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The Fundy Survey. The Hake Fishery

Author

Helen I. Battle

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T H E F U N D Y S U R V E Y

THE HAKE FISHERY

by

Helen I. Battle
University of Western Ontario
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THE FUNDY SURVEY

The Hake Fishery

Contents

Nomenclature

Two species of hake appear in the catches of the Fundy area:

I Scientific Name - Urophycis tenuis (Mitchill)

Common Name - Hake. This name is in practically universal use, although the term "White Hake" is very rarely found in Digby and "Mud Hake" is sometimes used at Grand Manan.

II Scientific Name - Urophycis chuss (Walbaum)

Common Name - Hake

- Snapper (Beaver Harbour)
- Squirrel or Squirrel Hake (North Head, Grand Manan; Digby)
- Ling (Wilson's Beach)

The second species very seldom appears in the catches in the Fundy area and comparatively few fishermen recognize it as distinct from the first species.

Illustrations

Bigelow, H. B. Fishes of the Gulf of Maine. Bulletin of the United States, Bureau of Fisheries, Vol. XL, Part I, 1924

Urophycis tenuis (Mitchill), Figure 219, p. 445.

Urophycis chuss (Walbaum), Figure 220, p. 447.

Goode, Geo. Brown. American Fishes. Urophycis tenuis, p. 360. 1887

Jordan and Evermann, Fishes of North and Middle America, Part IV, Plate CCCLXV.

Characteristics of the Hake

Although the hakes are closely related to the cod and haddock, they are not at all codlike in appearance. The body is more slender and tapers backward to a small tail, while the eyes are larger and the chin barbels smaller than those of the cod. There are only two back fins - the second being many times longer than the first - and one fin on the lower surface in place of the three back and two lower fins of the cod and haddock. The paired "ventral" fins are reduced to long narrow white feelers and are generally known as "smellers". Hake vary considerably in colour, but the back is usually reddish-brown with slight metallic reflections on the cheeks and dark patches mixed with grey beneath the eyes. The belly may be pale grey, yellow or white and in Urophycis tenuis is sprinkled with fine black dots, as are also the "smellers".

The two species of hake are very similar in external appearance and only with difficulty distinguished. Fishermen sometimes differentiate them by the presence of a longer thread or filament extending from the front of the first back fin in the "squirrel hake" than the common hake. The most reliable tangible difference is to be found in the scales which are much smaller in Urophycis tenuis, there being 135 to 140 oblique rows between the gill covering and the base of the tail. In Urophycis chuss the scales are larger and only about 100 rows are found along a similar length of the body. In the former species the long feelers or smellers do not ordinarily reach quite to the vent, while in the latter they extend beyond the vent. This latter characteristic is a less reliable distinction than the difference in the size of the scales.

At Wilson's Beach, Campobello, the squirrel hake are distinguished not only by the long filament on the back fin and a darker brownish less irridescent coloration, but also by the reaction of the flesh in bulging behind the path of the knife when the skin is scraped against the grain. The meat is not considered to be as good as that of the common hake, becomes tougher on drying, and is fairly easily distinguished by a grey-yellow appearance of the flesh.

Occurrence in Fundy Area

Hake have in various years been recorded from the watershed of all counties bordering on the Fundy area. Since the fishery returns are simply "hake" it is impossible to distinguish between the two species either in regard to local distribution or to relative abundance. For 1931 so far as could be ascertained in Digby, Yarmouth, Charlotte and St. John Counties, the catches were in the main almost exclusively composed of the white hake, Urophycis tenuis. Most of the fishing is done around the fifty fathom line. In the Gulf of Maine the "white" is the more common species below 30 to 40 fathoms. Both these fish generally lie on a soft muddy bottom, although off Digby County they occur

over fine gravel and pebbles.

The chief centres of abundance inshore in the Fundy area lie off Digby County toward the southwestern end of Nova Scotia, and across on the New Brunswick shore off Charlotte County. The catch decreases markedly toward the head of the bay where the fish are taken closer inshore and in shallower water. This distribution is indicated in Figure 3 which represents the allocation of the Fundy area hake catch for 1929. Dots represent an average annual catch of 1000 hundredweight while small circles represent catches of less than 1000 hundredweight.

Location of Fishing Grounds (See Figure 4)

Charlotte County - the chief hake landings are made for the county at St. Andrews, Wilson's Beach, Letete, Beaver Harbour and North Head, Grand Manan. From 1926 to 1930 the following are the average annual percentage landings for the four districts of the county:

Charlotte West - (International Boundary to Back Bay) . .	1.6%
Charlotte East - (Back Bay to St. John County Line) . . .	30.9%
Campobello and Deer Islands	42.5%
Grand Manan	25.0%

The hake fishing grounds for the county are located as follows:

1. Passamaquoddy Bay - Hake occur on a muddy bottom in from 10 to 25 fathoms, two or three miles off the mouth of the Magaguadavic River and off Letete. They appear in limited numbers on trawls set almost anywhere in the bay, even four or five miles up the St. Croix estuary.

2. The Mud Hake grounds ("The Mud"). This ground is a broad area of muddy bottom which extends north and south between Campobello and the Wolves and from West Quoddy Head to Grand Manan. It is about 15 to 18 miles long and 3 to 4 miles in width. The depth varies from 39 to 60 fathoms. The western edge of this ground lies about two miles off Campobello.

3. The Hake ground. This is an irregular stretch of ground about 20 miles in length extending from Point Lepreau and Beaver Harbour to the northern end of Grand Manan. The northern portion of this ground from Point Lepreau to The Wolves is known as Thomas Lord's Bank. It is about six miles long by three miles wide with a depth of 11 to 12 fathoms over a rock and gravel bottom.

   The Mussel Shoal ground is a mussel and scallop bed lying 8 miles ESE from the Eastern Wolf and 9 miles from Point Lepreau. It is really a part of the Hake ground when hake are abundant all summer.

4. Campobello grounds. Hake can be taken almost all around Campobello. Many fishermen go consistently to The Mud Hake ground, but successful hauls can also be made on the following grounds:

Grand Manan grounds. Hake are the most abundant species of fish between Grand Manan and the American shore in the North Channel. (Grand Manan Channel) The depths vary from 40 to 50 fathoms and the bottom consists of rocks, mud and sand. Campobello fishermen fish to a line midway in the channel between Campobello and the American shore on one hand, and Grand Manan.

Red Head ground - is an area about two miles long along the southeast shore of Campobello with a depth of 8 to 15 fathoms.

Phillips Bank - is a ridge about two miles in length near the north end of the island extending southeast from Head Harbour and parallel to the Campobello coastline. The depth varies from 45 to 59 fathoms.

Cod Hole - is located about one mile due north from Head Harbour. It is a small area about half a mile in width with a depth of 33 to 59 fathoms.

White Horse ground - is a small ground about a mile in length which lies about half way between Head Harbour and Letete. The depth is about 17 fathoms.

Mallock ground - extends from Head Harbour to the channel Mud Hake ground and is used by trawlers sometimes rather than proceeding on to the latter larger ground.

Hake may also be taken almost everywhere on the western side of Campobello, but particularly directly offshore from Wilson's Beach in the channel between Deer Island and Campobello and as far south as the Deep Cod Hole. Small trawlers work from Indian Point to Adamstone Island along the full length of Indian River. Less often they appear on the southwestern side of the island off Friar's Bay in 13 to 15 fathoms.

5. The Wolves - are a small group of tiny islands lying 8 or 10 miles northeast of Grand Manan. The bottom extending out about a mile from the shores and consists of rocks and gravel where hake are occasionally taken at a depth of 18 to 34 fathoms.

6. The Wolves Bank (The Wolf Bank) - This bank lies between The Wolves and Grand Manan about eight miles from East Quoddy Light SE.1/2E. It is a small ground (approximately six acres) varying in depth from 18 to 30 fathoms with a bottom of rock and mud where hake are occasionally taken in summer.

7. Grand Manan - Hake are taken in fair quantities about the Northern Head (20 minutes off Long Eddy Whistle) and are also abundant about the Southern Head. They occur all the way up the North Channel as has been mentioned previously and along the east of the whole island in deep water on mud. Some catch is made 15 minutes straight northeast from Whale Cove on what is known as Flag's Bank. From North Head to Big Duck, hake occur along with cod anywhere 20 minutes straight east from the shoreline.

The quantities are found to increase closer inshore off Long Island, High Duck, Low Duck and Big Duck Islands. Fishing is successful east of White Head Island, and it is said that hake can be taken at any time in deep water (50 to 100 fathoms) between Grand Manan and Digby Neck.

Peters Ground - is a small area lying about one half a mile east by northeast off Swallow Tail Light and one and a half miles square. The depth varies from 55 to 60 fathoms and the bottom consists of broken rock with small muddy areas. An extension of this ground toward the east is sometimes known locally at North Head as The Lunt ground.

Bulkhead Rips (Ripplings) - during the summer months hake occur along this rocky barrier along with other groundfish in 12 to 20 fathoms of water.

To summarize:

In Charlotte County west the only hake fishing ground is in Passamaquoddy Bay toward Letete, but fish from The Mud Hake ground and about the Wolves are landed at St. Andrews. In Charlotte County east, hake are taken largely on Thomas Lord's Bank and on The Hake Ground from the Wolves to Grand Manan. Beaver Harbour fishermen usually go about one to five miles offshore in less than 50 fathoms straight south from Beaver Harbour. Infrequently trawls are set five to six miles beyond the Wolves. Beaver Harbour is the only landing centre now from Lepreau to Letete. Ten years ago there were two other landing centres, Bennett's Stand and Lepreau Harbour (Crow Harbour). Some fishermen have been known to make good catches setting exactly at the mouth of Beaver Harbour, while pleasure parties take them right in the harbour. Campobello fishermen take their catches in Indian River, on the west side of the island but the greater part from The Mud Hake grounds, as far as the Wolves on the east, and Grand Manan on the south, and in Grand Manan Channel, directly south.

The Grand Manan catch is made mostly from North Head to the Wolves and in Grand Manan Channel to the west as well as close inshore along the east coast of the island.

St. John County - Hake are taken in fair quantities off the southern shoreline of St. John County but are rarely fished north of St. John city. The following are the approximate

locations of the catches:

A. Off Point Lepreau

Point L. Buoy ground - is located just off Point Lepreau and Dipper Harbour, not over two miles from shore. The bottom consists of hard gravel and stone with water to a depth of 25 fathoms. Beyond this ground about eight miles due east from Point Lepreau is a muddy area (Outer ground) on the border of which hake may be taken almost to Chance Harbour in 40 fathoms. Between the Buoy ground and the shore there is an Inner ground with a muddy bottom where fishing is generally good.

B. Off Musquash Harbour. This was a famous fishing ground years ago when hake were taken off the bar situated nine miles due north in shoal water of 35 to 40 fathoms.

C. Off Lorneville. Hake may be taken here about five miles from shore on a medium hard bottom in 25 fathoms of water.

D. Off Cape Spencer. Hake occur about two to eight miles off-shore on a rather hard gravel or stone bottom at a depth of 35 fathoms.

Hake have also been taken in the mud between rocky patches outside of Partridge Island in St. John Harbour. They have also been caught by hand line through the ice in winter in the Kennebecasis River about three or four miles up from the falls at McCormich's Cove.

Albert County and Fundy Watershed of Westmorland County - Hake used to be taken with cod and haddock close inshore off these counties on a mud bottom, but none have been reported off Albert County since 1899 and off Westmorland since 1917. In the latter county they appeared along with cod on the east shore of Cumberland Basin north of Ragged Point.

Fundy Watershed of Cumberland County - Hake have not been reported for this district since 1918, but old fishermen have formerly taken good catches with cod at Advocate Bay and off Cape Chignecto, and feel certain that good catches could be taken if operations were carried on.

Fundy Watershed of Colchester County - Small hake catches were taken here in 1883 and from 1898 to 1910, but none have been reported since the latter date. These catches were said to be taken with haddock off Economy Point.

Hants County - Small hake landings were reported for this county in 1895, 1898, 1904 and 1905. None are taken now, and the exact allocation of these landings could not be ascertained.

Kings County - A few hake are taken annually off Kings County from Hall Harbour westward. Catches are taken close inshore over a fine pebble bottom.

Annapolis County - Hake in this county are not taken more than half way up from the gaps abreast of Annapolis Royal. A large part of the catch is made at Parker's Cove where they are caught 11 minutes offshore in row boats.

Digby County - The hake are taken from Digby Gut southward along the west shore of Digby Neck and in St. Mary's Bay from Church Point southward. The centres about Tiverton, Centreville, Petite Passage and Brier Island are most productive. The county is divided into two fishing districts, Digby Clare from Yarmouth County line to the Sissiboo River, and Digby No. 1 from Weymouth to Bear River. The latter district has contributed 99.814 per cent of the total hake and cusk landings for the county for the period from 1926 to 1930. These respective landings of hake and cusk for the past five years are given in hundredweights as follows:

	Digby No. 1*	Digby Clare
1926	63,071	432
1927	95,558	12
1928	100,999	54
1929	114,346	139
1930	108,752	263

Hake are taken on the following grounds off Digby County (see Figure 4):

1. Nine-Mile Ridge - extends from Centreville northward to beyond Digby Gut about nine miles from shore and parallel to the shoreline. It is approximately 20 miles long by a mile in width and 35 fathoms in depth with a hard splinter bottom.

