

# JAPANESE FISHING VESSELS OFF ALASKA

William R. Dickinson

Each year Japan employs about 700 different ships in her fisheries off Alaska. This fleet lands more than 3 billion pounds of fish, shellfish, and whales. It consists of fishing or catcher vessels and associated support ships, such as processing or factory ships, refrigerated transports, tankers, cargo ships, etc. Included in the fishing vessels are three types of trawlers, salmon and herring gillnetters, longliners, crab boats, and whale catchers. Some fishing vessels are especially designed for operations in the north Pacific and Bering Sea, while many are standard models used worldwide by Japanese fishermen.

The trend in fishing vessels is toward larger units with all or most processing done aboard. Prompt processing or preserving is the keynote in all fisheries, and more Japanese fishing vessels are being designed for these purposes.

Japan is one of the world's foremost fishing nations. It started to exploit the resources off Alaska<sup>1/</sup> in 1930 with a king-crab expedition to the eastern Bering Sea. In 1933, a ground-fish fishery was started in the same area and, with the crab fishery, continued until 1941. World War II temporarily halted Japanese fishing.

The Japanese resumed in 1952 with a salmon fishery along the western Aleutian Islands. Fishing was resumed in the eastern Bering Sea in 1953, and extended into the Gulf of Alaska in 1962. The Japanese have continued to expand the fisheries off Alaska by exploring new grounds, seeking and utilizing new species, and employing new fishing methods.

Fishing gear used off Alaska includes trawls, gill nets, longlines, tangle nets, crab pots, and harpoons. Such diverse fishing methods require different types of vessels. The major types are listed in Table 1 for each year during 1952-1970. There are several classes of vessels within each category for each major type of fishery.

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The author is Fisheries Management Agent, NMFS, Division of Enforcement and Surveillance, Kodiak, Alaska.

<sup>1/</sup> The area off Alaska is considered the waters of the North Pacific Ocean and Bering Sea, generally north of 50° N. latitude and east of International Date Line.

## TRAWL FISHING OPERATIONS

The Japanese fish with trawls on almost all of the Continental Shelf off Alaska (Fig. 1). This fishery dates back to 1933, when trawling began in the eastern Bering Sea, primarily for yellowfin sole. The primary species sought by the trawlers have been walleye pollock (*Theragra chalcogrammus*), Pacific ocean perch (genus *Sebastes*), herring (*Clupea pallasii*), shrimp (genus *Pandalus*), yellowfin sole (*Limanda aspera*), and other flat fishes.

At first the Japanese sought flat fish. But when fishing resumed after World War II, Pacific ocean perch made up an increasingly larger part of the catch. Although perch landings peaked in 1966, that species is still a primary target for many independent trawlers along the Aleutians and throughout the Gulf of Alaska.

Pollack has replaced flat fish as the primary species sought. It is the bulk of the Japanese trawl catch off Alaska. The fish is used mostly for minced fish (surimi), utilized

Table 1 - Japanese Fishing Vessels Off Alaska, 1952-70

Year	Stern Trawlers	Trawlers <sup>1/</sup>	Longline	Gillnet	Crab Catchers	Whale Killers	Total
1952				57		4	61
1953				105		4	109
1953	9			205		10	224
1955	6			247		14	367
1956	13			447		15	475
1957	13			405		17	435
1958	20			460		15	495
1959	44			460		15	519
1960	125-135			410		15	600-615
1961	125-135			410		15	600-615
1962	149	2	37	369	19	21	597
1963	85	3	115	369	9	21	599
1964	155	9	14	379	12	21	590
1965	116	8	12	369	10	25	540
1966	117	26	18	370	10	28	569
1967	128	71	23	370	10	33	627
1968	130	133	22	375	29	29	719
1969	98	118	37	399	46	26	724
1970	107	99	32	399	43	10	690

<sup>1/</sup> Includes side trawlers, pair trawlers, pair trawlers and Danish seiners.

