MISCELLANEOUS ITEMS OF INFORMATION CONCERNING
THE NORTH AMERICAN HALIBUT FISHERY
AND TECHNIQUES OF RESEARCH

Submitted
to
THE BERING SEA GROUND FISH SUB-COMMITTEE
OF THE BIOLOGY AND RESEARCH COMMITTEE

by
THE CANADIAN SECTION

of
THE INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

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In its third report to the interim meeting of the International North Pacific Fisheries Commission, in February, 1963, the Bering Sea Groundfish Sub-Committee listed a number of items of information required for analysis and interpretation of results relating to the study of the halibut fishery in Bering Sea (INPFC Doc. 596, Appendix 18). It was agreed that this information would be exchanged at the earliest opportunity.

The following statements refer to items of information which were to be provided by Canada and the United States. They have been prepared by the staff of the International Pacific Halibut Commission. Figures in parentheses refer to the original items listed under Section IX of the above-mentioned Appendix.

1. Views regarding the adaptability of the IPHC system of coding statistical areas to that proposed by the Sub-Committee (Item IX A).

The International Pacific Halibut Commission reports that it has investigated the problem of modifying its present system of coding and advises that records of North American halibut catches in Bering Sea could be supplied on a six-digit or any other coding system that might be developed by the Sub-Committee.

2. Information on the factors used to convert round or live weight of halibut to gutted head-on weight and to gutted head-off weight (Item IX B).

In this reference the head is defined as that anterior portion of the fish that is removed according to standard United States and Canadian commercial practice. The viscera include the contents of the body cavity including the gill arches. It has been determined by many observations that the head of a halibut on the average accounts for about twelve percent (12%) of the total weight of the fish. Many thousands of weighings have also indicated that on the average the viscera constitutes about thirteen percent (13%) of the live weight.

The factor to convert round weight to gutted head-on weight is thus 87 percent of the round weight and the gutted head-off weight is 75 percent of the round weight. The factor to convert a gutted head-off weight to a round weight is 133 percent of the gutted head-off weight.

3. Details on the construction of longline (setline) gear to include: numbers and sizes of hooks used per skate, length of skate, method of handling, kinds and sizes of bait used (Item IX C).

A skate of longline gear, better referred to as setline gear, consists of four parts - the groundline, the becket, the gangle, and the hooks. The standard skate, or standard unit of gear as defined by the International Pacific Halibut Commission, is a 6-line skate with 120 hooks spaced at 13-foot intervals on a groundline of either manila or hemp. The skate as used by individual vessels in the fleet may differ considerably.
At the present time the groundline of a skate usually consists of five lines, occasionally six and very rarely four, spiced together in a continuous coil. Each line is 50 fathoms (300 feet) in length and usually made of nylon, manila or frequently of hemp or cotton. The weight of the nylon is usually 28 or 32 pounds (avoirdupois), while manila, hemp and cotton are usually 40 or 48 pounds. These weights refer to the weight of a bundle of six skeins of 50 fathoms each of the respective groundline stock. Occasionally, as in South-eastern Alaska, vessels use 9-thread manila buoy line as groundline, rigging it into skates of comparable length.

The becketts are small loops of lines spliced into the groundline to which the gangions are attached. The becket stock is number 600 or 750 (600 or 750 feet per 5-pound ball) manila, either plain or tarred. The number 600 stock is normally used with 48-pound groundline, and the number 750 with the 40-pound groundline. The becketts are spliced into the groundline at intervals of approximately 13 or 18 feet and rarely of 9 feet.

The gangions are of hard-lay, 12- or 14-pound hemp, or number 72 nylon, and they are attached to the becket with a figure-8 knot. They are usually about 50 inches long. The 12- or 14-pound weights refer to the weight of a bundle of six 50-fathom lines of the respective gangion stock.

The hooks used by the vessels fishing chiefly west of Cape Spencer are usually "large" Mustad number 6283, straight shanked (not eyed), offset and barbed. The "medium" Mustad number 6284 tend to be used by vessels that fish chiefly south of Cape Spencer. The hook is ganged or seized to the end of the gangion with pine-tar dipped linen salmon twine. Eyed hooks of the same sizes are used with nylon gangions. Hooks are spaced at intervals of 13 or 18 feet or rarely at 9 feet.

There is some variation in the length of skates used depending upon whether the vessel fishes permanently west of Cape Spencer or south of Cape Spencer. Vessels in the former region tend to use mainly 6-line skates with an average of 86 hooks per skate, while those south of Cape Spencer tend to use mainly 5-line skates with an average of 100 hooks per skate. However, the number of hooks per skate will vary between about 85 and 140 on different vessels depending upon the material used for a groundline and the distance between hooks.

