 harvest was caught by a record high number of 132 permit holders. While a major portion of the harvest continues to be sold over the dock, a significant portion of the harvest is being accepted by traditional processors and their associated transportation and marketing networks. Some fishermen have entered and utilized this fishery as a major income source. Reported harvests in the Yakutat Area are relatively small.

Management is limited to collecting fish ticket information and identifying known fishing areas. Very little research has been conducted concerning the distribution and abundance of spot prawns in

Southeast Alaska and Yakutat. The paucity of research information available was collected by various agencies during the 1960's and 1970's and is limited to pot efficiency studies. Studies were limited to various pot tunnel configurations in rectangular pots, and a comparison of covered versus uncovered pots. Research information concerning similar fisheries in Washington and British Columbia has been completed in recent years.

Regulations in the Southeast Alaska shrimp pot fishery include a limit of 150 pots per vessel in Districts 1 through 16 and pot specifications if left unattended for more than 14 days. In Yakutat Bay, the pot limit is 75 per vessel. Pot termination devices are mandatory to reduce the ghost fishing potential of lost pots, and GHR and open seasons have been established for some fishing locations. Guideline harvest ranges were initially established at the high harvests for the major fishing Districts of 1, 2, 3, and 7. These GHR's have been repealed based upon allocation and stock arguments provided by industry to the Alaska Board of Fisheries. A liberal GHR of 75,000 to 100,000 pounds continues for Districts 6 and 8. However, this GHR is not restricting the fishery since the largest reported harvest is less than 20,000 pounds (Table 8). This GHR is intended to maintain a ceiling on the harvest while providing for controlled expansion of the fishery in these districts. There are no GHR in the Yakutat Area.

A fishing season to prevent fishing when mature females are hatching eggs has been established in those fishing areas (Districts 1, 2, 3, 6, 7, and 8) with consistent effort and harvests. The "egg hatch" closure occurs from March 1 through April 30. In addition, Districts 1, 2, 3, and 7 are closed from May 1 through September 30. The summer closure is an allocative closure, that has biological significance in that fishing is prevented during the majority of the growth, recruitment, and perhaps mating period. The summer closure tends to allocate the fishery for supplemental income use. An open summer fishery would tend to allocate the fishery for a primary income use. During the past five to eight years, the regulations have oscillated between using this resource for supplemental and primary incomes. In Yakutat Bay, the fishing season is a summer fishery extending from May 1 through February 28.

Effective October 1, 1986 a minimum mesh restriction of 1.75 inches, stretch measure, went into effect to assist in the escapement of smaller shrimp. This was designed to reduce the potential for recruitment overfishing. However, interpretation of the regulation and consistent enforcement was difficult. Improvements to the regulation in 1989 have improved enforcement potential, but problems continue to exist. Due to the contribution of coonstripe shrimp in Yakutat Bay the minimum mesh utilized in that fishery is 1.50 inches.

1989 Season Summary

The 1989 shrimp pot fishery harvested 254,292 pounds of primarily spot prawns through December 1989 (Table 7). This harvest was worth approximately \$780,000. This harvest is approximately 125,000 pounds less than the record 1988 harvest. Number of permits fished was 110, down from a record 132 in 1988 and the number of landings was also below the 1988 figure (Table 7). Markets continue to be good for spot prawns.

Good harvests continued to occur during the January through April period. Approximately 39% of the harvest was taken during January and February, with another 37% harvested from October through December. Compared to 1988 data, 1989 harvests during the months of October were down by 8,000 pounds, followed by declines of 66,000 pounds in November and 55,000 pounds in December (Table 9). However, it is possible that the department has not received all fish tickets for November and December, and that harvest figures will increase.

District 1 contributed a harvest of 106,800 pounds, which was 42% of the total Region 1 shrimp pot harvest (Table 8). District 7, with a harvest of 36,700 pounds was the next most important fishing district. District 2, with a harvest of 31,600 pounds was the third most important district, followed by District 10 with 22,000 pounds. It is important to note that harvests in these districts have all declined from peak harvests observed in the period 1984 through 1988.

Outlook

It is difficult to provide a reasonable prediction of future stock condition and harvest potential with the information available. Market conditions appear to be strong and effort is certainly present to harvest the available stock. An initial examination of the harvest data (Table 9) appears to indicate that harvests have peaked in Districts 1, 7 and 10 during 1988, District 2 during 1987 and District 3 during 1986. The decline in current contribution from these important fishing districts could be due to shrimp population reductions, excessive harvest, or other factors such as reduced effort. Some fishermen are also concerned about the harvest in District 13. Information is insufficient to determine why 1989 harvests were reduced from peak harvests. However, it may be prudent to assume that some decline is occurring and that it is related to the commercial harvest. The present management program is not able to collect information to justify emergency closures that may be necessary to reduce fishing effort on reduced stocks. It is possible that harvests in the near future will be reduced.

ISSUES

Biological Information

Generally, commercial harvest data and limited effort data from fish tickets is not sufficient to estimate abundance or properly manage the resource. Considering the available markets, processing capabilities, and fishing effort, an accurate estimation of population abundance and knowledge of various life history parameters will be essential to proper fishery management in the near future. Current GHR's were established based upon historic harvests when fishing effort and resulting harvest rates were relatively low. The present capacities of the beam trawl, otter trawl, and pot fleets are high and can rapidly overexploit Region 1 shrimp fisheries before appropriate management action can be implemented. Dockside sampling of the beam trawl fishery, while limited, will allow some continued monitoring of that fishery and should allow management action to occur in a timely manner. Management of the otter trawl and pot shrimp fisheries will remain passive.

Beam Trawl Minimum Mesh Requirements

In the beam trawl fishery, some fishermen have voluntarily rehung their nets utilizing a larger mesh size. This could assist in stock conservation by harvesting pink shrimp with a larger average size and reducing the fishing mortality on the younger year-classes. Harvesting larger shrimp could result in an improved ex-vessel price. However, one potential risk associated with larger mesh size is increasing the proportion of large mature female shrimp in the catch, which could result in a decrease in pink shrimp stock reproduction.

Some beam trawl fishermen are interested in increasing the mesh size to target on sidestripe shrimp, particularly during the fall and winter months.

Beam Trawl Guideline Harvest Ranges

Once again, fishermen requested that additional harvests be allowed after closures were established based on achieving GHR. Data is insufficient to increase GHR's beyond those already published. It may be necessary to adjust the current GHR's into pink shrimp and sidestripe shrimp components in the future. At the current time information would be available to provide separate species GHR's by district. However, such management must consider that smaller pink shrimp may be discarded when sidestripe shrimp are targeted by the fishery.

Shrimp Pot Management

Management is passive in the shrimp pot fishery and little information is available to scientifically manage the resource. Discussions on needed management improvement have primarily centered on CPUE management. CPUE data from Southeast Alaska has been reviewed and is insufficient for management on a CPUE basis.

British Columbia utilizes a management system based upon CPUE information from resource agency surveys, mandatory fishery logbooks as a condition of license, information from enforcement officers who check mesh compliance and logbook accuracy. The basis of British Columbia management is the CPUE of female spawner shrimp. This management system is very time consuming from a staff perspective, requires; (1) considerable staff and funding support, (2) detailed data collection and analysis, and (3) considerable enforcement effort on the fishing grounds.

Washington State management uses restricted fishing time based upon resource surveys. Surveys are completed annually prior to the fishing season. The open fishing period in the major fishery is very limited, as little as two weeks during some seasons.

An improved management system is needed and funding proposals have been submitted to provide for a more resource responsive management and research program. This proposal has not been funded, and it is apparent that the present passive management system will continue, at least for the near future.

Shrimp Pot Mesh Regulations

The current regulation on minimum mesh requirements for shrimp pot gear continues to cause problems with fair and consistent enforcement. Two areas require change. First, the standard of measure utilized to enforce the minimum mesh size. Second, the amount of area on the pot which must conform to the standard of measure. Until this issue is resolved, the minimum mesh regulation will not provide the escapement necessary for conservation.