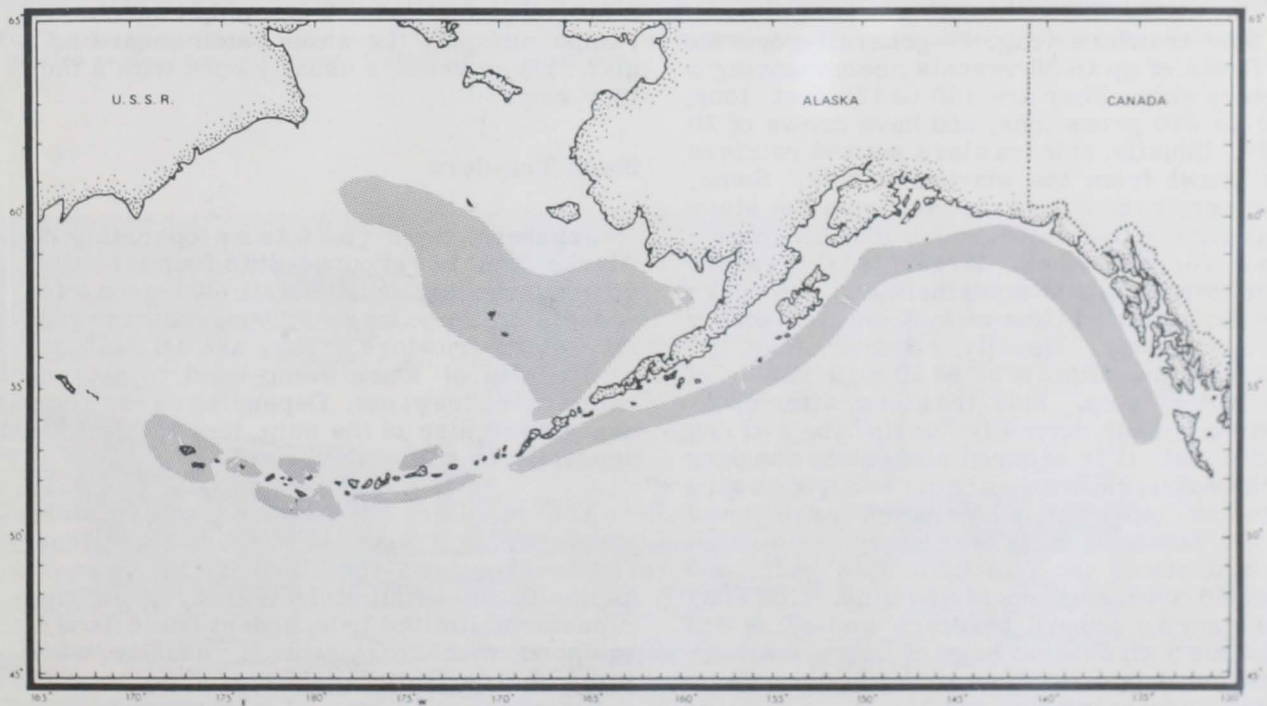


Fig. 1 - Japanese trawling areas off Alaska.

as a base stock for fish sausage, fish cakes, etc.

Trawling for shrimp northwest of the Pribilof Islands in the Bering Sea began in 1961. Peak annual landings of 34,775 metric tons occurred in 1963. Then these declined steadily until 1966, when they dropped to 3,230 metric tons--and the fishery ended.

The herring fishery started in 1966-67 with a catch of 3,000 metric tons. It expanded to about 35,000 metric tons in 1971. The fishery is conducted by trawlers from December through March between the Pribilof Islands and St. Matthew Island in the Bering Sea.

Japanese trawling off Alaska is conducted by four major types of ships: side trawlers, pair trawlers, Danish seiners, and stern trawlers. All use an active trawl net held open by trawl doors (side and stern trawlers), or by two boats pulling one net (pair trawlers). The exceptions are the Danish seiners. These use the traditional surrounding sweeping gear developed in the North Sea and called 'Scottish seining', 'Danish seining', or 'fly seining'.

#### Side Trawlers

Side trawlers (Fig. 2) generally operate in fleets of up to 30 vessels accompanying a factory ship. They are 100 to 170 feet long, 150 to 370 gross tons, and have crews of 20 to 30. Usually, side trawlers set and retrieve the trawl from the starboard side. Some, however, are rigged to set from the stern and retrieve to the side, much like U.S. west-coast vessels. Some larger side trawlers have refrigeration equipment and can operate for a limited time away from the factory or mothership. Usually, however, fleet operations are within a 20 to 30 mile radius of the factory ship. Side trawlers, after completion of haul, normally "unzip" the cod end of the net; it is secured alongside, dangling in the water, rather than being brought aboard with the fish. The filled cod ends are towed to the factory ship. There they are hoisted aboard, using the factory ship's gear, and dumped into large receiving bins. Cod ends are carried aboard trawlers so fishing can continue until several bags of fish are alongside and it is convenient to deliver the catch to the processing ship.

#### Pair Trawlers

Pair or two-boat trawlers operate one trawl net between two ships. Older pair trawlers (Fig. 3) are 90 to 150 feet long, 100 to 150 gross tons, and carry crews of 15 to 20. Recently designed pair trawlers (Fig. 4) are 122 feet long, 185 gross tons, and carry 14 to 16 persons.

Pair trawlers operate with one ship setting the gear and the second ship securing its warp to one wing of the net. Then they operate parallel to each other with the trawl net between them. When the trawl is completed, the net is hauled until one wing can be passed to the other partner, which completes the haul by itself. Like the side trawler, pair trawlers usually "unzip" the cod end of the net for delivery to a factory ship.

Danish seiners (Fig. 5) are 90 to 150 feet long, 100 to 150 gross tons, and have crews of 18 to 20. Recently a new type of Danish seiner (Fig. 6) has been operating off Alaska. These ships are about 90 feet long and 100 gross tons. Although similar in appearance to small stern trawlers, they employ their gear like older style vessels. Danish seiners set the net over the stern and usually retrieve it on the port side. The catch is brailed using a large dip net. Some newer ships have stern ramps and pull the whole catch aboard as a unit. These vessels usually work with a factory ship.

#### Stern Trawlers

Japanese stern trawlers operating off Alaska can be grouped into four (4) categories--ranging from small 300-gross-ton vessels to very large 5,000-gross-ton factory stern trawlers. They are all designed with a slip or stern ramp used to set and retrieve the trawl net. Depending on the fishery and/or size of the ship, they work independently or with a factory ship.

The smaller 300-gross-ton-class stern trawlers (Fig. 7) average 140 to 165 feet long, 250 to 350 gross tons, and carry 20 to 30 men. These small stern trawlers, although capable of limited independent operations if equipped with refrigeration, usually work with a factory ship.



Fig. 2 - Side trawler fishing in the eastern Bering Sea--one of several such vessels accompanying a factory ship which will process their catch.



Fig. 3 - Pair trawlers fishing in the eastern Bering Sea. The two vessels operate together towing one trawl. Pair trawlers, like side trawlers and Danish seiners, operate in fleets with a factory ship.