A series of skates tied end to end and set together is referred to as a "string of gear". A string may contain as few as one or two skates or as many as ten or more skates, depending upon the nature of the bottom and ground coverage desired. The number of strings set at any time varies with the length of the string and "soak" or time in the water desired. During continuous fishing operations a new string is set as soon as one is hauled, maintaining an approximately constant amount of gear in the water at all times.

Frozen or fresh herring, salmon, octopus or any of the several other species caught while fishing are used as bait. Generally the vessels will heavily supplement the frozen or fresh herring with frozen true cod or salmon or octopus, the latter being the major component for vessels fishing west of Cape Spencer. As the summer progresses some vessels secure fresh salmon heads or tails from the canneries in Alaska for bait. The size of the pieces of bait
will vary. Generally, they are about the size of a man's fist. When using salmon heads or tails it is customary to cut the snout from the salmon head and then split the head, using each half for a piece of bait. Similarly, the tail is cut into two pieces. With herring usually a whole fish is used on each hook. Octopus is cut into pieces about equivalent in size to that of a herring.

The gear is baited on a baiting table on the after-deck and the baited skates are stacked near the stern preparatory to setting. At the appropriate time and while the vessel is proceeding at full speed, the flag and floating buoy are thrown overboard, then the buoy line and finally the anchor with the ends of the buoyline and groundline attached. The required number of skates for the set are then payed out over the "gooseneck" chute at the stern of the vessel. The skates of a "string" are tied together as they are being set. When the desired number of skates has been set, another anchor, buoy line, float and flag are released overboard. In hauling, the foregoing procedure is reversed. First the flag and the float and then the buoy line and anchor are brought on board over a roller set in the starboard rail of the vessel. The gear is hauled by a deck winch or gurdy with a horizontal pulley or V-shape sheave whose trough approximates the diameter of the groundline. The gurdy is powered by the main engine with controls at the rail roller. As the groundline is hauled the fish are removed by one man from the hooks, or "shacked" into a compartmented deck area or checker beside the roller, usually without stopping the gurdy. The gear is coiled by another fisherman and each skate is bundled separately. As each skate is hauled, it is taken to the after-deck where it is rebaited preparatory to resetting.

4. **Explanation of the method used by the International Pacific Halibut Commission to sample longline (setline) catches of halibut from Bering Sea (Item IX E).**

Catches of the United States and Canadian setline fisheries in the Bering Sea are sampled in the same manner as setline catches of halibut from other areas on the Pacific Coast. The Commission maintains field crews at the major landing ports where they sample the commercial trips for length data and collect otoliths for age determinations. Usually about seven to eleven fish per thousand pounds of catch are randomly chosen and measured for length frequency observations, the size of the sample depending upon the size of fish and rapidity of the unloading operation. Usually about 140 otoliths are taken on a stratified sampling basis for age determinations from each trip.

In addition, observations on the size and age composition with sex identification are made at sea by observers placed on commercial vessels. During 1962 twelve Bering Sea trips from the United States and Canadian commercial setline fisheries were sampled either at sea or at the landing port, from which 7,830 length measurements were made and 2,236 otoliths were collected.

Also, at times the fishing operations of the Commission, primarily for tagging purposes, provide much size, age and sex composition material from the halibut unsuitable for tagging.
5. A review of the method used by the International Pacific Halibut Commission to standardize information on catch per skate (Item IX G).

In order to standardize the setline gear of the United States and Canadian halibut fleets, "gear information" pertaining to the number of skates of each type on deck, the type and weight of groundline and of gangions, the manner of rigging and the number of hooks per skate is secured from each vessel at the beginning of each season and more frequently during periods when modifications are being introduced. These data are tabulated according to the following categories: the skates that have the hooks placed at 13-foot intervals with 5 lines per skate; the 13-foot 6-line skates; the 18-foot 5-line skates; and the 18-foot 6-line skates, and by other less important types. The number of hooks per observation for each category of gear is tabulated and the average number of hooks per skate for each category is computed. Finally, the ratio between the number of hooks on the standard skate, that is a 13-foot 6-line skate having 120 hooks, and the average number of hooks for each category of gear is determined. This ratio is the gear factor used to standardize the gear data copied from the vessels' logs along with the records of the daily fishing operation.

The determination of the gear factor is based on several hundred reports on the type of gear used throughout the United States and Canadian setline fleets and is computed each year.

In addition to the collection of gear information, bait data is collected from each trip, including the amounts and proportions of each type of bait used. Extensive comparisons are being made as to the relative effectiveness of the various types of baits. Presently the catch per unit effort is being corrected for the effect of recent introduction of octopus bait, the use of which has become widespread since 1958.