JAPANESE TANNER CRAB FISHERY IN EASTERN BERING SEA

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Japan's two eastern Bering Sea king crab fleets diversified into a full-scale pot fishery for tanner crab (Chionoecetes sp.) in the summer of 1969. This new tanner crab fishery is a timely example of a fishery shifting to meet new demands of economic survival.

The tanner crab resource is not a new discovery. It occupies the same range where king crab has been exploited commercially by the Japanese since 1930. Japanese king crab fleets in the eastern Bering Sea began processing small amounts of tanner crab in 1953. Their production remained at experimental levels, ranging from 170 to 3,457 cases annually until 1964. Early attempts, both foreign and domestic, to extract tanner crab meat from the shell were not competitive with king crab processing then riding the crest of a burgeoning market.

Interest Heightened After 1965

Japanese interest in tanner crab expanded considerably following the 1965 U.S.-Japan King Crab Agreement. That established a quota on the Japanese eastern Bering Sea king crab catch. Emphasis on tanner crab utilization intensified further as king crab catches declined and prices climbed to unacceptable levels in the Japanese market. Tanner crab are retailed primarily as frozen sections and frozen meat in Japan; they find a ready market there with demand and price expected to continue upward.

The response in the Japanese fishing industry to a developing domestic tanner crab market became particularly evident in 1968. Then, in addition to the king crab fleets, several relatively small tanner crab processing ships moved onto the central and eastern Bering Sea grounds. These ships had been fishing tanner crab in the traditional ground near Olyutorskiy Gulf off the Soviet coast. The vessels were diverted 700-800 miles to the southeast and became the first serious commercial effort on the eastern Bering Sea tanner crab stocks. Typically 500-1200 gross tons and employing 35-50 men, they fished exclusively with crab pots. The smaller vessels handled all phases--from pot handling through cooking and freezing. The larger ships were accompanied by pot-setting boats of 80 gross tons. Crab butchering and cooking was done on the weather deck of all these processing ships. These expeditions fished some large U.S.-type king crab pots, but emphasis centered on smaller conical pots rigged several to a groundline.

Mothership Fleets in 1967

During summer 1967, Japan's two mothership-based, king-crab tangle-net fleets began limited use of tanner crab pots though the traditional tangle gear takes five times more tanner than king crab in some areas. Use of pots by the mothership fleets further increased in 1968. By 1969, the two mothership fleets in Bristol Bay used tangle nets and conical pots in nearly equal ratio, and pot use is expected to increase next season. All tanner crab effort in 1969 was incorporated with the two traditional king-crab tangle-net fleet operations.

The Grounds

In general, Japan's expanding tanner crab fishery shares a common season and area with the traditional king crab operations. The eastern Bering Sea crab grounds encompass most of the Bristol Bay "flats" on the Continental Shelf area north of the Alaska Peninsula to Cape Newenham and west to about 175° W. longitude. The extensive Bering Sea Continental Shelf connects Alaska and the Soviet Union on the southern approaches to Bering Strait, and thence northward. It provides a remarkably uniform bottom at depths generally between 30 to 50 fathoms--extending from the Alaska Peninsula west and north to Siberia. Within about 50 miles of the Shelf edge, or 100-fathom curve, the ocean floor falls gradually through 70 and 80 fathoms.

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Tanner Processors Before 1969

Prior to 1969, the small tanner processors fished productively in 60-70 fathoms along the Shelf edge between Cape Olyutorskiy (Siberia) and the Pribilofs, as well as on the Shelf near the Pribilofs. The 1969 effort was limited to north of the Alaska Peninsula and near the Pribilof Islands (fig. 1). Fishing began in March with the fleets first working some 20-30 miles offshore north of Unimak Island to as far northeast as off Port Moller. About early May, the effort shifted west to near the Pribilofs. By mid-June, the fishery had returned to north of the Alaska Peninsula. Generally, quotas are filled and the fleets bound for Japan sometime in September or early October.

