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THE FAUNA OF MINAS CHANNEL, MINAS BASIN AND
THE SHUBENACADIE RIVER.

by

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During the summer months of 1919, 1920 and 1921 the writer spent a considerable amount of time studying the life history of the shad as it occurs in Scotsman Bay, Minas Basin, Cobequid Bay and the Shubenacadie River. At the same time as much general collecting as possible was attempted. The Atlantic Biological Station boat "Prince" in the late summer of 1920 made a short survey of Minas Channel and part of Minas Basin. As a result of these investigations a considerable amount of material has been accumulated and the determinations which have been made are set forth in this paper. It is divided into two parts; the first dealing with the marine collections and the second with the freshwater material.

Physical Characteristics of the Region Investigated.

The Bay of Fundy terminates in two main bodies of water, Chignecto Bay to the north and Minas Channel to the south. Minas Channel, which is roughly about twenty-five miles long, is partially separated from Minas Basin by a narrow peninsula which projects northward to Cape Blomidon and thence westward terminating in a rugged point at Cape Split. In general the shores of this channel are high and rocky and the twenty-five metre line comes close to shore. The exposed points such as Cape Chignecto, Cape d'Or and Cape Split are swept clear of debris by the swift currents which rush by them almost unceasingly. The main channel seems to lie just to the south of Isle of Haute, running close out to Cape d'Or and also Cape Split. At both of the latter

points heavy tide rips occur. To the south of this channel, the water, although carried backward and forward by the tide, seems to be relatively stationary and it is in this region that, what is known locally as the "cedar swamp", occurs. This is a miniature Sargasso Sea in which seaweed, wreckage and other debris are collected. The position of this material is said to vary from close in to the south side of Cape Split to a point down the south shore opposite Isle of Haute. The writer has observed this drifting material in the latter position only. Fishermen and others state that this debris remains in this region until it finally becomes waterlogged and sinks. As evidence they cite the case of a small wrecked vessel which drifted in this locality for months.

In contrast to these rugged capes the region presents several sandy bays in which the water is comparatively shallow and where mud usually accumulates during the summer months only to be swept out again by storms in the fall and spring. Such bays occur between Cape Chignecto and Cape d'Or, Cape d'Or and Cape Sharp and to the south of Cape Split. The latter is known as Scotsman Bay and it was here that considerable collecting was done. This bay is quite shallow, the depth being under 25 metres and the entire eastern half is less than 10 metres deep. At the eastern end the intertidal zone is from three to six hundred yards wide and for the most part consists of a gradually-sloping sandy beach with outcroppings of rock here and there. During the summer months the lower half of the intertidal zone becomes covered with mud to a depth of from 5 to 8 inches or

more. It is in this portion of the bay at the lower edge of the intertidal zone that the weirs, where much of the collecting was done, are located. The south shore of the bay is somewhat similar in character although the intertidal zone becomes narrower and the shore more rocky. The north shore, however, is very rugged especially towards Cape Split and the intertidal zone is quite narrow, the shore line being high and rocky.

Connecting Minas Channel with Minas Basin is a narrow passage about 4 miles in width and 8 miles in length which for the most part has precipitous and rocky shores. The depth of this channel is over 50 metres and the tides rush through at about 8 knots so that except for a short period at slack water one finds the channel to be a mass of eddies and whirlpools in which the water from top to bottom must be very thoroughly mixed.

The inland basin connected with this passage consists of two parts; first, Minas Basin proper which extends as far as a line joining Economy Point with Burntcoat Head; second, Cobequid Bay which constitutes the remaining smaller portion. Taken together Minas Basin and Cobequid Bay form a roughly triangular body of water approximately fifty miles long and eighteen miles wide at the base. The amount of fresh water entering the basin is comparatively small for, although a considerable number of so-called rivers flow into it, most of the tributaries are mere brooks. There are two exceptions to this, namely the Avon River flowing into Minas Basin proper at its south western corner and the Shubenacadie River entering on the south shore of Cobequid Bay at Maitland. Both of these rivers, although large at their mouths due to a great volume of tidal water entering them, are

small in volume in the non-tidal portions.

The north shore of Minas Basin and Cobequid Bay is quite high in most places, although there are a few marshes at the mouths of rivers. In places the banks are rocky but for the most part they consist of a stiff red clay. As far as the writer has observed the south shore is similar in character as far west as the Avon River. At Tennycape and for some distance westward rock predominates and here and there are scattered along the shore in the intertidal zone numerous small islets of harder rock which has withstood the rush of the water. Westward and northward from the Avon river the shore is quite low and in many places has been dyked to prevent the highest tides from flooding the fields. A few miles south of Cape Blomidon the shore again becomes rocky, the height gradually increasing as one goes northward to the cape.

The intertidal zone of the entire basin is sandy with here and there small outcroppings of rock. During late summer, as at Scotsman Bay, mud collects on the "flats" to a depth of several inches. Farther out at the edge of the lowest tides in many places, Bass River and Tennycape may be instanced, the bottom becomes rocky. On the other hand the entire eastern half of Cobequid Bay is sandy and off the mouth of the Avon River the sand extends many miles from shore.

Cobequid Bay is a very shallow body of water the greater portion of it being under ten metres in depth. A channel which is about 2 miles wide and 8 miles long runs in at the western end and here the water is slightly over ten metres deep. The

bottom slopes off very gradually so that at spring tides at Bass River the intertidal zone is about three quarters of a mile wide.

The depth of Minas Basin is somewhat greater than Cobequid Bay although the ten metre line is still from one to six miles offshore, the latter distance occurring off the mouth of the Avon River. Just off Cape Blomidon there is an area of about twenty-five square miles where the depth is over twenty-five metres and in a small part of this a depth of over 50 metres is attained. This, of course, is connected with the deep area in Minas Channel. The remaining portion of the basin constituting slightly less than one half its total area is between ten and twenty-five metres in depth.

The depths as given in the above description are based on low tide data. It remains to say a few words about the tides for which the region is noted. At Burntcoat Head where the greatest tides of the basin are said to occur the following figures are given. (Dawson 1917).

Height of spring tides at Perigee	50.50 feet
Height of spring tides at Apogee	40.18 feet
Neap range at moon's average distance	38.78 feet
Average range during month	42.06 feet

There is no reason to suppose that these figures do not hold approximately for Bass River and Tennycape since there are no sand bars or other obstructions between those places, such as delay and modify the tide in the upper stretches of Cobequid Bay.

Figures for the height of spring tides at several other places in the region investigated are given in the Tables published

annually by the Tidal and Current Survey, Ottawa. Two of these may be given here, Isle Haute where the spring rise is 33 feet and Parrsboro where it is 43 feet. This will give some idea as to the rise of the tide in the region as a whole and of the tremendous amount of water rushing through the narrow passage at Cape Split.

Collecting Stations Established.

It will be well, before going on to a consideration of the other physical conditions such as salinity and temperature to give a list of the stations at which such data were obtained. The "Prince" established seven stations, two in Minas Channel, two in Scotsman Bay and three in Minas Basin. These stations were numbered 190 to 196 and their positions can readily be seen on the map. The depth and character of the bottom at each station are given in the following table.

