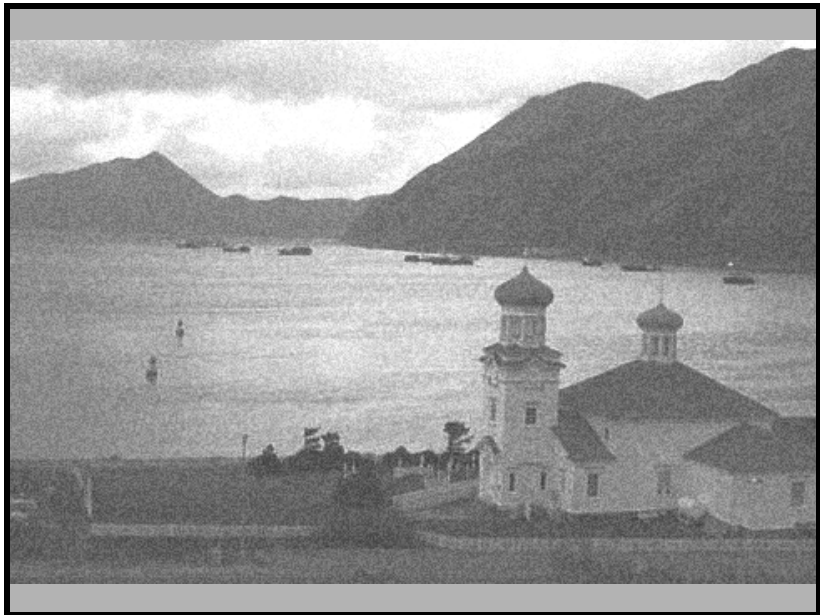

CHAPTER 1

*Introduction to the
Crab Fisheries*



HISTORY OF THE ALASKA CRAB FISHERIES

Discovery and Exploration

The rich crab resources of the Gulf of Alaska and the Eastern Bering Sea have been commercially exploited for over 70 years. In the 1930s, exploratory fishing by the Japanese found abundant stocks of red king *Paralithodes camtschaticus* crab in the Eastern Bering Sea. The Japanese fished these stocks until the outbreak of World War II, although it was not a major fishery.

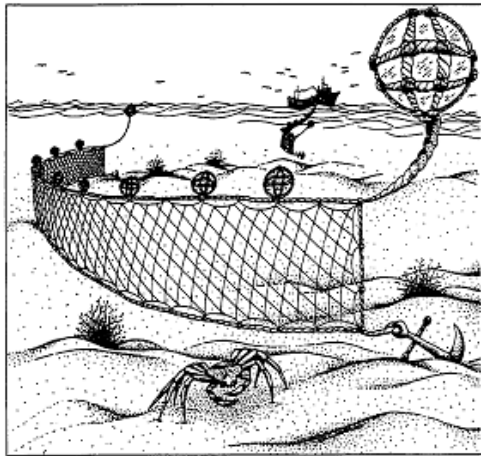


FIGURE 1-1. Tangle net gear.

The Japanese used tangle nets to catch king and Tanner *Chionoecetes bairdi* crab. These large-mesh, sunken gillnets were weighted on the bottom with floats at the top (Figure 1-1). The nets were deployed from small catcher boats. As the crabs tried to climb over or go through the net, they became entangled. Tangle nets are not selective, catching small crab, female crab and fish. The fish decompose and act as bait for more crabs. After a soak time of five to ten days, the nets were retrieved, the crabs removed, and the catcher boat would deliver the crabs to the mothership for processing. In the early years of the fishery, crab was canned. In later years, the Japanese developed and built catcher-processors that had the ability to cook and freeze the product.

While small amounts of crab was canned in the U.S. in the 1920s, American interest in the fishery did not begin in earnest until the late 1930s. An American catcher-processor explored the waters in the Gulf of Alaska adjacent to the Alaska Peninsula searching for marketable quantities of red king crab. Although the venture lost money, the effort did spur Congress to authorize research into the crab resource. By the end of the 1930s, the major stocks of red and blue king crab in both the Gulf of Alaska and the eastern Bering Sea had been identified.

Emergence of the Domestic Fishery

World War II nearly brought the crab fishery to a standstill. Following the war in the mid-1940s, American fishermen began to show a greater interest in a commercial crab fishery. Using sunken gillnets, American vessels filled their holds with crab and delivered their catch to shoreside canning facilities. Like the Japanese, the Americans soon realized the non-selective nature of tangle nets, and they switched from tangle gear to trawl nets in 1947. By 1950, the Bering Sea and Gulf of Alaska crab fishery was on its way to becoming a major economic force. Finally, in 1954, the use of tangle gear was prohibited in the commercial crab fisheries. Because trawl gear proved no better than tangle nets at discerning catch, trawling for crab was banned in the mid-1960s.

