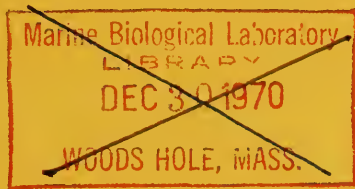


Tech. Rept No. 6
1970

INTERNATIONAL PACIFIC HALIBUT COMMISSION

*Appointed under the Convention between Canada and the United States
of America for the Preservation of the Northern Pacific Halibut Fishery*

TECHNICAL REPORT No. 6



The Pacific Halibut

by

F. HEWARD BELL and GILBERT ST-PIERRE



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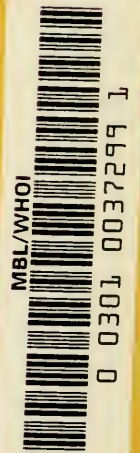
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Address Correspondence to:

INTERNATIONAL PACIFIC HALIBUT COMMISSION
P.O. Box 9, University Station
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THE PACIFIC HALIBUT

F. Heward Bell and Gilbert St-Pierre

INTRODUCTION

This report briefly reviews items of general interest regarding the Pacific halibut and the management of the fishery. It is primarily designed to answer some of the questions received by the International Pacific Halibut Commission from many interested groups and individuals, including students at nearly all educational levels.

THE SPECIES AND LIFE HISTORY

Scientific and Common Names

The scientific name for Pacific halibut is *Hippoglossus hippoglossus stenolepis* (Vernidub). In 1936 M. F. Vernidub proposed that Pacific halibut should be regarded as a variety of Atlantic halibut *Hippoglossus hippoglossus* rather than a new species *Hippoglossus stenolepis* as Schmidt had indicated in 1904.

The common name of the species is halibut. It came from the earlier "holibut" which was used as far back as the 13th Century. It is derived from the Middle English "halybutte", i.e. the flatfish (butte) that was to be eaten on holy (haly) days.

In commerce and with the public, where common names have their main if not only relevance, the word halibut has been used exclusively to identify the genus *Hippoglossus*. With ichthyologists, that is those who study fish, some use the word halibut in the common name of other large flounders. They continue to conform to a practice initiated by Jordan, an early ichthyologist, despite the fact that most of that worker's common names for fishes have now been replaced. Also, those wishing to take advantage of consumers have used the name halibut in identifying other flounders. In 1969 the United States and Canada ruled against use of such misnomers in commerce to prevent deception of the public.

General Appearance or Morphology

Halibut are more elongated or fusiform than most flatfishes, having a maximum width of about one-third the length. The small scales are well buried in the skin, the lateral line has a pronounced arch above the pectoral fin, and the end of the caudal fin or tail is crescent-shaped or lunate (Figure 1).

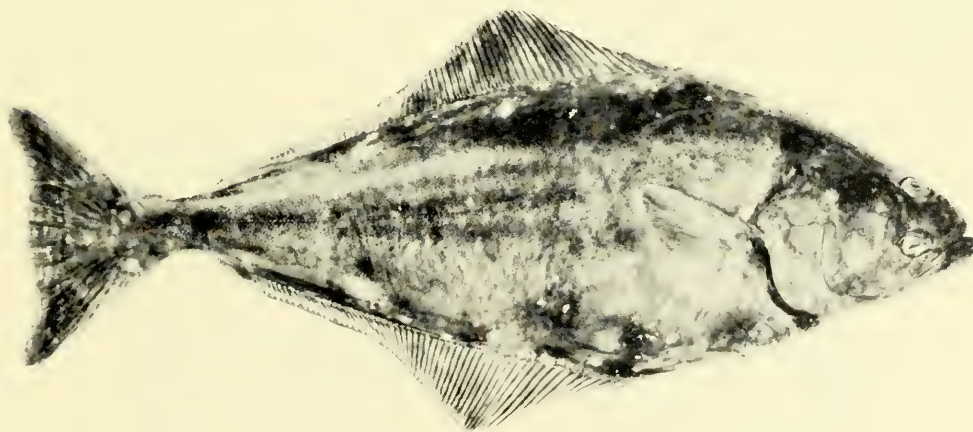


Figure 1. Adult Pacific halibut.

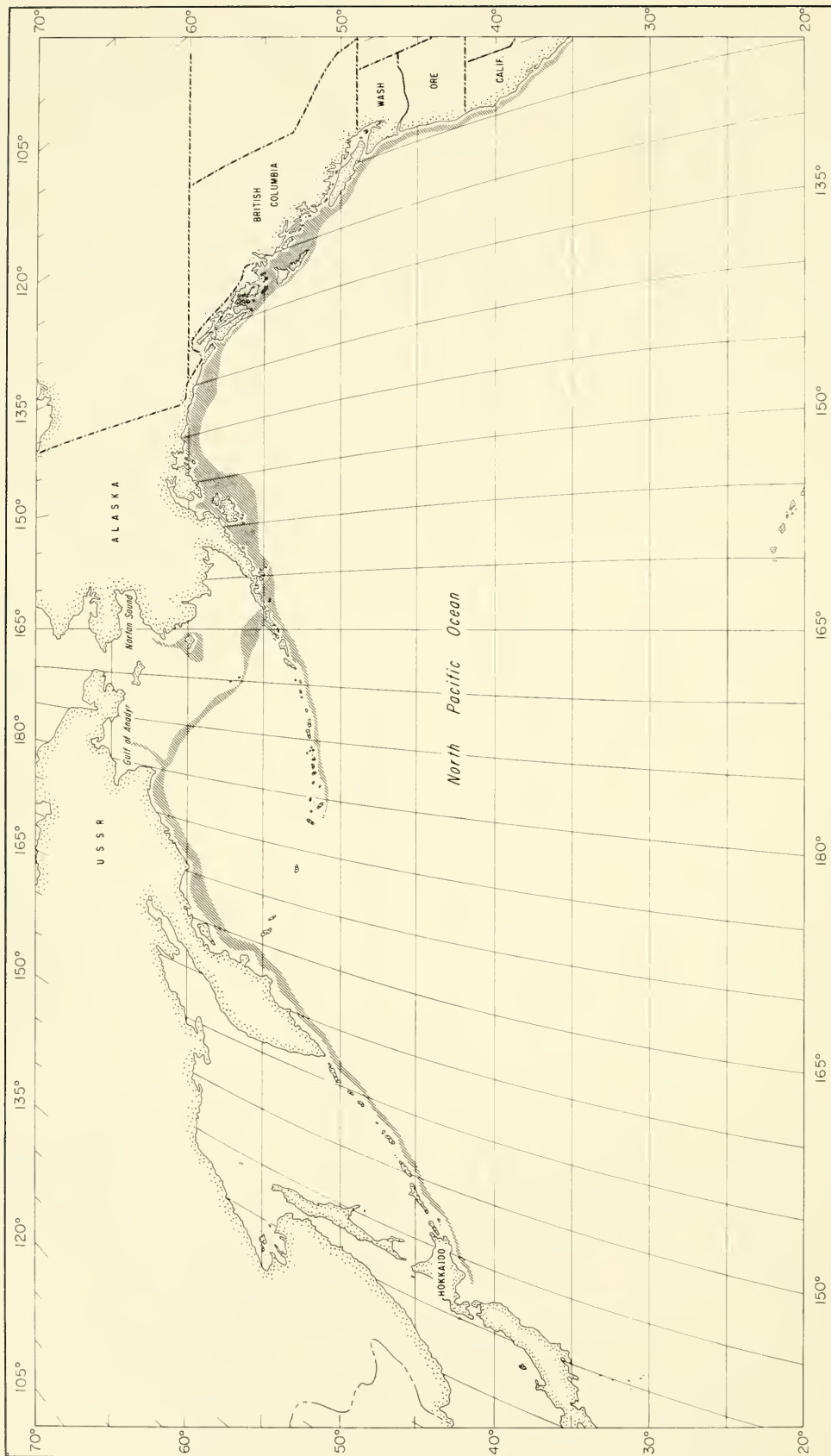


Figure 2. Distribution of Pacific halibut in the North Pacific Ocean and Bering Sea.

