

# DRAFT

## **Fishery Descriptions of Principal Federal FMP Fisheries**

for the analysis of  
**Essential Fish Habitat**

April 2, 2002

Prepared by the EFH Committee

North Pacific Fishery Management Council  
605 West 4<sup>th</sup> Ave, Suite 306

### Sources of Information

Fishery and gear descriptions contained in this document were based on information graciously provided to the EFH Committee by numerous fisheries representatives and fishermen, as well as published sources, information provided in public testimony at Council meetings over the years, discussions at other EFH Committee meetings, unpublished information from Craig Rose (NMFS), Herman Savikko and other ADF&G staff.

### Bibliography

Browning, R. J. 1980. Fisheries of the North Pacific. Alaska Northwest Publishing, Anchorage. 423p.

Dorsey, E. M., and J. Pederson (editors). 1998. Effects of Fishing Gear on the Sea Floor of New England. Conservation Law Foundation, Boston, MA. 160p.

Fritz, L. W., Greig, A., and Reuter, R. F. 1998. Catch-per-unit-effort, length, and depth distributions of major groundfish and bycatch species in the Bering Sea, Aleutian Islands, and Gulf of Alaska regions based on groundfish fishery observer data. NOAA Technical Memorandum NMFS-AFSC-88. 179p.

Hiatt, T., R. Felthoven, and J. Terry. 2001. Economic Status of the Groundfish Fisheries off Alaska, 2000. NOAA-NMFS Seattle, WA. 97p.

NET TEC. 1990. Trawl Orientation Manual. Nor'Eastern Trawl Systems Inc., Bainbridge Island, WA. 51p.

NPFMC (North Pacific Fishery Management Council). 1998. Environmental Assessment / Regulatory Impact Review (and supporting EFH Habitat Reports) for Amendments 55/55/8/5/5: Essential Fish Habitat. North Pacific Fishery Management Council, Anchorage.

NPFMC (North Pacific Fishery Management Council). 2001. Stock Assessment and Fishery Evaluation Report for BSAI King and Tanner Crab Fisheries. North Pacific Fishery Management Council, Anchorage.

Turk, T. 2000. Distribution, Abundance, and Spatial Management of the Weathervane Scallop Fishery in Alaska. Masters Thesis, University of Washington. 231p.

### Acronyms

AI	= Aleutian Islands
BSAI	= Bering Sea and Aleutian Islands
f	= fathom (equal to 6 feet)
ft	= feet (equal to 12 inches)
FMP	= fishery management plan
GOA	= Gulf of Alaska
IFQ	= individual fishing quota
LOA	= length overall
m	= meter (equal to 3.281 feet)

**Alaska Scallop FMP**

Alaska Weathervane Scallop Fishery ..... 1

**Bering Sea/Aleutian Islands King and Tanner Crab FMP**

Bristol Bay Red King Crab Fishery ..... 3  
Norton Sound Red King Crab Fishery ..... 5  
Pribilof Islands Red and Blue King Crab Fishery ..... 6  
Saint Matthew Blue King Crab Fishery ..... 6  
Aleutian Islands Red King Crab Fishery ..... 7  
Aleutian Islands Golden King Crab Fishery ..... 7  
Aleutian Islands Tanner Crab Fishery ..... 8  
Bering Sea Tanner Crab Fishery ..... 8  
Bering Sea Snow Crab Fishery ..... 9

**Alaska Salmon FMP**

Alaska Salmon Drift Gillnet Fishery ..... 10  
Alaska Salmon Set Gill Net Fishery ..... 10  
Alaska Salmon Seine Fishery ..... 11  
Alaska Salmon Troll Fishery ..... 12  
Alaska Salmon Rod and Reel Fishery ..... 12  
Alaska Salmon Fish Wheel Fishery (Commercial and Subsistence) ..... 13  
Alaska Salmon Subsistence/Personal Use Fishery ..... 13

**Bering Sea/Aleutian Islands Groundfish FMP**

Bering Sea Pollock Trawl Fishery ..... 15  
Aleutian Islands and Bogoslof Pollock Trawl Fishery ..... 16  
Bering Sea Pacific Cod Trawl Fishery ..... 17  
Bering Sea Rock Sole Trawl Fishery ..... 18  
Bering Sea Yellowfin Sole Trawl Fishery ..... 19  
Bering Sea Flathead Sole/Other Flatfish Trawl Fishery ..... 20  
Aleutian Islands POP and Northern Rockfish Trawl Fishery ..... 21  
Aleutian Islands Atka Mackerel Trawl Fishery ..... 22  
BSAI Pacific Cod Longline Fishery ..... 23  
BSAI Sablefish/Tubot Longline Fishery ..... 24  
Bering Sea Pacific Cod Jig Fishery ..... 25  
BSAI Pacific Cod Pot Fishery ..... 26

**Gulf of Alaska Groundfish FMP**

GOA Pollock Trawl Fishery ..... 27  
GOA Pacific Cod Trawl Fishery ..... 28  
GOA Deepwater Flatfish Trawl Fishery ..... 29  
GOA Shallow Water Flatfish Trawl Fishery ..... 31  
GOA Slope Rockfish Trawl Fishery ..... 32  
GOA Sablefish Longline Fishery ..... 34  
GOA Southeast Demersal Shelf Rockfish Longline Fishery ..... 35  
GOA Pacific Cod Longline Fishery ..... 35

## **Alaska Weathervane Scallop Fishery**

Description of gear used: This fishery is prosecuted with dredges. A total of 9 vessels is allowed to participate in this fishery, with access limited by a license limitation program. In 2000 there were 5 vessels using two 15-foot dredges and 2 vessels using smaller gear. Vessels used in the fishery range in size from 60 to 124 ft LOA. Maximum horsepower is 800. Vessels fishing outside Cook Inlet are limited by regulations to a maximum of two dredges with a maximum width of 15 feet. The 15-foot dredges weigh 2,400 pounds dry weight each, consisting of a frame and a bag. The 1,900-pound frame rests on two 4" by 9" shoes. The bags weigh 500 pounds each. The shoes are changed every 4 to 5 days because they bear most of the weight. In Cook Inlet, only one dredge with a maximum width of 6' can be used. Dredges are of a standard 'New Bedford' design, with the steel dredge shoe and 4" diameter steel rings contacting the bottom during fishing. The tops of the bags are constructed of 6" stretched mesh polypropylene netting. Each dredge is attached by single steel wire cable that is operated from a deck winch.

In the past, rubber chafing gear was used to protect the links connecting rings; however, chafing gear is not used at this time. The rate of the wear on the bag depends on the bottom type that is being fished. For example, in Yakutat the bottom is more sandy and abrasive to the gear, whereas in Shelikof Strait it is a soft, muddy, less abrasive bottom. Not using chafing gear creates more wear and requires more time and effort to replace links. For example, if link wear required 1,500 pounds of replacement links with chafing gear, the link wear associated with the same amount of fishing time without chafing gear would require 3,700 pounds of replacement links, at \$1.50 per pound. There are about 30 links per pound and it requires significant extra crew time to change the links. This represents less time fishing and more time repairing the gear. This extra effort is necessitated by reduced efficiency of the worn bag, causing increased effort for the area. This equals about 68,000 links per vessel, each one hand squeezed. The impression of the scallop fishermen is that the rubber chafing gear is less impactful on the bottom.

Description of fishery operations: Scallop fishing operations involve the following steps: 1) dredge setting, 2) towing for about 45 minutes on bottom at 4.3 to 4.8 knots, 3) dredge retrieval, 4) dumping the catch on deck, 5) sorting out the scallops to be retained, 6) discarding debris, small scallops and other bycatch, and 7) repairing gear as needed. The gear is then reset or the boat moves to a different area. Retained scallops are shucked by a hand-held knife, with the adductor muscle retained and the shells and remaining tissues discarded overboard as the scallops are shucked. The yield of shucked meats is approximately 10 to 11 percent. The discarded shell serves as substrate for settling scallop spat and other marine organisms.

Habitat type where fishery occurs: Weathervane scallops occur in discrete beds in areas 60-140 m (average of about 90 m) deep over predominantly clayey silt and sandy bottoms, but are also found in areas with gravelly sand and silty sand (Turk 2000). Bottom type and depth depends on the area fished. For example, in the Bering Sea, the fishery occurs at depths of 100-120 m, but occurs at 60-85 m near Kayak Island in the eastern GOA. The fishery occurs from the panhandle out to the Aleutian Islands and the Bering Sea, with the area fished each year equaling approximately 200 nautical square miles over the entire state. Scallop fishermen tend to avoid rocky or hard bottoms in order to protect their gear. The ADF&G regional information report has not reported any corals taken as bycatch in the scallop fisheries (Barnhart and Rosenkranz, 1999. ADF&G Regional Information report #4K99-63, 1997-1998).

“Throughout their range, weathervane scallops are typically found in discrete elongated beds located in areas with high currents and moderate mixing.” (Turk 2000).

Existing regulatory measures to mitigate effects of this fishery: Extensive areas in the North Pacific that support scallops are or were closed to scallop fishing to protect other resources. Scallop fishermen are restricted not only by trawl closure areas, but by additional areas that are closed specifically to scallop dredging. Shells are discarded as the scallops are shucked. Scallop shells that are discarded during the fishery serve as important substrate for settling scallop larvae as well as a wide variety of other invertebrates, including sponges, tunicates, and hydroids. The state regulations prohibit shell stocking and require that scallop shells be discarded at the time they are harvested, or where they are harvested, to serve as biological substrate. Soft body parts are used as food for a wide variety of organisms, including birds, fish and others.

Effort restrictions include both license limitations and the formation of cooperatives. The fishery has additional efficiency restrictions that include crew size restrictions, a ban on mechanical shucking, vessel length restrictions, gears size restrictions (including 4" ring size), limitation on dredge size (limit to 15 feet), bycatch limits (for crab bycatch caps see table [to be created]). These efficiency and effort restrictions spread the fishery in both time and area.

There are also time and area restrictions. From February 15 to July 1, scallop fishing is closed to protect molting crab in the Westward Region.

To minimize impacts, the scallop cooperative uses the Seastate reporting system, which allows real time identification and avoidance of hot spots for bycatch. Exploration of new areas is accomplished with a single dredge and limited towing time to minimize the risk of bycatch.

## **Bristol Bay Red King Crab Fishery**

Description of gear used: This fishery is prosecuted with pots that typically measure 7 feet by 7 feet by 3 feet deep, set one pot per line. The total number of pots allowed for a given vessel is determined by a grid that includes vessel length and abundance of the stocks. Vessels participating in this fishery range from 60' to 180' long, with most being catcher vessels of medium size (80'-125' LOA). In 2000, 213 catcher vessels and 5 catcher-processors participated in the Bristol Bay red king crab fishery, and made a total of 98,694 pot lifts during a 15 day season.

Pots used in this fishery are constructed with a steel bar frame (1.25" diameter) and covered with tarred nylon mesh netting (minimum 3.5" stretched mesh). Pots are required to include escape rings or large mesh (10" stretched) to sort out sublegal size crab. Pots are also equipped with a biodegradable panel that will open at least 18 inches. Pot sizes range from 6' to 8' square, with the average vessel using 7'x7' pots.

Pots are constructed as follows: There is an outer frame consisting of "weight bars" on the bottom of the pot, typically 1½" diameter steel bar stock; a top frame and sides, typically 1 1/8" steel bar stock, to provide the structure; and an inner frame of 5/8" "web bars" to support the mesh and separate it from the sides and bottom of the pot. Most of the initial contact with the bottom is borne by the weight bars. A rectangular "door" is hinged opposite the bridle, to allow easy unloading of catch. Each pot weighs from 500 to 700 pounds dry weight. Each pot has two tunnel openings, on opposite sides, typically 9 x 36 inches, with no dimension less than 5 inches and a perimeter of at least 36 inches.

The pot is attached with a bridle, generally constructed of 1" diameter floating polypropylene line. The bridle is attached to floats via a buoy line or warp that consists of a 30' to 60' surge line, constructed of heavy duty floating polypropylene and coils of line sufficient to reach the surface. The lower coils of line (33 fathom) are made of 3/4" floating polypropylene, and the upper coil of line is made of sinking line. The length of the floating line is not sufficient to reach the surface. The floating line keeps from fouling on the bottom and the sinking line avoids accidentally fouling in the vessel's propellers. Attached to the top coil is a plastic buoy ("bag"), with an auxiliary buoy attached on a tether (trailer) line. Pots are required to carry vessel identification by number and a state licensed serial tag on the buoy denoting the pot limit. These tags must be purchased for each season's fishery.