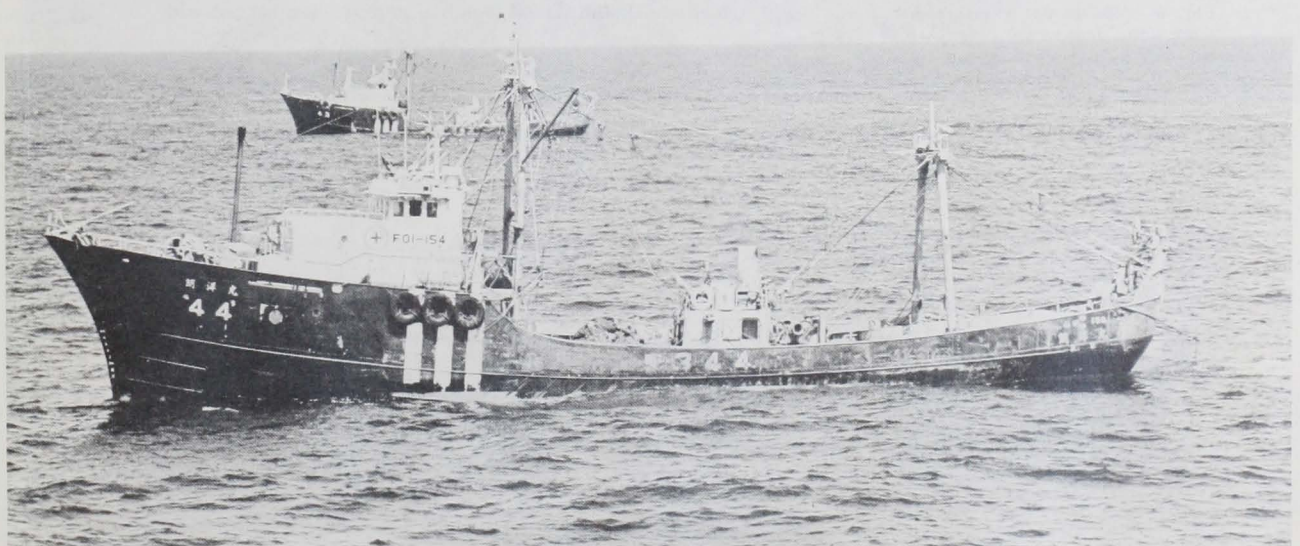


Fig. 4 - Pair trawlers of recent design. Similar in outward appearance to a small stern trawler, they continue to operate in pairs with one net between them.



Fig. 5 - Brailing fish from the net on a Danish seiner in the eastern Bering Sea. Danish seiners, like most side trawlers, fish in fleets with a factory ship which processes their catches.

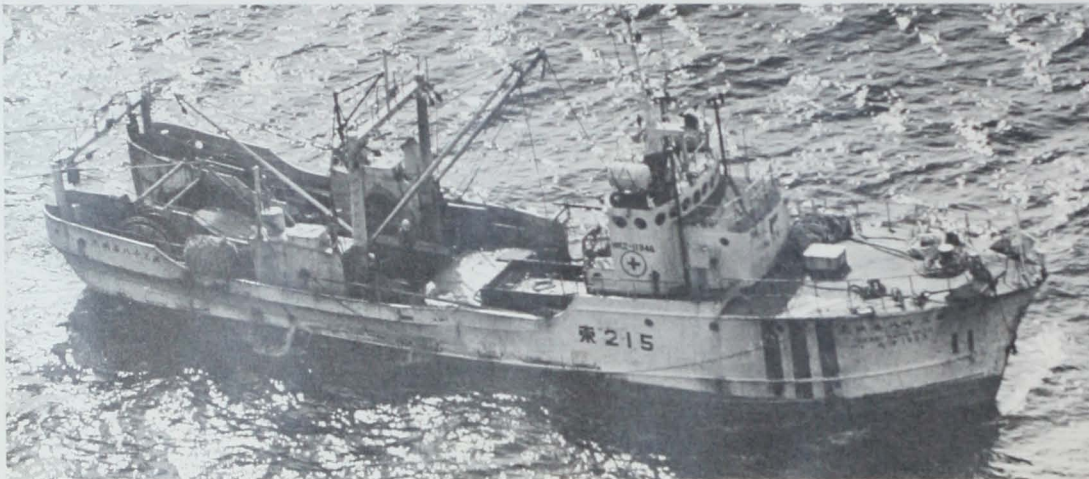


Fig. 6 - New model of a Danish seiner. Newly constructed Danish seiners look like stern trawlers but fish with the same gear as the older Danish seiners.



Fig. 7 - Small stern trawlers of this design usually work in fleet operations with a factory ship. Although some of these small stern trawlers have limited processing equipment which would enable an independent operation, they must then work in an area where resupply is readily available.



Fig. 8 - A stern trawler of this size (500 gross tons) is designed for independent operations. Processing usually includes only heading and freezing. This type of stern trawler is used in many areas off Alaska.



Fig. 9 - Medium stern trawlers (1,500 gross tons) are usually equipped with modern processing machinery, sharp freezers, and sufficient refrigerated holds to allow them to operate for some time without support.

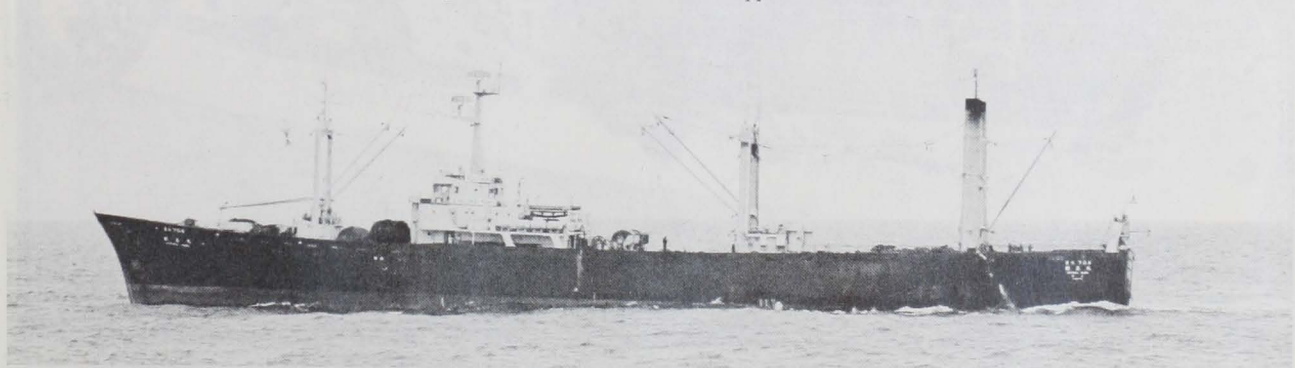


Fig. 10 - This ship is typical of the large (to 5,000 gross tons) factory stern trawlers working off Alaska. They have fully equipped factory areas and storage holds enabling them to operate extended periods in distant waters.