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Fishermen began experimenting with pots (traps) similar to ones used in the Dungeness *Cancer magister* crab fishery on the West Coast. The small, round pots of the Dungeness fishery were quickly swept away by Alaska's strong tidal currents. After a period of experimentation, crab fishermen developed a large rectangular pot that was resistant to the currents. The pots in use today are similar to those developed in the 1950s. Measuring six feet square and three feet high, they were constructed with a steel frame covered with mesh webbing, and weighed about 300 pounds. Today's pots range in size from five feet by five feet to ten feet by ten feet and weigh up to 800 pounds empty.

Lowell Wakefield, one of the true pioneers of the king crab fishery, canned crab during the off-season at his family's salmon processing plant in 1942. With his vision and capital he built the Deep Sea, the first vessel specifically designed for catching and processing crab. By 1955, Wakefield's vessels and plants produced 85 percent of the United States king crab catch.

Foreign Fisheries

The Japanese returned to the Bering Sea in search of king crab in 1953, followed by the Soviet Union in 1959. American fishermen concentrated most of their fishing effort in the Gulf of Alaska in those years, moving in 1964 into the rich red king crab areas of Bristol Bay. Acknowledging the value of the resource, Congress ratified the Continental Shelf Convention in that same year. The Convention declared king and Tanner crab, "creatures of the continental shelf," thus placing them under the management purview of the United States. The International North Pacific Fisheries Commission, through negotiations with the Japanese and Soviets, established quotas, minimum size limits and gear restrictions.

After Alaska gained statehood in 1959, management authority for the king and Tanner crab stocks within its waters was assumed by the State. Increasingly restrictive fishing agreements led to a decline in the foreign harvest of king crab, while the growing domestic fishery for red king crab harvested more and more of the quota. In 1966, the domestic harvest surpassed the foreign catch for the first time. By 1975, foreign landings of king crab were no longer permitted. The Japanese, facing reduced catches of king crab, re-directed their effort to Tanner crab stocks, a species taken incidentally as far back as 1953. In 1965, the Japanese started targeting Tanner crab using tangle gear. The Soviets were also harvesting Tanner crab, but still as incidental catch to their king crab harvest.

The American fleet was also incidentally catching and processing Tanner crab as early as 1961, but showed little enthusiasm for developing this fishery until the mid 1970s. Management regulations for Tanner crab were first employed in 1969 by the State of Alaska through the Alaska Department of Fish and Game (ADF&G) and the Alaska Board of Fisheries (BOF).

The Magnuson Fishery Conservation and Management Act was enacted in 1976. This act created the 200 mile Exclusive Economic Zone (EEZ) within which the United States has management authority for marine resources.

Domestic Fisheries

Increased capitalization of the fishery, stronger markets, removal of foreign competition, and the development of more efficient fishing gear and processing techniques all led to an increase in domestic production of king and Tanner crab during the '60s and '70s. Crab fishing, which had served as a temporary, interim fishery for small salmon boats, soon became a major directed fishery. As the fishery developed, the composition of the fleet changed to larger, more seaworthy vessels suited to the waters of the Bering Sea. In the 1960s, most crab vessels were less than 60 feet in length. By the mid 1970s, larger crab boats in the 80 to 100 foot range dominated the fishery.

The development of the live-tank system on catcher boats, which circulates sea water through the tank to keep crabs alive for extended periods of time, was a breakthrough in crab fishing technology. Another technological improvement was the development of better pot haulers, which increased the number of pots pulled daily (before the advent of the power blocks the crew would use capstans to retrieve their pots). Many of the newer crab boats had hydraulic cranes that allowed the crew to stack and store increased numbers of pots.

Gulf of Alaska king crab stocks near Kodiak Island attracted the most attention during this time of increased fishing, with a record catch of 95 million pounds in the 1965/66 crab season. As Kodiak harvests began to drop, more vessels began looking toward the Bering Sea to fill their holds.

By 1975, the domestic fleet had developed the ability to catch the entire 100 million-pound king crab quota in the Bering Sea. Domestic catches of Tanner crab had also been rising. The Japanese, who had earlier switched to targeting Tanner crab were now being pushed by American fisherman off the southern Tanner grounds onto the snow *C. opilio* crab grounds to the north. Japanese harvests continued to dwindle until 1981, when all foreign fishing for crab stopped. The Soviets had left the fishery in 1975, when they stopped fishing for king crab.

The boom in Alaska crab fishing came in the late '70s. In Bristol Bay, the harvest rose dramatically, peaking at 130 million pounds of red king crab in the 1980 fall season. Harvest of Tanner crab peaked in the 1979 season at 116 million pounds.

The growing harvest of Alaska crab spurred the construction of more and more boats by fishermen and investors who were confident that the king crab fishery would remain strong. However, in 1979, a red king crab survey indicated a marked decrease in the number of juvenile crabs to be recruited into the next year's fishery. Fishing continued, but a pattern of decreased recruitment dropped the annual harvest quota almost immediately. In 1982, the Bristol Bay red king crab harvest was a meager three million pounds, compared to 33 million pounds in 1981. The following year, the National Marine Fisheries Service (NMFS) summer trawl survey indicated a record low total king crab population, so the 1983 fishery was closed. The Tanner crab populations also experienced a sharp decline beginning in 1980.

