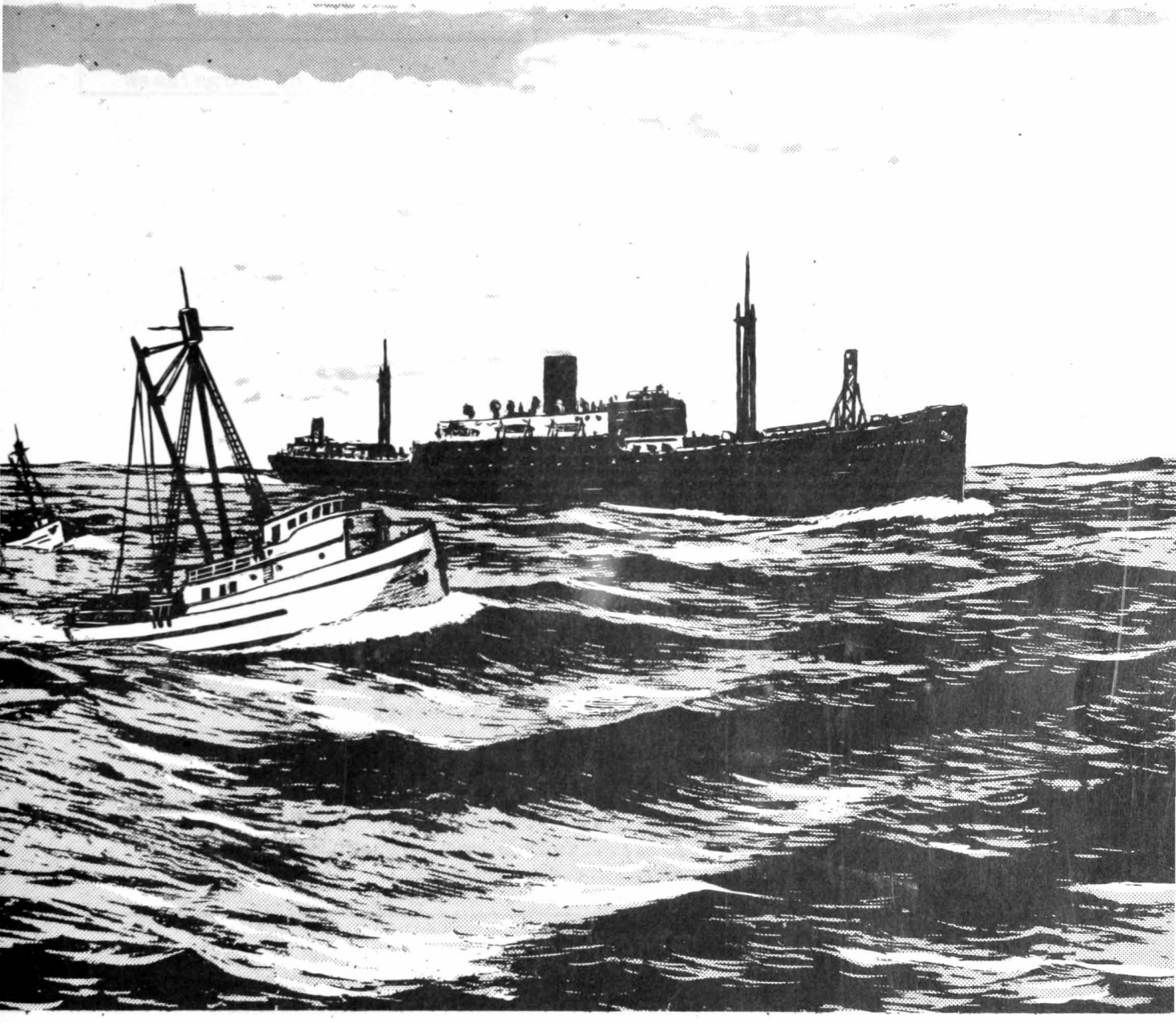
S.S. PACIFIC EXPLORER

PART V. — 1948 OPERATIONS IN THE NORTH PACIFIC AND BERING SEA



FISHERY LEAFLET 361

FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR

United States Department of the Interior, Oscar L. Chapman, Secretary
Fish and Wildlife Service, Albert M. Day, Director

Fishery Leaflet 361

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S. S. PACIFIC EXPLORER
PART V. 1948 OPERATIONS IN THE NORTH PACIFIC AND BERING SEA

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Note: Carlson remained on the ship until May 3 when fishing and gear problems had been solved, and a satisfactory canning method evolved.

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Introduction

Beginning in 1932 and ending with operations during the 1940 season, the Alaskan king crab fishery was extensively exploited by Japanese floating canneries. Japanese sources 1/ report over 16,000,000 Alaskan crabs during that period. In 1940 alone, four Japanese factory ships took in excess of 8,000,000 crabs.

For several years prior to 1939, small packs of king crabs were put up on Cook Inlet by American industry. In 1938, a small floating cannery prepared a small pack of king crbas in the Bering Sea and in the vicinity of the Shumagin Islands and Kodiak Island. This venture operated at a loss, primarily because of inadequate fishing equipment and lack of knowledge of productive fishing grounds.

Early in 1940, the President requested the Secretary of the Interior to investigate the possibility of establishing an American king crab industry in Alaskan waters. In June 1940, a special appropriation was approved by Congress authorizing the Fish and Wildlife Service to conduct a technical, economic and biological investigation of the king crab fishery off the coast of Alaska. A year later funds were provided to continue crab fishing experiments during the summer and fall months of 1941.

The investigation established that there was a large king crab population in the Bering Sea and that lesser but commercially

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1/ Fishery Leaflet 314, "Canned Crab Industry of Japan," U. S. Fish and Wildlife Service, Washington 25, D. C., August, 1948.

exploitable quantities of crab were to be found on the south side of the Alaska peninsula in Pavlof and Canoe Bays, around Kodiak Island and in certain locations in Cook Inlet. This investigation 2/ disclosed that commercial catches could be made and an outstanding opportunity existed for the development of a king crab industry in the Bering Sea. Large quantities of bottom fish were found which indicated that a floating factory ship or shore-based operation should be so designed as to provide for the utilization of these, as well as crabs, and of scrap resulting from processing operations.

The Pacific Explorer, an American factory ship, was a development resulting from the need for additional sources of protein foods during wartime. The 1940 and 1941 Bering Sea and North Pacific explorations of the Fish and Wildlife Service showed that possibilities of commercial exploitation of these fisheries could provide large supplies of fishery products to help meet these needs. In 1945, therefore, the War Food Administration recommended that the Defense Plants Corporation, a subsidiary of the Reconstruction Finance Corporation, obtain and convert a seagoing vessel to a factory ship in order to increase available food supplies for the war effort. When hostilities ceased, the conversion of the vessel had not yet been completed, due primarily to material and equipment shortages. It was decided, however, that it would be to the advantage of the country and its fishing industry to complete the vessel and proceed with its use as a factory ship to extend the scope of American fishing activities.

Facilities of the Pacific Explorer were designed by the firm of W. C. Nickum and Sons, naval architects, and the Pacific Exploration Company was designated construction and operating agent for the Reconstruction Finance Corporation. The ship was primarily designed to prepare products from king crabs and bottom fish in the Bering Sea. It was also conceived that a secondary activity would be the freezing and transporting of tuna from southern waters during the winter months when the Bering Sea can not be fished.

When the ship was completed, it was considered more advantageous to exploit the tuna fishery in southern waters. Accordingly, the Pacific Explorer made her first trip, from January 4 through July 23,

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2/ Report of the Alaska Crab Investigation, Fishery Market News, May 1942 Supplement, U. S. Fish and Wildlife Service, Washington 25, D. C.

1947, to waters off Central and South America. The Fish and Wildlife Service has published four reports as a result of that first trip. 3/

This report covers the crab canning, fish filleting and waste reduction operations conducted in the North Pacific and Bering Sea in 1948. Certain shortcomings in the design of the ship and its equipment are pointed out, handling and processing methods are evaluated, and suggestions made for improvements. These statements are not intended as criticism of the designers, builders, management or personnel connected with the operation of the Pacific Explorer. Never before was a factory ship of this type designed, built or operated by American personnel. Due to this fact, it was not possible to anticipate or make allowances for many of the problems in the planning stage since most of them could only be determined and solved under actual operating conditions.

General Description of Activities

The Pacific Explorer departed from Seattle, Washington for the Bering Sea on March 26, 1948. A fleet of fishing vessels (Table 1) was to rendezvous with the mother-ship at Amak Island in the Bering Sea where the Alaska King Crab Expedition of the Fish and Wildlife Service found the king crab most numerous. Because the early spring weather in the North Pacific Ocean is likely to be dangerous for small boats, the fishing vessels followed the so-called "inside route" through Southeastern Alaska. Rough weather was nevertheless encountered by them in crossing the Gulf of Alaska and between Kodiak Island and the Shumagin Islands delaying somewhat the arrival of the fishing vessels.

Reports from the Bering Sea indicated the presence of floe-ice almost as far south as Amak Island. It was therefore decided to rendezvous with the fishing vessels in Pavlof Bay on the south side of the Alaska peninsula inasmuch as the 1941 Expedition had found substantial numbers of king crab there and in adjoining Canoe Bay. The two

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3/ The factors considered in the conversion of the ship and a general description of the arrangement of the vessel were published in the January 1947 issue of the Commercial Fisheries Review and have been reprinted as Separate No. 161. Part II on suggestions for operators of tuna receiving ships was issued as Fishery Leaflet 301. Part III on the structure of the ship and the refrigeration system was issued as Fishery Leaflet 316. Part IV describes the movement of the catch through the various handling places on the ship, the transfer of supplies to the fishing vessels, and the personnel involved. Copies of these publications are available upon request from the U. S. Fish and Wildlife Service, Washington 25, D.C.

TABLE 1 - PACIFIC EXPLORER FISHING FLEET

VESSEL	TONNAGE		DIMENSIONS IN FEET			HORSEPOWER	CREW	GEAR USED
	GROSS	NET	LENGTH	BEAM	DEPTH			
BEAR	40	31	56.2	15.1	7.0	100	8 1/	TANGLE NETS
BORRIS	89	40	68.9	20.1	9.4	240	7	OTTER TRAWL
DOROTHY	130	89	92.8	20.6	10.1	300	5	" "
FOREMOST	82	66	79.8	18.5	8.2	165	5	TANGLE NETS
JEANNETTE F.	74	50	67.7	18.6	9.0	135	6	OTTER TRAWL
KISKA	94	45	70.5	22.4	8.7	240	7	" "
MARS	48	33	59.2	16.1	7.7	100	5	" "
PEARL HARBOR	105	53	74.4	20.2	10.3	250	7	" "
SUNBEAM	53	36	62.6	16.8	7.8	80	5	" "
TORDENSKJOLD	57	39	62.5	18.0	9.1	135	6	2/

1/ A CREW OF 8 MEN WAS SHIPPED BECAUSE THIS VESSEL'S OWNERS INTENDED TO ENTER THE SALMON SEINING FISHERY AFTER THE CRAB FISHING WAS COMPLETED.

2/ USED TANGLE NETS IN PAVLOF BAY AND OTTER TRAWL IN BERING SEA.

week stop in Pavlof Bay provided an opportunity for the fishing vessel crews to become accustomed to the king crab fishing, and for the various processing procedures and facilities on the ship to be tested.

Under favorable conditions the Pacific Explorer could average 11 knots. Enroute to Pavlof Bay, strong head winds and a moderately heavy sea made it necessary to reduce the speed of the ship. In one 25 hour period, the ship averaged only 4 knots. Normally, a vessel of the size of the Explorer would probably not need to slow down for the wind and sea conditions encountered on this day. However, the extensive ammonia refrigeration system 4/ on the Pacific Explorer made it imperative that such precautions be taken to prevent ammonia leaks. All rooms on the ship were heated by a forced air circulation system. In the event of a serious break in the ammonia lines it is conceivable that the fumes could be spread over the ship so rapidly as to endanger the life of the crew. To prevent such an occurrence it might be desirable to incorporate a closed heating system such as steam or hot water in future designs of factory ships. It should be considered, however, that the Pacific Explorer was also intended for operations in tropical climates where the air heating system could be used as an air cooling system.

Activities of the Pacific Explorer and its fishing fleet were centered in Pavlof Bay from April 4 through April 14. During this period a total of 31,657 male king crabs and 22,625 pounds of flat fish were delivered to the ship. Catches as high as 600 per tow were made most of which took place in waters of approximately 13 fathoms. Of the total crabs delivered, 12,432 were taken by the three tangle net boats and 19,225 were taken by the five trawlers.

On April 15, the ship departed from Pavlof Bay enroute to Amak Island in the Bering Sea. A stop was made at a cannery in False Pass where water and diesel oil were obtained. On April 18, anchorage was made in about 100 feet of water 1/2 mile off the S. W. shore of Amak Island. Bad weather in the Unimak Pass area delayed the arrival of the fishing vessels until April 21 when the first crabs and fish from the Bering Sea were delivered to the ship. After a period of exploration, the fishing activities centered at a point 17 to 20 miles north-northwest of Amak Island in depths of 20 to 25 fathoms until the end of April. The Pacific Explorer remained off Amak Island, moving from the west side to the east side and back again, to remain in the leeward shelter of the island in order to facilitate the unloading of catches from the fishing vessels. With the exception of two days the ship remained anchored off Amak Island from May 1 until the end of the first week in June. Crab fishing improved daily during this period with

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4/ A complete description of the refrigeration system is given in Fishery Leaflet 316, see page 22.

the center of operations moving slowly in a north-northeasterly direction to a point about 25 miles from Amak Island. During the second week in June south-southeast winds reaching up to 50 miles an hour and resultant heavy seas prevented fishing for two days. After this blow the crabs seemed to disperse and crab fishing became less productive. At the same time, however, the catches of fish increased on the same grounds where the heavy catches of crabs had been taken only a few days earlier.

After June 10, wind and sea conditions did not permit unloading of the fishing vessels at Amak Island. Prevailing winds near the Island at this time were southeasterly but elsewhere there was a tendency for the wind direction to vary, depending on where along the north side of the Alaska peninsula the ship was anchored. (The Alaska peninsula from Port Moller westward is mostly low land with some mountains and deep valleys between them. Winds from the Gulf of Alaska and the south side of the peninsula blow across to the Bering Sea. When these winds come through the valleys they eddy back and form cross currents in the lee of the higher elevations on the peninsula. As a result, there may be southeast, northeast, and southwest winds all within a very short distance.) During this period, the Pacific Explorer found the best anchorage about a mile off shore at a point eight miles W 5/8 S of Black Hill. As mentioned previously, the fishing vessels were taking few crabs, but the catches of fish, especially cod, were large. On June 23 several of the trawlers were dispatched offshore to a point some 65 miles N 1/2 W of Black Hill, where it was reported a large population of crabs were found in a "gully" in depths of around 35 fathoms. On the evening of June 24, the Pacific Explorer proceeded to this location. It was found that although the crabs were numerous here, they were recently moulted and very light. After two days at this location, it was decided to discontinue the taking of these lightweight crabs and return to the former fishing grounds, about one mile off shore 6 miles ExS from Black Hill. Crab catches here became progressively smaller. It was soon apparent that crab fishing was no longer worth while. Landings of fish were predominantly cod. These were usually split and salted although some of the smaller fish were filleted.

Within the next few days, the Pacific Explorer and its fishing fleet moved eastward in the Bering Sea toward Bristol Bay. It was reported that halibut were moving into shoal water off Nelson Lagoon. Several exploratory drags were made but very few halibut were discovered. Shortly after July 1, the sockeye salmon gill net fishing in the Ugashik Bay area was threatening to exceed the capacity of the canneries. Salmon were being transported in ice from Ugashik Bay to a floating cannery at Port Moller. The fleet moved to the vicinity of Ugashik Bay when it appeared likely that the Pacific Explorer might be able to freeze the surplus salmon. However, this development failed to materialize.

By July 5 all the fishing vessels had fulfilled the terms of their contracts for 90 days on the fishing grounds and departed for Seattle. The Pacific Explorer returned to Astoria, Oregon on July 18, 1948.

General Operating Requirements

The total complement of the Pacific Explorer on its voyage to the Bering Sea was 225 men plus two observers of the Fish and Wildlife Service. This was several times as large a crew as was used on the ship during its tuna operations off the coast of South America. The personnel distribution by job classification and department of operation is shown in Table 2. In addition to the men on the ship, there were 61 men on the fishing vessels. Many problems developed connected with providing food, potable water, fuel, etc., for a voyage of three months or more to the Bering Sea. Food supplies could not be obtained ashore except in very small quantities to tide over in an emergency. When the ship first left for the Bering Sea, it was assumed that bunkerfuel could be obtained either in False Pass or Dutch Harbor, or in both places. It was found, however, that this fuel was not available at either place. Diesel oil, lubricating oil, and gasoline were obtainable in False Pass, and Dutch Harbor or Unalaska. It was estimated about May 1, that the ship had sufficient bunkerfuel for its needs to June 1, and enough fuel left for the return to home port. Consequently, arrangements were made for a freighter carrying supplies to Bristol Bay for the salmon canning season to deliver about 4,000 barrels of bunkerfuel. This fuel was delivered to the Pacific Explorer on June 9 in very favorable weather. An open sea transfer should not be relied upon since seldom are conditions in Bering Sea sufficiently favorable to such a transfer. In fact, on June 10, the day after the above oil transfer was completed, the sea became so rough that an open sea transfer would probably have been impossible.

A thorough check on the availability of fuels in the area should be made by future operators. The determination as to which fuels are available and where they can be obtained should be a deciding factor in the type of motive and power installations made in factory ships which enter this fishery in the future. Adequate fuel capacity or equipment capable of operating on available supplies should be provided.

Within a few days after arrival in Pavlof Bay, a daily order of activities was established. This routine varied only slightly from day to day. The fishing vessels departed their anchorage, usually near the ship, about daybreak and returned with their catches in the evening. Fish and crabs delivered were held on deck until the start of operations the following morning. Radio contact between the ship and the fishing

TABLE 2 - PERSONNEL ON THE PACIFIC EXPLORER

DECK DEPARTMENT	ENGINEER'S DEPARTMENT
CAPTAIN	CHIEF ENGINEER
3 MATES	4 ASSISTANT ENGINEERS
RADIO OPERATOR	3 JR. ENGINEERS
BOATSWAIN	3 REFRIGERATION ENGINEERS
2 WINCHDRIVERS	2 ELECTRICIANS
9 A. B. SEAMEN	3 WATER TENDERS
	3 FIREMEN
TOTAL - 17 MEN	3 OILERS
	2 WIPERS
SPECIALISTS	
	TOTAL - 24 MEN
MANAGER	
ASSISTANT MANAGER	STEWARD'S DEPARTMENT
DOCTOR	
2 BOOKKEEPERS	CHIEF STEWARD
TIME KEEPER	SECOND STEWARD
TECHNOLOGIST	3 COOKS
CANNERY FOREMAN	BAKER
WEB FOREMAN	2 BUTCHERS
CRAB LINE FOREMAN	3 UTILITY MEN
CRAB LINE MECHANIC	8 MESS MEN
	2 ROOM STEWARDS
TOTAL - 11 MEN	JANITOR
FISH DEPARTMENT	TOTAL - 22 MEN
	CRAB DEPARTMENT 1/
FOREMAN	
31 FILLET MEN	
4 COD FISH MEN	2 FOREMEN
	2 HEAD BUTCHERS
TOTAL - 36 MEN	10 BUTCHERS
	84 LINE MEN
REDUCTION PLANT	2 COOKS
	BAKER
FOREMAN	9 MESS MEN
4 REDUCTION MEN	
	TOTAL - 110 MEN
TOTAL - 5 MEN	

TOTAL - ALL PERSONNEL - 225 MEN

1/ THE COOKS, BAKER AND MESS MEN IN THIS DEPARTMENT WERE NOT REALLY PART OF THE REGULAR CRAB PROCESSING STAFF. THEY ARE INCLUDED HERE BECAUSE THEY ARE ORIENTALS AND ESPECIALLY HIRED TO PREPARE AND SERVE THE FOODS EATEN BY THE ORIENTAL CANNERY WORKERS.

vessels was maintained at regular intervals so that daily work schedules could be arranged. On the Pacific Explorer, crab processing was divided into the stages of butchering, precooking, leg disjointing or sawing, meat shaking, sorting and washing, meat dipping, and can filling or packing. Fish processing was carried on intermittently as the fish of suitable size and quality were available. The major portion of the fish taken, especially of the flounders and "soles", were considered too small and too thin for filleting and were processed into meal as was the waste from both the crab and fillet lines.

Fishing Operations

The principal activity of the Pacific Explorer was concentrated on the canning king crabs because of the more attractive prices for the product and the unsatisfactory size and quality of the fish. Since the venture was largely experimental, the Pacific Exploration Company entered into charter agreements with the owners and operators of ten fishing vessels. The charters guaranteed a minimum remuneration and provided for further compensation if certain goals were exceeded.

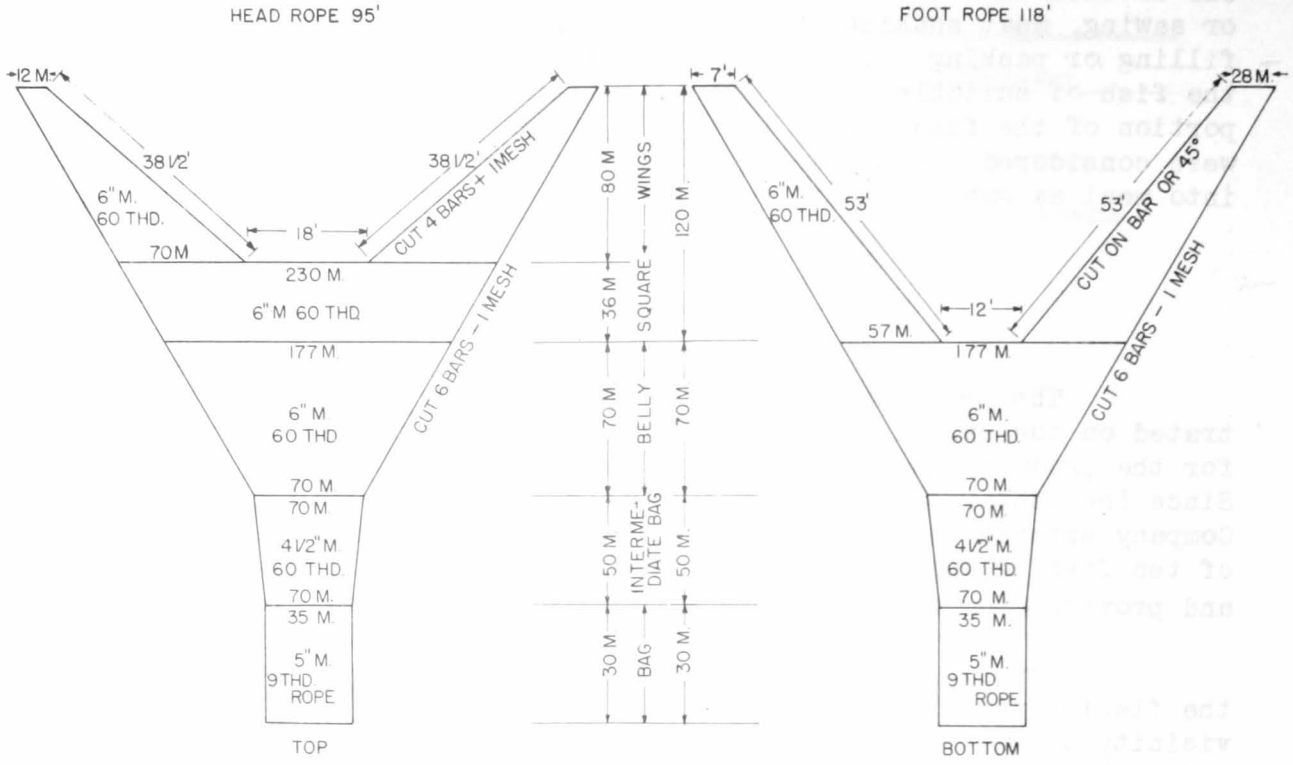
Briefly, the charter agreements, Appendix 1, provided that the fishing vessels would rendezvous with the Pacific Explorer in the vicinity of Amak Island in the Bering Sea on, or about, April 5, 1948, and would thereafter engage in either tangle net or otter trawl fishing for a period of 90 consecutive calendar days. All crabs and fish were to be delivered to the Pacific Explorer or to such other places as the manager might designate if the supply of crabs or fish could not be handled on the ship. All fishing gear, twine, and supplies for the maintenance of the gear was to be furnished by the Pacific Exploration Company. All repairs to the gear, nets, etc., were to be made by the crews of the fishing vessels.

Type of Vessels and Gear

Of the ten vessels (Table 1) chartered for fishing, two, the Bear and the Pearl Harbor, were purse seiners; three, the Dorothy, Foremost, and Tordenskjold, were schooners with the house aft; and the remaining five, the Borris, Jeannette F, Kiska, Mars, and Sunbeam, were of the more modern design combination boats, with house forward. This latter type of fishing craft normally engages in trawling, long line fishing for halibut, and sometimes enters the tuna and other fisheries off the Pacific Coast of the United States and Canada.

The fishing vessels varied in length. The smallest of the vessels, the Bear, was 56.2 feet long with a beam of 15.1 feet. Largest

ATLANTIC TYPE TRAWL



PACIFIC TYPE TRAWL

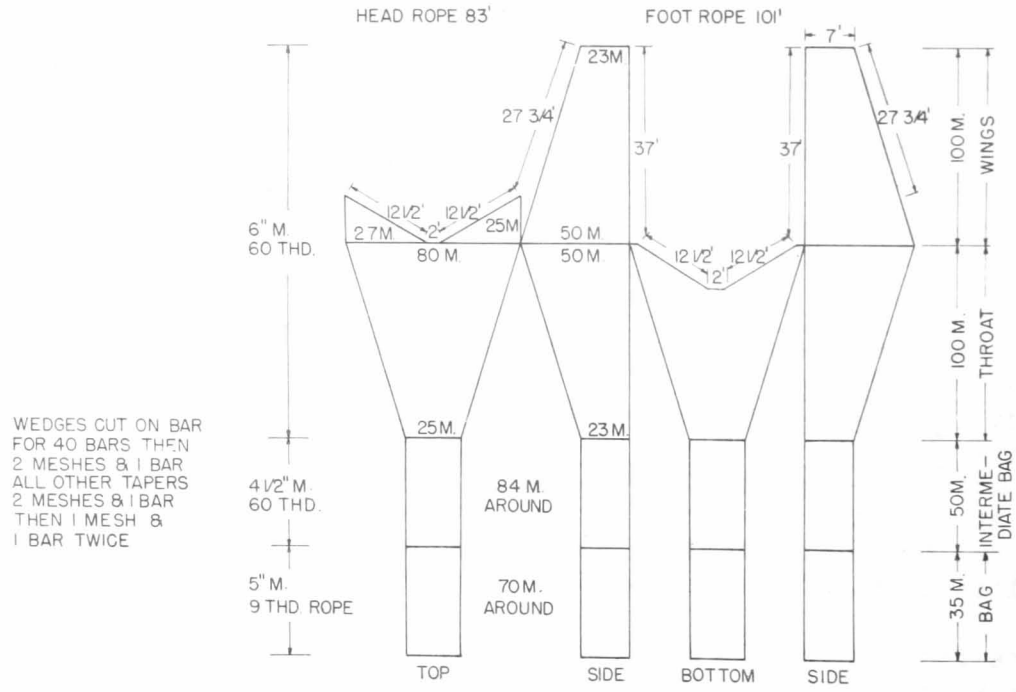
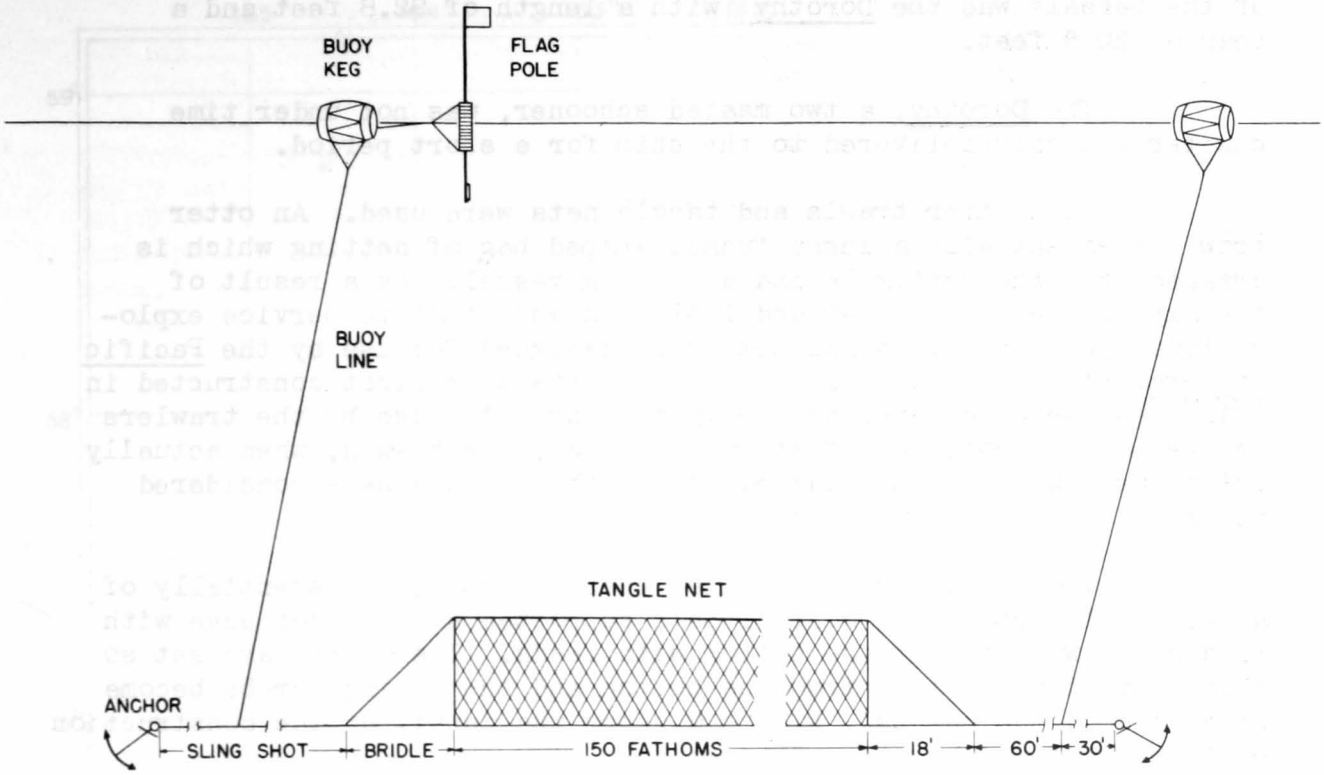
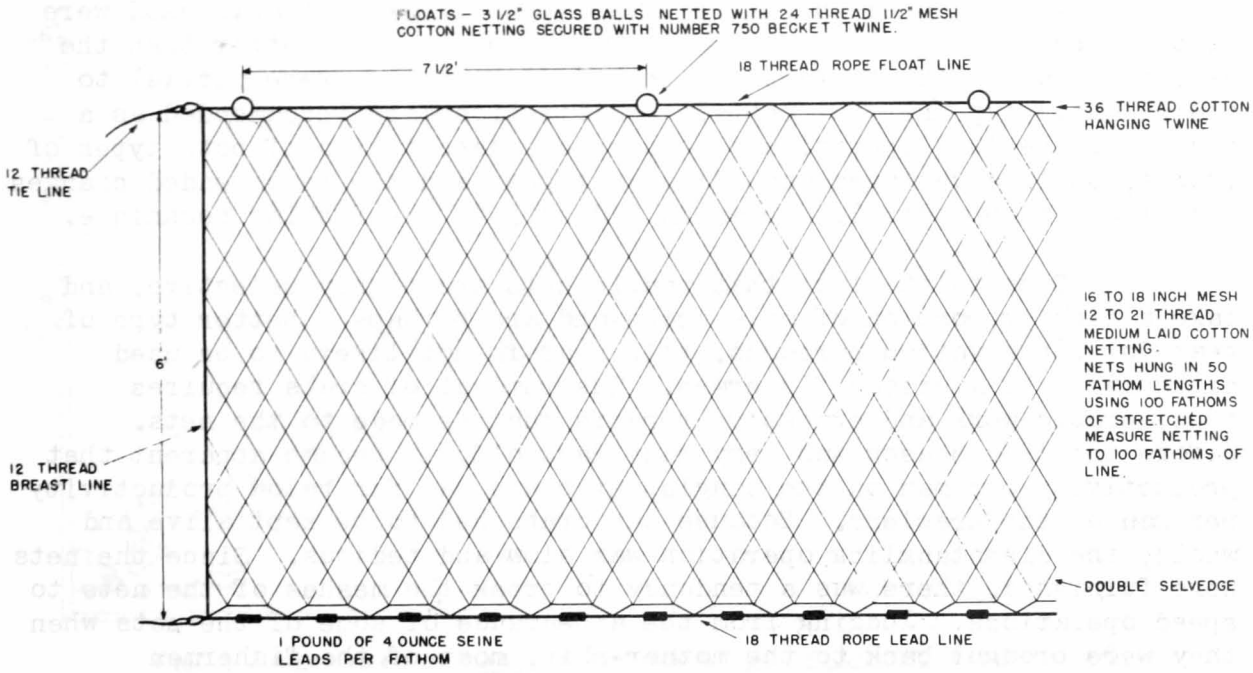


FIG. 1 — ATLANTIC AND PACIFIC TYPE TRAWLS



TANGLE NETS AS SET



DETAIL OF TANGLE NET HANGING

FIG. 2 — TANGLE NET AS SET AND DETAIL OF HANGING

of the vessels was the Dorothy with a length of 92.8 feet and a beam of 20.6 feet.

The Dorothy, a two masted schooner, was not under time charter and only delivered to the ship for a short period.

Both otter trawls and tangle nets were used. An otter trawl is essentially a large funnel shaped bag of netting which is dragged over the bottom behind a fishing vessel. As a result of the experience of the 1940 and 1941 Fish and Wildlife Service explorations, two types of trawl nets were designed for use by the Pacific Explorer fleet (Figure 1). When these nets were first constructed in 1946, they were believed too heavy and large for use by the trawlers in the Pacific northwest fishery. However, the trawls, when actually put to use, were not too large. If anything, they were considered too small for the purpose used.

The tangle net is a fixed gear and consists essentially of a vertical curtain, or wall of net, supported at is upper edge with floats and weighted at the bottom with leads. These nets are set so that they stand upright from the bottom and the moving crabs become entangled in the meshes. Figure 2 shows the detail of the construction of these nets and how they are set.

Of the ten vessels in the Pacific Explorer fleet, the Bear and the Foremost, used tangle nets exclusively. The Tordenskjold used tangle nets in Pavlof Bay but changed to trawling in the Bering Sea. The remaining seven vessels used trawls during the entire operation.

As indicated in Figure 1 and Appendix 2 the trawls used were of two types. The Atlantic type trawl seemed to fish better than the Pacific type. Without exception the trawl fishermen were partial to the Atlantic type net but certain modifications are recommended as a result of the 1948 operations. A complete description of both types of trawls, their advantages and disadvantages, and the recommended changes are given in Appendix 2. Appendix 3 describes the fishing technique.

Despite the fact that tangle nets are highly selective, and take a high proportion of male crabs and are perhaps a better type of gear for conservation purposes, this gear is not likely to be used extensively by American fishermen. The removal of crabs requires considerable work and extensive repairs must be made to the nets. Before the 1948 season was very many days old, it became apparent that productivity per man on the tangle net boats was far below productivity per man on the trawlers. Because the crabs had to be kept alive and whole, the disentangling operation was slow and tedious. Since the nets were furnished, there was a tendency to break the meshes of the nets to speed operations. Judging from the appearance of some of the nets when they were brought back to the mother-ship, most of the fishermen resorted to tearing the nets. Another factor against their use is that tangle net fishing requires continuous activity of the fishermen while

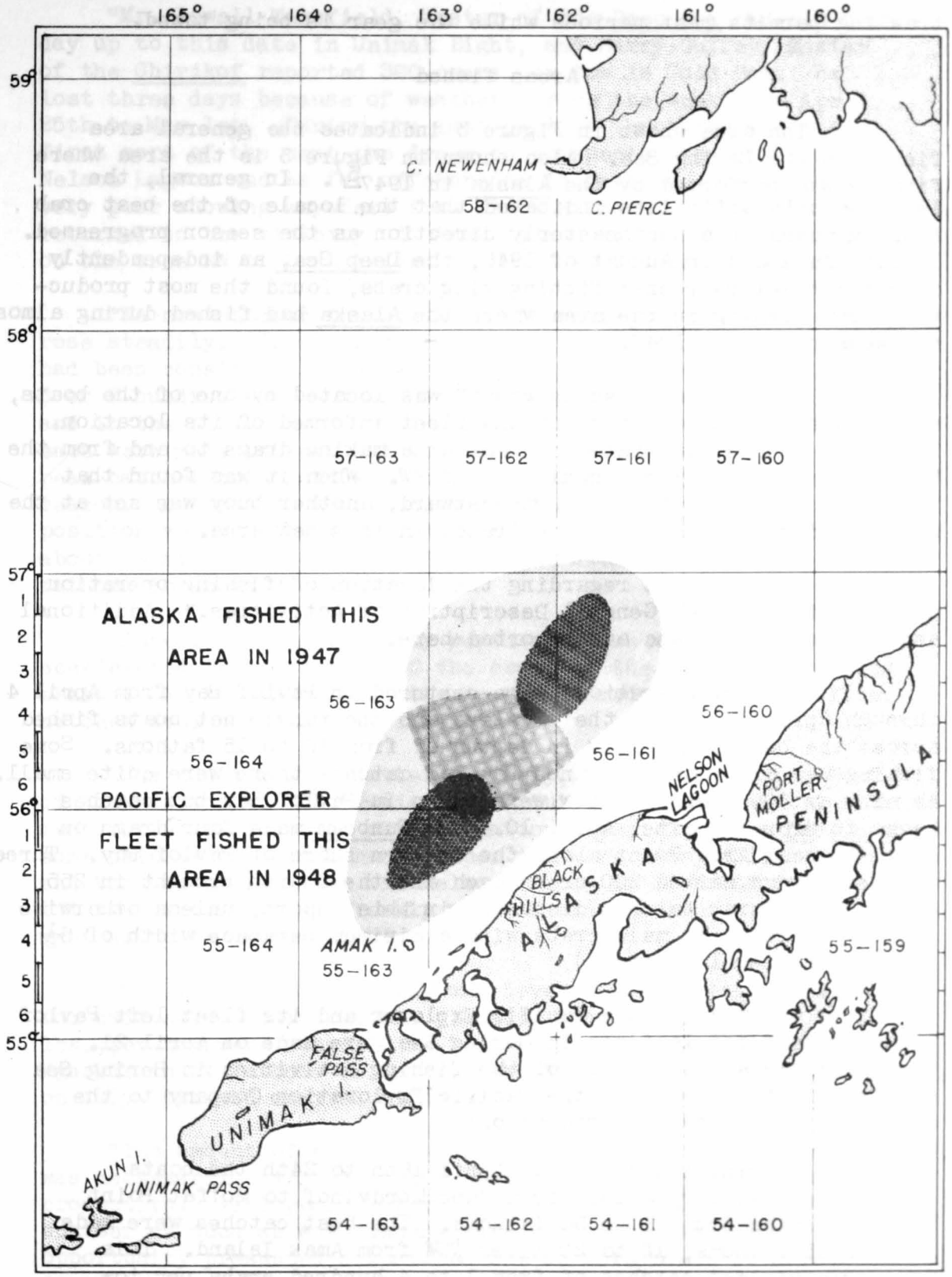


FIG. 3 - AREA FISHED BY ALASKA IN 1947 AND BY PACIFIC EXPLORER FLEET IN 1948

trawling permits rest periods while the gear is being towed.

Areas fished

The area shown in Figure 3 indicates the general area fished in the Bering Sea. Also shown in Figure 3 is the area where fishing was performed by the Alaska in 1947[5/]. In general, the 1948 season's activities indicated that the locale of the best crab fishing moved in a northeasterly direction as the season progressed. In late July and in August of 1948, the Deep Sea, an independently operated trawler-freezer fishing king crabs, found the most productive crab fishing in the area where the Alaska had fished during almost the same period in 1947.

When a good fishing ground was located by one of the boats, a buoy was set and the rest of the fleet informed of its location. The fleet then concentrated in that area making drags to and from the buoy in a line running roughly NE and SW. When it was found that the crabs had moved to the northeastward, another buoy was set at the new location and fishing concentrated in this new area.

Some details regarding the location of fishing operation are reported in the "General Description of Activities." Additional and more specific data are reported here.

Fishing operations were centered in Pavlof Bay from April 4 through April 14. Both the trawlers and the tangle net boats fished across the head of the bay in depths of from 10 to 15 fathoms. Some fishing was also done in Canoe Bay but catches there were quite small. As many as 600 crabs per tow were taken in Pavlof Bay but catches began to drop off after April 10. The Sunbeam made four drags on April 13 near Arch Point along the western shore of Pavlof Bay. Three of these drags netted 200 crabs each and the fourth brought in 255 crabs. (All crab catches discussed in this report, unless otherwise indicated, refer to male crabs with a minimum carapace width of $5\frac{1}{2}$ inches, the legal minimum.)

