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The Pacific Halibut:
Biology, Fishery, and Management

by
The International Pacific Halibut Commission

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Contents

FOREWORD

This report provides a general review of the biology of the Pacific halibut, its fishery, and management. It is designed to answer questions frequently asked by fishermen, students, and the general public. The report is an update and expansion of Technical Report No. 6 by F. Heward Bell and Gilbert St-Pierre that was published in 1970 and is now out of print. The information has been excerpted from the Commission's publications that are listed at the end of this report.

The Pacific Halibut: Biology, Fishery, and Management

by

The International Pacific Halibut Commission

Biology

DESCRIPTION AND SCIENTIFIC NAME

Halibut belong to a family of flounders called Pleuronectidae. Most fishes are torpedo-shaped and symmetrical, but flounders are compressed laterally and, except in the larval stages, have both eyes on one side of the head. Halibut usually are dextral, that is, both eyes are on the right side, which is heavily pigmented and is oriented toward the surface. Pigmentation varies from olive to dark brown or black with lighter, irregular blotches that often are similar to the color pattern of the ocean floor. This protective coloration makes the fish less conspicuous to predators and prey. The left or blind side faces the ocean bottom and usually is white.

Halibut are more elongate than most other flatfishes. The average width of the body is about one-third its length. The mouth is relatively large, extending to below the lower eye, and nearly symmetrical. The small, smooth scales are well buried in the skin and the lateral line has a pronounced arch above the pectoral fin. The tail or caudal fin is crescent-shaped or lunate (Figure 1).

The scientific name for Pacific halibut is *Hippoglossus stenolepis,* a name derived from the Greek *hippos* (horse), *glossa* (tongue), *steno* (narrow), and *lepis* (scale). The name was proposed by a Russian scientist, P. J. Schmidt, in 1904,

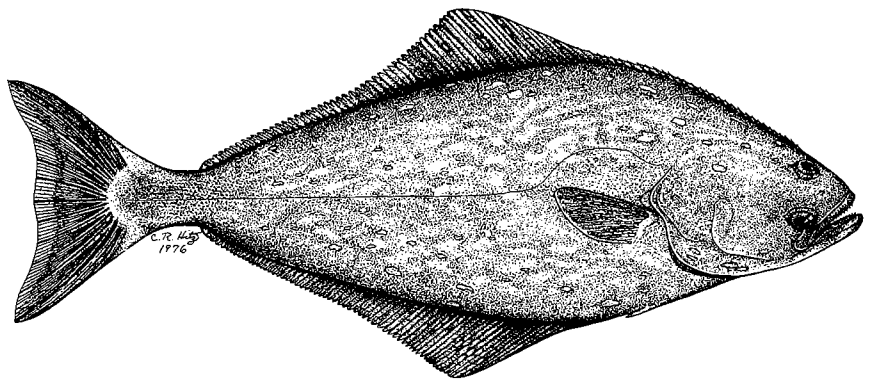


Figure 1. Adult Pacific Halibut, *Hippoglossus stenolepis.* (Drawing by Charles R. Hitz)

who distinguished the Pacific halibut from the Atlantic halibut (*Hippoglossus hippoglossus*) by anatomical differences such as the shape of the scales, length of the pectoral fin, and the shape of the body. In 1936, another Russian, M. F. Vernidub claimed that the differences between the Atlantic and Pacific halibut did not warrant the designation of separate species and she suggested the name *Hippoglossus hippoglossus stenolepis* for Pacific halibut. However, North American scientists have detected other morphological differences between halibut from the Pacific and those from the Atlantic and the name suggested by Schmidt is the one most commonly accepted.

DISTRIBUTION AND MIGRATION

Pacific halibut are found on the continental shelf of the North Pacific Ocean. They have been recorded along the North American coast from Santa Barbara, California to Nome, Alaska (Figure 2) and also occur along the Asiatic Coast, from the Gulf of Anadyr, U.S.S.R. to Hokkaido, Japan. Halibut are demersal, living on or near the bottom, and prefer water temperatures ranging from 3° to 8° C. Although halibut have been taken as deep as 600 fathoms, most of them are caught during the summer when they are at depths from 15 to 150 fathoms. Halibut move from deep water along the edge of the continental shelf to shallower banks and coastal waters during the summer and most return to deep water in the winter. This seasonal movement also is associated with spawning. These movements and coastwide migrations, that may involve distances of hundreds of miles, have been documented by tagging experiments.

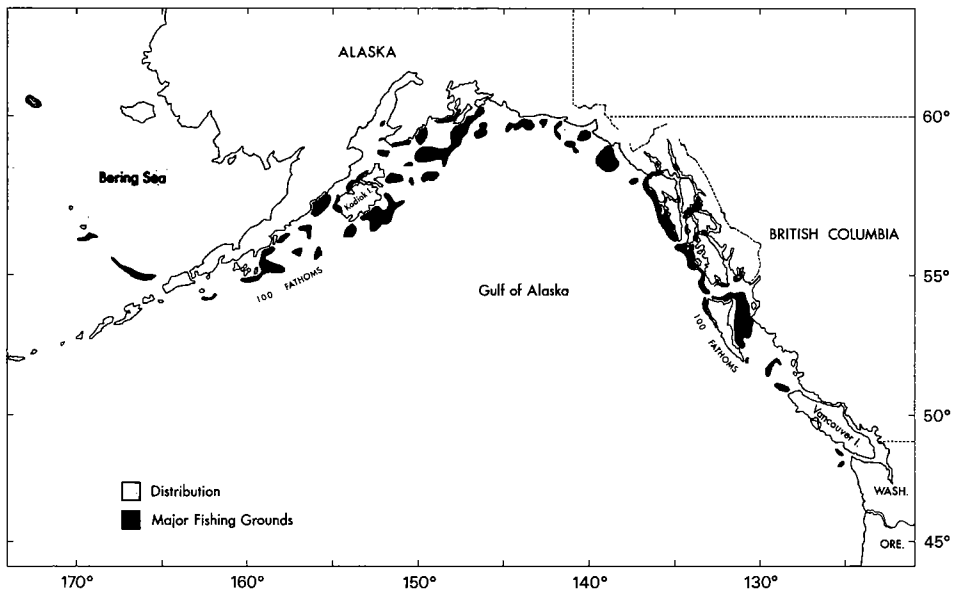


Figure 2. North American distribution of Pacific halibut and major fishing grounds.

The International Pacific Halibut Commission (IPHC) has tagged over 200,000 halibut since 1925 and over 30,000 tagged fish have been recovered. A reward is paid for tags that are returned to IPHC (see reward poster, inside

back cover). Most of the tagging experiments have been conducted in the summer and most of the recoveries are made during the summer when fishing is permitted. Although extensive summer to summer movements have been recorded, most of the recoveries are made within 60 miles of the release area. Data from experiments in which halibut were tagged or recovered in the winter are limited, but the results show that movements are more extensive than in summer and that the predominant direction of movement may differ substantially between the two seasons.

The distance and direction of the migrations also may differ with the size and age of the fish. Emigration has been observed from all regions, but no recoveries of adult halibut released in the Gulf of Alaska have been made in the Bering Sea. An example of the distribution of tag recoveries from a Bering Sea experiment in 1959 is shown in Figure 3. Halibut occasionally migrate great distances and six tags have been recovered over 2,000 miles from their point of release. These fish were tagged in the Bering Sea or near the Aleutian Islands and recovered at points from Cape Flattery, Washington to Cape Mendocino, California. One of the fish was recovered 2 years after being released; the others were recovered in 5 or 6 years. The longest migration was from Atka Island in the Aleutian Islands to Coos Bay, Oregon, a distance of 2,500 miles. Another halibut released southeast of Cape Navarin, U.S.S.R. during a joint Soviet-IPHC experiment in 1975 was recovered in 1977 near the Shumagin Islands in Alaska, a distance of 1,000 miles.

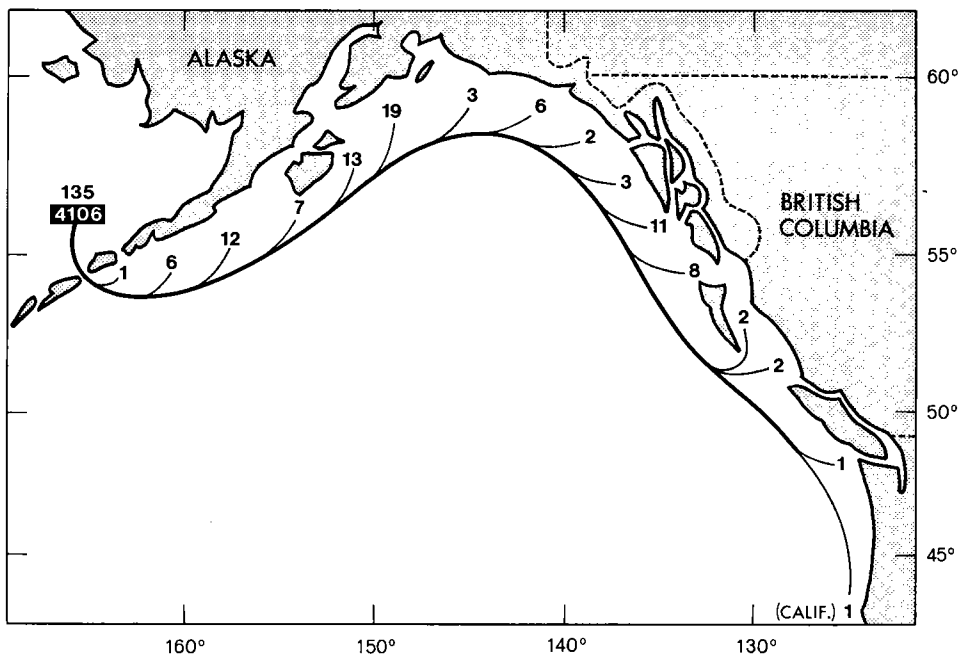


Figure 3. Recoveries of halibut tagged in the Bering Sea during 1959. The number of fish tagged is shown in the black box.

Juvenile halibut, those under 7 years old, also migrate long distances, apparently counterbalancing the northwesterly drift of the eggs and larvae as described in the next section. These juvenile and adult movements result in net migrations of an easterly and southerly direction in the Gulf of Alaska.

This complex pattern of movements indicates that the halibut stocks are interrelated and that intermingling is extensive, a factor that must be considered in the management of the fishery.

REPRODUCTION AND DEVELOPMENT

Maturity varies with sex, age, and size of the fish. Most males are mature by the time they are 8 years old, whereas the average age of maturity for females is about 12 years. From November to March, mature halibut concentrate on spawning grounds along the edge of the continental shelf at depths from 100 to 250 fathoms. Spawning occurs annually. The major spawning sites include Cape St. James, Langara Island (Whaleback), and Frederick Island in British Columbia and Yakutat, Cape Suckling-Yakataga ("W" Grounds), Portlock Bank, and Chirikof Island in Alaska. Other reported spawning locations include Goose Islands, Hecate Strait, and Rose Spit in British Columbia and Cape Ommaney, Cape Spencer, and Cape St. Elias in Alaska. Spawning concentrations also occur in the Bering Sea. In addition to these major grounds, there is reason to conclude that spawning is widespread and occurs in many areas, although not in as dense concentrations as those mentioned above. Evidence to support this conclusion is based on the widespread distribution of mature halibut during the winter months as indicated by research and commercial fishing.

The number of eggs produced by a female is related to its size. A 50-pound female will produce about 500,000 eggs, whereas a female over 250 pounds may produce 4 million eggs. The free-floating eggs are about 3 mm in diameter when released and fertilization takes place externally. Developing ova generally are found at depths of 50 to 100 fathoms, but occur as deep as 250 fathoms. The eggs hatch after about 15 days, depending upon water temperature. The eggs and larvae are heavier than the surface sea water and drift passively in deep ocean currents. As the larvae grow, their specific gravity decreases and they gradually move towards the surface and drift to shallower waters on the continental shelf. The entire life cycle of halibut is depicted in Figure 4. Postlarvae may be transported many hundreds of miles by the Alaskan Stream which flows counterclockwise in the Gulf of Alaska and westward along the Alaska Peninsula and Aleutian Islands. Some of the larvae are carried into the Bering Sea. The velocity of this current may exceed a mile per hour in certain coastal areas, but overall speeds of 3 to 5 miles per day are more typical.

Halibut larvae begin life in an upright position with eyes on each side of the head. Nutrition is derived from a prominent yolk sac until it is absorbed during the early postlarval stage; then the young fish must begin feeding on small planktonic organisms. When the larvae are an inch long, an extraordinary transformation or metamorphosis occurs: the left eye moves over the snout to the right side of the head and the pigmentation on the left side fades. When the young fish are about 6 months old, they have the characteristic adult form and settle to the bottom in shallow inshore areas. Detailed drawings of these early life history stages are depicted in Figure 5.

The survival of young halibut is affected by the environment and the abundance of the year classes varies accordingly. Juveniles from 1 to 3 years old generally remain in relatively shallow inshore waters and usually are

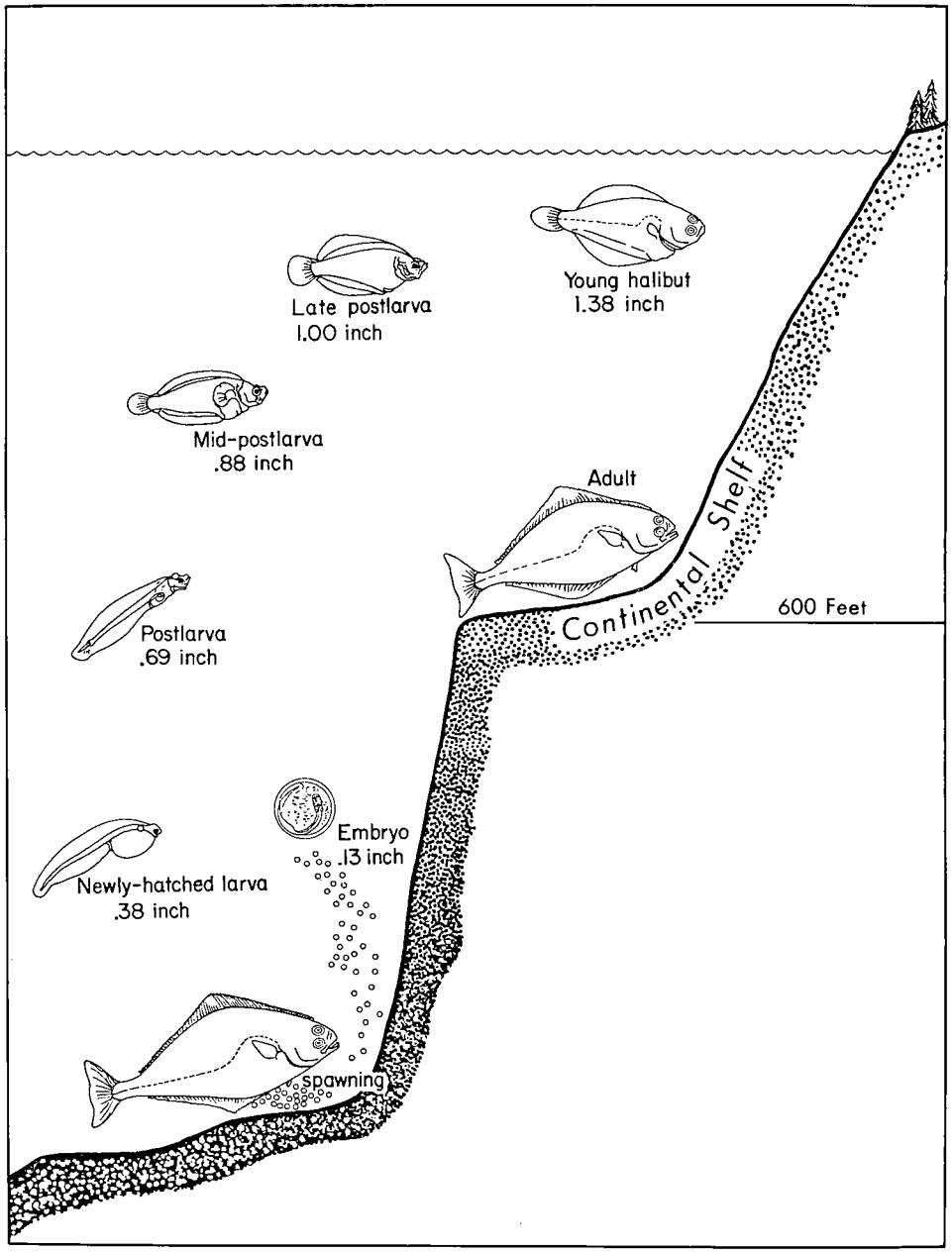


Figure 4. Life cycle of Pacific halibut.

not caught by the commercial setline fishery. With increasing age, many juveniles move to deeper waters and migrate in an easterly and southerly direction, reciprocal to the passive movement of eggs and larvae. Juveniles tagged in the Bering Sea and the western Gulf of Alaska have migrated as far south as British Columbia, apparently returning to the general area in which they were spawned. During this phase, many of the young halibut are taken as an incidental catch in trawls that are used to catch other species of groundfish.