Description of fishery operations: Pots are baited with 1 to 2 gallons of chopped herring or other bait placed in hanging bait jars in the center of the pot. The bait jars are thoroughly riddled with small holes to provide water circulation, spreading a plume of scent down current from the pot. "Hanging bait", often consisting of whole Pacific cod, or other fish, is also put in the pot, when available. On most vessels, the pot is tipped into the sea with a pot launcher. The coils of line are thrown overboard, followed by the buoys, as the pot sinks to the bottom. The pot rests directly on the bottom. The pot remains stationary on the bottom until it is retrieved. In recent years, the fishery has lasted from 4 to 10 days. Vessels are capable of handling more gear in a day's time than allowed by current pot limits. This produces shorter "soak" times, generally about 10 to 20 hours, than had been practiced in the past.

Pots are retrieved as follows: the crewman throws a grappling hook between the buoys to get the line. The line is fed into an hydraulic hauler located on a davit, which is positioned over the starboard side of the vessel. The pot is brought to the surface and a hook is placed in the bridle. The pot and catch are then lifted aboard and placed on the pot launcher. Crabs are dumped into a sorting table or totes and are sorted. Only

chute to carry the crab overboard with minimal loss or damage. Retained catch is placed in a hold that has circulating sea water, and is retained alive until delivery, to catcher vessels. Catcher processors process the catch and freeze it for later delivery. The pots are rebaited and reset, or are stored if they are being moved to a different area or it is the end of the season. In the highly competitive short seasons that are currently the rule, more gear is stacked and moved to different areas than is reset in the original location. This is a function of the short soak times.

The product form produced after processing is sections of legs, claws and body meat. The carapace, gills and viscera are removed and ground before discharge. Shore plants are required to have discharge permits in near shore areas, while at-sea processors disperse their discharge according to Marpol regulations.

Habitat type where fishery occurs: Red king crabs are mostly taken in areas consisting of sandy and silty bottoms at depths of 20 to 80 fathoms (120-480 ft.). This bottom is typically low relief, without marked features or steep slopes. Occasionally red king crab may be taken on shell hash, gravel, or cobble bottoms. They frequently feed on sand dollars, starfish, clams, scallops, and various marine worms in these areas.

Crabs in their first one to two years of life generally occur at depths of less than 25 fathoms on grounds characterized by cobble, rock, shell hash, and extensive epifaunal growth in the form of mussels, sponges, compound tunicates and hydroids. They may also be found in association with some species of sea stars and urchins. The commercial fishery tends to concentrate on mature stocks that have segregated themselves by size and sex. The fishery seasons generally avoid mating and molting periods, when males and females are found together.

Bristol Bay red king crab are considered a distinct genetic stock and are managed as a single unit. The area boundaries are established to accomplish this.

Existing regulatory measures to mitigate effects of this fishery:

**Gear.** Pots are the only legal gear type. Pots require biodegradable panels, to minimize “ghost fishing” by lost or derelict gear. Pots require escape rings and/or large mesh panels designed to permit the escape of non-target crabs. The number of pots a vessel can fish is limited by regulation to reduce accidental loss of gear, to produce efficiency controls on the fisheries, and to slow down the fishery for better management.

**Fishing Seasons.** The opening date and mandatory closure dates are established to avoid mating and molting periods. The season length is usually determined by quota because fisheries are closed when the quota is reached. Recently, this has occurred after fewer than 10 days of fishing. This has produced near year-round closure of these grounds to the directed fishery.

**Limited Access.** Beginning in 2000, the license limitation program has provided for a limit on the maximum number vessels allowed in the fishery. An analysis is currently being undertaken, aimed at further rationalization of the fishery.

**Size and Sex Restrictions.** A prohibition on the retention of female crabs is designed to maximize overall reproductive potential. Male size limits are set to ensure that males have at least one mating season before becoming vulnerable to the fishery. The legal size for mature males is 6½”. In addition, the exploitation rate is set conservatively to assure that there are adequate males of various size classes available to meet

## **Norton Sound Red King Crab Fishery**

Description of gear used: This fishery is prosecuted with pots set on single lines. Both “square” pots similar to those of Bristol Bay, but generally no larger than 6’ in largest dimension, and “conical” pots are used. Conical pots used in this fishery are constructed with a steel bar frame and covered with tarred nylon mesh netting (3.5" stretched mesh). Not all conical pots use an inner “web bar” frame. Conical pot sizes are generally 4’ to 6’ on the base diameter. These pots are built with a smaller diameter “top ring” and are designed to nest when stacked. Tunnels may be similar to the “square pots” or consist in a plastic collar approximately 18” in diameter and 10” high in the top of the pot. Pots may weigh from 70 to several hundred pounds. The pot is rigged with bridle and line similar to that described for the Bristol Bay red king crab fishery, although the depth fished is shallower, so the lines are shorter. Sometimes a “sash weight” is attached to the line to prevent flotation on the surface rather than using a nylon top coil.

The Norton Sound fishing fleet is unique from the other fisheries managed under the FMP. Due to the small pot limits and the super-exclusive registration area, almost all of the vessels that participate in the Norton Sound fishery are under 32 feet and are from the villages surrounding Norton Sound. The majority of the fleet is converted herring gillnet boats, many of which are skiffs that do not have wheel houses or even lights. The Norton Sound winter fishery uses snow machines instead of boats to harvest crab. Approximately 10 snow machines are permitted to harvest king crab commercially by fishing small pots through the ice. A substantial subsistence fishery in the winter also exists for Norton Sound red king crab.

Description of fishery operations: Pots are baited in a manner similar to that described for Bristol Bay, though hanging bait is less frequently used. On most vessels, the pot is set manually. The line is thrown overboard, followed by the buoys as the pot sinks to the bottom. The pot rests directly on the bottom. The pot remains stationary on the bottom until it is retrieved. Pots are retrieved with hydraulic haulers or by hand, and handled similarly to the method described for Bristol Bay.

Compared to the Bristol Bay red king crab fishery, the Norton Sound crab are held for much shorter time periods, if at all, in circulating seawater. The crab live in cold salt water on the ocean’s bottom; the surface waters are frequently warmer and less saline. A fresh water lens of Yukon River water is a common feature of Norton Sound.

The near shore area in the vicinity of Nome is closed to commercial fishing in the summer time to avoid decreasing the number of crab available to the subsistence fishers.

Habitat type where fishery occurs: Norton Sound red king crabs are taken primarily in areas consisting of sandy and silty bottoms at depths of 25 fathoms or less.

Existing regulatory measures to mitigate effects of this fishery: In addition to the provisions described under Bristol Bay, the following apply: 1) The legal size for mature males is 4 ¾”, reflecting the smaller size at maturity; 2) The fishery is managed as a “superexclusive” area. Vessels that fish in this fishery may fish in no other king crab fishery in the state. This provision protects this extremely small stock from excess fishing effort. 3) The harvest strategy is developed to assure the priority of the subsistence fishery; and 4) Pot limits are more restrictive than Bristol Bay.



## **Pribilof Islands Red and Blue King Crab Fishery**

Description of gear used: The gear used in this fishery is in every respect similar to the gear described for the Bristol Bay red king crab fishery. Compared to Bristol Bay, there are more vessels of smaller size used in this fishery. In 1998, the last year the Pribilof king crab fishery was open, 57 catcher vessels made a total of 23,381 pot lifts during the 13 day season.

Description of fishery operations: Pots are baited and fished identically to the method described for the Bristol Bay red king crab fishery.

Habitat type where fishery occurs: Red king crabs are taken in areas consisting of sandy and silty bottoms at depths of 15 to 60 fathoms (90-360 ft.). Blue king crabs are generally taken in similar depths, but are more likely found on harder bottom, including cobble, gravel and occasional rock ledges. Red and blue king crab in the Pribilof Islands are each considered a unique genetic stock. Juveniles of both species are found on shallow, hard bottom associated with epifauna. Blue crab juveniles in their first year of life are very frequently found on shell hash.

Existing regulatory measures to mitigate adverse effects of this fishery: Existing measures are the same as those described for Bristol Bay except that pot limits are lower, reflecting the relative size of the stocks. Recently, both red and blue crab stocks have to be open for either fishery to be opened in the Pribilof Islands. Additionally, the Pribilof fishery is always opened concurrent with the St. Matthew Island blue king crab fishery, to spread fishing effort. Both areas must be opened for either to be fished.

## **Saint Matthew Blue King Crab Fishery**

Description of gear used: The gear used in this fishery is in every respect similar to that described for the Bristol Bay red king crab fishery. Vessels participating in this fishery are mostly catcher vessels 58' to 125' LOA. In 1998, the last year the St. Matthew king crab fishery was open, 131 vessels made a total of 89,500 pot lifts during an 11-day season.

Description of fishery operations: Pots are baited and fished identically to the method described for the Bristol Bay red king crab fishery.

Habitat type where fishery occurs: Blue king crabs are taken at depths of 15 to 60 fathoms (90-360 ft.) on hard bottom, including cobble, gravel and occasional rock ledges near shore, and softer bottom off shore. Blue king crab in the St. Matthew Island fishery are considered a unique genetic stock. The early life history of this blue king crab is expected to be similar to the Pribilof Islands blue king crab.

Existing regulatory measures to mitigate effects of this fishery: The mitigation measures are similar to those described for Bristol Bay and the Pribilof Islands. The size limit for mature males is 5½" to reflect the smaller size of St. Matthew blue king crab at sexual maturity. There is a near shore area closed to all fishing to protect spawning stocks and habitat.

## **Aleutian Islands Red King Crab Fishery**

Description of gear used: The gear used in this fishery is in every respect similar to that described for Bristol Bay red king crab. In 1995, 4 vessels made a total of 2,205 pot lifts. In 1998, the last year the AI red king crab fishery was open, only one vessel made landings of red king crabs. Red king crabs can also be retained in the golden king crab fishery.

Description of fishery operations: Pots are baited and fished identically to the method described for the Bristol Bay red king crab fishery. The area between 179 degrees west longitude and 179 degrees east longitude will open October 25, 2002, for 500,000 pounds GHL. There will be a pot limit of 40 pots per vessel less than 125 feet long and 50 pots for larger vessels. In addition, the Board of Fisheries has directed that in the event of a fishery, the area between 172 and 179 degrees west longitude, inside 3 nautical miles, will be restricted to harvest by vessels of 90 feet or less LOA. Probably, multiple small stocks of red king crab are spread over the Aleutians, although this region is currently managed as a single unit. Traditional areas of high abundance are: Petrel Bank, Adak/Amlia Islands and Attu Island.

Habitat type where fishery occurs: Red king crabs are taken in areas of all sediment types at depths of 20 to 100 fathoms (120-600 ft.).

Existing regulatory measures to mitigate effects of this fishery: The mitigation measures are similar to those described for Bristol Bay.

## **Aleutian Islands Golden King Crab Fishery**

Description of gear used: This fishery is prosecuted with square pots set in strings of multiple pots. Most of the vessels participating in this fishery are catcher vessels under 125' long.. There is a single 130' catcher processor vessel currently participating. Vessels set 400 to 1,800 pots (710 pots each on average). In the 1999/2000 fishery, 17 vessels participated and made a total of 180,169 pot lifts. Pots used in this fishery are constructed with a steel bar frame and covered with nylon mesh netting.

A variety of pot sizes is used, largely depending on vessel size and area fished. Pots range from 5'3" x 5'3" x 32" high to 10' x 10' x 34" high. The leading end of the pots' outer frame bars are radiused so that they do not snag on the bottom (see diagram [to be added]). In addition, the bottom webbing is protected by the outer frame of the pot, and does not directly contact the bottom. The difference between golden king crab pots and traditional red king crab pots is that the industry is voluntarily moving toward use of larger webbing on the ends of the pot and the tunnel sides. The newer webbing is between 8¼" and 9" stretch mesh to reduce bycatch of undersized crab. Pots are set in strings of 20 to 80 pots, each pot connected to the other by 80 to 100 fathoms of floating polypropylene line. Therefore, a single string may be 2 to 5 miles long. The ends of each string are marked with buoys. A single buoy on each line is marked with the appropriate Fish and Game requirements.

Description of fishery operations: Pots are baited in a manner similar to that described for Bristol Bay, though nearly twice as much bait is used because of the longer soak times that are practiced in the longline fishery.

Limitations to the strength of the materials used in the longline make it imperative that the vessel be directly above the gear as it is hauled up. To accomplish this, the vessel must always haul the string from the end that lies up current, thus moving the vessel with the current. Three to four pots may hang in the catenary as the gear is hauled up, with the vessel positioned directly above the pot that is next to leave the bottom. Gear is usually visible on the vessel's depth sounding equipment as it is hauled.

Habitat type where fishery occurs: Golden king crabs are taken in areas consisting of rough, uneven bottom at depths of 100-400 fathoms (600 to 2,400 ft.). Fishery effort is concentrated at the entrances to passes between the islands.