2. Head and Horns - is a shoal of 60 fathoms about one and one half miles long in a NNE and SSW direction by one mile wide. It is located 14 miles north of Petite Passage. The bottom is hard.

3. Sandy Cove Bar - is located one mile east of Sandy Cove and is about three miles long by one mile the long axis lying parallel to the coast. It has 40 to 50 fathoms of water over a sandy bottom at high water, but sometimes not over 5 fathoms at low water.

4. Inner Sandy Cove grounds - are located about two miles NNW from West Sandy Cove. These are about three miles long NNE and SSW by one half mile wide, with a depth of 35 fathoms over the sandy bottom.

* Digby No. 1 landings include two per cent cusk.

5. Inner or Boar's Head ground - This runs parallel to the coast about four miles N by W from the Boar's Head at Petite Passage into St. Mary's Bay. It is about four miles long by three miles wide with depths of 55 to 65 fathoms over a hard bottom.

6. Outer ground - This is about three miles long by two miles wide and lies about nine miles out from the mainland on the same bearing as the Inner ground.

7. North West Ledge - lies about four miles northwesterly from Brier Island and off Grand Passage. It has a rocky bottom about two miles long by less than a mile in width and has two fathoms at low water.

8. West North West Rips - These lie WNW about 15 miles from Brier Island and due north from Lurcher Shoal. Rich states: "On the eastern end of this area two parallel shoals about 1 1/2 miles across and having 50 fathom depths between them, rise from the 100 fathom depths of water over the muddy ground around them, to reach 15 fathoms on the landward end of the rips, deepening to 35 fathoms on the western part, where the two ridges come together at about nine miles distance from Brier Island, to carry on to the westward over the Flat ground which extends to a distance of about 18 miles from the island. This Flat ground deepening gradually westward averages to have 50 fathoms of water over a level. gravelly and rocky bottom, to pitch down suddenly, as do all other slopes of this piece of ground, to the 100 fathom depth which prevails on all sides of The Rips. . . . . In these days The Rips furnish good cod and haddock fishing for the entire year with hake abundant at all times on the mud about them. In fact virtually all the ground from this point S to the Lurcher Shoal furnishes good fishing for these species." The Gullys where hake are so often taken off Digby County, so far as can be ascertained refer to the locality of the WNW Rips.

9. Young Lurcher Bar - extends midway northwest from Young Lurcher Shoal to the southwest Ledge to just off to Brier Island. The water is about 18 to 22 fathoms at low water over a rocky, gravel bottom. Hake occur largely on either side of the bar in depths to 45 and 50 fathoms.

10. Lurcher Shoal - lies 19 miles WSW from Cape St. Mary. It is an irregular rocky gravel area about five miles long and three miles wide, with an average depth of 13 to 15 fathoms. Hake may sometimes be taken on the Shoal or in depths of 30 to 50 fathoms surrounding the shoal.

11. Trinity Shoal or Trinity Rock Bar - runs 14 miles northwest from Cape Fourchu and about six or seven miles from Cape St. Mary and extends as a rocky bottom over an indefinite area, (three miles NE and SW by two miles wide). The depths are from six to ten fathoms with an average of from 12 to 16

fathoms over the sandy and stony ground about it. Hake are taken here while trawls are set for cod and haddock.

12. Port Maitland Bar - runs directly from Trinity Rock to Port Maitland. It is similar in nature to Trinity Bar. Hake fishing in St. Mary's Bay is at the present time largely centred.

13. Irish Bank - is situated in the middle of the mouth of the St. Mary's Bay running SE from Dartmouth Point. It is 4 1/2 miles long by 2 1/2 miles wide and has a depth of 14 fathoms.

To summarize:

Hake may be taken off practically the whole western shore of Digby Neck from Digby Gut to Brier Island. Fishermen proceed 15 minutes to one and one half hours offshore. Hake may also be taken near the mouth of St. Mary's Bay and in former years were said to abound everywhere to the head of the bay (Mink grounds, Sandy Cove Bar, etc.). Digby fishermen sometimes go further south for hake off Young Lurcher Bar, Lurcher Shoal, Trinity Rock Bar and seldom off Port Maitland Bar. The bulk of the landings are made at Tiverton.

Yarmouth County - The hake catches are small for Yarmouth County. There are two fishing districts, Yarmouth east, (No. 1) and Yarmouth west (No. 2). It is estimated that 15 per cent of the hake and cusk in Yarmouth west (No. 2) are hake. For Yarmouth east (No. 1) a typical fare from a vessel was weighed in August, 1931. This fare of fresh fish (cod, cusk, haddock, etc.) was caught by 17 fishermen operating with hand lines in one vessel during four and one half days of fishing between 10 and 20 miles south by east from Seal Island. It included among the other groundfish 651 pounds of cusk and only two hake. If these hake averaged five pounds each, which would undoubtedly be a maximum, the hake only represent 1.5 per cent of the total hake and cusk landings. The hake and cusk for both Yarmouth districts from 1928 to 1930 is given in hundredweights as follows:

	Yarmouth No. 1	Yarmouth No. 2
1928	144	6,697
1929	68	11,123
1930	85	10,390

Yarmouth No. 1 represents only 1.1 per cent of the landings for the county, but of the district total only 1.5 per cent is hake. This indicates then that about 1.08 per cent of the Yarmouth County cusk are landed in district No. 1. Similarly for district No. 2 Yarmouth 98.9 per cent of the hake and cusk for the county are landed here and of this 15 per cent of the total catch is hake. Then in the county 14.84 per cent of the total hake catch is landed in Yarmouth No. 2 and .016 per cent in Yarmouth No. 1 so that a total of 14.86 per cent of the hake and cusk returns representing hake.

Hake fishing is then merely incidental here to the taking of other groundfish and is generally offshore. Lurcher Shoal and Seal Island ground are the usual fishing centres, and less frequently the mouth of Lobster Bay. Some fishing is done off Trinity Shoal and the NW Rips. Digby fishermen frequently make their landings in Yarmouth County when weather conditions do not permit them to return to their home port. Occasionally Yarmouth fishermen go southeast of Cape Sable and into LeHavre Bank east of the cape on a sandy shell bottom for hake.

Off Shelburne County the fishery is prosecuted entirely offshore, and although hake appear only in very small quantities (1 per cent of hake and cusk of statistics) they are taken on the Seal Island ground, South East ground, High Land ground and Scandinavian Bank (32 miles SSE to SW from Cape Sable).

In brief, then, it may be stated that hake are found largely at the mouth of the Bay of Fundy to the 50-fathom line. The numbers decrease markedly proceeding up to the head of the bay where catches are taken closer inshore. Fishermen of Digby and Charlotte County occasionally set trawls at Ingalls Shoal situated midway between Digby and Point Lepreau. The ground is about nine miles long NE and SW by about five miles wide and lies about 22 miles NW from Digby and 18 or 20 miles from Point Lepreau. The shoalest area is 35 fathoms and slopes on all sides to about 47 fathoms. The bottom consists of sand and gravel or small stones except over the shoalest part which is rocky.

Seasonal Occurrence

New Brunswick Shore

The hake fishery as it is prosecuted in the Fundy area at the present time is essentially a summer fishery. The general opinion, however, seems to be that were there sufficient inclination and a good market demand, hake could be taken even during the winter, toward the centre of the bay. Hake seem to make a more or less regular inshore, up the bay, movement in the fall. During the summer they frequently enter St. John Harbour and in the winter have been taken in the brackish waters of the Kennebecasis. For some reason they seem to enter Passamaquoddy Bay in early summer and depart in the late autumn. Dr. Bigelow has suggested that the adults are essentially cool water fish and are barred from the shallows in summer by the high temperature of the water. Passamaquoddy Bay is, however, always cool in summer and hence permits their migration into its waters, although their fall departure has not yet been accounted for. They are found all year in the open Gulf of Maine and seem to be more stationary there than either cod or haddock.

Table I shows the total monthly landings of hake in hundredweights in the Fundy area from 1926 to 1928. The average annual course of the fishery over this period has been shown graphically in Figure 5. Small catches are made in January,

February, March and April. The May catch shows a slight increase while appearance of the "June School of Hake" brings a rapid rise in the landings. July and August are peak months or months of maximum catch, while September shows a slow decline. The fishery decreases progressively, but gradually through the months of October, November and December.

Table II is a resume of the monthly landings of hake (including .25 per cent cusk) in hundredweights for Charlotte County from 1926 to 1930. These monthly values for the five-year period have been plotted graphically in Figure 6. Small catches are made in January and in 1928 and 1929 in February. In 1930, 200 hundredweight were landed in April. The catches are small in May, increase rapidly in June reaching a maximum in July (1926, 1927) or August (1928, 1929, 1930) and decline slowly to December.

The following are the average monthly catches for the same period 1926 to 1930 from the four districts of the county:

	Charlotte West	Charlotte East	Campobello	Grand Manan
January	---	14	10	----
February	---	----	1	----
March	---	----	----	----
April	40	----	----	----
May	1	19	46	----
June	414	2061	1551	593
July	237	7173	5737	4288
August	123	7017	12049	4827
September	34	1492	4520	3983
October	59	6	464	694
November	28	----	101	----
December	4	16	26	----

From the above figures and the graphic representation of them in Figure 7, we see that in Passamaquoddy Bay the fishery is not prosecuted at all in January, February and March. Small catches are taken in April and May while the maximum is reached in June and a slow decline follows throughout the year with a minor increase in October.

In Charlotte East, hake are taken in small quantities in January, but not again until May. The catches rise rapidly in June and reach a peak level in July and August. They fall off in September and practically disappear in October, to reappear in December again.

The Campobello fishery is light in January and February and not prosecuted at all in March and April. Hake appear again in May, increase markedly in June and July reaching a peak in August. The subsequent decline in September is very rapid and continues into October, November and December.

Around Grand Manan hake are taken only from June to October. The July catch is almost four times as large as that for the previous month and the maximum is reached in August. The landings are maintained fairly well in September, but fall in October and none are made in November.

Table III gives the monthly catches of hake in hundredweights off St. John County from 1926 to 1930. These figures have been graphically represented in Figure 6. The first catches are sometimes (1929, 1930) taken in June, and increase in July reaching a maximum in August. The September landings decrease to less than those made in July and only small quantities are taken in October, November and December (1929-30).

Briefly then, on the New Brunswick shore hake may be taken off Charlotte County in small quantities in January, but rarely in February. They have appeared in Passamaquoddy Bay in April and in May are taken in small catches in Charlotte West, Charlotte East and off Campobello. In June they may be taken off any of the Charlotte County fishing grounds, and off St. John County in years of large catches (1929, 1930). They are everywhere plentiful in July and increase until the maximum catch is made in August. From this time they decrease in quantity until December.

Seasonal Appearance

Head of Bay

At the head of the Bay of Fundy they are taken off Advocate Bay and Cape Chignecto, while fishing for cod. June is considered too early for hake to have migrated up this far, but they do appear in July and August.

Seasonal Appearance

Nova Scotia Shore

Table IV gives the hundredweights of hake landed each month in Kings County from 1926 to 1930. Figure 8 is a graphic representation of these landings. No catches are made previous to June and the July catch is always smaller and may be nil. The record of a 958 hundredweight catch in November 1929 seems unusual.

Table V is a record of the hundredweights of hake landed each month in Annapolis County from 1926 to 1930. The graphic representation of these catches is shown in Figure 8 together with those for Kings County over the same period. Annapolis County returns are of the same general type as those of St. John County directly across the bay, with the exception in 1930 a 112 hundredweight landing was made in January, and in 1929, a 48 hundredweight landing in May. The hake seem to appear in June, increase in July and to reach a maximum in August which is followed by a decline to October, November and even

December (1929 and 1930).

Table VI is a resume of the hundredweights of hake landed monthly in Digby County from 1926 to 1930. These landings have been represented graphically with those for Yarmouth County, in Figures 9 & 10. The nature of the catch is very similar to that for Charlotte County, although on the average for the five-year period, the average July catch very slightly supersedes that for August. The landings are light in January, lighter in February, rare in March (4 hundredweight, 1929) and April (1 hundredweight, 1926). The fish usually appear in fair quantities in May, increase in June and reach a maximum in July (1927, 1929) or August (1926, 1928, 1930). There is a marked decrease to about one half the August catch in September followed by a slow decline to December.

Table VII is a record of the hundredweights of hake landed monthly in Yarmouth County from 1926 to 1928. These landings are graphically represented in Figure 10. The catches are light throughout. No hake are taken in January, they increase from February to May, decrease to July, and reach the annual maximum in August. The September catch shows a decline, but in October it rises again, but falls off to December.

As on the New Brunswick side of the bay off the southern county Digby hake can be taken in small quantities in January, but only occasionally in February, March and April. In May, they are present in fair quantities off Digby and occasionally can be taken along the Annapolis shore line. The June hake landings are large for Digby, fair in Annapolis and light off Kings County. July and August are months of maximum catch in Digby and Annapolis, but catches are only made off Kings County in the former month. September to December are months of progressive decline in catch for both Annapolis and Digby.

The Yarmouth County landings are more irregular and difficult to relate to the situation in the bay. This is due largely to the fact that fishing is more or less irregular. The decline in June and July is generally attributed to the fact that the offshore fishing is displaced in these months by inshore fishing on grounds where hake are not found.

The whereabouts of the hake in winter seems questionable. Some are inclined to think that they pass this season in the deep water channel in the bay. Others believe in an offshore migration to various fishing banks, since they may be taken on many of them (George's in particular) all winter. There is a possibility that their migration is fairly limited in extent. In any case, more seaworthy craft would be required to make catches even in the middle of the mouth of the bay.