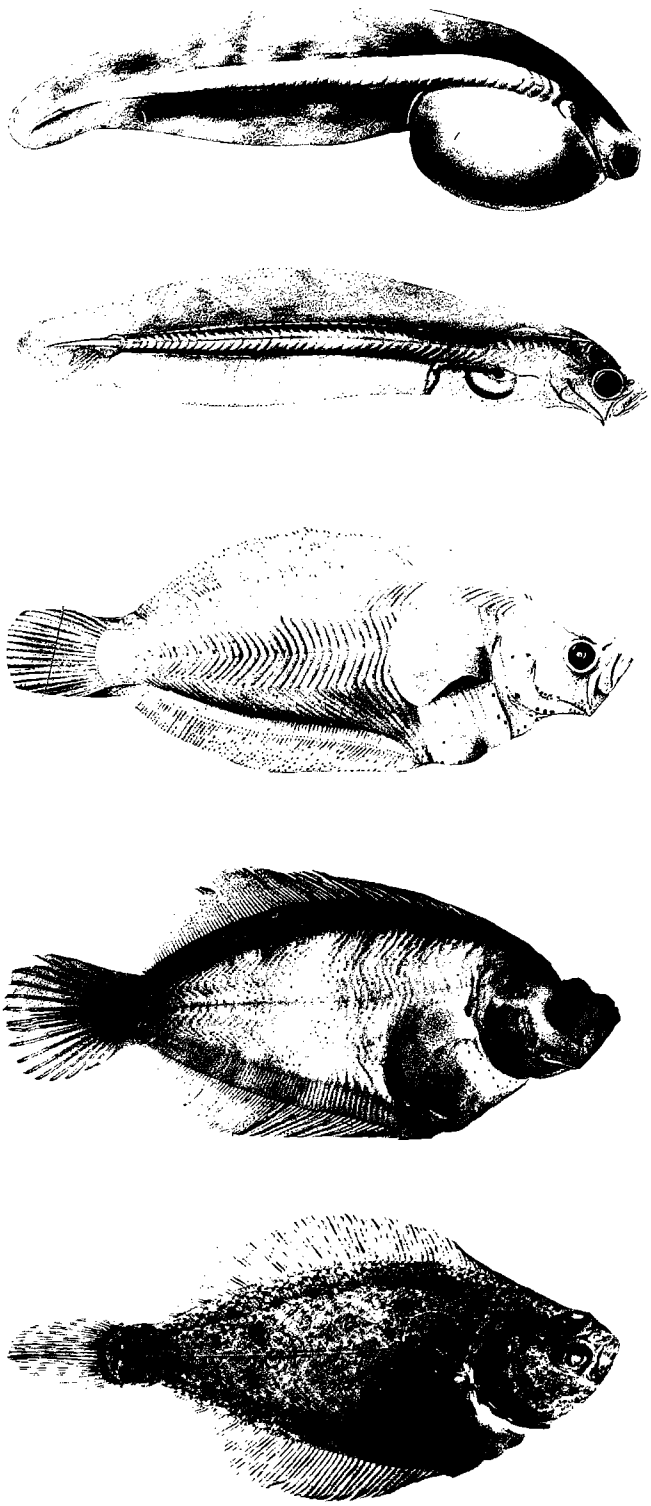


Figure 5. Growth and early development of halibut.

FOOD AND FEEDING

Halibut are strong swimmers and carnivorous feeders, eating almost any food they can catch. Larval halibut feed on plankton, whereas halibut 1 to 3 years old, that usually are less than 30 cm (12 inches) long, feed on small shrimp-like organisms and small fish. As halibut increase in size, crabs and fish become a more important part of the diet. The species of fish frequently observed in stomachs of large halibut include cod, sablefish, pollock, rockfish, sculpins, turbot, and other flatfish. Halibut often leave the bottom to feed on pelagic fish such as sand lance and herring. Octopus and clams, as well as an occasional smaller halibut, also contribute to their diet. Crabs with a carapace width of 7 inches have been found in the stomachs of halibut.

AGE AND GROWTH

Halibut are the largest of all flatfish and are among the larger species of fish in the sea. The largest specimens usually are over 9 feet long and have been reported, both in the Atlantic and Pacific, to weigh 700 pounds, but these weights have not been thoroughly documented. An 8-foot long, 33-year-old female that weighed 375 pounds with its head and viscera removed, or 500 pounds live weight, is shown in Figure 6. This fish was caught in the Bering Sea in 1974 by the vessel *Thor*. At $.80 per pound, the gigantic halibut was worth $300.00 to Captain Ralph Lund and his crew; at 1977 prices, the fish would be worth $500.00. Two other specimens weighing 500 pounds have been authenticated, one from Petersburg, Alaska and the other from Sakhalin Island, U.S.S.R. The North American catch of Pacific halibut, caught mostly by longline gear, consists of individuals chiefly from 10 to 200 pounds. The average size in the commercial catch is between 30 and 40 pounds. Few males reach 80 pounds and nearly all halibut over 100 pounds are females.

IPHC studies have shown that female halibut grow faster and live longer than males and that both males and females grow faster now than they did many years ago. For example, in the 1960-1970 period, 10-year-old male and female halibut in the Gulf of Alaska were on the average 38 and 46 inches long and weighed 18 and 35 pounds respectively. In the 1920's, the same fish would have averaged 29 and 32 inches long and weighed 8 and 10 pounds respectively. This increase in the growth rate since the 1920's is assumed to be the result of changes in population density and/or environmental conditions. The increased growth has important biological and management implications because stock biomass and fecundity are related to the growth rate.

The age of halibut is determined from the otolith, a calcareous or stone-like body in each internal ear, that serves as a hydrostatic or balancing organ (Figure 7). As the fish grows, the otoliths also grow and the size of halibut can be estimated from the otolith's length or weight. Each year, alternating opaque (summer) and translucent (winter) rings are deposited on the otolith. The paired growth rings are called annuli and are counted to determine the age of the fish. The oldest age recorded for a halibut is 42 years for females and 27 years for males. Most halibut in the North American setline catch are 8 to 15 years old.

IPHC biologists sample the commercial catch and obtain age and length information from about 40,000 halibut each year. This information is used

Figure 6. Female halibut 33 years old, 8 feet long, and 500 pounds before the head and viscera were removed.

to assess the condition of the resource. For example, the number of fish at each age class in the catch indicates the relative strength of individual year classes. Over a succession of years, individual year classes can be traced throughout their life and the rate at which their numbers decrease is an indication of their mortality rate. The increase in length with successive age provides a measure of the growth rate of the fish. Strength of year classes, mortality rates, and growth are essential items of information for determining stock condition and necessary conservation measures.

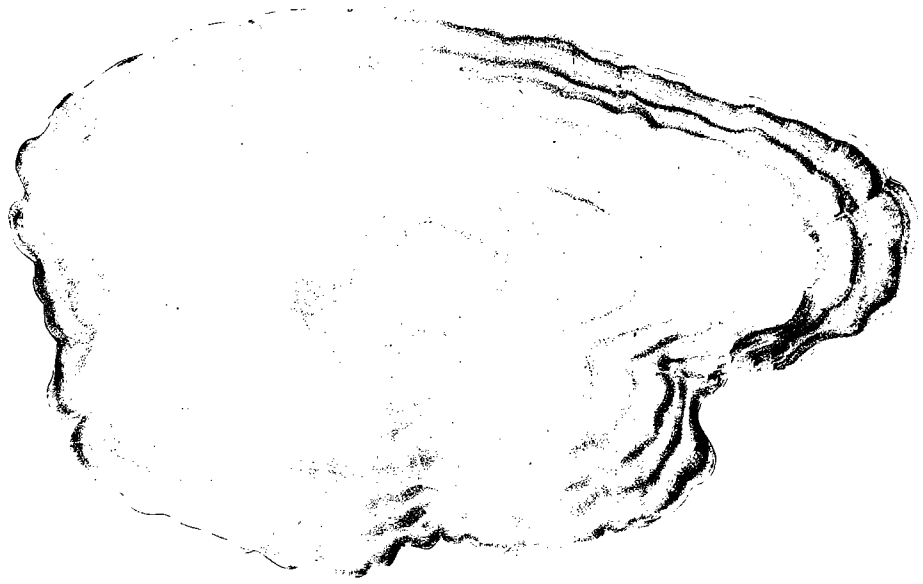


Figure 7. Otolith from a halibut in its ninth year. Photographed on a dark background, the wide, white bands are the opaque summer zones; the dark rings are the translucent winter zones.

The Fishery

THE INDIAN FISHERY

Halibut and other marine animals were a part of the folklore of coastal Indian tribes and were commemorated in carvings on totem poles or painted on the fronts of community houses (see back cover of this report). The following excerpt is from a Tsimshian myth that mentions a supernatural halibut:*

> "On the following day three of their young people went out in a canoe across the inlet; and when they reached the foot of a steep cliff, behold! a large halibut came up, opened its mouth, and swallowed the canoe with the three persons — two princesses and one prince. The people on the other side saw it. Therefore two of their brave men went to kill the monster who had devoured their prince and their princesses. They crossed the inlet in their canoe, having their large knives tied to the right wrist. As soon as they reached the foot of the steep rock, a halibut came up, opened its mouth, and swallowed the canoe with the two brave men; but as soon as the halibut had swallowed them, they cut it inside with their knives. They cut up its intestines until it died. Then the supernatural halibut felt the pains in its stomach, jumped out of the water, and struck the water with its tail. It swam around the inlet, and finally ran ashore and died there. Then those who had remained alive went down to the beach, and saw that the great supernatural halibut was dead. They cut it open, and saw the two canoes and five persons. Then they sang their mourning-song."

Halibut was included in the diet of several tribes and their hook and line fishery was conducted from large canoes which ventured as far as 20 miles from shore (Figure 8). The technique of these fishermen was well developed and very efficient:*

> "Halibut are caught with hooks made of crooked branches of red or yellow cedar, attached to fishing-lines made of red-cedar bark sixty fathoms long. The halibut hook is tied to the fishing-line with split spruceroots. Devilfish (octopus) is used as bait. The fishing-lines are taken out by the fishermen in their canoes and thrown overboard. After a while they are pulled up again. After the halibut hooks have been taken up, the fish are killed by clubbing. Then the hooks are thrown back into the water. At this place it is said that there were two fishermen in the canoe, who distinguished the halibut they had caught by placing them with the head toward the owner. The fishermen had his knees covered with a mat."

The hooks often were elaborately carved (see below) and were selective for large fish suitable for drying and smoking. Drucker provided a detailed description of the hooks that were used by various tribes:**

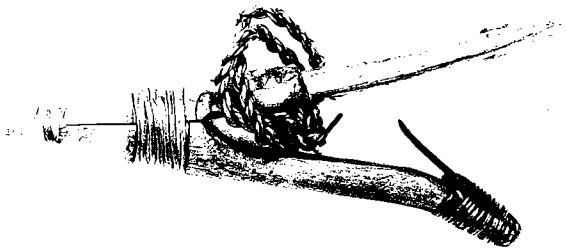
> "Halibut were taken by bottom-fishing, also, from the Olympic Peninsula north, but special hooks were used. The Tlingit, Haida, Tsimshian, and the Northern Kwakiutl groups, Haisla, and Xaihais, made halibut hooks of hardwood, shaped like a V with one short arm,

* Tsimshian Mythology by F. Boas, Bureau of American Ethnology, Annual Report 1909-1910, U.S. Government Printing Office, Washington, D.C., pp. 27-1037.

** Indians of the Northwest Coast by Philip Drucker, The American Museum of Science, Books Edition, 1963, 224 p.

Figure 8. Indian catch of halibut at Neah Bay, Washington (circa 1910). Photograph by A. H. Barnes. Hillary Irving of the Makah Tribe identified the location.

with a bone barb fastened into the short side. The shanks of these hooks were often elaborately carved with crests or figures intended to have magical potency . . . Two of these hooks were attached by short leaders to the ends of a cross-pole, to the middle of which a stone sinker was attached. The cross-pole held the buoyant wooden hooks clear of the line so as not to foul it. Large hooks of similar form, but undecorated, were used by the Chinook for the huge Columbia River sturgeon. The other Kwakiutl-speaking tribes, the Nootka, the Coast Salish of the Gulf of Georgia and Puget Sound, and the groups of northwestern Washington, made halibut hooks of spruce withes, steamed into U shape, and fitted with a sharp bone barb . . . The springy arms of the hook spread to permit the halibut to insert his snout to take the bait, then helped set the barb. These hooks were attached to one end of a short rod, the other end of which was made fast to the line, and also supported a stone weight just heavy enough to hold the rod horizontally, and keep the hook clear of the line. Lines were commonly made of the long thin stems of giant kelp."



The annual consumption of halibut by Indians in British Columbia was estimated at 3 million pounds in 1884, whereas the catch by commercial fishermen was only 150,000 pounds. The catch by the Makah Indians at Neah Bay, Washington during the late 1880's was reported at 600,000 pounds annually and the commercial fishermen landed 740,000 pounds in Washington ports in 1890. Today, many Indians in Washington, British Columbia, and Alaska participate in the commercial fishery, but records of their catch are not maintained separately. Both Indians and other citizens take small quantities of halibut in the subsistence fishery.

THE COMMERCIAL FISHERY

The Fleet

The initial impetus for expansion of the commercial fishery for halibut occurred in 1888 when three sailing vessels from New England began fishing off Cape Flattery, Washington. The catch was shipped from Tacoma to Boston on the newly-completed transcontinental railroad. By 1892, following completion of the trans-Canada railroad, Vancouver, British Columbia became the major center for the fishery. At the outset, fishing was conducted from two-man dories that were carried to the fishing grounds by relatively small sailing vessels. Larger sailing schooners and sloops joined the fishery during the next decade; however, by the late 1890's, the fishery was dominated

by large company-owned steam-powered vessels that carried 10 to 12 dories. Over the years, these steamers declined in number because of their high operating costs, labor problems, and a reduction in the stocks of halibut. At the same time, smaller independently-owned vessels powered by gasoline engines began entering the fishery and several of these were two-masted schooners carrying from five to seven dories.

During the 1920's, the rising economy, the development of diesel engines, and the expansion of the fishery across the Gulf of Alaska as far west as Unimak Pass led to a sharp increase in the number of owner-operated schooners. These diesel-powered schooners were designed to mechanically haul longline gear directly from the deck (Figure 9). This innovation quickly phased out the hand operations from dories. Most of the halibut schooners were built prior to 1930 and few have been built since that time. They ranged in size from 50 to 80 feet and were between 25 and 60 net tons. Most schooners still operating in the halibut fishery have been completely renovated. New propulsion systems, advanced navigation devices, communication equipment, hydraulic power and deck controls, cargo-hold modifications, refrigeration, new types of gear and bait, and other technological advances reduced the necessary manpower per vessel by 30%.

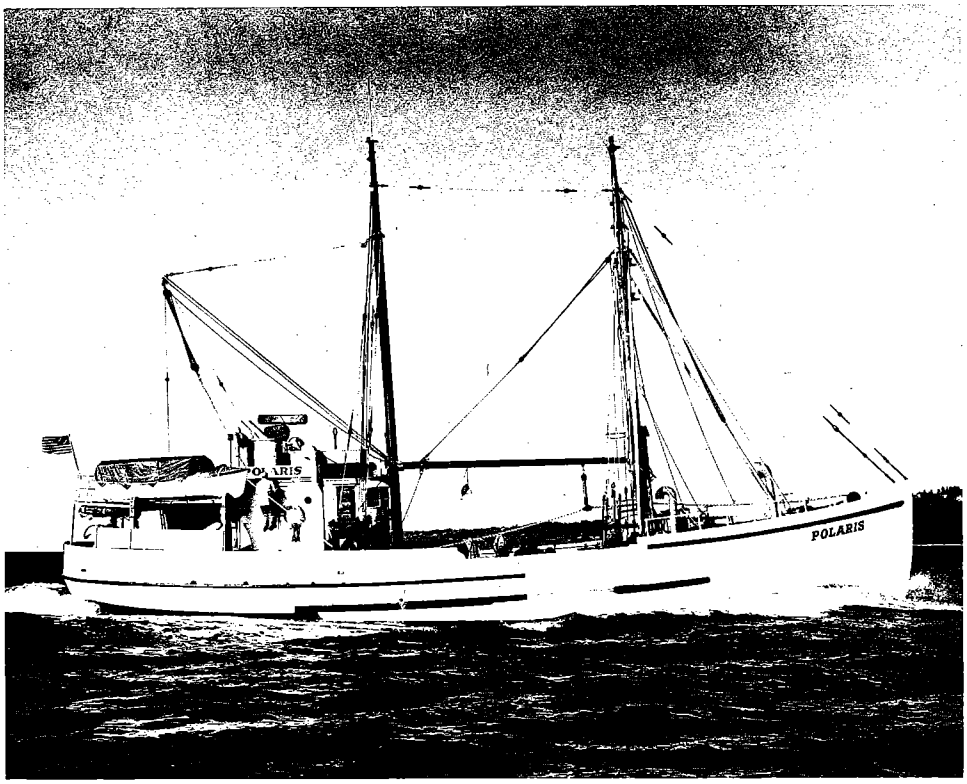


Figure 9. Halibut schooner *Polaris*, home port Seattle. Note pilothouse aft.

After 1930, most of the additions to the fleet were more versatile, the vessels could be used for trawling and purse seining in other fisheries as well as for longlining halibut (Figure 10). Small vessels, particularly salmon trollers and gillnetters, gradually entered the halibut fishery during the 1930's and 1940's.

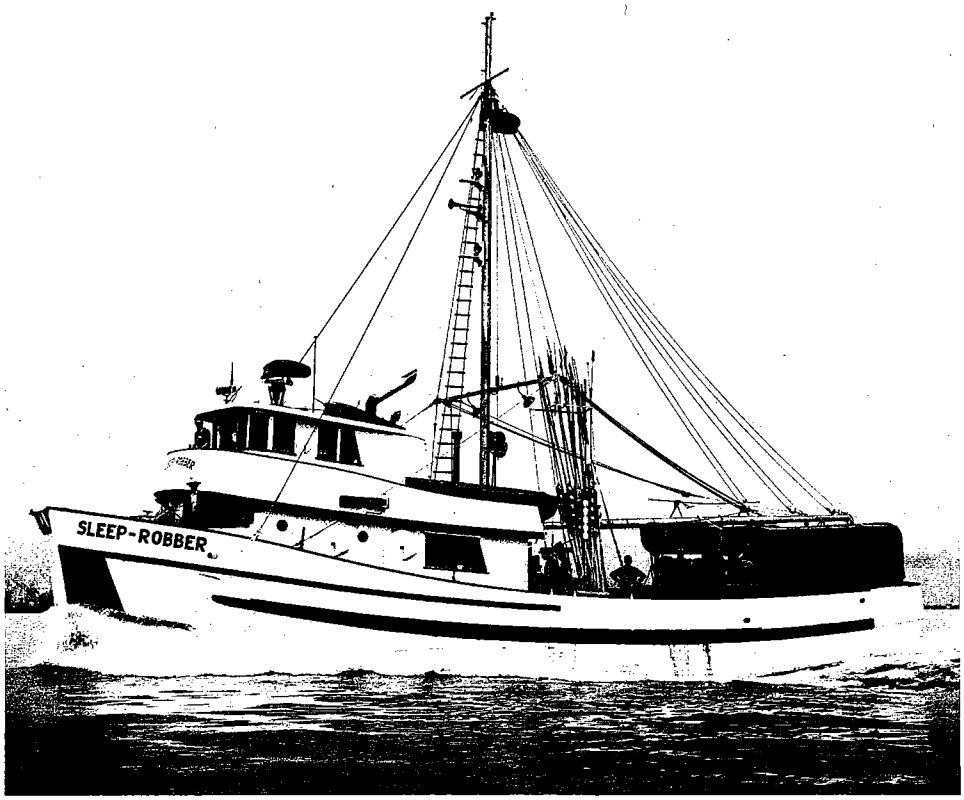


Figure 10. Seine-type vessel *Sleep-Robber,* home port Vancouver. Note pilothouse forward.