The crash in the red king and Tanner crab stocks in the early 1980s has been attributed to a variety of factors including over-fishing, handling mortality of females and undersize male crabs, and disease. Some scientists now believe that the major cause was a shift in climatological regime in the Bering Sea. Elevated water temperatures by three to four degrees (°F) decreased the survival rate of juvenile king crab. However, the survival of larval Pacific cod

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Gadus macrocephalus and Walleye pollock *Theragra chalcogramma* is enhanced at slightly elevated water temperatures, increasing predation on planktonic crab larvae. Fishery biologists believe such fluctuations are a normal pattern for these species.

Since the crash, the recruitment rate of the Bristol Bay red king crab stocks has not reached pre-1980s levels. In 1994 and 1995, poor recruitment closed the fishery. A modest catch quota has been set each year since 1996. Regardless of the reason for the king crab crash, fishermen were forced to seek out new crab fisheries in order to make ends meet.

Beginning in the 1980s and continuing into the 21st century, the crab fleet expanded into new fisheries and new areas. More recent target species of the crab fleet include the blue king crab, golden king crab, hair crab, grooved Tanner crab, triangle Tanner crab, snow crab and scarlet king crab.

Fisheries for Tanner and snow crab have had peak harvests of 40 million pounds of Tanner crab in the 1990/91 season and 329 million pounds of snow crab in 1991. Both have experienced a variable decline. The Tanner crab fishery was closed from 1997 to 2004, and the snow crab fishery reached a record low in 2004 (Figure 1-2).

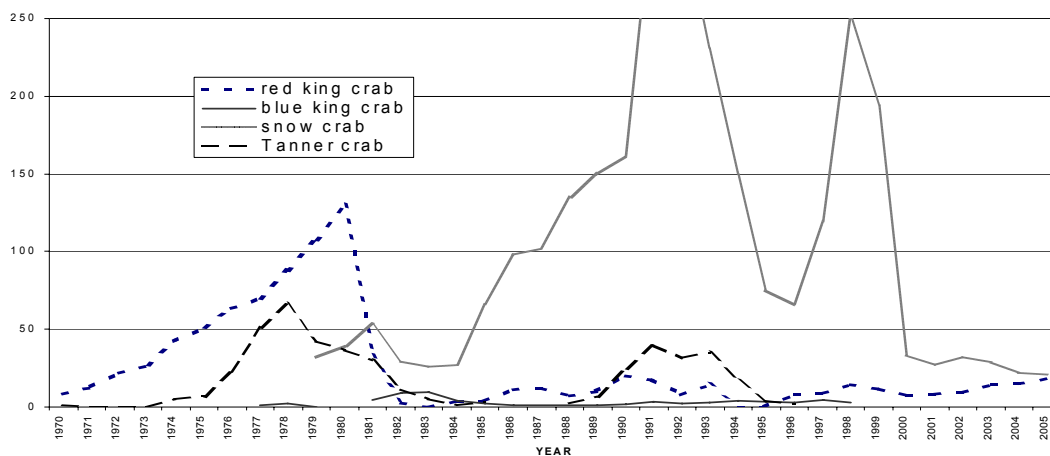


FIGURE 1-2. Harvest statistics for Bristol Bay red king crab, St. Matthew blue king crab, and Bering Sea snow and Tanner crab, 1970-2005.

Historically, the Bristol Bay red king and Bering Sea Tanner crab fisheries have been the major crab fisheries. The seasons lasted for months and often overlapped one another. Today the red king and snow crab quotas are smaller. Since 1982, diversification by the crab fishing industry and the development of new fisheries have somewhat stabilized annual landings. Pribilof and St. Matthew Islands' red and blue king crab fisheries were developed in the mid-1980s and occurred depending on each year's stock assessment. Both fisheries have been closed since 1999 due to low abundance.

The Aleutian Islands golden king crab stocks have become a significant harvest. Directed fishing for Aleutian Islands golden king crab began in 1981 (prior landings were incidental bycatch in the red king crab fisheries). From 1981 to 1996, the Aleutians were divided into two registration areas: Adak and Dutch Harbor. For the 1996/97 season, the Aleutian management area was restructured in order to better reflect the stock distributions and now consists of only one registration area (Area O), but is divided into eastern and western sections at 174° W longitude.

Interest in harvesting the deep water species of Tanner crab, such as grooved Tanner crab found on the edge of the continental shelf of the Bering Sea and Gulf of Alaska, developed in the 1990s. This is a permit fishery in which only specific vessels participate and the harvest rates are tightly controlled.

The hair crab fishery peaked in the mid 1990s with the number of participants nearly doubling every year between 1994 and 1997. The catch quota has diminished from 1.8 million pounds in 1995 to 0.3 million pounds in 1999 and 2000. The hair crab fishery has been closed since 2000.