The average monthly catches of hake from 1926 to 1930 are represented graphically in Figure 11 for each county with a commercial catch in the Fundy area. It will be noted that Digby County on the east shore takes the largest catch while Charlotte County holds a similar title for the west shore, although its

catches are generally slightly less than those for Digby, Annapolis takes third place, St. John fourth, while both Kings and Yarmouth Counties have very small landings.

Relative Importance of Fundy Catch

The hake fishery is one of the most important in the Fundy area. Such knowledge as there has been of its relative importance in the past and at present can be gleaned from a study of the annual statistical returns.

The conversion factors used to reduce all figures to the weight as landed are as follows:

100 pounds hake dried = 300 pounds, as landed.
1 barrel = 300 pounds, as landed.
1 case canned (48 cans) = 160 pounds, as landed.

From 1869 to 1909-10 inclusive hake catches are given in hundredweight, frequently as "Hake, dried hundredweight" and sometimes as "Hake, hundredweight". In both instances the quantities were taken as dried and multiplied by 3 to give the fresh round weight.

The 1870 Charlotte County hake catch is given in barrels which are multiplied by 3 to give the fresh round weight. (Approximation obtained from dealers).

For 1883 and 1884 the general Nova Scotia recapitulation gives a single heading "Hake and Haddock". Comparing the quantities of hake and haddock for the five years previous to 1883, it is found that approximately 33 per cent of the total returns are hake.

In 1885 and 1886 the Nova Scotia hake returns in some instances are apparently included with pollock and sometimes with haddock. So far no feasible separation can be made.

The 1887 Nova Scotia returns contain "hake sounds" only, for Digby and Yarmouth Counties. Possibly hake are again included here with haddock or pollock. In 1905 Charlotte County returns are given in cans which were converted to fresh round weight, using 160 pounds to a 48-can case. In 1908, 1909 and 1910-11, cusk are first noted in the statistics appearing as a separate heading in the Digby County returns. However, from 1911-12 to 1929, "Hake and Cusk" appear as one heading in hundredweights as caught and landed. The separation of these fish has to be done approximately. For Charlotte County .25 per cent is deducted from the annual landings, 2 per cent from Digby County and 85 per cent from Yarmouth County to allow for the cusk catch.

For the years 1908 to 1910 when the hake and cusk are classified separately the hake represent the following percentages of the total catch:

1908	99.3 per cent
1909	99.3 per cent
1910	98.9 per cent

In the years 1911-12 to 1930 the hake catch has been computed as a percentage of the "hake and cusk" landings using the percentages estimated above with the following results:

Year	Calculated per cent hake in combined landing "hake and cusk" for Fundy area	Year	Calculated per cent hake in combined landing "hake and cusk" for Fundy area
1911	95.8	1921	93.3
1912	96.7	1922	95.5
1913	97.4	1923	94.2
1914	91.9	1924	95.8
1915	94.9	1925	97.8
1916	95.1	1926	96.0
1917	96.7	1927	95.5
1918	93.9	1928	95.7
1919	92.1	1929	95.3
1920	90.9	1930	94.3

During the years 1911 to 1930 the hake catch for the Fundy area represents on an average 94.9 per cent of the recorded "hake and cusk" landings.

Unfortunately we have insufficient data regarding the proportions of hake to cusk along other regions of the Atlantic coast than the Fundy area, to calculate the percentage of the total hake landings made in the latter region. Over the period from 1872 to 1882 and from 1887 to 1930 inclusive, an average of 68.04 per cent of the hake and cusk landings for the Atlantic coast were made in the Fundy area. For the past twenty years (1911-1930) since hake and cusk have been recorded together 73.4 per cent of the total Atlantic coast landings are those of the Fundy area. These percentages for the 1872 to 1930 period have been represented graphically in Figure 12. During the earlier years of the period the catch was comparatively smaller, but rose to the latter part of the nineteenth century and with the exception of 1904 has never fallen below 61.6 (1913), but has been as high as 86.4 (1922).

The following are the detailed figures from which Figure 12 was constructed:

Year	Per cent of Atlantic Hake landings taken in Fundy area	Year	Per cent of Atlantic Hake landings taken in Fundy area
1872	34.79	1881	62.73
1873	42.48	1882	70.97
1874	36.87	1883	56.10
1875	69.31	1884	
1876	47.98	1885	
1877	62.74	1886	
1878	59.49	1887	44.73(?)
1879	61.53	1888	57.60
1880	66.88	1889	72.25

Year	Per cent of Atlantic Hake landings taken in Fundy area	Year	Per cent of Atlantic "Hake and Cusk" taken in Fundy area
1890	75.30	1911	72.28
1891	54.90	1912	72.50
1892	55.47	1913	61.64
1893	70.87	1914	73.72
1894	69.61	1915	76.53
1895	67.88	1916	75.96
1896	66.15	1917	69.84
1897	79.43	1918	65.65
1898	79.36	1919	71.05
1899	84.35	1920	82.73
1900	79.54	1921	71.89
1901	72.59	1922	86.41
1902	71.06	1923	62.95
1903	79.72	1924	74.38
1904	25.81	1925	73.12
1905	76.74	1926	74.84
1906	73.43	1927	78.01
1907	81.97	1928	76.11
1908	83.43	1929	75.59
1909	78.31	1930	72.90
1910	69.89		

On the New Brunswick shore of the bay the annual landings of hake for the period from 1872 to 1907 represent 78.5 per cent of the total hake landings for the province. From 1908 to 1930 the hake and cusk landings represent 85 per cent of the total provincial landings. Since cusk are taken only in Charlotte County (.25 per cent of total landings) we may say that from 1872 to 1930, 79.6 per cent of the hake catch of New Brunswick was made on the Fundy watershed of the province.

Similarly in Nova Scotia, the average annual hake landings for the Fundy watershed from 1872 to 1907 (with the exception of 1883 to 1887 for which data are incomplete) represent 64.8% of the provincial landings. From 1908 to 1930 the hake and cusk landings for the same area are 76.6 per cent of the total Nova Scotia landings. Over the whole period from 1872 to 1930, an average of 69.9 per cent of these groundfish of Nova Scotia were taken on the Fundy shore.

A further comparative idea, the relative distribution of the catch on either side of the bay, is given by the following figures based as percentages of the landings for the whole Fundy area:

	Period	New Brunswick shore	Nova Scotia shore
Percentage of whole "hake and cusk landings".	*1872-1930	40.61	59.39
	1891-1930	30.82	69.18
	1911-1930	37.21	62.79
Percentage of "hake" landings only.	*1872-1930	40.77	59.23
	1891-1930	32.03	67.97
	1911-1930	40.60	59.40

* 1885 to 1887 omitted.

Figure 13 shows the annual percentages of hake catch for the Fundy area taken on the New Brunswick and Nova Scotia shores of the bay from 1872 to 1930. It will be noted that during the early years to 1881 the catch was centred about the New Brunswick coast. From this period on, with the exception of 1919 to 1921, more than half the catch has been taken on the Nova Scotia side of the bay.

Methods of Capture

It is some forty years since the hand line has been used as a method for capturing hake. At the present time the "bultow" (long line or trawl line), formerly introduced by the French into Newfoundland, has almost entirely supplanted the hand line. Hake are, however, taken incidentally with cod, haddock and pollock by hand-liners using whatever type of gear is characteristic and found by experience most suitable for the particular locality.

The long line or trawl line consists of two parts, the ground line and the snoods or gangings, each fitted with a hook at the end together with buoys, buoy lines or rope and anchors or grapnels. The ground line may consist of tarred cotton or hemp weighing 16 to 20 pounds per dozen lines of 25 fathoms each. The snoods are of lighter weight line weighing $3\frac{1}{2}$ to 4 pounds to 600 yards. They are slightly over two feet in length and fastened to the ground line at intervals of 18 inches to four or even five feet. Small motor boats carrying one to three men are used in the fishery, the exact type depending upon the locality. Trawls are taken out already baited, the baited hooks being placed at the outer side in rows so that they can be thrown out rapidly without tangling. The buoy line and attached buoy (usually a small cask) are thrown overboard and the line gradually thrown out. The upper end of the trawl line and buoy line are bent on to an anchor which is lowered over the side of the boat. As the motor boat is run along slowly the whole trawl is thrown from the tub until the lower end is reached when it is bent on the upper end of the next trawl, and so on until all the trawls have been set. Frequently a "gurdy" or broad wheel is placed in the bow of the dory, over which the trawl is placed when it is hauled aboard the boat. As the trawl comes aboard, fish are found on the hooks and are freed and landed in

the bottom of the boat by a dexterous yank and twist. The trawl is coiled again into the tubs as it comes aboard.

The lines are always laid or "shot" across the tide, for, if the tide runs upon the end of the line, the hooks become entangled and fishing will be lost. They are anchored and buoyed at each end and left stationary for some time. Trawls are set at various times of the day and night dependent largely on the tidal run in any locality. Sometimes "Underrunning" is practised, that is, the hooks are rebaited as soon as the fish are removed so that fishing may go on continuously. "Upending" is practised where the tidal run is strong. As soon as the tubs of trawl are set it is customary to return to the end first set and haul immediately, rather than leave over night or for a few hours.

The types of gear for most of the larger fishing centres in the bay are designed for mixed fishing. Where hake only are taken the gear differs from that for haddock only in that the snoods are placed much closer together. The hake are of less commercial value than other groundfish so it is desirable to take as many as possible with each haul.

Hake are very voracious fish. When taken on the trawl their stomachs are usually crammed with small reddish-coloured shrimps and other Crustacea which normally inhabit a muddy bottom. Later in the fall they are said to feed upon "red feed" and follow large schools of herring, mackerel and squid. They come to the surface at night to prey on these forms, a practise which lead to the method of night fishing by hand line so common many years ago. Occasionally off Grand Manan the bellies have been found crammed with sea-pens and starfish.

Herring, either fresh or salted (corned) is the most general bait in use at the present time. Small fish or large fish cut in two inch sections are readily twisted on the hooks. Occasionally mackerel or clams are substituted, if herring are not available. Late in the summer and during the autumn squid are "jigged", cut in sections, and are said to be the most satisfactory bait after the first trawl or two. Hake are said to bite best after dark, but may be taken at almost any time of day.

The following is a resume of the type of trawl and fishing practices in some of the larger centres of the bay:

New Brunswick

Charlotte west. St. Andrews: Letete.

Ground line: 16 to 20 pounds cotton.
Snoods: 3 pounds cotton; 36 to 40 inches apart; 24 inches long; (18 inches for hake only.)
Hooks: No. 17 with ring (japaned).
Anchor: 20 pounds.
Buoy: keg or cedar float.
No. of tubs: 4 or 5; 10 lines each.
Boats: 35 foot motor; 1 or 2 men in crew.

Trips: 1 per day starting from 2 or 3 a.m. onward.
Bait: herring.
Fishing practices: set and haul on slack or almost any time at Letite where underrunning practised almost all the time.
Estimated good average catch: 4000 pounds.
Poor catch: 1500 pounds.
Maximum catch this year: 5000 pounds.

Charlotte east. Beaver Harbour.

Ground line: 16 pounds cotton (7 shot); 1 glass bowl per shot.
Snoods: 3 to 4 pound cotton; 37 inches apart; 37 inches long when cut; 4 inch bight.
Hooks: No. 17 with ring (japaned).
Anchor: 20 pounds; 150 fathom line.
Buoy: ¼ barrel (keg).
No. of tubs: 5 or 6; 7 shot each (14 lines).
Boats: 33 to 37 feet motor (square stern); 1 or 2, rarely 3 crew.
Trips: 1 trip per day starting 3.30 to 4.00 a.m.; 5 (rarely 6) trips per week.
Bait: herring (salt); squid when obtainable in the fall; baiters are women or children who receive 25 cents per tub.
Fishing practices: trawl usually set one hour; requires up to three or more hours to haul; "upending" sometimes two or three times at once.
Estimated good average daily catch: 3500-4000 pounds.
Poor catch: 3000 pounds per day.
Maximum catch this year: 9000-10,000 pounds.
Maximum catch 1930: 11,000 pounds.

Campobello. Wilson's Beach

Ground line: 20 pounds cotton or 6 thread tarred manilla (300 fathoms to the coil).
Snoods: 4 pounds factory tarred cotton or 3½ pounds hemp; 38 inches apart (for general trawl), 18 inches (for hake); 26 inches long before bight (4 inch) is tied (for general trawl), 22 inches (for hake).
Hooks: No. 16 with ring (japaned).
Anchor: 20 pounds.
Buoy: keg or cedar block.
No. of tubs: 6-8-10; 5 shot per tub; 140 hooks per shot (usual).
Boats: 30-40 feet motor (pea-pod stern); 1 or 2 rarely 3 crew.
Trips: 1 rarely 2 per day; 5 days (rarely 6) per week.
Bait: salt herring or squid in season.
Fishing practices: trawl is set very early in the morning or late at night; preference is given to two hours and a half flood, but fishing is good if set first of ebb or half ebb; the slack is best for setting or hauling; no "underrunning" is done because of the heavy current; sometimes stones of 2 to 4 pounds are placed every one or two shots along the ground line; to prevent rapid sinking of the line, six inch net covered oval glass floats are sent down with every shot.