The composition of the fleet was relatively stable from 1950 through the 1960's. During the 1970's, there has been a further influx of smaller vessels fishing relatively close to port and making short trips. In part, this influx has been caused by a marked increase in the price of halibut, but also many fishermen entered the halibut fishery because they were not eligible to fish salmon under the several limited entry programs. Most of these small vessels are under 5 net tons and do not require an IPHC license. Many originally were designed for the salmon gillnet fishery and are equipped with a power-driven reel for the storage of the gillnet. The gillnet can readily be replaced with halibut gear. The number of licensed and unlicensed vessels in the 1976 halibut fleet is shown in Table 1. Although the small boat fleet (3,597 boats) far outnumbers the licensed fleet (743 vessels), they land only about 20% of the catch because most of them only fish for halibut for a few weeks before the salmon season or take halibut incidentally while fishing for salmon.

Fishermen

The majority of the halibut fishermen are of Norwegian ancestry. Many of the original immigrants had fished halibut in Norway and came to North America intent on earning their living in the Pacific halibut fishery. Once established in the fishery, relatives followed and now there are many second and third generation Norwegians in the Canadian and United States fishery.

Table 1. Number of licensed and unlicensed vessels by area and nationality, 1976.

Vessel Category	Number of Vessels						
	Area 2		Area 3		Total		Grand Total
	Canada	U.S.	Canada	U.S.	Canada	U.S.	
Unlicensed Vessels							
Trollers	1,114	1,297	0	69	1,114	1,366	2,480
Setliners*	256	517	1	343	257	860	1,117
Total	1,370	1,814	1	412	1,371	2,226	3,597
Licensed Vessels**							
5-19 Tons	269	135	6	127	275	262	537
20-39 Tons	34	35	19	68	53	103	156
40-59 Tons	2	3	8	15	10	18	28
60+ Tons	0	1	16	5	16	6	22
Total	305	174	49	215	354	389	743
Grand Total	1,675	1,988	50	627	1,725	2,615	4,340

* Vessels under 5 net tons.
**Vessels 5 net tons and larger.

Many Nova Scotians and Newfoundlanders also have participated in the West Coast fishery.

Crew size on today's halibut vessels ranges from 1 to 8 men, depending on the size of the vessel and type of gear used. Fishing crews on the larger vessels operate under closed-shop contracts between the various vessel owner associations and fishermen's unions on the Pacific Coast. These contracts specify the responsibilities of each party and establish the distribution of the gross proceeds from the trip between the vessel owner and the crew. Fishermen on smaller unlicensed vessels usually do not belong to halibut unions.

Compensation is on a share basis. About one-fourth of the gross proceeds from the sale is the "boat share" which goes to the owner of the vessel. Lost gear, insurance, and other items also are deducted from the gross. From the remainder, the trip expenses (such as food, bait, fuel, and worn gear) are deducted. The net balance, or "crew share" is divided equally among all members, including the captain. If the captain is not the vessel owner, he usually receives an additional one-tenth of the boat share. Apprentice fishermen or "in-breakers" are paid a part share until they can earn a full share. On most vessels, the cook also works on deck except when meals are being prepared.

Halibut fishermen work hard, often for 18 to 20 hours each day. During bad weather, fishing stops only when handling the gear becomes dangerous or the captain can no longer keep the vessel "on the gear". When halibut were more abundant, the larger vessels usually completed their trips in less than 15 days, but trips of 20 days or more were not uncommon during the 1970's.

At the beginning of each trip, the vessel takes on several tons of crushed ice so that the catch can be chilled near, but usually not below, the freezing point. Halibut are dressed by removing the viscera and gills soon after they are brought aboard. The body cavity or "poke" is scraped, washed, and filled with ice. The head is not removed until the catch is delivered at dockside.

The fish are stored in the hold in layers separated with crushed ice. Many vessels now have refrigeration that reduces the amount of ice needed and maintains a lower and more uniform temperature in the hold.

Fishing Grounds

Most fishing occurs in specific areas or grounds where halibut tend to concentrate because of favorable conditions such as an abundant food supply. These fishing grounds are located throughout the entire range of the species from northern California to the central Bering Sea (Figure 2). The relative importance of particular regions along the coast is evident in Figure 11 which shows the catch by decades.

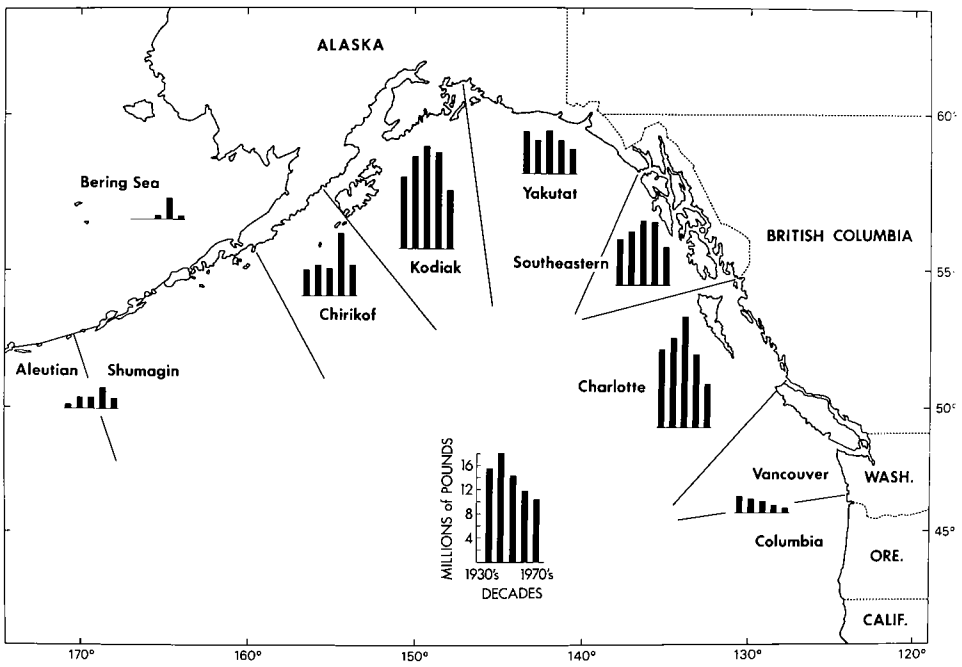


Figure 11. Distribution of the catch by coastal regions by decades from the 1930's to 1970's.

In general, halibut are found at depths less than 150 fathoms during the summer and greater than 150 fathoms in the winter. However, some halibut remain in the shallower waters year-round. The fish move into the shallower waters in the late spring as the water temperatures begin to rise.

Successful fishing depends on an intimate knowledge of the distribution of the species and the technique of setting gear with bait that will attract the fish. Experienced fishermen often prefer to set their gear on hard bottom (rock or gravel). Electronic depth sounders and navigation devices (loran) assist the captain in locating the fishing grounds. Some grounds cannot be fished when tidal currents are strong; others are difficult to fish because rock outcrops tend to snag the gear and chafe the groundline.

Fishing Gear

The gear, setting and hauling equipment, and deck arrangement for conventional longline gear are depicted in Figures 12 and 13 and are discussed in the following paragraphs. Another type of longline gear called "snap-on" is discussed later in this section. Halibut also are caught on salmon troll gear. Most of the troll catch is incidental to the salmon troll fishery, but trollers sometimes seek halibut when salmon fishing is poor or if the price of halibut is relatively high. A few small boats still use handlines.

Traditionally, a unit of setline gear or "skate" consists of groundline, gangions, and hooks. In the early years, a number of lines (each 300 feet) were spliced end to end to form the groundline. The number of lines varied considerably, but the 6-line skate (1,800 feet) eventually was adopted by most of the fishermen. Now, groundline is sold in 1,800-foot coils. Loops of light twine (beckets) are attached at regular intervals to the groundline. Short branch lines (gangions) 4 to 5 feet long are attached to the beckets and a hook is attached to the end of each gangion. Years ago, hooks were bound or "ganged" to the end of the gangion with linen thread treated with pine-tar; now, eyed-hooks are attached to a loop in the gangion. The interval between hooks or "rig" of the gear has varied from 9 feet to as much as 42 feet. The most common rigs have been 9, 13, 18, 21, 24, and 26 feet, as these intervals facilitate baiting the hooks and coiling the lines. Today, most of the gear is rigged at 18, 21, and 26 feet. The lines of conventional setline gear originally were made of natural fibers such as hemp, cotton, manila, or sisal, depending on their availability, quality, and cost. These natural fibers now have largely been replaced with man-made materials, mainly nylon.

The traditional gear usually is tied together and set in strings of 4 to 12 skates each. The number of skates per string depends on factors such as the size of the fishing ground and the likelihood of snagging on the bottom. Each end of the string is attached to an anchor and buoy line and marked at the surface with a buoy, flagpole, and flag. When fishing at night or in heavy fog, lights or radar reflectors are used on each flagpole to aid in locating the gear.

Most of the fishing is conducted in depths between 15 and 150 fathoms. The skates with baited hooks are set over a chute at the stern of the vessel. Depending upon the grounds, time of year, and bait used, most of the gear is left in the water, or is "soaked", for 4 to 48 hours, but the average soak for each skate is about 12 hours. Long soaks require durable bait and cannot be made where other organisms are likely to eat the bait or the halibut caught on the gear. The gear is hauled on a power-driven wheel, the gurdy, controlled by a fisherman who lands the fish, clears snarled lines, and stops the gurdy if the gear is snagged or if other problems occur (Figure 14). On traditional longline gear, another man coils the line after it passes the gurdy. The gear is then inspected for necessary repairs, baited, and recoiled in preparation for the next set. Baits used in the halibut fishery are either fresh or frozen and include herring, octopus, salmon, and "shack" or "gurdy" bait such as grey cod, sablefish, or other species caught incidentally on the halibut gear.

Snap-on gear was introduced into the halibut fishery about 20 years ago; it differs from traditional setline gear in that the branch lines (gangions) are attached to the groundline with metal snaps rather than being tied to the groundline with twine. Further, the groundline used for snap-on gear is one continuous line that is simply stored on a drum after the gangions are removed,

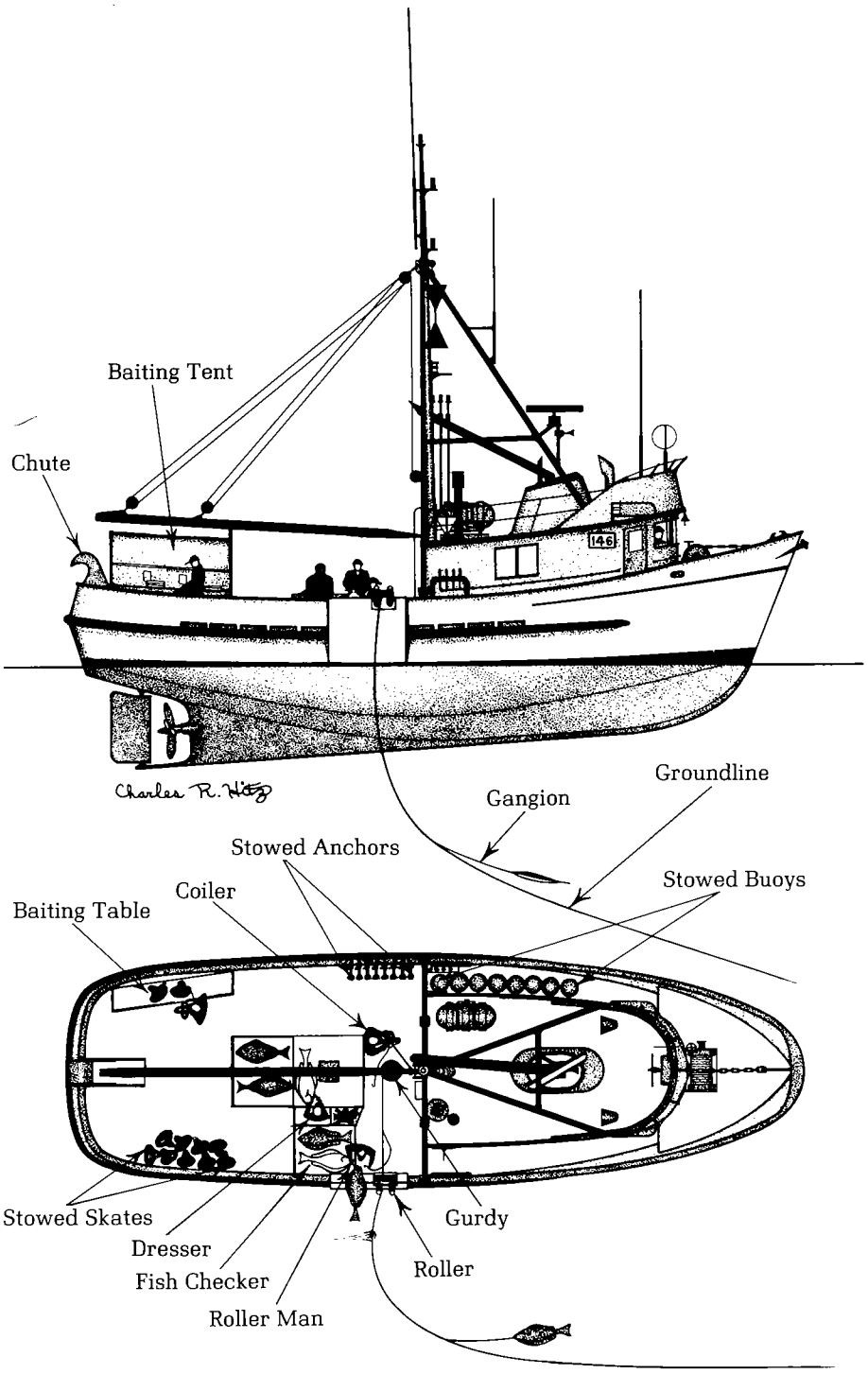


Figure 12. Deck layout and fishing arrangement. (Drawings by Charles R. Hitz)

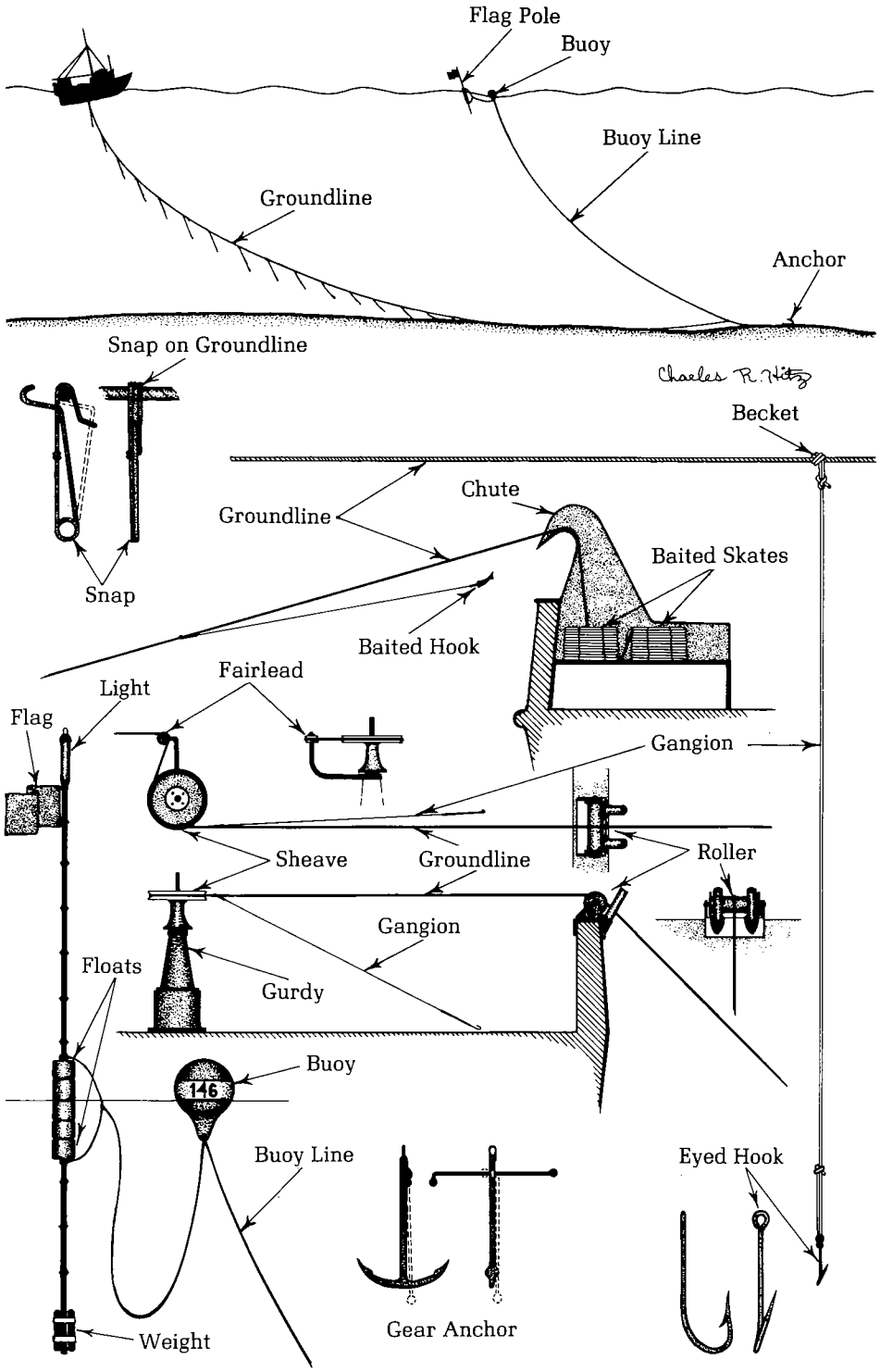


Figure 13. Halibut fishing gear and deck equipment. (Drawings by Charles R. Hitz)

Figure 14. Hauling gear with power gurdy (left) and coiling a skate (right).

instead of being coiled. The method of attaching the hooks to the gangions is the same for snap-on and traditional gear. When snap-on gear is set, the hooks are baited and the gangions are attached to the groundline as it unwinds from the drum. Hook intervals can be changed with each set. When the gear is retrieved, the hooks are unsnapped and stored on racks and the groundline is rewound on the drum. The snap-on gear is most prevalent on small boats.