HISTORY OF THE SHELLFISH OBSERVER PROGRAM

In April 1988, the Alaska Board of Fisheries adopted regulations requiring onboard observers on all vessels that process king and *C. bairdi* crabs within Bering Sea and Aleutian Islands (BSAI) waters. This requirement was prompted by information collected by ADF&G, which suggested illegal processing of undersize and female crabs by catcher-processors. Processor reports showed consistently higher production rates by catcher-processors compared to catcher vessels. These regulations resulted in the creation of the Mandatory Shellfish Onboard Observer Program. At inception, the primary program goals were to monitor compliance of sex and size regulations of retained crabs and to collect data for in-season management of BSAI fisheries. The first observer deployments occurred in September 1988 during the Bristol Bay red king crab fishery.

In the spring of 1990, the BOF adopted regulations that broadened observer coverage to include vessels processing *C. opilio* crab. This change was considered necessary based on reports of undersize *C. bairdi* crab processed and labeled as *C. opilio* crab. The BOF also defined observer qualification standards, observer and observer company conflict of interest guidelines, and observer duties and responsibilities. In the fall of 1991, the BOF adopted new regulations concerning observer certification and decertification.

Additional changes were made to the Shellfish Observer Program from 1993 to 1997. In 1993, the requirement to carry observers as a condition of the permit on all vessels fishing for hair crab in the Bering Sea was enacted. Regulations implemented in 1994 require, as a condition of the fishing permit, 100% observer coverage on all vessels targeting grooved Tanner, triangle Tanner, *Paralomis*, and scarlet king crab. Regulations requiring observers on all vessels fishing for king crab in the Aleutian Islands registration area were enacted in 1995. Separate certifications for crab and scallop observers were put into regulation in 1997.

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The Shellfish Observer Program was modified by the BOF in March of 1999. Most significantly, the Board granted ADF&G full authority and responsibility for deploying observers on any vessel participating in BSAI crab fisheries. Funding for additional observer deployments through ADF&G cost-recovery fishing was also approved. The BOF established an industry oversight task force to make recommendations for program implementation to ADF&G and report to the BOF on Shellfish Observer Program issues. The state-funded portion of the program was initiated July 1, 2000.

MANAGEMENT OF ALASKA CRAB FISHERIES

Management of the crab resources of the Bering Sea and Gulf of Alaska is a function of the State of Alaska, with oversight by the federal government. The 1976 Magnuson-Stevens Fishery Conservation and Management Act established eight regional fisheries management councils, which developed Federal Fishery Management Plans (FMPs) for each major fishery in the EEZ (from 3 to 200 miles from shore). The North Pacific Fishery Management Council (NPFMC) manages resources in the EEZ around Alaska. The NPFMC and its advisory bodies are composed of regional representatives with knowledge of the fisheries and the economics of the fishing industry.

Although the NPFMC has jurisdiction over king and Tanner crab resources of Alaska, authority for management decisions has been deferred to the State of Alaska. The FMPs for king and Tanner crab in Alaska are framework documents which provide for three categories of management tools: Category 1-management tools which are fixed in the FMP under Council control, Category 2-management strategies which the State controls following federal criteria and Category 3-management tools under complete discretion of the State (Table 1.1).

The State of Alaska manages the king and Tanner crab resources through the Alaska Department of Fish and Game. ADF&G is responsible for implementation of the regulations developed by the BOF, and for monitoring the fisheries to ensure that management goals are met. The National Marine Fisheries Service also contributes to the management of the crab fisheries, through research and stock surveys.

Category 1 (Fixed in FMP)	Category 2 (Framework in FMP)	Category 3 (Discretion of State)
Legal Gear	Minimum Size Limits	Reporting Requirements
Permit Requirements	Guideline Harvest Levels	Gear Placement & Removal
Limited Access	In-Season Adjustments	Gear Storage
Super-exclusive Registration	District, Subdistricts & Sections	Gear Modifications
	Fishing Seasons	Vessel Tank Inspections
	Sex Restrictions	State Observer Requirements
	Closed Waters	Bycatch Limits
	Pot Limits	
	Registration Areas	

TABLE 1.1. Management measures for the BSAI king and Tanner crab fisheries.

Management Objectives and Strategies

In the early years of the crab fisheries, when resources were abundant and fishing pressure was minimal, there was little apparent need for management of crab stocks. As the number of vessels and the amount of gear fished have increased, so has the need for precise management. Management strategy originally focused on gear restrictions and catch quotas, with the objectives of reducing the risk of over-fishing and minimizing the fishing mortality of undersize (pre-recruit) crabs, which were unmarketable. For example, tangle nets and trawls were prohibited from crab fisheries due to their non-selective fishing. The North Pacific Fishery Management Council and the Board of Fisheries have identified three goals in their joint statement of principles on the management of king and Tanner crab resources:

1. establish stability in landings;
2. produce long-term optimal yield; and
3. protect the reproductive potential of the stocks.

To accomplish these goals, the BOF created regulations that set exploitation rates and catch quotas, established registration areas, prohibited the retention of female crabs, restricted the amount and type of legal gear, set fishing seasons, and determined a minimum legal size for male crabs.

Total Allowable Catch

The crab fisheries are managed using a total allowable catch calculation, which sets the number of pounds of male crab which can be removed from a stock without adversely affecting its reproductive potential. Each year, NMFS and ADF&G conduct surveys to determine the condition of the king and Tanner crab stocks in the management areas of the Bering Sea and Gulf of Alaska.