Existing regulatory measures to mitigate effects of this fishery:

Gear. Pots are the only legal gear type. Pots require biodegradable panels to minimize "ghost fishing" by lost or derelict gear. Pots require escape rings and/or large mesh panels designed to permit the escape of non-target crabs. This fishery is managed exclusively as a longline fishery to reduce gear loss and "ghost fishing."

Fishing Seasons. The season length is usually determined by quota because fisheries are closed when the quota is reached. Recently, this has occurred after fewer than 6 weeks in the eastern Aleutians, and approximately 9 months in the western Aleutians.

Limited Access. Beginning in 2000, the license limitation program has provided for limits on the maximum number of vessels allowed in the fishery. An analysis is currently being undertaken, aimed at further rationalization of the fisheries.

Size and Sex Restrictions. A prohibition on the retention of female crabs is designed to maximize overall reproductive potential. Male size limits are set to ensure that males have at least one mating season before becoming vulnerable to the fishery. The legal size for mature males is 6".

## **Aleutian Islands Tanner Crab Fishery**

Description of gear used: The gear used in this Tanner crab (*C. bairdi*) fishery is identical to that described for the Bering Sea Tanner crab fishery. In 1994, the last year the eastern district Tanner crab fishery was open, 8 vessels made a total of 6,323 pot lifts. The western district was last open in 1991, when 8 vessels made 986 pot lifts.

Description of fishery operations: Fishery operations are identical to those described for the Bristol Bay red king crab fishery.

Habitat type where fishery occurs: Tanner crabs are taken in areas of soft sediment types (silt, mud) at depths of 30-110 fathoms (180-660 ft.).

Existing regulatory measures to mitigate effects of this fishery: Existing mitigation measures are the same as those described for the Bering Sea Tanner crab fishery.

## **Bering Sea Tanner Crab Fishery**

Description of gear used: The Bering Sea Tanner crab (*C. bairdi*) fishery is very similar to the Bristol Bay red king crab fishery, except that the tunnel height cannot be greater than 5", and escape rings of 5"-diameter are required. In 1996, the last year of a commercial Bering Sea Tanner crab fishery, a total of 196 vessels made 149,289 pot lifts during the 16-day fishery.

Description of fishery operations: Fishery operations are identical to that described for the Bristol Bay red king crab fishery.

Habitat type where fishery occurs: Tanner crabs are taken in areas of soft sediment types (silt, mud) at depths of 30 to 110 fathoms (180-660 ft.). Tanner crabs tend to inhabit the warmer waters of the Bering Sea where summer bottom temperatures exceed 4 degrees C. These occur in western Bristol Bay, the Pribilof Islands, and along the shelf edge.

Existing regulatory measures to mitigate adverse effects of this fishery: In addition to the measures described for the Bristol Bay fishery, the following apply: 1) The waters east of 163 W longitude are closed during the directed Tanner crab fishery to protect small male and female red king crab; 2) The fishery closes March 31 to protect molting king crab in the western portion of the eastern subdistrict; 3) At reduced abundance levels, this fishery is managed as a bycatch fishery during the Bristol Bay red king crab fishery for that area; 4) Legal size is 5½" carapace width for male Tanner crab; 5) Pot limits.

## **Bering Sea Snow Crab Fishery**

Description of gear used: The Bering Sea snow crab (*C. opilio*) fishery is very similar to the Bristol Bay red king crab fishery, except that the tunnel height cannot be greater than 4", and escape rings of 4"-diameter are required. In 2000, a total of 229 vessels made 170,064 pot lifts during the 7-day opilio fishery.

Description of fishery operations: Fishery operations are identical to that described for Bristol Bay red king crab.

Habitat type where fishery occurs: Snow crabs are taken in areas of soft sediment types (silt, mud) at depths of 40 to 110 fathoms (240-660 ft.). They are generally found in colder areas of the Bering Sea where summer bottom temperatures are less than 4 degrees C. These areas occur in the mid-shelf region of the central portion of the eastern Bering Sea shelf. In areas of overlap with Tanner crab stocks, hybridization occurs.

Existing regulatory measures to mitigate adverse effects of this fishery: In addition to the measures described for Bristol Bay, the following apply: 1) The waters are closed to the retention of snow crab when soft shell conditions occur; 2) Legal size is 3.1" carapace width for male snow crab, although the industry standard is 4"; 3) Pot limits.

## **Alaska Salmon Drift Gillnet Fishery**

Description of gear used: Gillnets function by catching the fish by the gill cover and preventing escape. Gillnets are hung with corks on the top side and a leadline along the bottom. Maximum drift gillnet length and depth are limited by state regulations, which vary by region. Most gillnets are 200 fathoms long and 2-7 fathoms deep. Each end of the gillnet is marked with a buoy, but is not anchored to the bottom. Webbing for gillnets varies by region, however monofilament nets are not allowed. Mesh size varies with targeted species.

Description of fishery operations: Gill nets are set where there are signs of a salmon, such as ‘jumpers’ Most gillnet fisheries occur in marine waters. To set the net, one end of the net and buoy is put into the water and the remaining net is pulled off the vessel as it moves away. Sets are commonly made in a straight line, perpendicular to the shoreline. The net is pulled back onboard with the aid of a hydraulic reel mounted either on the stern or bow of the vessel. Salmon that try to swim through the net are caught by their gills. In most areas, drift gillnets do not contact the bottom. Drift gillnets are used in most areas of the State.

Habitat type where fishery occurs: Drift gillnets are set over any bottom type, wherever salmon are migrating in the ocean, inlet, and bays. For the most part, gillnets are set in nearshore areas and are fished in the upper water column. Drift gill nets are not generally designed for bottom interactions, but occasionally contact occurs.

Existing regulatory measures to mitigate adverse effects of this fishery:

In some nearshore areas such as river mouths, fishing is closed to ensure escapement goals. One of the results of these closures is that accidental bottom contact may be avoided. Areas near stream mouths, identified by markers, are closed to fishing inshore from the markers. These areas would not have fishing effects from gill nets on salmon habitat.

## **Alaska Salmon Set Gill Net Fishery**

Description of gear used: This fishery is prosecuted with anchored gill-nets. The gillnets are hung from the set line with corks on the top and a leadline on the bottom. Maximum gillnet size is limited by state regulations, which vary by region. Gillnets for the set gillnet fishery must be made of multifilament line. A mesh lead may be used in the intertidal area to guide salmon during the high tide periods.

Description of fishery operations: Most set gillnets are anchored on the beach and the offshore end secured to anchors and buoys. Some nets have what is called a lead, which is usually very large mesh seine webbing at the ends of the set gillnet to channel the fish toward the net. Some nets are not anchored to the shoreline, but held stationary with anchors on each end of the net. Set gillnets can be simply set in a straight line, or set to have a v-shaped hook at the end. Salmon are caught in the nets by their gills. Fishermen may use small skiffs to tend the nets and pick the salmon, or the nets can be accessed by motor vehicles and picked at low tide in some areas (e.g., Bristol Bay). In some areas, the entire net contacts the substrate at low tide. In other locations, only the leader and the shallower portion of the gillnet would contact the bottom. Set gillnets are used in most areas of the State.

Existing regulatory measures to mitigate adverse effects of this fishery: Set gillnet regulations vary according to area and district of the state. Spacing of nets with respect to each other and other natural features (e.g. stream mouths) may reduce potential interactions with salmon habitat.

## **Alaska Salmon Seine Fishery**

Description of gear used: This fishery is primarily prosecuted with purse seines. The length and depth of seines can vary region of the state. Purse seines are nets with corks on the top and a leadline along the bottom; and can be closed at the bottom by means of a free running line through rings attached to the lead line or to a ribline, which runs parallel to the leadline, but is located in the body of the net above the leadline. Maximum seine size is limited by state regulations, which vary by region. The largest of these nets is 250 fathoms in length, and the smallest is 100 fathoms. Depth also varies regionally, with most salmon seines being about 10 fathoms in depth. Mesh size may vary throughout the net, with 3.5 and 4" mesh being most common. Twine size is generally #21, but may be as large as #42 in the meshes nearer the lead line.

A beach seine is a net that is set from and returned to the beach. This seine does not have a purse string, but is dragged along the bottom to pull the fish in.

Description of fishery operations: Sets are generally made where there are signs of a salmon such as 'jumpers'. At other times, sets may be made based on prior experience of the captain or crew. When setting a purse seine, one end of the net is held by the seine skiff, and the seiner moves in the opposite direction, launching the net. The skiff continues to pull until all of the net is off the deck. With the net hanging in the water like a curtain, the seine skiff and seine vessel meet and join both ends of the net to the seiner. Hauling in the bottom line or 'purse line' closes off the bottom of the net, entrapping the fish. Sets may be circular, or adjusted around depth contours, to avoid location of 'hang ups', or to prevent being pushed by current and waves, or other reasons. Following pursing up the net, the seine corks, webbing, and leadline are pulled back onto the deck through a power block that is suspended from a boom off the boat's mast. Once most of the net has been retrieved, the fish are lifted in the purse, which remains in the water. The fish are spilled onto the deck, and sorted into compartments below decks.

The beach seine must be set from, and hauled to, the beach, or to a vessel anchored to a beach. One end of the beach seine must remain on the beach above the water at all times during the set. There is no purse in a beach seine. The fish are contained by the walls of the net and the substratum.

In shallow water seine fisheries, there is likely to be interaction between seines and bottom habitat. The nets are set as close to shore as possible and configured in a "J" out from the shore. The level of interaction varies by operation and bottom type.

Habitat type where fishery occurs: Sets can occur over any bottom type and almost any depths. Most commonly, salmon seiners work in coastal waters. In most situations, the netting does not contact bottom, with the exception of beach seine contact points with the beach.

Existing regulatory measures to mitigate adverse effects of this fishery:

Areas near stream mouths, identified by markers, are closed to fishing inshore from the markers. These areas would not have fishing effects from gill nets on salmon habitat.

## **Alaska Salmon Troll Fishery**

Description of gear used: This fishery is prosecuted with a series of hooks that are trolled behind a moving vessel. Two forms of trolling are legal, power troll and hand troll. Gear is restricted in Southeast Alaska as follows: power troll can have no more than four lines, except west of Cape Spencer and outside three miles, where six lines are permitted; hand troll can have four hand poles or two hand troll gurdies. A typical power troll vessel is 40' long and fishes with two to four poles. Attached to each pole are 2 tag lines, constructed of 300-400 pound test line. Main lines (wire) are 400-600 pound test stainless steel wire that passes through the tag lines. Each wire is weighted down by a 20-65 pound lead cannonball sinker, Cannonballs are attached to the wire with a 200-300 pound breaking strap. Cannonballs may have up to 10 or more spreads (leaders with hooks) attached. Spreads are placed every 2 fathoms up from the sinker. Baited hooks may be used on occasion, but more commonly lures, spoons, and hoochies fished behind a flasher are used.

Description of fishery operations: Salmon trolling is only done in Southeast Alaska - Yakutat area. Troll fisheries can occur in nearshore and offshore waters. Upon reaching the grounds, the poles are lowered and, one at a time, the wires are attached to tag lines. The cannonball is dropped overboard and the monofilament spreads are attached to the wire. The lines are set out and retrieved by either a hand crank (hand troller) or hydraulic power (power troller). Vessels troll at speeds of 1 to 3 knots. When a fish is hooked, the fishermen haul back on the wire. Fish are either gaffed and brought aboard if they are of legal size, or shaken off.

Habitat type where fishery occurs: Trolling can occur over any bottom type and at almost any depths. Trollers work in shallower coastal waters; but may also fish off the coast, such as on the Fairweather Grounds. In most situations, the gear rarely contacts the ocean bottom.

Existing regulatory measures to mitigate adverse effects of this fishery:

Troll gear fishing has minimal contact with the bottom habitat. Accidental contact occurs occasionally, however, potential loss of expensive fishing gear encourages fishing practices that minimize bottom contact. Troll gear is never intentionally in contact with the bottom.

## **Alaska Salmon Rod and Reel Fishery**

Description of gear used: The rod and reel fishery uses including spinning, casting, trolling, and flyfishing gear. Hook sizes can vary depending upon target species, gear type, fishing method (bait, fly, or other artificial). In river fishing for salmon, salmon roe may be used as bait if regulations permit. Lead sinkers (or downriggers when in the ocean) may be attached to get the hooks to the depths where the salmon occur. Snagging is allowed in some tidewater areas. Snagging gear is generally a weighted treble hook. This practice can have potential effects on the bottom habitat (leaving lead on the bottom, moving wood on the bottom).