Factoryships in E. Bering

Current Japanese crab effort in the eastern Bering Sea is centered around two 7,500-ton factory ships, each carrying 4-6 forty-

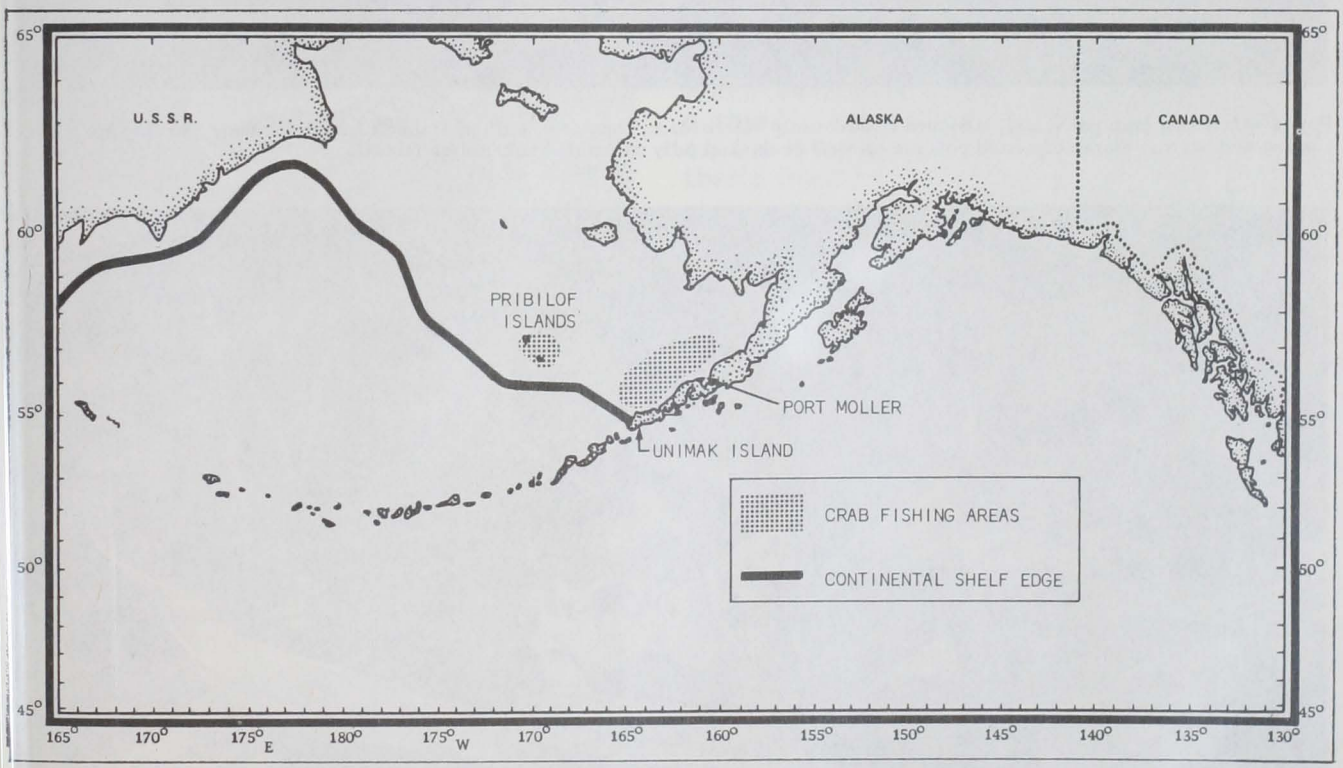

Fig. 1 - Japanese tanner and king crab fishing areas off Alaska, 1969.