Halibut are right-handed or dextral, with both eyes on the dark or right side. Probably one halibut in about 25,000 is left-handed or sinistral. The mouth is large, about one-third the head length, with jaws equally developed and carrying strong incurved teeth. The pigmentation on the dark side is variable and tends to assume the color pattern of the ocean's bottom. This protective coloration enables the fish to avoid detection by both predators and intended prey.

Occurrence

Halibut is a demersal species generally found on the continental shelf in North Temperate waters. Its distribution both in the Pacific and the Atlantic tends to be within bottom water temperatures ranging from 37° to 46° Fahrenheit (3° to 8° Centigrade), which encompass what is scientifically referred to as the boreal zone.

Commercial setline catches in the Northeastern Pacific have been made as deep as 600 fathoms, i.e. 3600 feet or about 1100 meters, but most halibut in the Pacific are found in waters from 15 to 150 fathoms (Figure 2).

Pacific halibut have been recorded along 3,500 miles of the North American coast from Santa Rosa Island off Santa Barbara, California to as far north as Norton Sound, near Nome. The species also exists across the continental shelf in Bering Sea, some 700 miles, and throughout an additional 2,000 miles along the Asiatic Coast, from the Gulf of Anadyr in the north to as far south as the Island of Hokkaido, Japan.

Reproduction and Development

Spawning takes place over a fairly protracted period of the year. From November to March mature males and females are found concentrated at places along the edge of the continental shelf at depths from .125 to 250 fathoms, that is, in water 750 to 1,500 feet deep.

While some females may mature as young as about 8 years of age, others may be immature until as late as 16 years of age, with the average age of first maturity for females considered to be 12 years. Males, on the other hand, mature much younger and the average age of first maturity of males is about 7 to 8 years of age.

Spawning probably occurs annually and a large female may produce from 2 to 3 million eggs yearly. The number of eggs is proportionate to the weight of the fish.

The eggs, which are about 1/8 inch in diameter, are spawned in deep waters at the edge of the continental shelf, and fertilization takes place at that time (Figure 3). The germinal disc of the egg goes through the normal processes of cell division to form the embryo, which lives off the yolk that makes up the main mass of the egg (Figure 4).

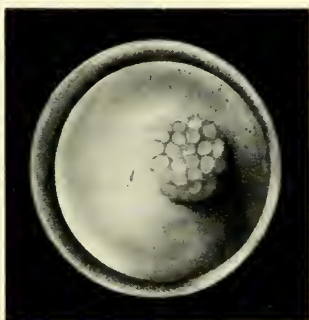


Figure 3. Early stage of halibut ovum showing germinal disc. Size: 3.3 mm. (1/8 inch).

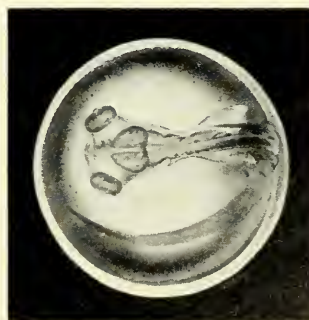


Figure 4. Developing halibut embryo. Size: 2.5 mm. (1/10 inch).

After about 15 days they hatch, still living off the yolk sac (Figure 5). After absorption of the yolk the postlarvae must depend upon the external environment for their food (Figure 6).

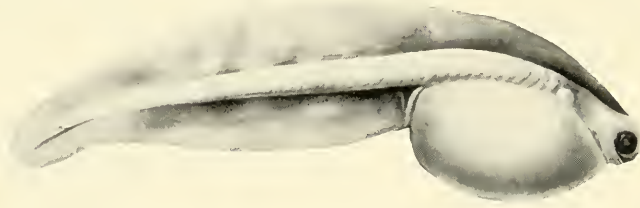


Figure 5. Newly-hatched halibut larva showing yolk sac. Size: 1 cm. (3/8 inch).

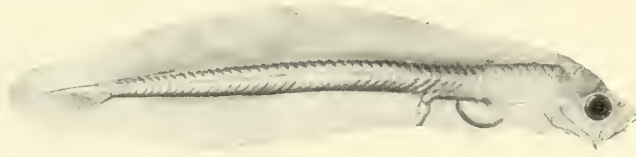


Figure 6. Halibut postlarva, yolk has been absorbed. Size: 1.7 cm. (11/16 inch).

Like the eggs and larvae, the postlarvae are free floating and may be transported many hundreds of miles by the ocean currents, which in the eastern North Pacific tend to move counterclockwise in the Gulf of Alaska and westward along the Alaskan Peninsula and Aleutian Islands (Figure 7). The velocity of some parts of this westward-moving subarctic current and Alaska Stream may reach as high as 10 knots, particularly at the edge of the continental shelf. Thus the floating eggs, the developing larvae and the postlarvae may be dispersed far from the point where they were produced. Eggs produced on the shelf edge in the eastern Gulf of Alaska and even from more distant grounds to the south could, under some conditions, be the source of the young found in Bering Sea.

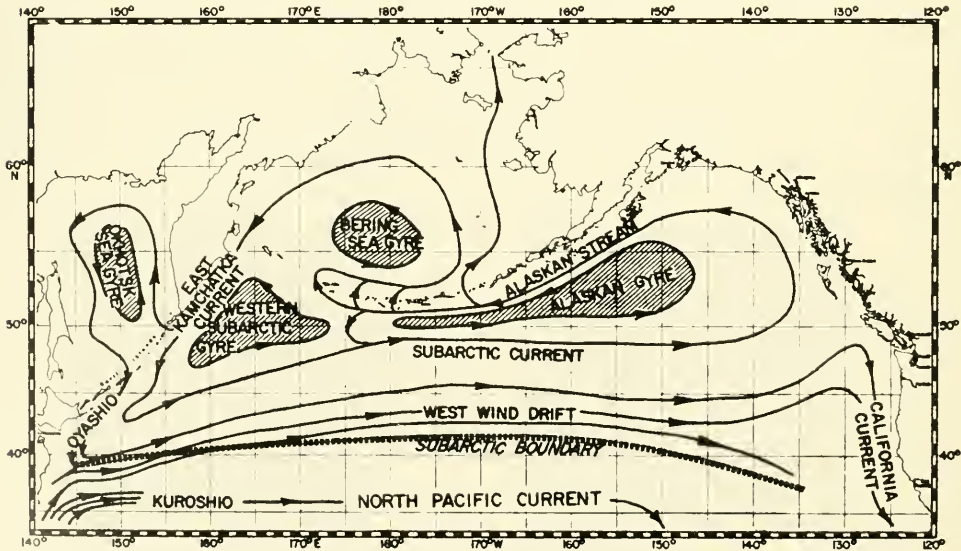


Figure 7. Map of North Pacific, showing main ocean currents. (from *Dodimead et al, INPFC Bull. 13*)

During the free floating stage, lasting up to six months, the postlarvae go through a number of developmental stages, two of which are indicated in Figures 8 and 9. During this time they rise toward the surface and are carried into the shallower section of the continental shelf by the prevailing wind-driven currents. At this time, there is a change in form or metamorphosis, the left eye migrates over the snout and the young fish are ready to commence their bottom existence as juvenile halibut possessing the characteristic adult form (Figure 10).