The 500-gross-ton-class stern trawler (Fig. 8) averages 170 to 190 feet long, 450 to 600 gross tons, and carries a crew of 20 to 35. These ships can operate independently if resupplied regularly. They are usually equipped with limited processing equipment, sharp freeze units, and refrigerated holds.

The 1,500-gross-ton stern-class trawler (Fig. 9) averages 230 to 270 feet long, 1,400 to 1,800 gross tons, and carries 70 to 90 men. These ships can operate for greater periods without resupply. Generally, they have a large processing area with modern machinery for washing, heading and gutting, and filleting the catch; also, they have a reduction plant to reduce fish to fish meal. Plate freezers and refrigerated holds are standard equipment.

Large factory stern trawlers (Fig. 10) are 290 to 370 feet long, 2,500 gross tons, and carry 90 to 135. They can operate for extended periods without resupply or returning to port. The factory areas are equipped with modern machinery to head, gut, fillet, and skin the catch; the larger ships have machinery to produce minced fish meat, called "surimi" or "otoshimi". Most have reduction plants to utilize waste and scrap fish for meal and oil.

## LONGLINE FISHING

In 1960, the Japanese began longlining off Alaska in the Bering Sea; in 1963, they expanded to the Gulf of Alaska (Fig. 11). Since 1963, the Gulf of Alaska fishery has increased continually, while effort in the Bering Sea has declined. The annual longline catches reached 62 million pounds in 1970.

The longline fishery is primarily for sablefish (*Anoplopoma fimbria*), with an incidental catch of rockfish (*Sebastes* sp.) Individual ships fish 12 to 13 miles of longline with about 8,000 hooks. Gear is set from the stern in 100 to 400 fathoms, held by anchors, and marked by flag and radio buoys. Fishing time is usually 12 hours; after that, the gear is retrieved using a line hauler on the ship's starboard side.

The first longliners (Fig. 12) off Alaska were similar to ships used in tuna longline fishery in southern waters. They had open well decks that exposed crew to the adverse weather common off Alaska. A more recent design (Fig. 13) has covered work areas that protect the crew. These ships are 120 to 170 feet long, 200 to 500 gross tons, and have crews of 25 to 30. Equipped with sharp

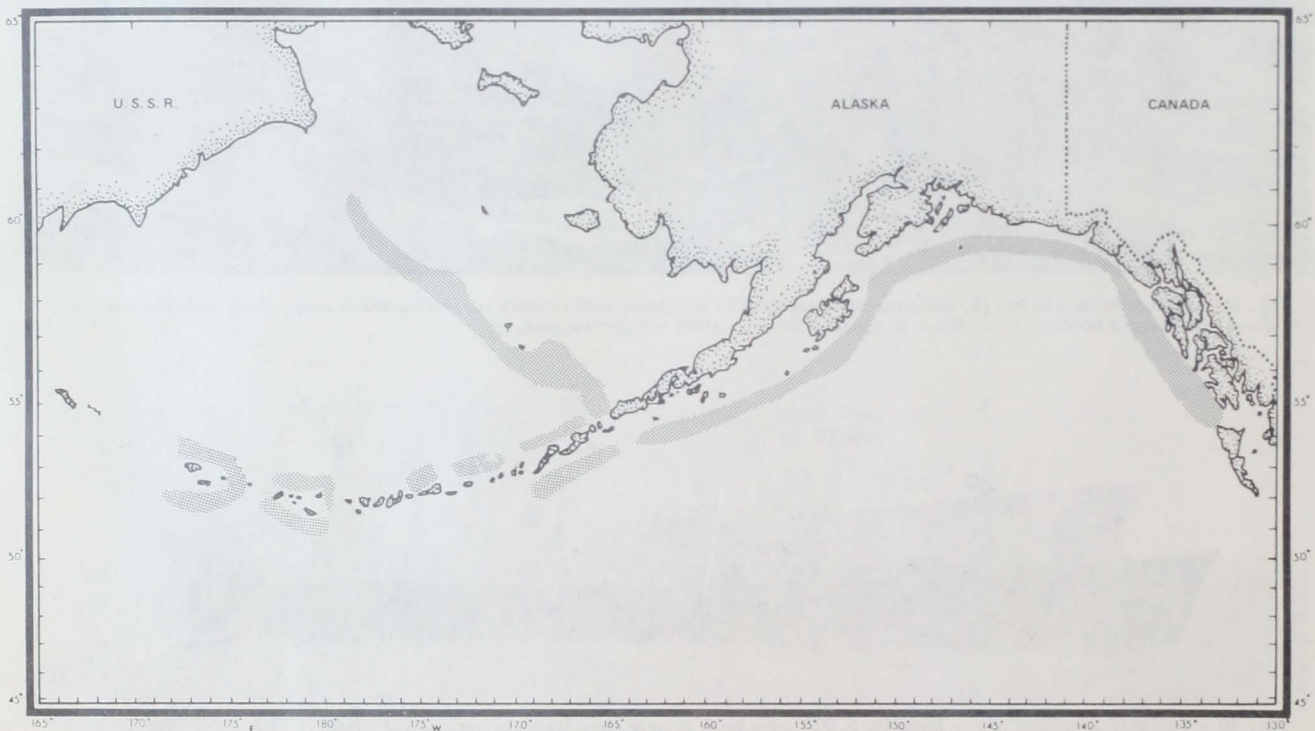


Fig. 11 - Japanese longline fishing areas off Alaska.