The harvest rate is based on an "exploitation rate" applied to the estimated number of mature males in the population. Exploitation rates vary by fishery. Crab stocks also must be above a set minimum threshold level of mature females before any fishery is permitted. For instance, a minimum of 8.4 million mature females, equivalent to a spawning biomass of 14.5 million pounds, has been established as a prerequisite for a commercial harvest of Bristol Bay red king crab.

The terminology used to describe catch quotas in different registration areas and fisheries differs based on how the fisheries are managed (Table 1-1). In open-access, permit fisheries and some restricted-access fisheries, a Guideline Harvest Level (GHL) is established. In rationalized fisheries, the number of crabs that can be harvested is referred to as the Total Allowable Catch (TAC). In-season adjustments cannot be made once the TAC is announced. The Individual Fishing Quotas (IFQs), the Community Development Quota (CDQ), and the Adak Community Allocation (ACA) for crabs are distributed to the qualifying parties prior to the opening of the season.

Registration Requirements

Crab vessels are required to register with the State by obtaining licenses and permits, and to register for particular fisheries and registration areas (Figure 1-3.) Norton Sound has been designated a super-exclusive area, meaning that vessels registered to fish red king crab in that area are not allowed in other areas, and vice-versa.

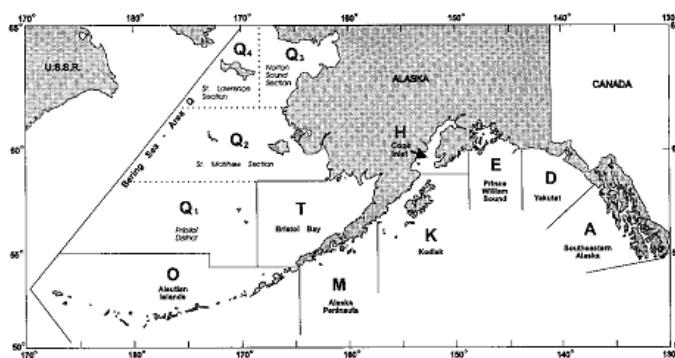


FIGURE 1-3. Management areas for king crab.

Male-only Harvest

To protect the reproductive potential of the stocks, retaining female crab is prohibited. Male-only restrictions have been standard practice in crab management for decades. They were established to provide maximum female reproductive capacity and ensure conservation of the resource, but the industry and the market are also resistant to harvesting females because of lower market value due to smaller size.

Minimum Size Limits

Minimum size limits are commonly used in managing crab fisheries. In order to maintain a reproductive stock of male crabs, minimum size limits are set at a size greater than the average size at maturity to allow males the opportunity to mate at least once before being harvested. Because of differences in environmental conditions and size at maturity in various areas, size limits for a given species may not be the same in all registration areas.

Fishing Seasons

Fishing seasons are established during the periods that minimize handling mortality of newly molted crabs and disruption of mating. For example, *C. opilio* molt in the late spring and early summer, so the fishing season begins in the fall and lasts until late spring, just prior to the molting period. This also promotes optimal product quality, in that the carapace is hardened and the crab has had an opportunity to fill the shell. The various regulatory seasons are listed in the manual appendix.

Gear Restrictions

Crab may only be taken in BSAI commercial fisheries by pot gear. This gear type minimizes bycatch of fish and non-targeted portions of the crab stocks. Given proper handling by fishermen, female and sublegal crabs taken in pots suffer only minor injuries, minimizing the incidental mortality. Additionally, pot limits and mandatory escape mechanisms are a requirement in some fisheries.

Multiple Species Retention

As some of the current crab fishing seasons overlap, it is now possible for vessels to retain some incidentally-taken species up to 5% of the vessel's harvest in certain fisheries. The vessel operator must have the correct Commercial Fisheries Entry Commission (CFEC) permit cards and a quota for each species retained. See the appendix for a list of fisheries and which species may be retained incidentally in each.

Crab Rationalization

The high number of vessels participating in Alaska's crab fisheries and declining catch quotas resulted in an overcapitalized industry. The BSAI Crab Rationalization Program addressed overcapitalization with an Individual Fishing Quota (IFQ) system that began in 2005.

The BSAI Crab Rationalization Program allocates harvest quota shares to individual vessel owners and captains based on their fishing history during a specified period. Crab Rationalization is unique from other catch share programs in that it also allocates processing quota shares.

Processors that took crab deliveries during the qualifying period for a crab fishery received processor quota shares equal to 90% of the percentage of quota that they processed during that period. Vessels are required to deliver a certain portion of their harvest, commonly referred to as "shares," to a particular processor.

This new system of allocating quota has changed the fleet harvest strategies. With individual quotas, fishing may be spread throughout the season at the discretion of the fishermen and processors. Vessels can form cooperatives to combine and share IFQ, and can lease their quota. This has resulted in fewer vessels and longer seasons. Observers are now needed throughout the year instead of many at one time for major fishery openers.