Description of fishery operations: River fishing is done by standing on banks, wading from shore, and from boats. Ocean fishing is done from shore and from boats. In most river fishing, the line is cast slightly upstream and allowed to sink and drift through areas holding salmon. These casts are repeated until a fish takes the hook or the angler changes location. In ocean fishing, baited hooks are trolled at slow speeds behind the recreational boats in areas where salmon may be feeding or migrating. When a fish is hooked, the angler

Sports recreational, sports commercial, and subsistence fishing all employ rod and reel. Locations of operations vary.

Habitat type where fishery occurs: Rod and reel fishing occurs in a variety of habitat types including nearshore and offshore marine areas, rivers, and lakes. Mouths of rivers, as well as upstream on rivers and lakes receive the most fishing pressure. In river fishing, salmon are generally caught in areas with moderate flow near river banks. The bottom type is generally cobble and rocky due to the current. In ocean fishing, salmon are caught over a wide variety of bottom types and depths, and fishing can occur in offshore areas.

Existing regulatory measures to mitigate adverse effects of this fishery:

In some heavily utilized rivers, such as the Kenai River, State laws limiting bank disturbance, redd disturbance, boat speed and motor size, and number of people per vessel, are designed to limit impacts on salmon habitat based. Area specific restrictions also prevent fishing upstream from bridges at certain times of year. On the Kenai River, the most heavily fished river in Alaska, there is a long-term habitat mitigation program that involves habitat protection and restoration.

## **Alaska Salmon Fish Wheel Fishery (Commercial and Subsistence)**

Description of gear used: This fishery is prosecuted in the Yukon , Copper, and Kuskakwim Rivers with stationary fish wheels. The Yukon has commercial fish wheels. Subsistence fishwheels occur on the Yukon River, the Kuskokwin, and on the Copper River. A fish wheel is constructed of two lift nets made of 2" galvanized screening attached to a circular frame operated by the river current. Paddle boards catch the current and create the movement of the fish wheel nets. These boards are adjusted to the speed of the river current so that maximum catching efficiency is achieved. The wheel is mounted on a floating raft. The raft is anchored to a tree or rock upriver and pushed out into the current.

Description of fishery operations: As a fish swims near the wheel, it is scooped up in the net, slides toward the axle as the wheel turns, and is deposited in a holding box. Fishermen generally unload the boxes several times per day.

Habitat type where fishery occurs: Fish wheels are located in areas of the river, close to the bank, where the salmon are migrating. In all situations, no part of the fish wheel contacts the river bottom.

Existing regulatory measures to mitigate adverse effects of this fishery:

Regulations on the rivers where fish wheels are used. Protective measures against ichthyophonus? disease spreading among juvenile salmon.

## **Alaska Salmon Subsistence/Personal Use Fishery**

Description of Gear Used: Drift Gillnets, Set Gillnets, Dip Nets, Beach Seines, Rod and Reel, Fish Wheels and Trolling are all used in the prosecution of subsistence fisheries for salmon in Alaska. Gear size limitations may pertain in these subsistence fisheries.



Habitat type where fishery occur: Nearshore, shoreside, river and lakes may be involved in subsistence salmon fishing.

Existing regulatory measures to mitigate adverse effects of this fishery:

## **Bering Sea Pollock Trawl Fishery**

Description of gear used: This fishery is prosecuted with pelagic otter trawls rigged to fish for schooled and scattered pollock. Vessels participating in this fishery include about 112 catcher vessels and 16 catcher/processor vessels. Typical vessel length for catcher vessels is about 120 feet (range is 70-190') LOA, and about 220-350 feet LOA for catcher/processors. The gear used has meshes in the front end as large as 32 to 64 meters (105-210 ft), and typically has a headrope to foot rope vertical distance "rise" of 10-30 fathoms (60-180 ft). To achieve these large openings with a minimum of drag, the mesh sizes are very large and twine size relatively small. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 4" to 4.5" stretched mesh. Otter board or "doors" are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 5-14 square meters. In the pelagic fishery the doors do not come in contact with the ocean floor. Door spread in most fishing depths ranges from 100 to 180 meters (328-590 ft), and trawl warp/scope to depth ratio is typically 3 to 1. Contact with the seafloor, when it occurs, is from weight clumps and footrope. Long wire rope bridles attach the net to the doors (the doors are not on the bottom). Unlike other groundfish trawl fisheries, there are no discs attached to the footropes on these trawls. Footropes typically extend 180 to 450 meters (590-1475 ft).

Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. "Container lines" around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial "chafing gear", typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp. Everything from the footrope aft, including the codend, is neutrally boyant.

Description of fishery operations: Sets are made on schooled or scattered pollock as indicated by electronics. When set, the codend, net, and sweeps are unwound from a net reel, then the doors are attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. Tow duration in this fishery ranges from 20 minutes to 10 hours (depending upon catch rates), at a speed of 3.5 to 4.5 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of 'hangs' and fixed gear, or pushed by current, or other reasons. Quite often, vessels will turn around (180°) while towing, making several passes over the same general area. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

Habitat type where fishery occurs: Pollock tend to aggregate mid-water column over areas with sand, sandy silt, and muddy bottom at depths of 35 to 250 fathoms (210-1500 ft) .

Existing regulatory measures to mitigate effects of this fishery: The BSAI pollock fishery is restricted to using only pelagic trawls, as defined in regulations. Pelagic trawl gear has evolved and developed over time as a result of technological changes, regulatory amendment requirements, changes resulting from implementation of Co-ops, and electronical advancements (net electronics, onboard electronics, VMS). The Pribilof Islands Habitat Conservation Area had some effort for pollock prior to being closed to all trawling. Area 516 in the Bering Sea is closed to trawling from March 15 through June 15. The Bristol Bay near shore area is closed to all trawl fisheries. Prior to being closed, Pollock fishing had also occurred in area 518 (Bogoslof Area) and sea lion rookeries and haulouts on Amak, Akutan, Akun, and Unimak Islands. Chum salmon savings area

## **Aleutian Islands and Bogoslof Pollock Trawl Fishery**

Although the Bogoslof area is closed, it would have fleet characteristics of the Bering Sea but habitat and fishery descriptions of the Aleutian Islands.

Description of gear used: This fishery is prosecuted with otter trawls rigged to fish for schooled and scattered pollock. Vessels that have participated in this fishery included about 30 catcher vessels and about 10 catcher/processor vessels. Typical vessel length for catcher vessels is about 140 feet LOA, and about 220-350 feet LOA for catcher/processors. The gear used is very large mesh midwater trawls, typically having a headrope to foot rope vertical distance “rise” of 10-30 fathoms. To achieve these large openings with a minimum of drag, the mesh sizes are very large and twine size relatively small. Front meshes of a large midwater net may be as large as 32-64 meters (105-210 ft). Net mesh gets smaller towards the intermediate and codend, with the codend typically having 4" to 4.5" stretched mesh. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 7-14 square meters. Door spread in most fishing depths ranges from 100 to 180 meters (328-590 ft), and a trawl warp/scope ratio of 3 to 1. In the Aleutian Islands pollock fishery. There is no intentional seafloor contact because of the rough bottom conditions, which would result in torn or lost midwater trawls. Long wire rope bridles attach the net to the doors. Unlike other groundfish trawl fisheries, there are no discs attached to the footropes on these trawls. Footropes typically extend 180-450 meters (590-1475 ft).

Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. “Container lines” around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial “chafing gear”, typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp. Everything from the footrope aft, including the codend, is neutrally buoyant.

Seasons are short, low quota, low effort compared to Bering Sea. Quota taken in A season, January to the end of March.

Description of fishery operations: Sets are made on schooled or scattered pollock as indicated by electronics. When set, the codend, net, and sweeps are unwound from a net reel, then the doors are attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. Tow duration in this fishery is about 3 hours (depending upon catch rates), at a speed of 3.5 to 4.5 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or other reasons. Quite often, vessels will turn around (180°) while towing, making several passes over the same general area. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

Habitat type where fishery occurs: Pollock tend to aggregate in areas with bottom sediments ranging from volcanic sand to hard bottom. Pollock schools may be located close to the bottom in depths of 200-1500 ft, or adjacent to steep edges at this same depth range. Pollock are also fished at depths of 600 to 1500 feet over much deeper bottom depths (>3000 ft). Pollock aggregate in subterranean canyons on the upflow side.

Existing regulatory measures to mitigate effects of this fishery: The BSAI pollock fishery is restricted to using only pelagic trawls, as defined in regulations. The AI pollock fishery has been closed in recent years as a precautionary measure to reduce potential competition with Steller seal lions.

## **Bering Sea Pacific Cod Trawl Fishery**

Description of gear used: This fishery is prosecuted with bottom trawls. Vessels participating in this fishery include approximately 84 catcher vessels and 27 catcher/processor vessels. Typical vessel length for catcher vessels is a range of 60 to 180 feet LOA, and about 107 to 295 feet LOA for catcher/processors. The gear used includes many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 1 to 5 fathoms (6-30 ft). Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5½ to 8" stretched diamond mesh. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 4-10 square meters. Door spread in most fishing depths is typically 100 meters (328 ft), and the trawl warp/scope to depth ratio is typically 4 to 1. The mouth of the net is a horizontal opening of about 15 meters (49 ft). Contact with the seafloor is from doors, sweeps, and bobbins. The vertical opening is achieved by floats attached to the headrope. Floats may be spaced intermittently along the riblines to achieve neutral buoyancy. Modern doors (starting in the mid-1980’s) are designed to spread with minimal bottom contact. Vented, cambered, foam-filled, etc doors are examples are more modern doors.

Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. “Container lines” around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial “chafing gear”, typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp.

Sweeps are made of wire and covered with rubber disks ranging from 4-8 inches in diameter. Footropes, constructed of chain or steel cable, typically extend 100 to 200 feet, and are covered with rubber discs and bobbins designed to roll, which are 8 to 18 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

Description of fishery operations: When set, the codend, net, and sweeps are unwound from a net reel, and the doors are attached. Wire cable, attached to each door, is let out to a distance of approximately 4 times depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. Tow duration in this fishery is 2-4 hours (depending upon catch rates), at a speed of 3-4 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or other reasons. Quite often, vessels will turn around (180°) while towing, making several passes over the same general area. At haulback, the setting procedure is reversed.

Habitat type where fishery occurs: Pacific cod tend to aggregate in areas with sand, sandy mud, and gravel, at depths of 20 to 90 fathoms (120-540 ft).

Existing regulatory measures to mitigate effects of this fishery: The Pribilof Islands Habitat Conservation Area, the Nearshore Bristol Bay Area, and the Red King Crab Savings Area had some effort for Pacific cod

## **Bering Sea Rock Sole Trawl Fishery**

Description of gear used: This is a bottom trawl fishery using an otter trawl rigged to fish effectively for flatfish which generally live on or very near the substrate. All vessels currently involved with this fishery in the Bering Sea are trawl CPs. Typical vessel length (LOA) for boats targeting rocksole are from 107 to 295 feet LOA for catcher/processors. Approximately 20 vessels participate in the rock sole directed fishery.

Rock sole is fished with a two- or four-seam trawl with a relatively low vertical opening (typically 1 to 3 fathoms). Nets are made of polyethylene netting, with codends and intermediates using 5.5 to 8 inch mesh in square or diamond configuration. Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. "Container lines" around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial "chafing gear", typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp.

Steel trawl doors ranging in size from 5 to 11 square meters spread the nets horizontally. Door spread varies with fishing depth and rigging style, but generally ranges from 100 to 200 meters (328- 656 ft). The rigging between the net and the doors includes bridles and sweeps ('mudgear'), ranging in length from 30 to 200 meters (98-656 ft), which herd fish into the path of the trawl. Sweeps are made of steel cable covered by rubber disks ranging from 4-8 inches in diameter. Footropes keep the front of the net off the bottom to protect it from damage. They are made of rubber disks and bobbins 12 to 18 inches in diameter strung on chain or wire at 18- to 48-inch intervals. Bobbins are mostly rubber but sometimes are hollow steel balls designed to roll along the seabed.

Contact with the seafloor is predominantly from doors, sweeps, and bobbins. A design objective for modern flatfish nets is to fish the net with minimum bottom contact, to reduce gear damage and drag and to maintain the quality of the catch. Ideally, only the doors, sweeps and footrope bobbins will touch the bottom, and these will only touch enough to ensure fish are herded into the trawl. Any increase in bottom contact increases the drag of the system, causing a reduction in towing speed and/or an increase in fuel consumption along with an increased risk of damage to the gear. Additionally, more bottom contact can cause sand to mix with the catch, which increases processing cost and decreases the value of the product.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of 'hangs' and fixed gear, or pushed by current, or other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

Habitat type where fishery occurs: In the spring, the fish tend to aggregate in areas with sand, sandy silt, and muddy bottom at depths of 120-300 ft. They are often taken in a mixed Pacific cod fishery. There is no target rocksole fishery outside of spring season (January 20 to the beginning of March). The general fishing grounds are from 162° W to 165° W longitude and 56° 10 minutes N to 55° N latitude.