Fig. 12 - Japanese longliner fishing in the Gulf of Alaska. This ship is typical of the older style longliner with the open work area on deck.

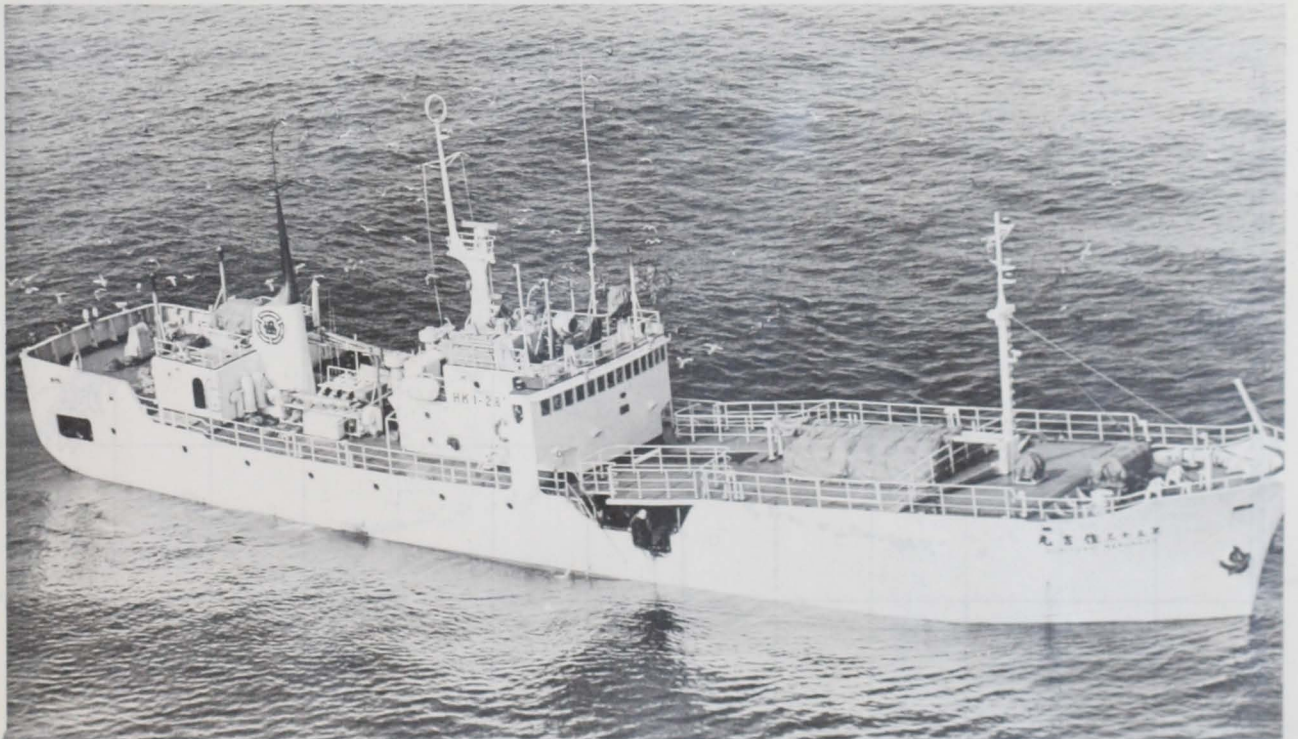


Fig. 13 - This ship is typical of the new design Japanese longliner with covered well decks enabling the crew to work during inclement weather. Note the opening in the well deck on the starboard side where the fishermen are retrieving the longline.



freezers and refrigerated holds, they can operate independently. They make 2 or 3 trips to Alaskan area a year. They stay  $1\frac{1}{2}$  to 3 months per trip.

#### GILLNET FISHING OPERATION

Japanese gillnetting off Alaska (Fig. 14) is primarily for salmon (genus *Oncorhynchus*), but there is also a small fishery for herring (*Clupea pallasii*). In 1963, a small exploratory gillnet fishery was conducted in the Gulf of Alaska primarily for sablefish (*Anoplopoma fimbria*). This fishery was abandoned in 1964.

The gillnet fishing vessels (Fig. 15) are 80 to 90 feet long, 70 to 100 gross tons, and have crews of 19 to 20. These ships operate in a fleet and deliver their catch daily to a factory ship for processing. The gillnet used for salmon is about 9 miles long by 18 to 20 feet deep, and about  $4\frac{1}{2}$ -inch mesh stretch measure monofilament nylon. It is fished on the surface. A herring gillnet is shorter, about 2-inch (stretch measure) mesh stranded nylon web; generally, it is anchored and submerged.

A gillnetter stores its net in a bin on the vessel's stern. The net is set from the stern and marked with radio buoys and flags. It is set just before dark and retrieved at first light the next morning. The net is retrieved by a vertical shiv hauler, built to engage the lead line, and mounted forward on the port side. As the net comes aboard, the fish are removed and the net is transferred to the stern for storage until reset.

#### CRAB FISHING OPERATION

The Japanese fish for king crab (*Paralithodes* sp.) and tanner crab (*Chioneocetes* sp.) on the Continental Shelf in the eastern Bering Sea (Fig. 16). Tangle nets have been used since the beginning of the fishery. Only in recent years have they begun using crab pots. In 1970, they fished extensively with pots in addition to tangle nets; in 1971, they did not use tangle nets until the very end of the season.

Tangle nets are large meshed nets (18-inch stretched measure) set in extensive fields up to 10 square miles. The nets are anchored along ocean floor, entangling crab as they travel along bottom.