CDQ Program

The Community Development Quota (CDQ) program was created by the North Pacific Fishery Management Council to enable residents of rural coastal communities in western Alaska to participate in and gain some economic benefit from the shellfish and groundfish fisheries of the Bering Sea. Ten percent of the crab TAC in the BSAI area is allocated to the CDQ program.

Sixty-five villages near the Bering Sea have established eligibility under federal and state regulations and have formed into six CDQ groups (Figure 1-4). Each group has established partnerships with fishing companies. The proceeds of the CDQ program are used to develop fisheries related business in rural coastal communities.

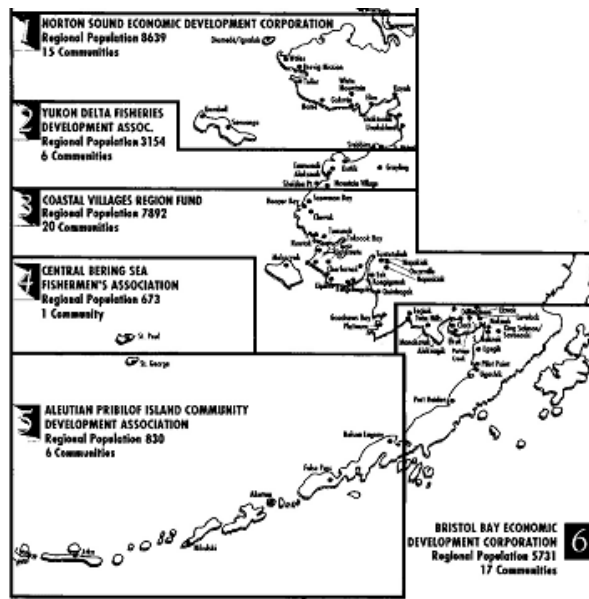


FIGURE 1-4. CDQ groups.

The CDQ program was enacted prior to the implementation of the crab rationalization program, and is still active to this day. Vessels can harvest both CDQ and IFQ shares concurrently.

In-Season Management

Guideline Harvest Levels for non-rationalized fisheries are announced before the opening of each fishery, and ADF&G monitors the progress of the fishery to determine when the GHLL has been reached. Observer reports are one of the primary tools used to monitor catch. In addition, ADF&G staff collect information from processors. As a fishery progresses, managers are thus able to estimate the size of the catch, and the season is closed consistent with the GHLL.

Catch per unit effort (CPUE) is also used as an index of stock strength to monitor the fishery while it is in progress. If it appears that CPUE is falling, the fishery can be closed by Emergency Order. Fisheries may also be closed by Emergency Order if large numbers of molting or non-targeted crabs are being taken, if ADF&G believes that catches are being grossly under-reported, or for a variety of other reasons that may represent a risk to the stocks.

FISHING OPERATIONS AND GEAR

Fishing Vessels

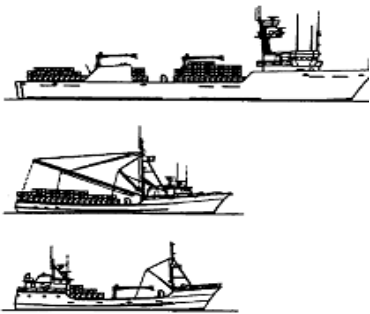


FIGURE 1-5. Typical C/P and C/V.

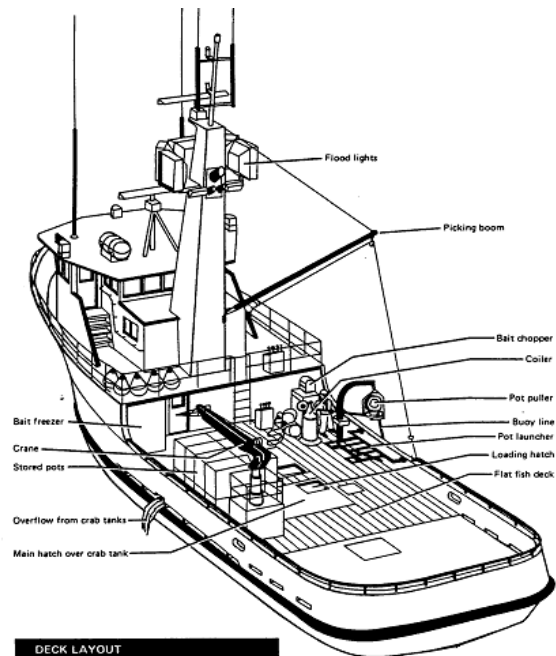
The vessels in Alaska's crab fisheries fall into three categories depending on how they handle the crab: catcher vessels (C/Vs), catcher-processor vessels (C/Ps) and floating processors (F/Ps) (Figures 1-5 and 1-6).

Catcher vessels retain crab in a “live tank.” Sea water is circulated through the tank to prevent the crab from suffocating. Retained crabs that die, but are not processed, are referred to as deadloss. Fishermen try to minimize deadloss because dead crab cannot be sold. Once the hold, or live tank, is full, catcher vessels deliver their crab to either a shoreside plant or a floating processor.