Between 1966 and 1969, the Japanese tanner crab catch east of 175° W. longitude in the Bering Sea increased elevenfold--from 1.5 million crab in 1966 to 8.6 million in 1967, 12 million in 1968, and 17.6 million crab in 1969. The 1969 catch exceeded the anticipated 16 million crab by 1.6 million. Crab size varies between areas, but an average of 150 tanner crab is required for one case of 48 half-pound cans. The Bristol Bay tanner crab have a higher market value, apparently because of larger size, than those caught on the western side of the Bering Sea. Reportedly, the Japanese industry considers crab of $3\frac{1}{2}$ inch carapace width to be commercially usable, though U.S. observers have noted that crab less than $4\frac{1}{2}$ inches are seldom used. Because females are small, they are not retained in commercial operations.

foot kawasaki boats. The kawasaki boats are used primarily for retrieving tangle nets; on occasion, they work pots. Other accompanying vessels, clippers or small trawlers in the 80- to 150-ton category, were increased from 6 per factory ship to 15 or more in 1969. These larger vessels are responsible for setting net fields and pot gear, and for retrieving pots and some tangle gear.

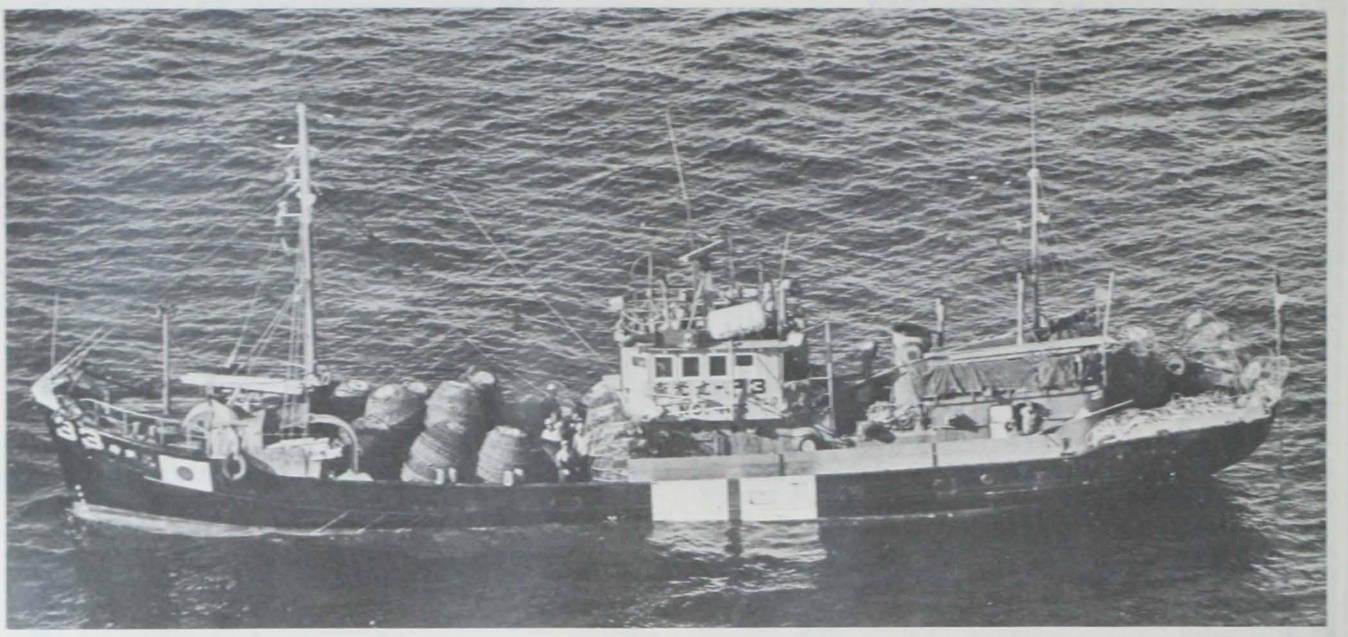

Fig. 2 - A tanner crab pot vessel, assigned to mothership 'Keiko Maru,' sets gear north of Unimak Island. A buoy and flag are visible going over stern. Stacks of nested pots are on well deck, and fully assembled pots are on fantail.