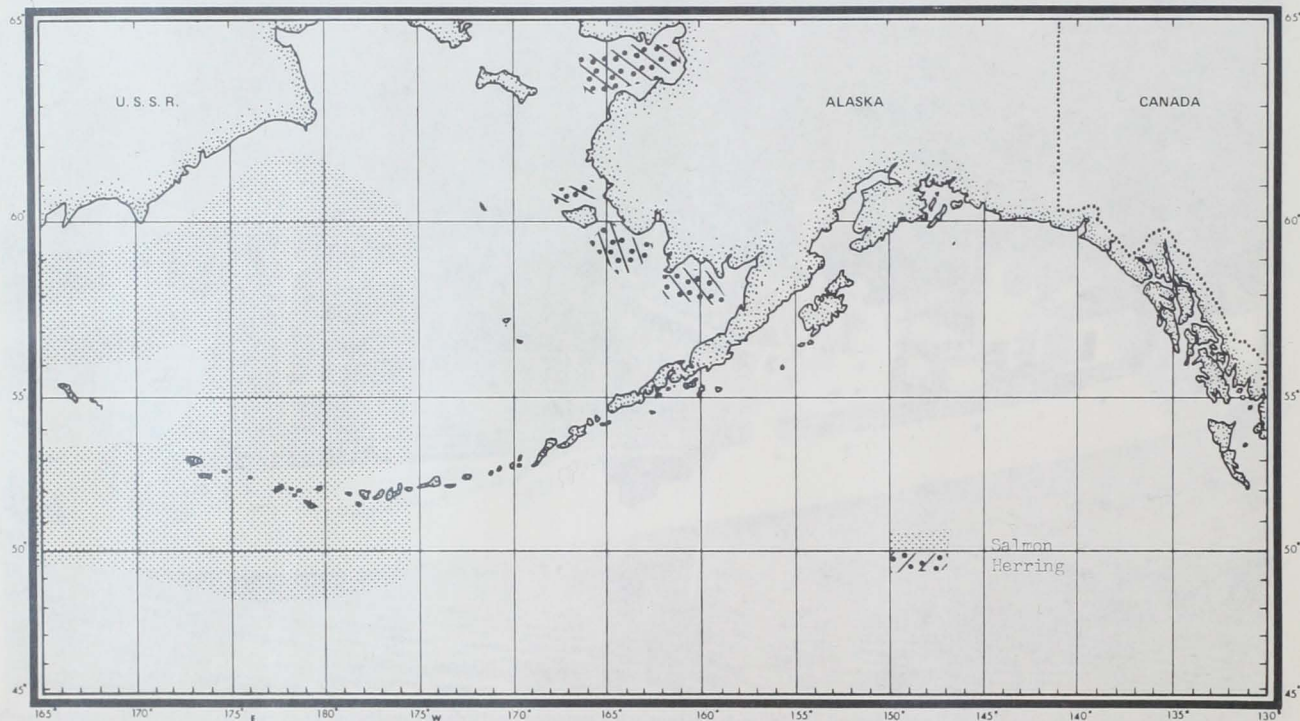


Fig. 14 - Japanese gillnet fishing areas off Alaska.

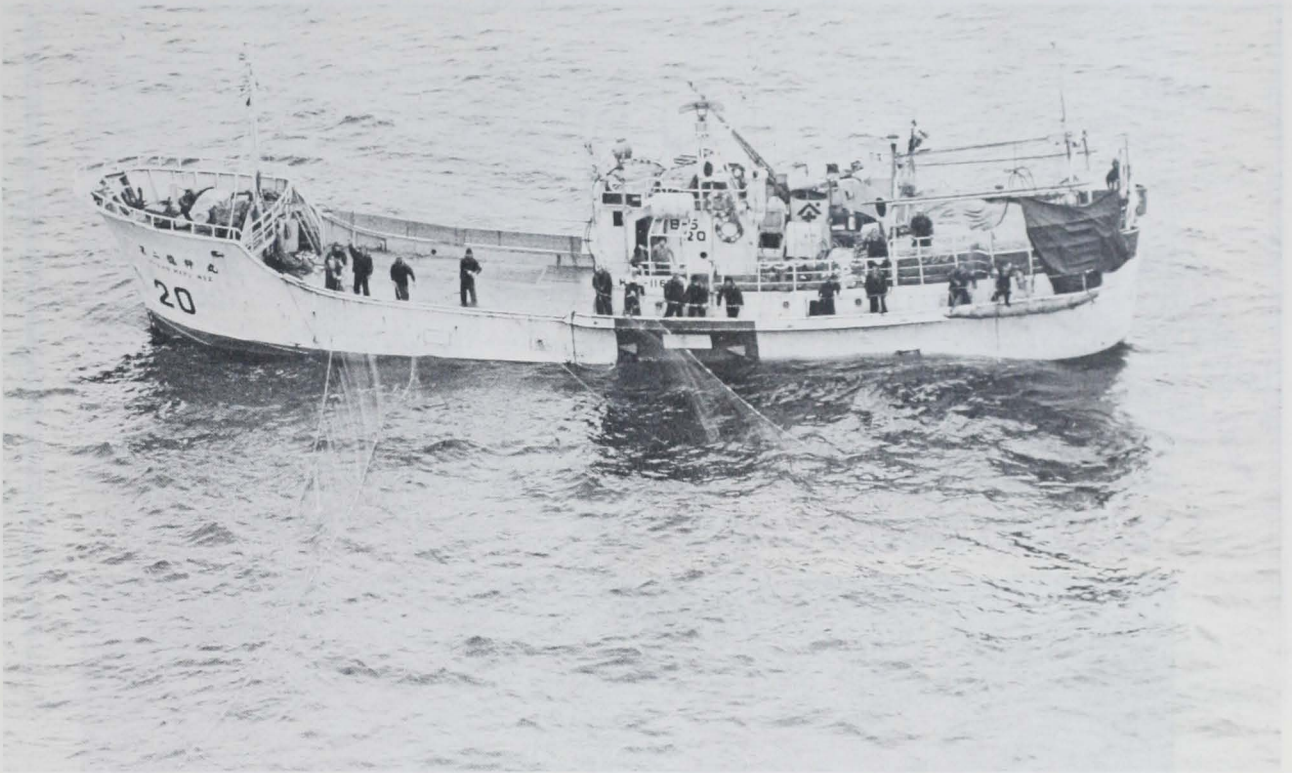


Fig. 15 - Salmon gillnet fishing vessel hauling a gillnet in the central Bering Sea. This ship is typical of those working in fleets with a factory ship off Alaska.