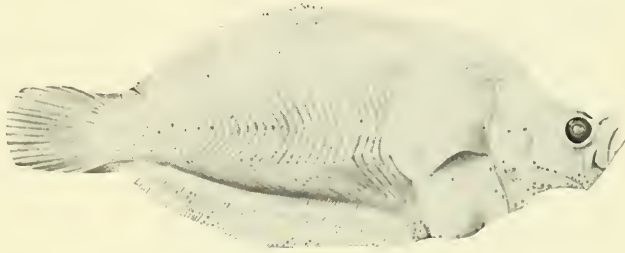


Figure 8. Halibut mid-postlarva. Size: 2.2 cm. (7/8 inch).

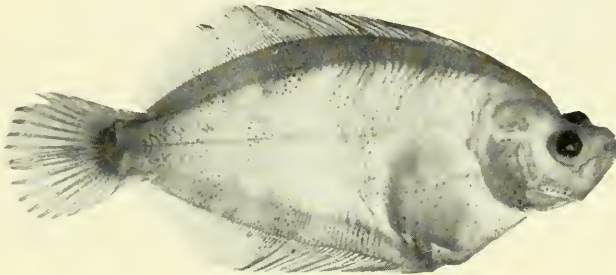


Figure 9. Halibut late postlarva, showing beginning of eye migration. Size: 2.5 cm. (1 inch).

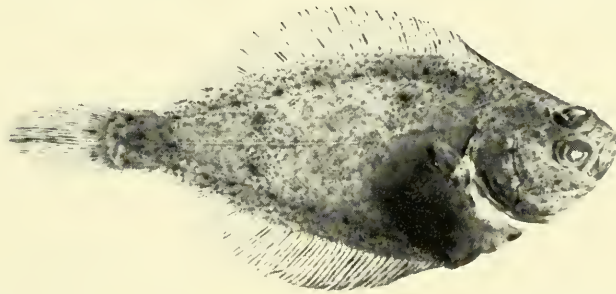


Figure 10. Young halibut, adapted to life on bottom. Size: 3.5 cm. (1 3/8 inch).

The entire early life history of the halibut, from the time of spawning until they reach the juvenile stage, is closely adapted to the general ecology and movements of the water masses of the North Pacific Ocean and Bering Sea.

The younger juveniles, from one to three years old tend to remain on the inshore grounds before moving offshore where they first enter the commercial setline fishery in significant numbers at about five to seven years of age.

The survival of the young halibut can be affected by natural variations in the environment, and, accordingly, some year classes will be more abundant than others. A series of weak or strong year classes can affect the size or productivity of the adult population upon which the fishery depends.

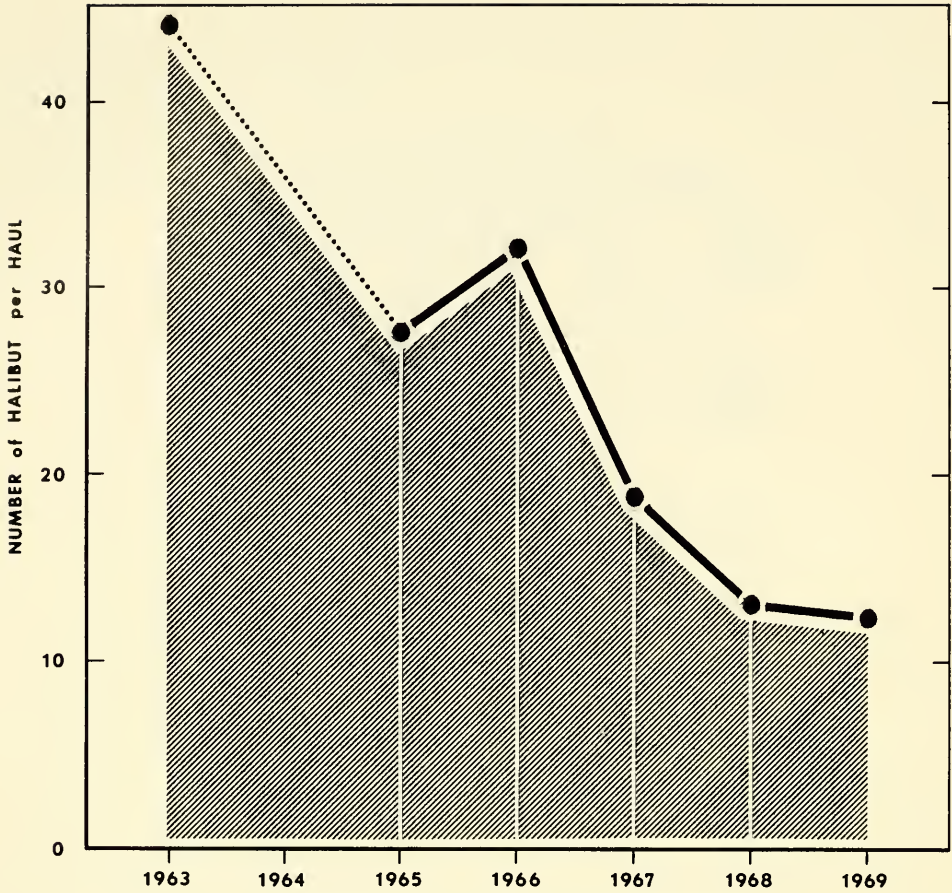


Figure 11. Decline in population of young halibut in Bering Sea shown by catch per haul of research trawlers.

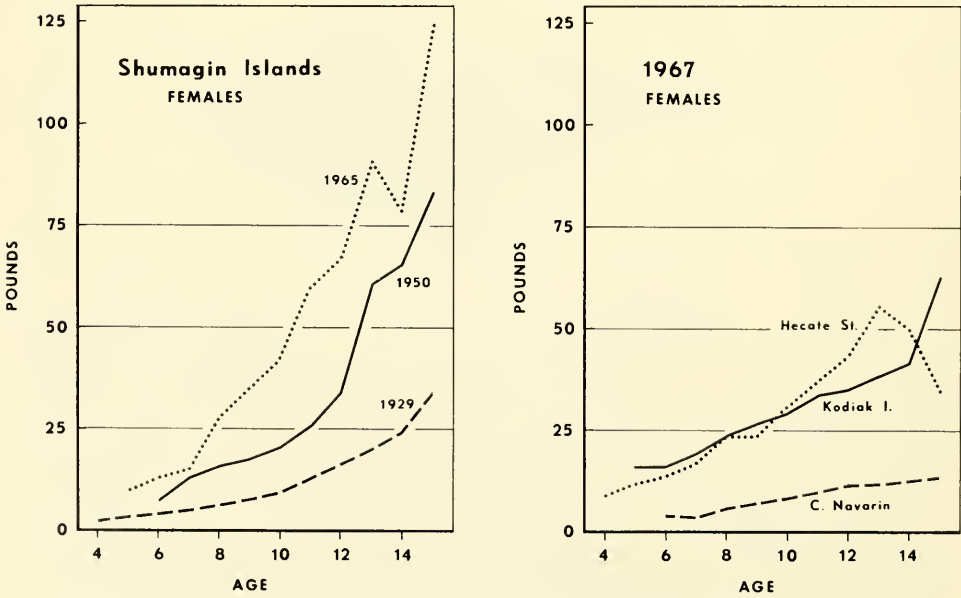


Figure 12. Growth rate of female halibut for (Left): the same grounds in different years, (Right): different grounds within the same year.