On April 15 the Pacific Explorer and its fleet left Pavlof Bay and the first landings in Bering Sea were made on April 21. There follows a description of the fishing activities in Bering Sea as given in the report of the Pacific Exploration Company to the Reconstruction Finance Corporation:

> "During the week from April 18th to 24th the boats prospected very widely from Cape Mordvinof to Moffat Point in depths from 18 to 50 fathoms. The best catches were made in 35 fathoms, 12 to 20 miles WNW from Amak Island. This area yielded catches of from 1 to 4 hundred crabs per tow, but catches of 25 to 50 crabs could be made in from 20 to 50 fathoms with several spots along a fifty mile stretch yielding up to 3 hundred.

5/ Fishery Leaflet 330, "Experimental Fishing Trip to Bering Sea," U. S. Fish and Wildlife Service, Washington 25, D.C., March 1949.

"Mr. Lowell Wakefield, Master of the Deep Sea had his best day up to this date in Unimak Bight, and Harry Guffey, Master of the Chirikof reported 300 crabs per tow in Cold Bay. We lost three days because of weather during the week from April 25th to May 1st. During the last part of that week and the first part of the next the draggers prospected as far NE as Nelson Lagoon and as far offshore as 53 fathoms, but found a very poor showing anywhere from Black Hills NE. The boats returned to the vicinity of Amak Island and began concentrating on the area NW of Amak Island in 30 to 40 fathoms of water.

"We now entered the moulting and mating season and catches rose steadily. Until this time 3 to 4 hundred crabs per tow had been considered good but by May 15th a number of catches of 6 or 7 hundred were made. Catches rose to 1,000 by May 21st, and in the first few days of June several catches around 2,500 each were made but not all successfully taken aboard. These peak catches coincided with the peak of the mating and moulting season. Meanwhile, the fleet had followed the crabs from a position about 12 to 14 miles NW of Amak Island to a position about 28 miles N NE of Amak Island and shoaled from 32 to 33 fathoms to about 24 fathoms.

"June 9th brought stormy weather, which may or may not have accelerated the dispersal of the crabs at the end of the mating season. At any rate, when the boats resumed fishing June 11th, catches dropped to 200 or less per tow.

"The fleet again scattered widely, boats ranged from West of Amak Island to Cape Seniavin and out to 50 fathoms, but with meager results. Acting on information supplied by the Deep Sea, some catches of 3 to 4 hundred per tow were made on June 24th and 25th about 60 miles off Nelson Lagoon in 37 to 40 fathoms, but the crabs were so freshly moulted and therefore light in meat as to be uneconomical to can.

"The balance of the trip was devoted to fishing, primarily for codfish. Concentrations yielding from 10,000 to 30,000 lbs. per tow were found. The best cod fishing was found off Ugashik in 14 fathoms of water. The Explorer left Port Moller on July 10th and arrived at Astoria on July 18th.

"The amount of exploring of new grounds we could accomplish was necessarily limited by the need to keep the large crew productively employed. However, we did encourage our boats to scatter as much as was commensurate with good fishing and as opportunity presented dispatched one or more boats to more distant areas. Thus, early in the season, when the best crab fishing was in about 35 fathoms NxW from Amak Island, we sent

one or two boats offshore into 45 to 50 fathoms of water on a number of occasions. We took all our trawlers up as far as Nelson Lagoon in the period from May 1st to 4th. On May 28th and 29th the Kiska worked the area between Nelson Lagoon and Port Moller for both crab and cod. Again on June 18th and 19th this area was prospected by the Mars and on June 20th to 22nd by the Borris.

"The most ambitious side trip was undertaken by the Borris between June 5th and June 14th. From the Explorer's anchorage off Amak Island the Borris made a large circle which took them Northeast above Port Moller, then North across the gulley toward Hagemeister Island, West to Pribilof Islands, South along the 100-fathom curve toward Cape Sarichef, and then back to the ship. Very few crabs were found. Those taken near the Pribilofs were of the species Paralithodes platypus whereas all our other catches had been P. camtschatica. This species difference, by the way, agrees with the findings of the Alaska Crab Investigation in 1941. Off Cape Newenham the Borris found unusually large lemon sole though not in very large quantity. Specimens measured up to 22 inches in length.

"The 100-fathom curve between St. George Island and Cape Sarichef yielded up to 5,000 pounds of very large codfish per tow, but weather prevented a thorough test of the area."

Catch data

The fishing vessels were required by regulations of the Service and the Pacific Exploration Company to keep a record of the drags and catches. Catch record books were prepared by the Service and copies were provided each boat captain. These books contained a series of original and duplicate sheets with necessary carbons so that each boat captain could retain a record and turn in to the Service observer the original sheets. (Fig. 4).

Table 3 lists the landings of the individual fishing vessels by months and the season totals. No attempt is made to differentiate between the various species of fish. Table 4 lists the landings of crabs and four species of fish by date. However, these data cannot be used as a criterion of how much fish can actually be taken since the vessels concentrated on crab fishing. Except in very few instances, when some of the boats were instructed to seek fish, most of the fish taken can be considered incidental.

FISHING RECORD

BOAT ______________________

CAPT. ______________________

MONTH ____________ DAY ______ YEAR ________

AREA NUMBER	DEPTH		TYPE OF BOTTOM		COMPASS COURSE	CURRENT SET	TIME ON BOTTOM			TOWING SPEED	SHELLFISH			FISH										TOTAL POUNDAGE FLOUNDER AND SOLE
											KING CRAB		OTHER	HALIBUT		GRAY COD	WHITING	Yellow Tail	FLOUNDER AND SOLE					
	Start	End	Start	End			Start Fish	Start Haul	Diff.		No. Male	No. Female	(List kinds)	Legal Size	Under Size				Rock	Starry Flounder	Flat-head	Lemon	Sand	

DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

FIG. 4 - RECORD FORM USED BY PACIFIC EXPLORER FLEET

TABLE 3 - SEASON LANDINGS, PACIFIC EXPLORER FISHING FLEET, BY VESSEL AND MONTH

BOAT	MONTH	CRABS No.	FISH LBS.
BEAR	APRIL	4,515	1/
	MAY	11,098	1/
	JUNE	11,720	1/
	TOTAL	27,333	
BORRIS	APRIL	10,748	10,270
	MAY	22,042	72,075
	JUNE	8,318	78,650
	TOTAL	41,108	160,995
DOROTHY 2/	MAY	5,543	15,875
	JUNE	7,861	-
	TOTAL	13,404	15,875
FOREMOST 3/	APRIL	7,629	1/
	MAY	12,001	1/
	TOTAL	19,630	
JEANETTE F	APRIL	3,148	3,200
	MAY	20,458	39,820
	JUNE	21,990	41,725
	JULY	-	12,750
	TOTAL	45,596	97,495
KISKA	APRIL	2,284	2,825
	MAY	28,811	86,730
	JUNE	28,054	279,375
	JULY	-	110,900
	TOTAL	59,149	479,830
MARS	APRIL	2,738	3,800
	MAY	9,315	13,430
	JUNE	16,270	64,500
	JULY	-	52,150
	TOTAL	28,323	133,880
PEARL HARBOR	APRIL	4,503	20,280
	MAY	10,773	122,500
	JUNE	14,682	103,700
	JULY	-	52,250
	TOTAL	29,958	298,730
SUNBEAM	APRIL	10,305	16,810
	MAY	33,967	34,775
	JUNE	34,531	291,850
	JULY	-	5,000
	TOTAL	78,803	348,435
TORDENSKJOLD	APRIL	7,521	4,300
	MAY	15,979	33,075
	JUNE	20,446	53,100
	JULY	-	2,500
	TOTAL	43,946	91,975
GRAND TOTAL		387,250	1,627,215

NOTE: FIGURES IN THIS TABLE REPRESENT DELIVERIES TO PACIFIC EXPLORER. BASED ON DATA TAKEN FROM SHIPS DAILY RECORD OF DELIVERIES. ACTUAL CATCH FIGURES ARE NOT AVAILABLE.

1/ VESSEL USED TANGLE NETS EXCLUSIVELY; HENCE ONLY CRABS WERE TAKEN.

2/ THE DOROTHY FISHED ONLY FROM MAY 20 THROUGH JUNE 7.

3/ THE FOREMOST BROKE DOWN ON MAY 27 AND LEFT THE FLEET AFTER THAT DATE.

TABLE 4 - DAILY LANDINGS ABOARD S. S. PACIFIC EXPLORER

DATE	MALE KING CRABS No.	"SOLE" LBS.	FLOUNDER LBS.	COD LBS.	POLLOCK LBS.
APRIL 4	557	2,560	1,110	-	-
5	911	240	110	-	-
6	2,095	140	960	-	-
7	4,204	-	1,400	-	-
8	2,810	-	-	-	-
9	4,295	470	1,130	-	-
10	3,375	1,035	1,690	-	-
11	1,480	1,470	2,115	-	-
12	4,703	3,640	2,375	-	-
13	3,602	1,610	510	-	-
14	2,344	-	-	-	-
16	1,281	-	-	-	-
21	380	2,715	105	160	-
23	2,527	18,000	-	1,400	-
25	3,629	5,750	-	100	-
26	5,450	600	-	-	-
27	5,683	1,130	70	-	-
28	4,036	6,350	1,140	1,335	-
MAY 2	1,598	13,495	3,060	3,250	-
3	197	18,215	4,210	100	-
4	4,483	-	-	-	-
5	4,105	9,225	1,150	275	-
6	6,228	41,250	-	1,875	-
7	3,971	13,600	250	650	-
8	-	4,450	-	200	-
9	1,022	8,875	100	1,750	-
10	4,331	11,100	250	9,150	-
11	7,838	14,700	800	10,700	-
12	8,122	16,200	2,225	11,525	-
13	4,884	11,775	1,300	12,000	-
14	5,619	19,100	925	6,750	-
15	7,566	4,550	300	1,500	-
16	8,312	11,775	350	6,600	-
17	6,273	7,700	75	5,375	-
18	6,461	5,200	-	3,550	-
20	11,429	5,050	-	-	-
21	10,315	4,900	3,350	-	-
22	11,267	4,970	2,700	200	-
23	6,602	4,350	4,400	-	-
24	5,168	3,600	3,750	400	-
25	737	900	900	-	-
26	3,690	4,200	4,250	-	-
27	9,095	7,125	7,175	-	-
30	9,534	8,400	8,400	-	-
31	13,164	6,350	6,400	-	-

NOTE: LANDINGS ARE DATED THE DAY THE CATCH WAS MADE. LANDINGS THROUGH APRIL 16 WERE FROM PAVLOF BAY. LANDINGS AFTER APRIL 16 WERE FROM BERING SEA.

TABLE 4 (CONTINUED) - DAILY LANDINGS ABOARD S. S. PACIFIC EXPLORER

DATE	MALE KING CRABS	"SOLE"	FLOUNDER	COD	POLLOCK
	No.	LBS.	LBS.	LBS.	LBS.
JUNE 1	20,033	2,300	2,300	-	-
2	25,468	-	4,000	-	-
3	15,838	-	-	-	-
5	7,766	-	-	-	-
6	416	5,000	200	1,150	-
7	13,397	3,000	625	650	-
9	10,428	-	12,000	-	-
11	2,078	3,100	-	-	15,700
12	6,569	6,125	-	7,575	41,975
13	12,427	7,925	-	8,550	-
14	12,342	6,000	-	4,325	5,550
15	1,488	-	-	-	-
16	7,448	3,100	-	7,750	10,650
17	3,939	1,850	-	4,400	7,950
18	3,460	2,225	-	3,200	5,850
19	2,355	2,250	-	3,400	2,250
20	2,384	8,600	-	7,675	3,600
21	1,347	1,500	-	7,700	1,250
22	272	3,000	-	9,000	-
23	1,531	22,175	-	44,450	-
24	3,113	7,300	-	31,650	-
25	6,067	9,950	-	5,550	-
26	1,905	19,350	-	51,075	-
27	669	42,950	-	91,150	-
28	755	41,900	-	94,050	-
29	77	49,150	-	84,850	-
30	300	41,900	-	34,200	-
JULY 1	0	900	-	1,600	-
2	0	3,000	-	2,000	-
3	0	26,150	-	31,950	-
4	0	39,300	-	11,410	-
5	0	12,900	-	41,950	-

NOTE: LANDINGS ARE DATED THE DAY THE CATCH WAS MADE. LANDINGS THROUGH APRIL 16 WERE FROM PAVLOF BAY. LANDINGS AFTER APRIL 16 WERE FROM BERING SEA.

A substantial quantity of fish taken was discarded by the fishing vessels, because most of the crew on the Pacific Explorer was required for the handling of the large and more profitable deliveries of crab. It should also be noted in Table 4 that the flatfish are divided into "sole" and flounder. Three cents per pound was paid to the vessels for "sole" while flounder, cod, pollock, and other species brought two cents per pound. The flatfish were not sorted on the fishing vessels when caught but the fishermen were required to sort out the flounder and the "sole" as the vessel was delivering to the mother-ship. Sorting was not always done as thoroughly as seemed desirable.

The "sole", in the order of their abundance, included the yellowfin sole, Limanda aspera; rock sole, Lepidopsetta bilineata; lemon sole, Pleuronectes quadrituberculatus; and flathead sole, Hippoglossoides elassodon. The flounder consisted primarily of the starry or roughback flounder, Platichthys stellatus. All of these species were taken in Pavlof Bay and in Bering Sea.

With the exception of the lemon sole, most of the flatfish were considered unsuitable for the regular commercial fillet market. The rock sole, yellowfin sole and the flatheads from both Pavlof Bay and Bering Sea were too thin and small. Moreover the flesh of these species was somewhat chalky in appearance and streaked with blood. The latter condition may have been caused by the pressure of the great weight of the catches. An experienced fish filleter performed recovery tests on several of the species taken. The results are shown in Table 5. Recovery of fillets from the round weight of the rock sole and yellowfins was 17.3 percent and 19.2 percent respectively. The lemon sole yielded 23.4 percent, which is even more significant when it is considered that the fillets of this species were skinned on both sides. The blind side of the lemon sole was removed because of its yellow color. Rock sole and yellowfin sole are white on the blind side and the skin was left on, according to the usual practice in the industry.

Test filleting of the Alaska pollock, Theragra chalcogramma, and the cod, Gadus macrocephalus, yielded 24.3 percent and 25.8 percent respectively (Table 5).

On May 5, a total of 261 lemon sole, 436 pounds in the round, were individually weighed and measured (Table 6). These were the same fish for which fillet recovery of 23.4 percent is shown in Table 5.

TABLE 5 - FISH FILLETING RECOVERY--PACIFIC EXPLORER, 1948

SPECIES	ROUND FISH LBS.	FILLETS RECOVERED LBS.	RECOVERY PERCENT
LEMON SOLE (PLEURONECTES QUADRITUBERCULATUS)	436	102 1/	23.4
ROCK SOLE (LEPIDOPSETTA BILINEATA)	400	69 2/	17.3
YELLOWFIN SOLE (LIMANDA ASPERA)	600	115 2/	19.2
ALASKA POLLOCK (THERAGRA CHALCOGRAMMA)	700	170 1/	24.3
COD (GADUS MACROCEPHALUS)	500	129 1/	25.8

NOTE: INCLUDE ONLY FISH OVER 10 INCHES IN TOTAL OVERALL LENGTH.
1/ FILLETS SKINNED BOTH SIDES.
2/ SKIN LEFT ON BLIND OR WHITE SIDE.

TABLE 6 - LEMON SOLE (PLEURONECTES QUADRITUBERCULATUS) CLASSIFIED BY WEIGHT--LENGTH CATEGORIES

WEIGHT	LENGTH IN INCHES													
	LESS THAN 10	OVER 10 LESS THAN 11	OVER 11 LESS THAN 12	OVER 12 LESS THAN 13	OVER 13 LESS THAN 14	OVER 14 LESS THAN 15	OVER 15 LESS THAN 16	OVER 16 LESS THAN 17	OVER 17 LESS THAN 18	OVER 18 LESS THAN 19	OVER 19 LESS THAN 20	OVER 20 LESS THAN 21	OVER 21 LESS THAN 22	TOTAL
LBS.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
LESS THAN 1 LB.	1	1	7	15	20									44
OVER 1 LB. LESS THAN 1½				1	18	57	33	4						113
OVER 1½ LESS THAN 2						1	25	17	1					44
OVER 2 LESS THAN 2½								10	1					11
OVER 2½ LESS THAN 3									8	7				15
OVER 3 LESS THAN 3½										8	6	2		16
OVER 3½ LESS THAN 4										3	5	2		10
OVER 4 LESS THAN 4½											2	4	1	7
OVER 4½ LESS THAN 5													1	1
TOTAL NUMBER	1	1	7	16	38	58	58	31	10	18	13	8	2	261

TOTAL WEIGHT OF FISH ..... 436 LBS.
FILLETS RECOVERED (SKINNED BOTH SIDES) .... 102 LBS.
% RECOVERY (FILLETS/ROUND WEIGHT) 23.4%

TABLE 7 - BERING SEA CRAB FISHING RECORD FOR 8 PACIFIC EXPLORER TRAWLERS SHOWING NO. DAYS FISHED, NO. OF DRAGS, AND HOURS ON BOTTOM, BY MONTHS[1/]

		BORRIS	DOROTHY	JEANNETTE F	KISKA	MARS	PEARL HARBOR	SUNBEAM	TORDENSKJOLD
APRIL:	NO. OF DAYS FISHED	7	2/	7	6	6	6	5	6
	NO. OF DRAGS	29	-	32	22	27	19	20	20
	HOURS ON BOTTOM	41.00	-	44.09	29.69	39.01	28.00	28.83	35.75
	CRABS[3/]	3,231	-	3,250	1,400	2,022	1,904	2,918	2,422
	CRABS PER DAY	462	-	464	233	337	317	584	404
	CRABS PER DRAG	111	-	102	64	75	100	146	121
	CRABS PER HOUR	79	-	74	47	52	68	99	68
MAY:	NO. OF DAYS FISHED	22	9[2/]	24	25	13	21	25	21
	NO. OF DRAGS	75	24	100	96	50	64	97	65
	HOURS ON BOTTOM	109.00	27.32	129.92	136.74	77.07	85.82	124.66	97.84
	CRABS[3/]	22,042	5,543	20,442	28,811	9,357	11,063	33,987	15,989
	CRABS PER DAY	1,002	616	852	1,152	720	527	1,360	761
	CRABS PER DRAG	294	231	204	300	187	173	350	246
	CRABS PER HOUR	202	203	157	211	121	129	273	163
JUNE:	NO. OF DAYS FISHED	15[4/]	5[2/]	23	24	24	24	25	22
	NO. OF DRAGS	42	13	86	86	83	69	92	66
	HOURS ON BOTTOM	59.34	14.34	118.83	123.52	121.53	95.99	126.25	99.01
	CRABS[3/]	8,631	7,861	22,145	28,054	16,557	14,682	34,531	20,654
	CRABS PER DAY	575	1,572	963	1,169	690	611	1,381	939
	CRABS PER DRAG	206	605	258	326	199	213	375	313
	CRABS PER HOUR	145	548	186	227	136	153	274	209

1/ BASED ON CATCH DATA REPORTED BY INDIVIDUAL VESSELS ON FORM SHOWN IN FIGURE 4. ONLY THREE MONTHS, APRIL, MAY, AND JUNE, ARE SHOWN. FROM JULY 1 THROUGH JULY 6, OPERATIONS CENTERED OFF UGASHIK WHERE CODFISH WERE PRIMARILY SOUGHT AND WHERE KING CRABS ARE NOT KNOWN TO OCCUR. FISHING ENDED AFTER JULY 6.

2/ THE DOROTHY FISHED FROM MAY 20 THROUGH JUNE 7--THE PEAK OF THE CRAB FISHING.

3/ MALE KING CRABS WITH CARAPACE WIDTH OVER 5½ INCHES.

4/ THE BORRIS WAS ON AN EXPLORATORY TRIP FROM JUNE 5 TO JUNE 15 INCLUSIVE.

The fishermen's records of crab catches were used in Table 7 for calculating the catch per day, per drag, and per hour of time the gear was actually on the bottom. These records are based on the crabs actually counted out by the fishermen as the catch was sorted on the deck. To some extent, the fishermen were eager to determine how their catches of crab compared with those of the other vessels as reported on the radio schedules.

For possible future operations, it is recommended that only the records of the Sunbeam and the Kiska be used as a criterion on which to base estimates of possible productivity. These two vessels exceeded the catches required by the charter guarantees. Several of the other vessels could have exceeded their guarantees had they realized early enough in the season that the fishing would improve as it did. However, they apparently did not exert the maximum possible effort--and they freely admitted they did not--therefore their catches cannot be considered a representative criterion.

The Sunbeam was the consistently high producer with a record for June of 1,381 crabs per day, 375 crabs per drag, and 274 crabs per hour. This record appears more significant when the size of the crews on the vessels is taken into consideration. The Sunbeam had a crew of five. The other trawlers had crews of from five to seven. The record of the Dorothy shows better production but she fished for only 14 days during the peak of the season.

Adverse weather conditions accounted for the greatest portion of fishing time lost (Table 8). This record, however, is limited to activities in the Bering Sea. A total of 16.3 percent of the time was lost due to unfavorable weather. This compares with 15 percent lost by the vessels of the Service's 1941 Crab Investigation from mid-April to September 9 (June excluded) in 1941. The Crab Investigation did not operate in June. It is reported that for a five year period, 1937-1941, the cod schooners fishing with dories for codfish in the Bering Sea from mid-April to mid-August lost an average of 17 percent of the fishing days due to bad weather.

Other causes for fishing days lost were varied. The Bear was regularly used as a mail boat and tender to obtain needed miscellaneous supplies from the cannery and oil dock at False Pass. The Bear had the shallowest draft and her captain had many years of experience in going through the Bering Sea side of Isanotzki Strait, commonly known as False Pass. The greatest loss due to mechanical difficulties was experienced by the Mars. She was laid up in False Pass from May 13 to May 25 undergoing repairs to the clutch. Engine trouble, broken rigging and trawl repairs all contributed to lost time in minor amounts. On May 27, the Foremost was rendered incapable of fishing as a result of damage to her engine. She left the fleet

TABLE 8 - BERING SEA FISHING RECORD FOR PACIFIC EXPLORER VESSELS SHOWING FISHING DAYS LOST

ITEM	APRIL 18-30 INCL.		MAY		JUNE		JULY 1-6 INCL.		SEASON TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
TOTAL POSSIBLE BOAT DAYS	117	100.0	287	100.0	238	100.0	28	100.0	670	100.0
BOAT DAYS LOST										
DUE TO UNFAVORABLE WEATHER	41	35.0	25	8.7	30	12.6	13	46.4	109	16.3
DUE TO OTHER CAUSES 1/	7	6.0	52	18.1	12	5.0	6	21.4	77	11.5
TOTAL BOAT DAYS LOST	48	41.0	77	26.8	42	17.6	19	67.8	186	27.8

1/ OTHER CAUSES INCLUDE FOLLOWING:

BEAR USED AS MAIL BOAT AND FOR GETTING INCIDENTAL SUPPLIES FROM FALSE PASS CANNERY AND OIL DOCK.

MARS BROKEN CLUTCH MAY 13-25 INCLUSIVE.

OTHER BOATS DOWN A DAY OR TWO AT A TIME WITH ENGINE TROUBLE, BROKEN RIGGING, AND REPAIRING TRAWL GEAR. TWO DAYS IN MAY, 28 AND 29, WERE LOST BY ALL BOATS WHEN PACIFIC EXPLORER WAS REQUIRED TO GO TO DUTCH HARBOR BECAUSE OF A SHOOTING INCIDENT ABOARD.

the next day. The entire fleet lost May 28 and May 29 when the Pacific Explorer was required to go to Dutch Harbor because of a shooting incident aboard. Some fishing time was lost when the boats were delayed in unloading their large catches at the peak of the season, June 1 through June 4.

Mooring and unloading the vessels

The Pacific Explorer was equipped with two pairs of boat booms or outrigger booms which when rigged out horizontally provided moorage alongside, at the starboard side forward, abreast cargo hatch number 2, and at the port side aft, abreast cargo hatch number 4 (Fig. 5). Six fenders were hung at each of these stations to protect the fishing vessels from damage. The fenders were made up with four large bus or truck tires and so hung that at least two feet of the lowest tire was below the surface of the water. When the vessels were tied between the booms they were moored between ten and twenty feet from the side.

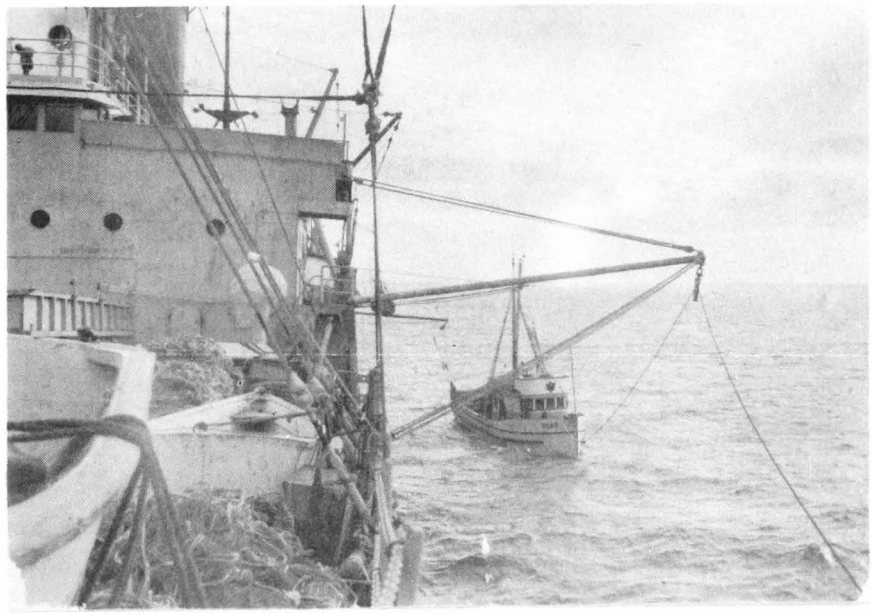


FIG. 5 - THE BEAR MOORED BETWEEN PORT SIDE OUTRIGGER BOOMS

During favorable weather and sea conditions, the fishing vessels usually tied up immediately alongside the ship. For this purpose, additional mooring lines were provided. In mooring immediately alongside the ship, the boats often tied directly to the heavy fenders.

S. S. PACIFIC

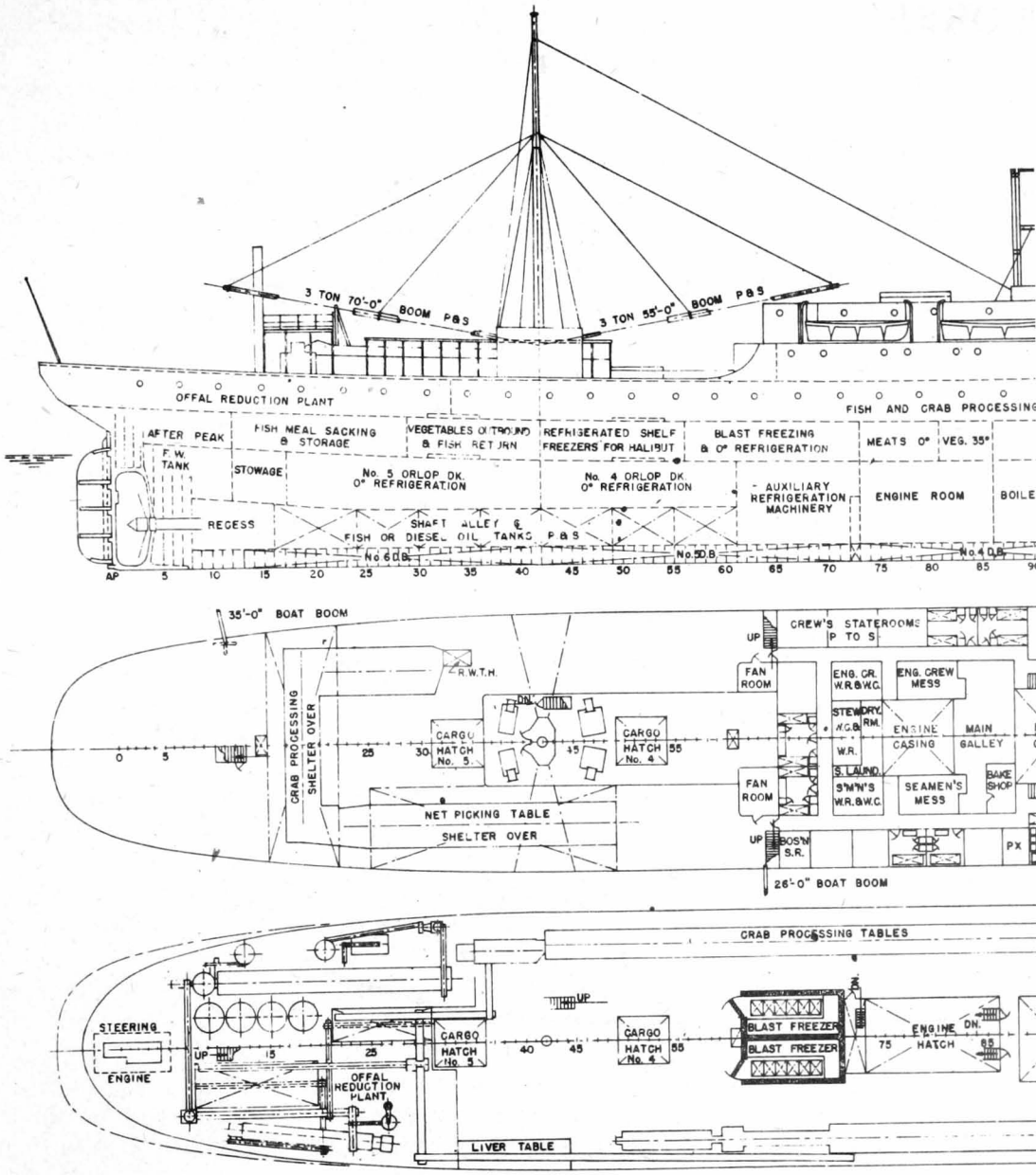
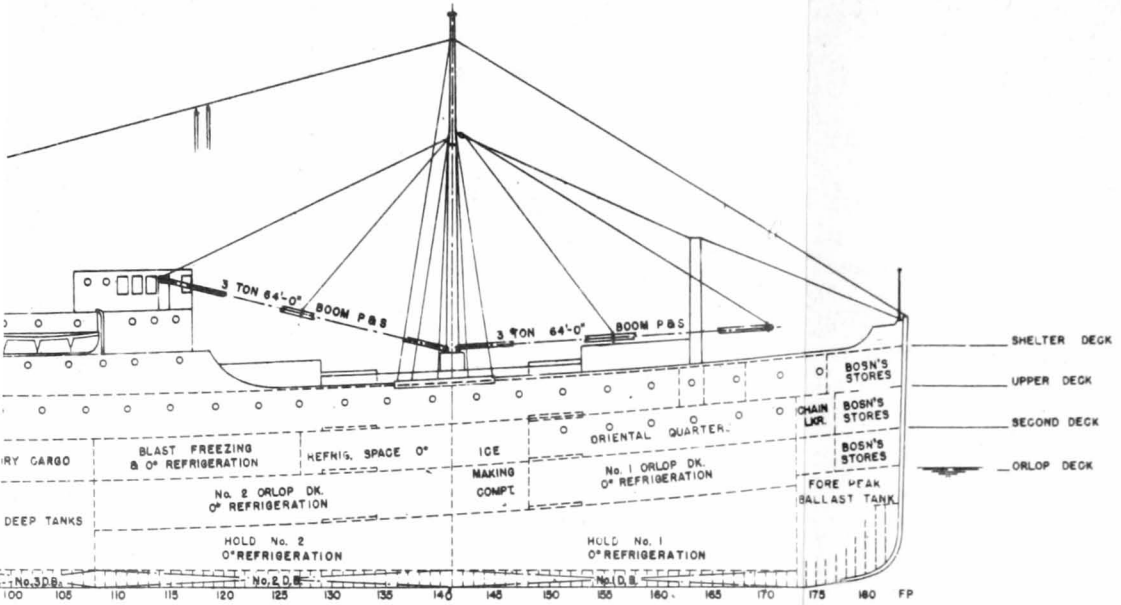
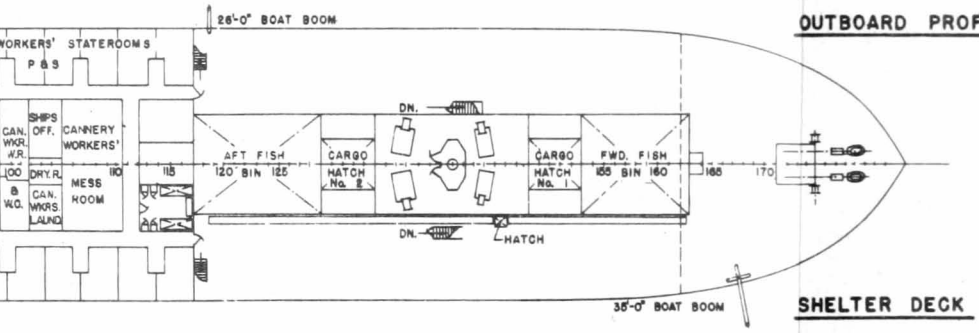


FIG. 6 - OUTBOARD PROFILE AND UPPE

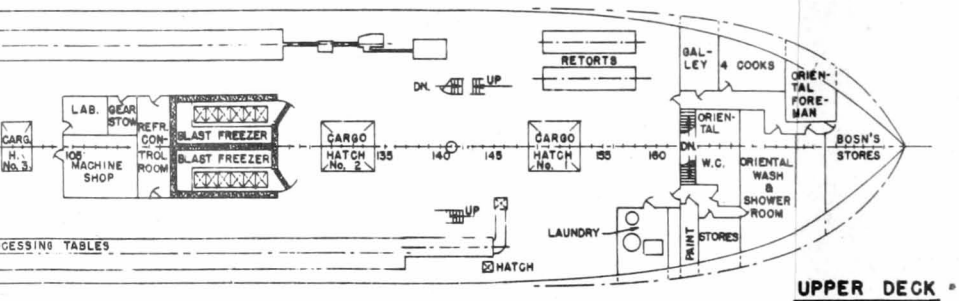
'LORER



OUTBOARD PROFILE



SHELTER DECK



UPPER DECK

In tying up with the lines from the boat booms, the vessels came in forward, picked up the line from the outboard end of the forward boom and then backed to pick up the line from the after boom. Those vessels with a power capstan forward made the aft line fast and then tightened the forward line. The boats without a forward capstan made the forward line fast and then backed with the vessel's engine and secured the aft line. In approaching the ship on the port side aft it was necessary to use extreme care to prevent fouling the after boom in the boat's rigging.

The following descriptions and the recommendations for mooring facilities are taken from the report of the Pacific Exploration Company to the Reconstruction Finance Corporation:

"1. The mother ship often laid quartering to the tide so that boats attempting to leave found difficulty working clear before being set into a boat boom.

"2. If, as occasionally happened, the forward bow line parted under a heavy surge, the boat faced the danger of drifting back on the stern boat boom before getting the stern line clear and getting underway.

"3. In heavy weather and adverse current conditions, the boat would be alternately set so far away from the ship as to be out of reach of the gear and up against the ship with risk of damage.

"4. The high masts and usually higher radio poles were in serious danger of being knocked off by the ship's outboard boom and guys.

"5. Often one side of the ship offered good lee while the opposite side was dangerous to approach.

"The following recommendations are advanced to minimize these difficulties:

"1. A mother ship's booms should be long enough to trim over the ships' (fishing boats) hatch while still peaked enough to be well clear of the fish boats rigging even when the latter is swinging broadly.

"2. A mother ship's boom guys should be bridled inboard as much as possible to allow maximum clearance.

"3. The boat booms should be so rigged as to permit them to be swung inboard almost instantly in emergency.

"4. The side of a mother ship should be blanketed with heavy fenders at each unloading station taking care to put at least five feet of fender below the water line.

"5. Heavy breast lines should be provided with the maximum possible lead and possibly made fast to flexible springs all so as to take a heavy surge while holding the fish boat within range of the gear.

"6. If possible, a mother ship should be so laid out as to permit discharging any catches on either side.

"7. It is advantageous to have the fish boats equipped with a power capstan both fore and aft so as to permit the boat to set tight on both bow and stern line.

"8. The fish boats should be provided with adequate chaulks and mooring bitts for heavy service.

"In spite of all the above precautions any exposed anchorage subject to wind, swell, and tidal currents will often present difficult or dangerous loading conditions. We found that at such times the only solution was to lift the anchor and drift, turning the wheel periodically and only enough to keep the mother ship broadside to the sea. We found that this technique made a tremendous difference and permitted the boats to discharge very comfortably in much worse weather than they would have dared come alongside while we were at anchor."

Unloading the catches from the fishing vessels was accomplished with the Pacific Explorer's conventional steam schooner rigging. Dirt slings, as commonly used on freight vessels, were used for unloading crab catches. These slings are squares of heavy canvas, reinforced with rope rib lines, of two sizes, 10 feet square and 12 feet square. The slings were spread on the deck of the fishing vessel and loaded with from 100 to 200 crabs (Fig. 8). The 12 foot square sling proved the most satisfactory because of the bulk of the crabs. A load of more than 150 crabs resulted in excessive crushing of the crabs and accelerated wear on the canvas.

Fish were unloaded in a salmon tierce fabricated as a large bucket, reinforced with iron straps, and fitted with a bail and stop for dumping (Fig. 9). The bottom rim of the bucket was fitted with rope guards to prevent damage to the decks of the fishing vessels. The fish were weighed by a dynamometer scale shackled between the ship's hoisting lines and the hook for grasping the bucket. The bucket carried about 700 pounds of fish. A bookkeeper or talleyman recorded the amounts of crab or fish as delivered.

FIG. 8 - LOADING CRABS ON CANVAS DIRT SLINGS FOR TRANSFER TO SHIP

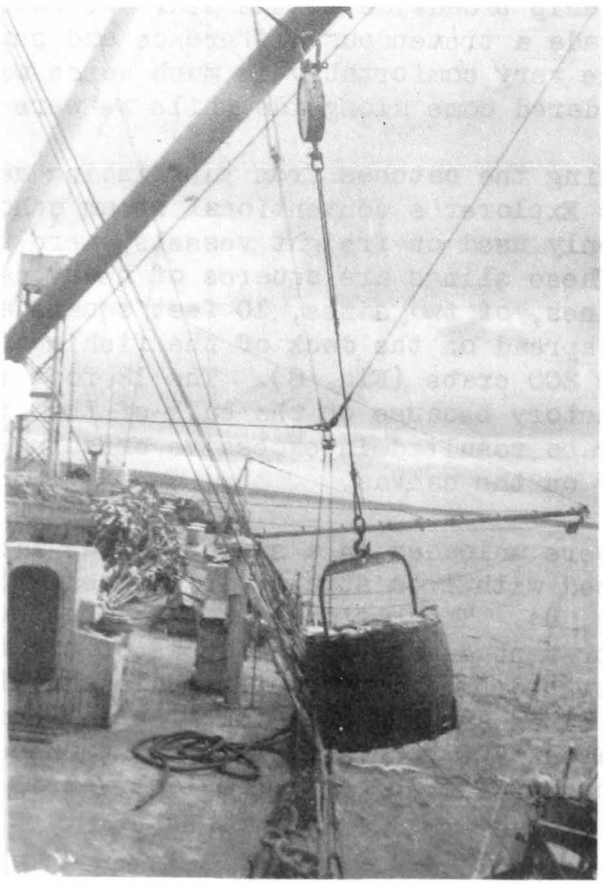


FIG. 9 - BUCKET FOR TRANSFERRING FISH FROM FISHING VESSELS TO PACIFIC EXPLORER

FIG. 10 - WHEN LANDINGS WERE HEAVY, THE CRABS WERE SPREAD ACROSS THE DECK OF THE SHIP

FIG. 11 - A GRATED PLATFORM OF 2 X 4 LUMBER WAS LAID OUT ON THE DECK TO ALLOW FOR DRAINAGE OF EXCRETORY MATTER FROM THE CRABS

Crab Processing Activities

Unloading crabs

The crab catches were unloaded on the port side abreast of cargo hatch number 4. The slings containing the crabs were raised aboard the ship and dumped on the shelter deck. Normally, sufficient storage space was available for the day's delivery of crabs on the starboard side of the shelter deck, between the after part of the house and the net picking table (Fig. 6). On several occasions, at the height of the crab fishing in late May and the first week in June, this space proved inadequate, and the crabs were spread over the covered hatch number 4 and across the deck to the port side of the ship (Fig. 10). The crabs delivered in the evening were butchered and run through the cannery during the following day. It was found that the crabs could be kept alive and in good condition up to 48 hours if certain precautions were taken. To allow for drainage of excretory matter from the crabs a grated floor or platform of 2" x 4" lumber, was laid out on the deck (Fig. 11). This was made in separate sections, about 3 feet by 6 feet, to facilitate removal for periodic cleaning of the platform and deck. A fence or retaining wall about six feet high was erected at the rail on the starboard side of the vessel to contain the pile of crabs. To protect the crabs from freezing temperatures early in the season and from the sun later in the season, a blanket of burlap sacks was spread over the piles (Fig. 12).