For small boats with only two or three fishermen, snap-on gear has several advantages over traditional gear. First, storing the groundline on a drum eliminates the need for a man to coil gear and reduces the amount of storage space required. The amount of gear set and the catch of snap-on vessels usually is much less than that of larger vessels using traditional gear, but two men usually can set and haul more gear using snap-ons than they could using the traditional coiled skates. Another advantage is that the hooks can be widely spaced when prospecting for fish and more closely spaced when a concentration of fish is located. For these reasons and the relatively low capital investment for small boats, hundreds of new fishermen have entered the halibut fishery in recent years. Snap-on gear is particularly attractive for boats that use a gillnet drum for salmon fishing because the gillnet can be replaced readily with halibut groundline when the vessel switches from salmon to halibut fishing.

Statistics of the Catch

The catch of halibut by Canadian and United States fishermen from 1930 to 1976 is shown in Figure 15. The total catch peaked at 69 million pounds in 1915 and fell to 44 million pounds in 1931; thereafter, the catch generally increased and exceeded 70 million pounds in 1962 but fell below 25 million

pounds in 1974. (Detailed catch data by country, region, and by statistical and regulatory areas from California to the Bering Sea are available in the Commission's Technical Report No. 14.)

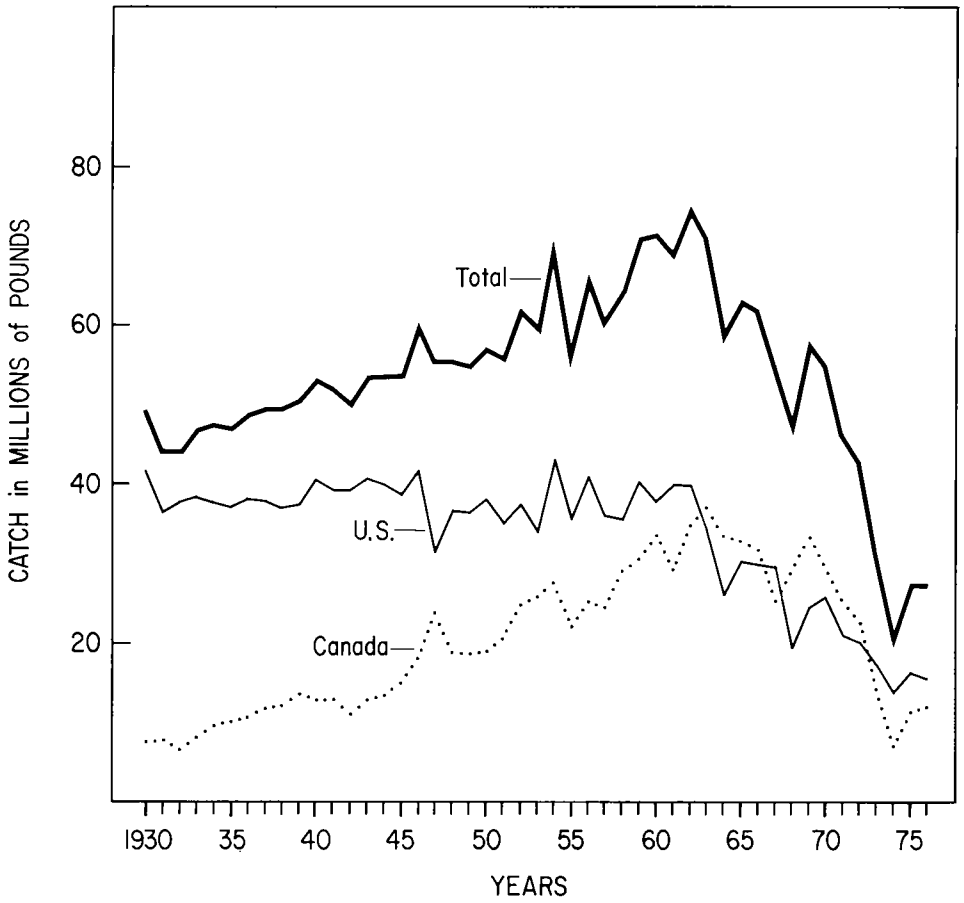


Figure 15. Total Canadian and United States catch of Pacific halibut, 1930-1976 (heads-off, eviscerated weight).

IPHC does not allocate the catch by country. When the fishery first began, U.S. vessels fished extensively in waters off British Columbia, but this effort has decreased, and the U.S. catch has dwindled from over 50% to less than 10% of the total in this area. In Alaska, the situation is just the reverse. The Canadian catch was very low in the early days of the fishery off Alaska and increased to 50% of the total from Alaska during the 1960's, but was only about 30% in the 1970's. Since 1926, nearly 3 billion pounds of halibut have been caught by the North American longline fleet; Canadian fishermen have taken 35% of this total and U.S. fishermen have taken 65%.

The two countries have a reciprocal landing agreement, permitting fishermen of one nation to land halibut at ports in the other country (see section on Halibut Conventions). In the early years of the fishery, United States fishermen landed over 20 million pounds of halibut in Canada, but they now land mostly in U.S. ports. Canadian landings in United States ports were less than 5 million pounds before 1958, but have averaged about 7 million pounds since that time.

The five major ports of landing in 1976 were Prince Rupert and Vancouver, B.C. and Kodiak, Seward, and Petersburg, Alaska. Prince Rupert has long held the distinction of being the "Halibut Capital of the World". Seward, Kodiak, and Petersburg have gained in importance in recent years, whereas ports such as Seattle and Ketchikan have declined in importance. In deciding where to sell fish, fishermen must balance the higher prices usually prevailing in more southern ports against the fuel costs and the fishing time lost in running to these ports. In recent years, buyers in northern ports have been offering more competitive prices and fewer vessels are running to southern ports. The relative importance of the ports is shown in Table 2 giving the percentage of the total landings at the major ports at 10-year intervals since 1935.

Table 2. Percentage of total landings by ports at 10-year intervals, 1935-1975.

Port of Landing	Year 1935	1945	1955	1965	1975
	%	%	%	%	%
Prince Rupert	27.4	28.6	25.3	32.3	18.8
Kodiak				6.9	15.2
Seward				1.0	14.2
Petersburg	1.0	3.7	5.8	8.0	11.5
Vancouver	4.7	3.5	9.0	6.3	6.8
Pelican		3.5	4.4	2.4	5.9
Juneau	3.0	3.7	4.5	2.9	3.2
Bellingham			0.7	3.7	2.2
Seattle	47.1	22.5	24.5	9.7	2.2
Sitka	1.6	5.2	1.7	1.7	2.2
Wrangell	0.2	1.1	0.5	0.6	1.6
Ketchikan	8.0	17.0	6.5	13.8	1.5
Port Williams		3.5	3.0	2.0	1.0
Sand Point			3.4	4.9	1.0
Other	7.0	7.7	10.7	3.8	12.7
Total Catch (000's of pounds)	47,343	53,395	57,521	63,176	27,616

Value and Marketing

The Pacific halibut fishery is one of the more valuable fisheries in North America. The landed value of the catch usually is among the top five foodfish species. The average annual catch and value by 5-year periods are shown by country in Table 3. The value to the fishermen has increased steadily since the 1930's and, despite the relatively low production in recent years, reached an all-time high of $34 million in 1976. Prices paid to the fishermen vary according to market conditions. Before 1940, the average annual price per pound usually was less than $.10. During the 1940's and 1950's, the price varied from $.10 to $.23 per pound and was $.16 to $.35 during the 1960's. The greatest change occurred during the 1970's when the price increased from $.58 in 1972 to $1.31 in 1977. The retail price is two to three times greater than the landed price.

Table 3. Average annual halibut catch and landed value by 5-year periods.*

Years	Average Annual Catch (in thousands of pounds)			Average Annual Value	
	Canada	United States	Total	Total	Price per Pound
1930-1934	7,965	38,537	46,502	$ 3,097,000	$ .07
1935-1939	11,650	37,602	49,252	3,645,000	.07
1940-1944	12,608	40,019	52,627	7,161,000	.14
1945-1949	18,962	37,028	55,990	9,305,000	.17
1950-1954	23,565	37,627	61,192	11,099,000	.18
1955-1959	26,346	37,789	64,135	12,025,000	.19
1960-1964	33,645	35,707	69,352	15,435,000	.22
1965-1969	30,650	26,806	57,456	17,562,000	.31
1970-1974	19,789	19,706	39,505	19,723,000	.50
1975	11,357	16,259	27,616	24,575,000	.89
1976	11,996	15,539	27,535	34,138,000	1.25

* Catch in pounds, heads off, eviscerated.

The system of distributing halibut to the consumer has changed: in the early years, most of the fish were shipped in ice and sold fresh, but today, a higher proportion of the catch is landed at Alaskan ports, and over 90% of the catch is frozen. Before freezing, the head is removed (Figure 16) and, after the initial freezing, the fish is dipped into water several times to "glaze" or coat the body with a layer of ice to prevent dehydration in storage.

Figure 16. Beheading a halibut with a guillotine.

In the past, most vessels sold their halibut catch to the highest bidder at public auctions called the Fish Exchange. Now, vessels usually sell directly to the processors, frequently after calling buyers by radio-telephone from the fishing grounds to obtain the best possible price. After the sale, the halibut are unloaded from the vessel, beheaded, and graded into trade categories according to weight (Figure 17). Halibut up to 60 pounds are called "mediums" and those over 60 pounds are called "large". Formerly, there was a third grade, called "chickens", of fish from 5 to 10 pounds; but in 1973, the legal size limit was increased and few fish under 10 pounds are now landed.

Halibut is a versatile species for marketing and is sold as steaks, fillets, or roasts. Its preparation for the table is varied — poaching, frying, baking, steaming, barbecuing, etc. Recipes are available from federal agencies such as the Canadian Department of Fisheries and the Environment and the U.S. National Marine Fisheries Service. Industry organizations such as the Halibut Association of North America (HANA) and the Halibut Fishermen's Wives' Association also provide recipes and tips on preparation. A recipe we have not seen in publication that is popular among halibut gourmets is presented below:

PELICAN COLD STORAGE COMPANY'S
FAVORITE HALIBUT RECIPE
(Sour Cream Halibut Recipe)

1 cup white wine or sauterne	1 cup mayonnaise
1 teaspoon salt	1/2 cup sour cream
1 pound halibut fillet	1/4 cup chopped onions
Fine bread crumbs	Paprika

Mix wine and salt and marinate halibut for at least 1 hour (best if marinated most of the day). Drain fish on paper towel, dip both sides in bread crumbs, place in greased baking dish. Mix together mayonnaise, sour cream, and onions, spread over fish and sprinkle top with remaining bread crumbs and paprika. Bake at 500° for approximately 20 minutes or until fish flakes with a fork.

THE SPORT FISHERY

Before 1973, all fishing for halibut, including recreational and personal-use fishing, was governed by the commercial fishing regulations. Catching halibut during the closed commercial season was illegal, but sport-caught halibut frequently were taken out of season. Because the sport catch was not large and because the number of fish taken illegally by sportsmen was small compared with the commercial catch, IPHC concluded that the problem was not a serious concern in the management of the fishery. As the sport catch increased, federal and state agencies urged IPHC to officially recognize the sport fishery.

Recent legal interpretations by the two federal governments indicated that the Halibut Convention provided the authority to regulate the sport fishery. After consultation with the Canadian Department of Fisheries and the Environment, the U.S. National Marine Fisheries Service, and the appropriate state agencies in Alaska, California, Oregon, and Washington, the Commission adopted sport regulations in 1973. Sport fishing for halibut is permitted from March 1 to October 31. The 1976 regulations set a two-fish bag and possession limit but no minimum size. Taking of halibut by sport fishermen usually is incidental to saltwater fishing for salmon, although in

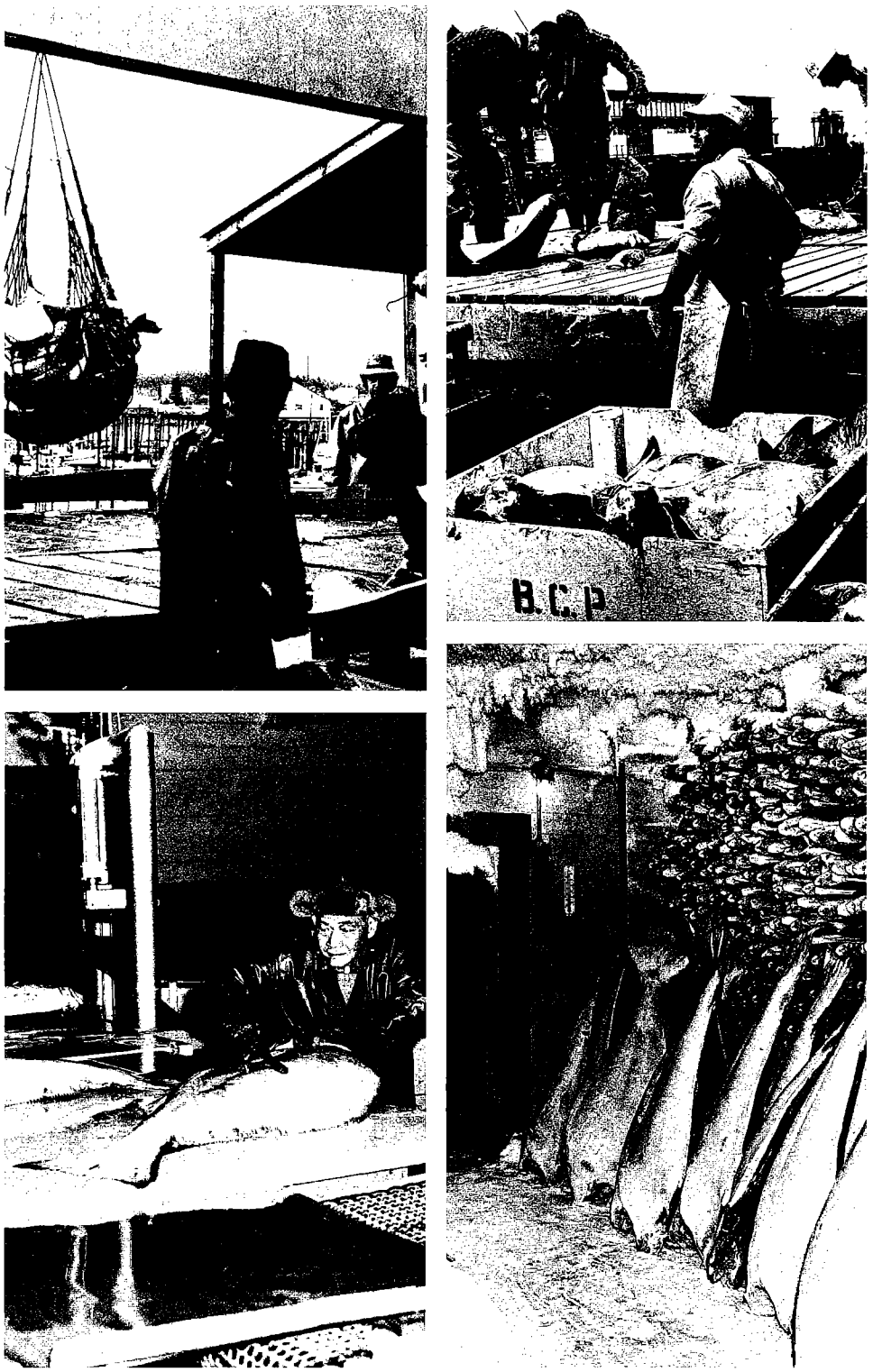


Figure 17. Unloading, sorting, beheading, and storage of halibut. (Photo credits Canadian Department of Fisheries and the Environment and U.S. National Marine Fisheries Service.)

some areas, particularly Alaska, a fishery specifically for halibut does occur. However, on all sections of the coast, the large size of halibut tends to make it a prestige or trophy fish and the interest in sport fishing for halibut is increasing. A 36-pound halibut taken in Puget Sound on July 31, 1969 in 22 feet of water set a world record for the Saltwater Fly Rodders of America in the 10-pound test tippet class. In Portage Bay, near Petersburg, Alaska, a 346-pound halibut (live weight) was caught in 1969 on sport tackle with a 30-pound test leader and a 40-pound test line. One of the largest halibut reported in recent years is depicted in Figure 18.