The young halibut are also vulnerable to capture by the expanding fleets of foreign bottom trawlers now fishing in the northeastern Pacific. Since 1960, annual surveys by the Halibut Commission have demonstrated that there has been a drastic decline in the number of young halibut on some grounds (Figure 11). This development poses a serious threat to the ultimate survival of the North American setline halibut fishery.

Age and Growth

Halibut live to a moderately advanced age. The growth rate or increase in size with age ranges widely from one section of the Pacific Coast to another, and it may also vary from one period of time to another (Figure 12).

Females grow faster than males and also live longer. The oldest female recorded was about 42 years, and the oldest male 27 years.

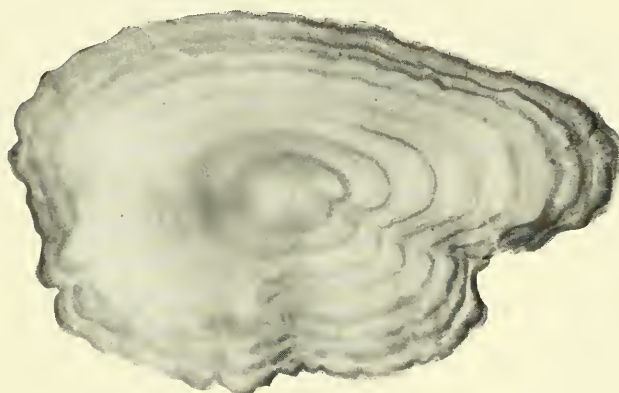


Figure 13. Otolith from a halibut in its ninth year. Dark rings are the less opaque winter zones.



Rings or annuli are formed each year on the bones or hard parts of fish as in a tree due to the succession of the fast summer and slower winter growing conditions. The otolith, a calcareous or stone-like body in the internal ear of the halibut (which probably serves as a hydrostatic or balancing organ), shows such annual rings (Figure 13).

The Halibut Commission “reads” about 40,000 such otoliths each year to determine the age composition of the stock and the growth rate (Figure 14). This information is essential for the scientific management of the resource.

Figure 14. Measuring annual zones for growth studies.

Size of Halibut

Halibut are the largest of all flatfish and one of the largest species of fish in the world. The largest halibut ever recorded from the northeast Pacific was a 495 pound fish caught off Petersburg, Alaska many years ago. A 507-pound halibut was reported taken in the Bay of Datt (Sakhalin Island, USSR). In the Atlantic even larger halibut have been reported, the largest weighing 700 pounds. These large specimens were over 9 feet in length.

The North American catch of Pacific halibut, caught mostly by setline gear in the regulated fishery, consists of individuals chiefly from 5 to over 200 pounds (Figure 15). The average size is between 30 and 35 pounds.



Figure 15. Female halibut 23 years old — 257 pounds eviscerated heads-on weight. Worth about \$100.00 at 1970 prices to fishermen.

Trawl-Caught Halibut

In the Pacific halibut fishery the retention of halibut taken by net gear is prohibited. This is necessary because the mesh size of the net gear used in the commercial trawl fishery, while well suited for the capture of the smaller flounders, cod and other bottom species, tends to catch an unduly large number of small and young halibut. Such halibut have not reached their optimum or best harvesting size. In addition, such net gear also fails to adequately crop the larger halibut that should be caught. Because of these characteristics of trawl nets, a loss of yield from the resource would result if halibut were harvested by such gear (Figure 16).

In the uncontrolled European halibut fishery, the catch now consists of a large proportion of individuals 2 to 4 years of age and under 5 pounds, caught chiefly by trawl net gear designed to catch other species.

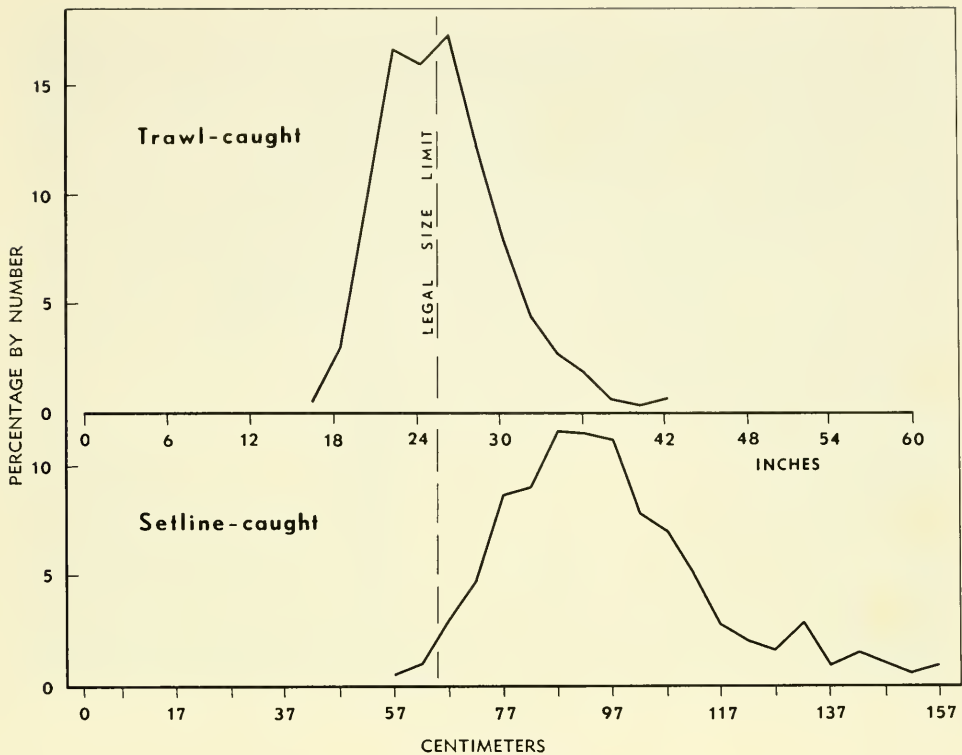


Figure 16. Size composition of trawl and setline-caught halibut.

The high percentage of small sizes in the unregulated European fishery creates a demand for imports of the larger sizes of North American setline-caught halibut. This has resulted in the export of several million pounds of halibut annually from the Pacific Coast to Great Britain.

Food

Halibut are strong swimmers and their food consists primarily of a large variety of fishes and, to a lesser extent, of the larger invertebrates such as crab and shrimp. The species most frequently observed in halibut stomachs include grey cod, sablefish, pollock, turbot, hake and, to a lesser extent, assorted rockfish, bullhead and other bottom fish. Halibut also leave the bottom to actively feed on midwater and pelagic fish such as sandlance and herring. The juvenile or young halibut (one to three years of age) subsist chiefly on small crustacea including shrimp.

Migration of Halibut

Each year thousands of halibut are caught by the Halibut Commission's chartered fishing vessels and are marked with numbered tags (Figure 17). Rewards are paid to persons recovering such marked halibut. Between 1925 and 1969 about 179,000 halibut were marked and released of which about 27,000 have been recovered to 1969.

Marking has shown that, in some areas and at some seasons, most of the fish migrate little (Figure 18). In other instances there is considerable dispersion or migration (Figure 19). The record migration observed to date by a tagged halibut was from the Aleutian Islands in western Alaska to northern California, a distance of 2,300 miles along the coast.



Figure 17. Halibut with monel metal strap and plastic-covered wire tag.