Station	190	191	192	193	194	195	196
Depth (metres)	70	30	13	5	50	20	8
Character bottom	Rock	Sand	Mud & Sand	Mud	Rock	Sand	Sand

All material from these stations was obtained between September 1 and 10, 1920.

Collections were made at many points in the intertidal zone and in weirs at Scotsman Bay between July 31 and August 24, 1920. Similarly a small collection was made near Cape Blomidon on September 8, 1920 and also at Tennycape on August 5, 1921. At Bass River the collections were more extensive and were made in the intertidal zone and in a weir just to the east of the mouth of the river. Work at Bass River was begun August 8, 1921 and discontinued September 8, 1921.

Temperatures

As was to be expected on account of the constant stirring effect of the tide the temperature of the water from the surface to the bottom was uniform and owing to estuarine conditions was considerably warmer than that obtained in the lower Bay of Fundy.

The temperatures were obtained at the time of year when they were likely to be at a maximum-namely early in September. The following table gives the data obtained from "Prince" stations 190 to 196 on September 4th and 8th, 1920.

Station Depth M.	Temperature °C.						
	190	191	192	193	194	195	196
0	14.25	14	14.4	14.4	14.50	15.0	16.5
4				14.3			
6							15.6
10	14.25	14.1			14.37	14.80	
12			14.1				
20						14.75	
25	14.25	14.08			14.35		
45					14.35		
50	14.25						
70	14.25						

There is a very noticeable uniformity of temperature except for stations 195 and 196. The higher temperatures there are due to the very shallow water coming in over the mud flats which are warmed up by the sun when the tide is out.

A few records were obtained of the temperatures close to shore where the water was only a few feet deep. At Scotsman Bay in late July until early September such temperatures ranged from 14.7° to 22.79°.

July 30	+14.7°
Aug. 6	17.6°
Aug. 12	16.2°
Sept. 6	22.79°

A similar reading at Blomidon on September 8th gave 16.9° as the temperature of the shore water.

At Bass River two readings were taken from a wharf at high tide where the depth was 4.3 metres; the first taken August 15th was 17.9°C and the second taken September 2nd was 17.8°C.

Salinity

Owing to the small amount of fresh water entering Minas Basin and Cobequid Bay by rivers and to the mixing effect of the tide the salinity is higher than might be expected in an estuary. A water sample taken at the surface at Bass River on August 15th had a salinity of 29.02‰. This may be compared with a sample taken August 25, 1916 at "Prince" Station 3 off Grand Manan near the mouth of the Bay of Fundy where the surface salinity was 31.77‰ (Vachon 1918).

History of the Sea Fisheries of the Region.

Although several writers have referred to the shad and salmon of these waters very few have given any account of the methods of fishing which were employed. Perley (1852) seems to have given about the only information that is available. This following account is derived mainly from that source and from the evidence given before the Dominion Shad Commission (Prince, 1908).

The most important fishery of the area from early times seems to have been the shad. Two main methods have been employed. First, weirs either of brush or of twine ("seines") were used. These were often of great length and captured large numbers of shad and some salmon. On the north shore of Minas Basin there was on an average of one weir for every mile of shore and "between Graham's Head and Economy Point, the flats for four miles were observed to have an almost unbroken continuance

of these weirs, crescent shaped, the ends of the weirs touching each other". (Perley).

Drift-nets were also used in the shad and salmon fisheries. Using this method the boats put out several hundred yards of gill-net in the upper part of the basin and drifted down with the ebb tide and back to the starting point with the flood. It is stated that the use of drift-nets began about 1840 on the Windsor (Avon) River.

The drift-net gave rise to another method of fishing which is known as a stake-net or set-net. Instead of allowing the nets to drift freely they were attached to stakes driven in the mud of the intertidal zone. These were unlike the "seine" weirs in that they were set in a straight line, one is recorded at Burntcoat Head as being three miles long, and the fish were caught in the meshes. Shad fishing was carried on in Scotsman Bay, Minas Basin and Cobequid Bay but not in Minas Channel.

The salmon fishery was the next most important and was carried on in the same way as the shad, that is by means of brush weirs and drift-nets. Salmon were obtained in the largest quantities in the Avon River, Cobequid Bay and Economy River.

The other fisheries were minor ones. Many gaspereau were obtained in weirs but there does not seem to have been any demand for this fish although it was abundant.

Some of the weirs in Minas Channel obtained fat, spawning herring and this was apparently an important fishery in a localized area. It was stated that "they deposit such quantities of spawn that it can be shovelled up upon the beach".

There was fishing for cod in Minas Channel on the north

shore, at Parrsboro on up as far as Cobequid Bay and at the mouth of the Avon. This fishery was a primitive one. Poles were driven into the flats at low tide and baited hooks attached. On the following low tide the fish were collected.

Good pollock and some haddock fishing is reported on the north shore of Minas Channel as far as Cape Sharp. Some halibut were obtained in the same locality and large quantities of flounders were said to have been smoked at West Bay, just east of Cape Sharp.

In addition "tons of eels", many smelt and some large sturgeon were taken to the south of Cape Blomidon.

Some bass were obtained farther up the basin but even in 1850 this fishery had become an unimportant one owing to the small quantities available.

The methods of fishing described by Perley are being employed today with scarcely any change. Owing to the decline of the shad and salmon, however, there has been a very great reduction in the number of weirs and drift-net boats and it is doubtful if stake-nets have been set except in a few instances where herring nets were set in this manner on the south shore opposite Isle Haute. Cod, with the exception of those taken in the weirs, are still fished for by means of lines set out on the flats attached to stakes. The cod and herring do not seem to have been included in the decline which occurred in most of the other fisheries.

Previous Collections made in this Region.

In the past Minas Basin has been neglected as far as marine biological work is concerned. None of the zoologists who have furnished reports on the southwestern part of the bay of Fundy

appear to have made collections in the upper portion. Kindle (1916, 1917) published reports on certain collections, mainly intertidal, which he and Whittaker made at Kingsport, near "Prince" station 196, and at Cheverie Point on the eastern side of the mouth of the Avon River. This material was obtained with a view to ascertaining the influence of bottom environment on the distribution of organisms. One species of sponge, one of annelids, five of bryozoa, twenty-five of molluscs and four of crustacea are reported by Kindle (1917). Whiteaves (1901) mentions only six species from Minas Basin, two sponges and four molluscs. He reports Chalina oculata (Pallas) and Desmacidon palmata (Johnston) from Five Islands, which is about midway between Parrsboro and Economy Point. The name of C. W. Willimott and the date 1892 are associated with these records which are also given by Lambe (1896). The molluscs reported are Modiolus demissus (Dillwyn), Crepidula fornicata (L), Astarte undata Gould and Astarte castanea (Say); the locality given for the first three is "Minas Basin" and for the last "Indian Springs, east side of Cape Blomidon, Minas Basin". These species were apparently collected by G. T. Kennedy in 1875.

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of the University of Toronto for much help and advice, as well as for the identification of the Ascidians and chaetognaths.

Owing to the wide field covered by the material collected it became necessary to send much of it to specialists for identification.