Washington State requires that the entire pot be meshed with a minimum size mesh, so that escapement occurs at any location on the pot. British Columbia meshed pots must be completely covered with the minimum size mesh and a 0.75 inch peg must pass through the meshes without stretching or altering the mesh opening. Solid pots must have the minimum size mesh placed in the

tunnels without any distortion of the shape of the meshes, using the same 0.75 inch peg for measurement standard.

Shrimp Pot Guideline Harvest Levels

Declines have been observed in harvests from the important fishing districts. Data are not available to estimate populations in these areas, determine fishing mortality rates, or other information pertinent to proper conservation. Some fishermen have expressed concern about declining shrimp catches that may be occurring in their fishing areas. It might be necessary to consider GHR by district for this fishery in the future. Data gathered during 1990 should assist in evaluating the need for district GHR's in this fishery.

Shrimp Pot Fishing Seasons

Fleet members continue to express concern for the present shrimp pot fishing season. Currently the fishing season in important districts (1, 2, 3, and 7) provides for a fall and winter fishery extending from October 1 through February 28. These districts are closed during the April-May "egg-hatch" period for conservation reasons. Additionally, these districts are closed from May through September. April through August encompass the growth and recruitment period for other species of Pandalid shrimp, and it is assumed that a similar pattern exists for the spot prawn. October is the beginning of the "egg extrusion" period for spot prawns, after which mature females will carry eggs externally until hatching occurs the following spring. Only districts 6 and 8 have closures during the "egg-hatch" period.

The current fishing season in important districts reduces fishing mortality on the stocks during some sensitive life history stages. It allocates the most significant portion of the fishery to the winter months, which is an allocation to those fishermen that utilize the fishery as a supplemental income source. Fishing conditions during the winter months are more rigorous, and a winter fishery may have a tendency to reduce effective effort in this fishery. Additionally, the present fishing season concentrates the fishery during the ovigerous period for mature females.

Some fishermen find that ovigerous females are not as desired by their customers, as non-ovigerous large prawns. These fishermen would rather harvest during the summer months to satisfy their markets. A summer fishery would allocate more towards the fisherman that utilizes the prawn fishery as a major income source. This issue will undoubtedly be raised through proposals at the next Alaska Board of Fisheries meeting.

Table 1. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl catch, number of vessels, number of landings, pound per vessel, and pounds per landing, 1955 to present.

Year/ Season	Catch in Pounds	Number of Vessels	Landings	Pounds per Vessel	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	10	952	184,073	1,934
1970/71	742,404	8	477	92,801	1,556
1971/72	1,050,978	8	592	131,372	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	9	434	133,957	2,778
1975/76	983,609	12	450	81,967	2,186
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	1,991
1979/80	956,927	17	982	56,290	974
1980/81	843,737	21	920	40,178	917
1981/82	918,975	15	523	61,265	1,757
1982/83	1,397,026	15	455	93,135	3,070
1983/84	1,768,148	18	668	98,230	2,647
1984/85	1,289,970	23	809	56,086	1,595
1985/86	428,184	16	249	26,762	1,720
1986/87	2,220,677	16	428	137,667	5,146
1987/88	1,761,636	26	389	67,755	4,529
1988/89	1,679,547	19	528	88,397	3,181
1989/90 ^u	1,586,210	21	578	75,534	2,744

^u Most recent year's data should be considered preliminary.

Table 2. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl harvests in thousands of pounds by month and season, 1969/70 to present.

Season	Month												Total
	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
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	65.5	79.8	49.7	64.3	54.8	59.2	59.9	56.8	2.8	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	8.2	1,051.1
1972/73	168.5	126.4	77.2	66.1	65.8	44.7	64.0	46.3	81.6	42.2	6.1	8.5	797.4
1973/74	96.3	124.1	72.6	73.7	45.0	32.0	59.1	64.8	60.3	29.2	8.8	8.5	674.4
1974/75	160.9	199.2	202.4	168.0	120.1	61.4	73.9	90.8	104.2	21.6	0.7	2.4	1,205.6
1975/76	180.7	130.3	67.2	92.6	112.3	154.5	73.0	77.8	38.9	46.1	3.6	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	0.5	0.8	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	949.1
1978/79	107.0	130.9	140.6	240.2	112.0	93.1	67.8	36.0	72.3	22.5	8.3	2.5	1,033.3
1979/80	98.2	154.9	146.6	177.4	104.3	55.1	58.4	39.6	66.3	48.2	3.5	4.4	956.9
1980/81	153.8	168.6	164.9	153.7	54.2	30.2	35.5	12.2	33.6	31.6	1.8	3.7	843.7
1981/82	165.1	183.4	124.0	168.8	81.1	52.8	36.2	48.3	33.0	22.3	0.9	3.1	918.9
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	1,397.1
1983/84	436.3	249.0	287.0	218.2	138.5	132.0	83.3	86.9	100.3	16.2	9.0	9.6	1,766.1
1984/85	156.3	252.5	269.9	232.8	130.9	59.5	61.8	49.7	51.9	22.5	1.1	1.0	1,290.0
1985/86	125.4	105.3	46.1	23.2	39.1	13.8	31.3	27.0	8.6	7.7	0.8	0.0	428.2
1986/87	294.0	507.8	576.0	446.8	372.0	0.7	0.0	1.8	1.4	0.4	0.8	1.2	2,202.7
1987/88	634.0	721.0	291.2	90.8	0.1	0.1	1.3	7.6	5.9	6.0	2.6	1.1	1,761.6
1988/89	650.5	369.0	258.4	137.9	2.6	2.5	82.8	127.9	37.8	2.7	3.2	4.2	1,679.5
1989/90 ^v	473.6	236.2	259.0	173.4	224.3	115.8	65.6	38.4	-----	Season in Progress	-----	-----	1,586.2

5.15

^v Most recent year's data should be considered preliminary.

Table 3a. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl fishery catch in thousands of pounds by season and district, 1969/70 through 1978/79.

Dist.	Year									
	69/70	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79
1	0.0	0.3	3.2	0.0	0.8	0.7	1.7	1.6	0.0	1.7
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	0.7	0.0	0.0	4.8	1.1	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	1.2	0.0	0.0	0.0	0.0	0.0	39.3	0.0	0.0	0.0
6	865.5	344.4	442.4	451.5	260.0	973.2	812.3	620.9	717.7	625.0
7	0.0	38.1	67.0	35.7	48.7	10.4	14.2	29.2	40.3	140.1
8	609.7	158.5	285.7	219.6	323.4	212.4	84.5	85.5	176.0	261.9
9	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	350.1	201.1	252.3	89.9	41.6	6.7	26.3	27.9	14.1	3.4
11	0.9	0.0	0.0	0.0	0.0	0.7	0.5	2.7	1.0	1.2
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	0.2	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
181	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	0.0	0.0
184	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	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
Total	1,840.7	742.4	1,051.0	797.4	674.4	1,205.6	983.6	768.9	949.1	1,033.3
Landings	952	477	592	421	460	434	450	476	404	519
Vessels	10	8	8	9	8	9	12	14	10	9

Table 3b. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl fishery catch in thousands of pounds by season and district, 1979/80 to present.

Dist.	Year										
	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90 ^a
1	6.4	3.2	6.7	2.5	7.2	0.1	*	*	0.0	*	*
2	1.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
3	2.4	1.1	1.3	0.6	0.0	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	0.0
5	0.7	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
6	427.4	416.9	790.4	1,199.6	1,015.4	544.7	235.7	1,667.1	1,234.5	1,049.1	800.0
7	109.8	77.9	31.5	11.8	138.6	101.2	29.7	100.1	75.8	17.5	67.4
8	405.7	342.5	88.3	51.0	545.6	607.9	160.7	431.6	434.1	593.9	679.0
9	0.0	1.8	0.0	97.1	21.8	0.0	0.0	0.0	0.0	0.0	0.0
10	2.8	0.0	0.0	34.3	26.3	34.7	*	*	*	*	*
11	0.0	0.1	0.2	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	0.0
13	0.2	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	0.1	0.2	0.2	0.1	2.0	0.9	*	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	0.0
181	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	11.0	0.0	0.0	0.0	0.0	0.0	0.0
184	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	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
Total	956.9	843.7	919.0	1,397.1	1,768.1	1,289.9	428.2	2,202.7	1,761.6	1,679.5	1,586.2
Landings	982	920	523	455	668	809	249	428	389	528	578
Vessels	17	21	15	15	18	23	16	16	26	19	21

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

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

Table 4. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl harvest and (landings) by district and month, 1989/90⁴.