Also, assuming the marked fish are representative of all fish on the grounds, the proportion of marked fish recovered indicates the mortality of the stock or death rate that can be attributed to fishing, that is, how "hard" the stocks of halibut are being fished.

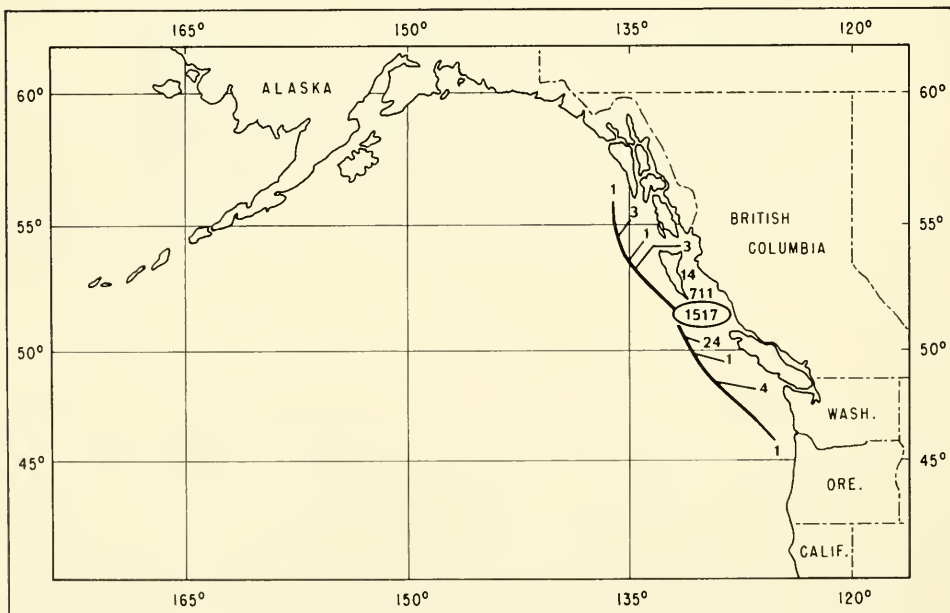


Figure 18. Limited migration shown by halibut tagged on Goose Islands grounds. 711 of 1517 total tagged recaptured at location of tagging.

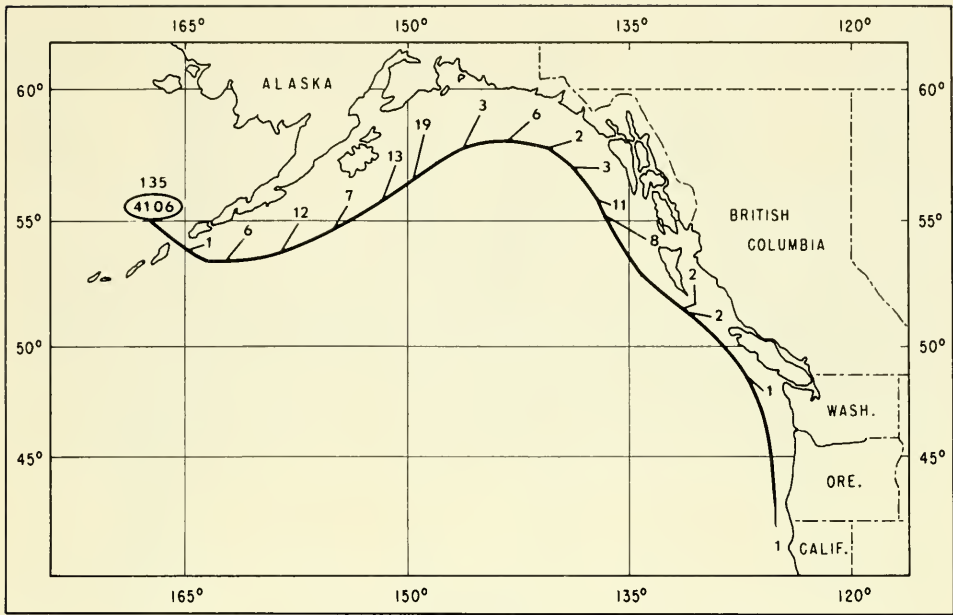


Figure 19. Extensive eastward migration of halibut tagged in Bering Sea.

THE FISHERY

The Pacific halibut fishery can be divided into three phases; the Indian fishery, the early commercial fishery, and the more recent commercial fishery.

Indian Fishery

Halibut, next to salmon, provided subsistence for a number of Pacific Coast Indian tribes, particularly the Makahs of Cape Flattery, the Haidas of the Queen Charlotte Islands, and the Tlingits of Southeastern Alaska.

Halibut and other marine animals became part of the folklore of these tribes. They were commemorated in carved heraldry on totem poles or painted on head boards covering the fronts of the large clan or community houses. (See the back cover of this report.)

The Indian hook-and-line fishery was conducted from large canoes, which ventured as far as 20 miles from shore. These fishermen used well-developed and efficient techniques. The hooks or gorges were often elaborately carved (Figure 20) and were selective of the larger fish. Such fish provided large flitches suitable for drying and smoking purposes.

The large hook may also have caused the fish to "drown" on capture, thereby permitting them to be more readily taken into the canoe.

Early Commercial Fishery

The early commercial fishery is considered to have commenced in 1888 when three sailing vessels from the New England States commenced to fish off Cape Flattery on the northwest coast of Washington Territory. The first car load of halibut was shipped from Tacoma to Boston in 1888 on the newly completed trans-continental railroad. After the 1885 completion of the trans-Canada railroad, Vancouver, British Columbia, became the major center for the fishery by 1892.



Figure 20. Bent wooden halibut hooks used by Nootka and Kwakiutl Indian tribes (center) and larger carved types used by Haida and Tlingit tribes.

At the outset, fishing was conducted usually in sheltered waters or in relatively close proximity to port. Other sailing schooners and sloops joined the fishery during the next decade (Figure 21), and by the later years of the 19th century, large company-owned steamers carrying ten to twelve 2-man dories had entered and dominated the fishery (Figure 22).



Figure 21. Sloop "Jennie F. Decker" in 1901, with dories stowed amidships.



Figure 22. S.S. "Roman" 1915. Her dories are out "on the gear".

Notwithstanding the important position held by company-owned steamers in the early 20th century, there was a growing number of smaller, independently-owned sloops which, by the early 1900's, were powered with gasoline engines. By 1910 several large, two-masted, gasoline-powered vessels, carrying as many as five to seven dories had joined the fishery (Figure 23). These were referred to as "smoke" boats by the "steamer" fishermen. Recently they have been referred to as "schooners". The company-owned steamers gradually declined in numbers due to their higher operating costs, wrecks and other mishaps coupled with World War I labor problems and a reduction in the stocks of halibut.



Figure 23. The "Mitkof", a schooner type vessel. Note pilothouse aft and stern chute for setting gear.

Recent Commercial Fishery

In the post-World War I years the rising economy, the development of diesel engines, and expansion of the fishery in the Gulf of Alaska as far west as Unimak Pass led to a sharp increase during the 1920's in the number of very seaworthy two-masted vessels or "schooners", most of which were built prior to 1930. They ranged from about 25 tons to 60 net tons. While they lack some of the versatility of the seine-boat type, most of the "schooners" still operating in the halibut fishery have been modernized to take full advantage of new technology.

New propulsion systems, advanced navigation and positioning devices, hydraulic deck controls, cargo-hold modifications, refrigeration, new types of gear and bait, and other technological advances have permitted a reduction of about 35 percent in manpower per vessel. Except for a few Canadian vessels, the halibut fleet consists of vessels that were built without government subsidy.