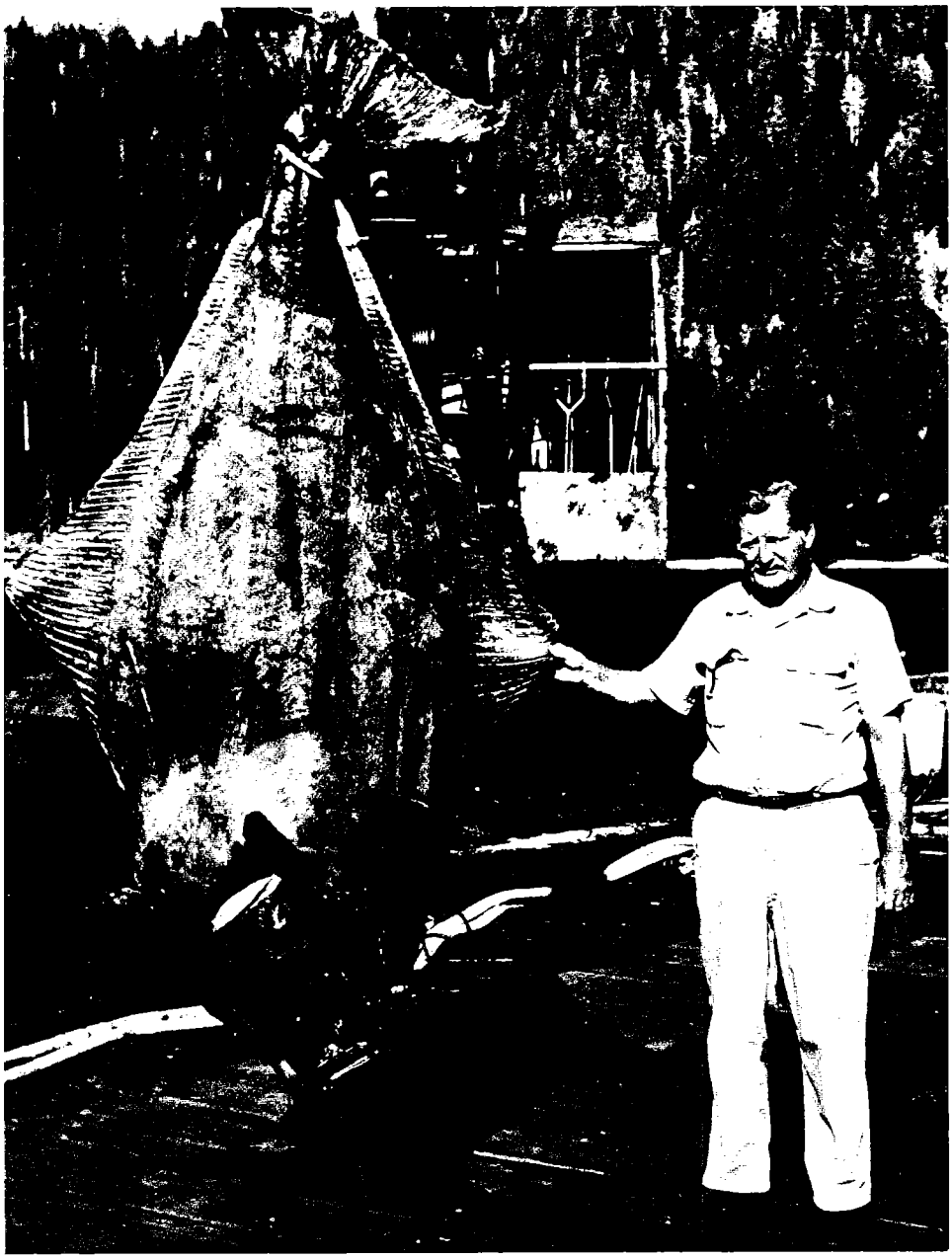


Figure 18. A 455-pound halibut caught on a handline near Chatham Cannery in Sitkoh Bay, Chichigof Island, Alaska. (Photo courtesy of Arve W. Pande II)

The coast-wide catch of halibut by sport fishermen is estimated to be 20,000 fish annually or about 250,000 pounds. The effect of the sport catch on stock abundance is considered to be of minor importance relative to the commercial catch and the incidental catch of halibut by foreign and domestic trawlers.

Sportsmen have individual preferences for their halibut gear. Lines usually test from 40 to 80 pounds and treble hooks, either 6/0 or 8/0 are used. Light or poorly-made hooks can be straightened out or bent by large halibut. A 10- to 32-ounce sinker is used when fishing with rod and reel and using baited hooks, whereas metal lures weighing from 17 to 28 ounces are used with jigs. Rods generally are heavy and stiff to handle the heavy sinkers and the potentially large halibut. Reels should have a high gear ratio to reduce the effort in retrieving the gear from depths as great as 300 feet. Jigging gear is used extensively in British Columbia and Alaska. All sportsmen should be aware of the dangers in handling a large halibut in a small boat. Halibut are powerful and have been known to smash objects with their tails. The tragic story related below is from the *Alaska Empire,* Juneau, Alaska in August 1973:

"FISHERMAN KILLED BY HALIBUT"

"A man killed by a halibut!

Alaska State Troopers investigated one of the most unusual deaths to occur in Alaska this year.

The body of Joseph T. Cash, 67, of Petersburg was found lashed to the winch of his troller after a 150 pound halibut had apparently broken his leg and severed an artery when he hoisted it aboard his boat while fishing alone in the vicinity of Eagle Point on Kupreanof Island.

Cash's customary way of landing a large halibut was . . . to gaff the fish with a shark hook attached to a ten foot length of half inch thick rope.

From evidence gathered at the scene, Cash . . . hauled it aboard (and) It apparently flopped and in so doing crippled the elderly man.

When falling to the deck, Cash cracked three ribs on his left side. Based on information obtained from friends, Cash had a horror of being injured or killed and being washed overboard to become "crab bait". Consequently he crawled to the winch and tied himself to it.

After his death the trolling boat washed ashore and was found partially sunk by men on another fishing boat. Crewmen of the boat found the old fisherman as indomitable in death as he was in life. His head and chest were still above water with the gaffed halibut at his feet."

Conventions and Treaties

The International Pacific Halibut Commission, originally called the International Fisheries Commission, was established in 1923 by a Convention between Canada and the United States. The abundance of halibut had been declining and industry representatives had requested international control. The Convention was the first international agreement for joint management of a marine fishery and has been revised several times to extend the Commission's authority and to meet new conditions in the fishery.

This section presents a brief review of the several revisions of the Halibut Convention (Treaty) and other treaties relating to halibut. At the present time, Canada and the United States are meeting to renegotiate the existing treaty. The U.S. Fishery Conservation and Management Act of 1976 required that all international treaties be renegotiated in accordance with the Act; and on April 1, 1977, the U.S. State Department notified Canada that the Halibut Treaty would be terminated if not renegotiated by April 1, 1979. The U.S. Act also created Regional Councils that are responsible for management of the fisheries, but did not specify how these Councils would interact with international commissions. The renegotiation of the Treaty should clarify this relationship.

THE HALIBUT CONVENTION OF 1923

Efforts to consummate a treaty in 1919 were unsuccessful, but the halibut industry persisted in advocating international control. In 1922, another convention was drafted that excluded the sensitive provisions of port-use and tariffs, and Canada and the United States signed the Convention for the Preservation of the Halibut Fishery of the Northern Pacific Ocean on March 2, 1923. In the past, Canada and Great Britain both signed treaties that involved Canada, but Canada contended that it alone should sign the Halibut Convention since it dealt with domestic matters. Great Britain preferred to retain this right but finally agreed that the Dominion of Canada could sign on behalf of His Majesty. This symbolic act was a first for Canada as a member of the British Commonwealth and for other Commonwealth nations of the British Empire.

The Convention went into effect on exchange of ratifications October 23, 1924. It provided for a 3-month closed season during the winter and for regulations concerning halibut caught incidentally during the closed season. The Convention also created an International Fisheries Commission of four members, each country was to pay the expenses of its two Commissioners, but expenses of the Commission and its staff were to be shared equally by the contracting parties. The Commission was charged with studying the life history of halibut and with recommending regulations for the preservation and development of the fishery.

THE HALIBUT CONVENTION OF 1930

In 1928, the Commission reported that the closed season alone could not protect the resource and requested authority to institute other conservation measures. A new Convention was signed in 1930 and ratified on May 9, 1931. The 1930 Convention empowered the Commission to establish regulatory areas, to limit the halibut catch from each area, to regulate the licensing and departure of vessels for halibut fishing, to collect statistics, to regulate the type of gear, and to prohibit fishing on nursery grounds where young fish are concentrated. Annual regulations were subject to the approval of the Governor General of Canada and the President of the United States. Enforcement of regulations was the responsibility of the individual governments. To provide an industry forum for the discussion of regulatory proposals, the Commission established a Conference Board of fishermen and vessel owners on May 27, 1931.

THE HALIBUT CONVENTION OF 1937

As the catch increased, more vessels entered the fishery and the catch limits were taken more rapidly. The 1937 Convention permitted more effective control of vessels catching halibut incidentally while fishing for other species during the closed season. The United States Act implementing the 1937 Convention stated that it was unlawful ". . . to bring to any place within the jurisdiction of the United States any halibut caught in Convention waters by the use of any vessel of a nation not a party to the Convention . . .", but this stipulation has not been applied.

THE HALIBUT CONVENTION OF 1953

The trend toward shorter fishing seasons continued and, by the end of World War II, fishing was concentrated on certain segments of the stock. Treaty changes were recommended by IPHC in 1946 to permit multiple seasons within a fishing area, but the new Convention was not signed until March 2, 1953, on the 30th anniversary of the signing of the first Halibut Convention. On exchange of ratifications, the new Convention became effective on October 28, 1953.

The 1953 Convention contained several important changes. Multiple seasons were permitted to distribute fishing effort in accordance with seasonal availability of different stocks, the number of Commissioners was increased from four to six, three from each country, and the International Fisheries Commission was renamed the International Pacific Halibut Commission. In addition, the Commission was charged with developing and maintaining halibut stocks at a level which would permit the maximum sustainable yield. This directive was implied in earlier conventions but had not been explicitly stated.

In 1969, to expedite the approval of regulations in the United States, the Presidential authority was delegated to the Secretary of State who was to consult with the Secretary of the Interior (now the Secretary of Commerce).

RECIPROCAL PORT PRIVILEGES

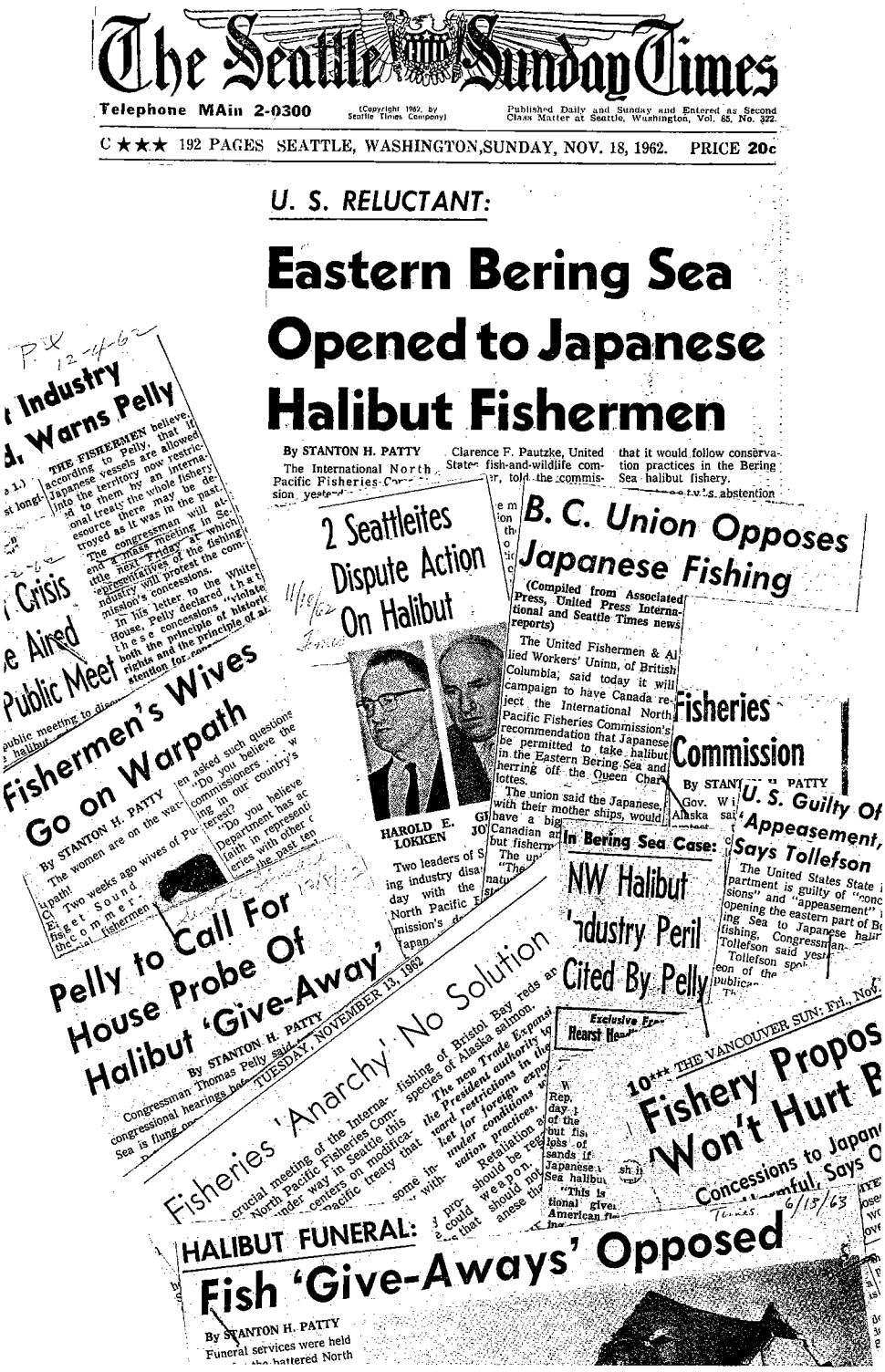
In 1897, Canada granted special port privileges to a United States firm, the New England Fish Company, that had established an office in Vancouver, British Columbia. Vessels owned by the company were permitted to land halibut and take on supplies in Vancouver. These privileges were renewed in subsequent years and in 1915 were extended to all United States flag vessels and included the port of Prince Rupert. This unilateral action was renewed each year by an Order-in-Council in Canada. In 1918, the United States reciprocated and permitted Canadian vessels to land and outfit in the United States.

In 1950, Canada and the United States signed a Convention for the Extension of Port Privileges to Halibut Fishing Vessels on the Pacific Coasts of the United States of America and Canada. The express purpose of this Convention was "to further the well-being" of halibut fishermen and to permit landings without payment of duty other than that required by the customs agency. Fishermen could trans-ship or sell their catch in bond for export and could obtain supplies, repairs, and equipment. The Convention specifies that vessels of one country landing in a port of the other country shall comply "with applicable customs, navigation, and fisheries laws" of the host country. The agreement includes sablefish as well as halibut.

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

An account of the several halibut conventions would not be complete without mention of the Convention by Canada, Japan, and the United States which established the International North Pacific Fisheries Commission (INPFC). This Convention, like that for the preservation of the halibut, was to "ensure the maximum sustained productivity of the fishery resources of the North Pacific". The Convention was signed in 1952 and entered into force on June 12, 1953.

Included in the Annex of the Convention is the abstention provision under which member countries agreed to abstain from fishing specific stocks of fish. Japan agreed to abstain from fishing halibut along the coast of North America and the fishery east of 175° W longitude remained under the jurisdiction of the Canadian and United States Halibut Commission. In 1962, INPFC decided that the halibut in the Bering Sea east of 175° W longitude no longer qualified for abstention, thereby including INPFC in the management responsibility. This change was an unpopular decision among North American halibut fishermen and was labeled "the Bering Sea halibut giveaway" by critics. The local press freely quoted the views of fishermen and prominent public figures that criticized the decisions of INPFC (Figure 19). After this decision, the condition of the halibut stocks in the eastern Bering Sea was reviewed and conservation measures were recommended annually by both IPHC and INPFC for adoption by the respective governments. This procedure was followed until 1977 when Canada and the United States extended their fisheries jurisdiction, obviating the authority of INPFC relative to halibut The North Pacific Fisheries Convention also is now being renegotiated.



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U. S. RELUCTANT:

Eastern Bering Sea Opened to Japanese Halibut Fishermen

By STANTON H. PATTY

The International North Pacific Fisheries Commission yesterday ... Clarence F. Pautzke, United States fish-and-wildlife commissioner, told the commission that it would follow conservation practices in the Bering Sea halibut fishery. ... U.S. abstention

2 Seattleites Dispute Action On Halibut

HAROLD E. LOKKEN

B. C. Union Opposes Japanese Fishing

(Compiled from Associated Press, United Press International and Seattle Times news reports)

The United Fishermen & Allied Workers' Union, of British Columbia, said today it will campaign to have Canada reject the International North Pacific Fisheries Commission's recommendation that Japanese be permitted to take halibut in the Eastern Bering Sea and herring off the Queen Charlottes.

The union said the Japanese, with their mother ships, would have a big ... Canadian ... but fishermen ...

Fisheries Commission

By STANTON H. PATTY

U. S. Guilty Of 'Appeasement,' Says Tollefson

The United States State Department is guilty of "conc... sions" and "appeasement" ... opening the eastern part of Be... ing Sea to Japanese halib... fishing, Congressman Tollefson said yes... Tollefson spo... eon of the ... publica...

In Bering Sea Case:

NW Halibut Industry Peril Cited By Pelly

Exclusive Fe... Hearst Ne...

10*** THE VANCOUVER SUN: Fri., Nov.

Fishery Propos... Won't Hurt B...

Concessions to Japan... ful, Says C...

Times 6/13/63

Industry ... Warns Pelly

THE FISHERMEN believe, according to Pelly, that if Japanese vessels are allowed into the territory now restricted to them by an international treaty the whole fishery resource there may be destroyed as it was in the past.

The congressman will attend a mass meeting in Seattle next Friday at which representatives of the fishing industry will protest the commission's concessions.

In his letter to the White House, Pelly declared that these concessions "violate both the principle of historic rights and the principle of abstention for conservation."

Crisis ... Aired

Public Meeting ...

Fishermen's Wives Go on Warpath

By STANTON H. PATTY

The women are on the warpath!

Two weeks ago wives of Puget Sound fishermen ... asked such questions as "Do you believe the commissioners ... working in our country's interest? "Do you believe the State Department has acted in good faith in representing ... fishermen ... the past ten ...

Pelly to Call For House Probe Of Halibut 'Give-Away'

By STANTON H. PATTY

Congressman Thomas Pelly said ... congressional hearings ... Sea is flung ...

TUESDAY, NOVEMBER 13, 1962

Fisheries 'Anarchy' No Solution

A crucial meeting of the International North Pacific Fisheries Commission is under way in Seattle this week with centers on modification of the Pacific halibut treaty that ... some international ... fishing of Bristol Bay reds and ... species of Alaska salmon. The new Trade Expansion ... the President authority to ... the President restrictions in the ... heard restrictions on foreign ... hat for foreign ... under conditions ... vation practices. Retaliation ... should be regarded ... weapon, ... should not ... anese ...

HALIBUT FUNERAL:

Fish 'Give-Aways' Opposed

By STANTON H. PATTY

Funeral services were held ... the battered North ...

Figure 19. News items concerning the INPFC decision to allow Japan to fish for halibut in the eastern Bering Sea.

Management of the Resource

Under the existing Treaty (1953), IPHC has jurisdiction over the Canadian and United States setline fishery for halibut and can prohibit retention of incidentally-caught halibut in other Canadian and U.S. fisheries, but has no jurisdiction over foreign fisheries and cannot control the domestic trawl fishery to reduce the incidental catch of halibut. Conservation measures to protect halibut in foreign fisheries were instituted through the International North Pacific Fisheries Commission (INPFC) for the Bering Sea and in bilateral arrangements with Japan and the U.S.S.R. for the Bering Sea and the Gulf of Alaska. Canada and the United States have extended their fisheries jurisdiction and now have control of both foreign and domestic trawl fisheries within 200 miles of their respective coasts.