Existing regulatory measures to mitigate effects of this fishery: The bottom trawl closure areas (Pribilof Islands Habitat Conservation Area, Bristol Bay Nearshore Closure, and Red King Crab Savings Area) included some historically important fishing grounds for rock sole.

## **Bering Sea Yellowfin Sole Trawl Fishery**

Description of gear used: This fishery is prosecuted with otter trawls rigged to fish effectively for flatfish, which live on or very near the substrate. Nearly 20 to 30 vessels are currently involved with this fishery in the Bering Sea are trawl CPs. Typical vessel length (LOA) for boats targeting yellowfin are from 107 to 341 feet. Yellowfin is fished with a two- or four-seam trawl with a relatively low vertical opening (typically 1 to 3 fathoms). Nets are made of polyethylene netting, with codends and intermediates using 5.5 to 8 inch mesh in square or diamond configuration. Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. “Container lines” around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial “chafing gear”, typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp.

Otter board or “doors” are used to spread the net and keep it open during towing. Steel trawl doors ranging in size from 5 to 11 square meters spread the nets horizontally. Door spread varies with fishing depth and rigging style, but generally ranges from 100 to 200 meters (328-656 ft). The rigging between the net and the doors includes bridles and sweeps (‘mudgear’), ranging in length from 30 to 200 meters (98-656 ft), which herd fish into the path of the trawl. Sweeps are made of steel cable covered by rubber disks ranging from 4-8 inches in diameter. Footropes keep the front of the net off the bottom to protect it from damage. They are made of rubber disks and bobbins 12 to 18 inches in diameter strung on chain or wire at 18- to 48-inch intervals. Bobbins are mostly rubber but sometimes are hollow steel balls designed to roll along the seabed.

Contact with the seafloor is predominantly from doors, sweeps, footropes, and to a lesser extent from the codend. Although codends are usually rigged with some poly twine chafing gear, a design objective for modern flatfish nets is to employ sufficient poly floats to buoy the net body and codend to keep it mostly off the bottom or at least reduce the drag on the bottom to the greatest extent possible. This reduces the problem of sand and mud in the catch (which lowers product value and complicates processing). Sweeps are made of steel cable covered by rubber bobbins and disks ranging from 4-8 inches in diameter. Sweep sections (both sides) range in length from 250-800 feet and occasionally longer for nets with smaller footrope extensions and larger sweeps extensions. Footropes are designed to keep the net off the bottom by utilizing rubber disks and bobbins that range in size from 8-16 inches in diameter. Steel cable and chain used for the footrope runs through rubber disks spaced intervals of 18 to 48 inches. Floatation on the net head rope provides lift to the footrope to reduce unnecessary drag and increase towing efficiency and performance. Some headrope/footrope combinations are designed to be as much as 70% buoyant at depth. Footropes typically extend 100 to 200 feet.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows may be in a straight line

or other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

Habitat type where fishery occurs: In the late spring, the fish tend to aggregate in shallow (<150 feet) sandy areas to spawn. At other times of the year, they occur over sand, sandy silt, and muddy bottom at depths of 100-300 ft.

Existing regulatory measures to mitigate effects of this fishery: The bottom trawl closure areas (Pribilof Islands Habitat Conservation Area, Bristol Bay Nearshore Closure, and Red King Crab Savings Area) included some historically important fishing grounds. A portion of Bristol Bay, south and west of Nushagak Peninsula, was designated as open to trawling from April 1 to June 15 to allow the fishery to target aggregated yellowfin sole when they are aggregated over sandy bottoms and the fishery can be conducted with minimal bycatch.

## **Bering Sea Flathead Sole/Other Flatfish Trawl Fishery**

Description of gear used: This is a bottom trawl fishery using an otter trawl rigged to fish effectively for flatfish which generally live on or very near the substrate. All vessels currently involved with this fishery in the Bering Sea are trawl CPs. Typical vessel length (LOA) for boats targeting rocksole are from 107 to 295 feet LOA for catcher/processors. Approximately 20 to 30 vessels participate in the flathead sole directed fishery, as well as other flatfish fisheries.

Flathead sole is fished with a two- or four-seam trawl with a relatively low vertical opening (typically 1 to 3 fathoms). Nets are made of polyethylene netting, with codends and intermediates using 5.5 to 8 inch mesh in square or diamond configuration. Trawl codends are usually made with polyethylene netting attached to four longitudinal riblines. The riblines are typically chain, wire or synthetic rope. Floats are attached along the length of the codend to counteract the weight of the steel components. "Container lines" around the circumference are attached along the length of the codend to restrict the expansion of the netting, preventing damage and allowing the codend to be hauled up a stern ramp. Sacrificial "chafing gear", typically polyethylene fiber, is attached to the codend to protect it from abrasion on the stern ramp.

Steel trawl doors ranging in size from 5 to 11 square meters spread the nets horizontally. Door spread varies with fishing depth and rigging style, but generally ranges from 100 to 200 meters (328-656 ft). The rigging between the net and the doors includes bridles and sweeps ('mudgear'), ranging in length from 30 to 200 meters (98-656 ft), which herd fish into the path of the trawl. Sweeps are made of steel cable covered by rubber disks ranging from 4-8 inches in diameter. Footropes keep the front of the net off the bottom to protect it from damage. They are made of rubber disks and bobbins 12 to 18 inches in diameter strung on chain or wire at 18- to 48-inch intervals. Bobbins are mostly rubber but sometimes are hollow steel balls designed to roll along the seabed.

Contact with the seafloor is predominantly from doors, sweeps, and bobbins. A design objective for modern flatfish nets is to fish the net with minimum bottom contact, to reduce gear damage and drag and to maintain the quality of the catch. Ideally, only the doors, sweeps and footrope bobbins will touch the bottom, and these will only touch enough to ensure fish are herded into the trawl. Any increase in bottom contact increases the drag of the system, causing a reduction in towing speed and/or an increase in fuel consumption along with

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

Habitat type where fishery occurs: Flatfish tend to aggregate in areas with sand, sandy silt, and muddy bottom at depths of 100-1200 ft depending upon species and season. For example, Alaska plaice are caught in shallow waters (<300 feet), but flathead sole and other species are caught down to much greater depths.

Existing regulatory measures to mitigate effects of this fishery: The bottom trawl closure areas (Pribilof Islands Habitat Conservation Area, Bristol Bay Nearshore Closure, and Red King Crab Savings Area) included only minor fishing grounds for flathead sole, Alaska plaice and other flatfish.

## **Aleutian Islands POP and Northern Rockfish Trawl Fishery**

Description of gear used: This fishery is prosecuted with otter trawls rigged to fish over generally rougher substrates. Target species in the BSAI fishery include Pacific ocean perch, shortraker rockfish, and rougheye rockfish. All vessels currently involved with this fishery are trawl CPs. Typical vessel length (LOA) for boats targeting rockfish are from 107 to 295 feet. The gear used is a four seam otter trawl and a headrope to foot rope vertical distance “rise” of about 4 to 6 fathoms. Nets are made of polyethylene. Net mesh is 8 inch diamond in the wings and forward belly and 5.5 inch diamond in the intermediate and codend. Double meshes may be used in the codend, and the codend is equipped with chafing gear. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 6.5-12 square meters. Door spread in most fishing depths and trawl warp/scope combinations is typically 45 to 50 meters (148-164 ft). Contact with the seafloor is predominantly from doors, bridles, and bobbins. Rockfish nets are designed to stay off the bottom as much as possible by employing numerous floats to buoy the net body and codend. Bridles are made of steel cable, and are generally 90 feet long on each side. Foot ropes are designed to keep the net off the bottom and may utilize tire gear, large disk tires (24 inch diameter airplane tires), 21 inch discs or bobbins, or a combination of these. Footropes typically extend 100 to 200 feet, plus an additional 40 foot extension from net wing ends on both sides. Steel cable and chain used for the footrope runs through bobbins or discs spaced at intervals of 24 inches or tires grouped together at the bosom, which is the center 30 to 80 feet. Floatation on the net head rope and riblines provides lift to reduce unnecessary drag and increase towing efficiency and performance.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a minimum distance necessary to achieve the fishing depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows are adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks. The tows in the rockfish fishery have more intermittent bottom contact compared to the other bottom trawl fisheries due to the nature of substrate and fish behaviors.



Because rockfish is fished over rough bottom adjacent to areas with large potential for hangs in some areas, the net is usually fished with very short scope (the ratio of warp to towing depth) to minimize actual contact with the substrate and allow the net to be quickly lifted if a hangup is sighted. The combination of short trawl warp and the large amount of floatation applied to the headropes and rib lines increases the likelihood that the net will bounce off a rock or hang that may be encountered. This avoids damage to the net. Flotation on the net body reduces potential for ripping or abrading the net on volcanic sand or rock surfaces.

Habitat type where fishery occurs: Rockfish are caught all along the narrow slope area. Bottom types include areas with rocks and living substrates at depths of 175-500 m (574-1640 ft) and deeper.

Existing regulatory measures to mitigate effects of this fishery: The allocation of POP TAC by the Aleutian Islands management areas (541, 542, and 543) based on the distribution of biomass as determined by resource assessment surveys, serves to spread the fishery out and reduce the impacts of spatially concentrated harvests. Furthermore, the spatial and temporal Steller sea lion closures and critical habitat catch limits restrict fishing effort and effort distribution in this fishery. Short Raker/Rougheye TAC allocated among gear types, resulting in less trawling for rockfish. In recent years there has been no directed rockfish trawl fishing in the Bering Sea.

## **Aleutian Islands Atka Mackerel Trawl Fishery**

Description of gear used: This fishery is prosecuted with otter trawls rigged to fish over generally rougher substrates. All vessels currently involved with this fishery are trawl CPs (approximately 8 to 12 vessels). Typical vessel length (LOA) for boats targeting Atka Mackerel are from 107 to 295 feet. The gear used is a four seam otter trawl and a headrope to foot rope vertical distance “rise” of about 1 to 4 fathoms. Nets are made of polyethylene. Net mesh is 8 inch diamond in the wings and forward belly and 5.5 inch diamond in the intermediate and codend. Double meshes may be used in the codend, and the codend is equipped with chafing gear. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 6.5-12 square meters. Door spread in most fishing depths and trawl warp/scope combinations is typically 45 to 50 meters (148-164 ft). Contact with the seafloor is predominantly from doors, bridles, and bobbins. Atka Mackerel nets are designed to stay off the bottom as much as possible by employing numerous floats to buoy the net body and codend. Bridles are made of steel cable, and are generally 90 feet long on each side. Foot ropes are designed to keep the net off the bottom and may utilize tire gear, large disk tires (24 inch diameter airplane tires), 21 inch discs or bobbins, or a combination of these. Footropes typically extend 100 to 200 feet, plus an additional 40 foot extension from net wing ends on both sides. Steel cable and chain used for the footrope runs through bobbins or discs spaced at intervals of 24 inches or tires grouped together at the bosom, which is the center 30 to 80 feet. Flotation on the net head rope and riblines provides lift to reduce unnecessary drag and increase towing efficiency and performance.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a minimum distance necessary to achieve the fishing depth. Modern trawl winches are designed to automatically adjust tension and release when necessary. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows are adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks. The tows in the rockfish

Because mackerel is fished over rough bottom adjacent to areas with large potential for hangs in some areas, the net is usually fished with very short scope (the ratio of warp to towing depth) to minimize actual contact with the substrate and allow the net to be quickly lifted if a hangup is sighted. The combination of short trawl warp and the large amount of floatation applied to the headropes and rib lines increases the likelihood that the net will bounce off a rock or hang that may be encountered. This avoids damage to the net. Flotation on the net body reduces potential for ripping or abrading the net on volcanic sand or rock surfaces.

Habitat type where fishery occurs: Mackerel are caught in areas with volcanic sand, rocks, and living substrates at depths of 125-200 m (410-656 ft). The fishery occurs in very discrete locations, and tows are generally made in the same locations each year. Mackerel live in a lot of areas where the fishery cannot target them.

Existing regulatory measures to mitigate effects of this fishery: The allocation of Atka mackerel TAC by the Aleutian Islands management areas (541, 542, and 543) based on the distribution of biomass as determined by resource assessment surveys, serves to spread the fishery out and reduce the impacts of spatially concentrated harvests. Furthermore, the spatial and temporal Steller sea lion closures and critical habitat catch limits restrict fishing effort and effort distribution in this fishery. A recently implemented platoon system further limits the amount of effort spatially and temporally.