The vessels that fish halibut off Southeastern Alaska and British Columbia are also usually owner-operated; but they are generally smaller and of the "seine boat" type with a single mast and range from about 5 to 45 net tons. After 1929, additions to the fleet fishing west of Cape Spencer in the Gulf of Alaska were also of the seine boat or combination vessel type adaptable to use in other fisheries (Figure 24).

Size of Fleet

The home ports of the major section of the fleet, and the average number of vessels and men centered therein during the past two five-year periods have been as follows:

AVERAGE SIZE OF UNITED STATES AND CANADIAN FLEETS BY SECTIONS OF THE COAST

| HOME PORT | Number of Vessels | | Number of Men | |
|-------------------------------|----------------------|----------------------|----------------------|----------------------|
| | Average 1960-1964 | Average 1965-1969 | Average 1960-1964 | Average 1965-1969 |
| Oregon Ports | 5 | 2 | 17 | 6 |
| Seattle | 106 | 70 | 636 | 401 |
| Vancouver (Can.) | 85 | 76 | 541 | 469 |
| Prince Rupert (Can.) | 100 | 86 | 448 | 391 |
| Other B.C. Ports (Can.) | 22 | 6 | 76 | 19 |
| Petersburg | 53 | 51 | 197 | 192 |
| Juneau/Pelican | 41 | 34 | 169 | 124 |
| Other Alaska Ports | 100 | 62 | 334 | 183 |
| <hr/> | | | | |
| TOTAL - United States | 305 | 219 | 1,353 | 906 |
| Canadian | 207 | 168 | 1,065 | 879 |
| <hr/> | | | | |
| GRAND TOTAL | 512 | 387 | 2,418 | 1,785 |

In addition to the above fleet of regular halibut vessels about 500 to 600 small, one- or two-man boats fish halibut with a variety of hook and line gear.

The number of vessels operating from year to year is of interest from an economic or census standpoint, but it is not a satisfactory measure of available fishing power unless adjusted at least for changes in average size, efficiency and length of season.



Figure 24. Modern steel seine-boat type "Silver Dolphin" with pilothouse forward and covered baiting and setting area on stern.

FISHING FOR HALIBUT

For many months prior to the opening of the season, which is set by the Halibut Commission, the vessels and their propulsion equipment are overhauled at home ports and readied for the fishery. Such activities generate a great amount of economic activity and shore employment in the home ports of the vessels.

Labor Relations

Crews operate under closed shop contracts between the various vessel owner organizations and fishermen's unions on the Pacific Coast. These contracts specify the responsibilities of each party.

Probably due to the nature of the calling, enlightened leadership, and because most owner-captains were former crew members, labor relations in the halibut fishery have been unusually good, with only one or two significant disputes over the past fifty years.

The Lay or Share

Compensation is on a share basis. The proceeds from the sale of fish are divided between the crew and owner. The lay or formula used in such division is negotiable between the owner groups and the fishermen's unions, although the basic allotments have not changed materially over the past half century. About one-fifth of the gross proceeds from the sale is the "boat share". From the remainder the trip expenses (such as food, bait, engine fuel, lost and worn gear) are deducted. The net balance, or "crew share", is divided equally to all members, including the captain. The latter also usually receives about one-tenth of the boat share.

The Length of Fishing Season

Initially, the fishery by the larger vessels was conducted over 12 months of the year. However, most of the catch was made between March to October. In 1924

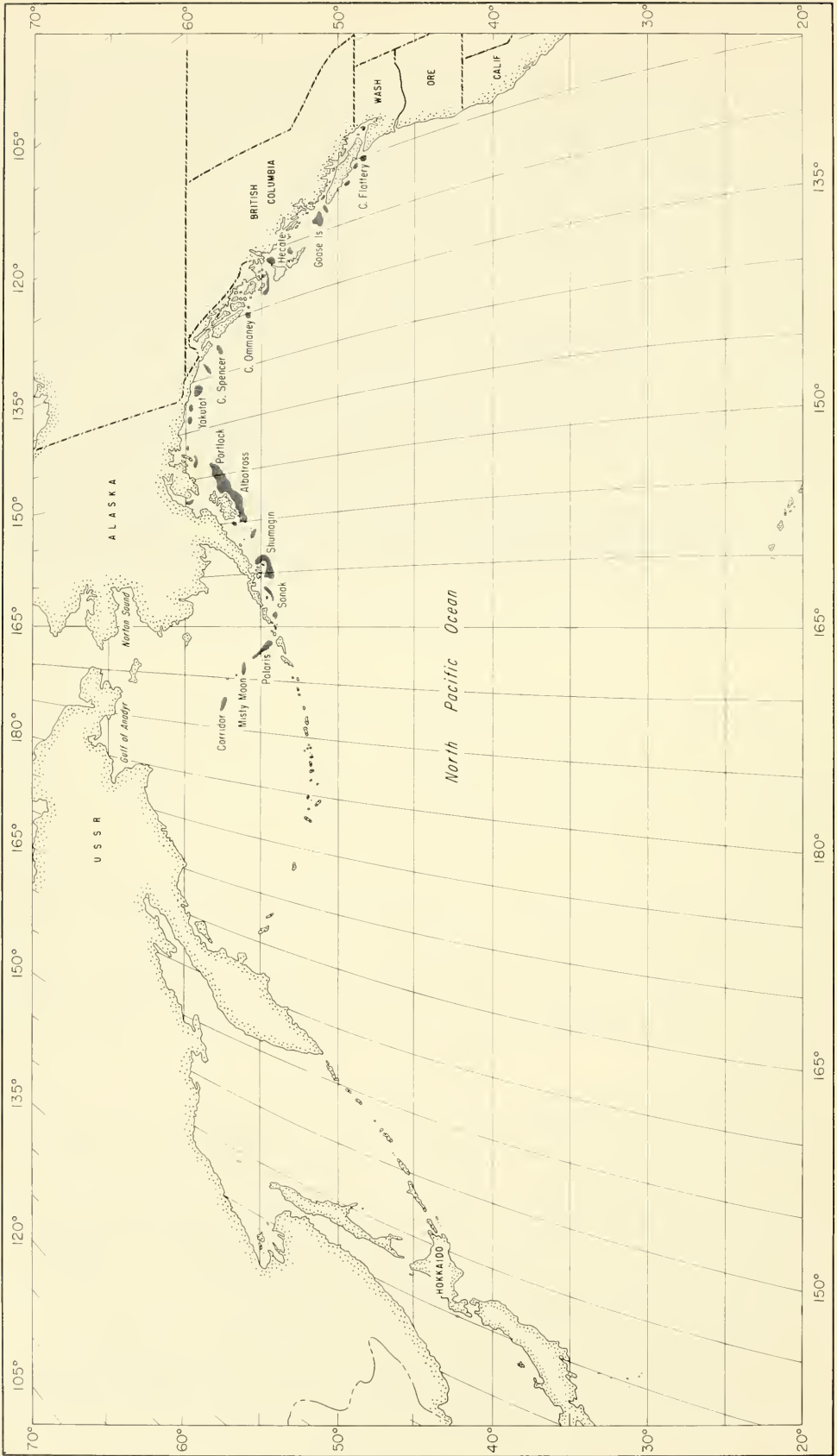


Figure 25. Major fishing grounds of North American halibut fleet.

the season was legally restricted by a 3-month winter closure, imposed by the first Halibut Convention. With the implementation of catch limits in 1932, under the 1930 Convention, the season became shorter.