Month	District						Total Vessels	Total Catch
	1	6	7	8	10	15		
May		154.1 (35)	25.8 (21)	277.7 (17)	*	0.0	21	473.6
June		216.0 (43)	*	*	*	*	17	236.2
July		84.4 (22)	*	163.4 (8)	*	0.0	12	259.0
August		169.3 (44)	*	*	0.0	0.0	9	173.4
September		39.1 (8)	*	184.7 (95)	0.0	0.0	16	224.3
October	*	37.7 (15)	24.5 (29)	51.4 (34)	*	0.0	15	115.8
November		*	0.0	0.0	*	0.0	4	65.6
December		*	*	0.0	0.0	0.0	6	38.4
Total Harvest	*	799.8	67.4	679.0	*	*		1,586.2
Landings	*	197	65	302	*	*		578
No. Vessels in Fishery	*	14	10	19	*	*		21

⁴ Most recent year's data should be considered preliminary.

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

Table 5. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp otter trawl fishery catch, number of landings, and CPUE, 1975/76 to present.

Year/ Season	Catch in Pounds	Number of Landings	Pounds Per Landing	Number of Vessels	Pounds Per Vessel
1975/76	*	*	*	*	*
1976/77	150,800	4	37,700	*	*
1977/78	0	0	0	0	0
1978/79	0	0	0	0	0
1979/80	66,220	8	8,278	*	*
1980/81 ^{a/}	2,051,966	38	53,999	19	107,998
1981/82	36,365	4	9,091	*	*
1982/83	138,246	8	17,281	*	*
1983/84	417,362	11	37,942	6	69,560
1984/85	202,259	6	33,710	4	50,565
1985/86	*	*	*	*	*
1986/87	480,374	11	43,670	4	120,094
1987/88	10,448	5	2,090	*	*
1988/89	0	0	0	0	0
1989/90 ^{b/}	0	0	0	0	0

^{a/} 1980/81 season includes 450,000 pounds reported out of Yakutat Bay in August and September, but not reported on fish tickets.

^{b/} Most recent year's data should be considered preliminary.

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

Table 8. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot fishery catch in thousands of pounds by year and district, 1969 to present.

Dist.	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^{4/}
1	32.9	11.0	3.9	8.4	*	3.0	1.6	4.4	3.6	5.7	4.2	21.4	14.5	18.9	39.5	47.4	58.5	47.6	70.6	153.4	106.8
2	4.5	1.5	3.3	14.8	*	12.8	4.0	6.7	10.8	13.1	7.3	13.2	16.5	18.1	32.5	19.0	50.6	68.0	119.8	64.3	31.6
3		8.1			*		0.2	1.4			4.2	7.6	23.1	60.5	61.0	35.5	31.0	65.5	26.0	25.0	6.6
4					*						1.3	0.4			1.0			0.7	0.1		*
5					*					0.7					0.9		0.2	0.1	0.9	*	*
6					*								4.5	4.5	13.6	4.7	4.4	5.7	1.2	0.6	9.0
7	2.8			1.7	*				4.8	3.8	5.0	15.4	19.2	28.2	73.1	82.7	57.6	26.3	45.3	48.0	36.7
8		1.1	0.9		*					4.5		0.8		2.2	4.9	15.0	5.5	3.4	1.5	2.1	5.2
9				0.2	*							2.7	2.1	4.1	6.0	1.0	1.9	0.6	6.1	15.9	*
10		0.2	2.0	1.9	*								2.1	0.0	5.5	13.3	26.5	15.5	23.2	31.9	22.0
11					*								0.1	0.5		0.2	1.3	0.5	1.3	2.2	*
12					*						1.3	0.0	2.0	1.1	0.5	3.7	1.6	2.3	5.6	10.0	7.3
13					*					0.4	0.1	0.5	0.5	15.8	15.2	21.1	9.0	6.5	12.0	19.8	18.9
14					*							1.0	1.4	0.2	0.1	0.1	0.4	0.1	0.1	1.7	
15					*												0.2	0.3	1.0		
16					*																
183		10.1			*	0.1									20.5	4.0	3.6	2.8	3.6	*	*
186					*							0.1	0.6	0.0	36.3	6.5	2.3	6.7	2.6	3.4	2.8
					*										1.6						
Total	40.2	32.8	10.1	27.0	*	16.0	5.8	12.5	19.2	28.2	23.3	63.1	86.8	174.6	290.0	255.8	254.9	252.7	320.9	380.8	254.3
Landings 53	42	24	44		*	18	11	31	17	82	30	146	227	428	549	738	749	602	679	860	601
Vessels 5	5	4	7		*	5	5	6	7	9	10	26	34	52	87	118	106	93	99	132	110

^{4/} Most recent year's data should be considered preliminary.

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

NOTE: Number of vessels reported as actual number of vessels fishing in 1969 through 1974 season, and number of permits fished from 1974 to the present.

Table 9. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot fishery catch in thousands of pounds by year and month, 1969 to present.

Year	Month												Total	Landings	Permits
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.			
1969	4,246	5,669	13,475	5,471	6,473	3,410	0	0	0	0	0	1,452	40,196	53	5
1970	4,594	4,638	5,094	2,470	4,303	6,481	976	0	0	282	782	3,213	32,833	42	5
1971	1,649	3,520	1,268	0	0	0	0	0	1,970	231	938	546	10,122	24	4
1972	1,846	1,588	4,301	10,923	3,788	1,750	0	2,142	0	625	0	0	26,963	44	7
1973	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1974	0	1,350	4,456	7,274	0	1,665	0	0	0	362	280	567	15,954	18	5
1975	70	567	1,265	675	0	0	956	0	0	0	362	1,946	5,841	11	5
1976	580	1,078	1,617	1,484	1,463	1,279	1,597	1,167	0	0	540	1,646	12,451	31	6
1977	10,400	0	1,454	6,466	0	0	310	0	100	369	86	0	19,185	17	7
1978	9,943	1,351	1,633	5,250	3,890	255	690	90	2	560	11	4,527	28,202	82	9
1979	0	0	0	3,239	5,109	3,168	3,946	1,644	3,589	1,790	820	0	23,305	30	10
1980	799	1,544	3,728	2,479	12,388	8,421	7,840	1,519	1,112	9,410	3,149	706	63,095	146	26
1981	1,679	1,373	4,041	7,443	8,275	7,171	22,552	9,964	5,717	11,413	2,863	4,312	86,803	277	34
1982	2,625	5,113	9,907	9,955	3,288	4,982	32,589	47,300	15,039	20,566	7,042	16,187	174,593	428	52
1983	9,214	25,817	7,468	990	4,501	3,281	50,712	42,895	58,223	38,234	34,208	14,421	289,964	549	87
1984	12,224	20,290	22,311	24,382	30,596	29,437	8,804	8,038	4,305	32,313	36,604	26,521	255,825	738	118
1985	29,795	35,681	9,076	8,467	29,125	19,873	15,909	17,608	18,964	15,191	26,696	28,473	254,858	749	106
1986	28,932	30,459	27,101	10,088	2,416	3,386	8,084	7,783	3,389	45,647	45,443	39,942	252,670	602	93
1987	45,660	61,393	24,912	9,884	5,349	2,709	6,824	4,871	5,071	64,251	48,453	41,531	320,908	679	99
1988	45,773	54,638	15,142	17,408	9,023	6,537	5,355	5,055	3,251	72,356	82,258	64,001	380,797	860	132
1989 ^v	47,939	52,209	19,997	10,641	2,592	5,798	6,610	8,344	5,972	64,484	15,730	13,976	254,292	601	110

^v Most recent year's data should be considered preliminary; season in progress.

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

Table 10. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot harvests in thousands of pounds and (landings) by district and month, 1989^{1/}.