REGULATIONS AND ENFORCEMENT

Authority for the Commission to regulate the halibut fishery is incorporated in the Halibut Convention and the Enabling Acts passed by the two countries to carry out the terms of the Convention. The following text from the 1953 Convention described the various regulations the Commission can recommend:

"(a) divide the convention waters into areas;
(b) establish one or more open or closed seasons, as to each area;
(c) limit the size of the fish and the quantity of the catch to be taken from each area within any season during which fishing is allowed;
(d) during both open and closed seasons, permit, limit, regulate, or prohibit, the incidental catch of halibut that may be taken, retained, possessed, or landed from each area or portion of an area, by vessels fishing for other species of fish;
(e) prohibit departure of vessels from any port or place, or from any receiving vessel or station, to any area for halibut fishing, after any date when in the judgment of the International Pacific Halibut Commission the vessels which have departed for that area prior to that date or which are known to be fishing in that area shall suffice to catch the limit which shall have been set for that area under section (c) of this paragraph;
(f) fix the size and character of halibut fishing appliances to be used in any area;
(g) make such regulations for the licensing and departure of vessels and for the collection of statistics of the catch of halibut as it shall find necessary to determine the condition and trend of the halibut fishery and to carry out the other provisions of this Convention;
(h) close to all taking of halibut such portion or portions of an area or areas as the International Pacific Halibut Commission finds to be populated by small, immature halibut and designates as nursery grounds."

Each year, the Commission holds an annual meeting, usually in January, to determine the regulations that will prevail for halibut fishing during the year. At the annual meeting, the scientific staff reports on the condition of

the halibut stocks and recommends regulations for the next halibut season. The Conference Board, whose members represent vessel owners and fishermen from the various halibut ports, presents its recommendations for regulations. At this time, the Commission also receives recommendations from other groups and individuals. Since 1974, all proposals are reviewed with an industry Advisory Group, whose 14 members are selected by the Conference Board and the Halibut Association of North America (HANA). Regulations are adopted by the Commission in the presence of the Advisory Group and submitted to the two governments for approval. Table 4 lists each type of regulation and its chronology from 1932 to 1975.

Table 4. Chronology of IPHC regulations, 1932-1975. X = year introduced, 0 = year deleted.

Regulation	1932 - 1945	1946 - 1960	1961 - 1975
Area Definition	X		
Closed Season	X		
Catch Limit	X		
Dealer Record	X		
Closed Area	X		O X
Licensing	X		
Log Book	X		
Validation	X		O
Catch Report	X		O
Dory Gear	X		O
Departure Control	X O		
Incidental Catch	X		O
Nets Prohibited	X		
Size Limit	X		
Landing Control	X		
Sealing of Gear			X O
Sport Fishery			X

As discussed previously, beginning in 1963, Bering Sea halibut were managed under regulations adopted by IPHC and INPFC. On behalf of Canada and the United States, the Halibut Commission assessed the condition of the Bering Sea stocks and recommended regulations for the Bering Sea fishery. Canada and the United States presented IPHC's recommendations at the following INPFC meeting and considered alternatives proposed by Japan. The three countries then agreed on regulations for that fishery, and they were subsequently adopted by the Halibut Commission. Approval of the Halibut Commission regulations by the two governments also implemented the conservation measures adopted by INPFC on behalf of Canada and the United States.

The Halibut Commission has no enforcement authority. This authority is vested in the Treaty to enforcement branches of the two federal governments. In the United States, when the states adopt the Commission regulations as part of their state codes, they can enforce the regulations and try violators in state courts. When questions arise as to the legality or enforceability of tentative regulations, the Commission consults with legal or enforcement authorities of the federal fishery agencies before making a decision and enforcement personnel usually attend IPHC's annual meeting to advise the Commissioners on these matters.

In Canada, most of the enforcement is executed by Fishery Officers of the Department of Fisheries and the Environment. Customs officials also

participate in enforcement, but are mainly concerned with the issuance of licenses. The enabling legislation also specifies that "Protection Officers" include members of the Royal Canadian Mounted Police and commissioned officers of the Royal Canadian Navy, but neither of the groups have an active enforcement role at the present time.

The U.S. enabling legislation specifies that enforcement shall be conducted by the Coast Guard, Customs Service, and the Bureau of Fisheries (now the National Marine Fisheries Service, NMFS). The role of the Coast Guard, for the most part, had been limited to providing aircraft or vessels for surveillance by fisheries personnel, but more active participation has resulted with the passage of the U.S. Fishery Conservation and Management Act of 1976. Customs officers have mainly been concerned with licensing requirements. Most of the enforcement in the United States is conducted by NMFS. State agencies, particularly in Alaska, also participate in the enforcement of the fishery.

The penalties for violations of the regulations are specified in each country's enabling legislation. The penalties differ in several respects, but the maximum fines are the same and the vessels, cargo, and gear can be seized and forfeited for major or successive offenses.

EFFECTIVENESS OF MANAGEMENT

IPHC's management goal is to maintain the stocks of halibut at levels which produce the maximum sustained yield. IPHC uses information from several sources to determine the condition of the resource. Statistics on the catch, effort, and age composition in the fishery as well as the results from tagging programs and research surveys are analyzed to provide estimates of vital parameters such as stock size, mortality rates, growth, production of young, and potential yields. IPHC also studies the life history of the species, the seasonal distribution of the fish, age of entry into the fishery, and the effect of other fisheries on the resource. The influence of environmental factors also is considered in evaluating changes in stock abundance. The data base probably is more extensive than for any other North American fishery and is indispensable for assessing stock condition.

In the early management of the fishery, regulations were based primarily on an empirical approach which related levels of catch to catch per unit of effort (CPUE) in the fishery. If CPUE increased, this was interpreted as an increase in stock size and the catch was allowed to increase. Changes in the age composition of the catch also were examined. If there was a balance between old and young halibut in the catch, stocks were concluded to be in satisfactory condition. IPHC still relies heavily on changes in CPUE and age composition to manage the fishery but, since the 1950's, also has used theoretical models and analyses to estimate parameters such as mortality rates and to determine harvesting levels. The results from these models, coupled with trends in the fishery and data from research surveys, provide for a better understanding of the factors affecting stock abundance and, in turn, improve the management of the resource.

IPHC regulations require that each licensed vessel keep a log of each day's fishing operations giving the location, the amount of gear fished, the estimated catch of halibut, and the depth fished. Information on bait, soaktime, undersized fish released, and interference by foreign vessels also is

requested. These records are copied by employees of the Halibut Commission at the landing ports. The information from individuals is held confidential, but is analyzed collectively to assess stock condition and to make management decisions. Data from the logs are used to calculate CPUE, a measure of the relative abundance of halibut on the grounds. Factors such as length of groundline and number of hooks used also affect the CPUE and are accounted for in analysis of the data.

All phases of the life history of the halibut have been studied: spawning, recruitment, growth, fishing and natural mortalities, parent-progeny relationships, and the identification of stocks. Several investigations initiated by the Commission have become standards for fishery research which not only set a pattern for subsequent biological studies but fathered oceanographic studies in the North Pacific. These early studies indicated that the halibut stocks had declined as a result of fishing and established the basis for IPHC's management program. Under the 1930 Convention, the Commission was granted the authority to regulate the time and area of fishing and to restrict gear, catch, and fish size. These measures, coupled with effective enforcement by the two member countries and with the cooperation of fishermen, gave IPHC the control necessary to manage the resource.

Based on tagging experiments and other biological studies, the Commission concluded that regulatory areas were required so fishing could be adjusted to obtain optimum harvest rates on individual stock components. Boundaries for these areas were defined and have been maintained with periodic adjustments since the 1930's. The major regulatory areas are depicted in Figure 20. Specific seasons and catch limits are assigned for each regulatory area in accordance with the assessment of stock abundance, but this does not imply that the stock units are separate and distinct. Tagging studies have shown that halibut regularly migrate across the boundaries of these regulatory areas. However, variations in abundance, age composition, and growth as well as geographic boundaries and fleet distribution warranted the separation of Areas 2 and 3 as management units in which to control fishing mortality and to obtain an appropriate distribution of fishing.

Prior to 1924, there were no restrictions on the fishery and the vessels were able to operate throughout the year, although most of the catch was made between March and October. In 1924, a 3-month winter closure was instituted, one of the provisions in the first Halibut Convention. Under authority of the 1930 Convention, catch limits were established in 1932. The season closed when the catch limit was attained or on a fixed statutory closing date. Continued improvement in the stocks attracted many vessels to the halibut fishery. These vessels came from the salmon fleet and primarily fished during May and June. As fishing effort increased during these months, the fishing season for halibut became shorter; in 1953, the season lasted only 52 days in the Gulf of Alaska and by 1954 the season was open only for 21 days in British Columbia and southeastern Alaska.

This short, intense fishery resulted in overfishing some segments of the stocks and underfishing others. The 1953 Convention was modified to permit more than one fishing season during any one year and enabled the Commission to spread fishing over a longer period of the year. This, along with a voluntary program of the fleet requiring vessels to lay up 8 days between trips, again extended the fishing seasons. During the 1960's, the fishing

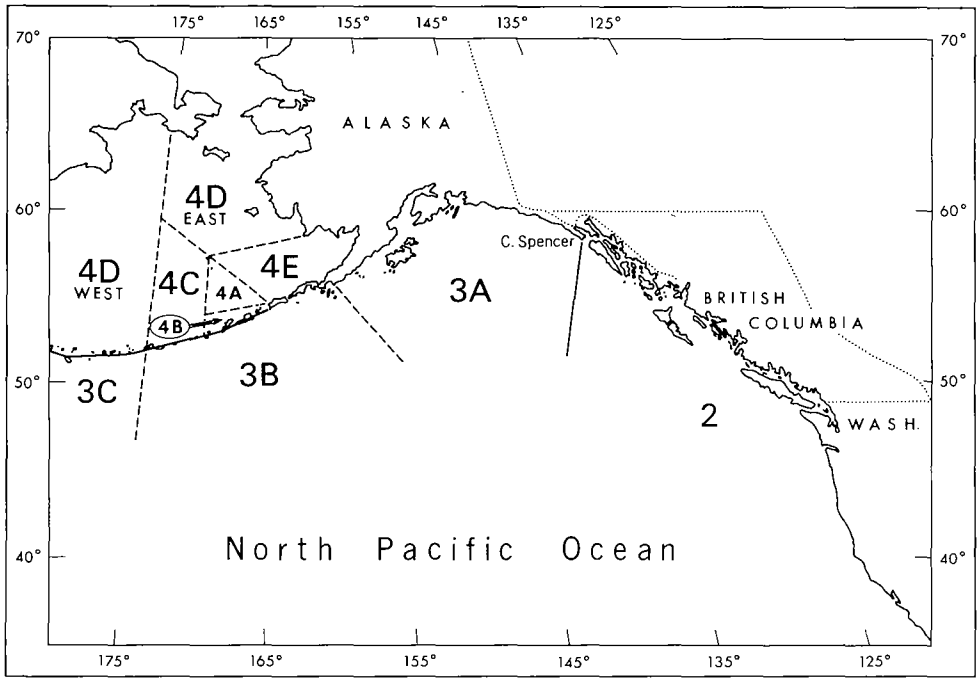

Figure 20. Regulatory areas for the Pacific halibut fishery, 1977.

seasons often were 6 months long. The seasons in the Gulf of Alaska now open in early May and close in August or September; in the Bering Sea, fishing occurs mostly in the spring and fall.

A few scientists have disagreed as to the role of the Commission in revitalizing the halibut stock through the 1950's, i.e., whether the increase in abundance in the earlier years resulted from the restrictions of effort, from improved environmental conditions, or both. Economists contend that because there is no restriction on entry, IPHC's regulations have reduced the efficiency of fishing and marketing. Granting that early conservation measures may not have been as effective as initially purported and that economic inefficiencies exist, the maintenance of a viable fishery under intense exploitation for the 50-year period certainly speaks for the Commission's contribution. Many scientists have recognized IPHC's role as a classic example of successful fishery management based on scientific information, but they attributed the success to different causes. Some credited organizational structure, i.e., IPHC has its own research staff, in contrast to other international groups that function through an Executive Secretary and draw on the research agencies of member countries. Other scientists concluded that IPHC simply had the good fortune to work on a long-lived species with an uncomplicated life history and a one-gear fishery. Still others contend that success was achieved because the two member nations of IPHC have similar cultures and interests. Each of these views has some basis in fact, but no single explanation can account for the accomplishments, and one of the more important aspects has been virtually ignored — that is, control of the fishery. Adequate scientific data were essential but beyond that, to effect the management program, IPHC had the authority to introduce the necessary conservation measures. The cooperation of industry also was needed and IPHC helped to engender this support by convincing the

industry of the benefits to be derived from curtailing fishing effort. As described in the next section, the critical condition of the halibut fishery today is due, in part, to the loss of control of certain elements in the fishery.

STOCK DECLINE SINCE 1960

Before 1960, over 90% of the halibut catch was taken by the regular longline fleet (vessels 5 net tons and over). Since 1960, important changes have occurred including increases in (1) the effectiveness of the setline gear; (2) the proportion of the catch taken by small, setline vessels and salmon trollers, particularly in British Columbia and southeastern Alaska; (3) the incidental catch in domestic (Canada and U.S.) trawl and pot fisheries; and (4) the incidental catch of halibut by foreign vessels (Japan, Korea, and U.S.S.R.). Further, environmental factors apparently have contributed to the decline in abundance of young halibut.

The longline fishery in the eastern Bering Sea collapsed during the early 1960's and the stock abundance in Area 2 and Area 3 has declined markedly since 1960 (Figure 21). Estimates of maximum sustained yield (MSY) during the 1950's were 32 million pounds for Area 2 and 38 million pounds for Area 3, but catch limits for 1977 were only 11 million pounds for each area. A number of factors have contributed to the decline in abundance and are discussed below.

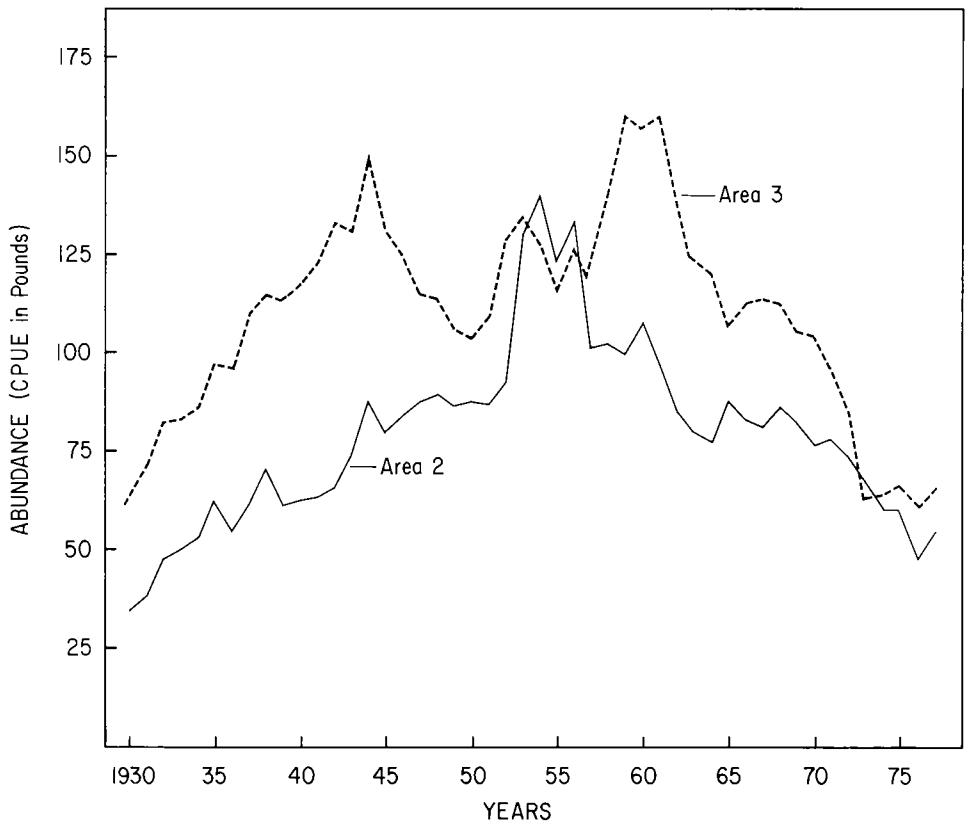

Figure 21. Abundance indicated by setline CPUE in Areas 2 and 3.

Both the domestic and foreign trawl fisheries increased sharply during the 1960's and early 1970's and, although these fisheries primarily seek other groundfish species, halibut are an incidental or by-catch. The incidental catch, in part, offset the conservation measures that were instituted in the domestic setline fishery. Also, IPHC's assessment of stock condition was hampered by a lack of information on the magnitude of the incidental catch by foreign trawlers. IPHC has prohibited retention of halibut by domestic trawlers since 1944 because trawls tend to catch young halibut which have not reached their optimum or best harvesting size (Figure 22). INPFC also prohibited the retention of halibut by Japanese trawlers in the northeast Pacific and in most of the Bering Sea east of 175° W longitude since 1962. Both Canada and the United States extended their fisheries jurisdiction in 1977 and now have direct control over foreign fishing operations.