FIG. 12 - BURLAP BLANKETS BEING SPREAD OVER THE CRABS

A constant stream of sea water was played on the blankets or on the pile of crabs to keep the crabs in a moist atmosphere, wet their gills, and wash away the wastes excreted by the animals. Burlap blankets consisting of a number of sacks sewn together were furnished to the fishing vessels for similar use.

Crabs from the pile were fed to a wood slat conveyor, under the net picking table, which transported them to the butchering table.

Butchering the crabs

The butchering table was located in a roofed and walled enclosure running across the shelter deck (Fig. 6). The wood slat conveyor dropped the whole crabs on a similar conveyor which ran the length of the butchering room from the starboard to the port side (Fig. 13). Stations for 13 men, eight on the stern side and five on the forward side were provided at the butchering table. At each station there was a fixed butchering tool, a sea water outlet fitted with a short rubber hose, a chute opening for disposal of waste, and a stiff rotary brush two inches wide and six inches in diameter. The crabs were "backed"--the carapace removed--by impaling the animal on the hook of the butchering tool and pulling it down sharply on the

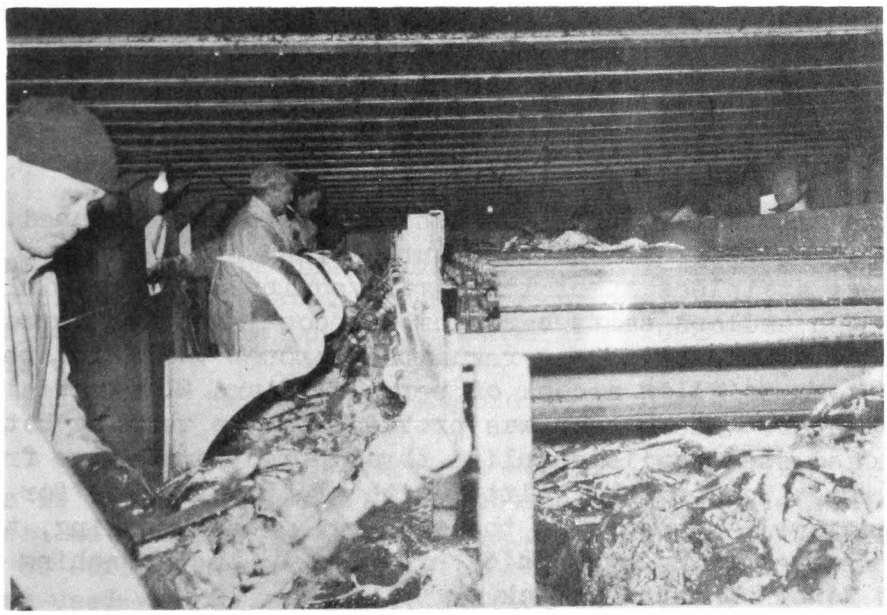


FIG. 13 - THE BUTCHERING ROOM--WOOD SLAT CONVEYOR FOR BUTCHERED CRABS ON TOP. THE FIXED BUTCHERING TOOLS ARE TO THE LEFT OF THE TABLE.

horizontal blade. This served also to divide the crab in half--each half consisting of a claw and three legs. The rotary brushes driven by v-belts from a powered shaft, intended for cleaning the viscera and gills from the crab halves, proved unsatisfactory since the viscera became thoroughly entangled and imbedded in the bristles. Consequently, the butchers were supplied with heavy chopping knives to properly remove the gills and visceral portions. While these proved quite satisfactory, there was a tendency to cut away more of the meat-bearing body portions than was absolutely necessary. This proved doubly harmful because, a certain amount of the body meat came free in the cooker and quench tank and was lost.

Another problem at the butchering table was the lack of sufficient water pressure to provide a strong stream for washing off pieces of viscera, slime, mud, sand, and bottom vegetation from the leg segments. The butchering shed also was poorly lighted and required electric extensions to provide the required illumination.

The cleaned crab halves were deposited on a wood slat conveyor which carried them to the cookers on the port side. Figure 13 shows the discharge end of the butcher conveyors. Immediately below the end of the conveyor was a sloped chute intended to allow the crab halves to drop directly into the cookers. This chute had insufficient drop and it was necessary to station one man at this point to pull the crabs down with a hoe-like rake.

The crab backs and other waste from the butchering table were dropped into chutes and flumed overboard. At the floor level, lengthwise on each side of the butcher table, was a flume to discharge the waste over the side of the ship. The crab backs were too large for the chute and the flume and the flow of water from the table insufficient to provide adequate flow of the waste. This was overcome by occasional flushing with a two inch fire hose.

Cooking and cooling the crabs

The crab halves from the butcher table were dropped into the cookers at the port side of the butchering shed. The two cookers (Fig. 14) were stainless steel lined vats equipped with stainless steel wire mesh endless belts carrying the cooking crabs forward and up. The speed of the belts was regulated through variable speed gear head motors to allow a cook of between 15 and 20 minutes in boiling sea water. Steam heat was provided to the vats by both steam jets and closed steam coils supplied through reducing valve from the ship's boilers. Wood planks, fitted with slotted handles for easy removal, were used as covers on the cookers. After cooking, the crabs were dropped on a chute which extended to the quenching tank on the next lower or cannery deck.

The cooking vats were vented at the top of the discharge end. However, the steam from the cookers was drawn back into the butchering shed from the charging end. This was remedied by installing a blower in the butchering shed to help keep the air free of steam. In addition, as can be seen from Figure 14, the cookers were fitted with stacks made by removing the ends of steel drums and welding three drums end to end. This created sufficient draft to carry off most of the steam.

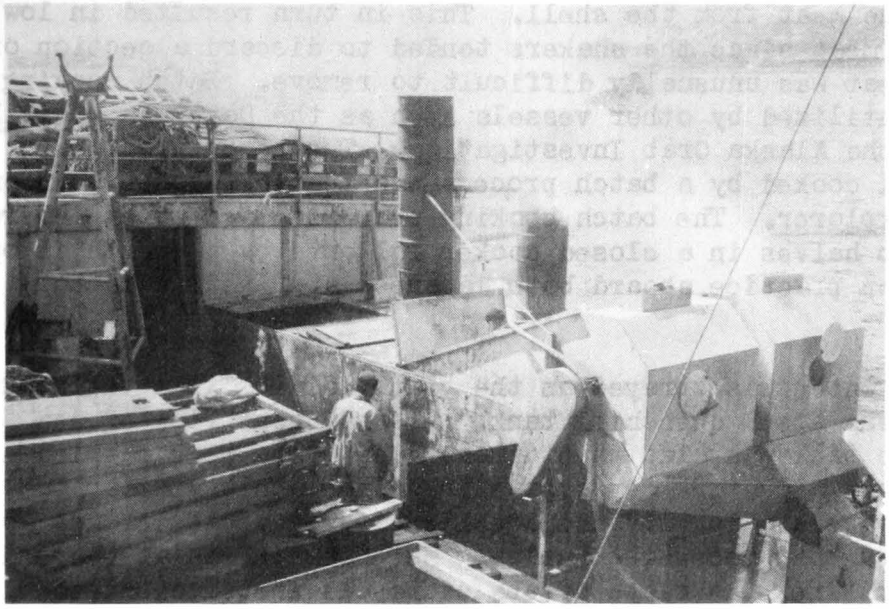


FIG. 14 - THE CRAB COOKERS WERE FITTED WITH STACKS TO KEEP THE STEAM FROM DRIFTING BACK INTO THE BUTCHER ROOM. AT RIGHT IS DISCHARGE END OF COOKER AND CHUTE LEADING TO QUENCHING TANK ON CANNERY DECK.

The cookers used excessive quantities of fresh water when the open jets were used but inadequate cooks frequently resulted if only the closed coil system was used. This may be attributed to improper use of the closed coil system. After one of the ship's engineers was placed in charge of the cookers to manipulate the system, the use of the open jets could be dispersed with.

Since the cookers were not equipped with built in thermometers it was impossible to accurately determine the temperature of the sea water used for cooking and vapor above the water prevented the use of surface thermometers. The rolling of the water when open jets were used was not a true indication of boiling temperatures. Furthermore, the use of continuous cookers employing the principle of cooking in boiling water presents difficulties aboard ship. Vertical motion of the ship in a fore and aft direction, even so slight as to be normally undetected by the personnel, seemed to greatly affect the motion of water in the cookers. Perhaps the length of the cooker was proper for a cyclic wave action. As a result the crabs periodically floated off the belt and might be advanced or retarded in their travel through the cooker over the rate of travel expected from the motion of the conveyor. Attempts to remedy this by lowering the water level resulted in improper immersion of the crabs during the cooking period.

It was apparent during the shaking operation that the cook was not uniform and excessive difficulties were frequently experienced

in removing the meat from the shell. This in turn resulted in low recoveries of meat since the shakers tended to discard a section of crab if the meat was unusually difficult to remove. Batch cooking methods were utilized by other vessels such as the Deep Sea, Chirikof, and those of the Alaska Crab Investigation. The removal of meat from the shell cooked by a batch process was less difficult than on the Pacific Explorer. The batch cooking process effected by immersing a cage of crab halves in a closed cooker followed by a quench in open water is common practice aboard both Japanese and Russian factory ships.

Sea water was sprayed on the chute leading from the cookers to the stainless steel quenching tank. A continuous flow of sea water into the tank was also maintained. The crabs were carried through the quenching tank by a stainless steel belt similar to that in the cookers (Fig. 15) and discharged on a chute leading to the conveyor to the processing tables. Here, again, as at the end of the butcher line, the slope of the chute was insufficient to allow for a gravity flow of the crab halves. A man had to be stationed at this point to keep the crabs moving.

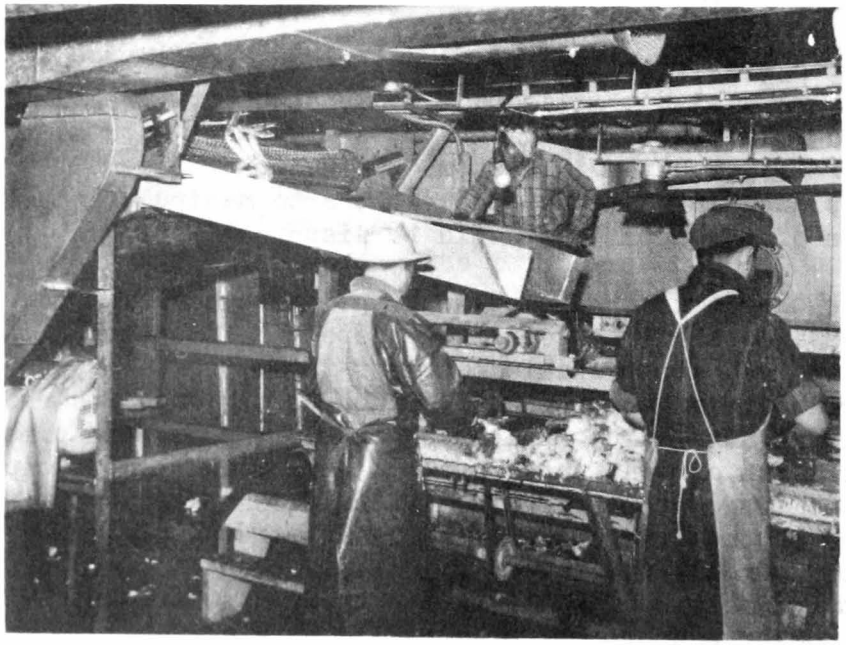
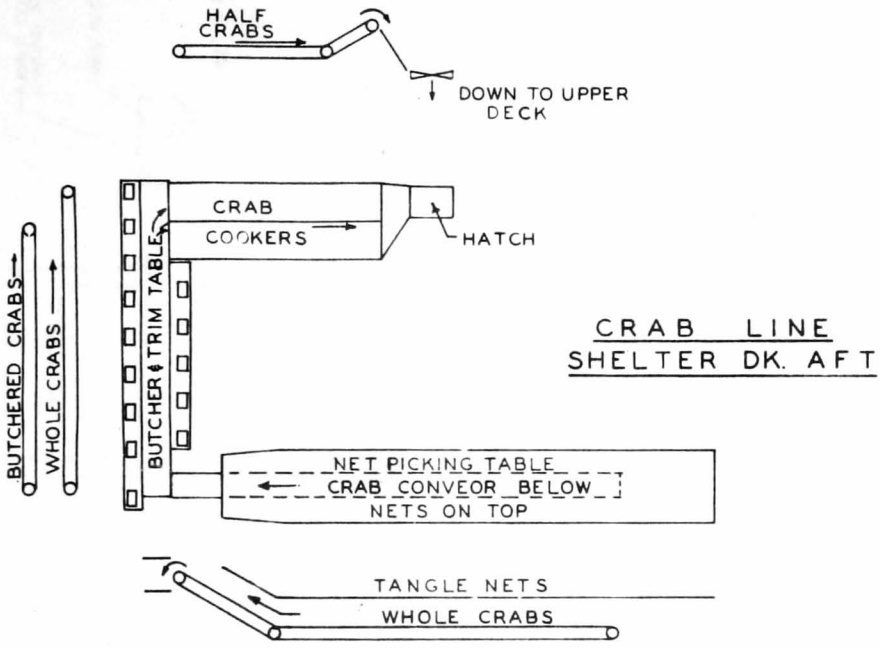


FIG. 15 - DISCHARGE END OF QUENCHING TANK AND BEGINNING OF SAWING TABLE

Some of the difficulties later encountered on the shaking table in removing the meat from the shells may have been caused by insufficient or slow quenching, or cooling, of the cooked crabs. The flow of water into the quenching tank was too slow, the tank was too short and the conveyor belt carried the crabs through the tank too rapidly to allow for adequate cooling despite the relatively low

F
CRAB PR



CRAB LINE
SHELTER DK. AFT

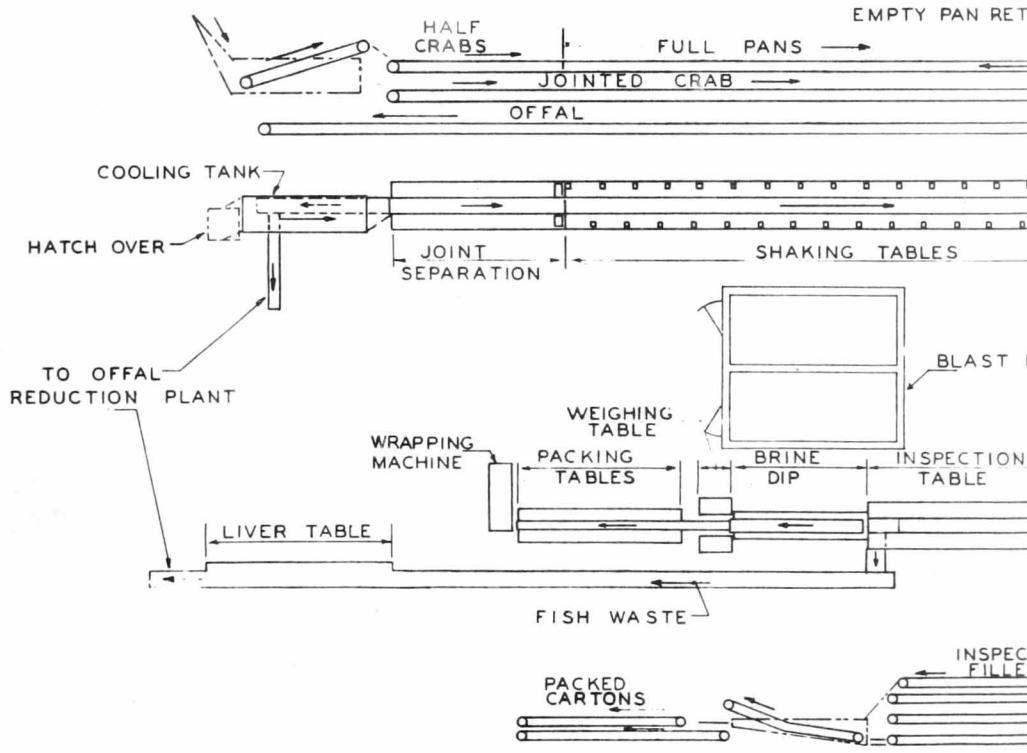
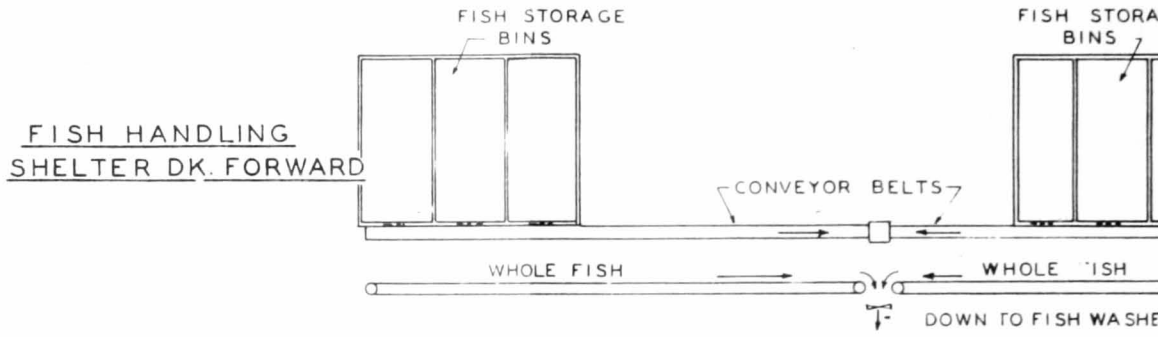
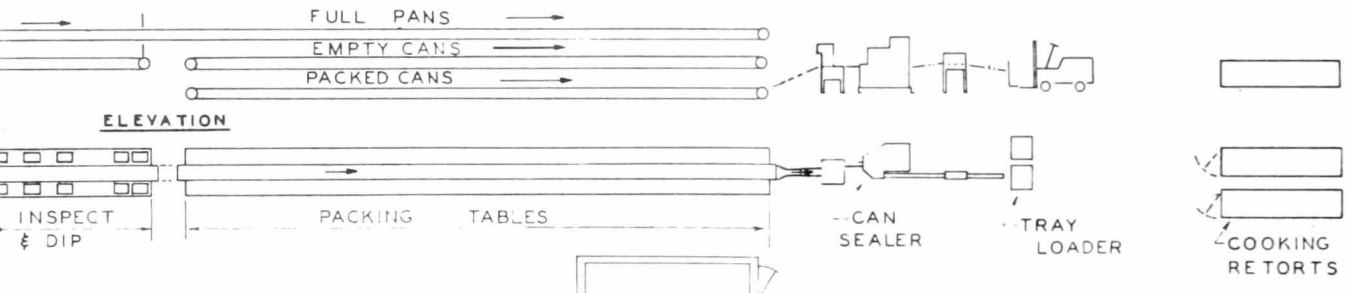


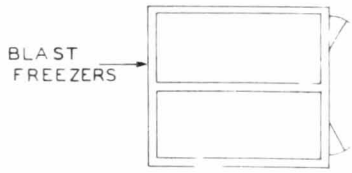
FIG. 16 — FLOW

DIAGRAM
AND FISH FILLET LINES

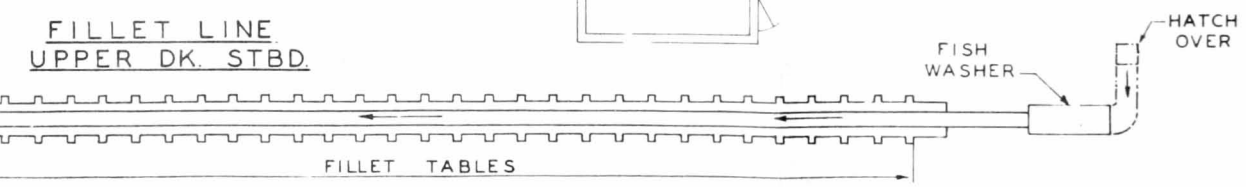


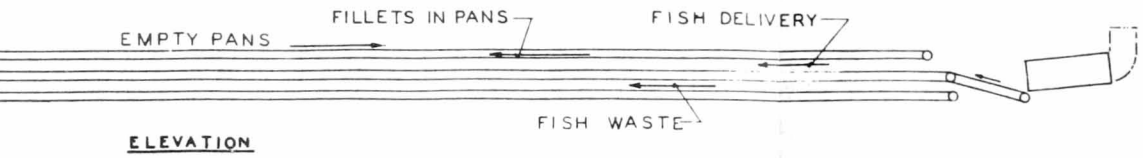
CRAB LINE
UPPER DK. PORT



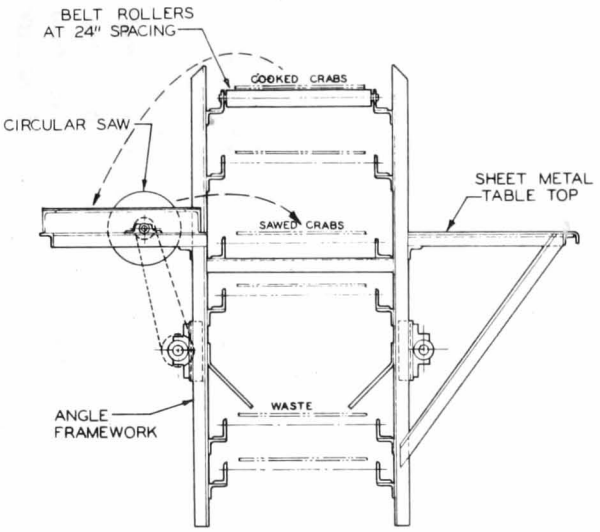


FILLET LINE
UPPER DK. STBD.

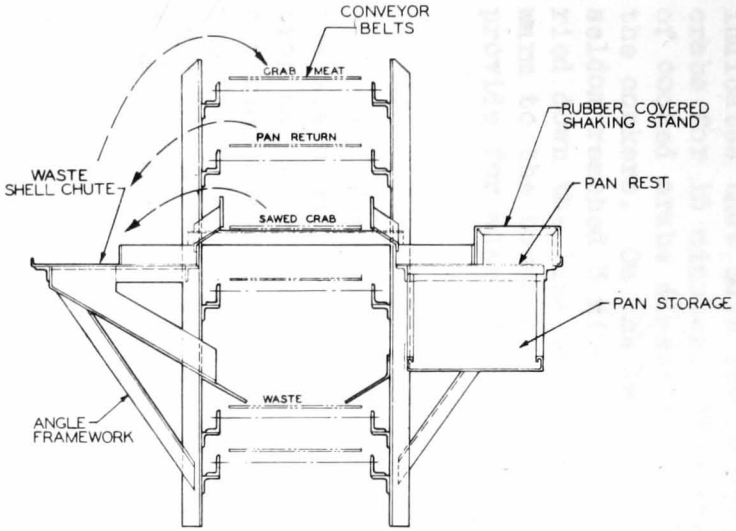




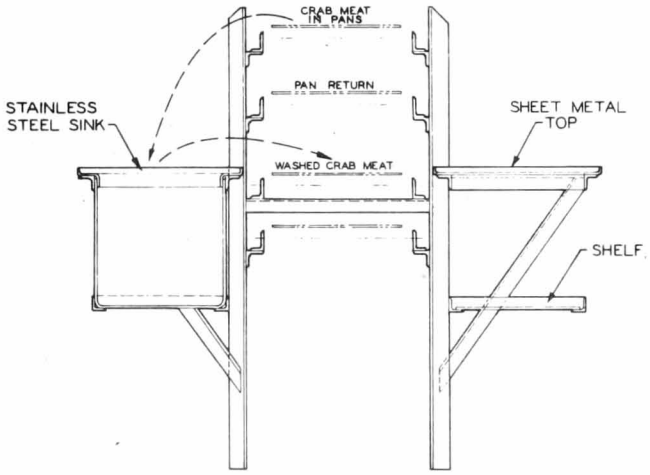
AM -- CRAB PROCESS AND FISH FILLET LINES



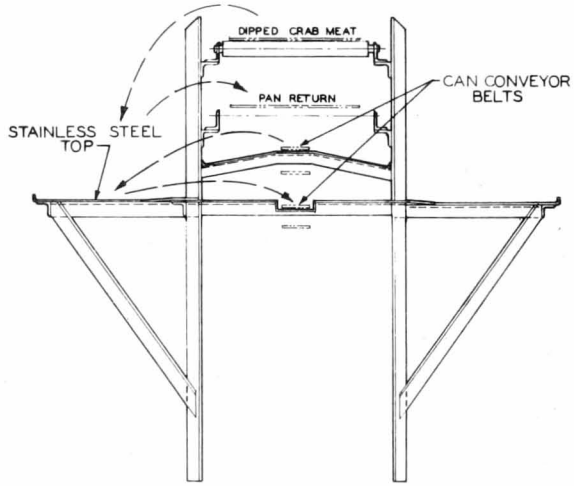
JOINT SEPARATION TABLE



SHAKING TABLE



WASH, INSPECT & DIP TABLES



PACKING TABLE

FIG. 17— DETAIL SECTION DRAWINGS OF CRAB LINE

temperature of the circulated sea water. All available information indicates that both the Japanese and the Russians quench the cooked crabs for 15 minutes. This they accomplish by immersing the baskets of cooked crabs directly into the sea immediately after removal from the cookers. On the Pacific Explorer, the cooling time in the tank seldom reached 5 minutes. The crabs which were not immediately carried down the line to the meat washing and dipping tanks remained warm to the touch after several hours. Future operations should provide for adequate cooking and cooling facilities.

Sawing or disjointing the crabs

The sawing or disjointing of the crab legs took place at the stern end of the main crab processing line (Fig. 16). This section had four stations on each side. Each station was fitted with a circular saw run by a v-belt from a powered shaft (Fig. 17). After the first few days of operation, it was found that the sawyers were handicapped because of the necessity of first separating the individual legs of each crab half. A table was set up near the crab line, the half crabs removed from the belt and separated on the table, and then the legs deposited at the sawyer's stations. The legs were sawed about 1/4 inch on each side of each joint. The longer leg segments were cut in half. All of the cut pieces were deposited on the conveyor which carried them to the shakers. At each shaking station a supply of cut sections was removed from the belt by a gate, so hinged that it could be swung at an angle across the belt to act as a stop.

Shaking

From 23 to 32 men were required at the shaking table. The meat was shaken into stainless steel pans measuring 16 x 9 x 4 inches (Fig. 18), which held from five to ten pounds of meat when filled from one-third to two-thirds of their depth. The pans were placed on the table level conveyor belt and were removed at the sorting stations. The empty crab shells and other wastes from the shaking table were dropped through chutes to the waste conveyor belt which carried them back to the reduction plant. Because the waste chute openings were flush with the shaking table, unshucked leg segments and other materials such as gloves, knives, etc., often found their way into the reduction plant. Some of the hard objects, such as knives, later caused damage in the dried meal disintegrator in the reduction plant. There was an excessive loss of meat on the shaking table which is reflected in the low yields shown in the section on "Yield of Meat Per Crab" and in Table 10. Waste chute opening on similar tables used in future operations should be raised at least 4 inches above the level of the shaking table. This will not only prevent loss of valuable meat, but should eliminate accidental damage to reduction plant equipment.

FIG. 18 - PORTION OF SHAKING TABLE. IN CENTER THE CRAB MEAT IS REMOVED FROM A LEG SEGMENT BY A QUICK SHARP RAP OF THE HAND ON A BRACKET COVERED WITH SPONGE RUBBER. ON THE LEFT THE MEAT IS BEING REMOVED WITH A WOODEN PROBE.

The meat shaking stations were so designed that the crab meat was to be removed from the shells by a quick sharp rap of the hand, holding the crab portion, on a bracket covered with sponge rubber. This method of meat removal did not prove satisfactory since the meat adhered to the shells and came out shredded in the repeated attempts to remove it. This difficulty in removing the meat may be attributed, at least in part, to the improper and insufficient cooking, and improper cooling. Seasonal conditions or biological factors may also affect the firmness of the meat. Considerable variation in the amount of meat in similar sized crabs was at times apparent. Those having shells showing signs of a lapse of considerable time since a moult or shedding of the shell were full of meat and shaking proved somewhat difficult. Crabs having recently moulted were not filled out with meat and shaking of these were simple but there was, of course, a much lower meat yield.

When the meat would not readily shake loose, the shakers used wooden probes to push out the segments. Regardless of how the

meat was removed there appeared to be a disproportionately large amount of shredded leg meat. This precluded a maximum production of fancy pack crab meat as discussed in the section on "Can Filling."

Sorting and washing

Five men did the sorting and inspecting and three men the washing. Washing and dipping stations were available on both sides of the crab line but only those on the inboard side were needed. Three men at the washing operation could keep up with the shaking and sorting at all times. The whole leg sections were separated from the shredded leg meat and the body meats. Bits of crab shell, visceral material, and other foreign matter were removed at this stage. The pans of meat were passed to the washing stations (Fig. 19) where they were placed on blocks in the bottom of stainless steel sinks and thoroughly washed by immersing in running sea water. Each pan of meat was put through two such washings.

FIG. 19 - WASHING STATIONS--THE PANS OF MEAT WERE WASHED IN RUNNING SEA WATER IN STAINLESS STEEL SINKS

As originally supplied by the manufacturer, the crab meat pans were perforated on the bottoms with 1/8 inch holes on 1 inch centers. Drainage of moisture from the meat through these holes was insufficient. The original holes were therefore enlarged to 3/8 inch and additional holes provided on one inch centers around the sides to a height of two inches above the bottom.

Dipping

From the washing stations the pans of meat were passed along on the table to the dipping operation where 2 or 3 men were required. The dip tanks were stainless steel sinks exactly the same as those shown in Figure 19 at the washing stations. All of the crab meat, except leg meat, was dipped for 15 seconds in a citric acid solution made up as outlined in Appendix 4. The leg meat was treated separately and given a 15 second dip in 50° salinometer brine made up with "canner's grade" salt and sea water.

Galvanized metal was used on the table surfaces above the dip and washing tanks. Due either individually or collectively to abrasion, the effect of citric acid, or electrolytic action between the stainless steel and the galvanizing, the latter was dissolved. The metal table surfaces were replaced with 2 x 4 wooden tops at the dipping stations. Dissimilar metals are not recommended for working surfaces at this stage.

From the dipping stations the pans of meat were transported on the top conveyor belt to the packing stations. The top belt was continuous from the sawing, shaking, washing, and dipping table to the packing table. This caused difficulties on the packing table.

It is recommended that a pan or tray which will provide faster and better draining of the washed and dipped crab meat be used in future operations. Pans or trays with bottoms of quarter inch wire mesh are commonly used in plants canning dungeness crab meat. The trays are usually put on racks or shelves and permitted to drain for from 15 to 30 minutes. On the Pacific Explorer the dipped pans of crab meat could seldom drain for more than 5 minutes because of the continuous nature of the design. As a result, a considerable amount of excess moisture was carried over to the packing table. Completely separate belts for the canning table would have provided a solution to this problem.

Can filling

The number of men at the packing or can filling table (Fig. 20), varied from 21 to 30. Each packer was supplied with a short pair of scissors for trimming the meat and each pair of packers a balance for checking filled weight against a standard. Each packer removed the pans of meat he needed from the conveyor belt. A supply of C-enamel cans with parchment cup liners was provided each packer by two general helpers since it was found that water from the belts contaminated the cans on the can delivery conveyor.

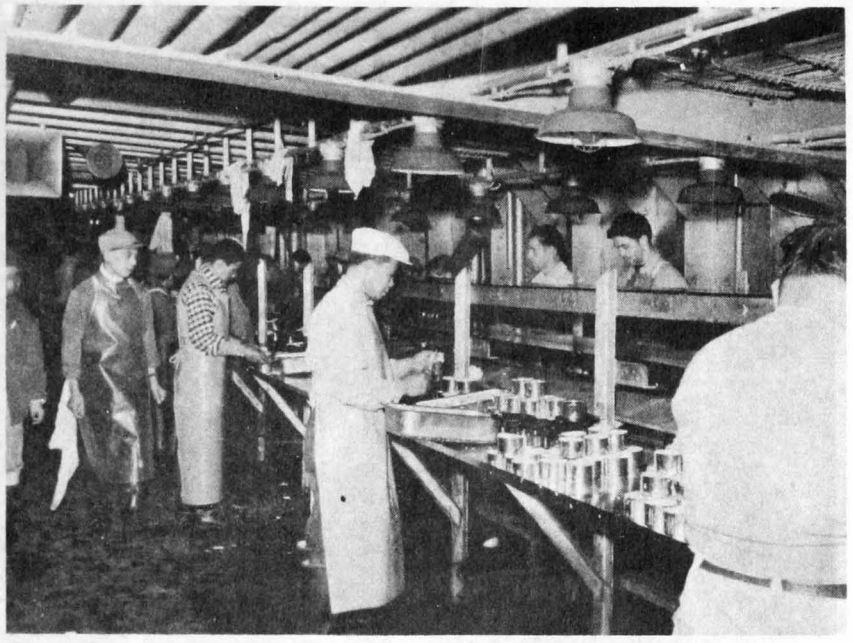


FIG. 20 - PACKING TABLE AT RIGHT

Each can was filled with a bottom layer of 3 or 4 whole leg meat sections, a middle layer of shredded leg meat and body meat, and a top layer of 3 or 4 pieces of leg meat to a standard weight of 8 ounces net, which after retorting yielded at least a net drained weight of 6.5 ounces. This was considered the fancy or "A" pack and consisted of 60 percent whole leg segments and 40 percent of mixed shredded leg meat and body meat.

Because disproportionately large amounts of shredded and broken meat resulted from the shaking operation, it was necessary to prepare a second or "B" grade pack. This pack consisted of about 70 percent shredded leg meat and body meat and about 30 percent whole leg meat segments. This was packed with a layer of leg meat segments only in the bottom of the can and the remainder filled with shredded leg meat and body meat.

A number of problems arose at the packing or can filling table. The crab meat pans carried over an excess of moisture from the washing and dipping operations. As a result, it was found that the cans could not be filled with sufficient meat to yield a net drained weight, after retorting, of at least 6.5 ounces. A wooden plunger type press was constructed and placed in the line between the dip and wash tanks and the can filling table. Only the pans of meat from the acid dip tanks were pressed. This reduced the excess moisture but slowed down the operations. The press was later dispensed with and the packers were instructed to squeeze the excess moisture from the shredded meat with their hands.

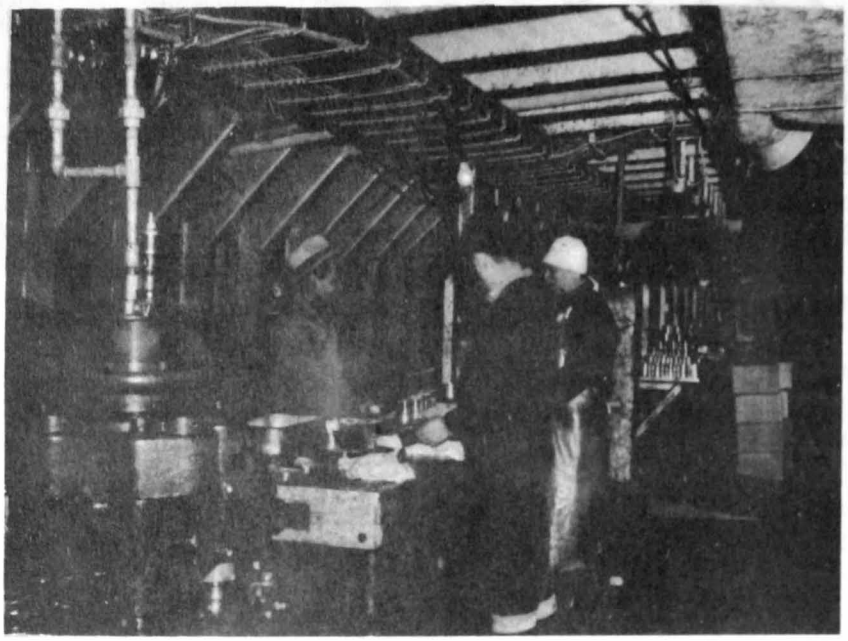


FIG. 21 - PATCHING TABLE WHERE WEIGHTS WERE CHECKED AND PARCHMENT LIDS PUT ON.

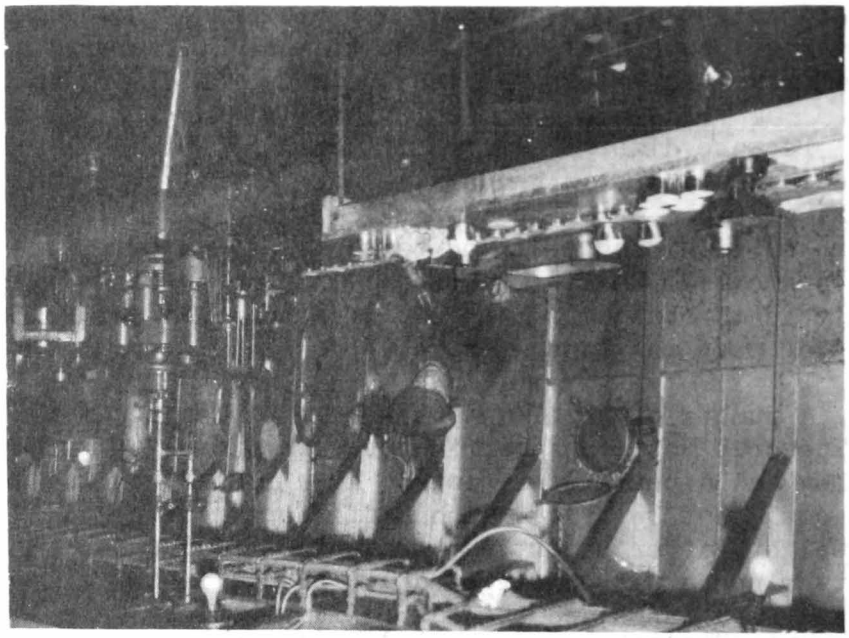


FIG. 22 - PATCHING TABLE AND LID CLINCHER

Another, and more serious, problem on the packing line resulted from moisture being carried over in the pans of meat and from the cooling tank by the continuous upper conveyor belt. The packing table was originally designed with a sloped storage shelf for empty cans. However, excess moisture from the top belt dripped into the cans to be filled. A pair or sponge rubber wipers was installed at the forward or bow end of the line but this did not completely eliminate the contamination. Thereafter, the empty can supply for each packer was placed at his station, on the table proper, in a fibreboard packing case.

As can be seen from Figure 21, the filled cans were stacked on the table. When the supply of filled cans was considered sufficiently large, the can seaming machinery was started and the packers then slipped the cans on the table level can conveyor. Stacking of the filled cans in this manner is not a good practice since contamination is apt to be introduced when the crabmeat in unevenly filled cans touch the bottoms of the cans on top.

From the packing table the filled cans were placed on the can conveyor and carried to the patching table (Fig. 22) where the weights of random cans were checked, and parchment lids or tops put on by hand. From the patching table the cans proceeded on the belt through the clincher and seamed under vacuum of 21 inches (Fig. 23). From the vacuum seamer the cans rolled down an incline where they were placed into steel strap cooling trays for later loading into the retort (Fig. 24).

Retorting the pack

The crab line was equipped with two steam retorts, each with a capacity of four cars. A car consisted of 7 or 8 cooling trays, each holding 126 cans. The cars of canned crab meat were moved from the line to the retort by means of electric industrial forklift trucks.

The crab line operated an average of 14 hours per day between 7 a.m. and 10 p.m. Three retort cooks per day were made--the first started about 1 p.m.; the second at about 6 p.m.; and the third after the last can fill had been completed. Here again, there was a lapse of considerable time. Some filled cans remained standing for as much as 4 to 5 hours before sterilization or retorting. Expeditious handling of the crabs from the butchering through the retorting is essential and cannot be too strongly emphasized. The greater the lapse of time allowed the greater is the possibility of loss of quality in the pack.