The continued improvement in the stocks under regulation attracted many vessels to halibut fishing; these vessels were primarily from the salmon fleet, and joined the halibut fishery between the summer salmon seasons. With rising prices and growing entry of such salmon vessels, the halibut fishing season became very short; by 1954 the season was only 21 days long off the coasts of British Columbia and Southeastern Alaska and in 1953, 52 days long in the Gulf of Alaska.

This resulted in the overfishing of some segments of the stocks and probable underfishing of others that were more available in other seasons of the year.

The 1953 Convention permitted 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 an eight-day lay-in between trips, ultimately resulted in fishing seasons of satisfactory length. The season lasts about four to five months in the main producing areas, which usually are opened in early May. Short fishing seasons prior to May have been provided in Southeastern Bering Sea.

Fishing Grounds

Fishing grounds or areas of halibut concentrations are dispersed throughout the entire range of the fishery from northern California to central Bering Sea. Some of the main grounds are indicated in Figure 25.

For successful fishing, an intimate knowledge of the depth or bathymetric distribution of the species and of the technique of setting gear is essential. This is evident in the fact that catches of vessels operated by more skillful and experienced captains will far exceed those of others.



Figure 26. Coiling a skate (unit of gear).

Fishing Gear

For convenience in handling, the gear is made up or "rigged" into units which are called "skates" (Figure 26). On the Atlantic Coast such units were called "tubs of trawl". Tubs or containers in which to coil gear are rarely used in the Pacific Coast set-line halibut fishery except on a few small one- or two-man boats mostly in northern California.

The skate usually consists of 5 or 6 lines of groundline of 50 fathoms each, onto which loops of light twine known as beckets are attached at regular intervals. Short lines, about 5 feet in length, called gangions or gangings, are attached to the beckets and at the other end of the gangion is a hook. Up to recent years hooks were bound or "ganged" to the end of the gangion with pine-tar-treated linen thread. Now eyed hooks are used and these are attached to a loop in the gangion (Figure 27).



Figure 27. (Left): Offset hook, ganged or bound to hemp ganging with pine-tar-treated thread. (Centre): Offset eyed-hook held to loop of nylon ganging. (Right): Attached to becket in groundline.

The intervals between beckets or "rig" of the gear are usually 13, 18, or 21, and occasionally 26 feet in length. These set intervals facilitate the baiting before setting, and the coiling while hauling by causing the becket and gangion or ganging with hook attached to line up properly in the coiled skate.

In the past the gear has been constructed either with hemp, cotton or manila, or occasionally sisal, depending upon their relative availability, quality and cost. However, such natural fibers have now been largely displaced by man-made materials, chiefly nylon, and very infrequently by stainless steel.



Figure 28. Hauling gear over rail roller with power gurdy or winch.

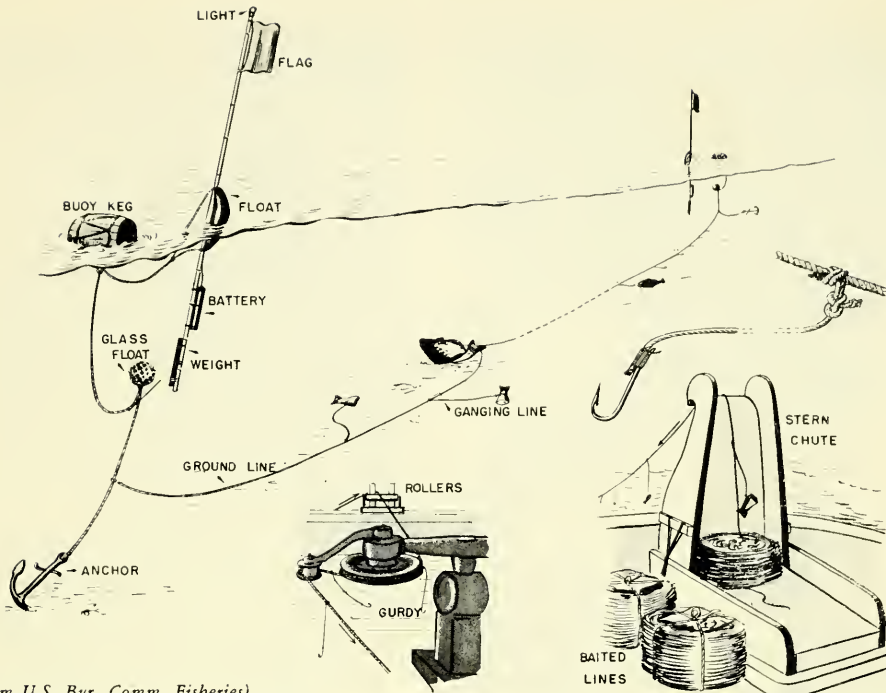
Bait

The baits used in the North American Pacific setline halibut fishery include both fresh and frozen herring, frozen octopus and fresh caught "shack" or "gurdy bait" consisting primarily of grey cod, sablefish, some turbot, and a scattering of other species. Frozen shack bait is almost entirely grey cod and sablefish. Also used, is fresh or frozen whole salmon or salmon parts, generally heads and tails.

Fishing Methods

Fishing is conducted in depths usually between 45 and 150 fathoms, but not infrequently may be as shallow as about 15 fathoms or as deep as 300 fathoms. Also, there are occasional instances of fishing as deep as 600 fathoms (Figure 28).

Depending upon the grounds, time of year and bait used, the gear remains in the water, or is "soaked" for variable periods from as short as 4 to 6 hours up to 20 to 30 hours (Figure 29).



(from U.S. Bur. Comm. Fisheries)

Figure 29. Diagram of halibut gear as set. Instead of wooden kegs, buoys now consist of round, coloured plastic buoys.

Dressing and Icing Down

According to the size of the vessel, from 5 to 40 tons of crushed or flaked ice are taken each trip. Many vessels have recently installed refrigeration to slow the melting process and thus sharply reduce the amount of ice needed. This refrigeration also holds the temperature of the fish close to the freezing point of fish but not below that point.

Halibut are dressed or cleaned soon after they are brought aboard and the body cavity, or "poke" is scraped and washed. Then the halibut are filled with ice and stored in layers, dark side down in pens in the hold. Each layer of fish is insulated from the other with crushed ice.

In the fishery off British Columbia or Southeastern Alaska, the average length of trip (from port to port) is about 13 days; in the Gulf of Alaska, the average trip is between 20 and 25 days, depending on the grounds fished and port of landing.

Fishing Records or Logs

The vessels keep a day-to-day log of fishing operations giving the location, the amount of gear fished, the estimated catch of halibut, as well as other information. These records are copied by the Halibut Commission at the landing ports and the data are analyzed by computers (Figure 30).

The catch per unit of gear fished is a statistic used by the Commission as a measure of the relative abundance of halibut on the grounds. There is both theoretical and empirical evidence that the catch per standard unit of gear varies proportionately with the abundance of halibut. In determining the catch per unit of gear, variations in the construction of the gear and in the baits used require the calculation and use of standardized factors so that the statistics of stock size are as comparable as possible from one period of time to another.



Figure 30. Transferring catch statistics to cards for machine processing.



Figure 31. Unloading halibut with net sling.

Sale of Catch

A very large proportion of the total catch is sold at public fish exchanges and unloaded in the major ports; sales are made to the highest bidder in an open auction. The buyers bid for the listed or "hailed" trips. Halibut between 5 and 10 pounds are designated in the market as "chickens", those 10 to 60 pounds as "mediums" and over 60 as "large". The halibut in the weight group over 80 pounds are sometimes known as "whales". Weights are head-off, dressed or eviscerated (Figure 31).

