

SILVER AND RED HAKES

(Squirrel Hake or Ling, P. S. G.)

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Atlan NIRO 1963, Fish Husbandry, Year XXXIX, No. 5, p. 10-13,

In section "Fishery Resources and Reproduction of Fish Stocks".

Translation by Paul S. Galtsoff

WOODS HOLE LABORATORY

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Published data on biology of silver and red hakes are only of general nature. Hardly any studies were made concerning the biological factors of the environment which affect the formation of commercially utilizable aggregations of these fishes and their biological state. The present paper gives principal attention to these problems.

Principal material was collected in June-September, 1962, during the cruise of the scientific fishery research trawler "Obraztovo" of the Balt NIRO. During this time the following areas were surveyed: southern part of Great Newfoundland Bank; shallow areas of Nova Scotia; Georges Bank; and portion of the shelf south of Cape Cod.

Altogether over 10,000 specimens of silver hake and 1,000 of ling were subjected to biological analysis. Moreover, fish were analyzed on board the fishing vessels. Continuous hydrological observations were made (temperature, salinity, oxygen) to determine the characteristic of water masses.

Silver hake (Merlucius bilinearis Mitchill) belongs to the codfish family; this species of Merlucius is distributed in the northern part of the Atlantic Ocean along the coast of North America from the Strait of

Belle Isle to Bahamas Islands (fig. 1).

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Figure 1. --Picture of silver hake.

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In June-August commercially utilizable aggregations of silver hake were recorded on the southeastern and northwestern slopes of Georges Bank and also around Sable Island.

On the southeastern part of Georges Bank an aggregation of hake extended along the frontal zone; this zone is formed by the penetration of Labrador waters from the eastern slope of the bank and by the Gulfstream. In July-August such a zone was located along the isobaths 90-150 m. The densest concentrations of hake were observed at 90-110 m at temperature 7-11° and 33.5-34.5 ‰ salinity.

In this area, the aggregation of hake consisted of spawning fishes. The fishes found in catches measured from 25 to 63 cm. The majority of fish (more than 80 percent) were specimens from 29 to 38 cm. (mean length 31.3 cm., mean weight 180 g.). The fish did not feed here. Sexually immature specimens were almost absent. Invariably the IV, V, and VI maturity stages were encountered. During the progress of spawning their relationship changed.

The maximal spawning activity occurred in the middle of July, then steadily diminished. As the spawning was coming to an end, and the density of fish aggregations diminished the mean size of fish was observed to decrease and relative abundance of males increased.

There were no significant changes in the hydrobiological conditions in July-August. Along the northwestern slope of the bank

in the areas of commercially utilizable aggregations of silver hake the hydrobiological conditions were significantly different from those found on the southeastern slope. The principal aggregations of fish were at 40-110 m depth (mainly between 50-80 m) aside from the "hydrofront" which passed along the isobaths 100-200 m.

Feeding aggregations of silver hake were observed on the northwestern slope of Georges Bank, although some of the fish spawned here. Small specimens were significantly more abundant in the catches made in this area. Fishes from 25 to 33 cm. (mean size 28.3 cm.) and mean weight of 160 g. were predominant in the catches. Sex products were represented primarily by stages II, III, and VI of sexual maturity.

Silver hake was feeding in this area. The composition of food was not diverse. Food masses found in the fishes of 35-38 cm. long consisted primarily of invertebrates, and very rarely juvenile hake and yearling cod were found. Among the invertebrates the Euphasidae and Gammaridae predominated; more rarely shrimp, Nereis, and cephalopods were encountered (in the stomach).

Specimens of larger size feed primarily on fish. Among the invertebrates only cephalopods were recorded. Herring was the basic food; also butterfish (Poronotus triacanthus (Peck))\* and silver hake were found.

Feeding intensity was weak. The average index of stomachs' fullness was only 0.64. Usually 75 percent of the fish had empty stomachs.

\* Author's spelling is Poronus tricanthus. P. S. G.