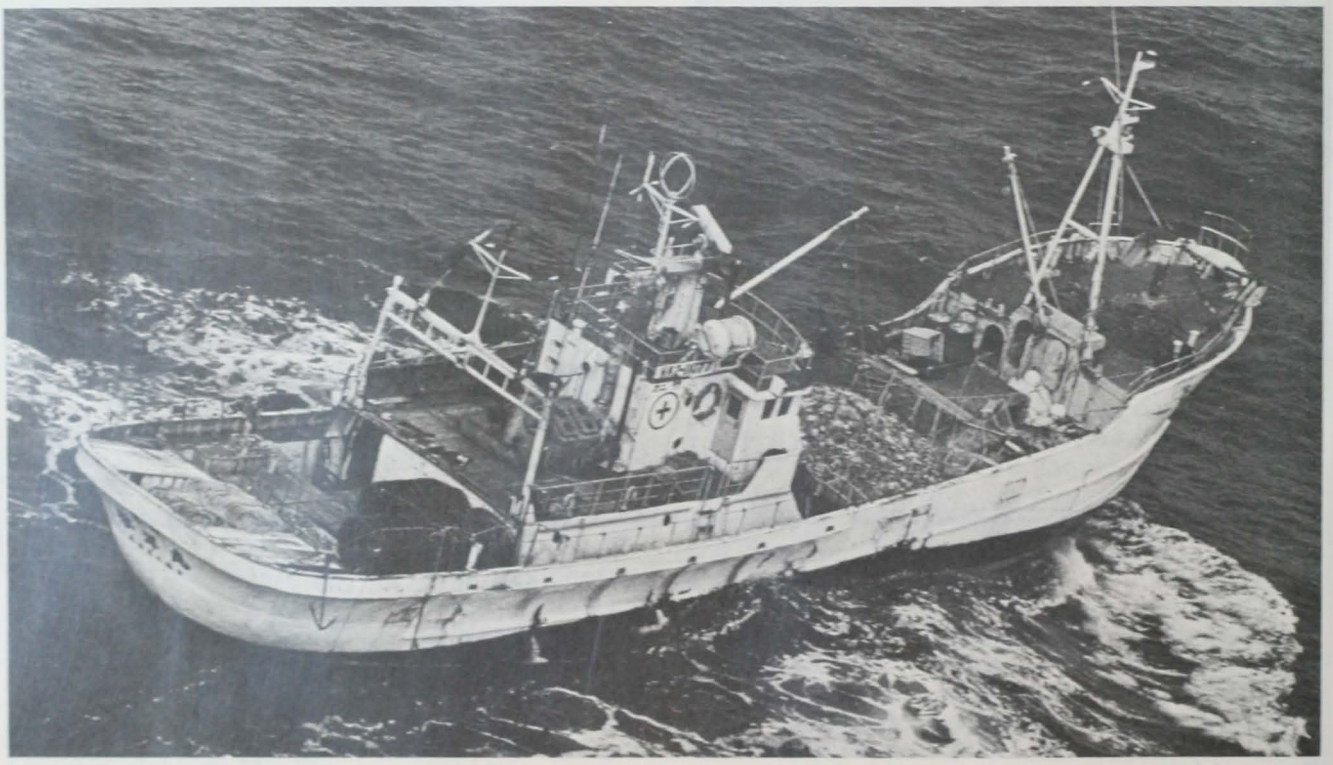

Fig. 3 - Aerial view of Japanese vessel handling tanner crab pots. Crab are visible stowed in sling loads on well deck. Longlines that carry the pots are coiled on fantail, with nested pots stored to one side.