Month	District																Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		183
Jan.	20.9 (31)	*	*			*	9.1 (21)	*		*			2.4 (5)				*	47.9
Feb.	20.8 (31)	12.6 (31)	*			*	8.5 (23)	*		*		*	3.3 (12)	*			(10)	52.2
Mar.	*	*	*							5.7 (15)		*	2.7 (11)					20.0
Apr.					*				*	9.8 (27)	*	*	2.0 (9)					10.6
May					*	*		*	*	1.8 (13)	*	*	*				*	2.6
Jun.								*	*	1.6 (9)	*	*	*				*	5.8
Jul.					*			*	*	*				*			*	6.6
Aug.						*		*	*	1.4 (10)				*		*	*	8.3
Sep.								*	*	*			*				*	6.0
Oct.	27.2 (47)	24.9 (46)	2.3 (11)				11.1 (17)		*	*	*	*	*				*	64.5
Nov.	39.3 (60)	14.7 (31)	*			*	10.1 (20)			5.3 (10)		*	2.8 (7)				*	15.7
Dec.	43.0 (81)	4.1 (12)	1.1 (12)		*	*	8.9 (26)		*	*			3.0 (13)				*	14.0
Total	153.4 (252)	64.3 (141)	25.0 (40)		*	0.7 (11)	48.0 (108)	2.1 (11)	15.9 (29)	31.9 (107)	2.2 (8)	10.0 (41)	19.8 (71)	*		*	3.4 (40)	254.3 (601)

^{1/} Most recent year's data should be considered preliminary.

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

REPORT TO THE BOARD OF FISHERIES

1989/90 SOUTHEAST ALASKA-YAKUTAT MISCELLANEOUS SPECIES FISHERIES



By

Timothy Koeneman,
Ken Imamura
and
Catherine A. Botelho

Alaska Department of Fish and Game
Division of Commercial Fisheries
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ABALONE

Background

The Alaskan abalone fishery targets the pinto, or northern abalone (*Haliotis kamschatkana*), which inhabits the rocky lower intertidal and subtidal surge zones of the outer coasts of Southeast Alaska. Commercially harvestable quantities of abalone occur in parts of Districts 103, 104, 105 and 113. 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 probably 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. 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, the commercial fishery utilizes SCUBA or hookah (umbilical diving) gear and most of the harvest occurs subtidally. Fishing success is variable depending upon weather, substrate, vegetative growth, visibility, diver experience, abalone abundance, and other factors.

Management strategy for the commercial fisheries include closures during spawning and settling periods, a 3 1/2 inch minimum size to insure some reproduction before full recruitment into the fishery, and guideline harvest ranges intended to protect the two major fisheries from overexploitation. In general, the major fisheries are divided into the District 13 (northern outer coast) and District 3, 4, and 5 (southern and southern outer coast) fisheries. This division was established historically by early fishing and landings patterns that generally persist to the present day. Closed waters around Ketchikan and Sitka, around Coronation Island in lower Chatham Straits, and the southern half of the west coast of Prince of Wales Island protect stocks from commercial exploitation.

The fishing season starts on October 1 of each year. In recent seasons, characterized by increasing brevity, closure dates have been set prior to the opening of the season.

Historical Summary

Harvests of Alaskan abalone were highly variable from 1964 through 1976 (Tables 1 and 2). During these years, effort and landings were sporadic, generally in response to fluctuations in local markets.

Seasons were open all year, minimum legal size was set at three inches in greatest diameter, and the fishery was managed through harvest permits the specified area-specific conditions. In 1968, the minimum legal size was raised to four inches in the high production areas, Districts 1 through 6. Minimum sizes were raised for Districts 9 through 14 to 3 1/2 inches in 1976, followed by a general change for all districts to 3 1/2 inches in 1977.

In 1977, a reduced supply of abalone products on the world market, the acceptance of pinto abalone in the Japanese market, favorable monetary exchange rates for the yen, and relaxed Alaskan harvest regulations combined to improve the commercial feasibility of this fishery. Landings jumped from a long-term average catch of about 4,000 pounds to 163,178 pounds in the 1977/78 season. This was followed by a 268,667 pound harvest in 1978/79.

During their spring meeting in 1979, the Board adopted a proposal to increase the minimum size from 3 1/2 inches to 3 3/4 inches. In response to requests by subsistence users, major commercial fishing closures were approved around Ketchikan and the small communities on the outside coast of Prince of Wales Island. Despite these substantial setbacks, 273,770 pounds were harvested in 1979/80, the first of the seasonal accounting years which started on September 1, 1979. The 1979/80 season ended on June 14, 1980, when the season was closed by emergency order for the first time. This closure was a result of the Board adopting a 250,000 pound seasonal quota in the spring of 1980.

The intensified fishing effort and remote locations of harvest in 1980/81 resulted in 279,113 pounds being harvested before the department could respond. The season closed by regulation on May 31, 1981. Earlier in 1981, more changes to harvest quotas and seasons were adopted by the Board. The harvest range was reduced to 100,000 to 125,000 pounds and the season shortened to September 15 through May 15.

The 1981/82 season lasted about two months, ending on November 12, 1981. The Sitka area was reopened on December 1 through December 15 so catches from this area would more closely approximate the historical relative proportion of the total catch harvested from the outside districts and those around Ketchikan. The differences in the lengths of the seasons for these two generally separate fishing areas continue to the present. For much the same reasons as in prior seasons, the total catch of 172,029 pounds was considerably above the upper guideline harvest range of 125,000 pounds.

In 1982 the Board split the existing guideline harvest range, allocating 86,000 to 107,500 to the area around Ketchikan and 14,000 to 17,500 to the area around Sitka. The season lasted about 1 1/2 months in the Ketchikan area and four months in 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 first segment was closed after about 1 1/2 months. The second was open from March 1, 1984 to May 15, 1984. The split allowed much more complete accounting of fish tickets and provided a total harvest of 126,942 pounds, very close to the upper end of the guideline

harvest range. No major regulatory changes occurred in 1984 and the 1984/85 season was managed for autumn and spring segments. However, it was apparent at this time that the resource was in trouble. Only 68,276 pounds were harvested in both segments.

The Board restricted the 1985/86 harvest to a range of 25,000 to 50,000 pounds in the Ketchikan area and 8,000 pounds in the Sitka area and delayed the Sitka area opening to November 1. The Ketchikan area season was over in a month and that in Sitka lasted little more than 1 1/2 months.

Starting in the 1986/87 season, harvest has been held to levels between 54,804 pounds in 1986/87 to 76,100 pounds in 1988/89. Regulations have not changed during this period, but the fleet has continued to improve its capabilities (Table 4). A significant portion of the catch is processed by floating processors and the fleet is becoming increasingly mobile.

Season Summary

The 1989/90 season opened on October 1, 1989. Sixty-eight permitted divers, operating from 25 registered vessels, made 116 landings for a total of 61,804 pounds (Table 3). Total ex-vessel value of the catch was estimated at \$247,800. Actual landed value is difficult to assess for this fishery because of the various forms of sale (fresh or frozen, in-shell and shucked, local specialty market or distant market, floating processor or shore plant). Some forms of the product may have sold for at least twice the average reported price of \$4.00 per pound.

Except for District 13, which is managed separately, the length of the season for the rest of Southeast Alaska was set prior to the opening. Closure was by emergency order on October 13, 1989. A total of 57,784 pounds was reported landed, mainly from Districts 3, 4, and 5 (Table 3). This harvest was above the upper guideline harvest range. Tracking the fleet and compiling harvest information has continually become more difficult with the improvements incorporated into the operations of increasingly competitive commercial fishermen.

As in the 1987/88 season, the relative harvest in District 5, which is more protected and inland than Districts 3 or 4, was very high. District 3 landings were the second lowest recorded since the 1977/78 season, while District 4 landings were the lowest since 1977/78.

District 13 was closed by emergency order on November 9, 1990. Only 14 landings were reported from District 13, all in October. The closure came after a notable lack of fishing effort that accounted for only 4,020 pounds being harvested. This was the lowest catch reported from District 13 since the start of the high level fisheries in 1977/78.