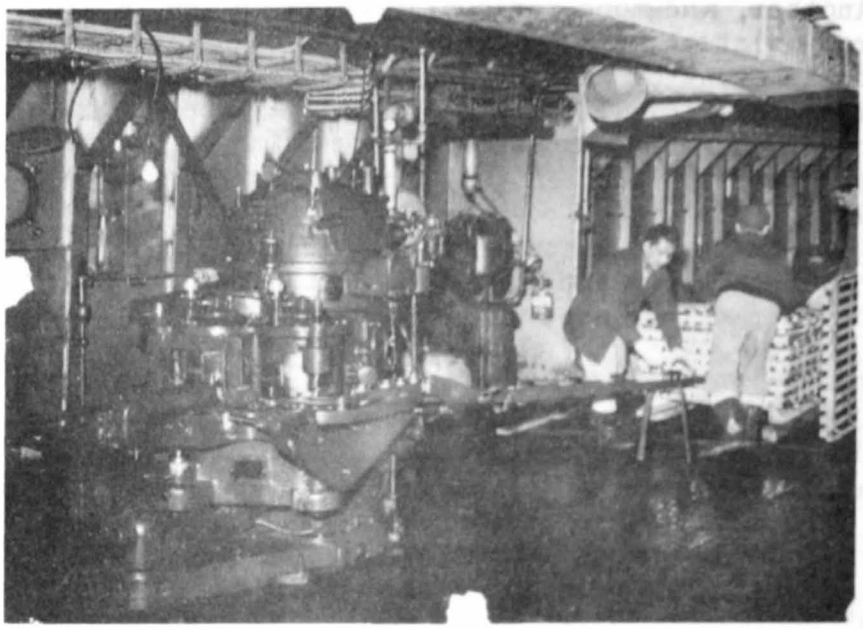


FIG. 23 - VACUUM SEAMER

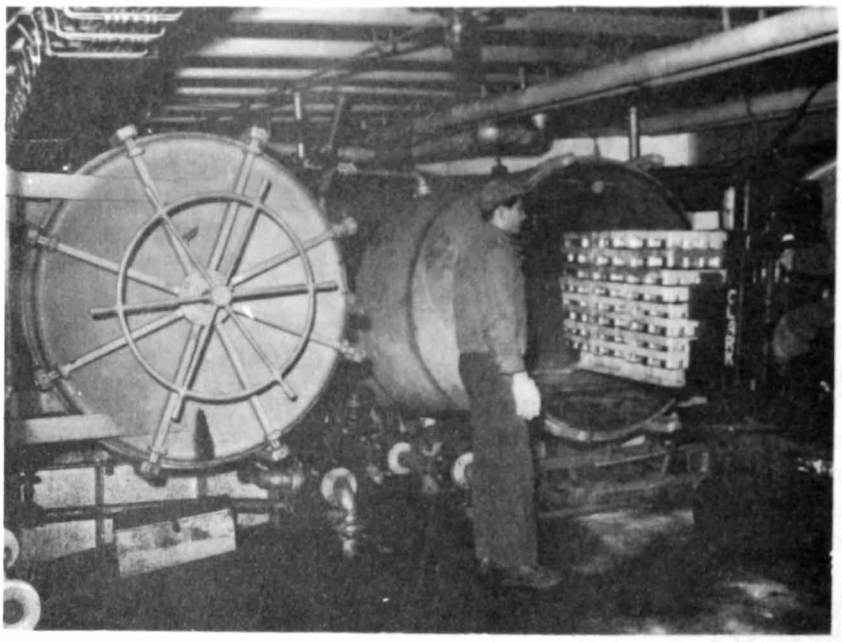


FIG. 24 - LOADING A RETORT

One retort proved sufficient at all times. In view of the delay of several hours between seaming and retorting, it appears desirable to use smaller retorts and to perform more frequent cooks.

The canned crab meat was retorted for 75 minutes at a temperature of 230° to 232° F. After the cook was completed and the pressure in the retort reduced, the cans were cooled by a 5 minute fresh-water spray within the retort. The steam condensate from the retort was drained into a receiving tank. The cooling water and the steam condensate was circulated through a salt water heat exchanger and then pumped into the retort for cooling. After several hours of air cooling subsequent to removal from the retort, the cans still were warm to the touch. Insufficient or slow cooling of cans of crab meat may cause loss of flavor and quality and hasten discoloration in storage. The cooling process should be designed to provide adequate and thorough cooling after the retorting process is completed.

The filled cans were not washed before retorting. After removal from the retort the cans were scrubbed with a stiff bristle brush and a lye solution made up with 7 tablespoons of lye dissolved in a half-tierce (about 250 gallons) of hot potable water (Fig. 25).

FIG. 25 - PREPARING TO WASH THE CANS AFTER RETORTING

After the lye scrub, the cans were rinsed with a cold fresh-water spray. (Fresh water was required to be used very sparingly at all times.) The coolers full of cans were then stacked on end (Fig. 26) and the cans allowed to cool in the air.

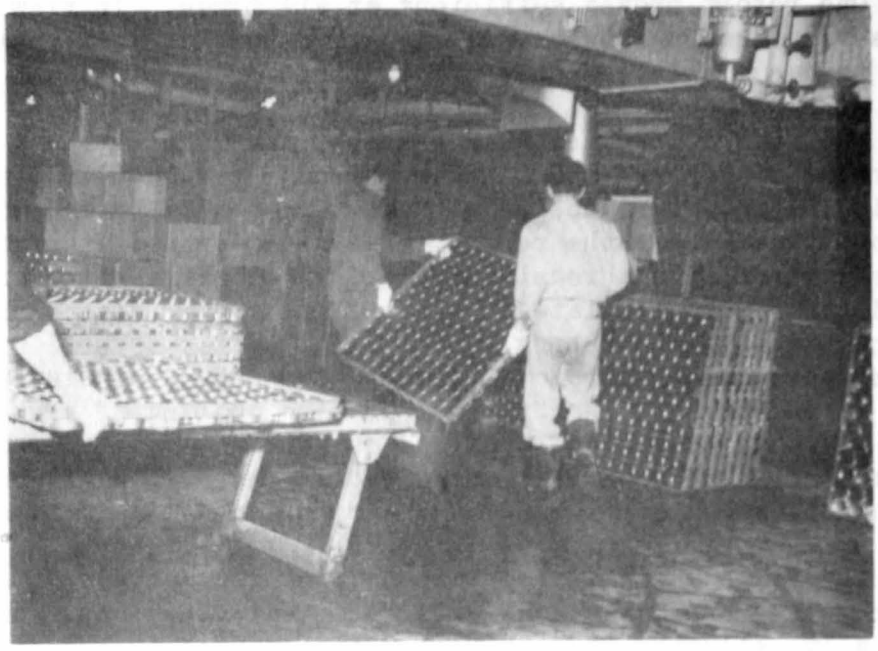


FIG. 26 - STACKING THE COOKERS ON END FOR DRYING

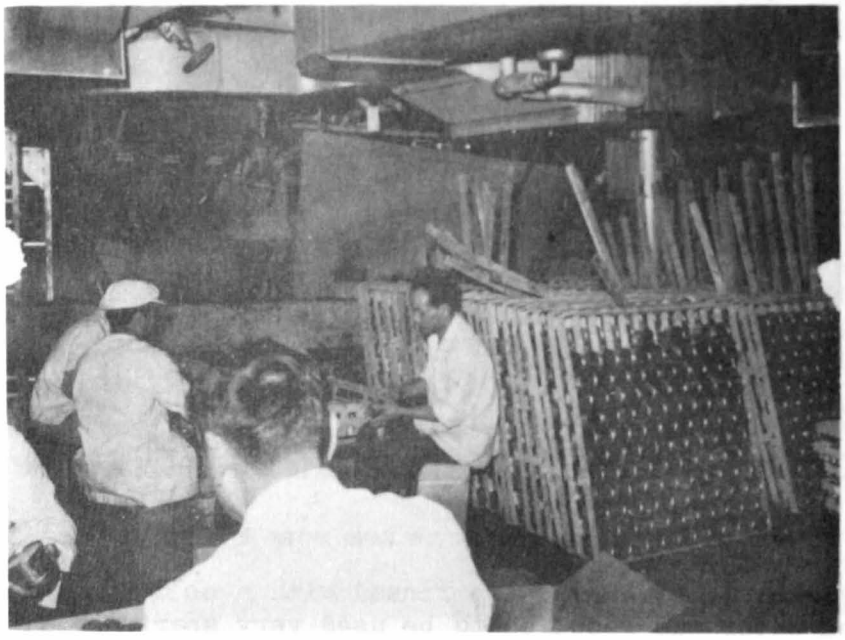


FIG. 27 - WIPING THE CANS PREPARATORY TO CASING. NOTE COOKERS STACKED ON END.

Casing and storing the pack

The cooled cans were packed in fibreboard cases, 48 cans to the case. It was often found necessary to wipe the cans clean by hand (Fig. 27) to remove sediment left by the wash water. The cases were glue-sealed, coded to show the contents, and lowered, by means of a block and tackle, through hatch number 1 into the hold for storage (Fig. 28).

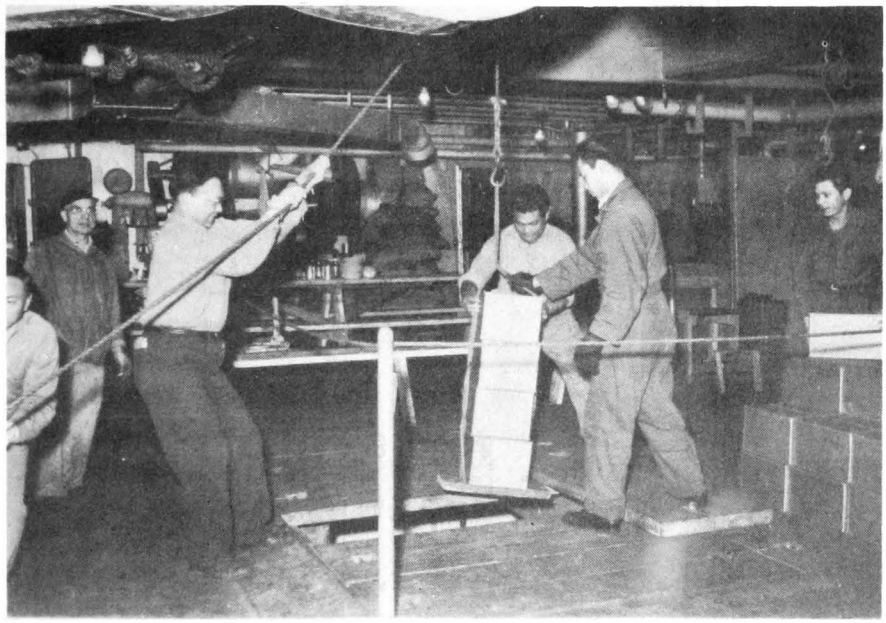


FIG. 28 - FOUR CASES AT A TIME WERE LOWERED TO THE STORAGE ROOM BY MEANS OF A BLOCK AND TACKLE.

Crab line productivity

Data were periodically recorded to determine the man-hour productivity in the various stages on the crab canning line. These data are summarized in Table 9. The average rate of butchering, 53.5 crabs per man-hour, compares favorably with the rate of 53 crabs per man-hour of butchering for the 1947 trip of the Alaska. The average butchering rate per man-hour reported by the 1941 Alaska Crab Investigation was 44.7.

Although the butchering rate on the Pacific Explorer compared favorably with those attained on the two above mentioned operations, the rates for the other stages of production proved much less satisfactory. This can be attributed largely to the fact that the oriental workers on the crab line are accustomed to attending salmon canning equipment, a major portion of which is automatic. The crab canning line was entirely a hand operation, and required a continuous expenditure of energy. Furthermore, there appeared to be a tendency to prolong work until overtime hours were reached. On occasion 12 hours were required to process 2,500 crabs while at other times 6,500 crabs could be handled in 14 hours.

TABLE 9 - PRODUCTIVITY PER MAN-HOUR--PACIFIC EXPLORER, 1948

PROCESSING STATE	UNIT	TOTAL	MAXIMUM	MINIMUM	AVERAGE
BUTCHERING	CRABS	32,884	113.0	40.0	53.5
SAWING (DISJOINTING)	CRABS	54,720	75.9	37.5	54.9
SHAKING	LBS. MEAT	65,749	28.7	16.8	21.5
SORTING AND WASHING	LBS. MEAT	65,749	82.4	54.6	66.5
DIPPING	LBS. MEAT	65,749	314.7	134.4	261.9
CAN FILLING	CANS	131,398	51.0	32.3	41.9

Freezing the daily excess catch

In a 14 hour day, the maximum number of crabs which could be put through the canning line was about 6,500. Catches in excess of this were butchered and cooked and frozen in the shell for canning when fresh crabs were not available. The cooked and cooled crabs were removed from the conveyor line at the sawing stations, stored on aluminum trays, frozen overnight at -30° F. in numbers 4 and 5 second deck shelf freezers (Fig. 29), and stored in numbers 4 and 5 orlop deck storage compartments at 0° F. (see Fig. 6 for location of storage spaces). The trays of crabs were lowered and raised to and from the shelf freezers by the ship's steam winches. The trays of frozen crabs were removed from the freezers, emptied into a large rectangular basket (Fig. 30), lowered into the storage compartment (Fig. 31), and there unloaded and shoveled into a heap (Fig. 32).

FIG. 29 - COOKED CRAB LEGS WERE FROZEN IN SHELF FREEZER FOR LATER CANNING

The whole frozen crab legs are quite brittle. Unless they are carefully handled, the legs are apt to break into small pieces, resulting in a low meat recovery. The frozen legs were not glazed or otherwise treated to prevent possible dehydration during cold storage. This might result in further reductions in weight of meats recovered and a possible loss in their quality. Samples of this product were brought back for testing at the Service's laboratory in Seattle. Findings will be made available in a forthcoming report. When the frozen crabs were needed for canning they were removed from storage, allowed to thaw overnight on deck in the aluminum trays, and then put through the canning line. When necessary, a stream of sea water was sprayed over the loaded trays to hasten thawing.

FIG. 30 - EMPTYING FROZEN CRAB LEGS INTO BASKET FOR TRANSFERRING TO STORAGE

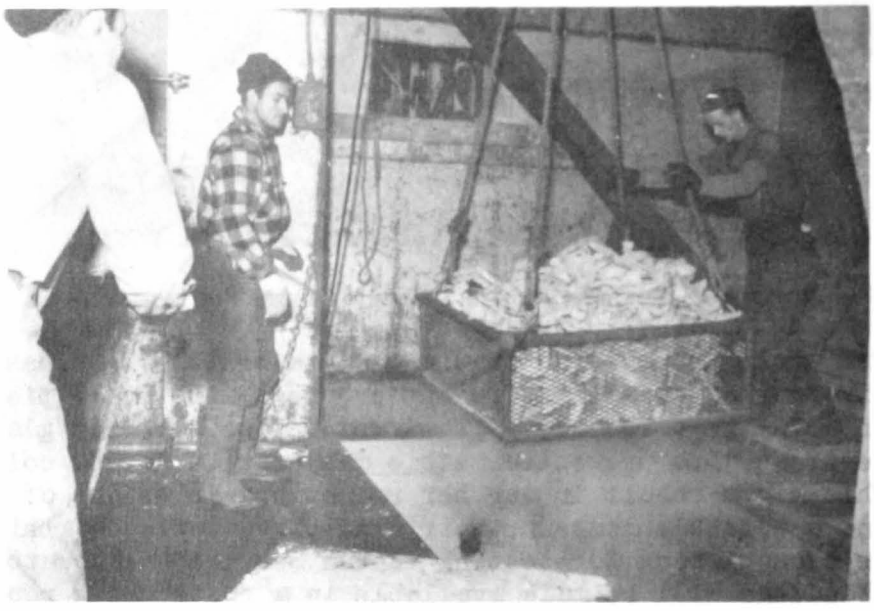


FIG. 31 - LOWERING BASKET OF FROZEN CRAB LEGS TO STORAGE

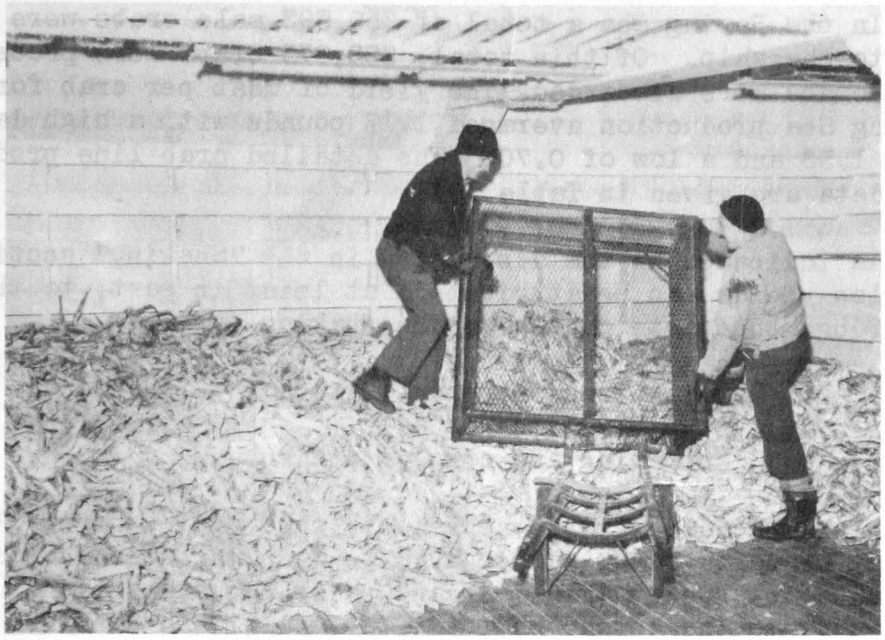


FIG. 32 - DUMPING THE FROZEN CRAB LEGS IN COLD STORAGE

Frozen crab meat

When it was first found that an excess of shredded leg meat and body meat was being produced, it was decided to package this meat in moisture vapor-proof cellophane for freezing. Five pounds of crab meat were divided into approximately six parts. A sheet of cellophane was placed over a rectangular recess cut through a two inch thick plank on the fish packaging table. The meat was pressed down into this cavity and the cellophane folded to complete the package. Six packages were placed in a waxed carton and the carton over-wrapped and heat-sealed, by machine, with moisture vapor-proof cellophane. The cartons of meat were air blast frozen at -35° F. in the after blast-freezers on the upper or canning deck. Six five-pound cartons were packed in a fibreboard case and stored in the refrigerator hold at 0° F. Later, as reported in the section on "Can Filling," a second grade canned pack utilized this excess meat and the packaging and freezing was discontinued.

Yield of meat per crab

Of a total of 31,657 male king crabs delivered to the ship from Pavlof Bay, 30,551 were processed. The remaining 1,106 crabs were discarded because they were dead or otherwise unsuitable for use when reaching the butcher table. The yield of meat per crab for total Pavlof Bay production averaged 1.61 pounds with a high daily average of 2.58 and a low of 1.27. The yields of meat were determined by assuming a fill of 8 ounces of meat per can multiplied by the number of cans produced for the day. Since the pack in Pavlof Bay was underfilled, the above averages are high.

In the Bering Sea a total of 355,593 male crabs were delivered to the ship. Of this total, 332,875 crabs were processed and 22,718 crabs were discarded. The yield of meat per crab for the total Bering Sea production averaged 1.17 pounds with a high daily average of 1.53 and a low of 0.70. The detailed crab line production and yield data are given in Table 10.

As indicated in the discussion in the "Shaking" section, the above low yields can be attributed, at least in part, to the loss of meat through the waste chutes on the shaking table.

Fish Processing Activities

Unloading and conveying fish

When unloading fish, the vessels tied up on the starboard side abreast of cargo hatch number 2. The fish were pewed or shoveled into the unloading bucket (Fig. 9), and raised aboard the ship. The talleyman recorded the weight shown on the scale, and the fish were dumped into the aft fish bins on the shelter deck (Figures 6 and 33).

FIG. 33 - FISH BIN CONTAINING CODFISH AND ALASKA POLLOCK

The bins had a capacity of approximately 90,000 pounds when filled to a depth of about 4 feet. From the bins the fish were run out through gates to a conveyor belt which carried them to a hatch (Figures 34 and 35) where they were dropped to a conventional wire mesh rotary washer at the forward end of the fish processing line on the upper deck.

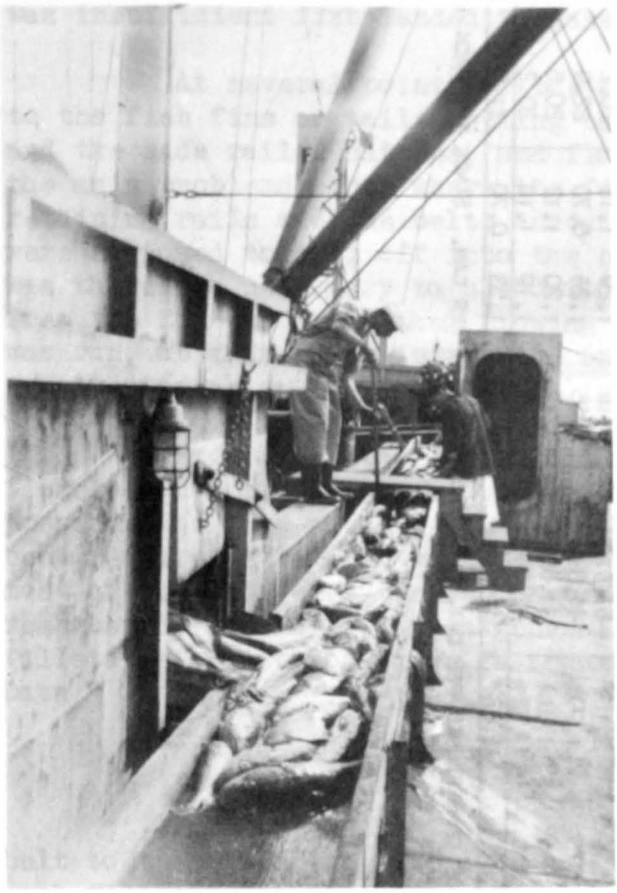


FIG. 34 - SHELTER DECK CONVEYOR CARRYING FISH FROM BINS

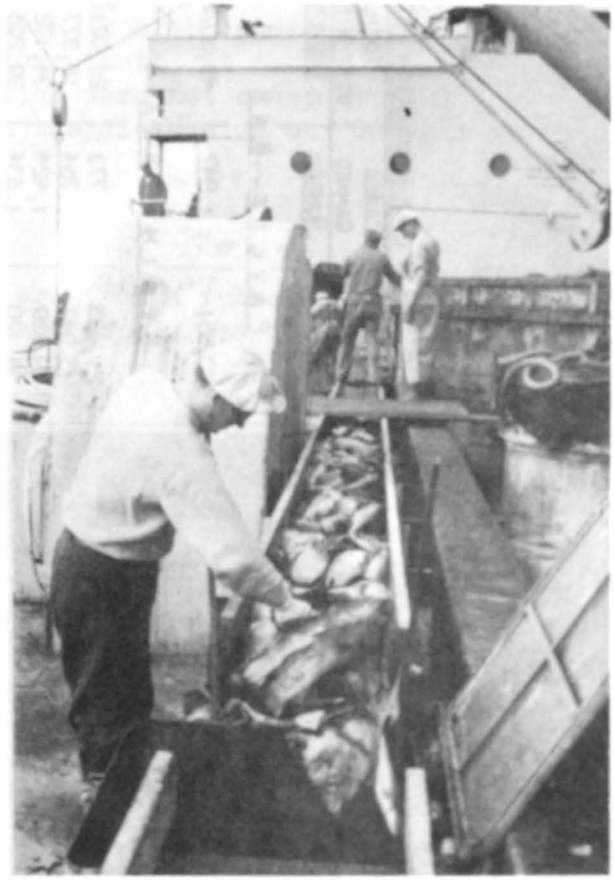


FIG. 35 - FISH WERE CAUGHT BY THE TAILS OR FINS AT THE JUNCTURE OF THE CONVEYOR AND HATCH.

TABLE 10 - CRAB LINE PRODUCTION DATA

DATE	DAYS OPERATED	CRABS PROCESSED	CASES CANNED	TOTAL MEAT YIELD 1/	MEAT PER CRAB			CRABS PER CASE		
					AVERAGE	HIGH	LOW	AVERAGE	HIGH	LOW
	NUMBER	NUMBER	NUMBER	POUNDS	POUNDS			NUMBER		
PAVLOF BAY										
APRIL 4-16	12	30,551	1,847	49,307 2/	1.61	2.58	1.27	14.9	18.9	9.3
BERING SEA										
APRIL 21-29	6	21,485	773	26,071 3/	1.21	1.30	0.87	19.8	27.5	18.5
MAY 3-8	6	15,942	764	18,377	1.15	1.32	1.04	20.9	23.1	18.2
9-15	7	29,839	1,424	34,172	1.15	1.31	0.99	20.9	24.2	18.3
16-22	7	34,120	1,634	39,206	1.15	1.32	0.98	20.9	24.5	18.2
23-29	6	29,918	1,613	38,809	1.30	1.40	1.23	18.5	19.5	17.1
MAY 30-JUNE 5	7	36,245	1,785	42,845	1.18	1.34	1.01	20.3	23.8	17.9
JUNE 6-12	7	39,739	1,925	46,207	1.16	1.53	1.09	20.7	22.0	15.6
13-19	7	43,566	2,161	51,917	1.19	1.29	1.13	20.2	21.2	18.6
20-26	7	44,575	1,903	46,684	1.05	1.26	0.70	22.9	34.3	19.1
JUNE 27-JULY 3	6	26,946	1,319	31,654	1.17	1.20	1.12	20.5	21.4	20.0
JULY 4-JULY 6	2	10,500	521	12,500	1.19	1.19	1.19	20.2	20.2	20.2
TOTAL BERING SEA	68	332,875	15,822	388,442	1.17	1.53	0.70	21.0	34.3	15.6

1/ DAILY YIELDS DETERMINED BY MULTIPLYING THE NUMBER OF CANS PACKED PER DAY BY 8 OUNCES OF MEAT PER CAN. SINCE THE PACK IN PAVLOF BAY WAS UNDERFILLED, THE RESULTANT DATA ARE BELIEVED TO BE HIGH.

2/ INCLUDES 4,978 POUNDS MEAT PACKAGED AND FROZEN.

3/ INCLUDES 7,515 POUNDS MEAT PACKAGED AND FROZEN.

The forward bins were not used for fish at any time. It is doubtful whether a fish boat could be tied alongside in a position far enough forward to permit unloading into these bins. Also, there was insufficient fish landed to make it necessary to use these bins.

At several points on the fish line, difficulties arose due to the fish fins or tails getting caught between the conveyor belt and the side rails, hatches, and flashings. On the shelter deck, the main problems arose where the fish were caught between the wood retaining rails and the belt, and also at the point where the fish were supposed to drop off into the hatch to the next deck below. It was therefore necessary to use 3 to 4 men at these places on deck to free the fish and keep them flowing on the belt. This deck conveyor was run, at infrequent intervals, only long enough to put a working supply of fish on the processing line.

Except for two occasions, ice was not used to preserve the fish loaded into the bins. Usually, the temperature was low enough to preserve the fish without ice. On the occasions when ice would have been required, the fish workers were employed in crab handling and most of the fish were run into the reduction plant. It should be remembered, however, that in general the fish were not considered of filletable quality or size, as reported in the discussion on "Catch Data."

Filleting

From the washer the fish were carried on a rubber conveyor belt to the filleting line where a sufficient supply was removed at each filleting station (Fig. 36).

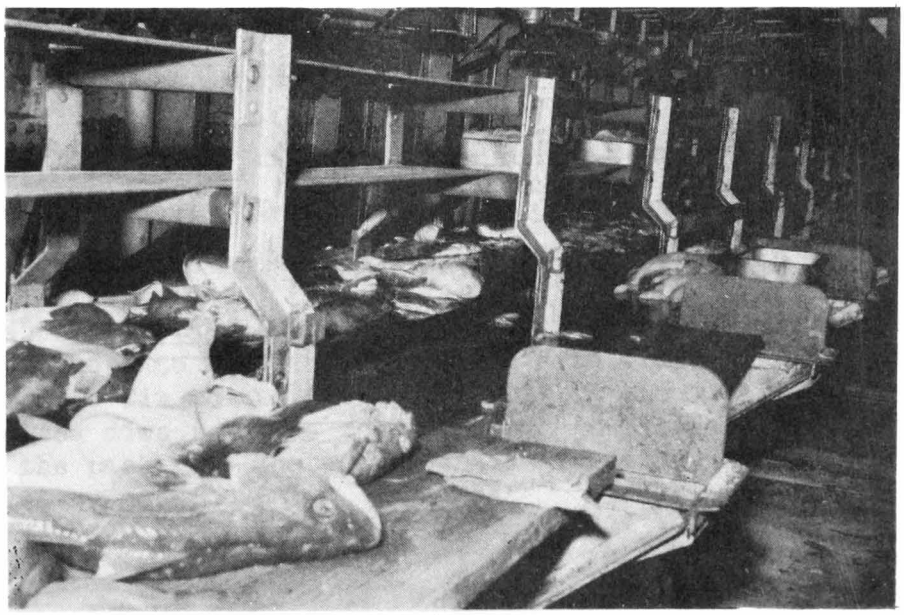
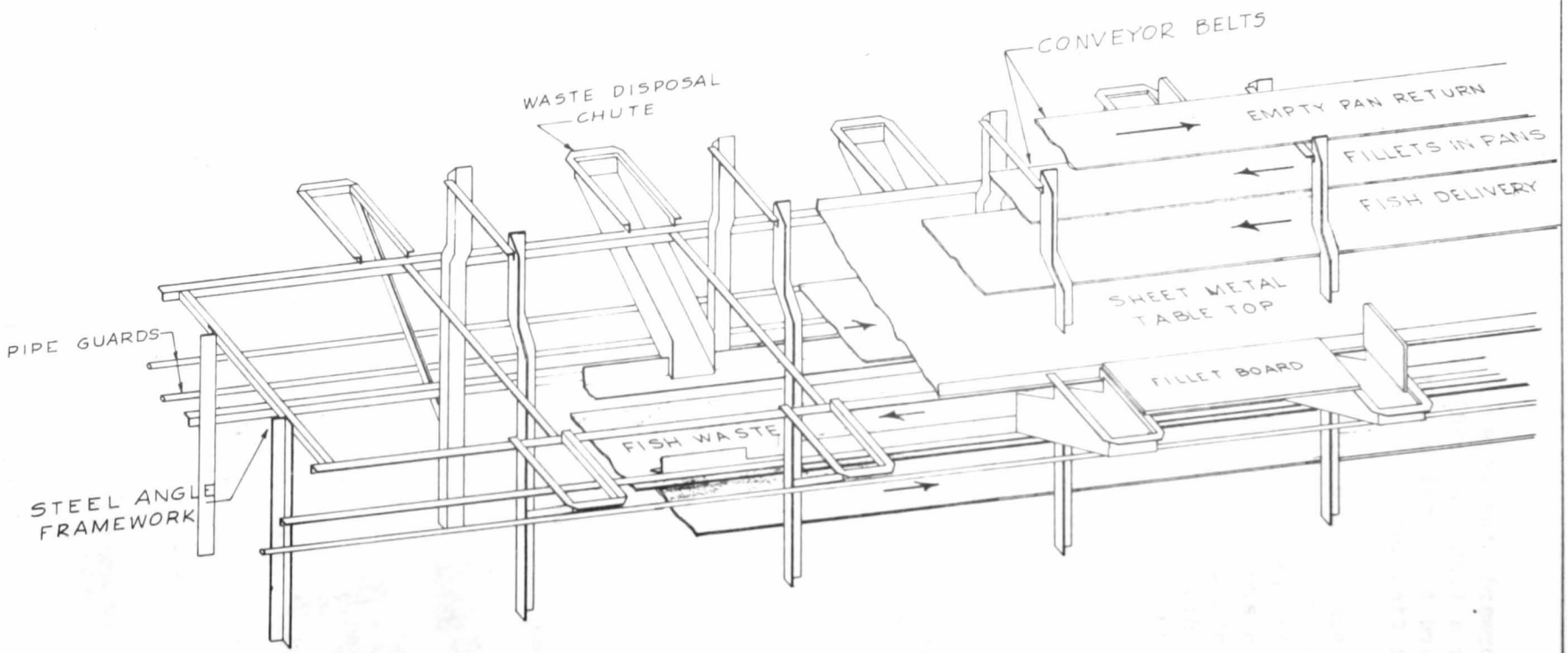


FIG. 36 - FILLETING LINE



FISH FILLETING TABLE

FIG. 37 — DETAIL DRAWING OF FISH FILLETING TABLE

The fish fillets were put into stainless steel pans, 16 x 9 x 4 inches, sent on the conveyor to the inspection, weighing, and packing tables. The waste from filleting was dropped into a chute to the lower conveyor belt leading to the reduction plant. The flow of materials on the filleting table is shown in Figure 16. The detail of construction and arrangement of the fillet table is shown in Figure 37.

The yields of fish and the species utilized are described in the section on "Catch Data."

Weighing and packaging

At the weighing table the fillets were weighed out in five-pound lots. The weigher, who also inspected the fillets, used a balance with a large sweep hand and a view window, and weighed against a standard tare of five pounds (Fig. 38).

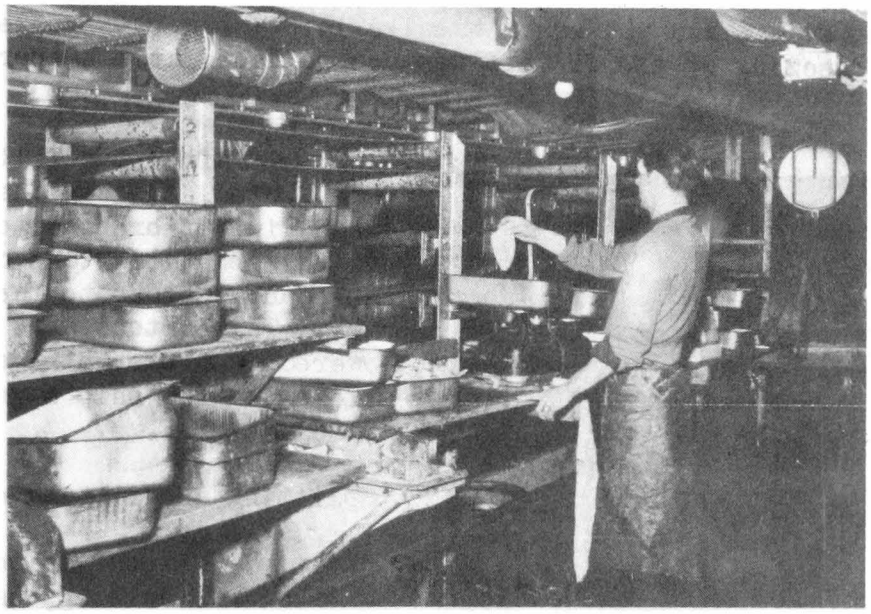


FIG. 38 - WEIGHING OUT FILLETS PREPARATORY TO PACKAGING

On the packaging table the fillets were wrapped and packaged in several ways. "Sole" fillets, "fancy" pack, were wrapped in six individual cellophane packages to each five-pound waxed carton. A sheet of cellophane was laid over a rectangular recess in a two-inch plank sized to fit in the five-pound carton, the fillets placed on the sheet, forced down into the recess and the cellophane folded over to complete the package. The carton was overwrapped with cellophane and heat-sealed by machine.

Cod, pollock, and flounder fillets were "layer" packed. Five pounds of fillets were laid flat in a waxed carton with a sheet of cellophane on the bottom and one on the top. There were no cellophane or other dividers used between the layers of fillets. These cartons were also overwrapped and sealed by machine.

Skinned or pan-dressed "sole" were prepared from the smaller sized flatfish. These were headed, gutted, and skinned on the dark side only. The blind side, or white skin, was left on. The yellow side of the lemon sole was removed. These were packed in ten-pound waxed cartons with a sheet of cellophane on top and bottom. The ten-pound cartons were not over-wrapped because the wrapping machines were not fitted for this size.

Freezing the fish fillets

The waxed cartons were loaded on aluminum trays. The trays were stacked on a conventional loading pallet, steel weights placed on top of the stack, and the stack wheeled into the blast freezers (Fig. 39). Freezing of the fillets was accomplished at a temperature of -35° F.

FIG. 39 - PACKAGED FILLETS BEING LOADED INTO BLAST FREEZER.

After the fillets were frozen, the cartons were loaded into fibreboard cases, six five-pound cartons or five ten-pound cartons to the case. The cartons were then lowered into the refrigerated holds with the ship's gear and stored at 0° F.

Splitting and salting codfish

The codfish considered suitable for salting, usually those over 25 inches long, were removed from the fish conveyor at the forward end of the line. The fish were simply brushed off the belt by hand and allowed to drop to the deck. From the deck they were pewed into a heading box, the heads removed by the "header," the viscera removed by the "passer," and the "splitter" completed the work (Fig. 40). The split fish were dropped by the splitter into a half-tierce of sea water for removal of the blood. From the tierce, the split fish

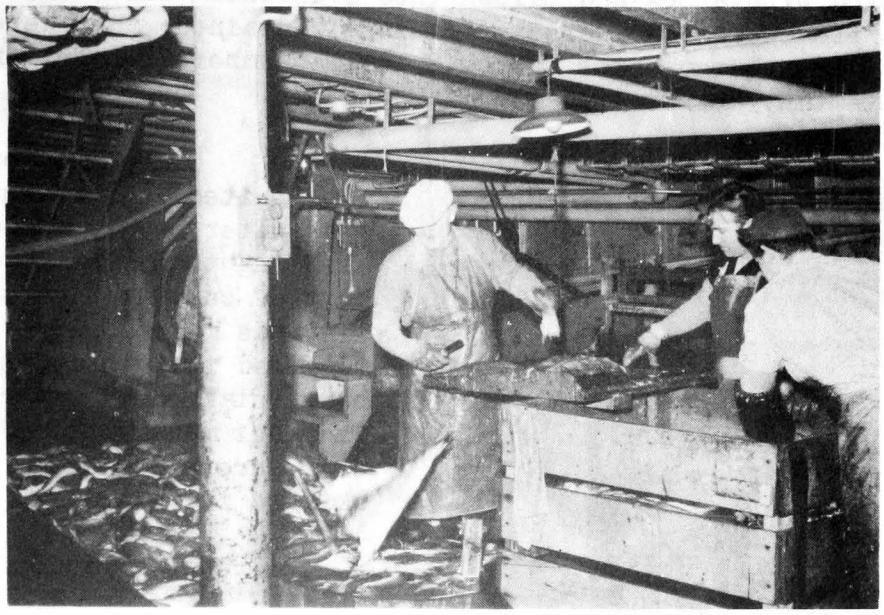


FIG. 40 - THE SPLIT FISH WERE DROPPED INTO A TIERCE OF SEA WATER WHERE THE BLOOD WAS WASHED OFF.

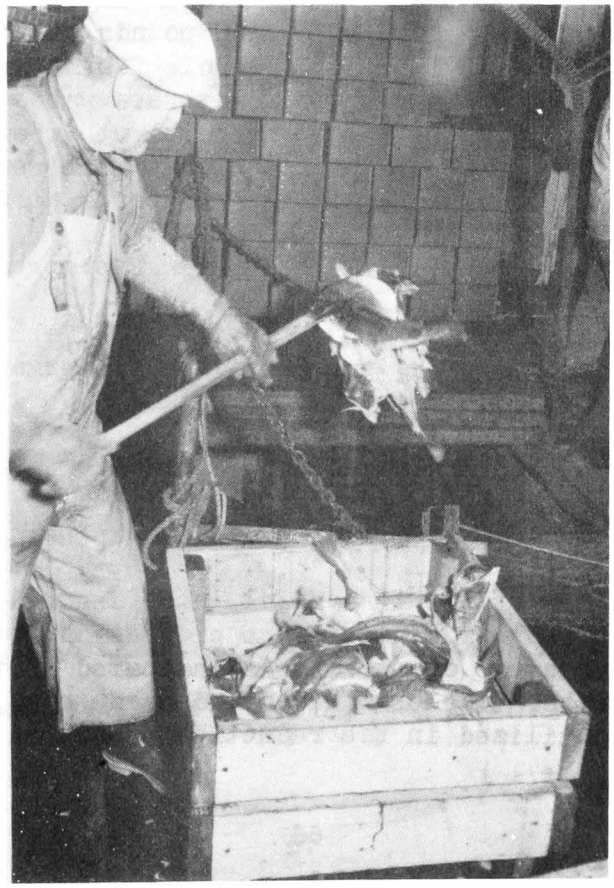


FIG. 41 - DRAINING BOX FOR SPLIT CODFISH

were removed with a pew and thrown into a draining box (Fig. 41). After the fish were considered sufficiently drained, they were pewed to a chute down cargo hatch number 2 to the number 2B refrigerated space where they were salted (Fig. 42 and 43).

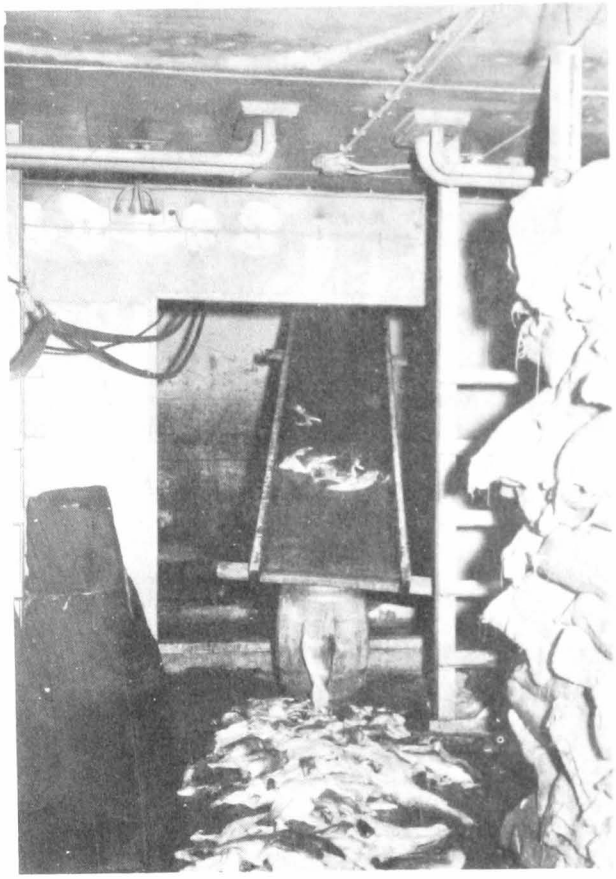


FIG. 42 - DRAINED FISH DROPPED OFF SLIDE TO CANVAS COVERED DECK IN SALTING ROOM.

The weight of codfish salted was estimated by the salter. This was done by assuming that a ratio of 1 part of salt to 2 parts of fish was maintained. It is reported that this ratio can be maintained by expert salters. The four men in the codfish crew were experienced and skilled in this work.