## **BSAI Pacific Cod Longline Fishery**

Description of gear used: This fishery is prosecuted with stationary lines, onto which baited hooks are attached. Vessels participating in this fishery include small to medium (<75') catcher vessels and catcher-processors (aka freezer-lingliners) that range from 90 to 200 feet in length. About 5-10 catcher vessels and 35 catcher-processors participate in the directed cod fishery. Gear components that contact the bottom include the anchors, groundline, gangions, and hooks.

For catcher vessels, anchors are two prong standard anchors weighing 50 lb, groundlines are generally constructed of 3/8" sinking line, 16" long gangions of #72 twine, and 14/0 circle hooks. Many of the catcher vessels use snap on gear with gangions spaced at 12 foot intervals. On catcher vessels, an average set consists of 12 'skates' of groundline, with each skate 300 fathoms long, for a total length of 3.5 n mi. Squid is the preferred bait. The ends of each set are anchored and marked with buoys. The lower shot (s) (33 fathoms each) of the anchor line is made of 3/4" floating poly, and the upper shot of line is made of 5/8" sinking line. Attached to the line are plastic buoys.

Catcher processors use slightly different gear: 9 mm groundline is employed with 10 to 14" gangions spaced 3 1/2 feet apart, No. 6 to 14 modified "J" or full circle hooks. Most vessels use swivel gear.

Description of fishery operations: For catcher vessels, the first anchor is set and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is not made in a straight line; instead the boat will steer to ensure the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed and the line is left to fish for 2-24 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are stripped off the hooks.

determine the exact trackline of the set, enabling the vessel to retrieve the gear without dragging it across the bottom. It is in the best interest of the fishing operation to do this in order to avoid gear damage. Generally the gear is set in a straight line, the average set being 8 miles long. Such a set would deploy 12,320 hooks at a depth of about 30 - 80 fathoms, with an occasional set as deep as 120 fathoms. Often two sets are made, parallel to one another and 1/2 - 3/4 mile apart. The total time the gear is in the water ranges from 4 to 20 hours. Vessels do not usually set back in the same place, but leapfrog. About 4 sets are made in a day. Gear is set with an anchor at each end, sometimes with an anchor in the middle of the set. Some vessels use intermediate weights of about 3 to 10 pounds, and most use swivel gear which adds weight to the line.

Habitat type where fishery occurs: The catcher vessel longline fishery occurs over gravel, cobble, and rocky bottom. In the summer, the fish are found in shallow (150-250 ft) waters, but are deeper (300-800 ft) in the winter. Catcher-processors fish over sandy/silt bottom in the Bering Sea, but over more rocky bottoms in the Aleutian Islands.

Existing regulatory measures to mitigate effects of this fishery: The sea lion closures prohibit this fishery from some nearshore areas.

## **BSAI Sablefish/Tubot Longline Fishery**

Description of gear used: This fishery is prosecuted with stationary lines, onto which baited hooks are attached. Vessels participating in this fishery include a few small to medium (<75') catcher vessels and 35 catcher-processors (aka freezer-longliners) ranging from 90 to 200 feet in length. Gear components that contact the bottom include the anchors, groundline, gangions, and hooks.

For catcher vessels, anchors are two prong standard anchors weighing 50 lb, groundlines are generally constructed of 3/8 sinking line, 12" long gangions of #72-#86 twine, and 13/0-14/0 circle hooks. Many of the catcher vessels use snap on gear with gangions spaced at 3-4 foot intervals. On catcher vessels, an average set consists of 20 'skates' of groundline, with each skate 100-150 fathoms long. Squid is the preferred bait. The ends of each set are anchored and marked with buoys. The lower shot (s) (33 fathoms each) of the anchor line is made of 3/4" floating poly, and the upper shot of line is made of 5/8" sinking line. Attached to the line are plastic buoys.

For freezer longliners, this fishery uses 9 mm groundline is employed with 10 to 14" gangions spaced 3 1/2 feet apart, No. 6 to 14 modified "J" or full circle hooks. Most vessels use swivel gear and autobaiting equipment.

Description of fishery operations: For catcher vessels, the first anchor is set and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is not made in a straight line; instead the boat will steer to ensure the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed and the line is left to fish for 2-24 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are stripped off the hooks.

For freezer longliners in the turbot fishery, the gear is set in 250 – 500 fathoms of water, with most of the fishery taking place in 350 – 400 fathoms. The sets are 4 – 5 miles in length. Normally two sets are made, with subsequent sets leapfrogging. Soak time is highly variable, minimum 5 hours.

In the sablefish fishery, the freezer longliners set their gear in 150 – 600 fathoms (900-3,600 ft), with average depth of 300 – 400 fathoms (1,800-2,400 ft). The sets are 3 – 4 miles in length, leapfrogging at roughly the same depth. The freezer-longliner quota is a small part of the overall IFQ quota. The fishery is conducted in the GOA and in the BSAI. Freezer longliner halibut IFQ quota is taken as bycatch by small number of freezer longliners engaged in this fishery

Habitat type where fishery occurs: The sablefish/Greenland turbot fishery occurs over silt, muc, gravel, cobble, and rocky bottom at depths of 150 to 600 fm.

Existing regulatory measures to mitigate effects of this fishery: Sablefish is an IFQ fishery.

## **Bering Sea Pacific Cod Jig Fishery**

Description of gear used: This fishery is prosecuted with actively fished vertical lines, onto which baited hooks are attached. Vessels participating in this fishery include small (<60') catcher vessels. Gear components include a 8 pound jig weight, a 400 lb test monofilament mainline, and long shank 10/0 J-hooks that are looped directly onto the mainline. Vessels employ 2-4 jig machines per vessel. Hooks are dressed with colorful segments of rubber surgical tubing, and are generally baited with strips of Atka mackerel.

Description of fishery operations: The vessels look for concentrations of Pacific cod, and position their vessel to drift over the fish. The machines drop the jig weight to the bottom, and may move the jigs up and down slightly to instigate the fish into biting. Each jig machine is adjusted to haulback when there is the right amount of tension on the line (amount of fish). Machines haul up the fish, which are then removed one by one. The vessels move often to keep over fish concentrations. There is no intentional contact with the bottom although such contact may occur.

Habitat type where fishery occurs: The fishery occurs over gravel, cobble, and rocky bottom. In the summer, the fish are found around rockpiles in shallow (150-250 ft) waters, but are deeper (300-800 ft) in the winter. Jig vessels fish the area of Shulin Bank between Bishop Point and Akutan, all within 10 nm of Unalaska.

Existing regulatory measures to mitigate effects of this fishery: None.

## **BSAI Pacific Cod Pot Fishery**

Description of gear used: The pot cod fishery is prosecuted with square pots set on single lines. In 1999, a total of 45 catcher vessels (mostly 60-125' LOA) and 5 catcher-processors (>125' LOA) participated in the fishery. The fishery begins at the end of the opilio fishery (March in recent years) and stops in April; A second season occurs during September and October (until the Bristol Bay red king crab fishery starts). Pots used in a directed cod fishery modified crab pots, which are constructed with a steel bar frame (1.25" diameter) and covered with tarred nylon mesh netting (3.5" stretched mesh). Pot sizes range from 6' to 8' square, with the average vessel using 7'x7' pots. Each pot has two tunnel openings on opposite sides, with plastic "finger" funnels to retain the fish. The pot is attached with a 6' to 8' bridle, generally constructed of 1" diameter poly line. A 30' to 60' surge, constructed of heavy duty line, is attached to the bridle. The lower

Description of fishery operations: The average number of pots per vessel is 120. An estimated total of 6,000 pots in the fishery. The average number of days of fishing per year is 40 to 50 days. Pots are set and retrieved once every 24 hours. Pots are baited with chopped herring placed in hanging bait buckets in the center of the pot. On most vessels, the pot is set tipped into the sea with a pot launcher. The shots of line are thrown overboard, followed by the buoys, and the pot sinks to the bottom. The pot rests directly on the bottom. The pot remains stationary on the bottom until it is retrieved, generally about 24 hours later. Pots are retrieved as follows: the crewman throws a hook between the buoys to get the line. The line is fed into the hauler and the pot is brought aboard by a crane and placed on the pot hauler. Pacific cod are dumped into totes. The fish are put on ice below decks. The pots are rebaited and reset, or stored if they are being moved or it is the end of the season. There is a very small footprint in this fishery (an estimated 0.17 square mile footprint combined). The average size of a fish is 8 to 9 pounds.

Habitat type where fishery occurs: The Pacific cod pot fishery occurs primarily around the west side of Unimak Island and around Unalaska Island, on areas of mud, sand, cobble and low relief hard bottom at a depth range of 50-300 m (165-985 ft).

Existing regulatory measures to mitigate effects of this fishery: Pots require biodegradable panels, constructed of #30 cotton twine. Halibut excluder devices (rigid tunnel eye openings are no more than 9 inches wide and 9 inches high) are required. The sea lion closures prohibit this fishery from some nearshore areas.

## GOA Pollock Trawl Fishery

Description of gear used: This fishery is prosecuted with primarily pelagic otter trawls rigged to fish for schooling pollock. Vessels participating in this fishery are shore-based catcher vessels between 58 and up to 125 feet and ranging in horsepower from 350 hp to 1,600. The gear includes primarily large mesh midwater trawls and to a limited extent, bottom trawls.

Mid water pelagic trawls typically have a headrope to foot rope vertical distance “rise” of 7 to 30 fathoms and a horizontal opening of 12 to 60 fathoms (wing-end spread of 18 to 80 fathoms). Typical sizes are 20 fathoms vertical and 40 fathoms horizontal and 60 fathoms wing-end spread for vessels with an average horsepower of 1,000. Wing-end spread is typically 15 percent greater than horizontal opening size. To achieve these large openings with a minimum of drag, the mesh sizes are very large and twine size relatively small. Front meshes of a large midwater net may be as large as 120 feet. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5” stretched mesh. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 3 up to 7 square meters. Door spread in most fishing depths and trawl warp/scope combinations is typically 100 to 180 meters. Contact with the seafloor, when it occurs, is from the weight chains attached to the wing ends and/or the center section of the footrope. Long wire rope bridles attach the net to the doors. Unlike other groundfish trawl fisheries, there are no discs attached to the footropes on these trawls.

Different types of bottom trawls are used, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from 90 to 120 feet. Wing-end spread is typically 12 fathoms with a 120-foot footrope. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5.5 inch stretched mesh, hung either square or diamond. Otter board or “doors” are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 2.5 to 6 square meters with typical horizontal length of 6 to 9 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 2 to 4 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the horizontal length of the door. Sweeps are typically 45 fathoms at 11 to 15 degrees. Contact with the seafloor is from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

A bottom trawl with headline length of 90 feet and footrope length of 120 feet weighs approximately 1,800 pounds. Footrope for same net 14 inch rockhopper disc weighs 2,100 pounds, steel components 750 pounds, rubber components 2,100 pounds, flotation 700 to 800 pounds headrope floats. Hydro dynamic affects contributes to reduced downward force.

Description of fishery operations: Sets are made on pollock schools as indicated by electronics. When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out, and the winches are tightened. Tow duration in this fishery is typically 3 hours, ranging from 2 to 12 hours depending upon catch rates, at a speed of 2.5 to 4 knots. Typically, this is done 2 to 3 times a day with the number of tows depending on catch rates. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or for other reasons. Quite often, vessels will turn around 180 degrees while towing, making several passes in the same general area. The rough substrate in the Gulf of Alaska would damage mid-water nets, creating an incentive to avoid

are often found up in the water column. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

The fishery occurs in four quarterly seasons and further is broken out into five separate management areas. There are standdown periods of no fishing between the quarterly seasons. Catch rates are generally higher during the winter roe season due to spawning aggregations. There are currently significant numbers of closed areas due to steller sea lion protection measures, which have altered fishing. The fishery has also changed over time due to State water closures to nonpelagic nets, Inshore/offshore allocations, steller sea lions mitigation measures, the American Fisheries Act, and a gradual increases in fishing capability.

Habitat type where fishery occurs: Pollock are generally ubiquitous throughout their gulf range. Pollock tend to aggregate and fishery generally occurs in areas with sand, sandy silt, muddy bottom, and pelagically over hard rocky bottoms at depths of 60 to 500 meters. Water depth may be greater than the depth at which fishery occurs. Pollock may aggregate to spawn, to feed, and to breed, and in relation to water temperature.

Existing regulatory measures to mitigate effects of this fishery: Some areas are closed to bottom trawling and/or all trawling, and there are season closures as well. Vessel size in this fishery is limited to 125 feet, with three hundred thousand pounds trip limits and no tendering allowed.

