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by

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The largest haddock catches of the Canadian as well as the United States fleets are made on the Western banks. This region includes Emerald, Sable Island, Middle Ground, and Quereau banks. The five principal haddock schools, Emerald-Sambro, Ingonish, Sable Island, Quereau and X-school (Prog. Rpt. No.14, 1935) are found on this area. The first two are rather seasonal visitors, while the remaining three are permanent residents here.

The Western banks may be divided into a spawning and a feeding area. The spawning area on which every year Sable Island and Quereau haddock (possibly also X-school) spawn during the spring months includes the Emerald bank, and the Gully between it and the Sable Island bank. During certain years, with unusual water temperatures, (high or low), other haddock schools may also spawn here. The remaining part of the Western banks is the feeding grounds, to which resident haddock schools return after spawning. Migration from the feeding grounds to the spawning area as a rule takes place in November or December, while during the period from the end of May to about the middle of July spent schools return to their customary feeding grounds. The haddock fishery on the feeding grounds is usually pursued from about July to November. Hence it is of importance to know what kind of food is consumed by these fish in order to understand properly the location of different haddock schools on the feeding grounds.

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The present study covers the period from September, 1934 to February, 1936. Slightly more than 8,000 stomachs were obtained from the Western banks among which 3,597 or 45% contained food. The total weight of food from these stomachs was about 66 lbs. The following table summarizes the occurrence of the different kinds of food found in haddock stomachs during the period under investigation.

Analysis of food, expressed as percentage weight, found in 3,597 haddock stomachs from the Western banks during the period September, 1934 - February, 1936.

Food	Percentage
Fish (mainly Sand launce)	54.1
Fish eggs	1.6
Worms	11.7
Echinoderms (Sand dollar, Sea-urchin, Brittle star)	8.3
Crustacea (Shrimps, Hermit crabs)	8.3
Mollusks (Clams, Snails)	4.2
Others	2.8
Minerals (sand, pebbles)	9.0

From this table it is evident that fish (Sand launce) constitutes the chief diet of haddock on the Western banks. However, in different seasons, the quantity of Sand launce varies greatly (from 0-92%) in haddock food. During September of 1934 and 1935 this amounted to about 57 per cent. of the total weight of haddock food analyzed. A very high amount of this type of food

(82.5 per cent.) was found in December, 1935, and in January, 1936 (66 per cent.). The highest amount (91.5 per cent.) was found in Jul6, 1935. For curiosity, it may be stated that the largest number of Sand launce found in a single stomach was 43 specimens, varying in size from one inch to four inches, weighing altogether about 6 ounces. On another occasion five herring baits, about the same weight as the above, were found in a single stomach. The largest Sand launce found in haddock stomachs measured 10 inches. In addition to Sand launce, occasionally young specimens of other fishes as Sculpin, Silver hake, Flat fish, ect. are found. In one case a 4 inch Rosefish was removed from a haddock stomach, and a Dogfish pup about 5 inches long.

On the whole it may be stated that Sand launce in large numbers are usually found in haddock stomachs only during the summer and fall months. The occasional finding of this fish in abundance during the winter months no doubt coincides with warm temperatures, and pre-spawning condition of the haddock.

Fish eggs, as haddock food on the Western banks, play only an negligible role, while close to shore, for instance in Halifax harbour during August and September, many haddock were gorged with herring spawn, often amounting to several thousand eggs in a single stomach.

Next to fish in importance are Worms. This type of food, as a rule, is found during the winter and spring months (December to May), and varies in weight during this time from about 15 to 22 per cent. The highest quantity of this food was found during August (31 per cent. and November (57 per cent.), 1935. In the Above November samples the total number of worms was about 9,000 weighing only 28 ounces. As a rule, two types of worms are commonly found, one (Pectinaria) carrying a thin tube covered outside with sand, from half inch to about 2 inches the other,

ordinary marine worms, varying in length from 2 inches to about 8 inches.