Landing Ports

The major ports of landing are Seattle, Bellingham, Vancouver, Prince Rupert, Ketchikan, Petersburg, Kodiak and Sand Point. Minor ports include Juneau, Wrangell, Pelican and Sitka. The relative importance of the ports of each area is shown below, giving landings in thousands of pounds for two 5-year periods.

Depending upon grounds fished, some vessels tend to land at their home ports, while others will tend to land at ports close to the grounds fished. Others, on occasion, make longer runs after balancing the costs in time against the benefits of the higher prices prevailing in the more distant railhead ports such as Prince Rupert, Vancouver and Seattle.

LANDINGS OF HALIBUT IN THOUSANDS OF POUNDS BY PORTS

| PORT OF LANDING | Average 1960-1964 | Average 1965-1969 |
|---------------------|----------------------|----------------------|
| Seattle | 12,690 | 6,879 |
| Bellingham | 3,153 | 2,903 |
| Vancouver | 6,266 | 5,571 |
| Prince Rupert | 17,450 | 16,317 |
| Ketchikan | 8,325 | 6,284 |
| Petersburg | 4,685 | 4,378 |
| Juneau | 1,814 | 1,706 |
| Wrangell | 556 | 383 |
| Pelican | 1,616 | 1,441 |
| Sitka | 1,156 | 882 |
| Kodiak | 1,663 | 4,191 |
| Sand Point | 3,880 | 2,492 |



Figure 32. Sawing frozen halibut into steaks. (from *National Fisherman*)

Marketing

Halibut is a most versatile species for marketing purposes. Its large size permits it to be cut into transverse slices or steaks (Figure 32) or to be sliced longitudinally as boneless fillets or flitches. It can also be sold in chunks and in measured portions.

It can be successfully frozen whole or in pieces, and has excellent keeping qualities, both in the fresh and frozen state.

From a dietetic standpoint, halibut is very low in fat and sodium content, sharply contrasting with what prevails in some flounders which, from time to time, have been marketed misleadingly as halibut.



(from Petersburg Press)

Figure 33. Record rod-caught halibut.

SPORT CATCH OF HALIBUT

The taking of halibut by sport fishermen is usually incidental to saltwater fishing for salmon, except in Alaska where it is a primary sport objective in a few areas. However, on all sections of the coast the large size of halibut tends to make it a prestige or trophy fish for sportsmen. One 36-pound halibut was taken in Puget Sound on July 31, 1969 in 22 feet of water; this catch set a then 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 by rod in 1969. A 30-pound test leader and 40-pound test line was used. Sports fishing for halibut is not permitted in areas closed to halibut fishing.

ECONOMIC VALUE OF THE RESOURCE

The Pacific halibut fishery is one of the more valuable fisheries on the North American continent. By value among foodfish it has usually ranked in the top three in Canada, and in the top five in the United States. The average annual catches by decades by the two countries during the past 50 years have been as follows:

AVERAGE ANNUAL CATCHES BY UNITED STATES AND CANADIAN FLEETS

In Thousands of Pounds by 10-Year Periods Since 1920

| DECADE | United States | Canada | Total |
|-----------|---------------|--------|--------|
| 1920 - 29 | 42,591 | 8,971 | 51,562 |
| 1930 - 39 | 38,290 | 9,874 | 48,164 |
| 1940 - 49 | 38,957 | 15,918 | 54,875 |
| 1950 - 59 | 38,296 | 25,051 | 63,347 |
| 1960 - 69 | 31,483 | 32,167 | 63,650 |

Despite the relatively low production permitted in 1969, the landed value reached an all-time high of \$22 million. Since regulation began in 1932, the value of the Canadian catch has increased 18 times and that of the United States has doubled in terms of United States dollars of equivalent purchasing power in 1932 and 1969.

The cumulative gain in total catch of halibut above what an unregulated fishery would have produced over the past 37 years has been worth at least \$300,000,000 to the North American economy – a very high return from the \$5,800,000 that the United States and Canada combined have provided the Halibut Commission since 1930.

MANAGEMENT OF THE RESOURCE

The Halibut Conventions or Treaties

The initial 25 years of the Pacific Halibut fishery was a period of unrestrained exploitation, limited only by market demands. By 1915 the halibut industry expressed deep concern when expansion to new grounds failed to sustain the total catch. Also, scientific studies during World War I by the British Columbia Government confirmed the fact of depletion of the resource.

Continuing efforts of the industry finally led to the first Halibut Convention between the United States and Canada in 1923. This provided for three months closure during the winter spawning season and created the International Fisheries Commission to investigate the fishery and propose further measures for its rebuilding.

The closed season alone was shown to be ineffective in halting the decline in the resource and a new Convention was signed in 1930 to broaden the Commission's regulatory powers. Commission studies proved overfishing was the cause of depletion. As the stocks were rebuilt, the Conventions of 1937 and 1953 further extended the authority of the Commission to meet the changed conditions.

The 1953 Convention changed the name of the Commission to the International Pacific Halibut Commission. The Convention specifically required that all Commission regulations be based on scientific studies, and that the stocks be developed and maintained at levels that would permit the maximum sustained yield.

The International Pacific Halibut Commission

The Halibut Commission consists of six non-salaried members, of whom three are appointed by the President of the United States of America and three by the Canadian Governor General in Council. Decisions are made as individuals as there are no national sections. A Director of Investigations, who is responsible for the staff of scientists and administrative persons, is employed by the Commission.

All Commission functions are centred at its headquarters in Seattle. They involve maintaining a comprehensive research program, collecting statistics on the fishery, developing and administering the regulations, chartering of vessels for field studies, publishing scientific and administrative reports. Other duties include budgeting and disbursing appropriated funds, which are provided in equal shares or moieties by the two countries.

The Commission holds a regular Annual Meeting and occasionally Special Meetings, usually at its headquarters, but from time to time at other important halibut fishing centres. At Annual Meetings it reviews with the staff and with the industry the progress of the fishery and results of research. Also, it approves a budget, a research program and the regulations for the succeeding year.

RESULTS OF MANAGEMENT

When management began in 1932 the stocks of halibut were depleted by over-fishing. Under scientific management the stocks of Pacific halibut were gradually rebuilt by holding the permitted increases in catch to slightly below what growth and the new recruits or young fish were providing. This conservation program was carried out over a period of 30 years in a manner designed to cause as little disturbance as possible to the industry.

By the early 1960's the stock of halibut had reached levels that were providing the largest yields that the grounds could sustain from year to year. This is referred to as the maximum sustainable yield or MSY. However, the North American setline halibut fleet has not received full benefit from this rebuilt halibut stock.

Since the early 1960's there has been an increase in both bottom-fish trawling and blackcod (sablefish) setline fishing by foreign vessels over much of the halibut's range. The domestic trawl fishery off British Columbia has also increased since 1960. The losses and removals of halibut by such fishing have sharply diminished the halibut fleet's share of the increased productivity.

However, these current developments cannot detract from the wisdom and foresight manifested by Canada and the United States nearly 50 years ago when international management of the halibut resource was instituted by those two countries.

The rebuilt stocks and larger yields continue to be assets of major dimensions to the fishery economies of both countries. Also, by such husbandry and prolonged restraint Canada and the United States have acquired a special interest in and a just claim to the resource.

The Pacific halibut.

AUTHOR: Bell, E. Heward

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CORPAU: Int'l Pacific Halibut Commission

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