Estimated good average daily catch: 2000 to 2500 pounds.
Maximum catch this year; 4000 pounds.
Excellent catches: 1930, 9200 pounds; 1929, 13,000 pounds (1 trawl).

Grand Manan. North Head.

Ground line: 18 to 22 pound line hemp.
Snoods: (Ganging in common use): 4 pound cotton; 3½ to 4 feet apart (unless trawl set for hake only 2 feet); 28 inches long when cut; 4 inch loop.
Hooks: No. 17 with ring (japaned).
Anchor: 15 to 20 pounds.
Buoy: keg used at end where there is least tide, cedar buoy at opposite end toward the channel.
No. of tubs: 3 to 7 or 8 (rarely 10).
Boats: 40 foot motor (box stern); 1 to 3 crew.
Trips: 1 per day in channel, or several in dead water near shore.
Bait: salt herring; squid when obtainable.
Fishing practices: kegs are used as buoys in dead water, but a solid buoy is required in the channel; sometimes it is necessary to weight each line of trawl with rock; the boat may act as a buoy at one end while a keg is used at the opposite. "Upending" is frequently practised when the trawl is hauled with the tide, otherwise it is hauled against the tide and cannot be successfully accomplished here. The alternative to upending is to wait for an hour until the tide turns.
Estimated good average daily catch: 3500 to 4000 pounds.
Poor catch: 2000 to 3000 pounds.
Maximum catch 1929: 12,000 pounds.

St. John.

Ground line: 6 thread manilla tarred by hand.
Snoods (Gangings): 2½ to 4 pounds tarred; 18 inches long; 18 inches apart.
Hooks: No. 17 with ring (japaned)
Anchor: 20 pounds.
Buoy: cedar about 4 feet long with a flag.
No. of tubs: 4 to 6; 6 lines per tub.
Boats: 30 to 40 feet motor; 1 to 3 men.
Trips: 1 per day; 5 days per week in good season; this year 3 or 4 tubs, 2 or 3 times per week.
Bait: herring, squid.
Fishing practices: ground lines are kept clear of the bottom by the "toddle" a structure like a lobster trap put about 12 feet from the bottom, or by means of a glass ball covered with netting; set and haul on slack, no underrunning; set often before dark, hauled before dawn; frequently one hour set is sufficient; if engine speed can be sufficiently reduced the trawl is hauled against the tide with the engine running slowly.
Estimated good average catch: 3000 pounds.
Poor catch: 1000 pounds.
Maximum catch 1929: 10,300 pounds.

Nova Scotia

Digby

Ground line: 18 to 20 pounds cotton.
Snoods: 3 pounds cotton; 18 inches apart (for hake only); 36 to 60 inches apart (for general groundfish); 18 to 24 inches long.
Hooks: No. 17 with ring (japaned).
Anchor: 15 to 20 pounds.
Buoy: ½ barrel.
No. of tubs: 3 or 4; 8 lines per tub.
Boats: 30 to 40 feet; motor; 1, 2, or 3 men.
Trips: 1 or 2 per day; 5 days per week.
Bait: herring, squid in season.
Fishing practices: set and hauled on slack; fine weather two sets per day; upending usually practised.
Estimated good average catch: 2000 pounds dressed.
Poor catch: 1500 pounds dressed.
Maximum catch 1931: 4000 pounds dressed.

Tiverton

Ground line: 18 to 20 pounds cotton.
Snoods: 3½ to 4 pounds cotton; 32 inches apart for "real" hake trawl; 32 inches long, 5 inch bight.
Hooks: No. 16 Norwegian tinned with eye.
Anchor: 15 to 20 pounds.
Buoy: ½ barrel; boat.
No. of tubs: 3-4 tubs; 12 lines per tub.
Boats: 30 to 40 feet in length (square stern); motor; 2 or 3 men.
Trips: two sets per day in suitable weather.
Bait: tinker mackerel (frozen); herring; or squid.
Fishing practices: trawls most frequently set at night or early morning, chiefly on slack.
Estimated good average catch: 3000 pounds (1 man, 1 haul).
Poor catch: 1500 pounds.
Maximum catch: 7000 to 9000 pounds.

Westport and Freeport

Ground line: 18 to 20, rarely 24 pounds cotton.
Snoods: 3 pounds cotton; 32 inches apart; cut 32 to 34 inches long, 5 inch bight.
Hooks: No. 16 or No. 17 Norwegian tinned or japaned.
Anchor: 15 to 20 pounds.
Buoy: ½ barrel; boat.
No. of tubs: 3 to 4; 12 lines per tub.
Boats: 30 to 40 feet in length; motor; 2 or 3 men.
Trips: one per day, seldom two.
Bait: tinker mackerel; herring; squid.
Fishing practices: trawls set on slacks particularly in early morning; occasionally left over night; seldom "upend".
Estimated good average catch: 4000 pounds.
Poor catch: 1500 pounds.

Maximum catch 1929: 7000 to 8000 pounds.

Yarmouth

Trawling for hake is seldom practised in this county. Various handline methods are in use where hake are taken occasionally along with cod, cusk and pollock. Handlining on the slack tide in the spring, summer and fall is carried on by a few older fishermen and by pleasure parties all over the bay. In the autumn when small hake are definitely following schools of herring, they may be taken almost anywhere in the bay in weirs even off Westmorland County.

At Grand Manan five pound cotton line is used for handlining with weights varying from one to three and one half pounds, depending on the tidal run. The weights in gear used off Swallow Tail Light consist of separate two ounce spherical leads so that they can be varied at will. (See Figure 14). From a swivel at the lower end of the weights a four pound cotton snood is cut one fathom in length. Sometimes a secondary snood six or seven inches shorter may be attached to the swivel or to the main snood some sixteen or seventeen inches from the swivel. No. 12 hooks are used since cod are taken in the main. Two lines are hung over one on either side of the dory and occasionally a third aft. If fishing is good one man in a dory may remain out three to four hours or until his bait runs out.

Handlining is carried on to a minor degree at Letete and Campobello when hake are taken while fishing cod. A 1 to 1½ pound lead sinker is used with two one to two foot snoods (3½ pound cotton). Off Musquash all haking was done by hand line at night thirty years ago when four or five hundred pounds could be taken in a short time off the bar nine miles offshore northerly. Now the trawl has entirely superseded this method.

The hake at the head of the bay are taken by hand line or trawl along with cod. On the Kings County shoreline many are captured near shore by handlining from Halls Harbour westward, but off Annapolis the trawl is consistently used.

Off Digby and Yarmouth Counties the type of fishery for groundfish shows a marked contrast in various centres. At Westport it is carried on chiefly at night by trawling and drailing, at Yarmouth by trawl during the day and at Abbott's Harbour by handlining at night.

Night drifting by fishermen of Brier Island is carried on around the Trinity and South West Ledges and the North West Rips where hake and cusk occasionally come up with pollock and cod. The boat drifts with the tide while six to eight lines are attended by two or four men.

Off Pubnico, Abbott's Harbour and Yarmouth Bar the hand line gear is that used for cod, taking hake and cusk incidentally off the south shore. Figures 15, 16 and 17 show the

respective types of gear in use. Herring with the gut removed, and squid are both efficient bait. Almost the same type of cod lead used at Pubnico is also used at Westport. The line in use at the latter, however, is 6 ply manilla thread twine or old 16 or 18 pound cotton trawl line. At the latter place also the ordinary cod "jig" is frequently used with a seven inch gangen and a number 12 hook.

Sizes of Hake in the Fundy Area

For market purposes the standards in length for dry hake are as follows:

Extra large - 26 inches or over.
Large - 22 inches to 26 inches.
Medium - 18 inches to 22 inches.
Small - 12 inches to 18 inches.
Snappers - under 12 inches.

All measurements are made from where the flesh joins the tail up the centre to the end of the flesh at the neck, but not to include the flap of the neck.

Dr. Bigelow states, for the Gulf of Maine, that the maximum length for the white hake is about 3½ feet, the weight 30 pounds, but that most of the fish caught are between 1 and 20 pounds, averaging no more than 5 to 8 pounds. He also states: "The 'squirrel' does not grow to as large a size as the white hake, seldom reaching a greater length than 30 inches (the largest of 780 Bay of Fundy fish measured by Craigie was about 27 inches long) or greater weight than 6 to 8 pounds. The average of the commercial catch will not run above 2 to 5 pounds. Females are both longer and heavier than males of the same age."

Young individuals appear in the Bay of Fundy in early spring and are taken near shore and far into estuaries in a fathom or two of water, while the older more mature fish keep offshore generally on a muddy bottom at depths of about 30 to 50 fathoms, but up to 100 fathoms. No recognizable larvae have ever been found, but a very few young have appeared in weirs, seines and gill nets during the winter.

Small hake are found sometimes in deeper water where they hide within the living shells of the scallop about Grand Manan and off Digby. It is generally considered that they merely receive shelter here, but about Grand Manan it is said that they frequently eat part of the scallop rendering it unfit for human consumption.

Many fabulous stories are current regarding the immense sizes to which hake may grow when they become known as "Sow Hake" or "Mother Hake". One taken about twelve years ago off the Gullies and landed at Tiverton was said to weigh 50 pounds, another at Wilson's Beach 60 pounds. Two weighed in August 1930 at Wilson's Beach were 25½ and 27 pounds respectively. They are usually

taken with cod in the spring or fall. All small hake are known either as "snappers", "squirrels" or "shack". The first and last terms are in general applied to all small groundfish.

Some idea of the relation of weight to length in the commercial catch of hake is given by the following data, compiled from measurements made of twelve specimens picked at random from representative catches at various fishing centres on the New Brunswick and Nova Scotian shores. Zoarces Stations 971, 975, 920, 1054 and 1053 are all on the Nova Scotian side of the bay off Digby County. The Weymouth hake were in general the largest and were followed by Beaver Harbour, Wilson's Beach, the Zoarces Stations and finally St. John respectively, where the fish were smallest.

AUGUST 1930

	Average			Maximum			Minimum		
	Length inches	Weight lbs.	oz.	Length inches	Weight lbs.	oz.	Length inches	Weight lbs.	oz.
Wilson's Beach	24.8	4	8	28.0	5	3	18.0	1	10
Beaver Harbour	25.7	5	3	30.0	5	9	21.5	3	7
St. John	20.2	2	1	24.4	3	8	18.9	1	8
Weymouth	27.3	5	15	29.5	8	12	24.8	3	3
Station 971	22.4	3	12	29.1	8	15	16.9	1	9
Station 975	22.7	3	13	27.6	6	4	15.8	1	1
Station 920	20.0	2	4	23.6	3	8	16.1	1	1
Station 1054	23.3	3	7	29.9	4	0	17.7	1	9
Station 1053	21.5	2	13	24.8	4	0	13.0		8

The weight to length relationship in the hake is further shown in Figure 18, where the maxima, average and minima weights are given for fish from different parts of the bay. This general resultant curve shows that weight has a tendency to increase more and more rapidly in proportion to length the older the fish becomes. We may take an example of a fish 18 inches long (Wilson's Beach) growing to 28.0 inches and increasing its weight by over three times the original.

Spawning - we know practically nothing of the breeding habits of the common hake. Fishermen state that the gonads are sometimes full in late fall, but are always spent in the spring. This would lead to a purely tentative conclusion that spawning takes place in either fall or winter. Off Gloucester, Welsh found a male with milt flowing on April 22, 1913. Squirrel hake gonads are full to the late summer on the New Brunswick shore. Of six specimens examined the last week of August, 1930, five contained large full gonads. Spawning of this species falls in early summer in Massachusetts Bay and as early as June south of Cape Cod (Bigelow), but is probably slightly later in the cooler waters of the Fundy area.

History of the Fishery

The numbers of hundredweights of hake taken in the Fundy area for the various years from 1869 to 1930 inclusive are given in Table VIII. In Figure 20 the volume of catch has been plotted against time. From this resultant curve, we see that there is a general tendency for an increased catch about the middle of the 1869 to 1930 period which is followed by a decline and a subsequent rise during the last five or six years.

In the early years from 1869 the catch rose consistently to 1882 when 399,612 hundredweights were reported for the whole area. We have incomplete data for 1885 to 1887 when hake are apparently included sometimes with pollock and sometimes with haddock or are classified only as "hake sounds". The catches were irregular though moderate to 1895. From this time on tremendous quantities were landed annually with a maximum for the recorded period of 608,010 hundredweights in 1899. The catch fell to 215,586 hundredweights in 1902, but rose to 399,894 hundredweights in 1905. In 1906 the catch dropped once more, but came again to a high level in 1907 and 1908. This year was followed by a general irregular decline to 1923 when a minimum landing for the recorded period (1869-1930) 55,464 hundredweights was made. Since that time there has been a general rise in the catch to a maximum of 244,350 hundredweights in 1929.

Many opinions as to the fluctuations in the catch from year to year have been expressed in the fishery reports. These will be taken up as concerned with each county, but in general decreases are attributed to unsatisfactory market conditions, increase of dogfish and the decrease in fishing activities consequent upon the preponderance of other fisheries, war conditions, epidemics and so on.

Charlotte County:

The hake catches for this county for the years 1869 to 1930 are given in hundredweights in Table IX. In Figure 21 the changes in the fishery are shown graphically for the same period.