Freezing round fish

Because the fish workers were often needed on the crab line, it was necessary to freeze some of the flatfish in the round. These were pan frozen into blocks containing 50 pounds of fish. The pans of whole fish were partially flooded with sea water and loaded into the blast freezer. The frozen blocks were sea water glazed and stored at 0° F. (Fig. 44).

Fish production data

Table 11 gives the weight of the fish received by the Pacific Explorer and lists the various fish items produced.

The Reduction Plant

General description of activities

Crab waste, fillet line offal, and fish and crab not useable on the respective production lines were processed in the reduction plant for the manufacture of meals. As indicated in the section on "Butchering the Crabs," the crab backs, viscera, etc., were dumped overboard and not utilized in the reduction plant.

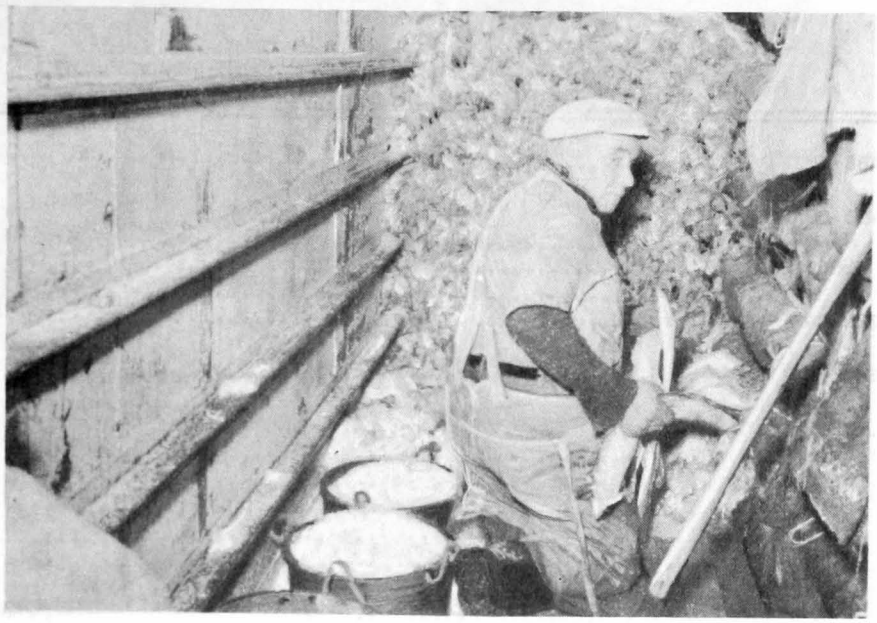


FIG. 43 - SALTER SPREADING FISH PREPARATORY TO SALTING. NOTE TUBS OF SALT ON LEFT.

FIG. 44 - GLAZING BLOCKS OF FROZEN WHOLE FLATFISH WITH SEA WATER SPRAY

TABLE 11 - 1948 PACIFIC EXPLORER PRODUCTION DATA

TOTAL CRABS RECEIVED	387,250
CANNED CRABS	
FANCY PACK	10,623 CASES[1]
SECOND GRADE	7,046 CASES
TOTAL	17,669 CASES
FROZEN CRAB MEAT	12,493 LBS.
TOTAL FISH RECEIVED	1,627,215 LBS.
FILLETS PRODUCED	
"SOLE"	29,577 LBS.
FLOUNDER	3,175 LBS.
COD	39,910 LBS.
POLLOCK	1,860 LBS.
TOTAL	74,522 LBS.
PAN-DRESSED SOLE	32,540 LBS.
ROUND SOLE	56,050 LBS.
SALT COD (GREEN DRESSED)	148,033 LBS.
COD LIVERS	8,865 LBS.
TOTAL	245,488 LBS.
MEAL PRODUCED	
CRAB MEAL	2,469 SACKS[2]
FISH MEAL	1,544 SACKS
FISH AND CRAB MEAL	342 SACKS
TOTAL	4,355 SACKS OR 217.75 TONS

1/ 48 HALF-FLAT CANS PER CASE.
2/ 100 LBS. MEAL PER SACK.

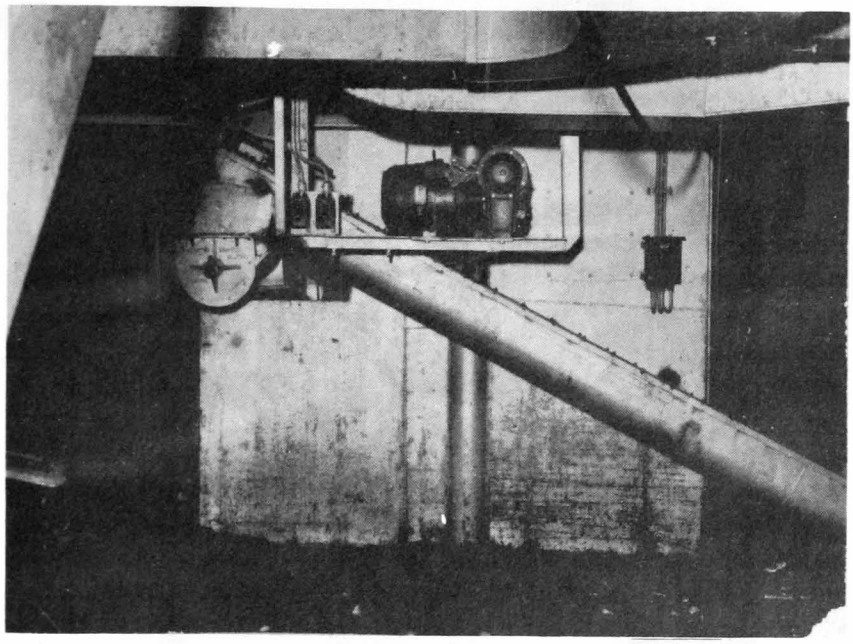


FIG. 45 - SCREW CONVEYOR FOR CRAB WASTE TO REDUCTION PLANT

Waste from the crab line was carried into a storage bin by a screw conveyor (Fig. 45). The lower end of the conveyor raised the waste from a discharge pit and transferred it to a system leading to storage. A rubber belt fitted with blades was initially intended to raise the waste from the pit but the system was unsatisfactory because of jamming and slippage of the belt. In addition, the blades were not high enough to prevent the crab waste from sliding back on the belt at a faster rate than it was carried forward. This belt was similar to the fish waste conveyor shown in Figure 46.

The machinery in the reduction plant had a design rating to handle ten tons of raw material per hour. A total of five men were required to operate the plant. A schematic layout of the reduction plant is shown in Figures 6 and 47.

Because the crab waste was already cooked, it was run directly from the storage bin through the press cake disintegrator and into the steam tube dryer. Early in the expedition it was found that the ground up crab and fish waste would not run through the dryer properly. This condition was further aggravated when the ship was light by the bow and the stern was consequently down. It may also, in part, be attributed to the counter-current air principle of steam dryers. Later, when the press cake disintegrator broke down and could not be repaired, the crab waste and the fish waste were run through the dryer without this preliminary grinding. The larger pieces of raw material served partially to remedy this situation but required a longer period of time for drying. The restricted headroom in the reduction plant would only permit the installation of the dryer with the minimum of recommended

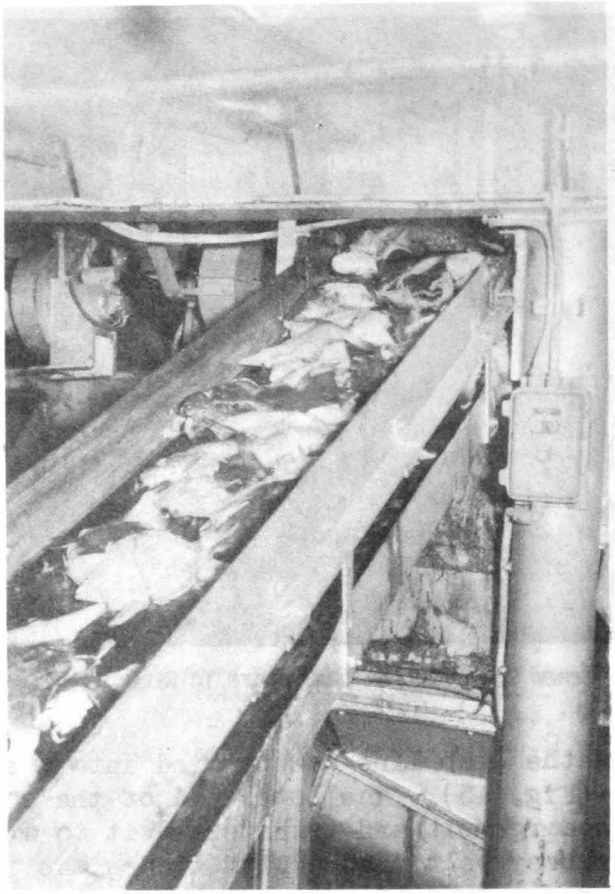
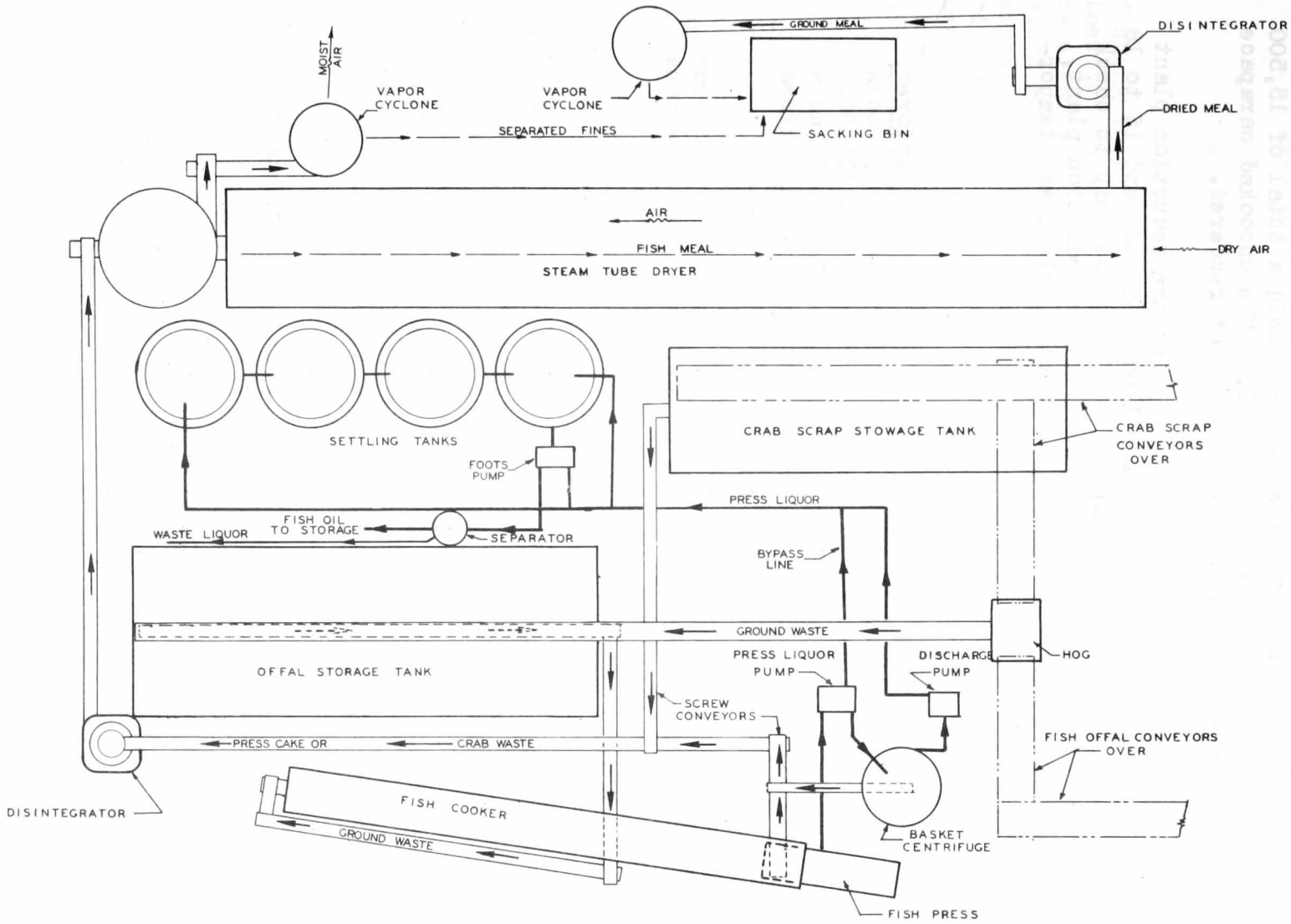


FIG. 46 - FISH WASTE CONVEYOR TO HOGGER. UNUSABLE WHOLE FISH WERE REDUCED TO MEAL.

slope. Furthermore, the ship was light forward which tended to reduce the slope below required levels. By careful control of ballasting, the dryer was made to pass meal.

The bulkheads and overhead in the reduction plant were bare steel plates and exposed to, and cooled by, low outside temperatures. High temperatures and moist air are common in a reduction plant, particularly in a closed space. This condition resulted in considerable condensation of moisture which eventually caused almost every electric motor in the reduction plant to become shorted at some time. The press cake motor finally burned out completely and it was necessary thereafter to by-pass it entirely.

It was anticipated that some oil would be recovered from the fish waste. Several attempts were made to run the press liquors through the settling tanks and thence through the centrifuge. On one occasion when close to 75,000 pounds of fish, mostly whole Alaska pollock, but including cod and flatfish, were run through the plant, about two gallons of oil were recovered.



FLOW DIAGRAM
OFFAL REDUCTION PLANT

FIG 47 — FLOOR DIAGRAM OFFAL REDUCTION PLANT

Meal yield

A yield of 26 percent of meal was obtained from the crab line waste. This yield was based on the average of 5 tests of the ratio of the weight of a cubic foot of the unground waste to the yield from a full bin. It was found that a cubic foot of the waste weighed 20 pounds. The bin measured 775 cubic feet and held a total of 15,500 pounds of waste yielding 4,000 pounds of meal. The uncooked carapace and viscera from the butchering operation were not rendered.

The yield of fish meal was estimated by the reduction plant foreman to be 10 to 12 percent for whole pollock and cod, and 16 to 18 percent for whole flatfish. No attempt was made on the ship to check on how much fish was filleted, how much went to the reduction plant, or how much was thrown overboard when the reduction plant was temporarily shut down.

Protein content of meals

An analysis of the meals produced on the Pacific Explorer, as reported to the Reconstruction Finance Corporation shows protein content of three lots of crab meal, totaling approximately 135,000 pounds, to be between 41.29 and 43.15 percent. The fish meal had a protein content of 61.12 to 62.78 percent for three lots. The mixed fish and crab meal protein content was 55.08 percent.

The high protein content of the crab meal appears to bear out the statement made in the discussion of the crab line operations that a large amount of meat was lost from the canning line.

Working Agreements

On her trip to the waters off Central and South America, the Pacific Explorer was manned by personnel under coastal maritime agreements. On the trip to the Bering Sea and North Pacific, similar agreements were applicable. However, these agreements provided for rates of pay somewhat higher than those on the rest of the Pacific Coast. This is the common practice in Alaska shipping. In addition, there was the usual agreement with the fish and cannery workers organization. Unions represented on the ship were:

1. Pacific Coast Marine Firemen, Oilers, Water Tenders, and Wipers Association, Independent

2. Marine Engineers Beneficial Association, CIO

3. Sailors Union of the Pacific, AFL

4. Masters, Mates, and Pilots Association, AFL

5. National Union of Marine Cooks and Stewards Association, CIO

6. International Association of Fishermen and Allied Workers of America, CIO

7. American Radio Telegraphers Association, CIO

Transferring of the catches of fish and crabs from the fishing vessels to the ship was the responsibility of the deck crew. Loading the catches on the ship was considered an overtime job and required a deck gang of six men--a mate, the boatswain, signal man, winch driver, and two hook tenders. These men were on a regular monthly rate of pay for which they were required to perform a security watch of eight hours a day in two 4-hour shifts. Catches were handled by the deck crew on their regular watches. Payment, at overtime rates, for this work was in addition to the regular pay for the watch. Over and above this pay, a premium of 25 cents per man per hour was made for the handling of crabs and fish. These were considered "penalty cargo," as differentiated from supplies, mail, etc., which came aboard the ship from time to time. Sunday and holiday cargo handling required a double-time payment. During the time that cargo was handled on deck and steam was supplied to the winches, it was required that overtime be paid to the engineer on watch, a fireman, an oiler, and a water tender in addition to their regular pay for the watch.

All of the agreements with the maritime unions provided for overtime payments in unbroken hours. For the deck department a minimum of 2 hours was the smallest interval of overtime. These requirements often made it questionable whether to permit a fishing vessel to come alongside the ship to unload a small catch or for any other reason which might require only a short time.

After the catches were unloaded on deck, they became the responsibility of the fish and cannery workers. The regular working time for this group was eight consecutive hours a day, exclusive of meal time, between the hours of 7:00 a.m. and 10:00 p.m. The working day was based on the first call to work. For work after eight hours, and before 7:00 a.m. and after 10:00 p.m., overtime pay was required.

All of the union agreements provided for a rest period or "coffee time" of fifteen minutes at mid-morning and mid-afternoon.

Personnel Facilities

There was a plentiful, wholesome, and varied diet furnished on the Pacific Explorer. In fact, it was reported by a number of the crew who regularly sail in coastwise and inter-coastal ships that "she was one of the best feeders" on which they had ever worked. Sufficient and adequate quarters and bathing facilities were provided for all personnel. In addition, there were available laundry facilities for washing personal items of clothing and a "slop chest" or ship's store where items of clothing and other personal needs could be purchased.

Recreation and morale

The report of the Pacific Exploration Company says: "In retrospect we believe it would have been worthwhile to have moderate expenditures for recreational equipment." A series of loud speakers were installed in the various mess halls. These were all connected to a radio capable of receiving both standard broadcast and short wave programs. This proved to keep the entire complement of the vessel in touch with the "outside." However, no other recreational facilities were provided. The fishing vessel Bear was regularly dispatched to False Pass to get the mail for the ship's personnel and for the personnel on the fishing boats. These occasions were always looked to with extreme anticipation by all of the men.

Personnel health problems

Before the Pacific Explorer left Seattle, the ship's doctor was advised by the Fish and Wildlife Service observers regarding "fish poisoning" problems which might occur. The Service has issued two leaflets on this subject and these were included in the doctor's library[6/]. On the basis of the recommendations in the leaflets for medication and treatment, and for preventive measures against "fish poisoning," certain drugs and chemicals were included in the doctor's supplies. Although the drugs and chemicals recommended for conditions discussed in the leaflets were useful, certain conditions developed which seem not to have been previously encountered.

Within a week after crab canning had started, one of the Service observers began to complain of an irritation in one eye. The observers had been preparing experimental packs and assisting in training the crew on crab canning procedures. This necessitated frequent tasting and much handling of the product. Soon afterward, others on the ship developed the same condition. The eyes became quite red, and in severe cases there was a profuse discharge. In some cases, the characteristic fish poisoning lesions accompanied the eye condition. In other cases, lesions on the forearms and around the

6/ F. L. 124, "Dermatitis in the Fish Industry," and F. L. 140, "Fish Poisoning and Its Prevention," U. S. Fish and Wildlife Service, Washington 25, D. C.

wrists were found without the eye complaint. Those men who had irritated eyes indicated they felt as though sand or some other foreign objects had been introduced. The infection or irritation seemed to be located on the inside of the eyelids. In every case, except one, the skin lesions were limited to the arms. The exceptional case is illustrated in Figures 48 and 49. In this instance, both legs and both arms were affected. This person's eyes were also badly irritated.

The eye infections and "fish poisoning" lesions were not found among the oriental workers, although they comprised over half the fish and crab workers on the ship. The workers affected were among the Caucasians, and with the exception of the bookkeeper, all the individuals were actively engaged in handling crab. None of the cases of eye infection or "fish poisoning" was found among those who were engaged in handling fish, exclusively. Among the 61 men on the fishing vessels, none were affected with the "fish poisoning" or eye infections. Two members of the crew of the Chirikof, an independently operated vessel on which frozen cooked crab meat was produced, were so badly affected with both conditions that it was necessary for them to seek the assistance of the doctor aboard the Pacific Explorer. In view of the foregoing, it seems logical to assume that these conditions were somehow associated with the operations connected with the handling of cooked crab meat. However, the bookkeeper who had not eaten or touched any of the cooked crab meat, because he "did not like to eat seafood," nevertheless contracted the eye irritation.

FIG. 48 - "FISH POISONING" LESIONS ON LEGS OF WORKER

Soon after the reduction plant started operations, the men working in this department began to complain of respiratory difficulties. It was assumed then that the fine meal dust in the sacking room was causing this condition. A short time later, the room steward on

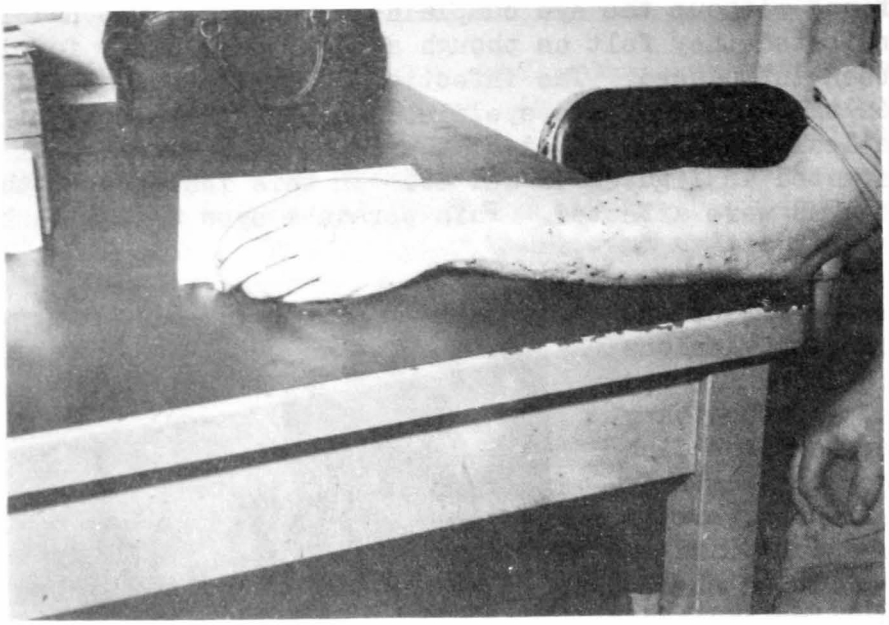


FIG. 49 - "FISH POISONING" LESIONS ON ARM OF SAME WORKER SHOWN IN FIG. 48

the shelter deck developed asthmatic symptoms. This man's condition became progressively worse and his heart was beginning to show signs of strain. The doctor was very skeptical when the man insisted that he had never had asthma before. It was finally considered advisable to send this man home. Later, a number of others developed the same symptoms. Among them were the crab line foreman, several of the oriental cannery workers, the chief engineer and others in the engine crew, the company technologist, and the second Service observer. With the exception of the cannery foreman, one of the orientals, and possibly the chief engineer, the attacks were very minor. In general, the symptoms could be described as a tight feeling in the chest, general difficulty in breathing, the accumulation of phlegm in the throat and a concomitant coughing. The crab line foreman, who became seriously affected by the asthma, reported he could notice an immediate effect when he was at the stern end of the crab line where fumes of warm, freshly cooked, shucked crab meat were strongest.

It is the opinion of the doctor on the Pacific Explorer that both the asthmatic and the irritated eye conditions are forms of allergic reactions to the king crab.

Besides the "unusual" conditions described in the preceding paragraphs in this section, there were the normally expected health and accident matters occurring on the ship. There were frequent instances of minor cuts and bruises. One accident at the sawing table on the first day of crab canning resulted in the loss of a part

of one finger on a cannery worker's hand. There were at least two cases of pneumonia, several cases of illnesses related to the digestive system, and one case in which abdominal surgery was at first indicated but later proved unnecessary and was not performed.

When the Pacific Explorer was in South American waters a doctor was not included in the ship's complement. However, hospital facilities were available and readily accessible ashore, and the ship's complement was only 63 men. Such facilities are not available in the Bering Sea. The closest hospital facilities are at Kodiak and Anchorage, several days away by water. In case of emergency, it is possible to rush a serious case to these hospitals through the Air Rescue facilities of the Government in which the Army, Navy, and Coast Guard perform various functions. However, the vagaries of the weather in the Bering Sea are such that these facilities may not always be readily available.

In an operation the size of that conducted in the Bering Sea by the Pacific Explorer, where a total of 286 men were employed on the ship and on the fishing vessels, it is desirable that a doctor be included in the complement. It is quite likely that the employment of a doctor would more than make up for its cost in worktime saved.

At the close of the trip, the doctor prepared the following findings and recommendations for the Pacific Exploration Company:

> "Pursuant to our recent conversation and in compliance with your request, I will endeavor to make a short outline of some of the unforeseen problems that have arisen on this trip and make recommendations to cover same as I see them, should a similar trip be planned at some future date.
>
> "1. On the hospital setup I could not recommend too strongly the advisability of having a small inexpensive operating table and at least one Corps man[7] that could assist in a major operation. He could be given some clerical job and used in operating room only should an emergency arise.
>
> "2. The poisoning of the skin as a result of handling crabs can practically be eliminated by the use of Chlorozine solution following a soap and water bath of hands and rinse after exposure.
>
> "3. The eyes became infected: First a Blepheritis and if not treated immediately this is followed by a severe conjunctivitis and pheto phobia - Treatment: It yields readily to boric acid irrigations followed by ophthalmic ointments as butyn sulphate and metaphine or yellow oxide of mercury, etc.

7/ A medical aide.

"4. The headaches are controlled by any of the coal tar preparations.

"5. The allergies resembling the piles occurring from pollens are very stubborn.

"(a) Sneezing, coughing, and what the patients describe as chest colds and head colds which are numerous do not respond well to anything that we have on board such as ephedrine propadrine and the coal tar products.

"(b) The cases of asthma are very severe and numerous. We have had about 30 cases occurring on this trip, some so severe that they have been placed in the hospital and lost a great deal of time. These cases have only yielded to morphine and adreniline, and that for only short periods of time. This is by far the greatest man-hour loss we have.

"In conclusion, I would recommend that before employing a crew for a season in a crab pack, that all members be skin tested and a suitable antigen be prepared and given to all reactors. I feel that by this prophylactic measure the loss of many man-hours could be prevented and the season made more profitable thereby."

Conclusions

There are a number of conditions and problems which arose during the course of the Pacific Explorer's 1948 operations. To attempt to detail them in this section would be to repeat all that has come before this section. The following conclusions have been taken from the report of the Pacific Exploration Company to the Reconstruction Finance Corporation.

"Our own experience in 1948, published information from Japanese and U. S. Fish and Wildlife Service reports, and conversations with informed parties all enter into the following conclusions:

"1. During the spring mating season there are restricted but commercially important concentrations of king crabs in a number of bays along the south side of the Alaska Peninsula, notably Pavlof Bay.

"2. These crabs disappear as soon as the females are through moulting and it will probably take considerable expensive research to find where, if anywhere, they can be taken in commercial quantities during the summer and the fall.

"3. While there are probably several large populations of king crabs in the Bering Sea, the two grounds proven by American data are:

(a) An excellent fishery during the spring mating season between False Pass and Port Moller and,

(b) A good fishery along the gulley offshore from this point later in the summer.

"4. It seems more probable that these two grounds are supported by different rather than the same population.

"5. The migration of king crabs in Alaskan waters apparently follows the same pattern as indicated in Japanese and U.S. Fish and Wildlife Service publications but with local variations in depth and significant variations in time from year to year.

"6. Because of this variation in time from year to year any regulations that may prove necessary as the fishery becomes more intense should be left flexible and the local enforcement officer should be empowered to set opening and closing dates to fit the particular year.

"7. The amount and condition of meat per king crab varies greatly from month to month. The males are in fair condition during the female moulting season, very poor condition immediately thereafter, and then gradually improve to their peak during late summer and fall. In view of this they can probably be purchased more fairly on a weight rather than count basis.

"8. During the period covered by our trip the sole were too thin to produce satisfactory fillets. They were improving when we left in July and might produce a satisfactory fillet later in the summer.

"9. The small size and poor condition of all varieties of sole and flounder in the Bering Sea may well be due to overcrowding which results in a shortage of feed. It is our opinion, and we believe one shared by all our fishing masters who are specialists in trawling, that these grounds should be cleaned up by extensive trawling even if the fish can only be ground up into meal and thus make room for a larger, fatter stock of fish[8/].

8/ Author's comment: Present fishery management practices would indicate that it might be advisable to reduce the population to make the existing food supply go a longer way in producing larger and fatter fish.

"10. During frozen storage the fillets developed a chalky appearance. This disappeared when they were thawed out and did not affect their flavor but did affect their salability. The cause of this chalky appearance is unknown and should be investigated.

"11. The expedition for the first time established beyond question the practicability of using the trawl rather than the hand line in the taking of cod in the Bering Sea.

"12. A negative but important finding is the failure of our boats to take any commercially important quantities of halibut. Since these boats have made large catches of halibut on good halibut grounds with similar gear it must be assumed that very few halibut are present on these grounds at least at this time of year.

"13. We found that it is necessary to tow very slowly and use heavy gear well protected from chafing in fishing king crabs.

"14. We believe we have established a satisfactory formula for canning king crabs.

"15. One of the chief industrial problems of Alaska has been the highly seasonal nature of employment in the fisheries. This has been particularly true of the brief salmon season in Bristol Bay. Since the best king crab fishing appears to be before and after the salmon season this new industry deserves special consideration as a means of spreading employment. The masters of a number of the boats under charter to us and a number of other responsible persons are making plans to engage in this fishery. If they are successful it may well finally result in substantial employment and production.9/

"16. This new industry, if it is to avoid expensive mistakes, needs additional research to complete tracing the migration of king crabs and to determine how many commercially important concentrations of king crabs there are.

"17. From a national interest viewpoint reasonable governmental support is justifiable for the further exploration and study of the grounds as well as firmly establishing our position in the Bering Sea area, resources of which are large but unknown."

9/ Authors comment: Consideration should also be given to processing crabs at shore plants. There are a number of salmon canneries on the Alaska peninsula at locations in relatively close proximity to the crab fishing grounds. These canneries are idle during the time when crab fishing is best. Such shore operations would do away with the need for maritime personnel not commonly employed in fish and shellfish processing plants.

Appendix 1

Summary of charter agreement

1. Fishing vessel required to depart for fishing in vicinity of Amak Island, Bering Sea to arrive there not later than April 5, 1948.

2. Continuous deep sea tangle net operations to be engaged in and crabs caught to be delivered to Pacific Explorer in sound, marketable condition. If company so directs, vessel to change to halibut fishing or trawling.

3. Term of charter shall be for 90 consecutive calendar days, beginning with first day after arrival on fishing grounds but not sooner than April 1, 1948.

4. Company to furnish necessary tangle nets, halibut gear, trawls, and twine and equipment for their repair. Vessel crew required to maintain and repair gear.

5. Vessel required to be kept in good running order at all times at no expense to Company.

6. Company guaranteed as follows:

(a) Three cents (3¢) per pound for all sole delivered to the steamship Pacific Explorer, provided however, that the Charterer shall not be required to accept sole less than eleven and three-quarters (11 3/4) inches in length.

(b) Halibut will be accepted and paid for at the prices and under the conditions indicated elsewhere in this contract.

(c) Codfish and any and all other varieties and species of fish and/or mammals caught by owners and delivered to the "charterer" may be accepted or rejected at the option of the owner. In the event any such other fishes are accepted by the Charterer, the price shall be set by Manager on board Pacific Explorer for Charterer.

(d) Crabs delivered to the steamship Pacific Explorer: Five dollars ($5.00) per dozen for male crabs, which yield a net quantity of crab meat in excess of one and one-quarter (1 1/4) pounds per crab, and four dollars ($4.00) per dozen for male crabs, the net crab meat yield of which is less than one and one-quarter (1 1/4) pounds per crab. Provided, however, that the Charterer shall have the option

to accept or reject male crabs, the net crab meat yield of which is less than one and one-quarter (1 1/4) pounds. Provided further that the Charterer shall not be required to accept soft-shelled male crabs or female crabs of any kind or description whatsoever, and provided also that all acceptable crabs must be alive at the time they are delivered to the Charterer.

(e) Halibut delivered to the steamship Pacific Explorer: All halibut shall be weighed after delivery to the steamship Pacific Explorer and twenty-five percent (25%) shall be deducted from the undressed weight to compensate for weight loss in dressing. Charterer shall pay Owners on the basis of such adjusted weight (or actual weight, if dressed at the time of delivery to Charterer) the price currently being paid for halibut of like size and quality at the Popoff Island Cold Storage Plant at Sand Point, Alaska, less one and one-quarter cents (1 1/4¢) per pound. Provided, however, that the Owners shall not fish for halibut or other fish named herein without the express direction of the Charterer's manager on board the steamship Pacific Explorer.

The Charterer guarantees that the Owners will catch and deliver to Charterer (or to such place as is designated by it) in accordance with the terms of this agreement, a sufficient quantity of fish and/or crab to equal the amount of $27,500.00 at the price named herein. In addition thereto, Charterer further guarantees to make an allowance to Owners of $1.75 per day for each crew member of said vessel and to furnish fuel oil and reimburse Owners therefor while the vessel is under charter. The aforesaid guaranty, with respect to board and fuel oil, shall be applicable to the period commencing with the time the vessel departs from Seattle, the period of hire as stated herein, and the normal period of time thereafter for return to Seattle by the usual and customary route without deviation or delay.

7. Value of fuel furnished and food allowances or food furnished required to be repaid to Company from earnings of vessel, if any, which are over and above the guarantees.

8. After the end of charter period Company to sell to vessel bait herring for halibut fishing and fuel for vessel for such fishing.

9. Livers and viscera of all halibut caught by vessel under charter remain property of vessel and its crew. Company required to furnish butchering and freezing services for livers and viscera at rate of 10 cents per pound. Livers and viscera of all other fish caught to be property of Company.

10. Company required to operate ship's facilities at capacity. Vessel to deliver catches to such reasonable destination as is selected by manager on ship if delivery cannot be accepted.

Appendix 2

Fishing gear[1/]

Trawls

Ten Pacific Coast trawls and twenty-five Atlantic Coast trawls as well as a supply of spare parts for each were purchased for the crab trip to Bering Sea. The specifications for each type as originally purchased follows:

Type of Section	Mesh Size (Inches)	Thread Size	Length of Section In Meshes	Section Tapers From Meshes	Section Tapers To Meshes
PACIFIC COAST TYPE					
Wing	6	60	100	50	20
Top & Bottom	6	60	100	80	20
Sides	6	60	100	50	25
Intermediate	4½	60	50	90	Meshes around
Fish Bag	5½	9-th rope	30	70	Meshes around
ATLANTIC COAST TYPE					
Top wing	6	60	70	62	14
Bottom wing	6	60	110	57	35
Square	6	60	36	230	177
Bellies	6	60	74	177	70
Intermediate	4½	60	50	To 100 meshes around	
Fish bag	5½	9-th rope	30	70	Meshes around

Both types of trawls were fished successfully but the Atlantic type of net was preferred by our fishermen and as modified is recommended for future use. While the nets proved good fishers as supplied and would probably be quite satisfactory for moderate catches of cod or bottom fish, heavy crab fishing brought out some specific problems which necessitated some modifications to the nets.

1. The Pavlof Bay bottom is of volcanic ash with considerable barnacled shells and had an exceptionally strong abrasive action on the web. Moreover, crabs tended to lay in the intermediate instead of working back into the fish bag. For both of these reasons it proved necessary to provide very extensive chafing gear. Not only the fish bag but both sections of intermediate bag had to be covered. We used tanned bull hides and old web or rope "hula skirts." The bull hides offered the best protection but had the disadvantages of being heavy, expensive and slow to remove and replace when the net became torn and required mending.

1/ Appendix 2 is taken verbatim from the report of the Pacific Exploration Company to the Reconstruction Finance Corporation.

2. When large catches of crab were made there was often little or no fish. In such cases the spiny legs of the crabs interlocked so that the catch choked up in the net and would not flow back and forth during the splitting operation. For this reason it became necessary to widen out the fish bag. Several sizes were tried from 5½" to 8" mesh of hog-ringed 9-thread rope; double 96-thread cotton mesh both 3½" and 4¼" mesh 90 meshes around; and from 70 meshes (as originally supplied) to 90 mesh hog-ringed, bags. We also added an additional intermediate piece 50-meshes deep 120 meshes around consisting of one of the following:

3½" 96-thread 4¼" 96 thread 5" 96-thread

This intermediate section was not tapered.

Two of the fishing boats added wing extensions about 7½ fathoms on each side. Both 6" 60-thread and 8" 72-thread were used.

1. It is believed that these extensions lead the crabs into the nets better than the bare dandy-line wires.

2. The longer intermediate was necessary for the heavy crab catches.

3. The straight untapered intermediate and cod end was necessary for easy splitting.

4. The hog-ringed rope cod ends were more durable and cheaper but also more cumbersome than the cotton mesh. The rope cod ends originally supplied of hard-laid tarred buoy line were very stiff, kinky and difficult to handle and did not open well. We later fabricated some rope cod ends from used 9-thread medium-laid untreated manila rope. These proved much easier to handle, did not kink (because previously shrunk and stretched) and opened well.

The splitting straps were originally 18' in length. When the bags were widened it was necessary to lengthen the splitting strap to 21'. The splitting strap worked best when fastened 2 meshes higher on the top side of the net than on the bottom. Various locations were tried and the most practical height for crab was found to be from 15 to 17, and for fish we suggest 14 to 15 as originally ordered. We found it helpful to reinforce the cod end by double hog-ringing three meshes each side of the splitting strap.

The original splitting straps were 7/16 6 x 24 plow steel. We found a very soft 1/2" wire gave less trouble from kinking and was less apt to choke up the bag between splits.

For splitting rings we used 1/4 x 3-inch galvanized rings. These proved too light and we therefore recommend 3/8" or 1/2" x 4" rings.

As previously mentioned several mesh sizes of both cotton web and hog-ringed rope were used. The Alaska regulations for trawls set a minimum size of 5 inches stretched measure between knots in the bag and 6" in the wings. It is believed that these sizes are satisfactory for cotton netting and recommend 5-1/2" stretched measure for hog-ringed rope bag.

As to twine, the 60-thread netting proved strong enough in wings tops and bottoms. For the balance of the net we suggest no less than 96-thread 100 meshes deep for the top section of the intermediate and 50 meshes of 120-thread for the lower intermediate.

The 4 rib lines as supplied were 27 thread sisal rope. These were not strong enough for the heavy catches made. We suggest four 27-thread manila lines one each top, bottom, and each side from the head and foot ropes to the 120 thread webbing, then 33 thread manila rope to the cod end. We also recommend two additional rib lines equally spaced between the side and bottom rib lines to run from the top part of the intermediate to the bottom end of the bag, their size to be the same as those previously described.

SUGGESTED KING CRAB TRAWL

Type of Section	Mesh Size	Thread Size	Length of Section in Meshes	Section Tapers From Meshes	Section Tapers To Meshes
Top wing	6	60	160	62	10
Bottom wing	6	60	200	57	30
Square	6	60	36	230	177
Belly	6	60	74	177	100
Intermediate:					
Top section	5	91 1/	100	90	90
Bottom section	5	120	50	90	90
Cod end:					
Either cotton	5	120	50 doubled	90	90
or rope	5½	9-th	34	85	85

1/ Author's comment: This is obviously a typographical error in the company report. This thread size should be 96. Thread size 91 is not manufactured.

It should be noted that the wings have been extended and that it is necessary to shorten the dandeline cables to about 10 fathoms to compensate. Also this net is designed for minimum size of boat of about 60 feet and not less than 135 horsepower.

Codfish Trawl

During the last half of June and early July, cod set into Bering Sea in great numbers and catches up to 30,000 pounds per tow

were taken in the nets designed for crabs. However, it was felt that a larger net with more vertical spread would be more effective in this fishery. Such a net was made up but unfortunately the doors available were not large enough to spread it. It is still thought that it would be successful if fished with a boat of 200 horsepower or more and doors at least 4-1/2' x 9' and preferably 5' x 10'.

The description of this net follows:

Specifications for codfish trawl.--Length around 650 meshes of 6" 60-th. Shrunk in treating to 5-1/2".

A. Bottom wing and footrope

1. Wings 200 meshes long (each)

Each 2 meshes or 11" of web is hung on one 8" hanging, i. e., 100 inches of 1 wing is hung on 800" of line or 66-2/3'.

2. Foot rope

(a) Taper 145 half meshes of 2.75" each will be hung in 3 half meshes per 5-1/2" hanging or 8.25" of web per 5-1/2" hanging or 145 meshes hung on 48 - 5.5" hangings equals 264" or 22'.

(b) Straight 15 meshes to center of foot rope. These meshes are full 5.5" (15 x 5.5 = 82.5") will be hung on 8" hangings. For convenience treat entire 30 meshes (15 each side of center) 30 x 5.5 = 165" of web hung two 5.5" meshes per 8' line or 15 hangings x 8" equal 120" or 10'.
Note: This is both sides of center.

3. Summarizing length of foot rope

(a) 1 wing = 66-2/3'

(b) 1 taper = 22'

(c) 1 center = 5'

Total 93-1/2'

Or entire footrope = (93-1/2) x 2 = 187' plus 16" for eye and 18" for splice = 34" each end or cut rope 193'.