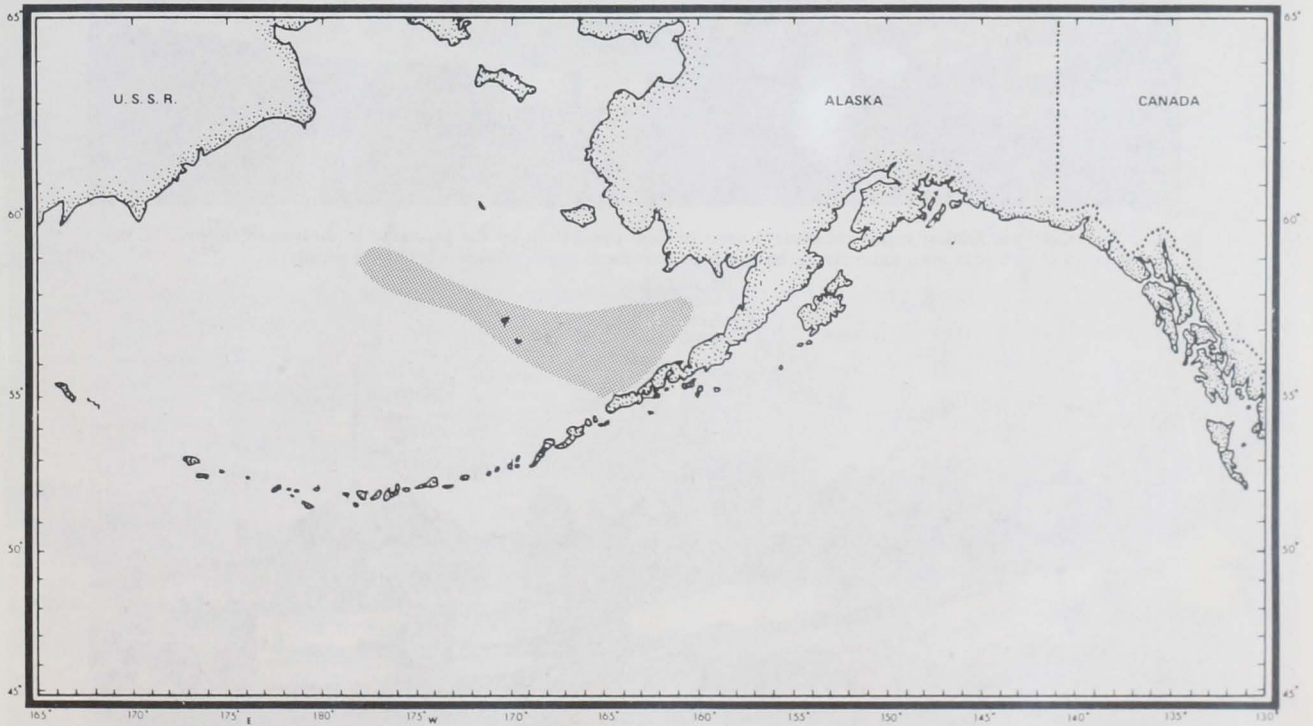


Fig. 16 - Japanese tanner and king crab fishing areas off Alaska.



Fig. 17 - Tanglenet fishing vessel operating in the Japanese crab fishery of the eastern Bering Sea. As the tanglenet is brought aboard, the crab are removed and placed in large cargo nets for transfer to the factory ship.



Fig. 18 - Crab pot fishing vessel (dokkosen) used in fleet operations by the Japanese in their crab fishery. Conical shaped crab pots used extensively by the Japanese for Tanner crab are visible on board.

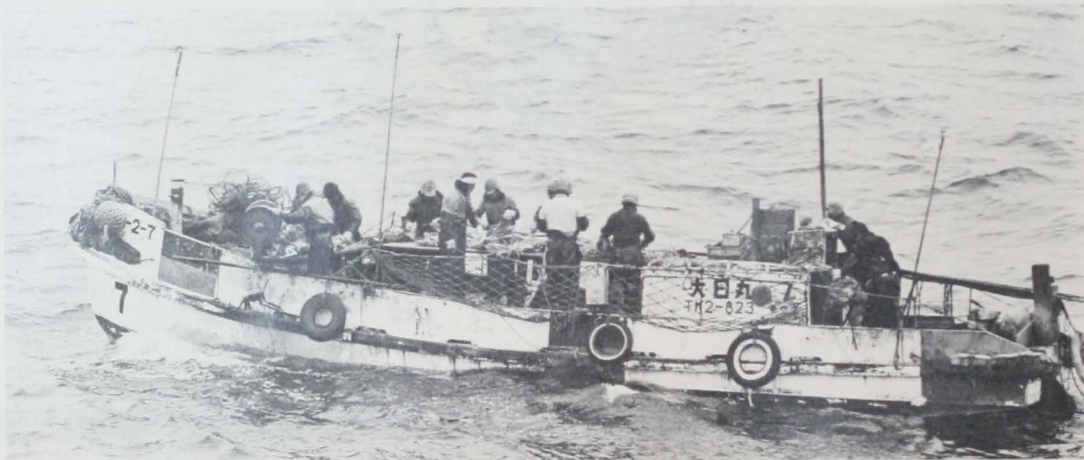


Fig. 19 - Japanese "kawasaki" boat--typical of the type used aboard most factory ships. This boat is retrieving tanglenet gear in the Japanese crab fishery.