The hake industry was an important one in Charlotte County even as early as 1868. Most of the fish were taken by hook and line off Campobello and Grand Manan. Around Letite to Point Lepreau the population pursued farming, but also spent a considerable time fishing, because hake were so abundant everywhere from July to November. From 1869 to 1870 the deep sea fisheries were said to be on the increase, although this is scarcely shown in the statistics. Hake are attracted by herring schools and the weirs were at that time considered disastrous to the latter, as the bait supply was continually decreasing. In 1871 and 1872 the hake catches increased all over the county. The fish appeared to have come in around Grand Manan in pursuit of a school of large herring. In 1873 the catch once more decreased slightly, but after 1874 showed a progressive annual increase to 1881. In 1875 the fish were not as plentiful as usual in the West Isles, but increased in 1876 for the whole county, except the Inner Bay. In this locality the decrease was attributed to the use of the trawl or bultow, which had just been introduced.

In 1878 the Grand Manan catch of hake exceeded any year in the history of the island. Progressively through the years the Inner Bay fishery fell off to 1879, while the Grand Manan landings continued as in former years. In 1880 line fishing was superseded by weir fishing at Letete and Campobello, while at Grand Manan line fishing increased since weir fishermen were making an attempt to retrieve ill luck at weirs. In 1881 hake were more scarce than usual about St. Andrews, but increased remarkably at Beaver Harbour and other fishing centres. The 1882 fishery as a whole decreased although it increased about St. Andrews, but landings at Letete were short except for fishermen who had apparatus to go to the mouth of the bay. The following two years the hake decreased all over the district due to a scarcity of fish and of fishing since the market price was too low to serve as a stimulus for increased effort. In 1885 the dogfish remained about Letete and the inner islands almost all season, but a good catch at Grand Manan brought the county total above that for 1884.

In 1886 hake fishery was almost deserted. The price was too low to induce fishermen to follow the fish with their old vigor and perseverance although at Campobello the catch was greater than that of 1885. In 1887 the weir fishing once more superseded line fishing, but at Grand Manan the catch increased remarkably, a fact attributed to the absence of foreign fishing boats around the grounds. At St. Andrews there was progressively less line fishing in favour of weirs. The 1888 catch showed a slight increase due to increased efforts about Deer Island. The annual catch remained about the same (slight decrease over 1890) until 1894 although in 1892 a minor decrease was attributed to less vigorous fishing. In 1893 the shore catch at Beaver Harbour was good, but the Grand Manan fishery was

irregular, particularly due to the appearance of dogfish in August and October.

Hake were declared to be plentiful in 1894, but the bait was scarce. At Beaver Harbour the catch was excellent in late June and early July, but small to the latter part of August when great numbers again appeared. At Campobello dogfish proved a menace until they left in early August. The Grand Manan catch was only 60 per cent of the previous years. This was not attributed to a scarcity of fish, but principally to the numerous schools of dogfish which frequented the grounds and consequently men engaged in the branch were compelled to pursue some other line.

In 1895 the catch fell materially at Beaver Harbour scarcity of bait and prevalence of dogfish contributing to the light fares. At Grand Manan the decrease was most marked. No particular reason was assigned for the 50 per cent decrease except a scarcity of certain feed such as shrimps upon which this class of fish largely subsists, was noticeable. The prices for all line fish were low so the fishery was not prosecuted to the same extent, although at Grand Manan, where the decrease was most marked, the number of men and boats engaged in the industry was the same as the previous year. It was quite a common sight for a man to haul his trawls and find half of the hooks holding dogfish.

The hake catch of 1896 was somewhat larger than the previous year, but not large compared to the previous history. The non-appearance of the fish in large schools was attributed to the lack of food and the numerous schools of dogfish. In consequence of the latter and the low price offered, the fishing was neglected during the season. The Grand Manan catch showed a great increase over 1895 since dogfish failed to appear there giving the trawlers a better opportunity to fish. The 1897 catch increased over 1896 since there was a great decrease in the schools of dogfish, but in 1898 the fares were lighter as a whole, particularly at Beaver Harbour. The hake decreased progressively to 1903 during which period the dogfish schools were ever on the increase and more line fishermen found employment in connection with the sardine canneries. Prices rose for the fish in 1899 so on the whole conditions were more satisfactory than would appear from a glance at the curve although they fell again in 1902, 1903.

In 1903 the hake catch increased slightly, although dogfish were, if anything, a greater hindrance than ever before. In fact at Wilson's Beach the fishery was completely abandoned in the month of July.

Hake were quite plentiful in 1904 and one week some of the fishermen stated that they could "catch all they wanted", the amount of a person's landings being regulated simply by the size of his boat and his inclination to work. The dogfish were scarce, except for a short time outside of Campobello, so fishermen were able to engage in the industry to the end of the season. The catch remained about the same in 1905, but in 1906 there was a marked decrease in this county, sardine bait was lacking and the

prices were too low to permit of profitable fishing. The following year hake were abundant all over the bay and dogfish were scarce. The Beaver Harbour fishermen were particularly fortunate and several of the small trawl boats with two men in a boat stocked upwards of $2000 during the summer season, with this branch alone.

The catch of 1908 was greater than the extraordinary one of 1907, but the market was unsatisfactory for all dried fish. This latter flooded market condition had a marked effect on the 1909 landings when as a consequence this branch of the fisheries was not prosecuted to any extent. By the end of the season the prices began to improve on the foreign markets and the 1910 catch was correspondingly greater followed by further increases in 1911 and 1912. The subsequent drop in 1913 was attributed not to over-fishing, but rather to extensive trawling, which is carried on all the year round in the mouth of the Bay of Fundy by both American and Nova Scotian schooners.

Hake fell off further in 1914 but in 1915 the catch was practically doubled. Dogfish did not trouble the fishermen and the market was good. The 1916 catch showed a decrease due to unfavourable weather and lack of men to fish, but prices were excellent and continued to be so throughout the war period despite the declining catch. Hake landings increased in 1919, but again fell off in 1920 and 1921, when there was a shortage, not due to a scarcity of fish, but rather to a poor demand at low market prices, which caused many fishermen to give up fishing altogether. In 1922 the prices rose once more and extensive fishing operations were entered into again.

In 1923 the catch was light due entirely to the fact that there was very little opportunity for the fishermen to dispose of hake in any part of the district as the market was glutted with stocks from the previous year. A few buyers took some at Beaver Harbour and Wilson's Beach. At North Head, Grand Manan, one of the chief hake centres, the dealers carried over from the previous year practically all they had bought. As a result, they did not buy during the season and consequently fishermen did not operate. Hake landings increased slightly in 1924 and 1925, but fell off again in 1926 and 1927, consequent, not so much upon a scarcity of fish, as upon market prices. In 1928 the prices rose slightly and the catch showed a correspondingly large increase. 1929 was a peak year for hake. The high catches were accounted for in major part by an increased market value accompanied by a phenomenal run of hake in the waters of the district. In 1930 the catch fell once more, since the fish seemed to be less plentiful, and 1931 fishing was little pursued because the market was already overstocked from the previous year, particularly at Grand Manan. Buyers prices were markedly low all over the bay.

St. John County:

The annual catches of hake are given in Table X for St. John County from 1870 to 1930, and the course of the fishery for the period is graphically represented in Figure 22. No catches are

reported for 1870, 1871, 1873, 1874, 1888, and 1892. The fishery rose from 1875 to 1879, maintained a high level for the following two years and thence fell progressively to 1888, when no catch at all was made. The landings increased to 1891, and declined once more in 1892. The maximum landings for the county over the sixty-one year period were made in 1900, after which the catches fell off rapidly and continued at a low level from 1902 to 1906. 1907 was another peak year for the county, but the landings fell off again by 1910 and did not vary a great deal until the large increase of 1916. Following this, the year-to-year fluctuations were great, the 1921, 1923 and 1924 catches being very small. From 1924 the hake landings rose to 1929, but fell off again in 1930. The fishery reports do not throw much light on the fluctuations for this county, but it might be expected that the factors having most bearing in Charlotte County immediately to the south would also lend weight here.

Albert County:

Fundy Watershed of Westmorland County:

The annual catches of hake in hundredweights from 1870 to 1930 are given for these counties in Table XI and the course of the fishery is graphically represented in Figure 23.

The landings for these counties at the head of the bay have all been small compared to those counties nearer the mouth. The fishery declined from 1871 to 1872, and rose in 1873 to the highest level over the period from 1870 to 1930. The catch fell rapidly to 1876, increased to 1878 and then declined progressively to 1883. Landings increased rapidly again to 1887 and fell off entirely then for four years. From 1892 to 1895 small catches were taken off Westmorland County and again in 1897, 1908, 1909, and 1917, while in 1898 and 1899 minor landings were made off Albert County.

Fundy Watershed of Cumberland County:

Table XII is a resume of the hake landings in the Fundy Watershed of Cumberland County from 1870 to 1930. The course of the fishery for this period has been graphically represented in Figure 24.

The first recorded catch in 1872 is high for the county, but fell off in 1873, increased in 1874 and then declined to 1877. The landings rose from 1877 to 1880 and fell to the zero level in 1884 and 1885. The maximum for the sixty-one-year period occurred in 1886, but was followed by two years devoid of any recorded catches. From 1889 landings were recorded to 1917 with the exception of 1892, 1894 and 1906. Peak years occurred even with these small catches in 1891, 1900, 1903, 1905 and 1911. In the most recent "Hake maximum year" for the Fundy area, 1929, one hundredweight is recorded for this county.

Fundy Watershed of Colchester County:

The hake catches for the Fundy Watershed of Colchester County from 1870 to 1930 are given in hundredweights in Table XIII and graphically represented in Figure 26. The landings are all small and recorded in 1883 and from 1898 to 1910 inclusive. The 1902 catch is the maximum for the county and is peculiar in that it does not correspond to a high value for any other county in the bay.

Hants County:

The annual hake catches for Hants County from 1870 to 1930 are given in Table XIV. The fishery has seldom been prosecuted in this county. Catches have been recorded only for 1895, 1898, 1904 and 1905, and of these the largest is 45 hundredweight in 1898.

Kings County:

The annual hake landings in hundredweights for Kings County from 1870 to 1930 are given in Table XV. Figure 27 is a graphic representation of the course of the fishery over this period.

Kings County differs from Albert and Westmorland, directly across the bay, in that during the first half of the period (1870 to 1930) in which statistics have been recorded scarcely any landings were made in Kings County. During the latter half of the period only scattered landings have been made in Albert and Westmorland Counties, while Kings County has with the exception of 1912 and 1926 had consistent small catches.

Aside from hake taken in 1875, 1892 and 1894, no landings are recorded for the county until 1897, which is followed by a large catch in 1898, a smaller one in 1899 and none in 1900. From 1901 the landings increase to a maximum in 1908 and 1909, and then fall rapidly to 1912, increase in 1913, decrease in 1914 and gradually rise to 1917. For the remaining period to 1930, the landings show a progressive decline, rapid at first, and then more gradual with the exception of 1920, when fair quantities were also taken elsewhere in the bay.

Annapolis County:

The annual hake landings in hundredweights from 1870 to 1930 for Annapolis County are given in Table XVI and the course of the fishery over the period is represented in Figure 28.

The Annapolis County catch follows closely that of St. John County on the opposite side of the bay, although the landings for the former county are generally considerably higher than those for the latter.

The catch was fair in 1872, but fell off to 1875, a decline attributed to the use of the bultow, which was just being introduced

and unfavourably commented upon. The landings increased again in 1876 and 1877, and a decrease in 1878 was followed by a large haul in 1879. The 1878 decline was attributed to excess trawling and to a tremendous quantity of sawdust in Bear River. The fishery remained at a fair level to 1882, but declined for the next few years due to a decrease in fishing operations since most hake were taken by small vessels at the mouth of the bay. 1888 was again a fair year, but the catches decreased subsequently to 1891. From this time to 1899 the catch increases annually, then is slightly less to 1904, but rises and maintains a high level with a maximum in 1908. The landings fall a little in 1909, but rapidly following to 1913, then increase to 1917 and are low to 1921. The 1922 catches were large; from this time on the quantities taken from year to year varied widely culminating in a maximum in 1930.

Digby County:

The hundredweights of hake landed annually in Digby County from 1870 to 1930 are given in Table XVII and the course of the fishery has been graphically represented in Figure 29.

Hake are unrecorded in the fishery statistics for Digby County until 1873, although they were apparently fished previous to this time. In 1872 it is stated in the annual fishery report that "hake which a few years ago were considered almost worthless are now largely pursued and taking of these fish has become quite a lucrative business." The sounds and oil at that time were equal in value to the fish. In 1873 and 1874 the quantities taken were small, but "no inconvenience was experienced since prices were higher". 1875 marked the beginning of a series of years up to 1882 each of which showed an increase over the previous year.

The statistics for the years 1883 and 1884 give in the general Nova Scotia recapitulation, "Hake and Haddock". The county returns are given as "Hake Sounds" and the Haddock returns are unusually large. The separation of haddock and hake in 1883 and 1884 was determined with regard to haddock and it was estimated that approximately 33 per cent (1878 to 1882) of the total returns for the two was "Hake". On this basis, these years both show a decreased catch from 1882. The statistics for 1885, 1886 and 1887 are more confusing. In these years there is an indication that they may have been included with pollock or haddock, but not definite enough to separate them definitely as the returns are only for "Hake Sounds". The sounds were valuable but it is scarcely conceivable that the fish were not put to any use at all when they were used both before and after this time.