Although these trends were suggestive of possible resource problems, these may be an artifact of the nature of current fisheries, which are very short and intense. Short-term influences such as inclement weather greatly affect the distribution of the fleet and possibly skews the district catches in any given season. A few participants also account for a disproportionate amount of the catch, and their fishing patterns also affect the reported fishing and landings patterns. Present management strategies are considered to be quite conservative, with the intent to provide for a small fishery while allowing some rebuilding of those stocks which were heavily harvested during the early 1980's.

Issues

Much of the emotion and heated discussions that characterized interactions between the department, the Board of Fisheries, and industry during the late 1970's and early 1980's has subsided, along with the resource. There is general agreement that most of the stocks were harvested at an inappropriate rate during that early period.

Commercial harvest and competition with subsistence users has been addressed by large area closures to commercial harvest. In general terms, the commercial abalone fishery, its pattern of development, and initial overharvest will remain a sore point for many in the subsistence versus commercial use debate.

Outlook

Unless major changes in the abalone populations or management strategy for this species are implemented, the fishery in the near future will approximate that of the last two to three seasons. Seasons will be as short as, if not shorter, than recent seasons because of continued high interest and participation in the fishery. There are also very few indications of a general increase in abundance on historically productive grounds to justify a larger harvest or longer season.

There is also no expectation for funding and staffing of field programs to more closely study the population dynamics and biology of abalone (Tables 5 and 6). Port sampling will continue to be done as the rare opportunity presents itself and as other duties of higher priority allow.

A major developing problem which is not readily acknowledged is the threat of the rapidly expanding sea otter populations to shellfish species in Southeast Alaska. The current rate of increase of sea otters will see their current population, conservatively estimated at 5,000 animals in Southeast Alaska, double its size every four years. The preferred habitat for sea otters overlaps that of many economically valuable shellfish species, most notably abalone, sea urchins, Dungeness, Tanner, and king crabs, and

hardshell clams. Experience in other recently colonized waters of the state suggests that these shellfish species may be driven to economic, if not local biological, extinction by sea otters.

SCALLOPS

Background

The weathervane scallop, *Pactinopectin caurinus*, is commercially harvested from offshore beds in Statistical Area D (Yakutat) by larger vessels using scallop dredges. No significant harvests have been reported from Statistical Area A (Southeast Alaska) in recent years. Studies conducted during the developmental stages of this fishery indicated an average size of maturity for this species of approximately three inches in shell length.

The primary conservation strategy employed in this fishery is a four inch minimum ring diameter in scallop dredges. In theory, this provides for some escapement of mature scallops. A permit registration system provides information on effort levels and the fish ticket system reports the harvest in pounds of shucked meats.

Historical Summary

The early years of the fishery, 1968 and 1969, were very productive. They were followed by a few years of relatively low effort and harvest. The fishery expanded again during the mid-1970's, and declined through the late 1970's. Effort and harvest increased once again from 1980 through 1982, decreased in 1983, increased in 1984, decreased in 1985, and increased through 1987. Some of these fluctuations in effort and harvest may have been a result of market conditions and the presence of more lucrative alternative fishing opportunities. However, a trend of high harvests is evident in the data and may be an indication of the need for a recovery period after periods of high harvest. In most years the harvest is taken by very few vessels. The catch for the last five years has averaged about 59,475 pounds of shucked meats (Table 7). Shucked meats represent about 11% of the whole weight of the live scallop. Current ex-vessel price per pound is approximately \$ 4.15.

Season Summary

During 1989, the scallop dredge fishery was limited to fewer than three vessels operating off the Yakutat coast in Statistical Area D. This vessel information and harvest data are confidential and is not stated in this report. This continues a recent season pattern of low effort by very few vessels in this fishery. Research assessment programs are not in place to obtain more detailed information concerning this resource.

Issues

The scallop fishery has a history extending back to 1968. As such, it is not a new or developing fishery. Yet, only a small number of vessels participate sporadically during any given period, the fishing grounds are usually remote, and variability in species abundance is extreme. These factors have combined to discourage any concerted research into the life history and population dynamics of this fishery. As such, this fishery shares many of the issues common to developing fisheries.

Information on distribution, abundance, and population characteristics are limited. The effects of the current fishing patterns and intensity are unknown. During periods of increasing effort and catch, the ability to collect and analyze the available data for use in management is outstripped by the fishery. Staff involvement is limited to resolution of in-season problems and collection of data to use for crisis management and post-season analysis.

Outlook

Recent information necessary to determine stock conditions for this fishery is totally lacking, and the information available from the commercial fishing industry is not useful to predict future harvests. Scallop beds may be relatively depressed from historic high harvests. An annual harvest of between 50,000 and 100,000 pounds of meat may be expected during the 1990 fishing year.

GEODUCK

Background

Known geoduck clam, *Panope generosa*, beds occur sporadically in the central and southern portion of Southeast Alaska, primarily near the outside coast. Studies done in other locations, specifically Puget Sound in Washington State, and more generally in British Columbia, indicate that this clam may live to be over 100 years old. It appears that Southeast Alaska is the extreme northern edge of the geographic range of this species and recruitment may be sporadic or very low seasonally.

Fairly high levels of paralytic shellfish poisoning (PSP) have been found in this species, mostly associated with the viscera. As a result, current regulations of the Department of Environmental Conservation prohibit the sale of unprocessed clams. Disposal of waste portions of the clam must be done in a prescribed manner. Each individual delivered lot must be certified free of PSP prior to release for marketing. Currently, sale of live geoducks is prohibited. These factors necessitate a close working relationship between the Department of Environmental Conservation, Department of Fish and Game, and industry.

Management goals in the geoduck fishery are to provide for low exploitation rates for this long-lived species with low and sporadic recruitment. Harvests are restricted to beds which have been surveyed, and for which biomass estimates are available. After an area has been surveyed, and a population estimate completed, the guideline harvest level is determined based upon a 2% fishing mortality. Area rotation is also utilized in the Gravina Island and Noyes Island fisheries. After an area has been open and the guideline harvest taken, that area is closed and is not reopened for three or four seasons.

The fisheries are monitored through the miscellaneous vessel registration and harvest permit system and fish ticket information. In most cases, a diving logbook is a condition of the harvest permit. Other biological data is collected from the fishery as time and opportunities permit.

Historical Summary

Prior to 1985 a few geoducks were test marketed or sold for bait. Starting in 1985, state grants were used to find and qualitatively assess commercial beds in the Ketchikan, Petersburg-Wrangell, and Sitka management areas. A number of potential commercial beds were located. Procedures for testing and certifying the product for human consumption were established. Harvestable biomass was estimated for a few promising beds. As a result, three beds in the vicinity of Noyes Island were certified for harvesting. Finally, two processors were certified for processing.

In late 1985, the first permit was issued for the commercial harvest of geoduck clams. This harvest was conducted under a management plan based on population estimates and designed to control the development of the fishery as well as prevent the depletion of the beds which were open, and was based upon population estimates. During the 1985/86 season, 154,582 pounds were harvested of the 300,000 pound five year quota in the Noyes Island area. During the 1986/87 season, only 28,191 pounds were harvested; the decline mainly due to poor marketing conditions and high operational costs. Increased interest in this fishery began after department personnel completed a survey and population estimate project on the west side of Gravina Island. During the 1987/88 season 124,568 pounds were harvested from the Vallenar Bay area of Gravina Island and 60,577 pounds were harvested from Noyes Island. The Vallenar Bay beds were closed on May 16, 1988 by Emergency Order (1-M-8-88). In 1988/89, the total landings were 142,455 pounds (Table 8).

Season Summary

In 1989/90, the current reported landings as of February 25, 1990 are 89,034 pounds from the open areas on the west coast of Gravina Island and the north shore of Noyes Island. The average price being paid during this season is \$.54 per pound, ex-vessel.

Issues

As with many other shellfish fisheries, that for geoducks is managed with relatively little available information on life history, fisheries biology, and population dynamics. Southeast Alaska stocks are at the northern extreme extent of the known range. These stocks are probably subject to greater variation in success of many life history stages than those in more central locales. The long-term effects of current harvest rates are unknown and the fishery itself is continuing to grow, with mounting pressures to certify and open new areas.

