

Information Bulletin

P.O. Box 95009, SEATTLE, WASHINGTON 98145-2009

May 1972

INFORMATION BULLETIN NO. 2: HOOK-SPACINGIntroduction

In the early years of managing the halibut resource, a standard length of groundline was used as the basic measure of fishing effort. In the 1940's, a new measure was introduced—the 120-hook "standard skate"—which assumed that fishing effort of each hook was the same regardless of spacing and that catch per hook did not change with hook-spacing. All rigs, regardless of hook-spacing or length of groundline, were adjusted to this standard; for example, 13-foot gear with 120 hooks would be credited as 1.00 skate, 18-foot gear with 80 hooks as 0.67 skate, and 21-foot gear with 70 hooks as 0.58 skate. In the late 1960's, fishermen claimed that the "standard skate" no longer reflected the catch rates on the fishing grounds and in 1971, the Commission re-examined the calculation of CPUE. A longline vessel was chartered to study the effects of hook-spacing and the log records of the fleet from 1954 to 1971 were re-examined.

Hook-Spacing Experiment

The chartered vessel, *Chelsea*, carried ten skates each of 12-, 18-, 21-, and 24-foot gear all of the same length (250 fathoms). Fishing was conducted near Kodiak Island as a regular commercial operation and all skates were baited similarly with herring and cod. Approximately 100,000 pounds of halibut were caught in 32 days. The catch per skate decreased as hook-spacing increased; however, the decrease was not proportional to the number of hooks as had been assumed in the standardization of fishing effort. The catch per hook increased with hook-spacing, indicating that the effective effort of hooks improved on the wider-spaced rigs.

Hook spacing in feet	Average no. of hooks per skate	No. of skates fished	Catch in pounds		
			Total	Per skate	Per hook
12	121.1	385	27,942	73	0.60
18	81.9	382	26,492	69	0.85
21	72.1	372	23,505	63	0.88
24	60.8	387	23,262	60	0.99

Hook-spacing experiment aboard the *Chelsea* in Area 3

Examination of Log Records

Since 1950 the fleet has shifted from predominately 13-foot gear to 18- and 21-foot gear. The log records show that the average catch per hook increased with hook-spacing. During the past 18 years in Area 3, the average catch per hook was 1.07 pounds for 13-foot gear and 1.28 pounds for 18-foot gear. During the last five years, when all rigs were being fished, the average catch per hook was 0.80 pounds for 13-foot gear; 1.05 for 18-foot gear; 1.18 for 21-foot gear; 1.41 for 24-foot gear; and 1.49 for 26-foot gear.

Log records from Area 2 also indicated that catch per hook increased with hook-spacing, but the difference between rigs was less pronounced than in Area 3. There are several plausible reasons for the difference; the fish in Area 2 are smaller and more abundant, and fishing often is conducted on "spots" inhabited by dense concentrations of halibut. A fishing experiment is planned in 1972 to obtain more information on the relationship of catch to hook-spacing in Area 2.

Significance of Catch per Hook Study

When effort was assumed to be proportional to the number of hooks and all rigs were adjusted to the 120-hook standard, the effective effort of wider-spaced gear was underestimated and the catch per skate was overestimated, indicating a higher abundance of halibut than actually existed. This error increased as wider-spaced gear was added to the fishery in the late 1960's. Discovering that catch per hook changes with hook-spacing has confirmed the experience of fishermen whose catch rates had declined.

Changes in hook-spacing are expected to continue and must be followed closely to maintain a valid assessment of stock condition. With the excellent data-base maintained by the Halibut Commission, the new concept of effort can be used to review past estimates of stock abundance and to interpret changes that occur in the years ahead. More extensive analyses of log records and more fishing experiments are necessary to determine the relationship between fish abundance and the catch per hook of different rigs. Changes in stock abundance may require periodic adjustments in the new measure of effort once it is established.

The new findings on catch per hook also have economic implications which may be of interest and use to the fishermen. During the test-fishing experiment, the time required to bait and haul each rig was measured. For example, the average time to bait a skate of 12-foot gear was 21.2 minutes and for 24-foot gear only 13 minutes. The average time for hauling was 14.6 minutes for a skate of 12-foot gear and 13.5 minutes for 24-foot gear. However, the advantages of wider-spaced gear—fewer hooks, less bait, higher catch per hook, and faster baiting and hauling time per skate—will vary with the operation of each vessel and the particular grounds being fished.

-END-