The Pelecypoda, Gastropoda, Amphineura and Brachiopoda were determined by Dr. W. H. Dall of the United States National Museum, the nudibranchs by Professor C. H. O'Donoghue of the University of Manitoba, the Amphipoda by Mr. C. R. Shoemaker of the United States National Museum, the parasitic Copepoda by Dr. C. B. Wilson of the Massachusetts State Normal School, the Annelida by Professor A. L. Treadwell, Vassar College, the Echinodermata by Mr. A. H. Clark of the United States National Museum, the Bryozoa by Professor R. C. Osburn, Ohio State University, the nematodes by Dr. T. B. Magath, Mayo Clinic, the hydroids by Professor C. M. Fraser of the University of British Columbia, the medusae by Dr. H. B. Bigelow of the Museum of Comparative Zoology at Harvard, the algae by Professor A. B. Klugh, Queen's University, and the diatoms by Professor L. W. Bailey, Fredericton, N.B. In addition some assistance relative to the Pycnogonida was obtained from Professor L. J. Cole, University of Wisconsin. Professor A. Vachon furnished the salinity determinations in connection with the hydrographic work. To each of these investigators the writer is indebted for their kindly interest and assistance.

(Calman - Cumacea and Pycnogonida).

List of Species Obtained in Minas Channel,
Minas Basin and Cobequid Bay.

PISCES

Squalus acanthias L. Dogfish.

Several specimens from 58 to 104 centimetres long were obtained at "Prince" station 191 in Scotsman Bay on a trawl. Ova were found in two of the largest specimens. Occasionally they are taken in the weirs at Scotsman Bay. On examination ova and embryos up to 22 centimetres in length were found in several females so obtained.

Raja erinacea Mitchill. Tobacco Box Skate.

Quite abundant throughout the region. Taken at Bass River, Scotsman Bay, "Prince" stations 191, 192 and 196. One specimen was obtained on a long line near Cape Sharp. They were largely between 50 and 75 centimetres in length although at "Prince" station 192 all lengths between 11½ and 50 centimetres were obtained. Similar small specimens were obtained at station 196. One of these skates 21 centimetres in length was obtained at Bass River. Small specimens from 25 centimetres up were frequently obtained in the weir at Scotsman Bay, along with the larger ones and at Bass River a 21-centimetre individual was taken.

Raja diaphanes Mitchill. Spotted Skate (Big skate)

Specimens from 52 to 67 centimetres in length were obtained at Bass River and at "Prince" station 192. Only a single specimen, 46 centimetres long was seen in the Scotsman Bay weir.

Raja stabuliformis Garman. Barn Door Skate.

Only a few specimens have been taken, one at Bass River and one each at "Prince" stations 191 and 195 and several in the weir at Scotsman Bay. The length varied from 115 centimetres to 146.

One other elasmobranch was reported by the fishermen but was never seen by the writer. This was the thresher shark Vulpecula marina Valmont which was stated to have been captured in weirs at Scotsman Bay and near Parrsboro.

Acipenser sturio L. Sturgeon.

Two specimens, about 170 centimetres long, presumably of this species, were observed at Scotsman Bay. One, 133 centimetres in length, was taken at Bass River. ✓

Anguilla chrysypa Rafinesque. Eel.

This species was abundant in the weir at Bass River, especially on the night tides. Specimens from 9 to 70 centimetres in length were obtained. In one or two cases small ones were found under stones in very small pools, left by the receding tide. They were abundant at high tide in the "marsh creeks" to the east of Bass River. Since these streams are almost dry except at high tide the eels must come in from the deeper water. Occasional specimens from 103-110 centimetres in length were taken in the weir at Scotsman Bay.

Clupea harengus L. Herring.

This was a very abundant species at Scotsman Bay. If the length frequency curve (figure) be examined it will be seen that the specimens fall into at least three groups; the first from 7 to 9 centimetres in length, which owing to the method of

capture in the weir is a very small one; the second a group with the mode at 19 centimetres; the third with the mode at 27 centimetres; and a possible fourth group at 33 centimetres. While it is hazardous to attempt to define the age of these groups without studying the scales, it is evident, as will appear later, that the 7 to 9 centimetre group is at least a year old and it seems probable that the other groups represent two, three- and four-year-old fish. (A similar group in 1922, 13-35 cm.)

At Bass River the larger groups were not represented. The specimens ranged from 5 to 9 centimetres in length with the maximum at 8 centimetres. The curve of these fish is shown in figure .

The area under consideration is a successful spawning ground for the herring. Larvae were obtained at Bass River and at stations 191, 193, 195 and 196. All these larvae were taken early in September of the years 1920 and 1921. While a few larvae were obtained in the Scotsman Bay stations they were much more abundant in the Minas Basin stations. Over 400 were obtained in a young fish trawl at both station 195 and 196 as compared with two and six with the same apparatus at stations 193 and 191. It would seem therefore that the sandy shores to the southeast of Cape Blomidon are favourable spawning grounds. The larvae obtained in Minas Basin ranged from 4½ to 22 millimetres in length. The length frequency of those from station 196 is shown in figure . Specimens from 3½ to 44 millimetres in length were obtained at stations 191 and 193. At Bass River the larvae were evidently abundant as a plankton net took 14 in one hour. These were from 5 to 8 millimetres in length.

Pomolobus pseudoharengus Wilson Alewite, gaspereau.

Occurs at Bass River and Scotsman Bay. A single smaller specimen, 88 millimetres, was obtained at station 193. Specimens from 12 to 17 centimetres long were obtained at Bass River, while those taken in the weir at Scotsman Bay were from 12 to 29 centimetres long. P. pseudoharengus runs up the Shubenacadie River as far as the lake in May and June for the purposes of spawning. It is also said to enter the Avon and many of the small rivers flowing into Minas Basin.

Pomolobus aestivalis.

Specimens which were referred to this species were frequently obtained in the weir at Scotsman Bay. The range of lengths observed was from 13 to 27 centimetres. The writer entertains considerable doubt as to whether this species is distinct from P. pseudoharengus. There is no appreciable difference in point of length frequency of the samples obtained in 1922 as shown by the table.

Length cm.	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
P. pseudoharengus	1	5	1	0	1	1	1	0	2	15	22	26	15	8	1	7	3	2
P. aestivalis		1							2	7	11	9	4	5	2	2		

Similarly a study of the number of rays in the dorsal fin, the number of p.v.s. (posterior ventral scutes) and the number of vertebrae revealed no differences. The only distinction was in the colour of the peritoneum (pale in p.p. and back in p.a.) and many specimens were obtained where this was intermediate in character and the matter could not be referred to one or the other species with any degree of certainty. Without studying mature material, however, nothing more can be said except that

the question should have further study.

Alosa sapidissima Wilson Shad.

This species was obtained at Scotsman Bay and Bass River in weirs. Specimens from 17 to 60 centimetres were taken. They occur in greatest abundance in August at Scotsman Bay, appearing somewhat earlier at Bass River. They ascend the Shubenacadie River late in May and early in June to spawn.

Salmo salar L. Atlantic Salmon.

Taken at Bass River and Scotsman Bay in weirs and also in drift nets in midbay between Maitland and Economy Point. The specimens recorded were from 50 to 86 centimetres in length, the latter weighing $15\frac{1}{2}$ pounds. In August they ascend the Shubenacadie and other rivers to spawn. Young salmon have been obtained at Elmsdale on the Shubenacadie (See fresh water portion of this paper).