SEA URCHINS

Background

Sea urchins are found in the nearshore marine waters in many areas of Southeast Alaska. Two species are of commercial interest. The green sea urchin (*Strongylocentrotus drobachiensis*) and the red sea urchin (*S. franciscanus*) are harvested primarily with dive gear. Available information suggests that the red sea urchin is more abundant and widely distributed, while the green sea urchin is preferred in some markets. The fishery for red sea urchins is more fully developed because it seems to be more prevalent in the Ketchikan area than the green sea urchin.

Red Sea Urchin Management

Management strategies that have been employed for this fishery include area rotation, restriction of harvest to urchins with test (shell) diameters between 3.0 and 4.5 inches, and a fishing season between October 1 and April 30, approximating the period for optimum economic roe recovery. Guideline harvest levels are also set for urchins. Harvest terms and stipulations are included in the harvest permits required of each participant in the fishery. Harvest information is collected through fish ticket data and logbooks.

Area rotation is utilized to assist in stock conservation by providing approximately two years between harvests for stock recovery and reproduction, growth, and recruitment. It allows for the controlled development of the fishery while providing information on stock distribution. Area rotation also protects localized stocks near the population centers from being depleted and ensures that at least one area easily accessible from Ketchikan is open for harvest each year.

Size limits were established to insure product quality and conservation of the resource. Industry has mainly been interested in roe obtained from urchins within the 3.0 to 4.5 inch size group. Also, a review of the available biological information indicated that the larger urchins provide a protective spine canopy for survival of young urchins. Future recruitment is thought to be positively density dependent. Urchins smaller than 3.0 inches test diameter are left for future recruitment.

Closed seasons protect stocks during sensitive reproduction and settlement stages. Guideline harvest levels provide for controlled development of the fishery and also provide some assurance that overexploitation will not occur on localized stocks nor affect large areas simultaneously.

Green Sea Urchins

Currently, there is no management plan developed specifically for green sea urchins. Harvest of this species is handled through specific permits terms entered on the miscellaneous species permit. Such terms generally follow the principles described for red sea urchins, with the exception that the size limit is smaller due to the smaller maximum size of this species.

Historical Summary

Between 1981 and 1983, small batches of urchin roe were test-marketed in Japan. In 1984, the first significant harvest, about 61,650 pounds of mostly red urchins, occurred in the Ketchikan area. The harvest increased to 125,973 pounds in 1985, 282,384 pounds in 1986, and 652,965 pounds in 1987. Part of the large harvest in 1987 was due to provision for a summer fishery to monitor gonadal development. It is unlikely that another summer fishery will occur. The effort peaked in 1987, with 36 individuals participating in the fishery. Since 1987, the market has been very marginal, with different processors entering and leaving the fishery with variable success (Table 8). Reported roe percentages have fluctuated greatly, with the outer coastal districts on the west coast of Prince of Wales maintaining a slightly higher level of roe maturity. Ex-vessel prices have reflected the variable demand for this product, ranging from \$.10 to \$.18 per pound whole weight, depending on roe maturity.

Season Summary

Of the 142,068 pounds reported landed in 1989, most were landed during January through March. Twelve divers made 83 landings during 1989. Landings during 1990 through February have been very low. Lack of markets appear to be constraining harvest since late 1989. Opportunities in other fisheries may also be affecting the effort being directed to the sea urchin fisheries.

Issues

Sea urchin harvests could easily expand if market conditions improve or demand for Southeast Alaska urchin roe products increases. A formal management plan for green sea urchins should be drafted to guide this fishery as it develops. Distribution and abundance information should be collected, either by directed department surveys or contracted diving services.

Outlook

Future direction in the sea urchin fisheries will depend on market demand for sea urchins and the availability of alternate species harvest opportunities for divers. Of the two, market demand is clearly the dominant determinant.

Continued growth and geographic expansion of the Southeast Alaska sea otter populations will cause declines in sea urchin stocks. In turn, this has many implications for commercial fisheries, most of which are pessimistic.

SEA CUCUMBERS

Background

Sea cucumbers are echinoderms, related to sea urchins and starfish. As a group, they are widely distributed in many of the oceans of the world. Some species have been harvested for human consumption for thousands of years, notably in the Orient. As demand has increased, exploitation of other species, including some native to the West Coast of North America, has begun.

The principal commercial species of sea cucumber harvested in Southeast Alaska has been tentatively identified as *Parastichopus californicus*. It is a common species distributed from Mexico to Southeast Alaska and has been observed as least as far west and north as Yakutat Bay. It occupies rocky and shelly subtidal habitats from nearshore shallows to over 100 fathoms, where its primary food seems to be detritus which it ingests along with significant amounts of fine substrate. Its ecological function seems to include recycling of larger detrital material into nutrients for the primary producers in the marine food chain. It appears to favor locations with moderate current and oceanic salinities, avoiding mud bottoms and areas subject to inundation by freshwater or glacial runoff. Major centers of abundance in Southeast Alaska seem to be located more on the outer coasts and immediately contiguous waters than the inner waterways and fjords.

Most of the harvest in Alaska has been confined to Southeast Alaska to date, primarily around the communities of Ketchikan and Sitka and secondarily around Craig. The fishery for this species has grown rapidly in the last four years, with continuing interest by divers and processors. Currently, four or five processors are located in Ketchikan, with two processing sea cucumbers exclusively, one is in Craig, and one is in Sitka, processing sea cucumbers as the primary product.

Most of the vessels pioneering this fishery were small skiffs of limited range and capability. The fishery was pursued in the vicinity of either Ketchikan or Sitka, mostly as a day fishery in clement weather, with up to several thousand sea cucumbers delivered per vessel per diver day. Most harvest was by SCUBA or hookah diving gear, with an average of two divers operating off a single skiff or vessel. Most of the harvest was taken from depths between ten to 60 feet. Each diver could work for between six hours and two hours per day, depending on the maximum working depths. Harvest of sea cucumbers consists of collecting sea cucumbers, which lie passively on the sea floor, filling large mesh bags with them, and transporting the filled bags to tendering skiffs or vessels.

While the fishery is still predominantly a skiff fishery, efforts are being made to find a means of using larger vessels to fish more distant waters. The immediate obstacle to development of multiple day fisheries in remote areas has been industry's inability to keep sea cucumbers alive, even in circulating holding tanks, for more than a few days. As the operational constraints to using floating processors are overcome, their use will probably allow more intensive harvest of more remote areas.

Processing of sea cucumbers is currently conducted in a two step process. The freshly caught sea cucumber is eviscerated on the fishing grounds by either the diver or a tender operator. A small slit is cut into the ventral, anterior end of the animal and the viscera, gonads, respiratory trees, water, and body fluids are expressed through this opening. The slit, drained sea cucumbers are placed in buckets or totes and transported to the processing facility, where they may be immediately processed or held for up to two days in a refrigerator or on ice. Sea cucumbers are bought by the bucket or drained weight, depending on the processor. Holding times for eviscerated, densely packed sea cucumbers are limited by their rapid decomposition, which occurs even when they are refrigerated.

Processing at the plant consists primarily of continuing the incision made by the diver so the sea cucumber is slit from anterior to posterior, opened, and the muscle bundles separated from the skin with a scraper or knife. The major product from this fishery to date has been the longitudinal and transverse muscle bundles or meat. Washed and blast frozen, blocks and portions of meat are sold mostly for domestic consumption.

Some processors also freeze the skins for shipment. Others, with no market for skins, discard them. A few processors are experimenting with added value processing of skins for the oriental dried sea cucumber market.

Skin processing involves cooking or boiling the skins to a specific texture and drying the product. The dried skins are ostensibly used, mostly in the Orient, in upscale cuisine. While the processed skins are of higher value, the production of an acceptable dried product, known in the industry as *trepang* or *beche de mer*, has not been achieved yet by Alaskan processors.

Current Management of the Fishery

Management for this fishery developed on an area specific basis in response to the onset of processing in communities. The first fisheries were based in Ketchikan and over the years, evolution of the management strategy resulted in a partition of most of the statistical subdistricts into one of three seasonal rotations. An area is open to harvest every third year, depending on which rotation it is in. Five percent of the estimated abundance in an area is harvested, after which the area is closed for two years. Abundance is estimated by using a formula derived from diving transects conducted by department divers in the Ketchikan area. With the exception of the west coast of Prince of Wales and the outer open ocean coasts, most of the statistical districts in the Ketchikan management area have been assigned to a rotation.