Lightweight Pots on Longline

Since at least 1965, Japanese fishermen have experimented with pot fishing for king and tanner crab in the Bering Sea. Large king crab pots, patterned on U.S. models, have proved unacceptable thus far. Highly successful, however, are lightweight pots for tanner crab fished on a longline. They are designed to take tanner crab and are selective of that species. Basic design resembles a top-entry beehive shape. Framework is $\frac{3}{8}$-inch black iron rod, except the bottom frame of $\frac{1}{2}$-inch stock wrapped with rope to reduce chafing. The circular base is 45 inches in diameter and the circular top 28 inches across. Top, middle, and bottom frames are welded to straight rods to form a structure 22 inches high. This framework is covered with 6-inch, stretched measure, synthetic fiber web. Some variation in mesh size and frame size occurs. The web bottom of the pot opens for dumping crab. Then it is easily closed by puckering with a drawstring arrangement that secures by means of a hook and stout rubber band. The entry tunnel, hanging vertically from the web top, is a sheet of white plastic sewn into a tunnel 20 inches wide; this tapers to 14 inches diameter and 8 inches long. The complete pot weighs about 40 pounds.

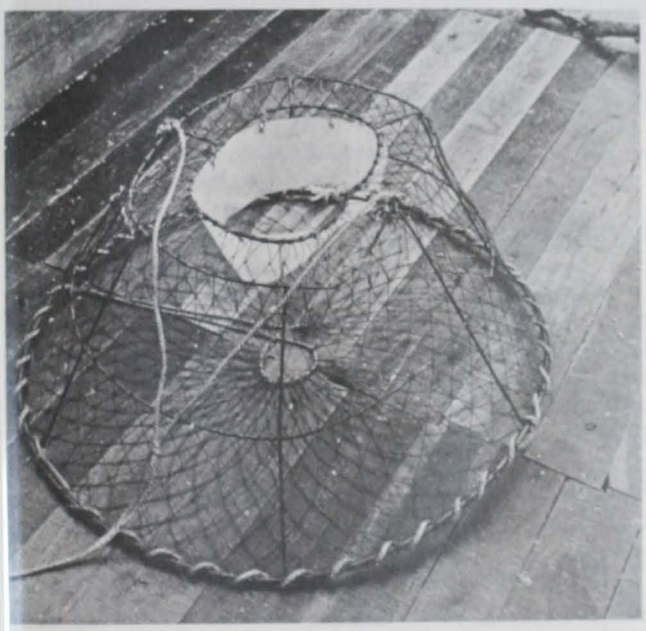

Fig. 4 - Tanner crab pot used by Japanese fleets in Bering Sea. Attached to anchored ground lines, about 1 mile long, these pots are highly selective for tanner crab.

Fishing The Pots

Each pot is rigged with bridle and a 4-fathom gangion ending in an eye splice. Bridles usually are knotted to the top frame in two places, so the pot hangs vertically. Some variation on this rigging incorporates a third piece in the bridle secured midway on the side of the pot. Most lines are synthetic fiber.

Due to ease of handling, pots can be stacked on deck in a ready-to-fish condition. Completely releasing the bottom drawstring, however, permits such efficient nesting that a stack of 30 pots is only 6 to $6\frac{1}{2}$ feet high. A common sight on the fishing grounds is a pot boat carrying hundreds of pots, stacked on all available deck space, so the original ship profile is unrecognizable.

A typical gear arrangement in the Bering Sea is 128 pots on a 3,200-meter groundline. Longlines are anchored and buoyed with glass floats and flagged poles similar to tangle net

Fig. 5 - Japanese crab factory ship 'Keiko Maru,' one of two motherships supporting crab fleets in eastern Bering Sea. Both king and tanner crab are processed on board.