In 1888 line fishing of all kinds was good in Digby and showed a further increase in 1889 despite the fact that regulations prohibited trawling in St. Mary's Bay. The 1890 catch was lighter although the fish were plentiful from the middle of May to the last of August. There was a notable decrease in 1891 and 1892 with a slight improvement in 1893 when the catches during most of August were irregular consequent upon unfavorable weather. The landings declined again to 1895 when they were fair to poor throughout the season. 1896 was a slight improvement over the previous year.

Bait was scarce and dogfish were prevalent with the result that almost all marketable fish were driven offshore. The 1897 catch was much in excess of previous years because the fishing was vigorously prosecuted and the fishermen well repaid for their labours. The following three years were most productive, but the 1901 catch decreased to less than half the catch of 1900, although it was still good. A further slight decrease in 1902 was followed by a progressive increase to 1905, a decline in 1906, and another increase in 1907 consequent upon the non-appearance of dogfish. 1908 was the beginning of a series of fair though smaller catches to 1911, as a result of less vigorous fishing, because low prices prevailed throughout the period. The 1912 catch was greater than that of 1911, but not as large as it might have been, because of a scarcity of bait combined with stormy weather throughout the summer and fall, which made deep sea fishing more than usually hazardous. In 1913, there was a further small increase in the hake landings followed by a fall in 1914, and a rise through 1915 and 1916 despite unfavorable weather conditions. The hake catch fell once more progressively from year to year until 1921, largely a result of the interruption of fishing operations by stormy weather and poor prices. The hake showed a great increase in 1922, but declined in 1923. The average catch in 1924 was better than that of the previous year, and, although the demand was good, the catch was not as large as that of 1922. In 1925 the hake landings decreased again, but rose progressively to 1929, and dropped slightly in 1930 with the lessened market demands.

Yarmouth County:

The annual hake landings in Yarmouth County from 1870 to 1930 are given in hundredweights in Table XVIII. The course of the fishery is graphically represented in Figure 30.

The catches are all small compared to the neighbouring county, Digby, and no landings at all are recorded in 1870, 1871, 1875, 1881, 1883 to 1886, 1888, 1903 and 1904. The catch decreased from 1872 to 1875, increased to 1877 and declined to zero in 1881. Small catches were made in 1882, 1887 and 1889 rising from the latter year to the county maximum for the period in 1897, with the exception of small landings taken in 1893 and 1896. The hake were scarce again for some years and none were recorded in 1903 and 1904.

Throughout the remaining years to the present there have been annual fluctuations with the catch falling to a very low level in 1913, 1923 and 1925. Since the latter date the landings have increased slowly, but have not reached the quantities of former years such, for example, as 1877, 1892, 1894, 1895, 1897 and 1910.

From the annual statistical returns it is evident that up to and including 1881, Charlotte County hake landings held first place in the Fundy area. From that time to the present, Digby County has superseded Charlotte County except in 1884 and from 1919 to 1921. Annapolis County usually has had the third highest annual hake catch, but in 1885, 1899, 1901, 1903, 1905

and 1909 they were greater even than those for Charlotte County. St. John County has occasionally shown larger landings than Annapolis in 1878 to 1881, 1883, 1893, 1919, 1925 and 1927, but otherwise holds fourth place in the series. Yarmouth County occasionally supersedes St. John (1897), and in 1877 took third place in the series.

Figure 31 shows the relative positions of the various counties of the Fundy area as regards the average annual magnitude of the hake catches over the period from 1870 to 1830. From this figure, it is clear that the counties are arranged in the following order: Digby, Charlotte, Annapolis, St. John, Yarmouth, Cumberland (Fundy watershed), Kings, Albert Westmorland (Fundy watershed), Colchester (Fundy watershed), Hants.

Utilization

The most common process of curing hake is essentially the same as was practised a century ago. A very few are gutted or headed and gutted on board the boat before returning to port, (Digby, Yarmouth). On the New Brunswick shore and more often all over the bay the fish are dressed in fishing sheds on shore. The usual gang consists of a "throater", a "gutter" and a "splitter". The first-named person cuts the fish across the throat below the gills, slits open the abdominal walls and cuts off the head. The gutter removes the organs that are contained within the abdominal wall, the livers are thrown into a barrel to be saved for their oil, and the sound or air bladders are removed from the backbones and saved. The fish then pass to the splitter who, with a knife that is rounded at the end, cuts along each side of the backbone from the ventral side toward the back and removes the bone from the fish. Care is taken that the cut does not extend too deeply or too far from the bone, thus leaving much flesh on the bone that is removed. The fish after being split are thrown into tubs of salt water and thoroughly washed. Most of the fish are pickle cured, that is they are salted and then placed in large tubs or butts where the pickle is retained. Rarely they are kench cured, that is the fish are thoroughly salted and placed in regular piles on top of each other called kenches. Later they are culled into different grades. When the time comes for the fish to be dried they are removed from the pickle of the butts and piled on each other in order that the pickle may drain off. These kenches of fish are about three feet high and the process is known as "water horsing". The fish later go to the flakes where they are spread out in the sun to dry. Fish flakes are raised about 30 to 36 inches from the ground and are made by nailing narrow strips of wood about three or four inches apart on top of long stringers or, now, wire netting is more often used in place of the wooden strips. This apparatus allows a free circulation of air to all parts of the fish. In some fishing centres, such as at North Head, Grand Manan (Gaskills), after curing the fish are carried to a hot water dryer, where they remain for about three days.

The drying time varies according to the market for which the fish are being prepared. Fish that are to be used in the

preparation of boneless fish require little drying (eight or ten hours of a good drying day) while the fish for export trade may require a week or ten days. Every evening the fish are collected into small piles on the flakes and covered to prevent them absorbing moisture from fog or rain.

Hake are hard dried for the Brazilian markets and compressed into Braxilian tubs which are about the size of a flour barrel sawed in halves and hold 128 pounds under pressure. Fish for the Cuban market are hard dried in 100 pound boxes or boned as boneless fish. Small quantities are shipped green salted to the United States. From a number of records in different regions, it has been shown that the average quantity of fresh fish required to make a gross quintal (112 pounds) of dried fish for the New England market is as follows:

From the Round	258
From the Knife	190
From the Butt	131

The early summer fish have a watery flesh which becomes more oily as the feeding season progresses so that the late fall fish are superior for all purposes. For some first quality dried fish the hake are bled immediately after removal from the trawl. The flesh then becomes white and clear on drying. If the fish are left in the sun before splitting, the flesh has a tendency to become pinkish yellow, so covered stands have frequently been erected to counteract this effect.

The fresh fish market is very poor for hake since the fish do not keep as well as haddock. Fresh fillets hold together better than haddock fillets, although the fish is of a somewhat coarser grain, and if well preserved are practically indistinguishable from haddock when cooked. The ice-fillets are excellent and will probably be the most suitable method of placing the fish on the fresh market. In Saint John city a small fresh market has been created and this past summer the buyers were paying up to 75 and 90 cents per hundred to meet this demand, while elsewhere in the bay the average price for the dry market was not over 30 cents round.

Dressed hake compare favourably with other groundfish in food value as is shown by Table XIX. It is only slightly below dressed haddock with a calorific value of 159, and above the common dressed flounder, which has a fuel value of 127 calories.

Hake livers are saved for oil extraction. In midsummer at Wilson's Beach 3 to 3½ buckets of liver are obtained from 1000 pounds of hake when the fish are large, but only 1 to 1½ buckets when they are small. The livers are thrown into barrels and allowed to decompose until the oil exudes. This oil is not used for medicine but largely for industrial purposes.

Hake sounds before the era of prohibition brought as much as one dollar and twenty cents per pound. Most fishermen still save

them either in salt or dried, and, in 1929, they were worth fourteen cents per pound, since they are still used in the manufacture of isinglass. One ton of fish yield about 40 to 50 pounds of swim bladders. The sounds are slit open on the flat side and thoroughly washed to remove the blood before they are packed in brine to be sent to the isinglass factory.

Future Possibilities

The future of the hake fishery in the Fundy area would seem to depend solely on the market conditions, since the quantities of fish obtainable off the counties at the mouth of the bay are always large, according to fishermen of the district. The dried fish market in the West Indies has fallen off of late years. It would seem advisable to establish a home market in the central provinces of Canada where fresh or smoked fillets could be available at all times. Once a demand is created, it will be essential to have a steady supply of fish. The preparation of ice-fillets and smoke fillets during the summer months of abundant catch would probably partially fulfil this requisite. It would be preferable, however, to make hauls consistently all through the year to meet the market demands. Hake apparently disappear from their summer haunts in the winter months. They can be taken by other trawl off Grand Manan, Georges and German Banks in the winter, but we have no evidence that these fish are migrants from the Fundy area. Some fishermen are inclined to think that the hake go out into the deeper water of the bay to remain there during the winter and could be taken if there were sufficient demand for the fish to warrant the investment required for more seaworthy craft.

Legends for Figures

Figure 1. The White Hake - Urophycis tenuis (Mitchill)

Figure 2. The Squirrel Hake - Urophycis chuss (Walbaum)

* Figure 3. Fundy area, showing hake catch for 1929, each dot representing 1000 hundredweight, and each circle a smaller quantity. Positions of the catches are only approximate.

* Figure 4. Hake fishing grounds of the Fundy area.

Figure 5. Graph showing the average monthly landings of hake in hundredweights taken in the Fundy area from 1926 to 1928.

Figure 6. Graph showing the monthly landings of hake in hundredweights in Charlotte and St. John Counties from 1926 to 1930.

Figure 7. Graph showing the average monthly landings of hake in hundredweights in the four districts of Charlotte County (Charlotte West, Charlotte East, Campobello, Grand Manan) from 1926 to 1930.

Figure 8. Graph showing the monthly landings of hake in hundredweights in Kings and Annapolis Counties from 1926 to 1930.

Figure 9. Graph showing the monthly landings of hake in hundredweights in Digby County from 1926 to 1930.

Figure 10. Graph showing the monthly landings of hake in hundredweights in Yarmouth County from 1926 to 1928.

* Figure 11. Graph showing the average monthly catches in hundredweights for the counties bordering on the Fundy area from 1926 to 1930.

Figure 12. Graph showing the percentage of the total annual Atlantic catch of hake (1872-1907) and of hake and cusk (1908-1930) taken in the Fundy area.

* Figure 13. Graph showing the percentage of the total annual hake landings (1872-1930) taken on the New Brunswick and Nova Scotia shores of the Bay respectively.

Figure 14. Hand line gear used off Swallow Tail Light, Grand Manan.

Figure 15. Hand line gear used at Pubnico.

Figure 16. Hand line gear used at Abbott Harbour.

* Of the thirty-one figures in the original manuscript, No. 349, only Figures 3, 4, 11, 13 and 31 have been reproduced in this Manuscript Report.

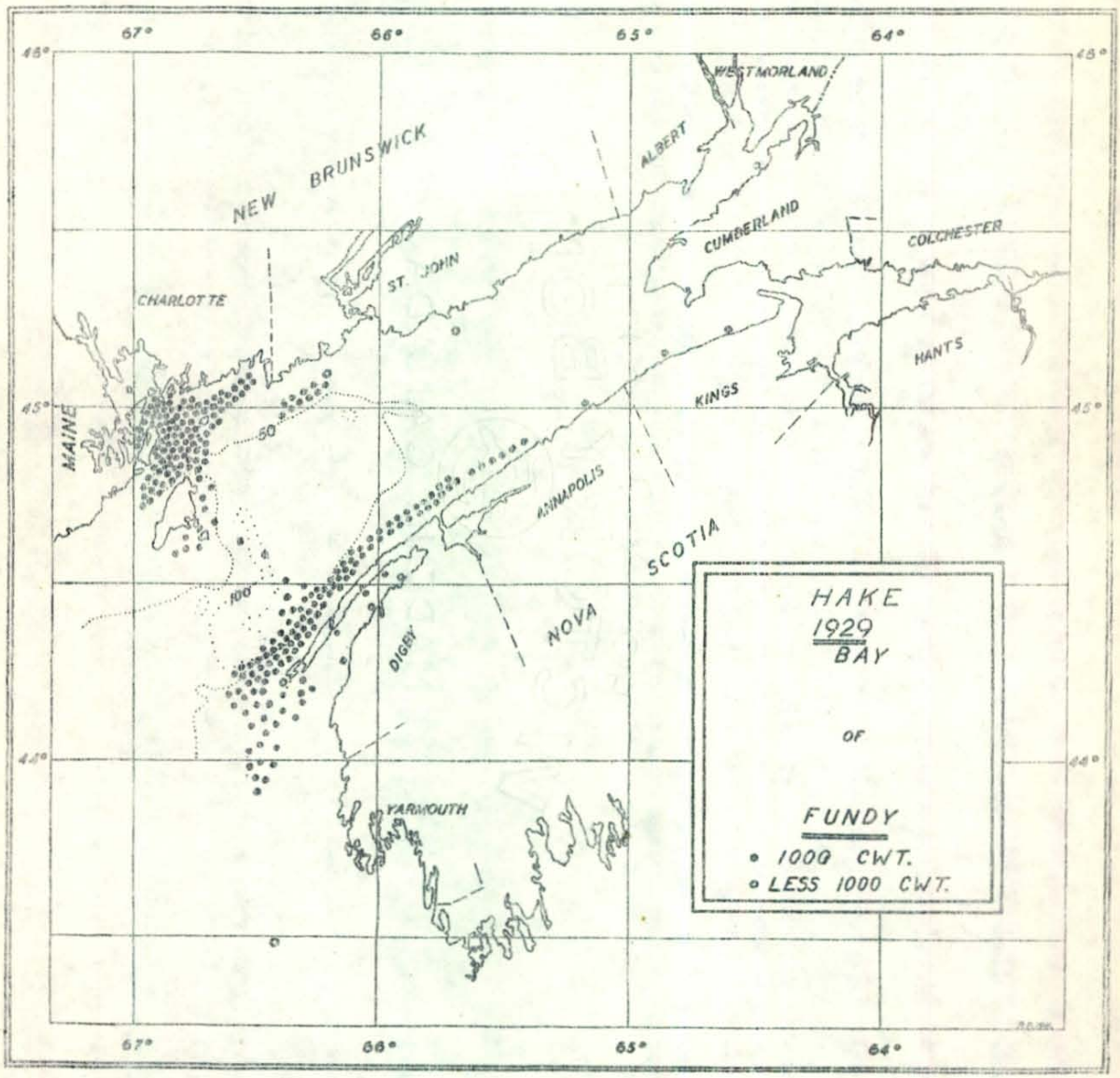
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Figure 3.