A processor started purchasing sea cucumbers in Sitka in 1989. Currently, Sitka Sound has been divided into three rotational areas. The first rotational area was closed in January 1990. Harvest is occurring in the second rotational area and also in more outlying areas, which are open by special permit for limited harvest. As five percent of the estimated abundance in these areas is caught, they will be closed and assigned to a rotation. The Sitka management area has not yet assigned all their districts to a rotation but are in the process of doing so.

Other management areas are less involved with this fishery because the resource apparently is concentrated on the outside coast or more open water than those in the Petersburg, Juneau, and Haines management areas. Fishing is permitted in these areas on a special permit basis, with restrictive conditions and very limited quotas.

The disparate nature of management policy for each management area is primarily an artifact of the stage of development of the fishery in each area. As the fishery matures and reaches full development throughout Southeast Alaska, management should become more consistent from area to area. The department is working to expedite this process through development of a sea cucumber management plan.

Development of a management plan will take some time. Input from various user groups need to be incorporated, differences in management strategy between areas resolved, and a realistic program developed. The fishery continues to expand and change, so speed is imperative. However, premature implementation of any plan will satisfy neither the needs of the resource nor those of the user groups.

Historical Review of the Fishery

The first registrations for sea cucumber were requested in 1981. One or two registrations were issued each year between 1981 and 1986, but only one vessel reported any landings during this period.

Rapid expansion in 1987 saw five registered vessels and thirteen permits harvest 132,484 sea cucumbers, with 155 reported landings. This represented the beginning of the development of processing and marketing of this species from Alaska.

In 1988, seven vessels were registered and five permits issued for this fishery. About 90,044 sea cucumbers were harvested in 1988. Effort increased in 1989 to 60 vessels and 95 hand-pick permits. The harvest increased to 1,585,054 animals (Tables 9 and 10).

1989 Season Summary

Consistent accounting years have not yet been set for Southeast Alaska, so the season summary is by calendar year. Sixty vessels were registered. The actual number fishing or involved in the fishery may have been slightly less. Ninety-five permit holders, a sizeable increase from the five permit holders in 1988, expended over 20,000 dive hours to harvest 1,585,054 sea cucumbers in 1989. This represents about 450 tons of drained weight equivalent sea cucumbers.

Monthly prices per pound averaged \$.55 at the beginning of the year through July, at which time prices began rising, ending the year at an average of about \$.70 in December. The total ex-vessel value of the product was about \$531,400.00.

1990 Season Update

In the first month of 1990, about 400,000 sea cucumbers were harvested (Table 8). The figures for 1990 will change markedly between the publishing of this report and the meeting of the Board. Winter is considered a harder period to fish, so it is likely that if demand remains high the monthly catch for the rest of the year could easily reach 500,000 animals. At this harvest rate, between 1,500 and 2,000 tons could be landed in 1990. Thus far, 72 permits show some participation in the 1990 fishery.

Issues

The sea cucumber fishery is still in a developmental stage characterized by rapid expansion, fluctuating markets and participants, inability of management to cope with the pace of change, and an uncertain future. Many of the real and perceived problems associated with this fishery are due to one or more of these elements.

The Department of Fish and Game is largely an observer of the first two elements. To the extent possible, it is trying to formulate a management strategy that provides for an orderly development of the fishery, insures continuing viability of the resource, and is realistic within its own fiscal limitations. At this point in time, the major limitations are both lack of essential biological information and lack of the necessary resources with which to procure this information. Without these data, management will need to be extremely conservative, perhaps more than it currently is, or risk the long term biological vitality of the resource.

Sea cucumber harvest is also starting to be a subsistence issue in the broad sense of the word. While recent court decisions cloud the applicability of subsistence priority, some harvest and consumption of sea cucumbers and other currently unconventional marine resources is acknowledged to occur around most Southeast Alaskan communities. Whatever term is applied to this activity, it remains one of personal harvest and use of locally available resources. The rapid commercial expansion of the sea cucumber fishery, past experience with the abalone fishery, and possible commercial exploitation of other species in the future disturbs many subsistence users.

OCTOPUS

Background

Octopus, mostly *Octopus dofleini*, has been harvested in Southeast Alaska at minimal levels. Most are caught incidentally in the shellfish pot fisheries.

Historical Summary

Since 1976, octopus landings have ranged between 324 and 17,262 pounds. Octopus has been sold predominately as bait in the longline fisheries. The last reported ex-vessel prices in 1988 were around

\$1.25 per pound. This fishery utilizes the fish ticket system and miscellaneous permit forms for the collection of information necessary for the development of regulations and a management plan in the future. Historically, higher landings were a result of efforts to establish a commercial pot fishery, with specialized octopus pots, in Southeast Alaska, in the mid-1980's (Table 8).

Season Summary

No landings of octopus were reported in 1989.

Issues

There are no compelling, current issues in this fishery. However, a management plan should be drafted against the day that a fishery is established.

Outlook

There are no strong indications of any resurgence of the fishery.

SQUID

Background

The commercial fishery for squid, *Loligo opalescens*, has been minimal and sporadic. There has been some interest in the use of purse seine gear for harvesting this species off the west coast of Prince of Wales Island where it has been observed concentrated in shallower waters in the spring. Only small harvests have occurred in this fishery. No permits for mechanical jigging machines or hydraulic pumps, commonly used in other squid fisheries, have been issued.

This fishery uses the fish ticket system and the stipulations on the miscellaneous permit form as management tools. A management plan has not yet been developed for this species.

Historical summary

There have been no registrations or permits requested for this species since 1984. No significant landings were reported for those years for which permits were issued (Table 8).

Season summary

No squid were reported landed in 1989.

Issues

There are no compelling issues associated with this fishery at this time.

Outlook

There is no significant interest in this fishery at this time nor any indication that there may be any in the near future.

Table 1. Statistical Area A (Southeast Alaska) historic abalone, harvests in pounds by management area, 1964 to present.

Year	Ketchikan Districts (1-4)	Sitka Districts (13, 9A)	Petersburg Districts (5-8, 9B 10)	Juneau Districts (11, 12, 14-16)	Total
1964		3,000			3,000
1965		1,000			1,000
1966	3,000				3,000
1967	6,511				6,511
1968					
1969					
1970		1,100			1,100
1971		923			923
1972		2,610			2,610
1973	144	2,669			2,813
1974		16,339			16,339
1975		8,497			8,497
1976	55	546			601
1977	955	12,939			13,894
1978	131,128	50,167			181,295
1979	286,266	67,671	3,134	298	357,369
1980	229,644	14,182	3,362	0	247,188
1981	337,481	30,919	824	0	369,224
1982	96,968	12,826	3,490	0	113,284
1983	37,499	8,735	570	0	46,804
1984	94,867	8,459	13,917	0	117,243
1985	60,223	8,827	6,946	0	75,996
1986	37,909	6,842	9,495	0	54,246
1987	53,440	10,964	3,769	0	68,173
1988	39,290	10,172	26,638	0	76,100
1989 ^{a/}	33,572	4,020	24,212	0	61,804

^{a/} Most recent year's data should be considered preliminary.

Table 2. Statistical Area A (Southeast Alaska) abalone, seasonal commercial harvests in round pounds (landings) by district, 1977/78 to present.