X Osmerus mordax (Mitchill) Smelt.

Obtained at Bass River, Scotsman Bay and stations 193, 195 and 196.

Enough specimens have not been taken to give a reliable length frequency curve but two groups stand out among the Bass River specimens. These are groups of from 3 to 7 centimetres and from 7 to 12 centimetres with the modes at 5 and 9 centimetres. Other specimens up to 31 centimetres in length were obtained. Those taken at Scotsman Bay were from 18 to 27 centimetres long. Those obtained at stations 193, 195 and 196 were from 28 to 58 millimetres in length. The smelt enter the Shubenacadie River, the young having been taken at Shubenacadie. (See fresh water portion of paper.) Doubtless they enter the other rivers of the region. The stomach of one specimen at Bass River

was found to contain one teleost (undeterminable) and one Pagurus longicarpus.

Fundulus heteroclitus (L). Killifish.

Two specimens each 9 centimetres in length were obtained at Bass River. It has been obtained at Shubenacadie on the Shubenacadie River in tidal, but fresh water, pools as well as farther down the river.

Syngnathus fuscus Storer. Pipe-Fish.

Three specimens from 16 to 18 centimetres in length have been obtained at Bass River. In each case the brood pouch was filled with partly developed ova. One free larva, 18 millimetres long, was obtained in a tow.

Menidia notata Mitchill Sand Smelt

Very abundant at Bass River. Most of the specimens belong to a group of from 5 to 9 centimetres in length, with the mode at 7 centimetres. A few specimens up to 13 centimetres were obtained. A single member of this species, 9 centimetres long, was taken at Blomidon. Young specimens were obtained at Shubenacadie. (See fresh water part of report).

Ammodytes americanus DeKay Sand Launce.

Two specimens, 11 and 12 centimetres in length, were taken at Bass River.

Scomber scombrus L. Mackerel.

This species is a somewhat irregular visitor at Scotsman Bay. During July, 1920, a run of large mackerel was said to have entered Scotsman Bay. During August an occasional large specimen, about 40 centimetres long, was seen but smaller fish

were present in large quantities. As many as four cart-loads were removed from the weir on a single tide. These specimens ranged from 23 to 33 centimetres in length with the mode at 27 centimetres.

Poronotus triancanthus (Peck). Dollar Fish

This species was quite abundant at Bass River and frequently seen at Scotsman Bay. Also taken in drift-nets in midbay between Maitland and Economy Point. Nearly all specimens were small as compared with the adult length of 10^{25cm} inches as given by Jordan. The length frequency curve (fig.) for the Bass River specimens shows that all fall into one group ranging from 7 to 13 centimetres in length with the mode at 10 centimetres. The curve is unsymmetrical which indicates either a higher death rate in the individuals over 10 centimetres long or a migration of the larger specimens. The latter explanation seems more reasonable since Huntsman (1922) reports spawning individuals in St. Mary Bay. Those taken at Scotsman Bay were similar in size to the Bass River specimens with an occasional large specimen. One such individual was 27 centimetres long.

Roccus lineatus (Block). Striped Bass.

Taken at Bass River only, where small specimens were very abundant. Large numbers were obtained of a group whose length ranged from 5 to 11 centimetres, with the mode at 8 centimetres. Another but very small group, from 17 to 26 centimetres long was taken and in addition an occasional adult up to 48 centimetres long was obtained. This species spawns in the Shubenacadie and probably in other rivers of the region. Large numbers of very small specimens have been taken at Shubenacadie (See fresh water portion of report.). The food of Bass River specimens, about

20 centimetres long, was found to consist of Crago septemspinosus and small teleosts which were too badly comminuted to be determined. Myoxocephalus aeneus Mitchill. Grubby.

Only a few specimens were obtained at stations 195 and 196 in Minas Basin. They were from 3 to 10 centimetres in length. One specimen, 5.5 centimetres, was found in a rock pool at Scotsman Bay.

Myoxocephalus octodecimspinosus (Mitchill). Long Spined Sculpin.

Four individuals were taken at station 192. They were from 5½ to 22 centimetres in length. One specimen, 37 centimetres long, was taken in the weir at Scotsman Bay.

Hemitripterus americanus (Gmelin). Sea Raven.

Specimens, from 23 to 58 centimetres in length, were frequently obtained in the weirs at Scotsman Bay. Young specimens between 4 and 5 centimetres in length were taken at Stations 192 and 195. It was not obtained at Bass River.

Cyclopterus lumpus L.

A single specimen, 10 centimetres long, was obtained in a weir at Scotsman Bay.

Pholis gunnellus (L). Butterfish.

Not seen in Scotsman Bay but a few specimens, between 10 and 18 centimetres long were found under stones in the intertidal zone near Cape Blomidon. A single specimen was obtained at "Prince" station 195. Similarly-sized specimens were found in the intertidal zone on the north side of Cape Split.

Zoarces anguillaris (Peck). Muttonfish or Eel Pout.

Taken in weirs at Scotsman Bay, most of the specimens being about 50 centimetres long. Younger individuals, 12 centimetres and upwards in length, were obtained at stations 191, 192 and 195.

Merluccius bilinearis (Mitchill). Silver Hake.

Specimens from 15 to 20 centimetres in length were occasionally taken at Bass River during August and early September. At Scotsman Bay during August only a single specimen, 13 centimetres in length, was seen but commencing about September 1 schools of larger fish, from 23 to 51 centimetres in length, were abundant - as many as a cart-load being obtained in one weir at a single tide.

Pollachius virens (L).

This species was obtained only at Scotsman Bay and even there it is not always found to occur. It was absent in 1920 but present in 1922. Several small specimens from 9 to 28 centimetres were seen and an occasional larger one about 70 centimetres long was obtained.

Microgadus tomcod (Walbaum). Tomcod.

This species is extremely abundant at Bass River where on one occasion over three thousand were obtained in a single seine haul in the weir. Most of the specimens fall into one group which ranged from 5 to 12 centimetres in length, with the mode between 7 and 8 centimetres. The largest individuals obtained were 33 centimetres in length. The length frequency curve is shown as figure . Also taken, though less numerous, at Scotsman Bay, Blomidon and stations 195 and 196 in lengths ranging from 6.3 to 30 centimetres. Some notes were made on the food of the larger specimens as they occur at Bass River. It consisted largely of amphipods together with Nereis virens, Pagurus longicarpus, Crago septemspinus and in one case a specimen of Roccus lineatus. The tomcod was represented by

small specimens at Shubenacadie on the Shubenacadie River (See fresh water portion of report.). At Scotsman Bay amphipods were the chief food of the few specimens examined, with an addition in one case of a small smelt.

Gadus callarias L. Cod.

Only six specimens have been seen by the writer. Five between 41 and 98 centimetres in length, were taken in a weir at Scotsman Bay and one, 7 centimetres long, was obtained at station 196. Said to be abundant enough to make profitable fishing at Bass River in the spring and fall.

Urophycis tenuis (Mitchill) and Urophycis chuss (Walbaum) Hake.