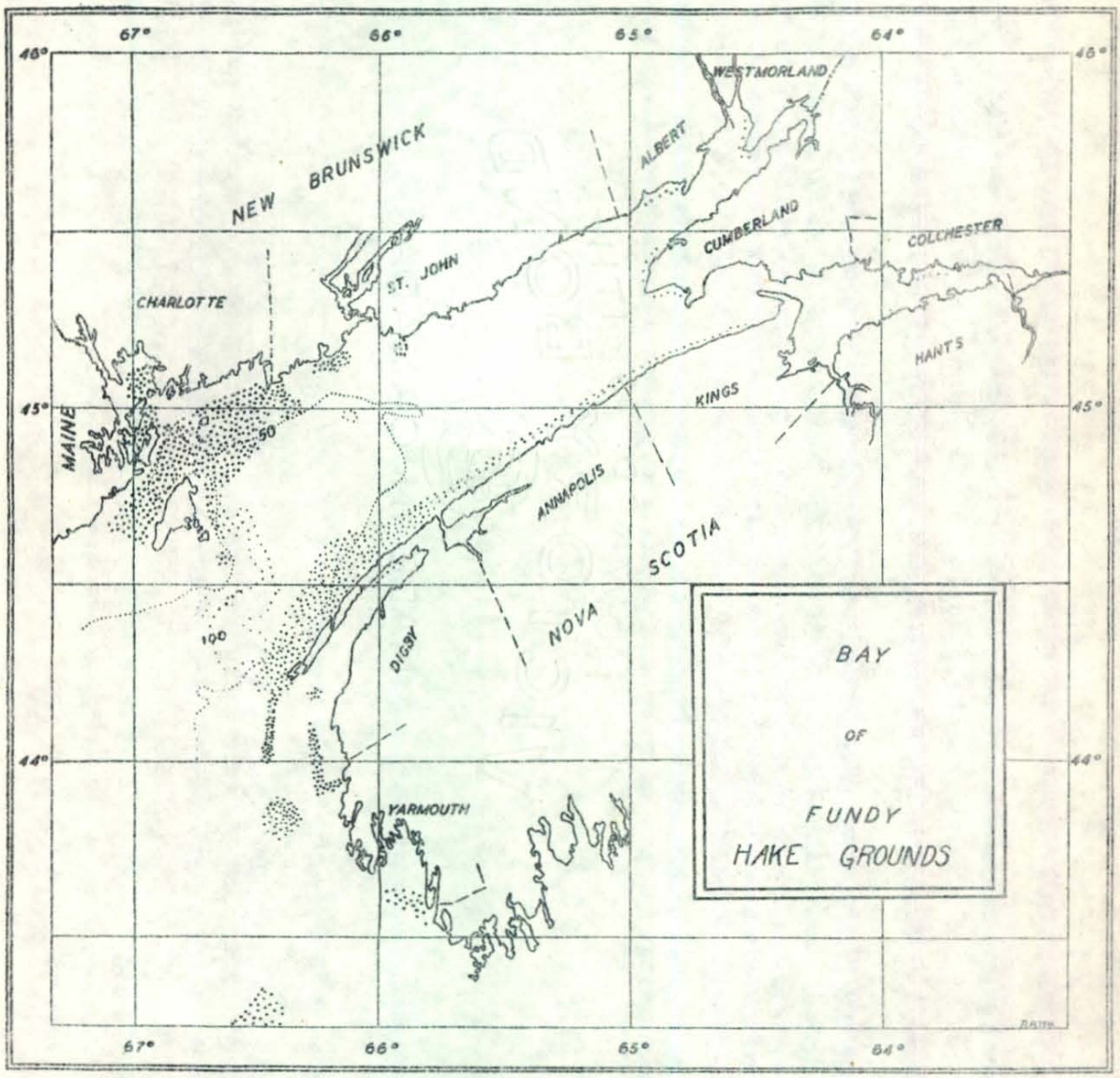
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Figure 4.

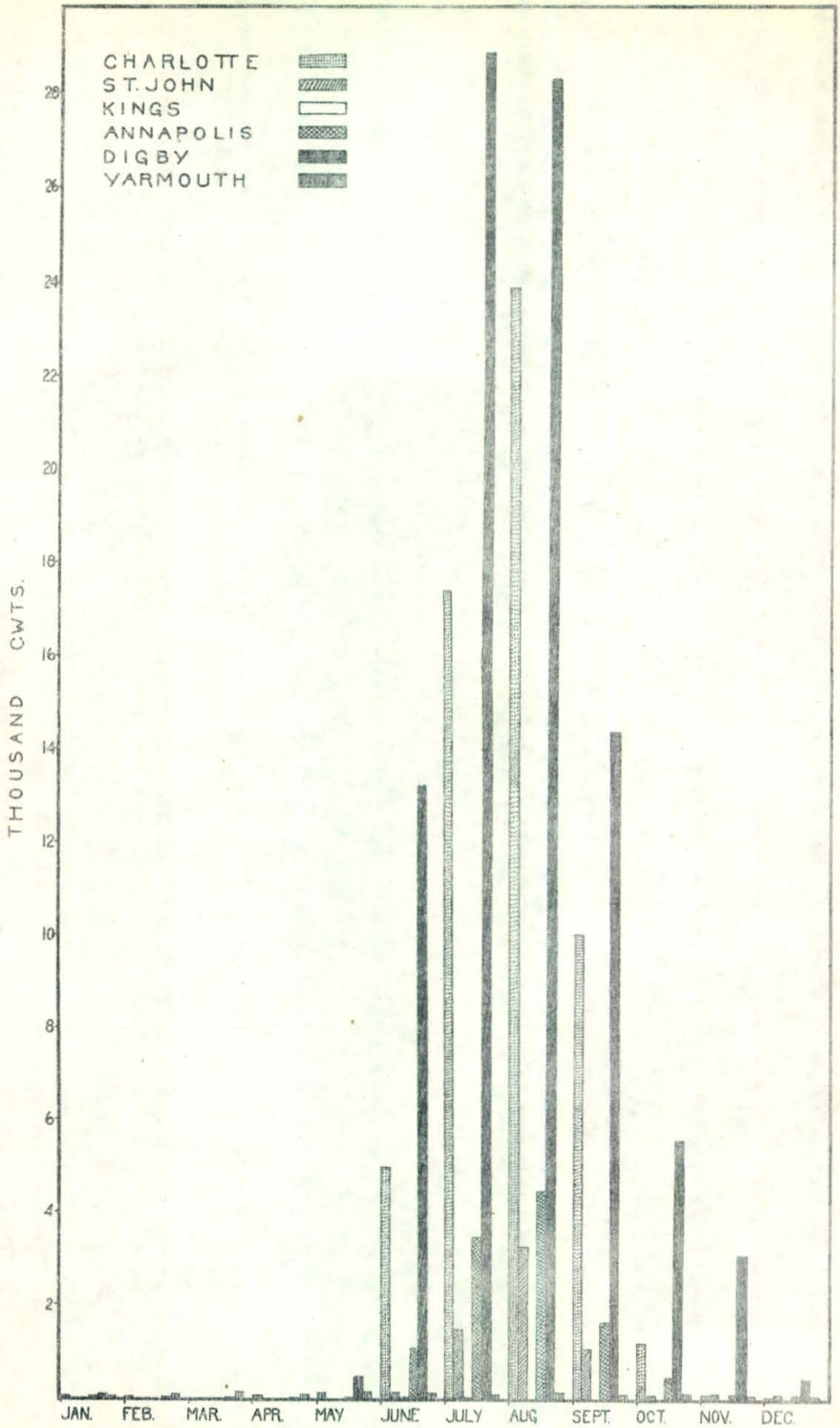

Figure 11. Fundy Area Counties, Monthly Catches Average 1926-1930.

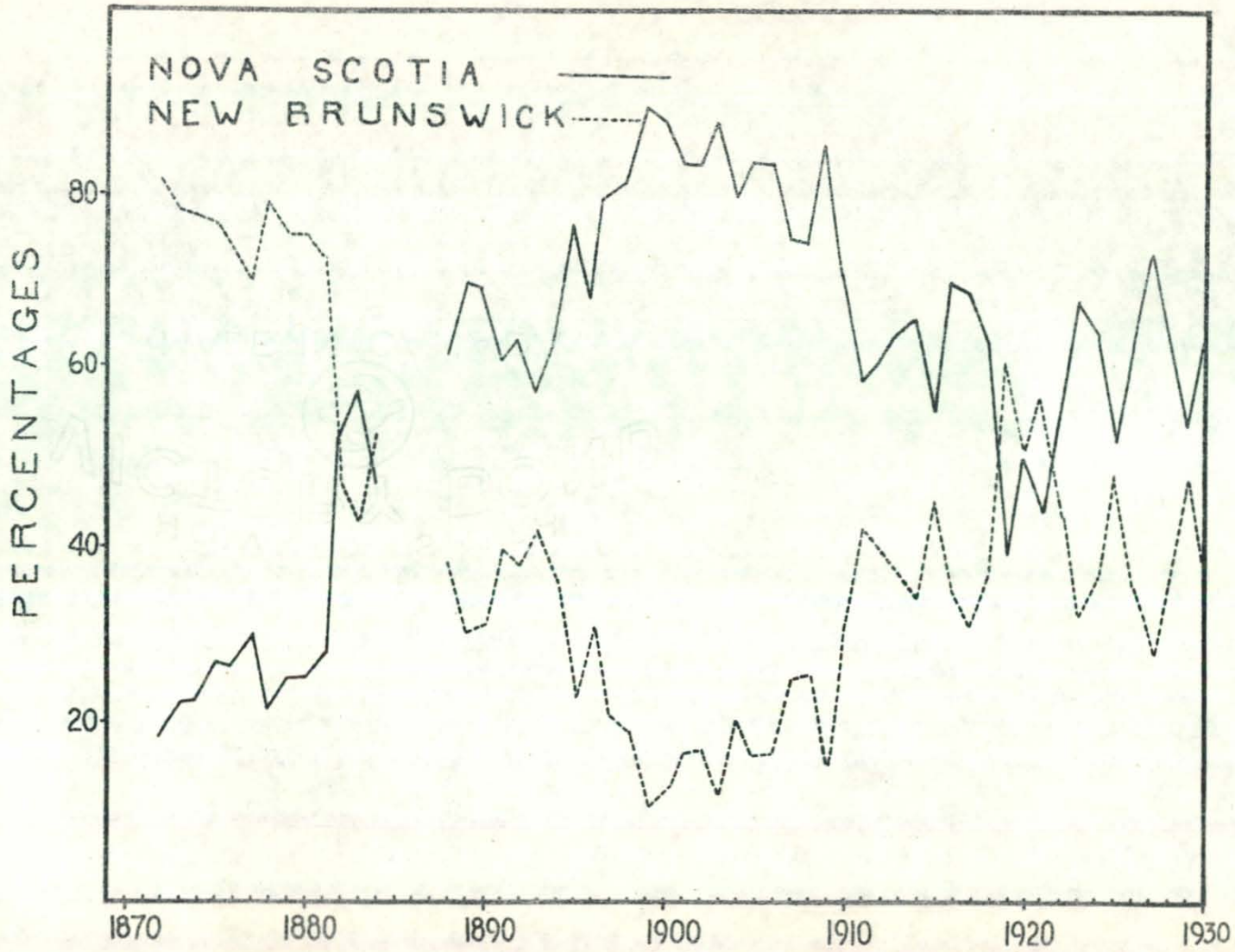

Figure 13. Percentage of Fundy Hake Area Landings taken on N. B. and N. S. Shores Respectively.