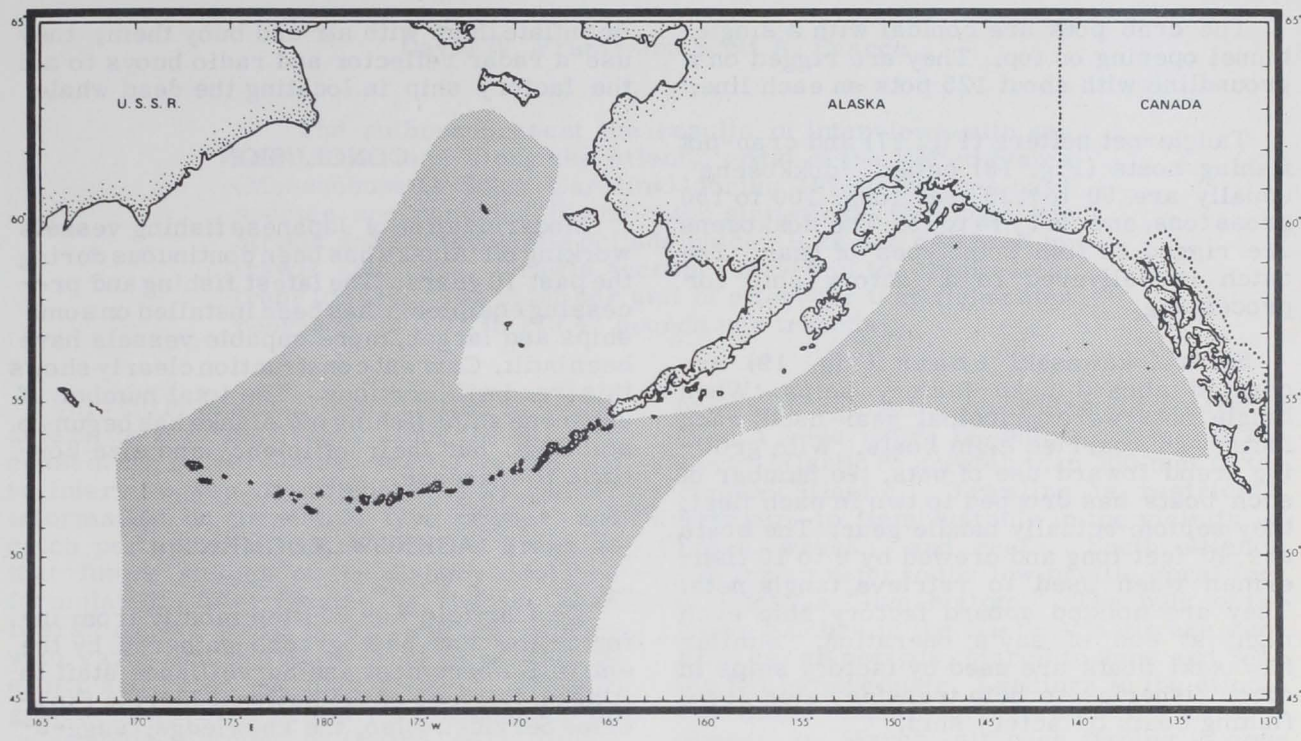


Fig. 20 - Japanese whaling area off Alaska.



Fig. 21 - Whale catcher of the type used off Alaska. Note the catwalk used by the captain or harpooner to get from the bridge to the bow and the harpoon gun mounted on the bow.

The crab pots are conical with a single-tunnel opening on top. They are rigged on a groundline with about 125 pots on each line.

Tangle-net setters (Fig. 17) and crab-pot fishing boats (Fig. 18) called 'dokkosens', usually are 90 to 120 feet long, 100 to 150 gross tons, and carry 14 to 15. The dokkosens are rigged to fish both types of gear. The catch is delivered to a factory ship for processing.

Several kawasaki boats (Fig. 19) are carried aboard crab factory ships. When tangle nets were principal gear used, each factory ship carried eight boats. With growing trend toward use of pots, the number of such boats has dropped to two in each fleet; they seldom actually handle gear. The boats are 40 feet long and crewed by 9 to 10 fishermen when used to retrieve tangle nets. They are hoisted aboard factory ship each night at end of day's operation. Similar kawasaki boats are used by factory ships in other fisheries to help transfer catch from fishing boats to factory ship.

#### WHALING OPERATION

Japanese whaling off Alaska (Fig. 20) is conducted by whale catchers (Fig. 21) in fleets of 6 to 10 with a factory ship. A typical catcher vessel is 195 to 210 feet long, 500 to 750 gross tons, speeds up to 20 knots, and crew of 18 to 20. The catchers range as far as 200 miles from their factory ships when scouting for whales. The whales are killed by explosive-headed harpoons fired from a gun mounted on the high bow. The harpooner is often the captain. After positioning the ship near the whale, he runs on a catwalk from bridge to bow to man the gun. The catchers either deliver the whales to the factory ship,

or inflate them with air and buoy them; they use a radar reflector and radio buoys to aid the factory ship in locating the dead whale.

#### CONCLUSION

Modernization of Japanese fishing vessels working off Alaska has been continuous during the past 10 years. The latest fishing and processing equipment has been installed on some ships and larger, more capable vessels have been built. Current construction clearly shows this trend will continue. The total number of Japanese ships fishing off Alaska has begun to stabilize, but their efficiency and size continue to increase.

#### ACKNOWLEDGMENT

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