Young hake were quite abundant at Bass River where large numbers were captured in the weir. Most of the specimens were between 5 and 30 centimetres in length although a few large individuals up to 77 centimetres in length were taken. At Scotsman Bay they were also abundant and the range in size was similar. A line trawl at station 191 caught many of these species in a short period. In addition they were obtained at stations 192, 193, 195 and 196. The largest specimen seen in the region, 84 centimetres long, was taken at Scotsman Bay.

A few half-grown specimens, on an examination of the stomach contents, revealed that their food consisted of small Microgadus tomcod and Scomber scombrus, Cancer irroratus and Crago septemspinosus.

Pseudopleuronectes americanus (Walbaum). Winter Flounder.

Obtained at Bass River, Scotsman Bay and Blomidon and at stations 191, 192, 193, 195 and 196. At Scotsman Bay it is less frequently taken than the following species. All lengths

from 4 to 43 centimetres were observed, except at Bass River where none exceeded 27 centimetres. Larvae, 4 and 5 millimetres in length were taken at Bass River and at stations 191 and 195, showing the region to be a successful breeding place for this species. The food of several specimens from Bass River consisted entirely of Amphipods. At Scotsman Bay amphipods, isopods, Nereis and Ulva lactuca were among the food constituents.

Liopsetta putnami (Gill). Smooth Flounder.

Two specimens, 13 and 16 centimetres in length, were taken at Scotsman Bay. At Bass River it is the most abundant of the flounders, individuals of all lengths from 7 to 30 centimetres having been obtained. Small ones from 7 to 9 centimetres in length were quite abundant on the sandy bottom of the weir. A study of the food of a considerable number of the larger specimens showed that the amphipods (species) and molluscs were the principal constituents. The molluscs were too much broken to be identified.

Loph^psetta maculata (Mitchill). Sand Flounder.

Quite common on the sandy bottom at both Bass River and Scotsman Bay. At Bass River the size ranged from 5 to 40 centimetres in length, and at Scotsman Bay the range was from 14 to 43 centimetres. Several larvae of this species from 2 to 6 millimetres in length were obtained at stations 195 and 196. Apparently the region constitutes a suitable environment both for breeding and growth of this species, as Professor Huntsman informs me that it attains a much greater size there than elsewhere in the Bay of Fundy.

At Bass River a study of the food of the larger specimens

was made. Correlated with the larger size of the mouth it was found that the sand flounder lived on a different kind of food from that of the two preceding species of flounders. In most cases the food consisted of Crago septemspinosus and Microgadus tomcod, the latter usually being from 7 to 10 centimetres in length. They are voracious eaters and in one case twenty specimens of Crago were found while in other specimens two or three specimens of Crago had been eaten along with four or five tomcod. Other animals found in the sand flounder's stomach were Roccus lineatus and Michtheimysis stenolepis.

At Scotsman Bay a similar study was made and it was found that in the food of the larger specimens (about 28 centimetres and longer) the following organisms occurred, being given in order of importance, Crago septemspinosus, Osmerus mordax, Urophycis tenuis chuss, Pollachius virens, Clupea harengus. The smaller specimens were found to live almost entirely on mysids.

Lophius piscatorius L. Angler.

This species was seen frequently in the weirs at Scotsman Bay and one specimen was obtained at station 191. The lengths ranged from 68 to 102 centimetres.

TUNICATA

Molgula Citrina Ald. & Han.

Two specimens were collected at station 196.

Boltenia ovifera (L).

Taken at stations 190, 191, 192, 194, 195 and 196. The largest specimens (20 centimetres total length, 5 centimetres body length) and the greatest quantity were obtained from station 194.

Boltenia echinata hirsuta (Ag.).

Two specimens were obtained at station 191.

Amaroucium glabrum Verrill.

Many large colonies of this species were obtained at station 195. It was also obtained at station 196 but the colonies were much smaller.

Tunicates are almost if not entirely lacking on the rocks down as far as the lowest tides at Scotsman Bay and Bass River where a search was made for them.

MOLLUSCA

Pelecypoda

Anomia sp.

Obtained occasionally in the intertidal zone at Scotsman Bay and at stations 190, 191 and 195.

Pecten magellanicus (Gmelin). Scallop.

Two specimens obtained, one at station 191 and one at station 192. Reported by Kindle $1\frac{1}{2}$ miles NE of Kingsport.

Mytilus edulis (L.) Common Edible Mussel.

Sparsely distributed in the intertidal zone at Bass River and Scotsman Bay. A few were obtained at station 190. Most of in length, but some up to $5\frac{1}{2}$ centimetres the specimens were small - from 2 to 3 centimetres were seen at Scotsman Bay. A number of small specimens were dredged at station 190. Kindle found it near Kingsport and Cheverie Point.

Modiolus modiolus (L.) Horse Mussel.

This seems to be the most abundant species of bivalve in the deeper water of Minas Basin and Channel. It was obtained at stations 190, 191, 192, 193, 194, 195 and 196. All sizes from larval shells to adults, $8\frac{1}{2}$ centimetres long, were taken.

Modiolaria nigra (Gray).

A single juvenile individual was obtained at Cape Blomidon just below the low-tide mark. Obtained at Kingsport by Kindle.

Modiolaria corrugata (Stimpson).

This species was obtained at station 190, 191, 194 and 195 being most abundant at the first and last stations.

Modiolaria laevigata (Gray).

The most common species of this genus. Taken at stations 191, 194, 195 and 196. Most abundant at the last two stations named. Reported by Kindle at Cheverie Point.

Larval shells of the genus Modiolaria were obtained at stations 191 and 195.

Nucula sp.

Larval shells were taken at stations 191, 193 and 195. The adults were not found.

Astarte undata Gould.

One specimen found in the intertidal zone at Scotsman Bay. Also obtained at stations 191, 192 and 195. Reported by Kindle from Cheverie Point.

Astarte subequilatera Sowerby.

One live and one dead specimen were taken at station 194.

Cyprina islandica (L).

Obtained two specimens and two half shells at station 192.

Petricola pholadiformis Lamarck.

Abundant at Bass River near the low-tide mark where it bores into the soft sand stone bottom. Kindle found it at Kingsport and Cheverie Point.

Macoma sp.

Larval shells were obtained at stations 191 and 193. No adult forms were found in Minas Basin but a dead shell, evidently carried up by the tide was ^{far} found up the Shubenacadie River. (See fresh water part of report.)

Solen sp.

Larval shells were taken at station 193.

Lyonsia hyalina (Conrad).

Over thirty specimens were obtained at station 195.

Mya arenaria L. Clam.

Common in the intertidal zone near the half-tide level at Bass River and Scotsman Bay, where it occurs buried in the sand. Kindle reported it from Kingsport and Cheverie Point.

Saxicava arctica (L).

Two juvenile specimens were dredged at station 190.

In addition to this list Kindle (1917) reports the following species of Pelecypoda.

Anomia simplex Orb. Mouth of Avon River, opposite Cheverie Point.

Astarte crenata Gray. Mouth of Avon River, opposite Cheverie Point, $1\frac{1}{2}$ miles NE of Kingsport.

Callocardia morrhuana (Linsley), from $1\frac{1}{2}$ miles NE of Kingsport to shore.

Clidiophora gouldiana Dall, $1\frac{1}{2}$ miles NE of Kingsport.

Ensis americana (Gld.), (Solen) Kingsport, near low tide.