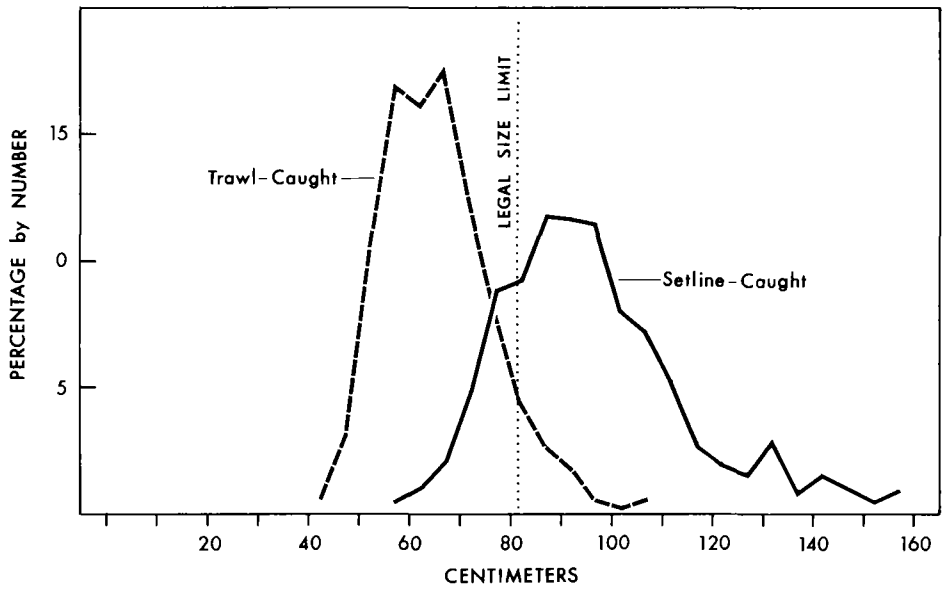

Figure 22. Size composition of trawl- and setline-caught halibut off British Columbia during a parallel fishing experiment.

Although regulations require that domestic and foreign trawlers discard halibut, many of them die from injuries or suffocation during capture and represent a loss in biomass. The mortality of discarded halibut is high for small fish and increases with sorting time and the weight of the total catch in the tow. Approximately 50% of the halibut survive when released from domestic trawlers, but mortality on foreign trawlers, with larger catches per tow and longer sorting time, usually is near 100%. The discard regulation has been a source of controversy between domestic trawl and setline fishermen. Trawl fishermen argue that the regulation is wasteful in that all halibut must be released, even if they are dead. On the other hand, setline fishermen argue that the scouring effects of the trawl not only destroy the habitat on the bottom but also disrupt the normal behavior of halibut. The major problem in allowing

retention of trawl-caught halibut is the design of an enforceable regulation that assures that the halibut taken by trawls is an incidental, not a directed catch. The situation is complicated because it involves a multi-species fishery and several management agencies. IPHC has recommended that Canada and the United States increase their research effort to reduce the incidental catch by domestic trawlers and develop management regimes which permit the optimum catch of halibut and other groundfish.

Although the incidental catch is not reported directly, data on the incidence of halibut are collected by observers who sample the groundfish catch at sea. Results from observers have provided a base for estimating the incidental catch, evaluating its impact, and establishing conservation measures to reduce the incidental catch. IPHC sampled the catch by domestic trawlers, and most of the data from the foreign trawl fishery was collected in programs arranged through INPFC or bilateral agreements and coordinated by the U.S. National Marine Fisheries Service (NMFS). These programs involved scientists from Canada, Japan, the United States, and IPHC. The results showed that the incidental catch increased sharply during the 1960's and early 1970's, varied with area and season, and consisted of halibut younger than those caught by setlines.

As data become available, IPHC continues to update and refine estimates of the incidental catch. The most recent estimates in the Bering Sea indicate that the total incidental catch increased to 19.1 million pounds in 1971 and then declined to 9.7 million pounds in 1974. The majority of the catch was by Japan, although the proportion taken by the U.S.S.R. has increased in recent years. Most of the catch by the Japanese fleet occurs in the western Bering Sea and may not significantly affect the North American setline fishery. In the northeast Pacific, the total (foreign and domestic) incidental catch increased to 17.6 million pounds in 1965 and then declined to 6.4 million pounds in 1971. The catch has been less than 10 million pounds since 1968. An additional incidental catch of about 3 million pounds may occur in the domestic shrimp and crab fisheries.

Recovery of the longline fishery in the Bering Sea was not possible as long as the high incidental catch of juvenile halibut by the foreign trawl fishery continued. In 1973, IPHC proposed that foreign trawling be prohibited in areas of the Bering Sea and the northeast Pacific when the incidental catch was high. The governments of Canada and the United States supported the proposal and, in subsequent negotiations in 1974-1976, Japan and the U.S.S.R. agreed to time-area trawl closures (Figure 23). IPHC's proposal for time-area closures was introduced in 1973 with the intent that this method of reducing the incidental catch of halibut would be applicable when jurisdiction of fisheries was extended to 200 miles. IPHC recognized the importance of the productive trawl fisheries and maintained that the incidental catch of halibut could be reduced without serious curtailment of the trawl fisheries, i.e., that the trawl species could be fully exploited in less than a 12-month season. IPHC also proposed that other methods be considered in the joint management of the trawl and setline fisheries; for example, the use of off-bottom trawls to reduce the incidental catch of halibut. An experiment organized under the auspices of INPFC in 1976 confirmed that off-bottom trawls did reduce the incidental catch and also showed that the pollock catch was as good or better than with on-bottom trawls.

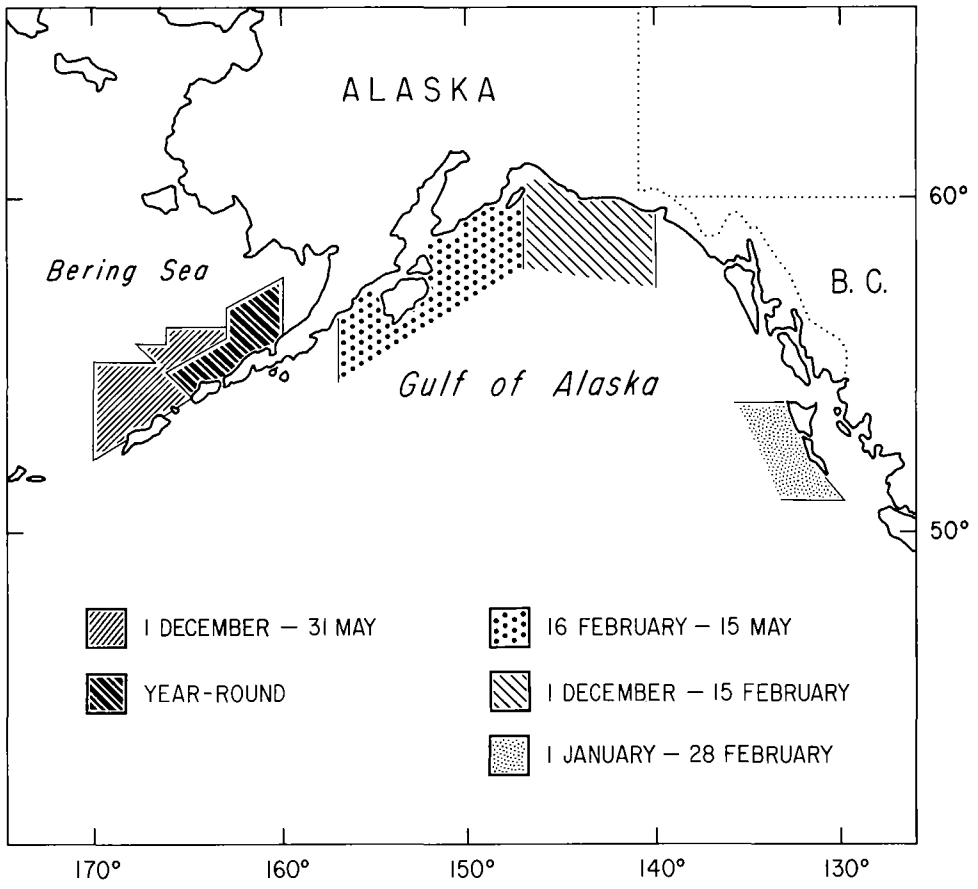

Figure 23. Japanese and Soviet trawl closures pertaining to halibut in the Bering Sea and the northeast Pacific, 1977.

Trawling reduced the survival of juvenile halibut, and the yield loss to the setline fishery was substantial. The loss from trawling, however, explains only part of the decline in the setline fishery. The decline began when the incidental catch was relatively low and occurred after IPHC allowed the setline catch to increase to test estimates of MSY. This action was needed to demonstrate that the stocks were fully utilized and, therefore, qualified for abstention by Japan. IPHC expected a decline in CPUE when setline catches were increased, but the decline was greater and lasted longer than anticipated. Exploitation by the setline fishery apparently was more than should have been permitted because quantitative measures of the loss from trawling were not available and because the stock decline was not accurately depicted by CPUE. Fishermen increased their catch per hook by increasing the spacing between hooks and, as a result, IPHC's measure of CPUE was overestimated. When IPHC did reduce the catch limits in the mid-1960's, the reductions were not sufficient to compensate for the combined mortality by the trawl and setline fisheries. More drastic reductions in the catch limit were made in the 1970's.

Analysis of catch and age data indicates that the abundance of young halibut has been declining since the 1940's. IPHC surveys in the Bering Sea and the Gulf of Alaska also provide evidence of reduced abundance of juveniles.

The decline in young halibut has reduced recruitment to the setline fishery and, in turn, may account for a large part of the drop in CPUE since 1960. The cause of the reduced abundance of young halibut is not known with certainty. The trawl fisheries were not intensive until the 1960's, and the reduced abundance was noted at ages younger than those generally caught by trawls. This indicates that the production of young halibut has declined although a possible increase in natural mortality cannot be dismissed. Reduced production might be due to adverse environmental conditions or to reduced spawning stocks. The abundance of spawners, however, was relatively high until the mid-1960's, and IPHC has no evidence of a long-term change in the environment. Until more is known about environmental factors and spawning stocks, the cause of the reduced abundance of young halibut will remain in doubt.

The trawl closures, along with the sharply reduced catch limits for the North American halibut fishery, are expected to halt the decline in abundance and to start the recovery process. Improvements in the abundance of juvenile halibut have been realized, particularly in the Bering Sea, but their abundance still is well below that of the 1960's (Figure 24). Additional restrictions on trawling are needed, especially for stocks in the Gulf of Alaska. Benefits from these conservation measures will not be realized for many years because most halibut are not recruited to the setline fishery until they are 8 years old or older.

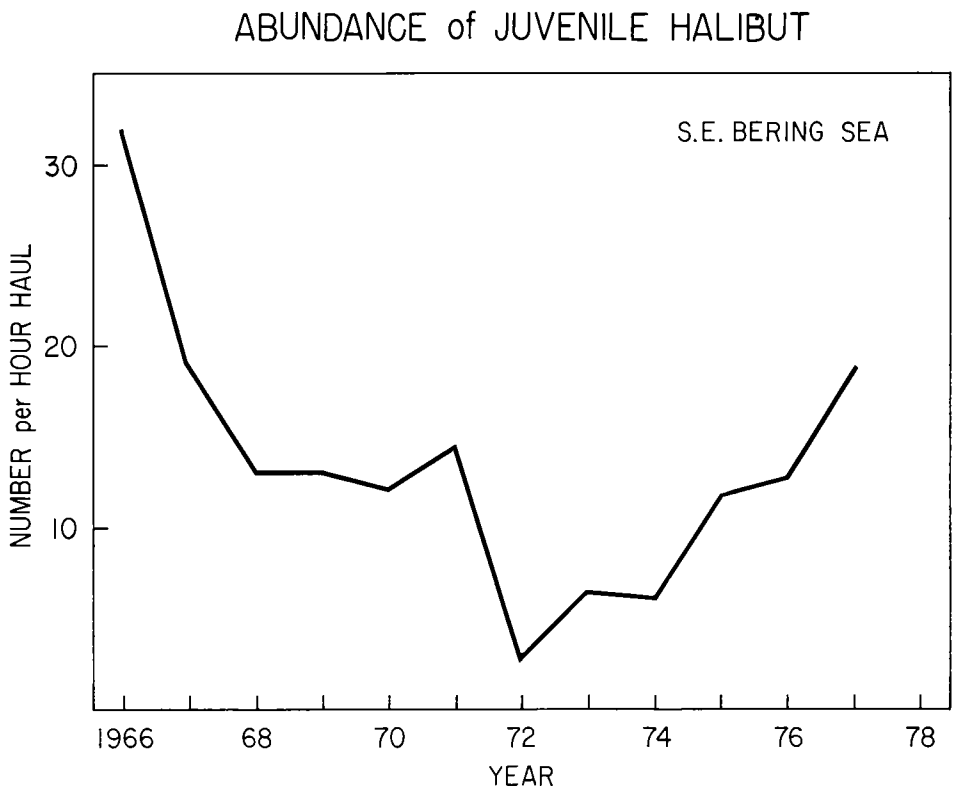

Figure 24. Abundance of juvenile halibut (<65 cm) in the southeastern Bering Sea.

The reductions in the catch limits for the longline fleet in the Gulf of Alaska (Areas 2 and 3) have been severe, but were necessary to halt the steep decline in abundance of halibut during the 1960's, and the CPUE in 1977 increased slightly in both areas. However, abundance remains low and the present restrictions should not be relaxed until stock conditions show a substantial and definitive improvement. In the coming years, consideration also must be given to social and economic changes affecting the fishery. For example, the price of halibut has tripled since 1970 and many more vessels have entered the fishery. As a result, the catch quota is taken in less time and the fishing season is becoming shorter each year. The 1953 Convention does not give the Commission authority to limit entry or to allocate the catch, but this could change when the Convention is renegotiated, as both Canada and the United States have endorsed consideration of economic and social factors in fishery management.

VOLUNTARY CONTROLS BY THE INDUSTRY

In addition to IPHC's regulations, the industry periodically introduced controls that affected the length of the fishing season and the distribution of the landings. During the 1930's, for example, the fishing fleet introduced a program that required each vessel to lay up for 10 days between trips and the catch of each vessel was limited on the basis of the number of its crew. This program was discontinued during World War II.

During the early 1950's, the catch limit was taken in less than 2 months and the processors had difficulty handling the volume of the catch in so short a period (Figure 25). In 1956, organized fishermen in Canada and the United States reinstituted a voluntary lay-up program " . . . to extend the fishing season, establish rest periods for the fishermen, attain a more orderly delivery of the catch, and aid in the conservation of the resource". The program was supported by as many as 18 organizations (unions and vessel owner associations) whose representatives met annually to establish the lay-up rules. The larger vessels with three or more men were required to take an 8-day lay-up between trips. Smaller vessels had the option of the same schedule or taking a one-half day lay-up for each day fished.

Support for the voluntary program was strong among the full-time halibut fishermen, but during the 1970's many new and part-time fishermen, who either were unaware of the objective of the plan or disagreed with the rules, did not follow the lay-up system. As a result, more and more of the full-time fishermen, who had supported the program, began to drop out and the lay-up system was in jeopardy for several years. The Commission was asked to incorporate the lay-up program in its regulations but questions were raised concerning the legal authority for the Commission to do so under the existing Convention.

At IPHC's 1977 Annual Meeting, the fishermen announced that the lay-up program was being discontinued because it lacked the needed support. The Commission had the option of letting the fishing season run its natural course in less than 50 days or splitting the season so that fishing would be extended over a longer period of time. A short single season would have concentrated the fishing effort and resulted in excessive mortality on certain components of the stock. The Commission decided that the fishing season should be

divided into a succession of open and closed periods to extend the fishing time and spread the fishing mortality between early and late components of the stock. In adopting the split-season plan, the Commission attempted to provide for a fishing season similar to 1976 with respect to overall length and timing and scheduled four fishing periods from May to September. Each period was 18 or 19 days and the closed period was 15 days. As in the past, the season in each area would be closed when the catch limit was attained regardless of the designated fishing periods.

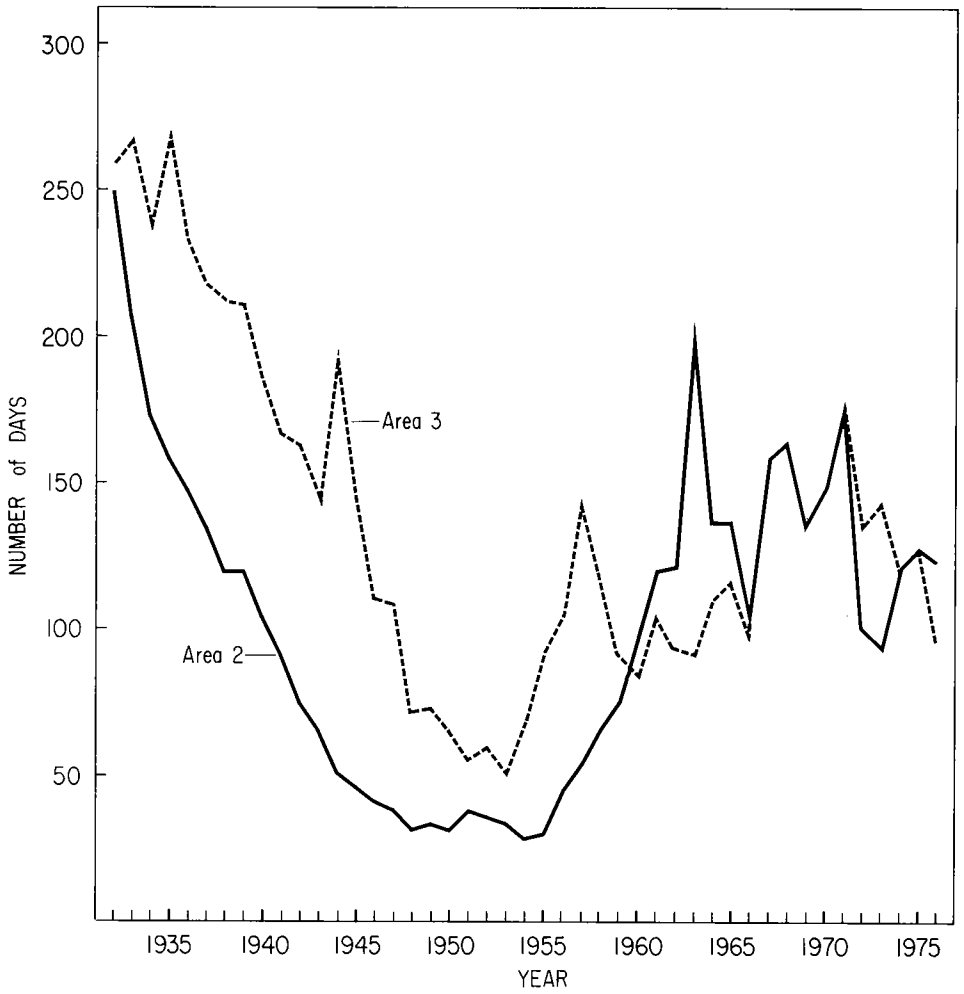

Figure 25. Length of fishing season in Areas 2 and 3A, 1932-1976.