## **GOA Pacific Cod Trawl Fishery**

Description of gear used: The inshore fishery is prosecuted by nonpelagic bottom trawls. Vessels participating in this fishery are shore-based catcher vessels between 58 and up to 125 feet and ranging in horsepower from 350 hp to 1,600 hp. The gear used includes many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from 90 to 120 feet. Wing-end spread is typically 12 fathoms with a 120-foot footrope. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5.5 to –8-inch stretched mesh, hung either square or diamond. Otter board or “doors” are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 2.5 to 6 square meters with typical horizontal length of 6 to 9 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 2 to 4 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the horizontal length of the door. Sweeps are typically 45 fathoms at 11 to 15 degrees. Contact with the seafloor is from doors, sweeps, and footropes. . Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

The offshore fishery is prosecuted by nonpelagic bottom trawls. Vessels participating in this fishery are catcher processors between 98 and 200 feet LOA, with a horsepower from 900 to 3,500 hp. The gear used includes many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from 120 to 190 feet. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5.5 to 8-inch stretched mesh, hung either square or diamond. Otter board or “doors” are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 5.5 to 9 square meters with typical horizontal length of 9 to 12 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 4 to 8 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the

and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

A bottom trawl with headline length of 90 feet and footrope length of 120 feet weighs approximately 1,800 pounds. Footrope for same net 14 inch rockhopper disc weighs 2,100 pounds, steel components 750 pounds, rubber components 2,100 pounds, flotation 700 to 800 pounds headrope floats. Hydro dynamic affects contributes to reduced downward force.

Description of fishery operations: Sets are made on cod schools as indicated by electronics. Fishing predominantly occurs during daylight hours. When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out, and the winches are tightened. Tow duration in this fishery is variable, ranging from 1 to 4 hours depending upon catch rates, at a speed of 2.5 to 4 knots. Typically, this is done 2 to 3 times a day with the number of tows depending on catch rates. Catcher processors may occasionally make more tows per day to keep onboard factories operating. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or for other reasons. Quite often, vessels will turn around 180 degrees while towing, making several passes in the same general area. The rough substrate in the Gulf of Alaska damages nets, creating an incentive to avoid rough bottom. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

The fishery occurs in two seasons and further is broken out into four separate management areas. There is no directed fishing for cod from November 1 to January 20 and between the two seasons there is no directed fishing. Catch rates are generally higher during the winter due to spawning aggregations. There are currently significant numbers of closed areas due to steller sea lion protection measures, which have altered fishing. The fishery has also changed over time due to State water closures to nonpelagic nets, management of a State water Pacific cod fishery, Inshore/offshore allocations, Steller sea lions mitigation measures, the American Fisheries Act, and a gradual increases in fishing capability.

Habitat type where fishery occurs: Pacific cod tend to aggregate in areas with sand, sandy mud, cobble, and gravel, at depths of 100 to 600 feet.

Existing regulatory measures to mitigate effects of this fishery: Some areas are closed to bottom trawling and/or all trawling, and there are season closures as well. Size of catcher vessels is limited to 125 feet.

## **GOA Deepwater Flatfish Trawl Fishery**

Description of gear used: Target species for this fishery include rex sole, Dover sole, arrowtooth flounder and other deepwater flatfish. This fishery is prosecuted by nonpelagic bottom trawls. Vessels participating in this fishery are shore-based catcher vessels between 58 and up to 125 feet and ranging in horsepower from 350 hp to 1,600 hp. Typically less than 20 vessels participate in this fishery.

Catcher vessels use many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from 90 to 120 feet. Wing-end spread is typically 12 fathoms with a 120-foot footrope. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 4.5 to 5-inch stretched mesh, hung either square or diamond. Codends have



Low aspect doors are made of steel and range in size from 2.5 to 6 square meters with typical horizontal length of 6 to 9 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 2 to 4 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the horizontal length of the door. Door spread is typically 60 to 100 fathom sweeps at 11 to 13 degrees. Contact with the seafloor is from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

Catcher processors also participate in this fishery with nonpelagic bottom trawls. Vessels participating in this fishery are catcher processors between 98 and 200 feet LOA, with a horsepower from 900 to 3,500 hp. Typically six catcher processors are involved in this fishery. The gear used includes many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from 120 to 190 feet. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 4.5 to 5-inch stretched mesh, hung either square or diamond. Codends have sacrificial ‘chafing gear’ (usually polyethylene fiber) attached to the bottom and sides to protect them from damage on the stern ramp. Otter board or “doors” are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 5.5 to 9 square meters with typical horizontal length of 9 to 12 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 4 to 8 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the horizontal length of the door. Door spread is typically 60 to 100 fathom sweeps at 11 to 13 degrees. Contact with the seafloor is from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

A bottom trawl with headline length of 90 feet and footrope length of 120 feet weighs approximately 1,800 pounds. Footrope for same net 14 inch rockhopper disc weighs 2,100 pounds, steel components 750 pounds, rubber components 2,100 pounds, flotation 700 to 800 pounds headrope floats. Hydro dynamic affects contributes to reduced downward force.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth, and the winches are tightened. Towing duration in this fishery is about 3 hours, at a speed of 2.5 to 3.5 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks.

A design objective for modern flatfish nets is to fish the net with minimum bottom contact, to reduce gear damage and drag and to maintain the quality of the catch. Ideally, only the doors, sweeps and footrope bobbins will touch the bottom, and these will only touch enough to ensure fish are herded into the trawl. Any increase in bottom contact increases the drag of the system, causing a reduction in towing speed and/or an increase in fuel consumption along with an increased risk of damage to the gear. Additionally, more bottom contact can cause sand to mix with the catch, which increases processing cost and decreases the value of the product.

also changed over time due to State water closures to nonpelagic nets, the American Fisheries Act, market conditions, and a gradual increases in fishing capability.

Habitat type where fishery occurs: In the spring, the fish tend to aggregate in areas with sand, sandy silt, cobble, gravel, and muddy bottom at depths of 70 to 300 fathoms.

Existing regulatory measures to mitigate effects of this fishery:

## **GOA Shallow Water Flatfish Trawl Fishery**

The shallow water flatfish fishery targets rock sole and flathead sole using nonpelagic bottom trawls. Catcher vessels participating in this fishery are shore-based catcher vessels between 58 and up to 125 feet and ranging in horsepower from 350 hp to 1,600 hp. Typically less than 25 vessels participate in this fishery.

The gear used by catcher vessels includes many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from 90 to 120 feet. Wing-end spread is typically 12 fathoms with a 120-foot footrope. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5 to 6-inch stretched mesh, hung either square or diamond. Codends have sacrificial ‘chafing gear’ (usually polyethylene fiber) attached to the bottom and sides to protect them from damage on the stern ramp. Otter board or “doors” are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 2.5 to 6 square meters with typical horizontal length of 6 to 9 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 2 to 4 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the horizontal length of the door. Sweep lengths are typically 60 to 100 fathom at 11 to 13 degrees. Contact with the seafloor is from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches.

Catcher processors also participate in the shallow water flatfish fishery. Vessels participating in this fishery are catcher processors between 98 and 185 feet LOA, with a horsepower from 900 to 3,200 hp. Typically five catcher processors are involved in this fishery. The gear used includes many different types of bottom trawls, most typically having a headrope to foot rope vertical distance “rise” of 2 to 5 fathoms. Typical foot rope length is from approximately 90 to 130 feet. Net mesh gets smaller towards the intermediate and codend, with the codend typically having 5.5 to 7-inch stretched mesh, hung either square or diamond. Codends have sacrificial ‘chafing gear’ (usually polyethylene fiber) attached to the bottom and sides to protect them from damage on the stern ramp. Otter board or “doors” are used to spread the net and keep it open during towing. Low aspect doors are made of steel and range in size from 4.5 to 6 square meters with typical horizontal length of 6 to 9 feet and typical angle of attack is 30 to 36 degrees. High aspect doors have a typical horizontal length of 3 to 5 feet and angle of attack of 30 to 36 degrees. Bottom contact usually is about one half or less of the horizontal length of the door. Sweep lengths are typically 60 to 100 fathom at 11 to 13 degrees. Contact with the seafloor is from doors, sweeps, and footropes. Sweeps are made of wire and covered with rubber bobbins and disks ranging from 2.5 to 4 inches in diameter. Footropes are covered with rubber discs and bobbins, which are 8 to 24 inches in diameter. The larger diameter bobbins are spaced at intervals of 12 to 48 inches

A bottom trawl with headline length of 90 feet and footrope length of 120 feet weighs approximately 1,800 pounds. Footrope for same net 14 inch rockhopper disc weighs 2,100 pounds, steel components 750 pounds, rubber components 2,100 pounds, flotation 700 to 800 pounds headrope floats. Hydro dynamic affects contributes to reduced downward force.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a distance of approximately 3 times the depth, and the winches are tightened. Tow duration in this fishery is about 3 hours, at a speed of 2 to 3 knots. Tows may be in a straight line or adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear, or pushed by current, or other reasons. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks. Catcher vessels sort catch on deck.

A design objective for modern flatfish nets is to fish the net with minimum bottom contact, to reduce gear damage and drag and to maintain the quality of the catch. Ideally, only the doors, sweeps and footrope bobbins will touch the bottom, and these will only touch enough to ensure fish are herded into the trawl. Any increase in bottom contact increases the drag of the system, causing a reduction in towing speed and/or an increase in fuel consumption along with an increased risk of damage to the gear. Additionally, more bottom contact can cause sand to mix with the catch, which increases processing cost and decreases the value of the product.

The fishing seasons are driven by the quarterly halibut PSC apportionments. There are approximately 7 months of fishing occurring between January and November. The shallow water flatfish fishery has also changed over time due to State water closures to nonpelagic nets, the American Fisheries Act, market conditions, and a gradual increases in fishing capability.

Habitat type where fishery occurs: The fish tend to aggregate in areas with sand, sandy silt, and gravel at depths of 15 to 40 fathoms.

Existing regulatory measures to mitigate effects of this fishery: There are numerous State water closures to nonpelagic gear. Kodiak red king crab trawl closure areas include shallow water flatfish habitat.

## **GOA Slope Rockfish Trawl Fishery**

The slope rockfish fishery is prosecuted by both bottom and pelagic trawls, targeting Pacific ocean perch (POP), northern rockfish, and other pelagic rockfish. Vessels participating in this fishery are shore-based catcher vessels between 70 to 125 feet and ranging in horsepower from 600 hp to 1,600 hp. Typically less than 30 vessels participate in this fishery. The pelagic trawls used for rockfish are generally used to target POP. Mid water configuration is similar to pelagic pollock net, only smaller.

Bottom trawls used in this fishery are rigged to fish over generally rougher substrates. The gear used is a four seam otter trawl and a headrope to foot rope vertical distance “rise” of about 4 to 6 fathoms (24 to 36 feet). Nets are made of polyethylene. Net mesh is 8-inch diamond in the wings and forward belly and 5.5-inch diamond in the intermediate and codend. Double meshes may be used in the codend, and the codend is equipped with chafing gear. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 3.5 to 6 square meters. Door spread is a function of sweep

the net body and codend. Bridles are made of steel cable, and are generally 90 feet long on each side. Footropes are designed to keep the net off the bottom and may utilize tire gear, large disk tires (24-inch diameter airplane tires), 14- to 18-inch discs or bobbins, or a combination of these. Footropes typically extend from 90 to 120 feet. Steel cable and chain used for the footrope runs through bobbins or discs spaced at intervals of 24 inches or tires grouped together at the bottom, which is the center 10 to 20 feet. Flotation on the net head rope and riblines provides lift to reduce unnecessary drag and increase towing efficiency and performance.

Catcher processors also participate in this fishery using both bottom and pelagic trawls. Vessels participating in this fishery are catcher processors between 125 and up to 295 feet and ranging in horsepower from 1,200 hp to 6,000 hp. Typically 10 vessels participate in this fishery. The gear used is a four seam otter trawl and a headrope to foot rope vertical distance “rise” of about 4 to 10 fathoms. Nets are made of poly or spectra. Net mesh is 8 inch diamond in the wings and forward belly and 5.5-inch diamond in the intermediate and codend. Double meshes may be used in the codend, and the codend is equipped with chafing gear. Otter board or “doors” are used to spread the net and keep it open during towing. Doors are made of steel and range in size from 6.5 to 12 square meters. Angle of attack ranges from 30 to 36 degrees. Doors typically employ 4-inch wide door shoes. Door spread in most fishing depths and trawl warp/scope combinations is typically 40 to 45 meters. Contact with the seafloor is predominantly from doors, bridles, footropes, and to a lesser extent from the codend. Rockfish nets are designed to stay off the bottom as much as possible by employing numerous poly floats to buoy the net body and codend. Bridles are made of steel cable, and are generally 90 to 180 feet long on each side. Footropes are designed to keep the net off the bottom by utilizing tire gear, large disk tires (24-inch diameter airplane tires), or 21-inch discs. Footropes typically extend 100 to 200 feet. Steel cable and chain used for the footrope runs through 18 to 21-inch diameter bobbins and disks spaced intervals of 6 inches. Flotation on the net head rope provides lift to the footrope to reduce unnecessary drag and increase towing efficiency and performance.