Macoma balthica (L). Kingsport and opposite Cheverie Point.

Mactra solidissima (Dillwyn), Kingsport.

Venericardia borealis (Conrad), from $1\frac{1}{2}$ miles NE of Kingsport to shore.

Whiteaves (1901) reports Astarte castanea (Say) as occurring near Cape Blomidon and Modiolus demissus (Dillwyn) from "Minas Basin".

Amphineura

Chiton ruber L.

One specimen was obtained in the intertidal zone at Scotsman Bay.

Chiton albus L.

Three examples of this species were dredged at station 190.

Gastropoda

Cylichna alba (Brown).

Occurs at stations 191 and 193.

Buccinum undatum L.

Seen occasionally in the lower part of the intertidal zone at Bass River and Scotsman Bay, also at Blomidon just below the low-tide mark. Specimens were obtained at stations 190, 191, 192, 194, 195 and 196, large numbers being taken at stations 191 and 195. Larval shells, which doubtless belong to this species, were taken at station 191. Found at Cheverie Point by Kindle.

Chrysodomus decemcostatus (Say).

A single individual was obtained on the intertidal zone at Scotsman Bay. An egg case belonging to this genus and probably to this species was taken at station 192.

Tritia trivittata (Say).

Taken in the intertidal zone at Scotsman Bay, Tennycape and Bass River, as well as at stations 192, 193, 194, 195 and 196. Larval specimens were obtained at station 191. A very abundant species. Reported at Cheverie Point by Kindle.

Ilyanassa obsoleta (Say).

Much less abundant than the preceding species. Taken in the intertidal zone at Bass River and at stations 192 and 195. As in the preceding species many of the shells were dead and had been moved about by the hermit crabs inhabiting them. Reported at Kingsport and Cheverie Point by Kindle.

Urosalpinx cinereus (Say).

Found frequently in the intertidal zone at Bass River and Tennycape. Kindle reported it from Cheverie Point.

Purpura lapillus L.

Obtained in the intertidal zone at Scotsman Bay, Blomidon and Tennycape, also at stations 195 and 196. Most of the specimens are unfluted but in some cases minute flutings are appearing. Apparently the typical form, although present at Tennycape, is absent at Bass River where it is replaced by the following variety. Reported from Cheverie Point by Kindle.

Purpura lapillus variety imbricata Stearns.

This variety with the fluted character well marked was found at Bass River only. It occurred there in the intertidal zone in considerable numbers.

Littorina rudis (Donovan).

A few specimens obtained at Scotsman Bay and Bass River in the intertidal zone.

Littorina palliata (Say).

A single shell inhabited by Pagurus longicarpus was taken in the intertidal zone at Tennycape. Kindle found it at Kingsport.

Littorina litorea (L).

Obtained in the intertidal zone at Scotsman Bay, Bass River

and Tennycape, also at station 195. All the specimens were quite small and not abundant. Reported at Kingsport and Cheverie Point by Kindle.

Larval shells belonging to the genus Littorina were obtained at station 193.

Lacuna sp.

Larval specimens were obtained at Bass River in a tow and at station 191.

Cingula sp.

Four juvenile shells were taken in a tow at Bass River.

Crucibulum striatum (Say).

A few individuals of this species were obtained at stations 191, 194 and 195.

Crepidula fornicata (L).

Three specimens were obtained at station 195. Kindle obtained it at Kingsport and Cheverie Point.

Crepidula plana (Say).

Much more abundant than the preceding species. Taken at Bass River, Tennycape and stations 192, 195 and 196. It was very largely found in shells of Euspira in which the hermit crabs, Pagurus longicarpus was also living. Reported from Cheverie Point by Kindle.

Euspira heros (Say).

Obtained frequently in the intertidal zone at Scotsman Bay, Bass River and Tennycape. It was also dredged at station 194. Kindle reported it from Kingsport and Cheverie Point.

Euspira triseriata Say.

More abundant than E. heros. Taken in the intertidal zone

at Bass River and Scotsman Bay. Also obtained from stations 192, 195 and 196. Station 195 furnished large specimens in which the colour markings were very faint.

Velutina laevigata (L). Following Gould's synonym, Whiteaves gives (Pennant).

One specimen was taken at station 194 and one at station 195.

Acmaea testudinalis (L).

Common on rocks in the intertidal zone at Bass River, Tenny-
cape and Scotsman Bay.

Margarites sp.

Larval and juvenile shells were obtained at Bass River and
at station 191.

Cephalopoda

Loligo pealii Lesueur. Long-finned Squid.

This was the only squid obtained in the region and was
taken frequently in the weirs at Scotsman Bay and Bass River.
Specimens from 13 to 32 centimetres in length were seen, the
measurement being made from the eyes to the tip of the body.
Masses of the ova were found stranded on the intertidal region
at both Scotsman Bay and Bass River. Larvae from 2 to 4 milli-
metres in length were taken at Bass River in a tow and at
station 195.

CRUSTACEA

Copepoda (Parasitic)

Argulus alosae Gould.

Many large heavily-pigmented specimens obtained at Bass
River where it is abundant as a parasite of Microgadus tomcod.
It has been obtained far up the Shubenacadie River near the
head of the tide. (See fresh water portion of report.) A single

free-swimming individual was taken in a tow at Bass River.

Caligus rapax Milne Edwards.

One free-swimming specimen taken at station 191. Another specimen was obtained from the stomach of Alosa sapidissima caught in the weir at Scotsman Bay.

Lepeophtheirus salmonis (Kroyer).

Obtained frequently at Bass River as a parasite adhering to salmon close to the adipose fin.

Cirripedia

Balanus crenatus Bruguiere.

Taken in the intertidal zone at Bass River and Scotsman Bay attached to various molluscan shells and to a sponge. Also obtained from stations 190, 191, 192, 195 and 196, where they are attached to molluscs, brachiopods and rocks. At station 196 a number of the tall columnar variety were found.

Balanus balanoides (Linnaeus).

This species, unlike the preceding, was taken in the intertidal zone only and occurred at Bass River, Tennycape, Amethyst Cove and Scotsman Bay. They were attached to rocks and to Mytilus edulis. The specimens taken at Scotsman Bay in 1920 were quite stout and thick walled, having the parietes with square tubes and narrow septae. The tergum has a long spur. (Those in 1922 were not.)

They were of the form which Darwin called "variety a", and figured by Pilsbry (1916) in Plates 45, fig. 1a-1c.

Barnacle casts belonging to this species were taken in the tows.

Cumacea

Eudorella truncatula (Bate).

Specimens were obtained at stations 191, 193, 195 and 196. Only a few were taken at stations 195 and 196, namely three and twenty-three, in a towing of the young fish trawl. At station 191 a similar tow yielded about 350 and at station 193 it was estimated that 1300 were taken. Females formed a very high percentage, over 90% of the mature specimens. (Calman considers E. pusilla to be included in E. truncatula.)

Ekdiastylis sculptus (G. O. Sars).

Taken at the same stations as the preceding and in the same relative numbers but this species is more abundant. The numbers obtained in a tow with the young fish trawl are given in the table.

<u>Station</u>	<u>No. of specimens</u>
191	Ca. 1400
193	Ca. 4000
195	14
196	79

Probably less than 1% of the specimens were males.