During a 24-hour period two peaks of feeding intensity are noticeable: at night (0-2 a. m.) and at noon time (12). During darkness the role of bottom animals (Gammaridae) as food increases, while during daytime the principal food consists of actively swimming Euphasids.

During the periods of intensive feeding silver hake keeps itself in separate schools. The distribution of fish to a great extent is related to the distribution of basic food organisms.

Red hake (i. e., squirrel hake, ling, P. S. G.) Urophycis chuss Walbaum, belongs to the family of codfishes. Typical taxonomical characters are: two dorsal and one anal fins; third ray of the first dorsal fin is elongated into a thread. Abdominal fins consist in three rays: two of them are long, threadlike, and one rudimentary.

Red hake is widely distributed along the southern half of Georges Bank and on the shelf south of Cape Cod. Principal commercially utilizable concentration of fish was observed along the southeastern slope of the bank, slightly westward of the concentration of silver hake. Gradual northward movement of red hake was observed beginning July to August along the northern slope of the bank. The sizes of red hake in the catches ranged from 24 to 51 cm., the predominant sizes being between 31-37 cm. In comparison with the silver hake the red hake spawns in deeper water of 110-120 m. The peak of spawning is in the middle of July. During spawning the red hake does not feed.

Silver hake fishery was initiated in March 1962, in the shallow area of Nova Scotia (at Sable Island, Emerald Bank) and Georges Bank. Red hake fishery started only in July on the southeastern part of Georges Bank.

During the summer specialized commercial fishing for the silver hake on Georges Bank was conducted by the vessels of EMRT type. Beginning July the vessel of SRT and SRTR types were used. The major part of the fishing fleet was centered in the area of concentration of spawning fish on the southeastern slope.

Fishing was going on successfully. Average 24-hour catches during the first half of July for EMRT was 30-35 tons per vessel and in single instances was as high as 50 tons. During trawling periods catches fluctuated within 3-6 tons. Single catches brought up 20-30 tons of fish for 15 minutes trawling. Commercial catches were made mainly between 90-120 m (the predominant depths were 100-115 m).

During the first decade of July the mean 24-hour catch made by SRT exceeded 10 tons; during the second decade it decreased to 8 tons. After the second decade of July the fishing conditions worsened due to the departure of spawned out fishes. The EMRT left this area and went to the northwestern part of the bank.

Catches made by SRT diminished to 5-8 tons per 24-hour period. Red hake became relatively more important. While during the first decade of July red hake comprised 20 percent of the catch, during the second decade it comprised 50 percent, and 80 percent in the third decade. In September the middle-sized trawlers fully completed the catch of hakes.

The EMRT were catching silver hake and herring on the northwestern part of the bank. The best catches were observed to occur at night when the fish began to feed on bottom animals (Gammaridae). Silver hake remained here in scattered schools. Consequently fishing conditions were

unstable. Some vessels had large catches, up to 20 tons per haul, while others working side by side made no catches at all. Because of very strong tidal currents in this region and low powered engines the work of SRT was hampered. This explains the instability of catches.

Thus, during summer silver and red hakes form commercially utilizable aggregations on Georges Bank. This gives us an opportunity to organize special trawling fishery and more fully and rationally to utilize the fleet (particularly the BMRT during the periods when conditions for herring fishery deteriorate).

In conclusion it is necessary to point out high nutritive qualities of both species, particularly those of silver hake.

Below are the results of biochemical analysis (in percent) made by the Laboratory of Technology of Atlan NIRO.

	Silver hake	Red hake
Fat	3.61	0.28
Nitrogenous matter	16.4	15.8
Moisture	78.8	82.1
Ash	1.13	1.21

Meat of silver hake contains more fat than other species of Merlucius. Seasonal fluctuations in fat content are insignificant.

Silver hake has few muscle bones. Its meat is tasty, tender, and somewhat resembles the meat of the northern sea "Navaga" (Eleginus navaga (Fall.), P. S. G.). Fried and smoked meat of hakes is especially delicious.