B. Top

1. Wing

Same as bottom wing or each wing = 66-2/3'

2. Head rope

(a) Taper:

Treated same as bottom taper except 125 meshes so 41 hangings (extra 2 meshes over being taken in) each 5.5" or 225.5 or 18.8'.

(b) Straight part

25 full meshes (5.5") hung three meshes per 8" hanging or 8 hangings (extra mesh taken in) each 8" = 64 inches or 5'4".

3. Summarizing length of head rope

(a) 1 wing = 66.7'

(b) 1 taper = 18.8

(c) 1 center = 5.3
Total 90.8'

Or entire head rope = (90.8) x 2 = 181.6 add 16" for eye and 18" for splice equals 34" additional on each end or cut rope 187-1/2' long.

C. Breast Lines

50 meshes (each 5.5") to be hung on 10'. Each hanging is 8" long. Will be hung 10 hangings of 3 meshes each and 5-4 mesh hangings, i.e., hand 334 3 3 4, etc.

Cut breast lines 10' long plus two 4" splices each end 4" splice require 8" for eye plus 18" for splice or 26" each end 52" for 2 ends so cut rope 14'4".

Tangle Nets

The tangle nets were similar to those shown on page 85 of the "Alaska Crab Investigation" report. Different thread, mesh size and percentage of hanging was used to determine the best gear specifications.

Thread varied from 12 to 21 inclusive. Two mesh sizes were used: 16-inch and 18-inch stretched measure between knots. The nets were made up in fifty-fathom shackles. Of the 50,000 fathoms bought: 5,000 fathoms were hung 75 fathoms of web on 50 fathoms of float and lead line; 35,000 fathoms were hung in 100 fathoms of netting on 50 fathoms of rope; and 10,000 fathoms were hung in 150 fathoms of netting on 50 fathoms of lead and float line. Our experience was that the best gear was the nets of 18-thread hung in 100 fathoms on 50 fathoms of line. No difference was noted between the 16-inch and 18-inch mesh size.

The light web broke too easily, tangled badly and produced less crabs because apparently the crabs broke loose and escaped. The nets hung 75 fathoms of netting to 50 fathoms of line were too tight to entangle many crabs. The nets hung 150 fathoms of netting to 50 fathoms of line caught the most crabs per net but not enough more to warrant the greatly increased effort required to untangle the crabs.

The lead line was 18-thread sisal with 4-ounce leads threaded on and spaced to provide 1 pound per fathom. The float line was double 9-thread sisal but alternately might as well have been single 18-thread. The floats were 3-1/2" glass balls sown into copper oleate treated sardine web 1-1/4" 12-thread as a guard. (Probably net dip would have been better for this purpose.) The floats were fastened to the float line at both ends so as to minimize tangling. These glass balls are not completely satisfactory both because they occasionally break with rough handling and because in spite of all care they still get fouled in the webbing. Nevertheless they were chosen after extensive experimentation with all other known substitutes. It was found that cork or cedar floats became watersoaked regardless of treatment used when subjected to water pressures equal to 50 fathoms or more. Plastic floats available at the time were of two major types, one of which was too brittle and the other unable to stand the pressure. Aluminum floats stood all tests and would be superior but it was felt the expense was too great.

Appendix 3

Fishing technique[1/]

Trawling

With the exception of the Dorothy all our trawlers operated in the customary stern-set Pacific Coast fashion with the gear customarily employed by Puget Sound and Alaska vessels. While this gear was in general satisfactory, certain modifications proved helpful and the practice of certain points of fishing technique seemed to improve catches.

It is usual procedure for West Coast fishermen to use about 20-fathom dandeline spreaders between the ends of the trawl wings and the otter doors. These spreaders are thought to lead fish into the net. Probably because they are slower, king crabs do not seem to be lead by the spreaders and it was a common sight to see crabs tangled in the chains of the door and even occasionally hanging to the spreaders. Two of our boats experimented by running sections of web out the first 7-1/2 fathoms of the spreaders from each wing. It is the opinion of the masters of these boats that this increased their catch of crabs.

An outstanding point of fishing technique was the need to tow very slowly when fishing king crab. This point was demonstrated time after time when boats towed side by side at differing speeds. No hard and fast rule can be laid down which will fit all conditions of wind and tide but we can say that the slowest speed which still permits the doors to give proper spread is the best.

A third point worthy of mention is to use fewer floats than in trawling for fish. The boats which had the best results were those that kept the floats to the minimum needed to keep the net from collapsing.

A fourth point is the need for maintaining depth accurately. Even though Bering Sea is remarkably uniform in depth as a whole, local variations of two or three fathoms occur within a mile or so and it was the experience of our boats that best results were obtained by watching the depth indicator and being careful to shape their course so as to maintain a constant depth.

A fifth point is the necessity of guarding against too large catches. During the mating season extremely dense concentrations of king crabs occur. On several occasions one or another of our boats was brought to a dead stop by the trawl filling completely. Such a catch is slow to handle and hard on gear. More often than not on such occasions the gear tore and much of the catch was lost. It was the

1/ Appendix 3 is taken verbatim from the report of the Pacific Exploration Company to the Reconstruction Finance Corporation.

experience of our fishermen that several catches of 1,000 crabs could be handled more smoothly and quickly than a single catch of 2,000 or 2,500.

Tangle Nets

Seven shackles of tangle net were tied together and set as a string. These were anchored, buoyed and hauled as described in the crab report above mentioned, except that the modern type of power roller developed by the shark fishery was used. Both the work of the Alaska Crab Investigation and our boats indicated that the best results came from setting the gear at a 45° angle from the current. A three day "soak" between setting and hauling seemed the most desirable compromise in giving good catches while not allowing the crabs to become so badly tangled as to be very difficult to remove.

Tangle nets do catch crabs. In some instances they may catch more per unit of effort than trawls. However, it is equally true American fishermen do not like to use them. In the cold weather prevalent in Bering Sea, with water only a few degrees above freezing, it is a cold tedious task to stand hour after hour on deck disentangling crabs. It is our opinion that this type of gear should be used only for test purposes and should not be relied on by American fishermen for any substantial production of king crabs for commercial purposes. We recommend that under no circumstances should fishing this gear be undertaken without a clear understanding between owner and crew as to the adverse working conditions to be expected and as to what is to constitute a day's work under these conditions.

Appendix 4

Crab processing formula[1]

National Canners Association officials have told us that no two canners of dungeness crab use exactly the same formula. Before taking the Explorer to Alaska, we secured canning information from a number of sources and in the first few packing days tried a number of combinations of pre-cook and retorting times and temperatures as well as acid and brine dips. Representatives of the Fish and Wildlife Service aboard the Explorer also made a number of experimental packs and will no doubt report their results later. However the following formula which was adopted by us early in the season produced an attractive and tasty pack which was[2]:

1. Butcher alive removing gills and viscera.

2. Pre-cook 15 minutes at 212° F.

3. Shake leg and body meat separately into perforated stainless steel pans.

4. Wash meat thoroughly in clean sea water using care to remove all bits of shell and viscera.

5. Dip meat 15 seconds in an acid solution as follows:

   (a) Make up 15 gallons water plus 13.75 ounces saturated citric acid.

   (b) Add 9 ounces saturated citric acid solution after every 100 pounds of meat dipped. (The original acid bath is designed to give a pH of 2.5 which will gradually rise to about 3. The end effect on the finished product should be about pH 6.5.)

   (c) Make up new acid bath after every 400 pounds of meat dipped.

6. Dip leg meat only for 15 seconds in 50° salinometer brine.

7. Pack 8 ounces of meat in "c" enamel can.

8. Retort at 232° F. for 75 minutes.

9. Water cool immediately after retorting.

1/ Appendix 4 is taken verbatim from the report of the Pacific Exploration Company to the Reconstruction Finance Corporation.

2/ Author's comment: This formula was adopted on the advice of the Service's representatives aboard the ship. It is essentially the same as that recommended in the "Report of the Alaska Crab Investigation," Fishery Market News, May 1942 Supplement, U. S. Fish and Wildlife Service, Washington 25, D. C.

We used the so called "Columbia River" half pound flat can. While we were able to pack 8 ounces of meat in this can and thus secure a net drained weight of better than 6-1/2 ounces it took careful filling to do so and the head space was not always sufficient to secure as much vacuum as desired. We believe use of the so called "Alaska" half pound flat which is the same diameter but 1/8 inch taller would permit less exacting and therefore faster filling and provide higher vacuum. We noted that the Russian king crab was packed in this larger size and tested very well for vacuum.

We used parchment liners and discs in our cans. This has been the usual practice in canning domestic crab and is still being done by the Japanese and Russian packers of king crab. However, some American packers of dungeness crab have discontinued use of the liners and discs and believe that the pack is satisfactory.

Liners cost money and their use involves additional labor so that it would be worth while to investigate their need thoroughly.

Appendix 5

Abundance and condition[1]

Of prime importance in this report is our findings as to the abundance and condition of king crabs and fish in the different localities and as the season progressed. May we say at the outset that it is unwise to forecast from the results of one year's observations; so that our findings in 1948 may not necessarily be true in any succeeding year. Fortunately, some of our work can be collated with other sources: published Japanese reports; the work of the Alaska Crab Investigation made by the U. S. Fish and Wildlife Service in 1940-41; the trip of the M.V. Alaska in 1947; radiophone conversations with the motor vessels Deep Sea and Chirikof in 1948; conferences with the masters of these vessels as to their 1947 findings; and radiophone conversations with Captain Shields of the codfish schooner C A Thayer as to information he had picked up during his many years codfishing in Bering Sea.

From all these sources certain agreements and certain discrepancies stand out; so that a few things can be relied on, others will probably occur, and other points are pure guess work.

Certainly there is a large scale migration of king crabs both horizontally and vertically and this migration is associated with the mating season, which in turn occurs when the females shed.

Let us briefly review what is known and surmised with respect to the female moulting season and the migration of king crabs:

The following table is taken from "Biological and Fisheries Research on Japanese King Crabs," by H. Marukawa:

MONTHLY VARIATIONS IN DEPTH OF HABITAT

MONTH	DEPTH IN FATHOMS
JANUARY	70-90
FEBRUARY	60-80
MARCH	40-50
APRIL	30-40
MAY	18-30
JUNE	30-40
JULY	40-50
AUGUST	50-60
SEPTEMBER	50-60
OCTOBER	60-70
NOVEMBER	60-70
DECEMBER	70-100

1/ Appendix V is taken verbatim from the report of the Pacific Exploration Company to the Reconstruction Finance Corporation.

These additional quotations from this outstanding Japanese authority are also pertinent:

Page 141. "Male crab travel 7.09 and female 5.6 and a maximum of 300 miles in a maximum of 290 days of liberation."

Page 129. "Handshaking of male and females takes place in the middle of April to early May in 20 to 30 fathoms of water. The duration is 3 to 7 days. Female moults followed by egg laying and fertilization."

Page 141. "Migration: In Kamchatka region generally South. Also horizontal movement to shallower water in May and June. Very rapid movement to deep water in August. This varies according to area studied."

American data and our own experiences with respect to the peak of the female moulting season are in rough agreement with these Japanese reports; but these points stand out:

1. There is an appreciable difference in the time of the female moulting season in different Alaskan localities.

The Alaska Crab Investigation found in 1940-41 that in Cook Inlet and around Kodiak Island the height of the female moulting season appeared to be during late March and early April, while in Canoe Bay and Pavlof Bay it was about the middle of April, and approximately May 1 in southeastern Bering Sea. Or in summary, the moulting season occurred progressively later as one traveled westward.

2. The time of occurrence of the moulting season varies several weeks from year to year.

In contrast to the May 1 date above mentioned for Bering Sea in 1941 we found the peak in 1948 to be approximately June 1.

3. It seems possible that the above variances are due at least in part to weather. 1941 was a mild winter with an early spring; 1948 was a notably hard winter and late spring in Bering Sea. Captain Shields who has had almost 40 years experience in the cod fishery of Bering Sea told us he had never seen or heard of so much snow on the mountains or ice in Bristol Bay so late as in 1948.

Such American data as exist also agree roughly with the Japanese concerning depths at which crabs are concentrated at different times of the year. There are exceptions but these seem to be accounted for by difficulties in attaining the optimum depth. Two examples of this are Canoe Bay where crabs migrate in over a shallow entrance and later seek the deepest water in the Bay; and Bering Sea where they remain in the deepest part of the gully (about 50 fathoms) long after they might be expected to be found in deeper water were this readily available.

We have dwelt at considerable length on this subject of king crab migration and its association with the female moulting season because they are vital to the planning of a fishery for king crabs for two reasons: First, as might be expected, king crabs are concentrated much more at the peak of the mating season than at any other time of the year; and, second, because crabs are much more easily found in shallow water.

On the south side of the Alaska Peninsula there are a number of bays where king crab can be fished productively when the spring migration brings the crabs into shallow waters but on the subsequent return of the crabs to the deeper waters of the offshore banks these populations have so far been lost. It will be a slow expensive task of research to determine where, if anywhere, they may be found in large enough quantity to make a profitable fishery during the summer and fall.

The Bering Sea side of the Alaska Peninsula presents a different set of conditions or perhaps similar conditions on a scale of so much greater magnitude as to disguise the parallel.

Bering Sea comprises a huge area--well over 200,000 square miles. Deep water approaches closely the northern shores of the Aleutian Islands and persists almost to the Pribilofs. North and east of a line drawn roughly from Cape Sarichef to the Pribilofs and then west to the international date line, depths are everywhere less than 100 fathoms and through most of the area less than 50 fathoms. The only ground proven by American data is the area between False Pass and Port Moller and from near the shore off to a distance of about 70 miles. Even this is a large area and king crabs are neither uniformly distributed nor remain in the same place.

In 1948 the Deep Sea prospected this area with very meager results during the first half of April. Our fleet found catches of 3 or 4 hundred in the last half of April. These catches improved during May and reached a peak of 2,500 per drag about the end of May and beginning of June. During this same period the best fishing

depth decreased from an average of 35 fathoms to 24 fathoms and the best location moved to an area about 35 miles northeast of Amak Island.

As previously mentioned in the chronological account, June 9 brought a SE blow and when the boats resumed fishing June 11 catches were very disappointing. Whether the dispersion at this time was pure coincidence or whether it was accelerated by a storm at the end of the mating season is a question which only future years can answer but the crabs certainly moved a substantial distance in two days and probably scattered out.

On the 24th and 25th of June, as the result of information supplied by the M.V. Deep Sea, we found catches of 400 to 600 on the Cape Newenham side of the gulley in 37 to 45 fathoms but these crabs were so freshly moulted as to be uneconomical to process. Whether these crabs were part of the same population that had migrated that far and shed in the meantime or, as seems more probable to us, they were from another population, is a question still unanswered.

The condition of the male king crabs varied greatly during the period from April to July and from reported condition during the late summer. The crabs taken in Pavlof Bay were larger, mostly clean of barnacles, and, while not completely "full", quite heavy meated. Number of crabs ran as low as 9.35 crabs per case. When we moved to the vicinity of Amak Island we found two different situations depending on depth of water fished. The crabs taken in 30 to 35 fathoms resembled those of Pavlof Bay except for their anticipated smaller size, while those caught further offshore in 40 to 45 fathoms were newer shelled and distinctly less filled out with meat. This condition prevailed generally during the moulting season although gradually more barnacles were noticed.

When the crabs dispersed at the end of the mating season the few males that remained in shallow water were in too poor condition to process. What little meat the shells contained was dark and withered and the crabs themselves seemed more dead than alive. It almost seemed as if putrefaction had already set in even though the crab was still breathing. These crabs seemed to have been dredged out of the mud.

In contrast the male crabs located 60 to 70 miles offshore in about 40 fathoms of water about two weeks later were clean, bright shelled, and although they had very little meat, what they contained was very white with bright outer covering. We have learned since from the master of the Deep Sea that this crab fattened up quite rapidly and was in good condition by the first of August. The Alaska Crab Investigation in 1941 and the Alaska in 1947 found crabs in this same locality during August and September to be in prime condition.

With few exceptions the bottom fish taken on this trip were of inferior quality and about comparable to what is known as the "winter fish" landed at Seattle. The exceptions to this statement were the lemon sole which in most instances compared very favorably with "petrale" sole taken off the Oregon and Washington coasts. The reason for the inferior quality of these fish is somewhat questionable and it might be due to either the season they were caught, the depth of water taken in, or the type of bottom they were feeding on. However, it is the writers opinion that their poor condition was due mainly to over population on the grounds which naturally results in insufficient feed to produce prime fish.

The cod fish taken were as a whole first quality and their condition improved as the season progressed. During the early stages when odd fish or "soakers" were about all that was caught, the flesh was not too firm and some wormy fish were found but later when the schools moved in, the fish were of uniform size and their condition excellent. What pollock were landed were about as good as could be expected for these fish are notably soft and watery.

One point that should be noted is the fact that all fish handled aboard the ship were exceptionally fresh and in this respect can compare favorably with the best packing practices.

From the foregoing observations and a review of all the Bering Sea references cited, we can set up the following hypotheses, some of which future research will probably prove and others disprove:

1. There is a large scale migration of king crabs into Bering Sea probably from deep water beyond the 100-fathom curve.

2. The crabs probably come in along the gulley and break up over the edge into 35 and down to 20 fathoms further and further NE; the females to moult and the males to mate with them.

3. The males first and then the females with them concentrate in increasing density as the peak of the mating season is reached.

4. At the end of the mating season there is a rapid dispersal to deeper water.

5. This dispersal may be influenced by weather at the time.

6. King crabs move into the deepest water readily available to them until late in the fall when they again migrate out of the area and over the 100-fathom curve.

7. There are probably other concentrations of king crabs in other parts of Bering Sea. Possibilities are (a) near shore along the Aleutians, (b) off the Pribilofs, (c) off St. Mathews and St. Lawrence Islands, and (d) Norton Sound. Research work should be carried out to determine whether these concentrations exist and if so their magnitude and the season at which they are available.

8. Male king crabs are in fair condition before and during the mating season. Just after the mating season we found old barnacled crabs unfit for processing in shallow water and newly moulted crabs offshore. These latter crabs were reportedly in good condition in August and are reported to be at their best in the fall.

Note that the above statements are presented as hypotheses with varying amounts of evidence for setting them up.

The records which must surely exist of the operation of Japanese floating canneries in this area would be invaluable. We understand that it is AMG policy to make such information available.

Appendix 6

Individual Tow Records

Section A - Otter Trawl

Drag Number	Date 1948	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1	4-4	1	55-161-C-3		12	60	88	25	50	
2	4-4	1	55-161-C-3		8	60	21	2	20	
3	4-4	1	55-161-C-3		12	75	145	48	75	
4	4-4	1	55-161-C-3		12	70	216	100	100	
5	4-4	1			23	35	12		1000	Drag area - Canoe Bay
6	4-4	1			16	60	47		1000	Drag area - Canoe Bay
7	4-5	7	55-161		13	60	300		175	
8	4-5	7	55-161		14	60	300		175	
9	4-6	1	55-161-C		14	65	273	52		
10	4-6	1			14	75	334	362		
11	4-6	1			15	75	16	3		
12	4-6	1			13	65	107	16		
13	4-6	1			14	70	349	349		
14	4-6	7	55-161		13	70	300	100	100	Tanner Crab 2000
15	4-6	7	55-161		15	65	250	150	100	Tanner Crab 10000
16	4-6	7	55-161		14	60	150	150	50	Tanner Crab 1000
17	4-6	7	55-161		12	75	150	150	50	Tanner Crab 1000
18	4-6	7	55-161		13	60	200	200	50	Tanner Crab 1000
19	4-7	7	55-161		14	60	506	2	300	Halibut, legal 1
20	4-7	7	55-161		14	60	400		300	
21	4-7	7	55-161		14	120	600	3	300	
22	4-7	7	55-161		14	60	518		300	
23	4-7	7	55-161		14	60	506	20	200	

1/ 1, Borris; 2, Dorothy; 3, Jeannette F.; 4, Kiska; 5, Mars; 6, Pearl Harbor; 7, Sunbeam; 8, Tordenskjold.

2/ Numbers indicate degrees latitude and longitude; letters and small numbers indicate sub-areas of ten minutes longitude and latitude, respectively (See Fig. 50).

3/ Abbreviations used are those of U. S. Dept. of Commerce, Coast and Geodetic Survey, Hydrographic Manual. M - mud; S - sand; G - gravel; HRD - hard; SFT - soft; STK - sticky; BK - black; GY - gray; SH - shells.

* Females

Note: The data appearing on these pages represents only those reports which were most complete. Many of the tow records were devoid of any definite information on area and time fished, bottom, catch, etc.
Where figures do not appear in the columns, information was not furnished.

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
24	4-8	1	55-161-C		14	35	376	402			
25	4-8	1			13	25	86	98			
26	4-8	1			12	30	310	325			
27	4-8	1			13	30	415	362			
28	4-8	1			13	30	205	678			
29	4-8	1			13	30	716	809			
30	4-8	7	55-161		15	60	500	300		Tanner Crab	50
31	4-8	7	55-161		15	60	500	300		Tanner Crab	50
32	4-9	1	55-161-C		13	30	454	215			
33	4-9	1			13	30	76	36			
34	4-9	1			14	30	241	97			
35	4-9	1			14	35	350	112			
36	4-9	1			13	40	615	276			
37	4-9	1			13	35	216	278			
38	4-9	1			12	30	109	32			
39	4-9	5	55-161-C-3	S	14	55	50	30			
40	4-9	5	55-161-C-3	S	14	45	5				
41	4-9	5	55-161-C-3	S	13	40	251	60			
42	4-9	5	55-161-C-3	S	13	80	58	11			
43	4-10	1	55-161-C		13	15	9				
44	4-10	1			14	30	240	113			
45	4-10	1			14	30	69	52			
46	4-10	1			13	45	354	219			
47	4-10	1			14	55	27	78			
48	4-10	1			13	45	118	213			
49	4-10	7	55-161	Sh	14	60	100	500	100		
50	4-10	7	55-161	Sh	15	60	150	700	200		
51	4-10	7	55-161	Sh	12	60	230	300	100		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
52	4-10	7	55-161	Sh	11	60	230		100		
53	4-10	7	55-161	Sh	11	60	184	600	200		
54	4-11	5	55-161-C-3	S	13	55	60				
55	4-11	4	55-161-C-3	M	15	35	142	210	50		
56	4-11	4	55-161-C-3	M	14	36	15		90	Soft Shell Crab	120
57	4-11	4	55-161-C-3	M	14	45	20	10	150		
58	4-11	4	55-161-C-3	M	15	75	21	40	100		
59	4-11	7	55-161		14	60	100	500	930		
60	4-11	7	55-161		15	75	100	500			
61	4-11	7	55-161		13	75	126	500			
62	4-12	1	55-161-C		11	75	123	19			
63	4-12	1	55-161-C		12	85	60	16			
64	4-12	1	55-161-C				76	23			
65	4-12	5	55-161-C-3	S	14	80	36	10			
66	4-12	5		S	13	95	213	260			
67	4-12	5		S	18	65	41	6			
68	4-12	5		S	14	70	47				
69	4-12	5		S	16	60	62	22			
70	4-13	1	54-162-E-6		11		10	1			
71	4-13	7	55-161	Sh	17	60	200				
72	4-13	7	55-161	Sh	15	60	200				
73	4-13	7	55-161	Sh	15	60	200				
74	4-13	7	55-161	Sh	15	150	255				
75	4-14	1	54-162-A-1		14	60					
76	4-14	3	55-161-C-3		17	47	1	2	100		
77	4-14	3	55-161-C-3		15	45	8	3			
78	4-18	1	54-164-B-2		21	60	65	259			
79	4-18	1			25	55	1				

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
80	4-18	3	54-164-B-2		21	60	2	1	50	Halibut, Under Size 2
81	4-18	3	54-164-B-2		26	60				Halibut, Under Size 1
82	4-18	4	54-164-B-2	Gy S	19	55	8	2	70	Halibut, Under Size 20
83	4-18	4	54-164-B-2	Gy S	25	50	3		35	Halibut, Under Size 7
84	4-21	1	55-164-A-3		22	60	6	1		
85	4-21	1	55-164-A-3		19	100	28	4		
86	4-21	8	55-164		27	45	8		50	
87	4-21	8	55-163		25	75	2		800	
88	4-23	1	55-163-F-2		42	80	55	6	500	
89	4-23	1	55-163-F-2		42	75	63	9	500	
90	4-23	1	55-163-F-2		43	75	72	3	2000	
91	4-23	1	55-163-F-2		47	80	53		2000	
92	4-23	1	55-163-F-2		46	100	57			
93	4-23	3	55-163-D-4		34	90	64	27	100	
94	4-23	3	55-163-D-4		35	120	319	306		
95	4-23	3	55-163-D-4		35	90	100	55		
96	4-23	3	55-163-D-4		34	50	40	20		
97	4-23	3	55-163-D-4		34	45	42	25		
98	4-23	4	55-162-B-1	Gy S	44	70	38		80	
99	4-23	4	55-162-C-1	Gy S	46	95	2		20	
100	4-23	4	55-163-B-3	Gy S	46	80	8	1	200	
101	4-23	4	55-163-B-3	Bk S	37	90	28	1	40	
102	4-23	5	55-163-D-4	S	49	85	34	30	2000	
103	4-23	5	55-163-D-4	S	44	60	101	226		
104	4-23	5	55-163-D-4	S	41	70	15	30		
105	4-23	5	55-163-D-4	S	40	75	10			
106	4-23	7	55-163	S	32	75	26	25	150	Tanner Crab 20
107	4-23	7	55-163	S	37	60	50		400	Tanner Crab 70 Halibut, Under Size 3

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
108	4-23	7			42	90	50	5	900	Tanner Crab	10
109	4-23	7		S	51	150	180		2000	Tanner Crab	3
110	4-24	1	55-163-F-4		25	120	69	5			
111	4-24	1	55-163-F-4		29	60	17	3			
112	4-24	1	55-163-F-3		35	120	62	57			
113	4-24	1	55-163-F-3		34	60	100	98			
114	4-24	1	55-163-F-3		33	60	132	78			
115	4-24	5	55-163-D-4	S	34	120	67	26	150		
116	4-24	5	55-163-D-4	S	37	120	35	28	100		
117	4-24	5	55-163-D-4	S	42	105	88	50	200		
118	4-24	5	55-163-D-4	S	39	100	157	400			
119	4-24	7	55-163	S	25	85	30	6	75	Tanner Crab	50
120	4-24	7	55-163	S	34	100	300	100	250	Tanner Crab	50
121	4-24	7	55-163	S	35	90	277	200	400	Tanner Crab	100
122	4-24	7	55-163	S	35	95	400	150	400		
123	4-24	8	55-163		25	100	40	120	150	Tanner Crab	300
124	4-24	8			35	130	32	17	100	Tanner Crab	300
125	4-24	8			35	90	385	300			
126	4-26	1	55-163-F-3		32	80	212	311			
127	4-26	1	55-163-F-3		34	110	208	298			
128	4-26	1	55-163-F-3		33	75	309	331			
129	4-26	1	55-163-F-3		33	75	108	168			
130	4-26	1	55-163-F-3		34	100	65	15			
131	4-26	3	55-163-D-4		35	75	105	150			
132	4-26	3	55-163		35	80	65	100			
133	4-26	3	55-163		34	80	210	150			
134	4-26	3	55-163		34	90	7				
135	4-26	3	55-163		34	70	47	20			

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
136	4-26	4	55-163-F-4	Bk S	35	80	132	130	20	Tanner Crab 200 Halibut, Under Size 1
137	4-26	4	55-163-F-4	Bk S	35	95	87	95	20	Tanner Crab 150
138	4-26	4	55-163-F-4	Bk S	34	90	135	108	100	Tanner Crab 350 Halibut, Under Size 4
139	4-26	4	55-163-F-4	Bk S	34	80	58	50	150	Tanner Crab 100 Halibut, Under Size 3 Halibut, legal 1
140	4-26	4	55-163-F-4	Bk S	35	95	80	59	50	Tanner Crab 80
141	4-26	5	55-163-D-4	Hrd S	37	90	214	160	15	
142	4-26	5	55-163-D-4	Hrd S	36	90	133	241	10	
143	4-26	5	55-163-D-4	Hrd S	35	90	261	346	10	
144	4-26	5	55-163-D-4	Hrd S	34	90	26	16	5	
145	4-26	5	55-163-D-4	Hrd S	34	100	83	106		
146	4-26	6	55-163-E-3	S	35	80	80	20	100	
147	4-26	6	55-163-E-3	S	35	90	120	50	200	
148	4-26	6	55-163-E-3	S	34	80	150	350	200	
149	4-26	6	55-163-E-3	S	34	105	175	700	100	
150	4-26	6	55-163-E-3	S	34	90	50	200	200	
151	4-26	7	55-163	S	35	90	75	50		Tanner Crab 50 Halibut, legal 1
152	4-26	7	55-163	S	34	90	250	100	75	Tanner Crab 100
153	4-26	7	55-163	S	34	90	100	300	75	Tanner Crab 50
154	4-26	7	55-163	S	34	90	200	100	50	Tanner Crab 50
155	4-26	7	55-163	S	34	60	83	125	50	Tanner Crab 50
156	4-26	8	55-163		35	105	222	360	20	Tanner Crab 300 Halibut, legal 1
157	4-26	8			34	90	205	857	20	Tanner Crab 2000 Halibut, Under Size 1 Halibut, legal 1

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
158	4-26	8			34	120	173	300		Tanner Crab 200 Korean Crab 1000 Halibut, Under Size 1
159	4-27	1	55-164-A-3		34	90	104	104		Halibut, legal 1
160	4-27	1	55-164-A-3		36	90	56	24		Halibut, legal 1
161	4-27	1	55-164-A-3		33	80	304	450		Halibut, legal 2
162	4-27	1	55-164-A-3		32	100	204	98		
163	4-27	1	55-164-A-3		32		275	275		
164	4-27	3	55-163-D-4		35	120	114	92	700	Halibut, Under Size 1
165	4-27	3	55-163-D-4		35	90	79	112		
166	4-27	3	55-163-F-4		34	100	90	120		
167	4-27	3	55-163-F-4		32	60	4	3		
168	4-27	4	55-163-E-4	Gy S	30	105	39	47		Tanner Crab 30
169	4-27	4	55-163-A-4	Gy S	34	95	114	97		
170	4-27	4	55-163-A-4	Gy S	34	65	137	248	200	
171	4-27	4	55-163-A-4	Gy S	34	125	117	205	150	Tanner Crab 300
172	4-27	4	55-163-A-4	Gy S	32	77	87	150	250	Tanner Crab 200
173	4-27	5	55-163-D-4	Hrd S	37	90	135	562	15	
174	4-27	5	55-163-D-4	Hrd S	35	90	84	111	20	
175	4-27	5	55-163-D-4	Hrd S	28	90	21	6	200	Halibut, Under Size 1
176	4-27	5	55-163-D-4	Hrd S	30	90	62	36	150	
177	4-27	6	56-165-A-6	S	33	90	40	10	100	
178	4-27	6	56-165-A-6	S	28	90	35	35	500	
179	4-27	6	56-165-A-6	S	31	95	116	200	50	
180	4-27	6	56-165-A-6	S	31	90	125	200		
181	4-27	7	55-163	G S	35	95	71	10	125	
182	4-27	7	55-163	G S	30	90	350	300	450	Gray Cod 150
183	4-27	7	55-163	S	31	90	250	250	450	Gray Cod 150
184	4-27	7	55-163	S	29	90	72	72	450	Gray Cod 150

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
185	4-27	8	55-163		35	150	177	450	20	Tanner Crab 1000 Korean Crab 3000 Halibut, Under Size 1
186	4-27	8	55-163		35	225	300	600		Tanner Crab 300 Korean Crab 300
187	4-27	8	55-163		33	215	200	1000	20	
188	4-28	8	55-163		35	240	100	100		Korean Crab 500
189	4-28	8	55-163		34	160	125	300		Tanner Crab 500
190	4-28	8	55-163		34	120	150	150	10	Tanner Crab 500 Halibut, Under Size 1
191	4-28	1	55-164-B-3		30	100	34	4		
192	4-28	1	55-164-B-3		30	120	76	7		
193	4-28	1	55-164		32	120	229	52		
194	4-28	1	55-164		34	120	236	98		
195	4-28	3	55-163-D-4		31	120	12	10	150	
196	4-28	3	55-163-D-4		32	100	135	100	200	
197	4-28	3	55-163-D-4		34	120	192	300	250	Halibut, legal 1
198	4-28	3	55-163-D-4		35	120	206	300	100	
199	4-28	3	55-163-D-4		35	75	84	115	100	
200	4-28	4	55-163-E-4	Gy S	36	123	45	20	320	Tanner Crab 200 Halibut, Under Size 4
201	4-28	4	55-163-E-4	Bk S	37	90	163	47	2050	Tanner Crab 100 Halibut, Under Size 2 Halibut, legal 1 Gray Cod 50
202	4-28	4	55-163-D-4	Bk S	36	90	115	82	3100	Tanner Crab 100 Gray Cod 50
203	4-28	5	55-163-D-4	Hrd S	37	105	108	106	200	
204	4-28	5	55-163-D-4	Hrd S	38	105	45	60	100	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
205	4-28	5	55-163-D-4	Hrd S	37	90	86	163	150		
206	4-28	5	55-163-D-4	Hrd S	37	90	175	80			
207	4-28	5	55-163-D-4	Hrd S	36	65	111	300	100		
208	4-28	5	55-163-D-4	Hrd S	37	90	51	230	150		
209	4-28	6	55-163-F-2	S	32	90	47	10			
210	4-28	6	55-163-F-2	S	36	110	250	1000			
211	4-28	6	55-163-F-2	S	36	85	100	300			
212	4-28	6	55-163-F-2	S	36	95	110	150			
213	4-28	7	55-163	S	32	80	75	75	600		
214	4-28	7	55-163	S	28	90	75	75	850		
215	4-28	7	55-163	S	32	90	75	150	450	Gray Cod	300
216	5-2	3	56-161-E-5		32	60	1		1500		
217	5-2	3	56-161-E-5		33	70	5	8	1000		
218	5-2	3	56-161-B-5		31	85	31	20	1000		
219	5-2	3	56-161-A-5		31	95	39	23	1600		
220	5-2	4	56-160-A-5	Gy S	28	58			600		
221	5-2	5	55-163-D-4	Hrd S	32	105	5	4	1500		
222	5-2	5	55-163-D-4	Hrd S	34	60	19	1	1500		
223	5-2	5	55-163-D-4	Hrd S	36	75	26	1	100		
224	5-2	5	55-163-D-4	Hrd S	33	90	80	6	150		
225	5-2	7	55-163		32	90	68	50	150		
226	5-2	7	55-163	S	35	75	148	100	275		
227	5-2	7	55-163	S & G	25	90	150	500	1100		
228	5-2	7	55-163	S & G	30	60			3500		
229	5-3	3	55-162-C-2		32	75	25	30	200		
230	5-3	3	55-162-A-2		33	85	25	25			
231	5-3	4	55-162-F-1	S & G	31	95	10		500		
232	5-3	4	55-162-C-3	S	35	110	115	83	100	Halibut, legal	2

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
233	5-3	5	55-163-D-4	Hrd S	31	60	35	12	300	
234	5-3	5	55-163-D-4	Hrd S	36	125	31	10	150	
235	5-4	1	55-164-B-3		32	110	505	475	100	
236	5-4	3	55-163-D-4		32	105	52	20		Halibut, Under Size 4
237	5-4	3	55-163-D-4		36	120	90	40	500	
238	5-4	3	55-163-D-4		35	70	156	200	500	Halibut, Under Size 8
239	5-4	3	55-163-D-4		35	100	142	250		
240	5-4	4	55-163-B-4	S	33	85	153	300	100	Halibut, Under Size 2
241	5-4	4	55-163-A-3	S	35	90	43	30	250	Halibut, Under Size 4
242	5-4	4	55-163-A-4	S	32	90	17	15	100	Halibut, Under Size 5
243	5-4	4	55-163-B-4	S	33	105	212	150	200	Halibut, Under Size 3 Halibut, legal 2
244	5-4	5	55-163-D-4	Hrd S	37	90	70	21	50	
245	5-4	5	55-163-D-4	Hrd S	38	110	266	89	200	
246	5-4	5	55-163-D-4	Hrd S	37	110	256	282	100	
247	5-4	5	55-163-D-4	Hrd S	37	120	169	143	150	
248	5-4	5	55-163-D-4	Hrd S	37	90	149	114	200	
249	5-4	7	55-163	M	30	90	25			Halibut, legal 1
250	5-4	7	55-163	M	35	60	135	100	700	Halibut, legal 1
251	5-4	7	55-163	M	35	90	175	175	800	Halibut, legal 1
252	5-4	7	55-163	M	35	60	1000	2000	800	
253	5-4	8	55-163		34	105	125	74	150	Korean Crab 500
254	5-5	1	55-164-B-3		33	105	229	281	50	
255	5-5	1	55-164		32	90	155	98	200	
256	5-5	1	55-164		35	115	150	76	300	
257	5-5	1	55-164		32	75	190	65	500	
258	5-5	3	55-163-D-4		35	90	147	200	800	
259	5-5	3	55-163		36	90	124	200		Halibut, Under Size 12

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
260	5-5	3	55-163-D-4		35	95	36	40		
261	5-5	3	55-163		36	90	130	150		
262	5-5	3	55-163		36	105	145	200		
263	5-5	4	55-163-A-3	S	32	85	85	100	250	Halibut, Under Size 4
264	5-5	4	55-163-A-3	S	35	95	48	25	300	Halibut, Under Size 6 Halibut, legal 1
265	5-5	4	55-163-A-3	S	32	90	160	275	200	Halibut, Under Size 5 Halibut, legal 1
266	5-5	4	55-163-A-3	S	33	90	112	150	300	
267	5-5	4	55-163-A-3	S	34	120	183	102	850	Halibut, Under Size 3 Halibut, legal 1
268	5-5	5	55-163-D-4	Hrd S	38	105	84	34	15	
269	5-5	5	55-163-D-4	Hrd S	38	105	146	260	100	
270	5-5	5	55-163-D-4	Hrd S	37	105	132	180	300	
271	5-5	5	55-163-D-4	Hrd S	37	105	209	206	100	
272	5-5	5	55-163-D-4	Hrd S	37	90	184	80	200	
273	5-5	7	55-163	S	35	75	200	500	50	
274	5-5	7	55-163	S	35	80	300	500	150	
275	5-6	1	55-163-E-3		47	95	34		10000	Gray Cod 800
276	5-6	1	55-163		50	120	22		6000	Gray Cod 200
277	5-6	1	55-163				148			
278	5-6	3	55-163-D-4		35	100	270	150	100	Halibut, Under Size 100
279	5-6	3	55-163		36	85	184	200	300	Halibut, Under Size 100
280	5-6	3	55-163		36	100	145	180	500	
281	5-6	3	55-163		36	90	118	105		
282	5-6	3	55-163		36	95	170	200		
283	5-6	4	55-163-A-3	S	35	105	53	40	3000	Halibut, Under Size 6 Korean Crab 500

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
284	5-6	4	55-163-A-3	S	36	105	450	180	300	Halibut, Under Size 3 Korean Crab 1000
285	5-6	4	55-163-A-3	S	36	100	266	90	300	Halibut, Under Size 11 Korean Crab 1000
286	5-6	4	55-163-A-3	S	36	95	268	60	400	Halibut, Under Size 6 Korean Crab 800
287	5-6	5		Hrd S	37	105	226	306	300	
288	5-6	5		Hrd S	37	105	250	280	500	
289	5-6	5		Hrd S	37	105	246	360	300	
290	5-6	5		Hrd S	38	105	111	180	50	
291	5-6	5		Hrd S	38	110	415	280	450	
292	5-6	7	55-163	S	35	95	299	50	150	Tanner Crab 50 Halibut, legal 3
293	5-6	7	55-163	S	35	90	300	100	350	Tanner Crab 50 Halibut, legal 3
294	5-6	7	55-163	S	35	90	150	200	300	Tanner Crab 50 Halibut, legal 2
295	5-6	7	55-163	S	35	90	200	200	350	Tanner Crab 500 Halibut, legal 2
296	5-6	7	55-163	S	35	60	200	200	350	Tanner Crab 500 Halibut, legal 2
297	5-7	1	55-163-F-3		35	110	69	17	800	Halibut, legal 1
298	5-7	1	55-163		36	115	215	30	500	Korean Crab 4000
299	5-7	3	55-163-D-4		36	90	115	70	500	
300	5-7	3	55-163		37	90	137	150	400	
301	5-7	3	55-163		37	75	76	30	400	
302	5-7	4	55-163-F-3	S	36	105	252	130	500	Korean Crab 800 Halibut, Under Size 6 Halibut, legal 2