At stations 194 and 196 specimens of Ekdiastylis, too young to be determined specifically, were obtained. It seems probable that they belong in with this species.

Lamprops quadriplicata Smith

Five female specimens were taken at station 195.

Leucon sp?

One male specimen taken at the surface at station 190.

Mysidacea

Michtheimysis stenolepis (Smith).

This species was found in tide pools in the intertidal zone

at Scotsman Bay. It was also obtained at stations 193, 195 and 196. The specimens, none of which bore ova or larvae, were from 15 to 25 millimetres in length.

Neomysis americana (Smith).

Taken at stations 190, 191, 193, 195 and 196. It was more abundant than the preceding species and all sizes from 2 to 10 millimetres in length were obtained. A few of the mature females bore ova or larvae.

Isopoda

Chiridotea caeca (Say).

A single specimen 11 millimetres in length was obtained on rocks near the high-tide mark at Bass River. Quite abundant in sandy parts of the intertidal zone at Scotsman Bay where they burrow just below the surface when the tide leaves them.

Chiridotea tuftsii (Stimpson).

One specimen, 3 millimetres long, was obtained at station 196.

Idothea baltica (Pallas).

Taken frequently in the intertidal zone at Bass River and Scotsman Bay. The length varied from 10 to 22 millimetres. In the case of several females the brood pouch was full of larvae.

Idothea phosphorea Harger.

Common in the intertidal zone at Bass River and Scotsman Bay. Also taken at station 196. The lengths were from 11 to 19 millimetres and several females bore ova. At station 191 smaller specimens from 2 to $7\frac{1}{2}$ millimetres long were obtained.

Edotea triloba (Say).

This specific name is used in the sense in which Wallace

(1919) used it as including E. montosa Stimpson. The species was quite numerous being obtained at stations 191, 193, 195 and 196. The specimens were from $1\frac{1}{2}$ to 7 millimetres in length. Two male (?) specimens, 4 millimetres in length, taken at stations 191 and 193 had a peculiar modification of the third and fourth thoracic segments. These are considerably narrower than the succeeding segments so that the thorax appears to be divided into two parts. This is but another variation in a very variable species. The specimen from station 193 is shown in figure .

Jaera marina (Fabricius).

Three specimens were obtained at Bass River and one at Scotsman Bay in the intertidal zone. They were from 3 to 4 millimetres long and one female bore ova. Several specimens of a similar size were found on rocks near low-water mark at Amethyst Cove. A single specimen was taken in a rock pool in Scotsman Bay.

Amphipods Scotsman Bay Shad.

Photis reinhardi Kroyer

Ischyrocerus anguipes Kroyer

Gammarus locusta (Linn.)

Gammarus annulatus (Smith)

Orchomenella minuta (Kroyer)

Pontogoneia inermis (Kroyer)

Decapoda

Crago septemspinosus (Say).

This was the only shrimp taken in the region under consideration. It was very abundant on the mud flats at Scotsman Bay and Bass River. It was obtained in large numbers

at stations 191, 192, 193, 195 and 196. Also taken in the dredge at station 190 and in the seine at Cape Blomidon. All sizes from 6 to 60 millimetres in length were represented and several females were found bearing ova.

Homarus americanus Milne Edwards. Lobster.

Taken occasionally in the weir at Scotsman Bay. The specimens measured were from 30 to 40 centimetres long. Females bearing ova were obtained. One individual was obtained at station 191.

Spirontocaris pusiola.

One specimen, approximately 13 millimetres long was obtained in Scotsman Bay in a rock pool at the edge of a very low tide. It was a female and bore ova.

Pagurus acadianus Benedict.

It was obtained at the deeper stations in Minas Channel and Minas Basin. Five specimens were taken at station 195, 36 at 192 and 1 at 191. None were obtained at the two deepest stations 190 and 194. Most of the specimens were small but a few large ones were obtained in which the length of the right cheliped was as great as 7 centimetres.

The shells inhabited by this species are as follows:

Euspira heros, Euspira triseriata, Buccinum undatum, Purpura lapillus, Littorina litorea, Tritia trivittata.

Only when the tides are extremely low is this species found in the intertidal zone. Several specimens have been found in this location on the rocky north shore of Scotsman Bay.

Pagurus longicarpus Say.

Found in the intertidal zone and at the shallow-water stations. Abundant at Scotsman Bay and at stations 195 and 196. Also obtained on the shore at Blomidon. Extremely abundant at Bass River and Tennycape. At station 195 it was associated with the preceding species which it greatly outnumbered. Kindle reports it from $1\frac{1}{2}$ miles N.E. of Kingsport and from Cheverie Point. The shells inhabited by this species are:

Euspira heros, Euspira triseriata, Buccinum undatum, Urosalpinx cinereus, Tritia trivittata, Ilyanassa obsoleta, Purpura lapillus, Purpura lapillus var imbricata, Chrysodomus decemcostatus, Littorina litorea, Littorina palliata.

Hyas coarctatus Leach.

Two specimens about 3 centimetres in length were taken at station 195. Kindle found it off Cheverie Point. One specimen, 12 millimetres in length, was taken in a rock pool at low-water mark in Scotsman Bay.

Cancer irroratus Say Rock Crab.

Taken in rock pools in the intertidal zone at Scotsman Bay and also at stations 191 and 196. The carapace length of the specimens was from 1 to 5 centimetres. Reported from $1\frac{1}{2}$ miles N.E. of Kingsport and from Cheverie Point by Kindle.

Ovalipes ocellatus Herbst Lady Crab.

Found frequently on the intertidal flats at Bass River, where they were found digging themselves into the sand by means of their peculiar fifth pereopods when left behind in shallow pools by the tide. Specimens with a carapace length of 8 centimetres were obtained. Two small specimens, carapace lengths 26 and 32 millimetres, were obtained on the flats at Scotsman

Bay in 1922. It was not observed there in 1920. Previously, to the writer's knowledge, this species has never been reported north of Provincetown on Cape Cod.

One species of decapod has been reported from this region which was not obtained in the present investigation. This is Libinia emarginata Leach which was obtained off Cheverie Point by Kindle. Another specimen from Windsor was formerly in the collections of the Victoria Memorial Museum at Ottawa.

ARACHNIDA

Pycnogonida

Nymphon rubrum Hodge.

Several specimens were obtained at stations 193, 195 and 196.

Phoxichilidium femoratum (Rathke).

Several individuals were taken at stations 191 and 195.

Pycnogonum littorale (Ström).

Three specimens were dredged at station 190 and a single specimen was taken in the intertidal zone at Bass River.

ANNULATA

Polychaeta

Autolytus sp.

One specimen in the Polybostrichous stage was obtained in a tow at Bass River. One specimen was taken in a tow at Scotsman Bay.

Phyllodoce gracilis Verrill.

Taken at station 195. A tubful.

Eulalia gracilis Verrill.

Obtained from station 195.

Harmothoë imbricata (Linn).

Specimens were taken in the intertidal zone at Scotsman Bay and at stations 195 and 196. Also taken at Amethyst Cove.

Lepidonotus squamatus (Linnaeus).

A single individual taken in the intertidal zone at Bass River. Several specimens taken at stations 190, 192 and 196. Abundant at station 195. Quite common in the more rocky part of the intertidal zone near the low-water line at Scotsman Bay.