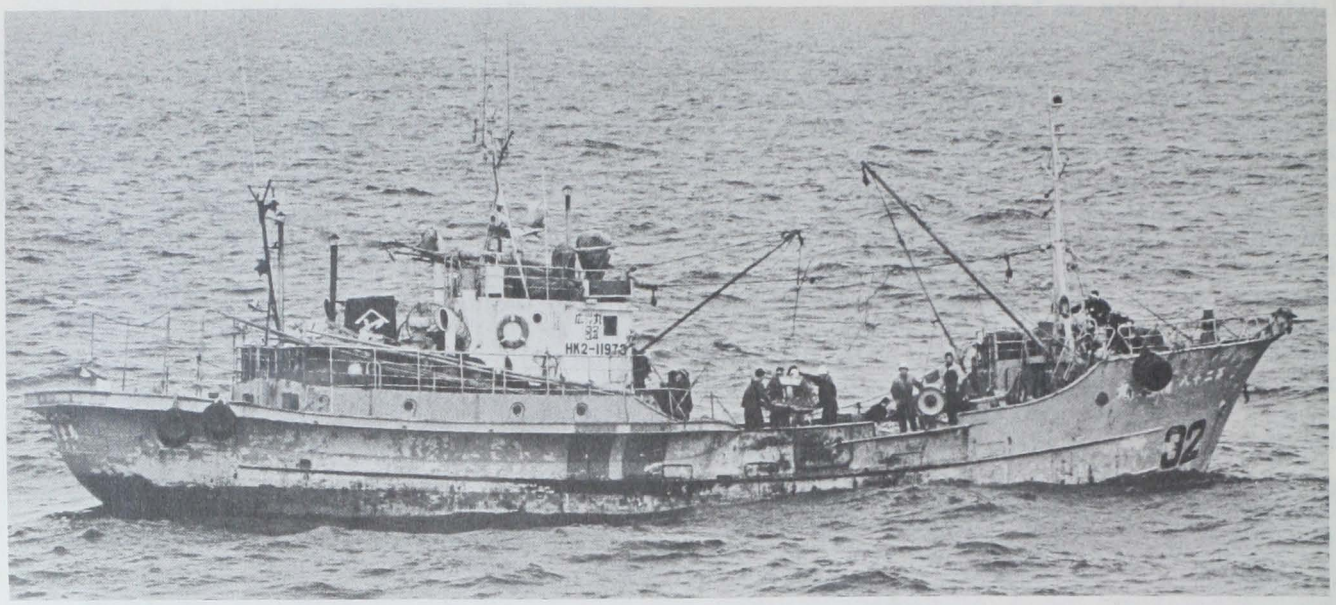

Fig. 6 - A Japanese ship, about 90 feet long, retrieves tanner crab pots. Groundline comes aboard over power roller at starboard rail. (Photos: M. C. Zahn)

gear. Flag code indicates either tangle net or pot string. Both types of gear are set parallel to each other, and as close as one-fourth mile. Gear strings in the eastern Bering Sea are set on a northwest/southeast direction. The longline is retrieved over a power roller at the starboard rail of the well deck, although some boats are rigged for port hauling. There is some variation in handling gear as it comes aboard. In one method, the pot is emptied on deck, and then is baited and reset without detaching from the longline. In other cases, the pots are hand carried to the fantail for stacking, and the longline passed aft and coiled in separate piles. Pots on the stern work areas usually are nested in tight groups on their sides rather than in vertical stacks, apparently for ease of handling during setting. A platform on the stern facilitates setting gear with strings of pots being set at about 5 knots. Crab on board pot boats are stored in sling loads on deck to facilitate delivery to the mothership, generally within 24 hours. Catches, frequently dead but in good condition, are unloaded day and night with delivery and turn-around taking less than one-half hour.

Herring Bait

The usual bait is herring and herring waste placed in small perforated plastic containers of about $\frac{1}{2}$-cup capacity. Three bait containers are placed in each pot. Another successful bait has been Pacific cod (Gadus macrocephalus) used as hanging bait. Pot strings, normally, are fished for 2- to 4-day soaks. Pot success, with seasonal and area variations, has ranged from 12 to 17 crab per pot.

The two species of tanner crab (Chionoecetes [bairdi and opilio]) in the Bering Sea pack are not differentiated in processing. They are marketed in Japan simply as "zuwaigani" (tanner crab). After cooking, most of the meat is frozen, and less than one-third of the pack is canned. The final frozen product varies from legs with shell on to flake meat and leg meat segments. By 1969, large tanner crab legs were retailing for as much as 14 cents each in Japanese markets. Recent use of clear plastic shrink packs, before freezing, has increased market value. It was being considered for larger use in 1970.