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
303	5-7	4	55-163-F-3	S	37	120	276	120	500	Korean Crab	800
										Halibut, Under Size	2
										Halibut, legal	2
304	5-7	4	55-163-F-3	S	37	75	137	350	200	Halibut, Under Size	2
										Halibut, legal	1
305	5-7	7	55-163	S	35	60	200	50	350	Tanner Crab	50
										Halibut, legal	1
306	5-7	7	55-163	S	35	90	200	50	350	Tanner Crab	50
										Halibut, legal	2
307	5-7	7	55-163	S	35	90	406	150	350	Tanner Crab	50
										Halibut, legal	3
308	5-7	8	55-163		36	150	150	150	500	Korean Crab	2000
										Halibut, legal	1
										Tanner Crab	500
										Soft Shell Crab	5
309	5-7	8	55-163		36	90	150	25	400	Korean Crab	500
										Tanner Crab	200
310	5-9	4	55-163-E-4	S	35	95	31	20	300	Tanner Crab	100
										Halibut, Under Size	1
										Gray Cod	150
311	5-9	4	55-163-E-4	S	34	130	28	14	150	Tanner Crab	40
										Halibut, legal	1
										Gray Cod	50
312	5-9	4	55-163-E-4	S	32	75	35	12	500	Tanner Crab	125
										Halibut, legal	1
										Gray Cod	50
313	5-9	5	55-163-D-4	Hrd S	36	80	38	30			
314	5-10	1	55-163-F-3		33	120	150	210	200	Korean Crab	3000
										Halibut, Under Size	7

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
315	5-10	1	55-163-F-3		34	120	190	300	300	Halibut, Under Size 11 Halibut, legal 2 Korean Crab 1000
316	5-10	1	55-163-F-3		33	90	150	30	100	Tanner Crab 200
317	5-10	1	55-163-F-3		34	105	135	110		Halibut, Under Size 3 Halibut, legal 1 Korean Crab 400
318	5-10	3			34	90	55	150	1200	
319	5-10	3			35	120	75	100	1000	
320	5-10	3			35	105	117	150	800	
321	5-10	3			35	90	99	80	2000	
322	5-10	4	55-162-A-3	S	35	120	39	18	50	
323	5-10	5	55-163-D-4	Hrd S	37	110	22	6	150	
324	5-10	5	55-163-D-4	Hrd S	36	60	80	46	50	
325	5-10	5	55-163-D-4	Hrd S	37	100	46	42	100	
326	5-10	5	55-163-D-4	Hrd S	35	100	126	102	500	
327	5-10	5	55-163-D-4	Hrd S	36	95	105	127	300	
328	5-10	7	55-163	S	34	90	100	100	150	Halibut, legal 1 Tanner Crab 500
329	5-10	7	55-163	S	34	150	100	1000	400	Halibut, legal 1 Tanner Crab 500
330	5-10	7	55-163	S	34	60	150	700	400	Tanner Crab 500 Halibut, legal 1
331	5-10	7	55-163	S	34	65	150	200	400	Halibut, legal 1 Tanner Crab 500
332	5-10	7	55-163	S	34	60	384	600	1500	Halibut, legal 1 Tanner Crab 50
333	5-10	8	55-163		35	80	72	70	300	Halibut, Under Size 1 Korean Crab 100 Tanner Crab 100

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
334	5-10	8	55-163		34	75	35	35	10		
335	5-10	8	55-163		33	110	65	50			
336	5-11	1	55-163-F-3		34	75	77	17	100	Tanner Crab	300
										Halibut, Under Size	1
337	5-11	1	55-164-B-3		30	90	346	55	200	Tanner Crab	50
										Halibut, Under Size	2
338	5-11	1	55-164-B-3		30	105	383	850	40	Tanner Crab	300
										Korean Crab	200
339	5-11	1	55-164-B-3		28	105	250	375	300	Tanner Crab	200
340	5-11	3	55-163-F-2		31	90	135	250	345		
341	5-11	3	55-163-F-2		31	90	170	300	355		
342	5-11	3	55-163-F-2		30	95	221	500	380		
343	5-11	3	55-163-F-2		31	110	170	300	350		
344	5-11	3	55-163-F-2		31	90	202	300	370		
345	5-11	4	55-162-A-3	S	30	90	362	628	100	Halibut, Under Size	1
										Tanner Crab	150
346	5-11	4	55-162-A-3	S	31	100	403	768	400	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	125
347	5-11	4	55-162-A-3	S	31	105	235	580	200	Halibut, Under Size	1
										Halibut, legal	1
348	5-11	4	55-162-A-3	S	31	95	410	750	150	Tanner Crab	200
										Halibut, Under Size	2
										Halibut, legal	1
349	5-11	5	55-163-D-4	Hrd S	30	105	167	204	50	Tanner Crab	150
350	5-11	5	55-163-D-4	Hrd S	31	105	173	103	100		
351	5-11	5	55-163-D-4	Hrd S	32	90	181	184	100		
352	5-11	5	55-163-D-4	Hrd S	33	105	114	300	75		
353	5-11	5	55-163-D-4	Hrd S	30	105	115	165	125		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
354	5-11	7	55-163	M	30	90	200	200	650	Halibut, legal	2
355	5-11	7	55-163	M	35	90	200	200	350	Halibut, legal	2
356	5-11	7	55-163	M	35	90	250	500	700	Halibut, legal	2
357	5-11	7	55-163	M	33	90	471	1000	1250	Halibut, legal	2
358	5-11	8	55-163		33	80	116	100	10	Halibut, legal	1
										Korean Crab	50
359	5-11	8	55-163		32	85	100	75		Korean Crab	25
360	5-11	8	55-163		34	90	114	35	800	Halibut, legal	1
361	5-11	8	55-163		31	90	230	200	100	Tanner Crab	200
										Korean Crab	50
362	5-11	8	55-163		30	90	197	450	100	Tanner Crab	50
363	5-11	8	55-163		30	110	400	1000	100	Soft Shell Crab	100
364	5-12	1	55-163-D-2		45	65	21	4	6000	Halibut, Under Size	5
										Halibut, legal	2
										Tanner Crab	200
										Gray Cod	500
365	5-12	1	55-163-D-2		46	75	25	7	4000	Halibut, Under Size	2
										Gray Cod	100
366	5-12	1	55-163-D-2		47	80	24	1	5000	Halibut, Under Size	13
										Gray Cod	600
367	5-12	1	55-163-D-2		45	85	35	3	6000	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	300
										Gray Cod	800
368	5-12	1	55-163-D-2		43		100	1	8000	Halibut, Under Size	13
										Tanner Crab	200
										Gray Cod	700
369	5-12	3	55-163-F-2		32	90	265	250	450		
370	5-12	3	55-163-F-2		32	100	335	500	425		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
371	5-12	3	55-163-F-2		32	90	167	200	475	
372	5-12	3	55-163-F-2		33		254	500	450	
373	5-12	4	55-162-A-3	S	32	105	543	850	100	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 100
374	5-12	4	55-162-A-3	S	32	90	385	650	150	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 130
375	5-12	4	55-162-A-3	S	32	110	291	720	75	Halibut, legal 2 Tanner Crab 150
376	5-12	4	55-162-A-3	S	31	100	301	580	150	Halibut, legal 2 Tanner Crab 190
377	5-12	5	55-163-D-4	S	34	105	407	622	50	
378	5-12	5	55-163-D-4	S	35	105	371	607	150	
379	5-12	5	55-163-D-4	S	34	95	234	871	150	
380	5-12	5	55-163-D-4	S	32	120	234	340	150	
381	5-12	6	55-163-D-2	S	45	60	75		6000	
382	5-12	6	55-163-D-2	S	45	55	60		6000	
383	5-12	6	55-163-D-2	S	45	60	40		6000	
384	5-12	6	55-163-D-2	S	45	60	35		6000	
385	5-12	7	55-163	M	33	90	300	500	650	Halibut, legal 2
386	5-12	7	55-163	M	34	75	300	500	600	Halibut, legal 1
387	5-12	7	55-163	M	35	75	300	1000	200	
388	5-12	7	55-163	M	32	75	300	500	150	Halibut, legal 1
389	5-12	7	55-163	M	33	75	346	500	200	Halibut, legal 2
390	5-12	8	55-163		30	90	280	300		Halibut, legal 1
391	5-12	8	55-163		30	90	245	400		Soft Shell Crab* 50
392	5-13	3	55-163-F-2		33	90	125	75	700	
393	5-13	3	55-163-F-2		32	90	144	125	300	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
394	5-13	3	55-163-F-2		34	90	195	300	200		
395	5-13	3	55-163-F-2		34	90	268	400	300		
396	5-13	3	55-163-F-2		34	80	190	300	100		
397	5-13	4	55-162-A-3	S	32	105	332	405	250	Halibut, Under Size	1
										Halibut, legal	3
										Tanner Crab	250
398	5-13	4	55-162-A-3	S	31	100	290	310	150	Halibut, Under Size	2
										Halibut, legal	3
										Tanner Crab	200
399	5-13	4	55-162-A-3	S	30	120	252	350	100	Halibut, Under Size	1
										Halibut, legal	2
										Tanner Crab	100
400	5-13	4	55-162-A-3	S	34	120	305	280	200	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	150
401	5-13	7	55-163	M	35	75	300	500		Halibut, legal	1
402	5-13	7	55-163	M	35	95	660	500		Halibut, legal	1
403	5-13	7	55-163	M	34	90	88	500		Halibut, legal	1
404	5-14	1	55-164-B-3		32	80	182	175	200	Halibut, Under Size	1
405	5-14	1	55-164-B-3		34	90	400	400	200	Halibut, legal	2
406	5-14	1	55-164-B-3		34	90	375	360	100	Halibut, legal	1
407	5-14	1	55-164-B-3		30	70	282	290	50		
408	5-14	1	55-164-A-3		25	75	210	200	75	Halibut, Under Size	1
409	5-14	3	55-163-F-2		35	85	150	100			
410	5-14	3	55-163-F-2		36	95	122	70			
411	5-14	3	55-163-F-2		34	90	78	50			
412	5-14	3	55-163-F-2		33	90	113	100			
413	5-14	3	55-163-F-2		33	90	115	100			

Section A - Otter Trawl (Continued)

Drag	Date	Vessel[1]	Area[2]	Type of Bottom[3]	Depth	Time on Bottom	Male King Crab	Female King Crab	Total Flounder and Sole	Remarks	
Number		Number	Code Number		Fathoms	Minutes	Number	Number	Pounds		
414	5-14	4	55-162-A-3	S	33	105	470	453	150	Halibut, legal	1
										Tanner Crab	80
415	5-14	4	55-162-A-3	S	35	105	304	150	100	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	100
416	5-14	4	55-162-A-3	S	33	90	237	100	200	Halibut, Under Size	3
										Halibut, legal	2
										Tanner Crab	150
417	5-14	4	55-162-A-3	S	33	120	282	250	250	Halibut, Under Size	1
										Halibut, legal	2
										Tanner Crab	180
418	5-14	4	55-162-A-3	S	34	85	181	225	290	Halibut, legal	1
										Tanner Crab	250
419	5-14	7	55-163	M	35	90	270	200		Halibut, legal	1
420	5-14	7	55-163	M	35	105	300	100		Halibut, legal	2
421	5-14	7	55-163	M	35	105	400	500		Halibut, legal	1
										Tanner Crab	500
422	5-14	7	55-163	M	35	90	332	200		Halibut, legal	2
423	5-14	8	55-163		23	60	10		200		
424	5-15	8	55-163		31	88	140	50	300	Halibut, Under Size	1
										Korean Crab	25
425	5-15	8	55-163		33		108	150	400	Halibut, Under Size	4
										Korean Crab	25
426	5-15	8	55-163		36	90	300	700	300	Halibut, Under Size	4
										Tanner Crab	50
										Korean Crab	50
										Soft Shell Crab*	100
427	5-15	8	55-163		37	120	675	3000			
										25% Soft Shell Crab*	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
428	5-15	1	55-164-A-3		33	95	210	225	200	Halibut, Under Size	4
429	5-15	1	55-164-A-3		35	115	350	210	50		
430	5-15	1	55-164-A-3		35	120	854	2400			
431	5-15	3	55-163-F-2		33	120	207	350	800		
432	5-15	3	55-163-F-2		34	90	153	250	700		
433	5-15	3	55-163-F-2		35	95	247	350			
434	5-15	3	55-163-F-2		36	55	107	70			
435	5-15	4	55-162-A-3	S	33	120	331	420	200	Halibut, Under Size	3
										Halibut, legal	4
										Tanner Crab	150
436	5-15	4	55-162-A-3	S	33	120	270	380	250	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	200
437	5-15	4	55-162-A-3	S	35	80	512	750	150	Halibut, Under Size	2
										Halibut, legal	3
										Tanner Crab	130
438	5-15	4	55-162-A-3	S	37	65	790	1150	200	Halibut, Under Size	1
										Halibut, legal	2
										Tanner Crab	150
439	5-15	7	55-163	M	34	95	250	300		Halibut, legal	2
440	5-15	7	55-163	M	35	95	250	300		Tanner Crab	50
										Halibut, legal	1
441	5-15	7	55-163	M	34	90	700	500		Halibut, legal	2
										Tanner Crab	50
442	5-15	7	55-163	M	37	75	800	1000		Halibut, legal	1
										Tanner Crab	50
443	5-16	1	55-164-A-3		34	70	365	400	19	Whiting	60
										Halibut, legal	1
										Star Fish	200

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
444	5-16	1	55-164-A-3		34	70	357	370	75	Whiting	100
445	5-16	1	55-164-A-3		36	100	400	400	50	Halibut, legal	2
										Whiting	50
										Korean Crab	200
446	5-16	1	55-164-A-3		36		740	300	500	Whiting	1500
										Gray Cod	500
447	5-16	4	55-162-A-3	S	37	90	212	245	250	Halibut, Under Size	5
										Halibut, legal	2
										Tanner Crab	300
										Gray Cod	160
448	5-16	4	55-162-A-3	S	35	90	339	427	200	Halibut, Under Size	4
										Halibut, legal	1
										Tanner Crab	200
										Gray Cod	150
449	5-16	4	55-162-A-3	S	37	90	452	200	250	Halibut, Under Size	2
										Halibut, legal	3
										Tanner Crab	150
										Gray Cod	150
450	5-16	4	55-162-A-3	S	37	80	414	280	400	Halibut, Under Size	3
										Halibut, legal	2
										Tanner Crab	200
										Gray Cod	100
451	5-16	4	55-162-A-3	S	36	70	385	225	250	Halibut, Under Size	4
										Halibut, legal	2
										Tanner Crab	150
										Gray Cod	150
452	5-16	7	55-163	M	37	85	500	500		Tanner Crab	50
453	5-16	7	55-163	M	37	95	426	300		Tanner Crab	50
454	5-16	7	55-163	M	37	90	500	300		Tanner Crab	50

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
455	5-16	7	55-163	M	37	90	600	100		Tanner Crab 50
456	5-16	8	55-163		37	90	400	400	200	Halibut, Under Size 1
										Tanner Crab 100
										Gray Cod 200
457	5-16	8	55-163		37	105	570	1570		Soft Shell Crab* 200
										Gray Cod 700
458	5-17	3	55-163-F-2		36	70	257	150	500	Gray Cod 250
459	5-17	3	55-163-F-2		37	80	117	100	500	Gray Cod 250
460	5-17	3	55-163-F-2		36	90	270	200	250	Gray Cod 300
461	5-17	3	55-163-F-2		36	50	144	100	250	
462	5-17	3	55-163-F-2		36	70	175	100		
463	5-17	4		S	36	120	246	300	850	Halibut, Under Size 1
										Halibut, legal 2
										Tanner Crab 150
										Gray Cod 50
464	5-17	4		S	37	115	124	100	250	Tanner Crab 80
465	5-17	4		S	36	105	288	200	400	Tanner Crab 175
										Gray Cod 250
466	5-17	7	55-163	M	37	90	300	300		Tanner Crab 100
467	5-17	7	55-163	M	37	90	300	300		Tanner Crab 100
468	5-17	7	55-163	M	37	90	300	300		Tanner Crab 100
469	5-17	8			37	120	500	2000	500	Gray Cod 500
										Soft Shell Crab* 200
470	5-17	8			37	150	475	300	4000	Gray Cod 2000
471	5-17	8			36		400	4000	1500	Gray Cod 500
472	5-18	1	55-164-A-3		36	70	300	150	60	Halibut, Under Size 4
473	5-18	1	55-164-A-3		34	75	300	200	55	Halibut, Under Size 5
474	5-18	1	55-164-A-3		34	100	250	125		Halibut, Under Size 2
475	5-18	1	55-164-A-3		35		184	110		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
476	5-18	3	55-163-F-2		37	70	208	200	2000		
477	5-18	3	55-163-F-2		35	58	143	150			
478	5-18	3	55-163-F-2		36	70	143	150			
479	5-18	3	55-163-F-2		35	105	246	500			
480	5-18	4	55-162-A-3	S	37	85	261	180	150	Halibut, Under Size	5
										Halibut, legal	2
										Tanner Crab	100
										Gray Cod	50
481	5-18	4	55-162-A-3	S	38	90	197	158	250	Halibut, Under Size	7
										Halibut, legal	4
										Tanner Crab	150
										Gray Cod	400
482	5-18	4	55-162-A-3	S	32	105	296	280	200	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	200
										Gray Cod	150
483	5-18	4	55-162-A-3	S	32	110	221	290	250	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	150
										Gray Cod	100
484	5-18	8	55-163		31	70	100	100		Tanner Crab	50
										Halibut, Under Size	4
										Halibut, legal	1
485	5-18	8	55-163		33	105	200	300		Halibut, Under Size	5
										Korean Crab	50
486	5-18	8	55-163		34	105	278	100	400	Halibut, Under Size	10
										Korean Crab	100
487	5-20	1	55-164-A-3		31	110	175	50	50	Halibut, legal	2
488	5-20	1	55-164-A-3		27	120	575	600	60	Halibut, legal	6

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
489	5-20	1	55-164-A-3		24	60	200	600	60	
490	5-20	1	55-164-A-3		25	60	500	1800	80	Tanner Crab 2000
491	5-20	2	55-163-F-2		32	50	57	20	50	
492	5-20	2	55-163-F-3		31	75	67	25	50	
493	5-20	2	55-162		25	70	187	40	575	
494	5-20	3	55-163-F-4		35	120	162	200	200	
495	5-20	3	55-163-F-4		35	90	257	300	150	
496	5-20	3	55-163-F-4		25	70	306	800	250	
497	5-20	3	55-163-F-4		26	55	610	1000	300	
498	5-20	3	55-163-F-4		26	35	208	300	100	
499	5-20	4	55-162-B-3	S	25	110	540	980	250	Tanner Crab 150
500	5-20	4	55-162-B-3	S	24	75	492	1524	550	Tanner Crab 250
501	5-20	4	55-162-B-3	S	24	55	483	850	600	Tanner Crab 280 Halibut, Under Size 1
502	5-20	4	55-162-B-3	S	25	80	623	1240	600	Tanner Crab 250 Halibut, legal 1
503	5-20	7	55-163	M	35	90	365	50		
504	5-20	7	55-163	M	35	55	300	25		
505	5-20	7	55-163	M	25	60	400	300		
506	5-20	7	55-163	M	25	75	600	300		
507	5-20	7	55-163	M	25	60	358	300		
508	5-20	8	55-163		32	90	150	300	190	Halibut, Under Size 5 Halibut, legal 1 Tanner Crab 100 Korean Crab 100
509	5-20	8	55-163		26	90	400	500	200	Tanner Crab 300 Soft Shell Crab 100 Korean Crab 100
510	5-20	8	55-163		26	75	400	300	250	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
511	5-21	2	55-162-C-3		24	50	41	40	100		
512	5-21	2	55-162-C-2		23	75	200	100	700		
513	5-21	2	55-162-C-1		26	75	202	100	400		
514	5-21	3	55-163-F-4		25	50	367	600			
515	5-21	3	55-163-F-4		26	85	165	200			
516	5-21	3	55-163-F-4		26	60	421	1000			
517	5-21	3	55-163-F-4		26	40	250	350			
518	5-21	3	55-163-F-4		26	45	360	500			
519	5-21	4	55-162-B-3	S	25	70	520	550	150	Halibut, legal	1
										Tanner Crab	150
520	5-21	4	55-162-B-3	S	25	70	160	250	720	Halibut, Under Size	1
										Tanner Crab	450
521	5-21	4	55-162-B-3	S	25	60	514	2460	1050	Halibut, Under Size	1
										Halibut, legal	2
										Tanner Crab	290
522	5-21	4	55-162-B-3	S	24	60	264	290	600	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	150
523	5-21	7	55-163	M	25	75	297	500	600		
524	5-21	7	55-163	M	25	75	411	400	600		
525	5-21	7	55-163	M	25	75	675	1000	600		
526	5-21	7	55-163	M	25	75	800	1000	600		
527	5-21	8	55-163		24	90	724	700	200	Halibut, Under Size	3
										Tanner Crab	100
										Korean Crab	100
528	5-22	8			25	80	440	400	350	Soft Shell Crab*	400
										Star Fish	2000
529	5-22	8			26	85	700	700			
530	5-22	8			26	70	350	200			

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
531	5-22	1	55-164-A-3		26	60	700	900	50	
532	5-22	1	55-164-A-3		26	60	340	200	60	
533	5-22	1	55-164-A-3		26	60	500	2000		
534	5-22	1	55-164-A-3		26	30	500	1500		
535	5-22	2	55-162-A-2		26	65	209	900		
536	5-22	3	55-163-F-4		26	70	308	900		
537	5-22	3	55-163-F-4		26	60	364	700		
538	5-22	3	55-163-F-4		27	75	321	600		
539	5-22	3	55-163-F-4		27	60	507	700		
540	5-22	4	55-162-B-3	S	25	60	377	280	350	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 220
541	5-22	4	55-162-B-3	S	25	80	531	1560	500	Halibut, Under Size 3 Halibut, legal 2 Tanner Crab 150
542	5-22	4	55-162-B-3	S	25	55	383	980	580	Halibut, Under Size 2 Halibut, legal 4 Tanner Crab 200
543	5-22	4	55-162-B-3	S	26	60	431	1240	370	Halibut, Under Size 1 Halibut, legal 2 Tanner Crab 150
544	5-22	4	55-162-B-3	S	26	60	445	740	600	Halibut, legal 1 Tanner Crab 100
545	5-22	7	55-163	M	26	60	400	400	150	
546	5-22	7	55-163	M	26	70	200	400	250	
547	5-22	7	55-163	M	26	80	500	200	300	
548	5-22	7	55-163	M	26	75	1000	500	300	
549	5-23	1	55-164-A-3		25	70	400	700		
550	5-23	1	55-164-A-3		26	60	640	900		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
551	5-23	2	55-162-C-2		25	70	47	30	200	
552	5-23	2	55-162-B-2		26	105	494		1000	
553	5-23	3	55-163-F-4		26	45	260	500		
554	5-23	3	55-163-F-4		26	60	340	700		
555	5-23	3	55-163-F-4		26	30	276	500		
556	5-23	4	55-162-B-3	S	27	50	310	651	350	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 150
557	5-23	4	55-162-B-3	S	26	80	240	1150	440	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 100
558	5-23	4	55-162-B-3	S	25	65	239	750	400	Halibut, Under Size 1 Tanner Crab 180
559	5-23	4	55-162-B-3	S	23	40	70	180	350	Tanner Crab 200
560	5-23	8	55-163		25	75	300	300	500	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 300
561	5-23	8	55-163		27	60	300	900	500	Soft Shell Crab* 300 Star Fish 5000
562	5-24	1	55-163-E-3		32	75	200	50	30	Halibut, Under Size 6 Halibut, legal 2 Tanner Crab 1500
563	5-24	1	55-163-E-3		34	90	125	35	20	Tanner Crab 3000
564	5-24	1	55-163-E-3		32	120	150	15	25	Tanner Crab 4000
565	5-24	1	55-163-E-3		31	90	160	20	10	Halibut, Under Size 2 Halibut, legal 7 Tanner Crab 5000
566	5-24	2	55-162-C-2		26	55	96	100	500	
567	5-24	2	55-162-B-2		25	72	209	100	700	
568	5-24	2	55-162-B-2			75	47	40	800	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
569	5-24	3	55-163-F-4		26	60	271	500			
570	5-24	3	55-163-F-4		27	75	258	300			
571	5-24	3	55-163-F-4		26	60	322	700			
572	5-24	3	55-163-F-4		25	45	149	200			
573	5-24	4	55-162-A-3	S	36	75	30	100	250	Halibut, Under Size	4
										Halibut, legal	2
										Tanner Crab	100
										Gray Cod	50
574	5-24	4	55-162-B-3	S	27	60	295	400	300	Halibut, legal	1
										Tanner Crab	200
575	5-24	4	55-162-B-3	S	24	75	429	550	200	Halibut, Under Size	5
										Halibut, legal	2
										Tanner Crab	150
576	5-24	4	55-162-B-3	S	25	45	225	100	250	Halibut, Under Size	2
										Halibut, legal	4
										Tanner Crab	50
577	5-24	4	55-162-B-3	S	26	45	50	75	250	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	100
578	5-24	7	55-163	M	26	75	300	400	150		
579	5-24	7	55-163	M	26	60	400	400			
580	5-24	7	55-163	M	26	60	300	400			
581	5-24	7	55-163	M	26	60	400	40			
582	5-24	8	55-163		31	75	105	25	3250	Halibut, legal	2
										Tanner Crab	50
										Korean Crab	50
										Gray Cod	100
583	5-24	8	55-163		27	80	68	25		Star Fish	5000
584	5-24	8	55-163		33	45	2	2		Tanner Crab	300
										Star Fish	500

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
585	5-25	1	55-164-A-3		27	105	200	300	200	
586	5-25	1	55-164-A-3		26	75	400	1200	50	
587	5-25	1	55-164-A-3		26	60	500	2000	15	
588	5-25	2	55-162-C-2		26	70	280	200	600	
589	5-25	2	55-162-C-2		25	80	448	250	800	
590	5-26	1	55-164-A-3		25	70	600	1600		
591	5-26	2	55-162-B-3		26	75	267	267	500	
592	5-26	2	55-162-C-2		27	75	253	253	1200	
593	5-26	3	55-163-F-4		26	80	111	150		
594	5-26	3	55-163-F-4		26	75	179	200		
595	5-26	3	55-163-F-4		26	60	215	200		
596	5-26	3	55-163-F-4		26	90	161	200		
597	5-26	3	55-163-F-4		26	60	277	300		
598	5-26	4	55-162-B-3	S	25	75	517	480	250	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 50
599	5-26	4	55-162-B-3	S	25	55	392	380	450	Halibut, Under Size 4 Halibut, legal 1 Tanner Crab 100
600	5-26	4	55-162-B-3	S	24	75	307	450	650	Halibut, Under Size 1 Halibut, legal 2 Tanner Crab 80
601	5-26	4	55-162-B-3	S	25	65	475	680	1000	Halibut, legal 1 Tanner Crab 150
602	5-26	5	55-162-F-3	S	28	85	402	306	200	
603	5-26	5	55-162-F-3	S	27	60	125	92	150	
604	5-26	5	55-162-F-3	S	27	80	165	260	125	
605	5-26	5	55-162-F-3	S	27	90	132	106	100	
606	5-26	5	55-162-F-3	S	27	70	440	1600	200	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
607	5-26	7	55-163	M	26	75	300	500		
608	5-26	7	55-163	M	26	60	350	400		
609	5-26	7	55-163	M	26	60	350	300		
610	5-26	7	55-163	M	26	60	350	200		
611	5-26	7	55-163	M	26	60	250	100		
612	5-26	8	55-163		27	80	150	150	200	Halibut, legal 1 Tanner Crab 50 Star Fish 3000
613	5-26	8	55-163		27	80	250	150		Star Fish 2000
614	5-26	8	55-163		26	80	200	250	410	Halibut, Under Size 1
615	5-26	8	55-163		26	95	300	200	510	Star Fish 2000
616	5-26	8	55-163		27		130			
617	5-27	1	55-164-A-3		27	70	260	1500		
618	5-27	1	55-164-A-3		27	60	700	2000		
619	5-27	1	55-164-A-3		27	60	585	1500		
620	5-27	3	55-163-F-4		28	90	187	300	1000	
621	5-27	3	55-163-F-4		28	70	441	900		
622	5-27	3	55-163-F-4		27	60	285	800		
623	5-27	3	55-163-F-4		27	45	278	500		
624	5-27	3	55-163-F-4		26	30	118	150		
625	5-27	4	55-162-C-3	S	26	55	432	1150	300	Halibut, legal 1 Tanner Crab 100
626	5-27	4	55-162-C-3	S	25	70	368	850	400	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 80
627	5-27	4	55-162-C-3	S	25	70	163	150	450	Halibut, legal 2 Tanner Crab 1200
628	5-27	5	55-162-F-2	S	26	80	144	208	100	
629	5-27	5	55-162-F-2	S	25	60	404	360	200	

Section A - Otter Trawl (Continued)

Drag	Date	Vessel[1]	Area[2]	Type of Bottom[3]	Depth	Time on Bottom	Male King Crab	Female King Crab	Total Flounder and Sole	Remarks
Number		Number	Code Number		Fathoms	Minutes	Number	Number	Pounds	
630	5-27	5	55-162-F-2	S	25	60	201	436	200	
631	5-27	7	55-163	M	27	75	506	200	700	
632	5-27	7	55-163	M	27	60	750	100	700	
633	5-27	7	55-163	M	27	60	750	100	600	
634	5-27	8	55-163		28	60	250	400		Soft Shell Crab* 200 Halibut, legal 1
635	5-27	8	55-163		27	60	340	300	350	Soft Shell Crab* 100 Star Fish 2000
636	5-28	2	56-160-A-4	S	23	75	12	24	2500	Halibut, Under Size 10 Halibut, legal 1
637	5-30	1	55-164-A-3		27	90	200	800		Halibut, legal 1
638	5-30	1	55-164-A-3		26	85	827	1700		Halibut, Under Size 2
639	5-30	1	55-164-A-3		28	80	240	600		
640	5-30	2	55-162-D-2		25	50	37	30		
641	5-30	2	55-162-C-2		25	55	377	400	200	
642	5-30	2	55-162-C-2		24	75	358	200		
643	5-30	3	55-163-F-4		27	90	98	150		
644	5-30	3	55-163-F-4		27	60	168	200		
645	5-30	3	55-163-F-4		27	80	152	200		
646	5-30	3	55-163-F-4		27	75	539	300		
647	5-30	4	55-162-C-3	S	26	75	374	310	1500	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 50
648	5-30	4	55-162-C-3	S	27	90	159	100	1000	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 20
649	5-30	4	55-162-C-3	S	25	90	380	350	1500	Halibut, Under Size 1 Tanner Crab 100
650	5-30	4	55-162-C-3	S	26	65	369	150	1200	Halibut, Under Size 3 Halibut, legal 1 Tanner Crab 150

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
651	5-30	4	55-162-C-3	S	26	70	318	420	2000	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 100
652	5-30	4	55-162-C-3	S	26	50	4	7	100	
653	5-30	5	55-162-F-2	S	25	80	85	60		
654	5-30	5	55-162-F-2	S	25	60	167	230		
655	5-30	7	55-163	M	35	60	300	200	1000	
656	5-30	7	55-163	M	35	75	500	50	1000	
657	5-30	7	55-163	M	35	80	200		1000	
658	5-30	7	55-163	M	35	90	871	50	1000	
659	5-30	8			27	70	75	75	150	Tanner Crab 50 Soft Shell Crab* 25 Star Fish 1000
660	5-30	8			27	75	270	50	600	Soft Shell Crab* 100 Dead Soft Shell* 270
661	5-30	8			26	112	683	400	1000	Soft Shell Crab* 500 Star Fish 1000
662	5-31	2	55-162-D-2		24	55	250	200	700	
663	5-31	2	55-162-C-2		24	75	712	350	70	
664	5-31	2	55-162-C-2		25	75	291	300		
665	5-31	2	55-162-C-2		27	65	203	200	1000	
666	5-31	3	55-163-F-4		28	80	335	700		
667	5-31	3	55-163-F-4		28	90	736	900		
668	5-31	3	55-163-F-4		28	90	730	900		
669	5-31	5	55-162-F-2	S	27	90	360	500		
670	5-31	5	55-162-F-2	S	25	75	427	620		
671	5-31	5	55-162-F-2	S	27	80	353	710		
672	5-31	5	55-162-F-2	S	25	65	220	400		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
673	5-31	7	55-163	M	30	60	300	200	500	
674	5-31	7	55-163	M	33	90	300	100	700	
675	5-31	7	55-163	M	27	60	300	50	900	
676	5-31	7	55-163	M	27	90	700	50	900	
677	5-31	7	55-163	M	27	60	712	50	1000	
678	5-31	8	55-163		26	60	100	100	100	Soft Shell Crab* 25
679	5-31	8	55-163		28	65	350	400	100	Soft Shell Crab* 100 Star Fish 1000
680	5-31	8	55-163		27		400	600	1000	Soft Shell Crab* 300 Star Fish 500
681	5-31	8	55-163		27	50	300	300		Soft Shell Crab* 150
682	6-1	1	55-164-A-3		26	60	160	300		
683	6-1	1	55-164-A-3		28	60	2460	1000		
684	6-1	2	55-162-C-2		28	75	436	400	500	
685	6-1	2	55-162-C-2		28	55	1684	500	500	
686	6-1	3	55-163-F-4		28	90	152	200		
687	6-1	3	55-163-F-4		27	65	223	300		
688	6-1	3	55-163-F-4		30	50	382	600		
689	6-1	3	55-163-F-4		29	65	1600	900		
690	6-1	4	55-162-C-3	S	25	60	350	220	100	Halibut, legal 1 Tanner Crab 150
691	6-1	4	55-162-C-3	S	28	50	1075	520	400	Halibut, Under Size 1 Tanner Crab 100
692	6-1	4	55-162-C-3	S	29	60	1650	350	1000	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 100
693	6-1	5	55-162-F-2	S	25	70	183	106		
694	6-1	5	55-162-F-2	S	24	60	222	220		
695	6-1	5	55-162-F-2	S	27	60	381	164		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
696	6-1	5	55-162-F-2	S	28	60	231	180			
697	6-1	5	55-162-F-2	S	27	60	458	600			
698	6-1	8	55-163		27	70	150	100		Soft Shell Crab*	100
699	6-1	8	55-163		28	55	1200	1500		Soft Shell Crab*	750
700	6-2	1	55-164-A-3		29	40	300	300		Halibut, legal	2
701	6-2	1	55-164-A-3		28	55	920	900			
702	6-2	2	55-162-C-2		27	75	500	400	200		
703	6-2	2	55-162-C-2		28	55	985	600	100		
704	6-2	2	55-162-C-2		28	70	168	300	300		
705	6-2	2	55-162-C-2		28	75	634	500			
706	6-2	3	55-163-F-4		30	45	918	2000			
707	6-2	3	55-163-F-4		29	50	686	1000			
708	6-2	3	55-163-F-4		30	55	841	1000			
709	6-2	4	55-162-C-3	S	28	45	1850	950	300	Halibut, Under Size	1
										Tanner Crab	50
710	6-2	4	55-162-C-3	S	28	45	700	450	200	Tanner Crab	100
711	6-2	4	55-162-C-3	S	28	45	1200	300	100	Halibut, legal	1
										Tanner Crab	100
712	6-2	5	55-162-F-2	S	26	60	786	200			
713	6-2	5	55-162-F-2	S	27	65	826	400			
714	6-2	5	55-162-F-2	S	27	55	834	300			
715	6-2	7	55-163	M	27	60	2100	300	1000		
716	6-2	7	55-163	M	27	60	1000		1500		
717	6-2	7	55-163	M	27	60	2068	100	1500		
718	6-2	8	55-163		28	80	1020	1000		Soft Shell Crab*	600
719	6-2	8	55-163		28	55	1357	500		Soft Shell Crab*	250
720	6-2	8	55-163		29	70	1550	1000	100	Soft Shell Crab*	500
721	6-3	1	55-164-C-3		28	65	700	600	50		
722	6-3	1	55-164-C-3		28	50	1300	1000	30		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
723	6-3	2	55-162-C-2		29	70	965	1000		
724	6-3	2	55-162-C-2		27	65	630	300		
725	6-3	3	55-163-F-4		29	90	478	800		
726	6-3	3	55-163-F-4		30	85	893	1000		
727	6-3	3	55-163-F-4		29	65	800	1000		
728	6-3	4	55-162-C-3	S	28	50	800	350	750	Halibut, Under Size 1 Tanner Crab 150
729	6-3	4	55-162-C-3	S	28	55	1070	430	450	Halibut, Under Size 1 Tanner Crab 70
730	6-3	5	55-162-F-2	S	27	80	498	210	200	
731	6-3	5	55-162-F-2	S	27	60	282	160	100	
732	6-3	5	55-162-F-2	S	27	65	1166	800	600	
733	6-3	7	55-163	M	27	60	1000		1200	
734	6-3	7	55-163	M	27	60	800		800	
735	6-4	8	55-162		29	70	703	700	120	Soft Shell Crab* 507 Star Fish 500
736	6-4	8	55-162		29	90	747	700	1100	Soft Shell Crab* 350
737	6-5	4	55-162-C-3	S	27	35	487	80	600	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 50
738	6-5	4	55-162-C-3	S	29	55	227	150	800	Halibut, Under Size 1 Tanner Crab 100
739	6-5	4	55-162-C-3	S	26	50	462	175	500	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 150
740	6-5	4	55-162-C-3	S	28	40	647	350	500	Halibut, Under Size 1 Tanner Crab 75
741	6-5	5	55-162-F-2	S	27	75	151	70	1000	Gray Cod 100

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
742	6-5	5	55-162-F-2	S	27	75	525	900	250	Whiting	100
743	6-5	5	55-162-F-2	S	26	75	889	600	100	Whiting	50
744	6-5	7	55-163	M	27	70	900	800			
745	6-5	7	55-163	M	27	70	600	100			
746	6-5	7	55-163	M	27	70	1000	50			
747	6-5	7	55-163	M	27	60	1000	75			
748	6-6	2	55-162-C-2		27	50	416	300			
749	6-7	2	55-162-C-2		27	75	460	300			
750	6-7	2	55-162-C-2		26	70	370	250			
751	6-7	2	55-162-C-2		28	75	330	250			
752	6-7	3	55-163-B-3		28	60	545	1000			
753	6-7	3	55-163-B-3		28	70	817	1000			
754	6-7	3	55-163-B-3		28	70	153	200			
755	6-7	3	55-163-B-3		29	65	256	300			
756	6-7	3	55-163-B-3		30	60	335	500			
757	6-7	4	55-162-C-3	S	26	60	805	200	500	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	150
758	6-7	4	55-162-C-3	S	27	50	342	50	250	Halibut, Under Size	1
										Tanner Crab	80
759	6-7	4	55-162-C-3	S	28	60	204	150	300	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	150
760	6-7	4	55-162-C-3	S	27	60	150	50	250	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	100
761	6-7	5	55-162-F-2	S	27	65	403	200	300		
762	6-7	5	55-162-F-2	S	26	60	310	160	100		
763	6-7	5	55-162-F-2	S	27	75	117	200	400		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
764	6-7	5	55-162-F-2	S	27	85	450	300	50	
765	6-7	5	55-162-F-2	S	27	75	349	400	100	
766	6-7	7	55-163	M	27	60	850	100		
767	6-7	7	55-163	M	27	60	500	50		
768	6-7	7	55-163	M	27	60	700	100		
769	6-7	7	55-163	M	27	60	800	150		
770	6-7	7	55-163	M	27	60	800	200		
771	6-7	8	55-162		28	70	855	873	360	Halibut, Under Size 1 Halibut, legal 2 Soft Shell Crab* 435
772	6-7	8	55-162		27	90	655	800	150	Soft Shell Crab* 400
773	6-7	8	55-162		26	90	440	400	300	Halibut, legal 1 Soft Shell Crab* 200
774	6-8	3	55-163-B-3		29	65	375	500		
775	6-8	3	55-163-B-3		28	70	420	600		
776	6-8	3	55-163-B-3		28	75	296	500		
777	6-8	3	55-163-B-3		28	70	225	400		
778	6-8	3	55-163-B-3		29	90	377	500		
779	6-8	4	55-162-C-2	S	29	55	30	10	800	Halibut, Under Size 2 Halibut, legal 3 Tanner Crab 100 Korean Crab 200
780	6-8	4	55-162-C-2	S	26	55	417	95	600	Halibut, Under Size 4 Halibut, legal 2 Tanner Crab 100
781	6-8	4	55-162-C-3	S	27	55	127	70	200	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 100
782	6-8	4	55-162-C-2	S	28	50	200	100	450	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 500

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
783	6-8	5	55-162-F-2	S	28	70	515	300	500		
784	6-8	5	55-162-F-2	S	28	70	279	500	200		
785	6-8	5	55-162-F-2	S	27	70	340	600	1000		
786	6-8	5	55-162-F-2	S	28	60	351	600	600		
787	6-8	8			27	75	688	700	250	Soft Shell Crab*	350
										Halibut, legal	1
										Tanner Crab	500
788	6-8	8			30	80	324	500	2300	Halibut, legal	1
										Soft Shell Crab*	250
										Gray Cod	50
789	6-8	8			27	60	300	400		Soft Shell Crab*	509
790	6-8	8				50	700	800	100	Soft Shell Crab*	400
										Halibut, legal	3
791	6-11	3	55-163-B-3		28	90	155	200			
792	6-11	3	55-163-B-3		28	80	37	50			
793	6-11	3	55-163-B-3		29	90	186	200			
794	6-11	4	55-162-C-3	S	26	65	68	45	400	Halibut, Under Size	2
										Halibut, legal	1
										Tanner Crab	300
795	6-11	4	55-162-C-3	S	32	80	32	12	500	Halibut, Under Size	2
										Whiting	300
										Tanner Crab	26
796	6-11	4	55-162-C-2	S	27	80	217	60	1500	Halibut, Under Size	1
										Halibut, legal	1
										Whiting	300
797	6-11	5	55-162-F-2	S	27	85	56	20	300		
798	6-11	5	55-162-F-2	S	28	75	74	102	400		
799	6-11	7	56-162-D-2	S	20	60	70	50			