Catcher-processors have been designed to cook and freeze their catch on board. Because of their ability to process crab and keep it in large freezers, they can remain at sea for extended periods. The length of the trip is determined by how fast the vessel can fill its freezer. A C/P may fill its hold in less than two weeks, but it is common for C/Ps to offload to and take on supplies from anchored vessels, allowing them to stay at sea for the duration of the fishery.

Floating processors do not fish. They are designed to take and process deliveries at sea from catcher vessels.

FIGURE 1-6. Deck layout of a “house-forward” vessel.



Fishing Gear

Crab pots are a live trap. Rectangular crab pots typically range in size from 5 feet by 5 feet to 10 feet by 10 feet square and three feet deep. Many vessels will custom-build pots to fit their decks and they are made in all rectangular combinations between 5 and 10 feet, with 3 feet deep being constant.

A typical rectangular king crab pot is illustrated in Figure 1-7. Depending on the fishery, it may be fished singly, or by longline (pots are attached to each other with a groundline.) Circular pots (Figure 1-8) similar to Dungeness pots, pyramid pots, and conical pots are also used. Both pyramid and conical pots are truncated and have tunnels that are located on top.

Crab pots are enclosed with a synthetic mesh similar to trawl mesh. Pots are baited with chopped herring, octopus or squid. Herring oil is sometimes added and whole Pacific cod are sliced open and hung next to the bait jar. Crab find their way to the "tunnel," fall into the pot and are trapped.

Tunnels may include excluder devices to help keep unwanted crab species out of the pots. "Tanner boards" are used in the Tanner crab fishery to prevent king crab from entering. Another type of alteration is the use of "fingers" or "triggers" in the tunnel openings so the pots can be used to fish for Pacific cod or golden king crab.

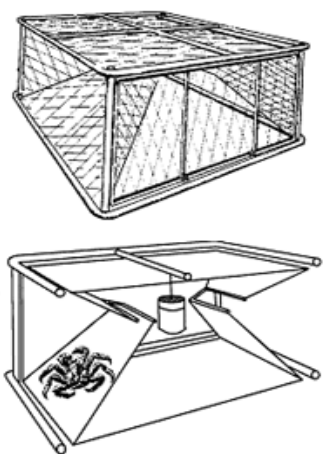


FIGURE 1-7. Rectangle pot with cut-away view.

Pots are occasionally lost at sea, potentially causing sea life to die needlessly each year from "ghost fishing." To prevent ghost fishing, each pot must have some form of built-in escape mechanism.

There are two types of escape mechanisms currently used. One is a strand of 30-thread cotton twine (referred to as rotten cotton or biotwine). The cotton twine closes an opening in the mesh webbing that is at least 18 inches long, parallel to and within six inches of the bottom of the pot. The cotton in a lost pot decomposes over time, causing a gap in the mesh and allowing crabs to exit freely. Another mechanism is a galvanic timed release (GTR) device, which is a ring of metal that dissolves over time due to the galvanic current created by different metals and seawater.

Shellfish observers are responsible for monitoring compliance of all gear regulations including Tanner boards, escape mechanisms, storage, etc. Observers are expected to be able to reference the Commercial Shellfish Regulations book and know exactly which gear code regulations apply to the particular fishery in which the vessel is participating.

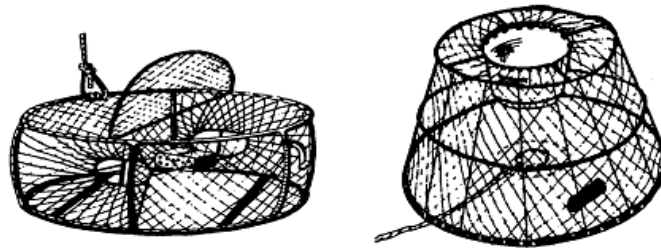


FIGURE 1-8. Circular and conical crab pots.

Pot Fishing Operations

While each vessel may operate somewhat differently, the overall pattern is the same. On the way to the fishing grounds, the crew will assemble bait sets. When setting the gear, the crew will use a large crane to drag the pots to the pot launcher. Once on the launcher, a crew member climbs into the pot to hang the bait set. When the bait is in place, the door is closed and secured. Meanwhile, the buoys and shots of line are readied by other crew members.

Next, the pot launcher is raised and the pot slides off into the sea. Some of the buoy line goes over with the pot, while the remainder of the line is thrown over with the buoys. Usually a pot is marked with two or three brightly colored buoys (the third buoy is sometimes referred to as a cork or trailer buoy). By regulation, one of the buoys must bear the vessel's ADF&G registration number. If there is a pot limit in the area, one of the buoys must also bear a pot tag.

It is common for a captain to use buoys of a specific color combination to make sighting easier at a distance. Some buoys have reflective tape so that they may be more visible at night. Commercial crab vessels search for pots at night with very powerful sodium lights.

Pots are often set in a discrete "string" (Figure 1-9). A string of pots will usually include about 20 pots and will cover several miles of the ocean floor. Typically, several strings of pots will be fished in good crab grounds while others are used to prospect for crab in other areas.