A bottom trawl with headline length of 90 feet and footrope length of 120 feet weighs approximately 1,800 pounds. Footrope for same net 14 inch rockhopper disc weighs 2,100 pounds, steel components 750 pounds, rubber components 2,100 pounds, flotation 700 to 800 pounds headrope floats. Hydro dynamic affects contributes to reduced downward force.

Description of fishery operations: When set, the net is unwound from a net reel, the sweeps attached, then the doors attached. Wire cable, attached to each door, is let out to a minimum distance necessary to achieve the fishing depth. The tow duration in this fishery is about 1 to 4 hours, at a speed of 3 to 4 knots. Tows are adjusted to curve around depth contours, or avoid location of ‘hangs’ and fixed gear. At haulback, the setting procedure is reversed, and the codend is dumped into the fish hold below decks. The tows in the rockfish fishery have more intermittent bottom contact compared to the other bottom trawl fisheries due to the nature of substrate and fish behaviors.

Because rockfish is fished over rough bottom adjacent to areas with large potential for hangs in some areas, the net is usually fished with very short scope (the ratio of warp to towing depth) to minimize actual contact with the substrate and allow the net to be quickly lifted if a hangup is sighted. The combination of short trawl warp and the large amount of flotation applied to the headropes and rib lines increases the likelihood that the net will bounce off a rock or hang that may be encountered. This avoids damage to the net. Flotation on the net body reduces potential for ripping or abrading the net on volcanic sand or rock surfaces.

time due to the trawl closure in Southeast Alaska, the American Fisheries Act, market conditions, gradual increases in fishing capability, and increased effort since 1996

Habitat type where fishery occurs: The POP fishery occurs over sand, gravel, and mud in 90 to 200 fathoms. The Northern and pelagic shelf rockfish fisheries occur over rock, gravel, and hard sand at depth of 40 to 80 fathoms.

Existing regulatory measures to mitigate effects of this fishery: The Southeast Alaska trawl closure contains vast amount of habitat for slope rockfish.

## **GOA Sablefish Longline Fishery**

Description of gear used: This fishery is prosecuted with stationary lines, onto which baited hooks are attached. Vessels participating in this fishery include small (<60') and medium (60-90') catcher vessels and catcher-processors (aka freezer-lingliners) of small (<60'), medium (60-90') and a few large (>125') size vessels. Gear components that contact the bottom include the anchors, groundline, gangions, and hooks. For catcher vessels, anchors are two prong standard anchors weighing 50 lb, groundlines are generally constructed of 3/8" sinking line, 12" long gangions of #72-#86 twine, and 13/0-14/0 circle hooks. Catcher vessels generally use stuck gear (not snap on) with gangions spaced at 3-4 foot intervals. On catcher vessels, an average set consists of 15-30 'skates' of groundline, with each skate 100-150 fathoms long, for an average length of about 3 n mi. Squid is the preferred bait. The ends of each set are anchored and marked with buoys. Intermediate weights are used to minimize the movement of groundline across the bottom. The lower shot (s) (33 fathoms each) of the anchor line is made of 3/4" floating poly, and the upper shot of line is made of 5/8" sinking line. Attached to the line are plastic buoys and flag poles.

Description of fishery operations: The first anchor is set and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set are generally made in a straight line; with some deviation to ensure the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed and the line is left to fish for 6-24 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are stripped off the hooks.

Since 1995 fishery occurs over an 8 month season opening March 15<sup>th</sup> and closing November 15<sup>th</sup>.

Habitat type where fishery occurs: The sablefish longline fishery occurs over gravel, cobble, and mud bottom at depths of 400 to >1000 m. This fishery is often a mixed halibut/sablefish fishery, with shortraker, roughey, and thornyhead rockfish also taken.

Existing regulatory measures to mitigate effects of this fishery: Sablefish is an IFQ fishery which has reduced number of vessels, reduced crowding, gear conflicts and gear loss, and increased efficiency.

## **GOA Southeast Demersal Shelf Rockfish Longline Fishery**

Description of gear used: Less than 20 vessels participate in this fishery. This fishery is prosecuted with

the bottom include the anchors, groundline, gangions, and hooks. For catcher vessels, anchors are two prong standard anchors weighing 30 to 50 lbs, groundlines are generally constructed of 3/8" sinking line, 12" long gangions of #72-, and 10/0-13/0 circle hooks. Many of the catcher vessels use snap on gear with gangions spaced at 3-4 foot intervals. On catcher vessels, an average set consists of 10 'skates' of groundline, with each skate 100-150 fathoms long, for a total length of one nautical mile. Both herring and squid are used for bait. The ends of each set are anchored and marked with buoys. The lower shot (s) (33 fathoms each) of the anchor line is made of 3/4" floating poly, and the upper shot of line is made of 5/8" sinking line. Attached to the line are plastic buoys (floats) to mark the gear.

Description of fishery operations: The first anchor is set and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is generally made in a straight line; with some deviation to ensure the groundline is set in the preferred areas based on depth contour and bottom structure. Intermediate weights are used to minimize the movement of the groundline across the bottom. The second anchor is deployed and the line is left to fish for 2 to 12 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are stripped off the hooks.

The fishery opens November 15<sup>th</sup> and generally lasts 1 to 2 weeks and reopens January 1<sup>st</sup>, again lasting 1 to 2 weeks.

Habitat type where fishery occurs: The demersal shelf rockfish directed longline fishery occurs in Southeast Alaska over bedrock and rocky bottoms at depths of 75 m to >200 m (246 to over 656 feet).

Existing regulatory measures to mitigate effects of this fishery: The fishery is managed by Alaska Department of Fish and Game (ADFG). There is no directed trawl fishing. The Sitka Pinnacles Marine Reserve includes areas important to demersal shelf rockfish, other rockfish species, and lingcod.

## **GOA Pacific Cod Longline Fishery**

Description of Gear Used: This fishery is prosecuted by numerous catcher vessels (ranging from 30 to 60 feet in length) and less than 10 freezer longliners (catcher-processors) from 58 to 125 feet in length. Freezer longliners use 9 mm groundline employed with 10 to 14" gangions spaced 3 ½ feet apart, and No. 6 to 14 modified "J" or full circle hooks. Most vessels use swivel gear and set through autobaiting equipment. For catcher vessels, the gear is similar to as described above except generally hand-baited and sets are shorter in length (1 to 3 miles). Sets are weighted to minimize movement of the groundline on the sea floor. Sets are anchored at each end with an anchor weighing 30 to 60 pounds. Many of these vessels use snap-on gear with 5/16" groundline. Circle hooks are typically used and spaced 36 to 42 inches apart. Gear components that contact the bottom include the anchors, groundlines, intermediate weights, gangions, and hooks. Two to four sets are made each day.

Description of Fishery Operations: Freezer longliner gear is normally set through autobaiting equipment, which adds tension to the groundline and this minimizes the movement of the groundline on the seafloor. Normally a GPS plotter is used to determine the exact trackline of the set, enabling the vessel to retrieve the gear without dragging it across the bottom. It is in the best interest of the fishing operation to do this in order to avoid gear damage. Gear components that contact the bottom include the anchors, groundlines,

Often two sets are made, parallel to one another and 1/2 to 3/4 mile apart. The total time the gear is in the water ranges from 4 to 20 hours. Vessels do not usually set back in the same place, but leapfrog. About 4 sets are made in a day. Gear is set with an anchor at each end, sometimes with an anchor in the middle of the set. Some vessels use intermediate weights of about 3 to 10 pounds, and most use swivel gear which adds weight to the line.

For catcher vessels, sets are marked at each end with flag pole and buoys, which are attached by bouy line to the first anchor. The first anchor is set and the boat steams ahead with the groundline and baited hooks being set off the stern of the boat. The set is generally made in a straight line; with some deviation to ensure the groundline is set in the preferred areas based on depth contour and bottom structure. The second anchor is deployed and the line is left to fish for 2 to 16 hours depending upon the catch rates. Upon haulback, the groundline is fed through a hauler, and the fish are stripped or taken off the hooks. The cod fishery may also take halibut as bycatch.

The cod longline fishery generally occurs in Western and Central Gulf of Alaska, opening on January 1<sup>st</sup> and lasting until early March. The fishery is sometimes curtailed by halibut PSC.

Habitat type where fishery occurs: The fishery occurs over gravel, cobble, mud, sand, and rocky bottom, in depths of 25 fathoms to 140 fathoms (150 to 840 feet).

Existing regulatory measures to mitigate effects of this fishery: Stellar sea lion closures have effected this fishery. The location of catcher vessel fishery changed from Cook Inlet to waters adjacent to Kodiak Island. In the past few years, there has been an increase in small “pocket” freezer longline effort in western gulf.

## **GOA Cod Jig Fishery**

Description of gear used: This fishery is prosecuted with actively fished vertical lines, onto which baited hooks are attached. Vessels participating in this fishery include small (<60') catcher vessels. Gear components include a 8 pound jig weight, a 400 lb test monofilament mainline, and long shank 10/0 J-hooks or 10/0 circle hooks that are looped directly onto the mainline. Vessels employ 2-4 jig machines per vessel. Hooks are dressed with colorful segments of rubber surgical tubing, hoochies, and may be baited with strips of herring or other fish.

Description of fishery operations: The vessels look for concentrations of Pacific cod, and position their vessel to drift over the fish, and may occasionally anchor. The machines drop the jig weight to the bottom, and may move the jigs up and down slightly to instigate the fish into biting. Each jig machine is adjusted to haulback when there is the right amount of tension on the line (amount of fish). Machines haul up the fish, which are then removed one by one. The vessels move often to keep over fish concentrations. The fishery opens January 1<sup>st</sup> and closes in early March due the quota being taken. A state managed fishery occurs in state waters.

Habitat type where fishery occurs: The fishery occurs over gravel, cobble, sand, mud, and rocky bottom. In the spring and summer, the fish are found nearshore in shallow (5 to 40 fathoms) waters, but are deeper (40-60 fathoms) in the winter. Jig vessels fish primarily from the ports of Homer and Kodiak. Black rockfish is a common “top-off” target species for this fishery.

## **GOA Pacific Cod Pot Fishery**

Description of gear used: The GOA pot cod fishery is prosecuted with square pots set on single lines. Vessels used in the inshore fishery are all catcher vessels of small (< 60' LOA) and medium size (60-125' LOA). The offshore fishery includes some catcher processors ranging from 90 to over 125 feet. The fishery begins on January 1<sup>st</sup> and concludes in early March. Pots used in a directed cod fishery modified crab pots, which are constructed with a steel bar frame (1.25" diameter) and covered with tarred nylon mesh netting (3.5" stretched mesh). Pot sizes range from 6' to 8' square, with the average vessel using 6'x6' pots. Each pot has two or three tunnel openings on opposite sides, with plastic "finger" funnels to retain the fish. The tunnel eye cannot be greater than 9 inches in any one dimension. The pot is attached with a 6' to 8' bridle, generally constructed of 1" diameter poly line. A 30' to 60' surge, constructed of heavy duty line, is attached to the bridle. The lower shots (33 fathoms each) of line are made of 3/4" floating poly, and the upper shot of line is made of 5/8" sinking line. Attached to the line is a plastic buoy ("bag"), with a an auxillary buoy attached on a tether line.

Description of fishery operations: Approximately 100 boats participate in this fishery. Pots are baited with chopped herring placed in hanging bait buckets or sacks in the center of the pot. On most vessels, the pot is set tipped into the sea with a pot launcher. The shots of line are thrown overboard, followed by the buoys, and the pot sinks to the bottom. The pot rests directly on the bottom. The pot remains stationary on the bottom (except during extreme weather) until it is retrieved, generally about 12 to 48 hours later. Pots are retrieved as follows: the crewman throws a hook between the buoys to get the line. The line is fed into the hauler and the pot is brought aboard by a crane or picking boom and placed on the pot launcher. Pacific cod are dumped into totes and bled. The fish are put on ice or into RSW tanks below decks. The pots are rebaited and reset, or-stored if they are being moved or it is the end of the season. The fishery opens January 1<sup>st</sup> and is closed in early March due to quota being taken. There is a state managed fishery in state waters.

Habitat type where fishery occurs: The GOA Pacific cod pot fishery occurs primarily in the waters of Central and Western Gulf, including Cook Inlet and Prince William Sound on areas of sand, mud, rock, gravel, and cobble at depths of 25 to 140 fathoms (150 to 840 feet). Fish are usually found shallower in the summer and deeper in the winter.

Existing regulatory measures to mitigate effects of this fishery: Pots require biodegradable panels, constructed of #30 cotton twine. The sea lion closures prohibit this fishery from some nearshore areas.