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
800	6-11	7	56-162-D-2	M	27	90	200	50		
801	6-11	7	56-162-D-2	M	30	90	200	50		
802	6-12	3	55-163-B-3		28	75	519	1000		
803	6-12	3	55-163-B-3		28	75	405	1000		
804	6-12	3	55-163-B-3		25	60	175	300		
805	6-12	3	55-163-B-3		28	60	500	1000		
806	6-12	4	55-162-F-1	S	25	65	97	15	400	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 50 Whiting 500
807	6-12	4	55-161-A-6	S	29	75	50	14	200	Halibut, Under Size 5 Halibut, legal 3 Whiting 1000
808	6-12	4	55-162-D-2	S	25	65	350	400	300	Halibut, Under Size 3 Halibut, legal 1 Tanner Crab 100 Whiting 500
809	6-12	5	55-162-F-2	S	28	75	38	38	100	
810	6-12	5	55-162-F-2	S	29	60	59	160	150	
811	6-12	5	55-162-F-2	S	26	75	400	200	300	
812	6-13	3	55-163-B-3		29	60	174	200	500	Gray Cod 500
813	6-13	3	55-163-B-3		29	90	600	1000		
814	6-13	3	55-163-B-3		26	60	778	1000		
815	6-13	3	55-163-B-3		27	100	625	1000		
816	6-13	4	55-162-D-2	S	29	80	350	80	300	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 70 Whiting 150

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
817	6-13	4	55-162-D-2	S	28	75	352	100	400	Halibut, Under Size 1 Tanner Crab 100 Whiting 50
818	6-13	4	55-162-D-2	S	26	80	905	350	500	Halibut, Under Size 1 Halibut, legal 2 Tanner Crab 100 Soft Shell Crab* 175
819	6-13	4	55-162-D-2	S	26	55	483	150	200	Halibut, Under Size 4 Halibut, legal 1 Tanner Crab 80
820	6-13	4	55-162-D-2	S	26	55	340	85	800	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 50
821	6-13	5	55-162-F-2	S	29	80	215	160	400	
822	6-13	5	55-162-F-2	S	28	80	253	500	900	
823	6-13	5	55-162-F-2	S	25	90	585	600	600	
824	6-13	7		S & G	30	90	700	300		
825	6-13	7		S & G	30	60	1000	300		
826	6-13	7		S & G	27	90	1000	300		
827	6-13	8			26	90	900	600	100	Halibut, Under Size 2 Halibut, legal 2 Soft Shell Crab* 300
828	6-13	8			27	85	1065	1000	100	Halibut, Under Size 1 Halibut, legal 1 Soft Shell Crab* 500
829	6-14	3	55-163-B-3		28	80	265	400	1600	Gray Cod 1000
830	6-14	3	55-163-B-3		26	60	430	800		
831	6-14	3	55-163-B-3		29	55	200	400		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
832	6-14	3	55-163-B-3		26	75	502	800		
833	6-14	3	55-163-B-3		26	60	372	700		
834	6-14	4	55-162-D-2	S	26	85	470	150	400	Halibut, Under Size 3 Halibut, legal 1 Tanner Crab 50
835	6-14	4	55-162-D-2	S	26	85	732	300	200	Halibut, Under Size 4 Halibut, legal 2 Tanner Crab 25
836	6-14	4	55-162-D-2	S	26	90	750	280	100	Halibut, Under Size 3 Halibut, legal 1 Tanner Crab 50
837	6-14	4	55-162-D-2	S	24	100	800	320	400	Halibut, Under Size 4 Halibut, legal 1 Tanner Crab 50
838	6-14	5	55-162-F-2	S	24	85	246	164	400	Gray Cod 200
839	6-14	5	55-162-F-2	S	26	70	368	280	600	Gray Cod 60
840	6-14	5	55-162-F-2	S	25	90	15	2		
841	6-14	5	55-162-F-2	S	27	105	423	600	1500	
842	6-14	5	55-162-F-2	S	26	95	174	300	1000	
843	6-16	1	55-162-C-2		25		115	125	100	Gray Cod 100
844	6-16	3	55-163-B-3		27	70	51	100		
845	6-16	3	55-163-B-3		28	65	60	80		
846	6-16	3	55-163-B-3		27	75	281	300		
847	6-16	3	55-163-B-3		28	125	306	500		
848	6-16	4	55-162-D-2	S	26	90	201	125	1200	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 50

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
849	6-16	4	55-162-D-2	S	25	70	75	75	500	Halibut, Under Size 3 Halibut, legal 2 Tanner Crab 10 Gray Cod 50
850	6-16	4	55-162-D-2	S	27	90	300	180	350	Halibut, Under Size 4 Halibut, legal 2 Tanner Crab 100 Whiting 50
851	6-16	4	55-162-D-2	S	30	90	448	250	800	Halibut, Under Size 3 Halibut, legal 2 Tanner Crab 200 Whiting 200
852	6-16	4	55-162-D-2	S	31	90	300	200	300	Halibut, Under Size 5 Halibut, legal 2 Tanner Crab 100 Whiting 1500
853	6-16	5	55-162-F-2	S	26	85	98	30	600	Gray Cod 150
854	6-16	5	55-162-F-2	S	25	105	104	140	300	
855	6-16	5	55-162-F-2	S	26	75	129	200		
856	6-16	5	55-162-F-2	S	32	70	79	160	400	
857	6-16	5	55-162-F-2	S	28	80	239	300	200	
858	6-16	7	55-163-D-2	S & G	27	70	250	100	2000	
859	6-16	7	55-163-D-2	S & G	27	75	50	100	500	Gray Cod 500 Whiting 500
860	6-16	7	55-163-D-2	S & G	27	60	340	100	1000	Gray Cod 50 Whiting 500
861	6-16	7	55-163-D-2	S & G	27	60	440	500	2000	Gray Cod 1000 Whiting 500

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
862	6-17	1	55-162-C-2		27	90	175	200	135	Gray Cod	100
863	6-17	1	55-162-C-2		31	60	100	75	90	Gray Cod	50
864	6-17	1	55-162-C-2		27	120	271	300	50		
865	6-17	3	55-163-B-3		26	60	132	200			
866	6-17	3	55-163-B-3		30	75	107	200			
867	6-17	3	55-163-B-3		35	80	35	50			
868	6-17	3	55-163-B-3		30	45	145	150			
869	6-17	4	55-162-D-2	S	25	90	270	150	300	Halibut, Under Size	4
										Halibut, legal	1
										Tanner Crab	100
										Whiting	100
870	6-17	4	55-162-D-2	S	28	90	110	60	500	Halibut, Under Size	1
										Halibut, legal	1
871	6-17	4	55-162-D-2	S	35	85	30	3	100	Halibut, Under Size	5
										Halibut, legal	1
872	6-17	5	55-162-F-2	S	29	110	141	200	500	Gray Cod	400
										Whiting	3000
873	6-17	5	55-162-F-2	S	28	105	30	60	200	Whiting	3000
874	6-17	5	55-162-F-2	S	27	85	14	50	400	Whiting	300
875	6-17	7		S & G	27	90	130	50	1500		
876	6-17	7		S & G	30	60	130	100	1500		
877	6-17	7		S & G	30	90	100	100	1000	Gray Cod	500
878	6-17	8	55-162		27	120	165	100	350	Halibut, legal	1
										Gray Cod	1000
										Soft Shell Crab*	25
879	6-17	8	55-162		28	90	165	100	300	Halibut, legal	1
										Gray Cod	100
										Soft Shell Crab*	50

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
880	6-18	1	55-162-C-2		27	90	150	175	125	Gray Cod	100
881	6-18	1	55-162-C-2		28	90	100	50	110	Gray Cod	50
882	6-18	1	55-162-B-2		29	120	102	500	40		
883	6-18	3	55-163-B-3		30	70	179	300			
884	6-18	3	55-163-B-3		28	75	118	200			
885	6-18	3	55-163-B-3		31	80	208	400			
886	6-18	3	55-163-B-3		32	90	158	200			
887	6-18	3	55-163-B-3		31	70	100	30			
888	6-18	4	55-162-E-1	S	25	90	103	30	150	Halibut, Under Size	3
										Tanner Crab	150
889	6-18	4	55-162-E-1	S	25	65	50	30	250	Halibut, Under Size	2
										Tanner Crab	100
890	6-18	4	55-162-E-1	S	25	90	36	25	1250	Halibut, Under Size	1
										Halibut, legal	1
										Tanner Crab	50
891	6-18	4	55-162-E-1	S	29	65	40	12	350	Halibut, legal	1
892	6-18	5	55-162-F-2	S	25	75	20	40	200	Gray Cod	200
893	6-18	5	55-162-F-2	S	28	75	33	60	600	Gray Cod	300
894	6-18	5	55-162-F-2	S	25	120	10	20	1500	Gray Cod	400
895	6-18	7	55-162-D-3	S & G	30	75	400	200	600	Gray Cod	200
896	6-18	7	55-162-D-3	S & G	30	85	150	100	430	Gray Cod	200
897	6-18	7	55-162-D-3	S & G	30	90	150	100	500	Gray Cod	500
898	6-18	7	55-162-D-3	S & G	30	90	150	100	450	Gray Cod	300
899	6-18	7	55-162-D-3	S & G	30	90	150	100	500	Gray Cod	200
900	6-18	8	55-162		27	75	130	50	300	Halibut, legal	2
										Gray Cod	300
901	6-18	8	55-162		28	120	200	80	200	Halibut, legal	1
										Gray Cod	100
										Whiting	300

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
902	6-18	8	55-162		30	110	170	70		Halibut, legal 1 Gray Cod 200 Whiting 400
903	6-18	8	55-162		31	90	75	50		Gray Cod 200 Whiting 200
904	6-19	1	55-162-A-2		29	60	35	25		
905	6-19	1	55-162-A-2		29	60	28	38		
906	6-19	1	55-162-A-2		31	45	25	20		Tanner Crab 3000 Korean Crab 500
907	6-19	3	55-163-B-3		29	70	157	200		
908	6-19	3	55-163-B-3		31	90	80	150		
909	6-19	4	55-162-C-2	S	29	90	24	10	50	Halibut, Under Size 1 Tanner Crab 800
910	6-19	4	55-162-C-2	S	40	60	30	12	100	Halibut, Under Size 2 Halibut, legal 1
911	6-19	4	55-162-C-2	S	29	105	100	50	500	Halibut, legal 1
912	6-19	5	55-162-F-2	S	34	75	23	5	1000	Gray Cod 600 Whiting 200
913	6-19	5	55-162-F-2	S	35	120	10	2	1500	Gray Cod 500 Whiting 100
914	6-19	7	55-162-D-3	S & G	29	90	300	300	800	Gray Cod 500
915	6-19	7	55-162-D-3	S & G	29	90	300	300	700	Gray Cod 500
916	6-19	7	55-162-D-3	S & G	29	90	300	200	750	Gray Cod 500
917	6-19	7	55-162-D-3	S & G	29	90	300	100	800	Gray Cod 500
918	6-19	7	55-162-D-3	S & G		90	100	100	550	Gray Cod 200
919	6-20	3	55-163-B-3		29	70	80	150		
920	6-20	3	55-163-B-3		29	60	93	100		
921	6-20	3	55-163-B-3		29	70	72	100		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
922	6-20	4	55-162-D-2	S	25	90	115	25	500	Halibut, Under Size 5 Halibut, legal 3 Tanner Crab 100 Gray Cod 50 Whiting 50
923	6-20	4	55-162-D-2	S	25	90	68	35	200	Halibut, Under Size 6 Halibut, legal 1
924	6-20	4	55-162-B-3	S	25	90	75	50	350	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 100
925	6-20	4	55-162-B-3	S	27	120	50	15	450	Halibut, Under Size 2 Halibut, legal 1
926	6-20	5	55-162-F-2	S	26	90	4	1	800	Gray Cod 600 Whiting 200
927	6-20	5	55-162-F-2	S	26	105	44	6	3000	Gray Cod 800 Whiting 100
928	6-20	5	55-162-F-2	S	26	60	7	2	600	Gray Cod 200 Whiting 300
929	6-20	7	55-163-D-2	S & G	30	90	180	200	1500	Gray Cod 600
930	6-20	7	55-163-D-2	S & G	30	105	120	200	1500	Gray Cod 600
931	6-20	7	55-163-D-2	S & G	23	90	120	200	600	Gray Cod 600
932	6-20	8	55-162		29	120	150	150	300	Halibut, Under Size 10 Halibut, legal 4 Gray Cod 300 Soft Shell Crab* 75 Korean Crab 50
933	6-20	8	55-162		29	80	100	100		Gray Cod 100 Halibut, Under Size 6 Halibut, legal 2

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
934	6-20	8	55-162		29	130	200	200		Halibut, Under Size 4 Halibut, legal 4 Gray Cod 200 Soft Shell Crab* 100
935	6-20	8	55-162		30	105	150			Halibut, legal 10 Gray Cod 100
936	6-21	1	56-160-B-5		24	90	24		50	Gray Cod 1500 Whiting 100
937	6-21	1	56-160-B-5		28	120			300	Gray Cod 200
938	6-21	3	55-163-D-5		27	60	30	50		
939	6-21	3	55-163-D-5		29	75	65	100		
940	6-21	3	55-163-D-5		29	75	50	100		
941	6-21	3	55-163-D-5		26	90	10	4		
942	6-21	5	55-162-F-2	S	26	80	53	300	300	Gray Cod 60
943	6-21	5	55-162-F-2	S	25	70	49	10	500	
944	6-21	5	55-162-F-2	S	30	85	19	60	200	Gray Cod 250 Whiting 60
945	6-21	5	55-162-F-2	S	19	90	20	40	8000	
946	6-21	7	55-163-D-3	S & G	30	90	140	100	1000	Gray Cod 50
947	6-21	7	55-163-D-3	S & G	30	90	140	100	1000	Gray Cod 500
948	6-21	7	55-163-D-3	S & G	20	90	80	100	1000	Gray Cod 2000
949	6-21	8	55-162		32	110	150	400	500	Halibut, Under Size 1 Halibut, legal 2 Gray Cod 500
950	6-21	8	55-162		31	140	70	100	1000	Gray Cod 500 Tanner Crab 100
951	6-21	8	55-162		30	60	100	100		Gray Cod 300 Tanner Crab 100 Star Fish 1000

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
952	6-22	7	55-163-D-2	S & G	22	100	70	70	1000	Gray Cod	4000
953	6-22	7	55-163-D-2	S & G	19	100	70	70	500	Gray Cod	3000
954	6-22	7	55-163-D-2	S & G	22	90	80	70	1000	Gray Cod	200
955	6-22	7	55-163-D-2	S & G	22	80	120	700		Gray Cod	1000
956	6-23	1	55-162-C-2		29	120	175	250	20	Gray Cod	75
										Korean Crab	300
										Whiting	50
957	6-23	1	55-162-C-2		26	90	129	700			
958	6-23	3	55-162-B-3		28	80	42	35	600		
959	6-23	3	55-162-B-3		26	80	24	50	550		
960	6-23	3	55-162-B-3		30	80	60	100	600		
961	6-23	3	55-162-B-3		26	100	68	200			
962	6-23	4	55-162-D-2	S	22	110	42	60	1500	Halibut, Under Size	3
										Halibut, legal	1
										Tanner Crab	50
										Gray Cod	150
963	6-23	4	55-162-D-2	S	19	120	10	25	1400	Halibut, Under Size	6
										Halibut, legal	2
										Gray Cod	150
964	6-23	4	55-162-D-2	S	19	125	50	20	500	Halibut, Under Size	2
										Halibut, legal	1
										Gray Cod	100
965	6-23	5	55-162-F-2	S	22	95	19	20	400	Gray Cod	600
966	6-23	5	55-162-F-2	S	21	70	86	20	300	Gray Cod	400
967	6-23	5	55-162-F-2	S	19	105	40	10	200	Gray Cod	200
968	6-23	7		S & G	22	80	100	20	2000	Gray Cod	6000

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
969	6-23	7		S & G	23	90	100	50	2000	Gray Cod	4000
970	6-23	7		S & G	23	90	100	20	3000	Gray Cod	3000
971	6-23	7		S & G	23	90	50	30	4000	Gray Cod	4000
972	6-23	8	55-162		29	120	131	200	200	Halibut, Under Size	1
										Halibut, legal	1
973	6-23	8	55-162		29	115	100	400		Star Fish	1000
974	6-23	8	55-162		25	120	70	25	1500	Halibut, legal	1
										Tanner Crab	25
										Gray Cod	3000
975	6-24	1	55-162-C-2		24	90	100	400	6000	Halibut, Under Size	15
										Halibut, legal	2
										Gray Cod	4000
										Star Fish	200
976	6-24	1	55-162-C-2		22	90	200	300	10000		
977	6-24	3	56-161		38	90	30	0			
978	6-24	3	56-161		37	90	175	0			
979	6-24	3	56-161		38	105	270	0			
980	6-24	3	56-161		37	110	165	0			
981	6-24	3	56-161		37	60	195	0			
982	6-24	4	56-162-E-4	S	36	90	109	0	250	Halibut, legal	1
										Tanner Crab	250
983	6-24	4	56-162-E-4	S	38	95	83	0	250	Tanner Crab	1500
984	6-24	4	56-162-E-4	S	36	100	87	0	350	Tanner Crab	1250
985	6-24	5	55-162-F-2	S	36	90	100	0	100	Gray Cod	200
986	6-24	5	55-162-F-2	S	34	90	69	0	400	Gray Cod	50
987	6-24	5	55-162-F-2	S	27	90	68	0	600	Gray Cod	100
988	6-24	5	55-162-F-2	S	35	100	129	0	200		

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
989	6-24	7		S & G	23	105	75	100	3000	Gray Cod 6000
990	6-24	7		S & G	23	105	75	50	2500	Gray Cod 5000
991	6-24	7		S & G	23	60	75	100	2500	Gray Cod 1000
992	6-25	3	56-161		37	80	148	0	350	
993	6-25	3	56-161		36	85	220	0		
994	6-25	3	56-161		38	85	117	0		
995	6-25	3	56-161		37	120	181	0		
996	6-25	4	56-161-A-3	S	35	115	282	0	250	Halibut, Under Size 5 Halibut, legal 1 Tanner Crab 2500
997	6-25	4	56-161-A-3	S	35	90	250	0	200	Halibut, Under Size 2 Tanner Crab 2000
998	6-25	4	56-161-A-3	S	36	120	300	0	250	Halibut, Under Size 2 Halibut, legal 1 Tanner Crab 1500
999	6-25	4	56-161-A-3	S	37	145	390	0	500	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 2500
1000	6-25	5	55-162-F-2	S	35	95	168	0	400	Gray Cod 50
1001	6-25	5	55-162-F-2	S	35	120	116	0	200	
1002	6-25	5	55-162-F-2	S	35	120	48	0	300	
1003	6-25	5	55-162-F-2	S	36	125	102	0	150	
1004	6-26	1	56-161-B-5		35	120	100	2	1500	Halibut, legal 2 Gray Cod 50
1005	6-26	1	56-161		30	60	50	100	300	Halibut, legal 1 Gray Cod 75
1006	6-26	1	56-161		28	60	50	100	200	

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1007	6-26	3	55-162-B-3		29	120	135	400	150	
1008	6-26	3	55-162-B-3		27	120	161	500		
1009	6-26	3	55-162-B-3		28	120	237	800		
1010	6-26	4	55-162-E-1	S	21	120	65	35	1500	Halibut, Under Size 5 Halibut, legal 1 Tanner Crab 200 Gray Cod 100
1011	6-26	4	55-162-E-1	S	20	115	97	25	1000	Halibut, Under Size 3 Halibut, legal 1 Tanner Crab 100 Gray Cod 100
1012	6-26	4	55-162-E-1	S	23	125	30	15	1500	Halibut, Under Size 4 Halibut, legal 2 Tanner Crab 100 Whiting 300
1013	6-26	4	55-162-E-1	S	22	120	59	40	1500	Halibut, Under Size 1 Halibut, legal 1 Tanner Crab 50 Gray Cod 150 Whiting 150
1014	6-26	5	55-162-F-2	S	23	105	30	10	100	Gray Cod 2000 Whiting 600
1015	6-26	5	55-162-F-2	S	26	120	16	0	50	
1016	6-26	5	55-162-F-2	S	23	105	6	0	150	
1017	6-26	5	55-162-F-2	S	24	120	10	0	250	
1018	6-26	5	55-162-F-2	S	23	120	20	0	300	
1019	6-27	1	55-162-C-2		22	120	60	30	4000	Halibut, legal 2 Gray Cod 6000

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1020	6-27	1	55-162-C-2		22	120	25	15	2000	Halibut, Under Size 1 Gray Cod 3000
1021	6-27	1	55-162-C-2		23	120	30	30	4000	Halibut, legal 1 Gray Cod 4000
1022	6-27	3	55-162-B-3		28	120	75	150	4500	Gray Cod 5000
1023	6-27	3	55-162-B-3		24	105	0	0		
1024	6-27	3	55-162-B-3		23	120	0	0		
1025	6-27	4	55-162-E-1	S	20	120	15	10	1500	Halibut, Under Size 7 Halibut, legal 2 Gray Cod 250 Whiting 200
1026	6-27	4	55-162-E-1	S	18	120	5	5	3000	Halibut, legal 1 Halibut, Under Size 5 Gray Cod 150 Whiting 100
1027	6-27	4	55-162-E-1	S	20	105	20	10	2000	Halibut, Under Size 6 Halibut, legal 1 Gray Cod 100 Whiting 250
1028	6-27	4	55-162-E-1	S	22	145	30	20	4000	Halibut, Under Size 4 Halibut, legal 1 Gray Cod 100 Whiting 250
1029	6-27	5	55-162-F-2	S	22	120	30	20	500	Gray Cod 2100
1030	6-27	5	55-162-F-2	S	21	145	20	10	600	Gray Cod 1000
1031	6-27	5	55-162-F-2	S	22	60	0	0	400	Gray Cod 400
1032	6-27	5	55-162-F-2	S	21	100	0	0	300	Gray Cod 600

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1033	6-27	8	55-162		22	125	20	10	1500	Halibut, Under Size 2 Gray Cod 3500 Korean Crab 10
1034	6-27	8	55-162		23	110	20	15	2000	Halibut, Under Size 2 Halibut, legal 1 Gray Cod 8000
1035	6-27	8	55-162		23	120	20	15	2000	Halibut, Under Size 4 Halibut, legal 1 Gray Cod 6000
1036	6-28	1	55-162-C-2		24	120	45	30	4000	Halibut, Under Size 2 Gray Cod 4000
1037	6-28	1	55-162-C-2		25	120	60	35	4000	Gray Cod 4000
1038	6-28	1	55-162-C-2		23	120	30	15	5000	Halibut, legal 1 Gray Cod 4000
1039	6-28	3	55-162-B-3		23	120	30	50	3000	Gray Cod 2000
1040	6-28	3	55-162-B-3		24	120	20	30		
1041	6-28	3	55-162-B-3		24	110	30	20		
1042	6-28	4	55-162-E-1	S	22	105	8	10	1150	Halibut, Under Size 4 Halibut, legal 1 Gray Cod 150 Whiting 100
1043	6-28	4	55-162-E-1	S	21	150	10	15	250	Halibut, Under Size 5 Halibut, legal 1 Gray Cod 300 Whiting 250
1044	6-28	4	55-162-E-1	S	21	120	15	25	350	Halibut, Under Size 3 Halibut, legal 1 Gray Cod 200 Whiting 150

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1045	6-28	4	55-162-E-1	S	21	50	10	15	200	Halibut, Under Size 2
										Halibut, legal 1
										Gray Cod 100
										Whiting 50
1046	6-28	5	55-161-F-2	S	21	120	15	1	1000	Gray Cod 6000
1047	6-28	5	55-161-F-2	S	22	120			2000	Gray Cod 7000
1048	6-28	8	55-162		23	120	50	50	2000	Gray Cod 3000
1049	6-28	8	55-162			120	25	20	1000	Gray Cod 5000
1050	6-29	1	55-162-C-2		22	120	16	27	3000	Gray Cod 5000
1051	6-29	1	55-162-C-2		23	120	30	19	2000	Gray Cod 4000
										Halibut, legal 1
1052	6-29	3	55-162-B-3		23	120	0	0	4000	Gray Cod 1000
1053	6-29	3	55-162-B-3		22	100	0	0		
1054	6-29	4	55-162-E-1	S	21	150	10	15	1500	Halibut, Under Size 4
										Halibut, legal 1
										Gray Cod 250
1055	6-29	4	55-162-E-1	S	22	135	8	15	1200	Halibut, Under Size 5
										Halibut, legal 2
										Gray Cod 300
										Whiting 100
1056	6-29	4	55-162-E-1	S	20	115	5	20	1800	Halibut, Under Size 6
										Halibut, legal 1
										Gray Cod 200
										Whiting 100
1057	6-29	5	55-161-F-2	S	20	120	6	2	3000	Gray Cod 3000
1058	6-29	5	55-161-F-2	S	22	120	10	10	5000	Gray Cod 2000
1059	6-29	5	55-161-F-2	S	21	130	5	0	1000	Gray Cod 2000

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks	
1060	6-29	7		S & G	23	105	65	100	2500	Gray Cod	5000
1061	6-29	7		S & G	23	100	65	50	2500	Gray Cod	5000
1062	6-29	7		S & G	23	105	65	100	2500	Gray Cod	5000
1063	6-29	7		S & G	23	90	65	100	2500	Gray Cod	5000
1064	6-30	3	55-162-B-3		22	130	0	0	4000	Gray Cod	2000
1065	6-30	3	55-162-B-3		22	130	0	0	3000	Gray Cod	1000
1066	6-30	4	55-162-E-1	S	20	135	7	12	250	Gray Cod	200
										Whiting	100
										Halibut, Under Size	5
										Halibut, legal	2
1067	6-30	4	55-162-E-1	S	19	145	5	15	500	Halibut, Under Size	4
										Halibut, legal	1
										Gray Cod	100
										Whiting	200
1068	6-30	4	55-162-E-1	S	21	105	12	20	1000	Halibut, Under Size	3
										Halibut, legal	1
										Gray Cod	200
										Whiting	150
1069	6-30	5	55-161-F-2	S	21	120	8	10	4000	Gray Cod	2000
1070	6-30	5	55-161-F-2	S	21	120	8	2	2000	Gray Cod	4000
1071	7-2	3	56-159		26	135	3	0	500	Halibut, Under Size	5
										Halibut, legal	3
										Gray Cod	200
1072	7-2	3	56-159		27	135	2	0	2000	Halibut, Under Size	4
										Halibut, legal	6
										Gray Cod	100
1073	7-2	4	56-160-D-4	Gy S	18	75	8	5	350	Halibut, Under Size	7
										Halibut, legal	2
										Gray Cod	100

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1074	7-2	4	56-160-D-4	Bk S	7	35	0	0	500	Halibut, Under Size 5
										Halibut, legal 3
										Gray Cod 50
1075	7-2	5	57-160-E-3	S	21	60	0	0	1000	Gray Cod 2000
1076	7-2	5	57-160-E-3	S	6	60	0	0		Gray Cod 4000
1077	7-2	6	57-159-F-6	S	27	60	1	0	2000	Gray Cod 100
1078	7-2	8	57-159		22	75	2	0	250	Halibut, Under Size 10
										Halibut, legal 2
										Star Fish 500
										Gray Cod 50
1079	7-2	8	57-159		26	65	1		200	Halibut, legal 2
										Tanner Crab 10
										Gray Cod 800
1080	7-2	8	57-159		27	75	10		1000	Halibut, Under Size 6
										Halibut, legal 4
										Gray Cod 200
1081	7-3	3	56-159		27	150	0	0	650	Gray Cod 200
1082	7-3	4	57-159-E-5	G	24	90	2	1	1200	Halibut, Under Size 25
										Halibut, legal 8
1083	7-3	4	57-159-C-6	S	7	90	0	0	1200	Halibut, Under Size 1
1084	7-3	4	55-158-E-4	Bk S & G	15	115	0	0	150	Halibut, Under Size 6
										Halibut, legal 2
										Gray Cod 250
										Korean Crab 12
1085	7-3	5	57-159	S	25	100	0	0	1500	Gray Cod 500
1086	7-3	5	57-159	S	9	60	0	0	50	Gray Cod 500
1087	7-3	5	57-159	S	13	90	0	0	1000	Gray Cod 500

Section A - Otter Trawl (Continued)

Drag Number	Date	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Minutes	Male King Crab Number	Female King Crab Number	Total Flounder and Sole Pounds	Remarks
1088	7-4	4	55-158-E-4	Gy S & G	15	120	1	0	1000	Halibut, Under Size 8 Halibut, legal 2 Korean Crab 6 Gray Cod 200
1089	7-4	4	55-158-E-4	Gy S & G	15	120	0	0	500	Halibut, Under Size 5 Halibut, legal 3 Gray Cod 100
1090	7-4	4	55-158-E-4	Gy S & G	16	90	0	1	1000	Halibut, Under Size 10 Halibut, legal 2 Gray Cod 100
1091	7-4	4	55-158-E-4	Bk S & G	12	115	0	0	1000	Halibut, Under Size 5 Halibut, legal 2 Gray Cod 200
1092	7-4	5	58-158-E-2	S	17	120	1	0	8000	Gray Cod 8000
1093	7-4	5	58-158-E-2	S	15	60	0	0	9000	Gray Cod 8500
1094	7-5	3	57-158		14	90	0	0	1500	Gray Cod 2000
1095	7-5	3	57-158		16	90			1500	Gray Cod 1500
1096	7-5	3	57-158		15	60			500	
1097	7-5	4	55-158-E-4	S	14	150	0	0	1500	Halibut, Under Size 15 Halibut, legal 2 Gray Cod 500 Whiting 50
1098	7-5	6	57-157-A-2	S	15	120			1000	Gray Cod 10000
1099	7-5	6	57-157-A-2	S	15	110			2000	Gray Cod 5000

Appendix 6

Individual Tow Records

Section B - Tangle Net

Set Number	Date Set	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Days	Fathoms of Net	Male King Crab Number	Female King Crab Number	Remarks
1	4-3	10	55-161-E-3	sft S	27	2	250	38	30	
2	4-3	10	55-161-D-3	sft S	14	3	250	259	10	
3	4-3	10	55-161-D-3	sft S	13	3	250	75	6	
4	4-4	8	55-161		11	2½	400	46	10	
5	4-4	8	55-161		13	2½	400	120	20	
6	4-4	8	55-161		13	3	400	180	30	
7	4-4	8	55-161		13	3	400	266	45	
8	4-4	8	55-161		13	2½	400	297	75	
9	4-4	10	55-161-E-3	hrd S	9	3	500	1	46	
10	4-4	10	55-161-C-3	hrd S	11	4	500	130	10	
11	4-5	10	55-161-E-3	sft S	10	4	500	20	300	
12	4-5	10	55-161-E-3	hrd S	13	5	500	28	10	
13	4-6	10	55-161-D-3	sft S	14	2	250	150	40	
14	4-6	10	55-161-C-3	hrd S	14	4	1000	126	130	
15	4-6	10	55-161-B-4	hrd S	12	5	850	653	412	
16	4-6	10	55-161-B-4	hrd S	12	6	150	122	52	
17	4-7	10	55-161-C-4		17	2	1000	50	75	
18	4-7	10	55-161-B-4	hrd S	11	5	1000	250	200	
19	4-8	10	55-161-C-3	sft S	16	3	500	114	116	
20	4-8	10	55-161-D-3	sft S	17	4	750	448	376	
21	4-9	10	55-161-B-4	hrd S	17	4	400	16	2	
22	4-9	10	55-161-B-4	hrd S	25	4	750	236	54	
23	4-10	10	55-161-B-4	sft S	20	4	750	1019	30	
24	4-11	10	55-161-C-3	sft S	17	3	500	60	47	

1/ 8, Tordenskjold; 9, Bear; 10, Foremost.

2/ Numbers indicate degrees latitude and longitude; letters and small numbers indicate sub-areas of ten minutes longitude and latitude, respectively (See Fig. 50).

3/ Abbreviations used are those of U.S. Dept. of Commerce, Coast and Geodetic Survey Hydrographic Manual. SFT - soft; HRD - hard; BK - black; S - sand; SH - shells.

Note: Where figures do not appear in the columns, information was not furnished.

Section B - Tangle Net (Continued)

Set Number	Date Set	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Days	Fathoms of Net	Male King Crab Number	Female King Crab Number	Remarks
25	4-11	10	55-161-C-3	sft S	17	3	750	29	32	
26	4-11	10	55-161-B-4	sft S	17	4	750	1281	40	
27	4-20	10	55-163-E-5	bk S	23	3	400	110	41	
28	4-20	10	55-163-E-5	bk S	23	3	400	134	10	
29	4-20	10	55-163-E-5	bk S	23	3	400	107	12	
30	4-20	10	55-163-E-5	bk S	23	3	400	141	22	
31	4-20	10	55-162-C-3	bk S	24	4	400	81	10	
32	4-20	10	55-162-C-3	bk S	24	4	400	100	20	
33	4-23	10	55-162-E-5	S	23	3	400	91	10	
34	4-23	10	55-162-E-5	S	23	3	400	68	5	
35	4-23	10	55-162-E-5	S	23	3	400	110	4	
36	4-23	10	55-162-E-5	S	23	3	400	128	11	
37	4-26	10	55-162-E-3	bk S	35	1	400	360	400	
38	4-26	10	55-162-E-3	bk S	35	1	400	245	510	
39	4-26	10	55-162-C-3	bk S	35	2	400	415	740	
40	4-26	10	55-162-C-3	bk S	35	2	400	269	250	
41	4-26	10	55-162-E-5	bk S	26	7	400	340	20	
42	4-26	10	55-162-E-5	bk S	26	7	400	326	40	
43	4-27	10	55-162-E-5	bk S	26	4	400	561	112	
44	4-28	10	55-162-C-3	bk S	35	6	400	320	38	
45	4-28	10	55-162-C-3	bk S	35	6	400	305	300	
46	4-29	9	55-163-E-4		25	13	300	538	120	
47	4-29	9	55-163-E-4		26	14	300	694	92	
48	5-10	9	55-163-E-4		23	5	350	243	63	
49	5-10	9	55-163-E-4		25	5-3/4	350	225	41	
50	5-13	9	55-163-E-4		26	8	400	709	58	
51	5-15	9	55-163-E-4		25	6-3/4	350		5	
52	5-16	9	55-163-E-4		25	7	350	489	24	

Section B - Tangle Net (Continued)

Set Number	Date Set	Vessel[1] Number	Area[2] Code Number	Type of Bottom[3]	Depth Fathoms	Time on Bottom Days	Fathoms of Net	Male King Crab Number	Female King Crab Number	Remarks
53	5-16	9	55-163-E-4		25	6-3/4	350	300	36	Soft Shell Crab 42
54	5-17	9	55-163-E-4		29	9	350	734	29	Soft Shell Crab 32
55	5-17	9	55-163-E-4		29	9-3/4	350	835	95	Soft Shell Crab 38
56	5-17	9	55-163-E-4		28	18-3/4	350	696	65	Soft Shell Crab 46
57	5-18	9	55-163-E-4		29	21	350	741	46	Soft Shell Crab 63
58	5-20	9	55-163-E-4		29	22-3/4	400	896	5	Soft Shell Crab 11
59	5-20	9	55-163-E-4		27	21-3/4	350	605	12	Soft Shell Crab 56
60	5-21	9	55-163-E-4		28	22-3/4	400	731	12	Soft Shell Crab 62
61	5-20	9	55-162-A-3		34	10	400	310	65	
62	5-20	9	55-162-A-3		33	12	400	731	46	
63	5-20	9	55-162-A-3		34	13	400	620	72	
64	5-22	9	55-162-A-2		35	9	400	410	43	
65	5-22	9	55-162-A-2		35	9	400	440	67	
66	5-24	9	55-162-A-2		36	9	400	724	74	
67	5-24	9	55-162-A-2		32	10	400	450	62	
68	5-23	9	55-163-E-4		28	22½	350	740	26	
69	5-23	9	55-163-E-4		27	22½	350	748	16	
70	6-8	9	55-163-E-4		24	9	350	620	12	
71	6-8	9	55-163-E-4		29	8-3/4	350	724	18	
72	6-12	9	55-163-E-4		31	6-3/4	300	296	12	
73	6-13	9	55-163-E-4		30	7	400	377	14	
74	6-16	9	55-162-B-3		26	10	350	265	10	
75	6-16	9	55-162-B-3		26	5	350	132	4	
76	6-18	9	55-162-B-3		26	5-3/4	350	441	10	
77	6-18	9	55-162-B-3		27	10	350	390	34	
78	6-20	9	55-162-B-3		28	7	350	275	63	
79	6-21	9	55-162-C-4		13	1	350	12	0	
80	6-21	9	55-162-C-4		16	3	350	0	0	

Section B - Tangle Net (Continued)

Set	Date	Vessel[1]	Area[2]	Type of Bottom[3]	Depth	Time on Bottom	Fathoms of Net	Male King Crab	Female King Crab	Remarks
Number	Set	Number	Code Number		Fathoms	Days		Number	Number	
81	6-22	9	55-162-D-3		5	4	350	0	0	
82	6-22	9	55-162-D-3		9	4-3/4	350	0	0	
83	6-27	9	55-162-E-2		29	3		43	35	
84	6-27	9	55-162-E-2		29	3		112	78	

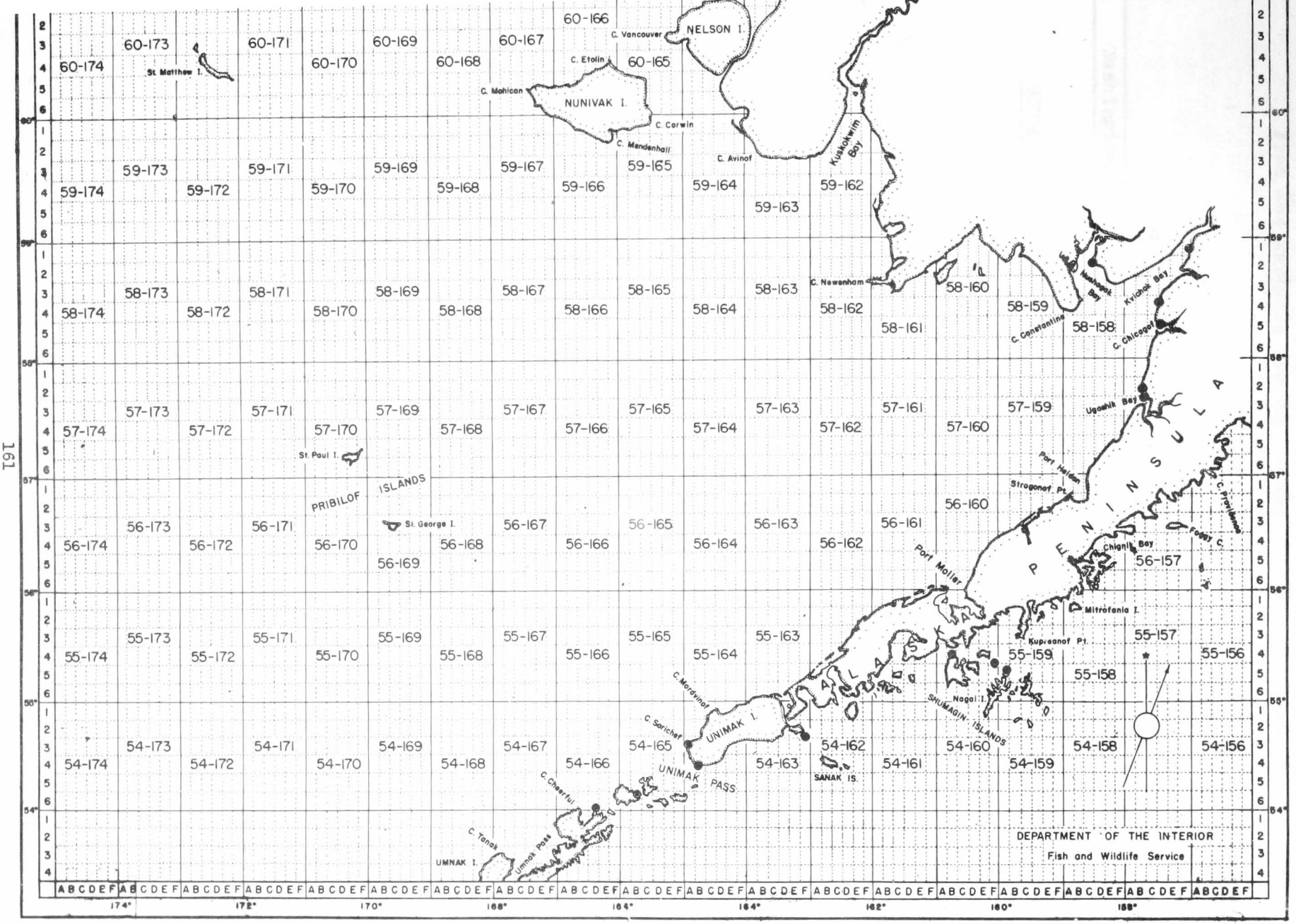


FIG. 50 - BERING SEA STATISTICAL AREAS

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