The development of electronic navigation and plotting equipment has greatly improved fishermen's ability to locate their gear. The Global Positioning System (GPS) enables vessels to determine positions fairly accurately. Often, the GPS receiver is integrated into a navigational system including electronic charts, plotters, and autopilot.

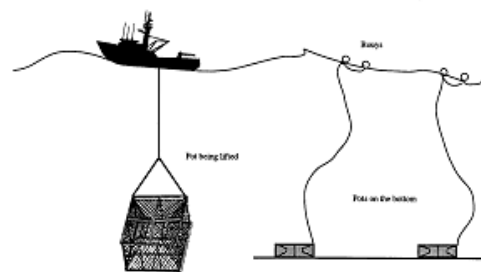


FIGURE 1-9. Single-pot fishing.

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After a "soak time" of several hours up to several weeks, the pots are retrieved. The wide range of soak times is due to fishing strategy, the amount of gear used, the tides, and the weather (which may prevent the timely hauling of pots).

The captain will usually work a string of gear in the direction that provides the easiest maneuverability and best protection from the weather. Since most vessels are rigged to haul gear from the starboard side, the gear is usually hauled with the weather on the port bow. As a vessel comes alongside the buoy setup, the crew member working the rail throws a grapple, hooking the trailer buoy line. After retrieving the buoys, the line is placed in the power block or pot-hauler that pulls the pot from the water.

As the pot is raised toward the vessel, the line is coiled by hand or by an autocoiler. Once the pot is at the rail, the rope bridle is hooked to a crane (commonly called a picking boom), the pot is placed on the pot launcher, the doors are opened, and the catch removed.

Regulations prohibit the retention of sublegal (undersize) males and all females, so the crew must sort the catch and return all unwanted crab immediately to the sea unharmed. Some crews sort the crab while they are in plastic totes while other vessels have more elaborate sorting tables and methods.

If fishing is good, pots will commonly be baited and set again in the same spot. If the fishing is poor, the captain may decide to set in a new area. The pots are stacked on deck and are set again when the vessel reaches what is hoped to be a more productive area. At the end of the season, pots may be stored in the water with bait containers removed and doors secured open. The location and manner of pot storage allowed is defined by regulations.

While single-pot fishing is employed for most crab fisheries, regulations permit longlining of pots for golden king crab and several other smaller crab fisheries such as hair crab, grooved Tanner crab and triangle Tanner crab in certain areas only. Longlined crab gear consists of a heavy ground line, anchored at each end, to which the pots are attached.

Longlining makes the most economic sense when harvesting species in depths greater than 100 fathoms. For example, at depths of 400 fathoms, 40 pots can be longlined with 6 miles of line while single pot fishing of 40 pots at the same depth would require 27 miles of line.

Processing Operations

Cooked and frozen "sections" are the predominant product of domestic crab processors. A section includes the legs and the attached ventral side of the crab, minus the viscera and the carapace. Whole cooked and frozen crab is a rare and specialized product that is usually produced only in hair crab fisheries. Canned crab is rarely produced at sea, but some frozen sections are reprocessed on shore and the meat is canned.

Processing operations are similar for both catcher-processors and shore-based or floating processors. A catcher boat delivers its catch to either a shore-based plant or a floating processor. On a C/P, the crabs are stored temporarily in a hopper or live tank. In either case, the females and small males are sorted before retention.

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At the butcher station, the live crabs are split along the axis of symmetry. With large crab, the butcher uses the weight of his body to push the ventral side of the crab onto a blade. For smaller crab, simple arm strength is sufficient. In one swift motion, the crab is impaled, and pulling outward on the legs separates the sections. The viscera and carapace fall away, leaving the butcher holding the two halves of the crab. The gills are then removed by holding them against a rapidly spinning bristle brush or cogged wheels.

Once gilled, the sections are tightly packed into wire cages for cooking. The cages are immersed in a boiling brine tank and cooked for about 15 minutes. The sections are gradually cooled in a recirculating sea water tank, then frozen in a chilled, super-saturated brine freezer (approximately 5° F). The frozen sections are dipped in a tank of fresh water to glaze it with ice and seal it from the air. The sides of cages in which the sections are cooked fold down, allowing an inverted cardboard box to fit over them. The box is then turned right side up, the cages are removed and the box is closed. The cases are weighed and stored in a freezer hold.

Most of the crab product undergoes some form of reprocessing or grading before finally entering the marketplace. Shoulder sections are sometimes separated from the legs, and the body meat is removed, then canned or packaged. Legs and sections are graded as 1s, 2s and 3s based on percentage of meat fill, any discoloration, and the presence of barnacles.

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7) What are the three goals of the BOF and NPFMC for the management of king and Tanner crab resources?

8) Why are minimum size limits used in crab fisheries?

9) What are the three types of crab vessels in the BSAI fisheries, and what are the differences?

10) Describe two types of escapement mechanisms which prevent ghost fishing of lost crab pots.

11) What must the crew do with undersize males and female crabs caught in a crab pot?

12) Why is the golden king crab fishery typically “longlined?”

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