Aricia ornata Verrill

One specimen was obtained among the rocks at the edge of a very low tide at Scotsman Bay.

Nereis pelagica L.

Obtained at stations 190, 194, 195 and 196. Also obtained near the low-water mark at Amethyst Cove.

Nereis virens Sars.

Specimens up to 9 centimetres in length were frequently obtained under the soft, mud-like rocks near the low-tide mark at Bass River. Specimens up to 18.5 centimetres long were taken under stones on the mud flats at Scotsman Bay.

Clymenella sp.

Fragments obtained at stations 191 and 193.

Nephtys sp.

Several specimens which Professor Treadwell found to closely resemble N. caeca Gir., and which may be the young of that species, were obtained in the mud flats at Scotsman Bay.

Brada sp.

Fragments taken at stations 191 and 193.

Trophonia sp.

Fragmentary specimens from stations 191 and 193.

Sternaspis fossor Stimpson.

Several specimens taken at station 191.

Amphitrite attenuata Moore (?)

One specimen, approximately centimetres long was taken at Scotsman Bay, on a rocky portion of the shore at low-tide line. Professor Treadwell in a letter writes as follows concerning this specimen.

ECHINODERMATA

Henricia sanguinolenta (O.F. Muller).

Occurred at stations 191, 192, 195 and 196. Specimens ranged in size up to $7\frac{1}{2}$ centimetres in diameter. Kindle reported it from $1\frac{1}{2}$ miles N.E. of Kingsport.

Asterias vulgaris (Packard).

One specimen 42 millimetres in diameter taken at station 190. Another specimen 4 millimetres in diameter from station 195 was doubtfully placed in this species. Recorded from $1\frac{1}{2}$ miles N.E. of Kingsport by Kindle.

Leptasterias littoralis (Stimpson).

One individual, 2 centimetres in diameter, was taken in the intertidal zone. This was the only echinoderm found above the low-tide level in the whole region.

This species was also obtained at stations 190, 191, 192, 194, 195 and 196. All sizes from 6 to 60 millimetres in diameter were obtained. This was the most common echinoderm taken in Minas Basin or Channel.

Ctenodiscus crispatus (Retzius).

One specimen of this species, 4 centimetres in length, is somewhat doubtfully included here as occurring at station 193. The specimen was a dead one and since it was obtained the first time the shrimp trawl was used in this region, it is possible that it was taken in the lower part of the Bay of Fundy and remained clinging to the net.

Amphipholis squamata (Delle Chiaje).

Several small specimens were taken at stations 191 and 195.

Strongylocentrotus drobachiensis (O. F. Muller).

A single small specimen, 17 millimetres in diameter was obtained at station 191.

Echinarachnius parma (Lamarck).

One specimen, 17 millimetres in diameter, from station 192.

MOLLUSCOIDEA

Brachiopoda

Terebratulina septentrionalis (Couthouy).

Juvenile and adult specimens abundant at station 191. Also obtained at stations 192 and 195.

NEMATODES

Contracaecum sp. (Probably new).

From the digestive tract of the Microgadus tomcod from Bass River.

Oncholaimus sp.

One specimen taken in a tow at station 193.

CHAETOGNATHS

Sagitta elegans Verrill.

Taken in tows at Bass River and at stations 191 and 195.

COELENTERATA

Hydroids

The species of hydroids obtained and their distribution are shown in the following table. Those listed under Scotsman Bay and Bass River were collected in the intertidal zone.

Species	Station 190	191	192	193	194	195	196	Scotsman Bay	Bass River
<u>Eudendrium tenue</u> A. Agassiz	+					+	+		
<u>Hydractinia echinata</u> (Fleming)								+	
<u>Acaulis primarius</u> (Stimpson)		+		+					
<u>Corymorpha pendula</u> Agassiz						+			
<u>Tubularia crocea</u> (Agassiz)						+			
<u>Tubularia spectabilis</u> (Agassiz)		+				+			
<u>Campanularia verticillata</u> (Linn.)					+		+		
<u>Gonothyraea loveni</u> (Allman)							+		
<u>Obelia dichotoma</u> (Linn.)							+		
<u>Obelia geniculata</u>						+		+	+
<u>Calycella syringa</u> (Linn.)					+	+	+		
<u>Halecium beanii</u> (Johnston)					+	+	+		+
<u>Halecium halecinum</u> (Linn.)							+	+	
<u>Abietinaria abietina</u> (Linn.)							+		
<u>Diphasia fallax</u> (Johnston)	+		+		+	+	+		+
<u>Diphasia rosacea</u> (Linn.)						+	+		+
<u>Hydrallmania falcata</u> (Linn.)	+				+	+	+		+
<u>Sertularella rugosa</u> (Linn.)						+			
<u>Sertularella tricuspidata</u> (Alder)			+			+	+		+
<u>Thuiaria cupressina</u> (Linn.)					+	+	+		+
<u>Thuiaria similis</u> (Clark)							+		
<u>Antennularia americana</u> Nutting			+						
<u>Antennularia antennina</u> (Linn.)						+	+		

ALGAE

Cyanophyceae

Chroococcus refractus.

Found in the stomach of Alosa sapidissima at Scotsman Bay.

Chlorophyceae

Ulothrix sp.

Obtained at station 196.

Enteromorpha crinita (Roth)

From station 191. Enteromorpha sp. from station 196.

Monostroma fuscum

Taken at Bass River and at station 192.

Ulva lactuca rigida (Agardh.)

From Bass River, also stations 193 and 195.

Cladophora sp.

Obtained at station 193.

Rhizoclonium polymorphum.

Obtained at Bass River and at station 196.

Phaeophyceae

Ectocarpus confervoides (Roth) Le Jolis.

From the stomach of Alosa sapidissima from Scotsman Bay.

Ectocarpus littoralis Lyngbye?

From stomach of Alosa sapidissima obtained at Scotsman Bay.

Agarum turneri Post. & Rupr.

Obtained at station 192.

Laminaria sp.

Taken at Bass River.

Rhodophyceae

Callithamnion pylaisaei Mont.

From Bass River and station 196.

Polysiphonia urceolata (Lightfoot).

Taken at Scotsman Bay and stations 191 and 196.

Chondrus crispus (L).

Obtained at Scotsman Bay.

Rhodymenia palmata (L).

Cast up in quantities by the tide at Bass River. Common on the rocks at low tide to the west of Bass River.

Polyides rotundus (Gmelin).

From Scotsman Bay.

Corallina officinalis Linn.

Abundant from the half to low-tide level on rocks at Scotsman Bay, Bass River and Tennycape. Also obtained at stations 192 and 195.

DIATOMS

A sample of mud from weir stakes at Bass River contained the following species:

Melosira nummuloides Ktz.

Navicula smithii Ag.

Navicula sp.

Cyclotella Kutzingiana

Raphoneis ampiceros

Licmophora

Schizonema

MEDUSAE

Since the above report was written Dr. H. B. Bigelow has supplied the identifications for the medusae.

Podocoryne carnea.

Stations 195 and 196 and at Bass River.

Nemopsis bachei.

Taken at Bass River. According to Dr. Bigelow this species has not been reported north of Cape Cod formerly.