The Echinoderm group, embracing Sand dollars, Sea-urchins Brittle stars, Sea-cucumbers, etc. also constitutes a very important food article for the haddock. It seems that the haddock prefer to feed on them close to spawning (February-March), or shortly after (June and August). A high number was found in February (16 per cent.) and March (20 per cent.) of 1935, and also February, 1936 (29 per cent.). The highest quantity was (31 per cent.) consumed during June, 1935. It may be mentioned that only smaller specimens are found in haddock stomachs, Sand dollars up to about one inch, and Sea-urchins to about half an inch in diameter. Sometimes on inshore grounds (off Jeddore) as many as 126 Brittle stars, locally known as "Five-fingered Jacks", were taken from a single stomach.

Crustacea are practically of the same importance as Echinoderms. The largest amounts are eaten by haddock during the winter months. The highest quantities were found in samples from December of 1934 (18.5 per cent.), January of 1935 (23.5 per cent.), and February of 1936 (34.5 per cent.). Among Crustacea, Shrimps, (Sabinia) and Hermit crabs (Pagurus and Parapagurus) are perhaps the most important. In some cases Amphipods are also abundant. On the whole, no Crustacea larger than 2 inches in length were found.

The Mollusks, or Shell fish, are the last important food group for haddock on the Western banks. It seems that they prefer this type of food during the late fall. The largest quantities were found in November (20.5 per cent.) and December (15.6 per cent.) of 1934, and also November (19.8 per cent.) of 1935. Among shell

fish may be distinguished small clams (Yoldia, Leda, and Astarte) and snails (Polynices, Margarita and Haminea), which may dominate in certain samples. In some cases, haddock instead of swallowing the entire Sea snail (Polynices) only bites off their muscular feet. Occasionally four or five feet of this species were found in a single stomach. The largest Mollusk found was a specimen of Bank clam (Glycymeris siliqua) measuring 2¼ inches in length. A squid (Illex illecebrosus) of small size (about 3 inches long, with tentacles) was observed on only one occasion in haddock stomachs.

Several other items, as Sponges, fragments of algae, etc. were occasionally found, but they play only a negligible part as food. On the other hadd, mineral materials such as sand, pebbles, pieces of coal, etc. are found quite often in haddock stomachs. Some of them, no doubt, are swallowed attached with regular food material, while some pebbles presumably are mistaken by their size of colour for food. The largest pebble, measuring one inch by inch and half and weighing about one ounce, was removed from a haddock caught off Digby. For curiosity it may be mentioned that in one stomach was found the stomach, together with intestines, of another haddock.

Although the number of samples examined was quite high it is very hard to generalize observations due to the rather casual collection of material. Nevertheless, it may be roughly stated that different parts of the Western banks may be characterized by the dominancy of certain types of haddock food. The Sand launce were particularly abundant on the whole Emerald bank, and also on Western portions of Sable Island and Middle Ground banks. The worms were found in abundance on the south east of Sable Island, as well

as on the northern part of the Sable Island bank. Some patches where this type of food was also found in abundance are situated west of Sable Island bank, and on the western part of Quereau. The Echinoderms are found between Sable Island and Middle Ground; and also in the "Cowpen" (north western part of Sable Island bank). One of the components of the Echinoderms food (Brittle stars) are found in abundance on Canso bank, and along the shore of the outer coast of Nova Scotia from Sambro to Cape Breton, and along the eastern part of Prince Edward Island. The Crustacea are rather a characteristic feature of the Gully, situated between Emerald and Sable Island banks. The greatest concentration of Mollusks was found north of Emerald bank, along the western side of the Gully.

When the knowledge of the seasonal variation in haddock food within individual schools is sufficiently advanced this will no doubt be an important factor in understanding the seasonal location of the individual haddock schools on the Western banks. This, however, will be possible only when haddock stomachs will be collected systematically and examined along with samples of bottom from the main feeding grounds.