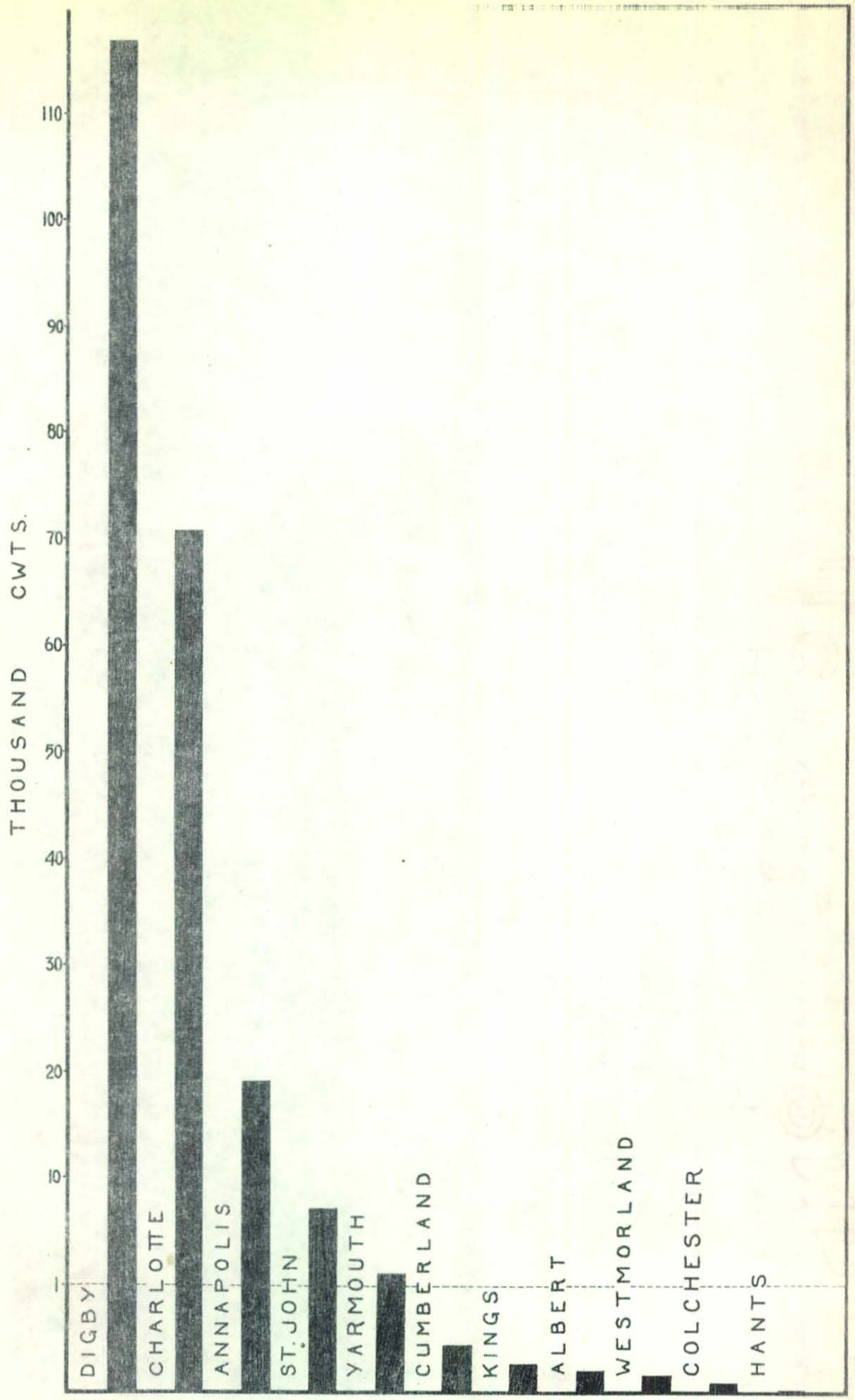

Figure 31. Average annual Catch 1870-1930.

TABLE I

Hundredweights of Hake landed monthly in the Fundy area from 1926 to 1928.

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1926	7	7	30	46	192	7,755	32,099	36,403	18,467	5,247	1378	153
1927	7	31	36	49	128	18,529	41,650	34,129	22,953	10,936	3227	661
1928	75	19	34	126	692	20,755	60,484	70,525	23,004	2,742	2006	1461
Average	30	19	33	74	337	15,680	44,744	47,019	21,475	6,308	2204	758

TABLE II

Hundredweights of Hake* landed each month in Charlotte County from 1926 to 1930.

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1926	2	----	----	----	75	1832	10,762	7,885	5,325	1556	8	47
1927	.5	----	----	----	13	4851	11,652	7,720	7,135	281	118	26
1928	15.5	7.5	----	----	19	3400	18,526	25,080	4,968	291	87	90
1929	69	5	----	----	38	6197	29,665	46,051	19,177	3348	296	27
1930	24	----	----	200	184	6716	16,469	33,340	13,543	642	135	46
Average	23	2.5	----	40	66	4599	17,435	24,015	10,030	1224	129	47

* Figures include .25 per cent Cusk.

TABLE III

Hundredweights of Hake landed each month in St. John County from 1926 to 1930.

Year	June	July	August	Sept.	Oct.	Nov.	Dec.
1926	----	1100	2500	1200	----	----	----
1927	----	800	3500	850	----	----	----
1928	----	600	4300	1850	----	----	----
1929	160	3500	5200	800	----	420	180
1930	600	1400	1900	880	330	276	330
Average	152	1480	3280	1116	66	139	102

TABLE IV

Hundredweights of Hake landed each month in Kings County from 1926 to 1930.

Year	June	July	August	Sept.	Oct.	Nov.
1926	--	--	--	--	--	---
1927	12	8	--	--	--	---
1928	12	--	--	--	--	---
1929	15	12	--	--	--	958 (?)
1930	23	7	--	--	--	---
Average	12	5	--	--	--	---

TABLE V

Hundredweights of Hake landed each month in Annapolis County from 1926 to 1930.

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1926	----	----	----	----	--	105	1696	4002	1278	50	----	----
1927	----	----	----	----	--	46	228	540	108	45	----	----
1928	----	----	----	----	--	1338	6568	7221	1469	23	40	----
1929	----	----	----	----	48	827	4122	6018	3756	32	224	62
1930	112	----	----	----	--	3027	5068	4891	2018	2367	304	448
Average	22	----	----	----	10	1069	3536	4534	1726	503	113	102

TABLE VI

Hundredweights of Hake landed monthly in Digby County from 1926 to 1930.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1926	5	----	----	1	90	5,797	18,430	21,997	10,523	3,509	1354	105
1927	2	----	----	----	---	13,488	28,909	22,231	14,844	10,502	3047	626
1928	60	11	----	----	461	15,907	29,370	33,601	14,860	2,383	1817	513
1929	38	50	4	----	997	13,707	44,917	24,430	15,659	6,938	5135	229
1930	122	22	----	----	886	18,081	23,188	40,611	14,407	4,753	3791	747
Average	45	17	1	.2	487	13,396	28,963	28,574	14,059	5,617	3029	444

TABLE VII

Hundredweights of Hake landed monthly in Yarmouth County from 1926 to 1928.

Year	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1926	7	30	45	27	21	111	19	141	132	16	1
1927	31	36	49	115	132	53	138	16	108	62	9
1928	--	34	126	212	98	20	323	57	45	62	48
Average	13	33	70	118	87	61	160	71	95	47	19

Values calculated by deducting 85 per cent from "hake and cusk" landings to allow for cusk.

TABLE VIII

Hundredweights of Hake landed each year in the Fundy area from 1869 to 1930

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
186'										4,320
187'	990?	60,540	132,192	89,291	79,273	96,682	105,363	145,788	198,828	231,441
188'	234,615	286,671	399,612	246,230	158,785	------	------	79,878	210,186	257,322
189'	213,063	204,870	194,151	228,621	215,691	149,526	188,148	328,920	350,946	608,010
190'	494,103	254,589	215,586	241,890	343,110	399,894	279,177	451,395	457,518	304,737
191'	195,885	190,007	245,118	212,353	178,294	275,991	278,773	217,014	150,853	160,191
192'	131,912	68,542	216,901	55,464	137,332	124,559	108,484	132,113	184,735	244,350
193'	203,363									

TABLE IX

Hundredweights of Hake landed each year in Charlotte County from 1869 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
186'										4,230
187'	990	60,060	102,930	59,070	60,330	72,558	74,415	95,805	145,440	163,515
188'	166,605	198,390	182,580	99,579	84,120	99,693	45,060	70,875	79,800	76,248
189'	64,833	77,616	72,945	84,282	66,588	23,028	47,469	53,964	50,991	43,191
190'	36,015	30,822	30,996	25,170	63,792	61,470	43,251	91,146	100,560	37,512
191'	55,820	71,812	91,104	62,232	56,279	114,914	79,683	57,935	50,733	85,484
192'	59,585	37,632	85,289	17,069	48,385	54,756	33,767	31,517	61,256	104,611
193'	69,992									

TABLE X

Hundredweights of Hake landed each year in St. John County from 1870-1930

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	------	4,530	------	------	150	2,280	6,000	9,630	10,248
188'	9,771	9,840	7,725	6,300	3,150	1,800	1,800	1,200	------	1,500
189'	1,500	4,200	------	12,000	13,350	12,240	10,950	14,070	14,745	21,405
190'	23,895	11,280	4,950	4,500	5,850	4,860	3,429	22,950	17,640	10,410
191'	4,930	7,420	6,192	2,792	4,950	7,900	19,104	10,030	4,198	11,010
192'	7,500	700	8,000	800	850	4,750	4,800	5,200	6,750	10,750
193'	6,700									

TABLE XI

Hundredweights of Hake landed each year in Albert County and the Fundy Watershed of Westmorland County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	480	156	10,515	1,449	900(A) 120(W)	450(A) 120(W)	420(A) 180(W)	435(A) 564(W)	465(A) 438(W)
188'	375(A) 270(W)	285(A)	222(A) 75(W)	75(A)	72(A) 36(W)	300(A)	441(A)	600(A)	------	------
189'	------	------	150(W)	300(W)	300(W)	150(W)	------	36(W)	120(A)	120(A)
190'	------	------	------	------	------	------	------	------	30(W)	45(W)
191'	------	------	------	------	------	------	------	60(W)	------	------
192'	------	------	------	------	------	------	------	------	------	------
193'	------	------	------	------	------	------	------	------	------	------

A = Albert County

W = Westmorland County

TABLE XII

Hundredweights of Hake landed each year in the Fundy Watershed of Cumberland County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	------	2,910	956	2,107	1,414	1,260	450	975	900
188'	1,650	435	525	539	------	------	3,300	------	------	60
189'	45	561	------	69	------	45	33	48	210	210
190'	540	300	135	2,460	450	1,050	------	318	234	195
191'	83	869	122	40	112	111	5	3	------	------
192'	------	------	------	------	------	------	------	------	------	1
193'	------									

TABLE XIII

Hundredweights of Hake landed each year in the Fundy Watershed of Colchester County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	------	------	------	------	------	------	------	------	------
188'	------	------	------	10	------	------	------	------	------	------
189'	------	------	------	------	------	------	------	------	30	30
190'	36	45	3,900	63	57	30	30	24	60	45
191'	40	------	------	------	------	------	------	------	------	------
192'	------	------	------	------	------	------	------	------	------	------
193'	------									

TABLE XIV

Hundredweights of Hake landed each year in Hants County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	------	------	------	------	------	------	------	------	------
188'	------	------	------	------	------	------	------	------	------	------
189'	------	------	------	------	------	15	------	------	45	------
190'	------	------	------	------	27	21	------	------	------	------
191'	------	------	------	------	------	------	------	------	------	------
192'	------	------	------	------	------	------	------	------	------	------
193'	------									

TABLE XV

Hundredweights of Hake landed each year in Kings County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	-------	------	------	------	300	------	------	------	------
188'	------	-------	------	------	------	------	------	------	------	------
189'	------	-------	57	------	30	------	------	75	885	435
190'	------	156	150	336	366	453	381	477	1,125	1,134
191'	761	245	------	454	222	267	333	855	642	180
192'	390	150	96	132	105	12	------	20	12	27
193'	30									

TABLE XVI

Hundredweights of Hake landed each year in Annapolis County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	------	16,350	5,100	3,945	3,540	4,320	6,021	4,725	9,810
188'	8,814	7,065	8,610	4,108	------	800	------	6,828	9,666	8,079
189'	3,450	4,326	7,869	10,500	22,668	25,983	24,336	28,785	32,700	43,575
190'	24,900	35,985	20,130	28,536	38,250	72,300	32,700	65,460	90,450	83,400
191'	27,450	21,618	25,595	18,100	24,955	21,823	34,266	35,080	17,929	6,197
192'	8,096	4,201	21,868	1,333	13,984	4,551	7,131	967	16,659	15,089
193'	18,235									

TABLE XVII

Hundredweights of Hake landed each year in Digby County from 1870 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
187'	------	------	------	11,775	11,130	17,700	22,398	26,712	35,394	45,021
188'	47,100	70,656	197,880	122,938	64,777	------	30,735	------	120,720	171,375
189'	142,965	117,237	108,090	121,350	106,860	81,930	105,045	216,942	248,835	496,644
190'	406,377	173,391	152,430	180,825	234,318	256,320	198,375	267,660	246,324	168,381
191'	101,395	86,754	121,141	128,240	89,390	128,886	143,389	112,225	75,928	55,157
192'	54,361	25,109	100,261	35,669	73,226	60,246	62,233	93,659	99,032	112,195
193'	106,835									

TABLE XVIII

Hundredweights of Hake landed each year in Yarmouth County from 1869 to 1930.

Year	'0	'1	'2	'3	'4	'5	'6	'7	'8	'9
186'										------
187'	------	------	5,316	1,875	312	------	120	10,200	1,665	1,050
188'	75	------	1,995	------	------	------	------	375	------	60
189'	270	930	5,040	420	5,895	6,135	315	15,000	2,385	2,400
190'	2,340	2,610	2,895	------	------	3,390	1,011	3,360	1,095	3,615
191'	5,406	1,298	964	495	2,386	2,090	1,993	839	1,423	2,163
192'	2,080	750	1,387	461	782	244	553	750	1,026	1,678
193'	1,571									