Commission Organization

COMMISSIONERS

Three Commissioners are appointed by the Governor General of Canada and three by the President of the United States and serve without remuneration. The Commissioners appoint the Director who supervises the scientific staff, who collect and analyze statistical and biological data needed to manage the halibut fishery. The Commissioners annually review the regulatory proposals made by the scientific staff and consider proposals from the industry and the Conference Board that represents vessel owners and fishermen. The regulatory measures adopted by the Commission are submitted to the two governments for approval and fishermen of both nations are required to observe the approved regulations.

The average tenure of the Commissioners since 1924 has been 9 years, and 12 of the members have served 10 years or more. The length of service and the overlapping terms of the members has had a stabilizing influence on the Commission and the management of the resource.

In recent years, one Commissioner from each country has been an employee of the federal fisheries agency, one a fisherman, and one either a buyer or processor. One U.S. Commissioner usually is from Alaska and one Canadian Commissioner usually is from Prince Rupert. The chairmanship of the Commission alternates annually between countries. Initially, most of the Commission meetings were held in Seattle. Later, a system was devised to hold every third meeting in either Canada or Alaska. In 1972, the Commission adopted a policy to alternate its meetings between Canada and the United States.

STAFF

The Commission staff of Canadian and United States employees consisted of 4 biologists and 4 supporting personnel in 1925. At present, there are 13 biologists and 10 administrative, clerical, and technical persons; 14 are U.S. citizens and 9 are Canadians. The staff is supervised by the Director who is responsible to the Commission for its research, regulatory, and administrative functions. The Commission headquarters have been on the campus of the University of Washington in Seattle since 1924, except for 5 years (1931-1936) when the staff was housed in a laboratory of the U.S. Bureau of Fisheries (Figure 26). An office is maintained in Prince Rupert during the fishing season.

Each summer, 15 temporary employees are engaged to collect data on the landings and the fishery. The temporary employees usually are undergraduates from different universities in Canada and the United States. Temporary staff members are stationed in Seattle, Vancouver, Prince Rupert, Petersburg, Sitka, Juneau, Pelican, Seward, and Kodiak. In addition, some temporary employees serve at sea on the Commission's charter vessels.

ADMINISTRATION

The Convention specifies that expenses of the Commission are to be shared equally by the two governments. The Director submits a budget to the Commissioners and, when approved, it is forwarded to the Canadian Department of Fisheries and the Environment and to the U.S. State Department. The Commission budget in fiscal year 1924/1925 was $20,000, most of which was for staff salaries. The combined Canadian and United States appropriations for fiscal year 1977/1978 of $890,000 brought the total funds appropriated during the 53-year history of the Commission to $11.7 million. Until the 1970's, all billings and salaries were paid by the Canadian Government in Ottawa. Then, the United States Government was billed for and reimbursed Canada for one-half these payments. In 1971, IPHC petitioned the governments for its own financial regulations. This request was approved and the Commission adopted its own fiscal year (April 1 to March 31); thereafter, appropriated funds were deposited in a Commission account and billings were paid directly by IPHC.

For the most part, the administrative policies and salaries are consistent with those of the U.S. Civil Service. The Commission has a pension plan under the auspices of the International Fisheries Commissions Pension Society.

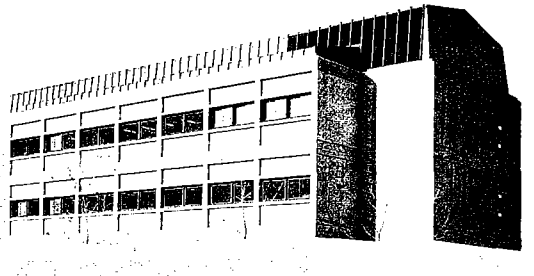

Figure 26. IPHC headquarters, University of Washington, 1969-1977.

Industry Organizations

A number of organizations have been formed by people in the halibut industry to promote their respective interests. Some of these organizations have been in existence for several decades and represent hundreds of members. These organizations not only provide many services to their members, but also have contributed substantially to the management of the halibut fishery.

HALIBUT ASSOCIATION OF NORTH AMERICA

Most of the fish processing companies that buy and sell halibut in Canada and the United States belong to the Halibut Association of North America (HANA). Membership includes 38 companies; 13 from Washington, 14 from British Columbia, and 11 from Alaska. The Association maintains a fund for promoting sales of halibut and works to maintain standards that provide a high quality product for the consumer. The Association frequently consults with the IPHC staff and Commissioners on matters concerning the management of the fishery and sends a representative to IPHC's Annual Meeting. Seven members of HANA are represented on the Advisory Group.

FISHERMEN'S UNIONS

Many halibut fishermen are active union members although their earnings are based on shares of the net proceeds from the sale of their fish. Some unions represent only halibut fishermen, others represent members from several fisheries, and at least one represents shore workers at fish processing plants as well. One of the primary functions of the unions is to negotiate financial arrangements for the fishermen. The unions frequently maintain funds for the welfare of their members and may assist their members in filing tax returns. Fishermen's unions are interested in preventing accidents at sea and encourage the use of navigational and life saving equipment on vessels. Union and vessel owner associations jointly have adopted gear maintenance standards. The degree of union organization varies from port to port and tends to be stronger among the fishermen who work on the larger vessels and who fish out of the larger ports.

FISHING VESSEL OWNERS' ASSOCIATIONS

Many owners of halibut vessels belong to associations of vessel owners which provide a number of useful functions for their members. Some of the associations maintain an insurance pool and provide coverage for accidental loss of the fish catch, a type of insurance usually not offered by commercial companies. Many associations assist their members with tax returns and other accounting services. They also may participate in price negotiations on behalf of their members as well as in labor negotiations with fishermen's unions. Association spokesmen provide information to executive and legislative branches of government and participate in national and international meetings.

HALIBUT FISHERMEN'S WIVES' ASSOCIATION

The Halibut Fishermen's Wives' Association was formed by the wives of the halibut fishermen that operate out of Seattle, Washington. The organization was formed in 1963 to protest the decision by INPFC to allow Japanese fishermen to fish for halibut in the eastern Bering Sea. Although their membership is not large, they have worked diligently to inform the public about political and conservation problems in the halibut fishery. They have distributed halibut recipe booklets with an insert appealing for support for their cause. They attend fisheries meetings and express their concern for the halibut resource and have been responsible for having state and federal governments designate a "Halibut Week". The 1974 Proclamation by the U.S. Senate is reproduced here:

93D CONGRESS
2D SESSION

S. J. RES. 210

IN THE SENATE OF THE UNITED STATES

MAY 21, 1974

Mr. MAGNUSON introduced the following joint resolution; which was read twice and referred to the Committee on the Judiciary

JOINT RESOLUTION

Authorizing and requesting the President of the United States to proclaim June 2 to June 8 as "National Halibut Week".

Resolved by the Senate (the House of Representatives concurring), That the President is authorized and requested to issue a proclamation designating the seven-day period beginning June 2, 1974, and ending June 8, 1974, as "National Halibut Week", and calling upon the people of the United States to observe such week with appropriate ceremonies and activities.

II

CONFERENCE BOARD

The Conference Board is an advisory panel representing Canadian and United States halibut fishermen and vessel owners. The Board was created by the Commission to obtain recommendations from the fishing fleet on conservation measures. After the Commission staff has presented information on stock condition and has made its proposals for regulations in the coming year, the Conference Board meets to develop its own regulatory proposals which

are presented to the Commission for consideration. Conference Board members are designated by union and vessel owner organizations at the various ports where halibut are landed. To insure broad representation, the Commission pays the expenses for 6 to 10 delegates who attend Commission annual meetings. The Board sets its own rules for participation and voting. A consensus of recommendations is presented to the Commission, but minority views also are expressed.

ADVISORY GROUP

In 1972 and 1973, the Conference Board asked the Commission to allow a few Board members to be observers at the Commission's sessions when regulatory decisions were made. In 1974, the Commission established an Advisory Group consisting of representatives of fishermen, vessel owners, and processors. The Commission asked that the members of this body be selected from all geographic areas of the fishery. The Advisory Group consists of 14 members: 7 selected by the Conference Board and 7 by the Halibut Association of North America (HANA).

Commission Publications — 1930-1977

Reports

1.* Report of the International Fisheries Commission appointed under the Northern Pacific Halibut Treaty. John Pease Babcock, William A. Found, Miller Freeman and Henry O'Malley. 31 p. (1931).
2. Life history of the Pacific halibut (1) Marking experiments. William F. Thompson and William C. Herrington. 137 p. (1930).
3. Determination of the chlorinity of ocean waters. Thomas G. Thompson and Richard Van Cleve. 14 p. (1930).
4. Hydrographic sections and calculated currents in the Gulf of Alaska, 1927 and 1928. George F. McEwen, Thomas G. Thompson and Richard Van Cleve. 36 p. (1930).
5.* History of the Pacific halibut fishery. William F. Thompson and Norman L. Freeman. 61 p. (1930).
6.* Biological statistics of the Pacific halibut fishery (1) Changes in the yield of a standardized unit of gear. William F. Thompson, Harry A. Dunlop and F. Heward Bell. 108 p. (1931).
7.* Investigations of the International Fisheries Commission to December 1930, and their bearing on the regulation of the Pacific halibut fishery. John Pease Babcock, William A. Found, Miller Freeman and Henry O'Malley. 29 p. (1930).
8.* Biological statistics of the Pacific halibut fishery (2) Effect of changes in intensity upon total yield and yield per unit of gear. William F. Thompson and F. Heward Bell. 49 p. (1934).
9.* Life history of the Pacific halibut (2) Distribution and early life history. William F. Thompson and Richard Van Cleve. 184 p. (1936).
10. Hydrographic sections and calculated currents in the Gulf of Alaska, 1929. Thomas G. Thompson, George F. McEwen and Richard Van Cleve. 32 p. (1936).
11. Variations in the meristic characters of flounders from the northeastern Pacific. Lawrence D. Townsend. 24 p. (1936).
12. Theory of the effect of fishing on the stock of halibut. William F. Thompson. 22 p. (1937).
13. Regulation and investigation of the Pacific halibut fishery in 1947 (Annual Report). IFC. 35 p. (1948).
14. Regulation and investigation of the Pacific halibut fishery in 1948 (Annual Report). IFC. 30 p. (1949).
15. Regulation and investigation of the Pacific halibut fishery in 1949 (Annual Report). IFC. 24 p. (1951).
16. Regulation and investigation of the Pacific halibut fishery in 1950 (Annual Report). IFC. 16 p. (1951).
17. Pacific Coast halibut landings 1888 to 1950 and catch according to area of origin. F. Heward Bell, Henry A. Dunlop and Norman L. Freeman. 47 p. (1952).
18. Regulation and investigation of the Pacific halibut fishery in 1951 (Annual Report). Edward W. Allen, George R. Clark, Milton C. James and George W. Nickerson. 29 p. (1952).
19. The production of halibut eggs on the Cape St. James spawning bank off the coast of British Columbia 1935-1946. Richard Van Cleve and Allyn H. Seymour. 44 p. (1953).
20. Regulation and investigation of the Pacific halibut fishery in 1952 (Annual Report). Edward W. Allen, George R. Clark, Milton C. James, George W. Nickerson and Seton H. Thompson. 22 p. (1953).
21. Regulation and investigation of the Pacific halibut fishery in 1953 (Annual Report). IPHC. 22 p. (1954).
22. Regulation and investigation of the Pacific halibut fishery in 1954 (Annual Report). IPHC. 32 p. (1955).
23. The incidental capture of halibut by various types of fishing gear. F. Heward Bell. 48 p. (1956).
24. Regulation and investigation of the Pacific halibut fishery in 1955 (Annual Report). IPHC. 15 p. (1956).

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25. Regulation and investigation of the Pacific halibut fishery in 1956 (Annual Report). IPHC. 27 p. (1957).
26. Regulation and investigation of the Pacific halibut fishery in 1957 (Annual Report). IPHC. 16 p. (1958).
27. Regulation and investigation of the Pacific halibut fishery in 1958 (Annual Report). IPHC. 21 p. (1959).
28. Utilization of Pacific halibut stocks: Yield per recruitment. Staff, IPHC. 52 p. (1960).
29. Regulation and investigation of the Pacific halibut fishery in 1959 (Annual Report). IPHC. 17 p. (1960).
30. Regulation and investigation of the Pacific halibut fishery in 1960 (Annual Report). IPHC. 24 p. (1961).
31. Utilization of Pacific halibut stocks: Estimation of maximum sustainable yield, 1960. Douglas G. Chapman, Richard J. Myhre and G. Morris Southward. 35 p. (1962).
32. Regulation and investigation of the Pacific halibut fishery in 1961 (Annual Report). IPHC. 23 p. (1962).
33. Regulation and investigation of the Pacific halibut fishery in 1962 (Annual Report). IPHC. 27 p. (1963).
34. Regulation and investigation of the Pacific halibut fishery in 1963 (Annual Report). IPHC. 24 p. (1964).
35. Investigation, utilization and regulation of the halibut in southeastern Bering Sea. Henry A. Dunlop, F. Heward Bell, Richard J. Myhre, William H. Hardman and G. Morris Southward. 72 p. (1964).
36. Catch records of a trawl survey conducted by the International Pacific Halibut Commission between Unimak Pass and Cape Spencer, Alaska from May 1961 to April 1963. IPHC. 524 p. (1964).
37. Sampling the commercial catch and use of calculated lengths in stock composition studies of Pacific halibut. William H. Hardman and G. Morris Southward. 32 p. (1965).
38. Regulation and investigation of the Pacific halibut fishery in 1964 (Annual Report). IPHC. 18 p. (1965).
39. Utilization of Pacific halibut stocks: Study of Bertalanffy's growth equation. G. Morris Southward and Douglas G. Chapman. 33 p. (1965).
40. Regulation and investigation of the Pacific halibut fishery in 1965 (Annual Report). IPHC. 23 p. (1966).
41. Loss of tags from Pacific halibut as determined by double-tag experiments. Richard J. Myhre. 31 p. (1966).
42. Mortality estimates from tagging experiments on Pacific halibut. Richard J. Myhre. 43 p. (1967).
43. Growth of Pacific halibut. G. Morris Southward. 40 p. (1967).
44. Regulation and investigation of the Pacific halibut fishery in 1966 (Annual Report). IPHC. 24 p. (1967).
45. The halibut fishery, Shumagin Islands and westward not including Bering Sea. F. Heward Bell. 34 p. (1967).
46. Regulation and investigation of the Pacific halibut fishery in 1967 (Annual Report). IPHC. 23 p. (1968).
47. A simulation of management strategies in the Pacific halibut fishery. G. Morris Southward. 70 p. (1968).
48. The halibut fishery south of Willapa Bay, Washington. F. Heward Bell and E. A. Best. 36 p. (1968).
49. Regulation and investigation of the Pacific halibut fishery in 1968 (Annual Report). IPHC. 19 p. (1969).
50. Agreements, conventions and treaties between Canada and the United States of America with respect to the Pacific halibut fishery. F. Heward Bell. 102 p. (1969).
51. Gear selection and Pacific halibut. Richard J. Myhre. 35 p. (1969).
52. Viability of tagged Pacific halibut. Gordon J. Peltonen. 25 p. (1969).

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53. Effects of domestic trawling on the halibut stocks of British Columbia. Stephen H. Hoag. 18 p. (1971).
54. A reassessment of effort in the halibut fishery. Bernard E. Skud. 11 p. (1972).
55. Minimum size and optimum age of entry for Pacific halibut. Richard J. Myhre. 15 p. (1974).
56. Revised estimates of halibut abundance and the Thompson-Burkenroad debate. Bernard Einar Skud. 36 p. (1975).
57. Survival of halibut released after capture by trawls. Stephen H. Hoag. 18 p. (1975).
58. Sampling landings of halibut for age composition. G. Morris Southward. 31 p. (1976).
59. Jurisdictional and administrative limitations affecting management of the halibut fishery. Bernard Einar Skud. 24 p. (1976).
60. The incidental catch of halibut by foreign trawlers. Stephen H. Hoag and Robert R. French. 24 p. (1976).
61. The effect of trawling on the setline fishery for halibut. Stephen H. Hoag. 20 p. (1976).
62. Distribution and abundance of juvenile halibut in the southeastern Bering Sea. E. A. Best. 23 p. (1977).
63. Drift, migration, and intermingling of Pacific halibut stocks. Bernard Einar Skud. 42 p. (1977).

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1. Recruitment investigations: Trawl catch records Bering Sea, 1967. E. A. Best. 23 p. (1969).
2. Recruitment investigations: Trawl catch records Gulf of Alaska, 1967. E. A. Best. 32 p. (1969).
3. Recruitment investigations: Trawl catch records eastern Bering Sea, 1968 and 1969. E. A. Best. 24 p. (1969).
4. Relationship of halibut stocks in Bering Sea as indicated by age and size composition. William H. Hardman. 11 p. (1969).
5. Recruitment investigations: Trawl catch records Gulf of Alaska, 1968 and 1969. E. A. Best. 48 p. (1969).
6.* The Pacific halibut. F. Heward Bell and Gilbert St-Pierre. 24 p. (1970).
7. Recruitment investigations: Trawl catch records eastern Bering Sea, 1963, 1965 and 1966. E. A. Best. 52 p. (1970).
8. The size, age and sex composition of North American setline catches of halibut *(Hippoglossus hippoglossus stenolepis)* in Bering Sea, 1964-1970. William H. Hardman. 31 p. (1970).
9. Laboratory observations on early development of the Pacific halibut. C. R. Forrester and D. F. Alderdice. 13 p. (1973).
10. Otolith length and fish length of Pacific halibut. G. Morris Southward and William H. Hardman. 10 p. (1973).
11. Juvenile halibut in the eastern Bering Sea: Trawl surveys, 1970-1972. E. A. Best. 32 p. (1974).
12. Juvenile halibut in the Gulf of Alaska: Trawl surveys, 1970-1972. E. A. Best. 63 p. (1974).
13. The sport fishery for halibut: Development, recognition and regulation. Bernard Einar Skud. 19 p. (1975).
14. The Pacific halibut fishery: Catch, effort and CPUE, 1929-1975. Richard J. Myhre, Gordon J. Peltonen, Gilbert St-Pierre, Bernard E. Skud and Raymond E. Walden. 94 p. (1977).
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