Season	Districts									Total
	1	2	3	4	5	9	13	14	16	
1977/78	*		26,911 (38)	94,504 (42)			41,482 (163)	*		163,178 (247)
1978/79	*	*	51,151 (5)	152,823 (142)	*		61,045 (178)	*	*	268,667 (364)
1979/80		3,807 (7)	102,946 (53)	129,743 (66)		*	32,684 (126)			273,770 (255)
1980/81	*	*	111,058 (84)	147,242 (120)	824 (5)		18,619 (76)			279,113 (287)
1981/82	0	0	68,049 (69)	87,159 (74)	0	0	16,821 (13)	0	0	172,029 (156)
1982/83	*	0	29,693 (33)	67,177 (82)	3,490 (4)	0	12,826 (14)	0	0	113,284 (134)
1983/84	2,565 (11)	0	67,336 (46)	39,506 (40)	7,601 (12)	0	9,922 (19)	0	0	126,950 (128)
1984/85	2,745 (8)	*	23,553 (38)	23,511 (37)	*	0	10,864 (13)	0	0	68,276 (100)
1985/86	0	0	10,317 (15)	16,216 (12)	4,836 (4)	1,448 (4)	*	0	0	40,537 (37)
1986/87	60 (1)	0	19,417 (19)	18,432 (22)	9,495 (13)	0	7,400 (11)	0	0	54,804 (66)
1987/88	0	449 (5)	26,000 (30)	26,991 (46)	3,769 (8)	0	10,964 (18)	0	0	68,173 (107)
1988/89	0	0	18,227 (40)	21,063 (35)	26,638 (14)	0	10,172 (25)	0	0	76,100 (114)
1989/90 ^u	*	0	17,004 (39)	15,394 (33)	23,388 (19)	*	4,020 (14)	0	0	61,804 (117)

^u Most recent year's data should be considered preliminary.

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

Table 3. Statistical Area A (Southeast Alaska) 1988/89 and 1989/90 season harvests statistics of pinto abalone, in pounds and landings by district and month.

1988/1989					
District	October	November	December	February	Total
3	18,227 (40)				18,227 (40)
4	21,063 (35)				21,063 (35)
5	26,638 (14)				26,638 (14)
13	3,781 (18)	6,391 (7)			10,172 (25)
Total Pounds	69,709	6,391			76,100
Total Landings	(107)	(7)			(114)

1989/1990 ^u					
District	October	November	December	February	Total
1	974 (13)	*			974 (13)
2					
3	17,004 (39)				17,004 (39)
4	15,394 (33)				15,394 (33)
5	23,388 (19)				23,388 (19)
9	*				*
13	4,020 (14)				4,020 (14)
Total Pounds	61,804	*			61,804
Total Landings	(117)				(117)

^u Most recent year's data should be considered preliminary.

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

Table 4. Statistical Area A (Southeast Alaska) historic abalone fishery statistics.

Season	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90 ^u
Harvest In Pounds	163,178	268,667	273,770	279,113	172,029	113,284	126,942	68,276	40,537	54,804	68,173	76,100	61,804
Number Landings	247	364	255	287	156	134	117	100	37	66	104	107	117
Months Fishing	12	12	9.5	9	2.5	1.3	4.5	5.1	2.6	4.8	1.2	1.07	1.3
Weeks Fishing	52	52	38	36	10	5	17.8	21.0	8.6	19.3	5.0	4.03	5.7
Pounds/ Landings	660.6	746.3	1,073.6	972.5	1,102.8	845.4	1,085	683	1,096	830	656	711	528
Pounds/ Month	13,598.2	22,388.9	28,817.9	31,012.6	68,811.6	87,141.5	28,029	13,384	15,591	11,418	56,811	71,121	58,538
Pounds/ Week	3,138.0	5,166.7	7,204.5	7,753.1	17,202.9	22,656.8	7,132	3,251	4,714	2,840	13,635	18,883	10,843
Landings/ Monthly	20.6	30.3	26.8	31.9	62.4	103.1	26.0	19.6	14.2	13.8	86.7	100.0	90.0
Landings/ Weekly	4.8	7.0	6.7	8.0	15.6	26.8	6.6	4.8	4.3	3.4	20.8	26.6	20.5

^u Most recent year's data should be considered preliminary.

Table 5. Statistical Area A (Southeast Alaska) abalone, summary of commercial dockside sampling data.

Season	Number of Landings Sampled	Sample Size	Average Length (mm)	Length Range	Number Abalone Per Pound
1977/78	4	493	98.02	81-126	2.86
1978/79	7	965	100.22	80-136	Not Sampled
1979/80	18	2,026	106.06	84-143	2.51
1980/81	10	1,311	103.91	90-130	2.78
1981/82	7	785	106.91	83-136	2.60
1982/83	6	689	103.01	89-132	2.74
1983/84	13	971	106.46	92-138	2.90
1984/85	5	608	106.35	92-136	2.79
1985/86	5	433	100.97	92-137	3.08
1986/87	4	502	103.61	89-137	3.04
1987/88	4	730	104.52	90-137	3.12
1988/89	3	458	103.81	92-128	2.80
1989/90	2	423	107.60	93-134	2.60

Table 6. Comparative abalone length frequencies from research sites in Districts 3 and 4 (outside Prince of Wales Island) in areas open to commercial exploitation. Data developed by Robert Larson.

Year of Sample	1979	1980	1981
No. of sites	7	18	54
Sample size	1,304	1,230	2,848
Ab.'s collected per diving minute	Unknown	Approx. 4.0	6.0
Percent \leq 3 inches	17	28	57
Percent $>$ 3 inches by $<$ 3.75 inches	31	39	29
Percent \geq 3.75 inches	52	32	14
Average Length	3.7	3.4	2.9

NOTE: No studies done from 1982 through 1989.

Table 7. Statistical Area D (Yakutat) historic commercial catch and effort of weathervane scallops.

Year	Number of Vessels	Catch in Pounds	Number of Landings	Average Pounds Per Landing	Average Pounds Per Vessel
1968	11	927,795	34	27,288	84,345
1969	14	837,087	59	14,188	59,792
1970	*	*			
1971	*	*			
1972	4	128,241	6	21,373	32,060
1973	4	173,700	4	43,425	43,425
1974	*	*			
1975	4	139,022	12	11,585	37,455
1976	*	*			
1977	*	*			
1978	No Fishing Occurred				
1979	*	*			
1980	6	261,517	22	11,887	43,586
1981	11	445,934	36	12,387	40,539
1982	7	210,554	30	7,018	30,079
1983	*	*			
1984	*	*			
1985	4	21,836	11	1,985	5,459
1986	*	*			
1987	*	*			
1988	*	*			
1989 ^{a/}	*	*			

^{a/} Most recent year's data should be considered preliminary.

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

Table 8. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) commercial catch (landings) of miscellaneous species.

Year	----- Species and Species Code -----						
	Octopus 870	Sea Urchins 896	Snails 890	Geoducks 815	Razor Clams 830	Squid 875	Coral 899
1976	1,525 (20)						
1977	390 (8)						
1978	1,135 (15)		*		*		*
1979	1,362 (18)					*	*
1980	3,581 (36)			*			
1981	6,107 (62)	*					
1982	2,274 (42)	*					
1983	*	*	*	*			
1984	2,184 (10)	61,650 (29)	471 (6)	*	*		
1985	575 (4)	125,973 (48)		18,917 (4)			
1986	*	282,384 (153)		*			
1987	15,864 (94)	614,047 (303)		*			
1988	15,941 (204)	54,409 (31)	873 (8)	188,919 (161)			
1989 ^u	5,674 (70)	142,068 (83)	*	203,708 (185)			

^u Most recent year's data should be considered preliminary.

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

Table 9. Statistical Area A (Southeast Alaska) sea cucumber harvests in numbers, pounds, registered vessels, permits fished, and landings, 1981 to present.

Year	Number of Cucumbers	Pounds of Cucumbers	Number of Registered Vessels	Number of Permits Fished	Number of Landings
1981			1		
1982			1		
1983			0		
1984	*	*	2		*
1985			1		
1986			0		
1987	132,484	44,732	5	13	155
1988	90,044	50,018	7	5	75
1989	1,985,986	1,313,349	68	97	1,379
1990 ^v	401,142	266,081	42	72	301

^v Catch reported for the month of January only. Season in progress.

Table 10. Statistical Area A (Southeast Alaska) sea cucumber harvests in numbers (landings) by district 1987 to present.

Season	1	2	3	5	6	7	11	12	13	Total
1987	105,807 (113)	26,677 (42)								132,484 (155)
1988	90,044 (75)									90,044 (75)
1989	972,199 (727)	215,892 (90)		*			*		796,014 (559)	1,985,986 (1,379)
1990 ^{u/}	110,723 (55)	35,958 (8)	66,898 (35)		*	*		*	149,498 (191)	401,142 (301)

^{u/} Catch reported for month of January only. Season in progress.

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