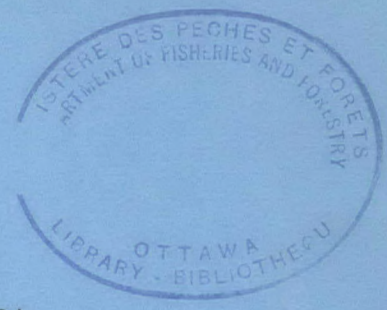


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FISHERIES RESEARCH BOARD OF CANADA
ANNUAL REPORT
OF
EASTERN ARCTIC FISHERIES INVESTIGATION
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DECEMBER, 1950.

EASTERN ARCTIC INVESTIGATIONS - REPORT FOR 1950

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"Arctic Sealer", 1950.

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Eastern Arctic Investigations. Report for 1950.

I. "Calanus" Expedition.

I.A. For all but one month of the 1950 season, the scientific work of the "Calanus" in the field was carried out by E. H. Grainger and John Lewis, with the former in charge. Emerson Reid was engineer, and W. E. Wilson was again in the party, in charge of technical operations. M. J. Dunbar flew up to Chimo in August and joined the ship for the last cruise of the season, and for the beaching of the vessel.

Introduction and Summary, 1950.

The work accomplished includes the following:

1. A hydrographic section across Hudson strait from Wakeham Bay to Lake Harbour, involving the usual measurements of temperature, salinity and oxygen at standard depths from the bottom to the surface. Hydrographic stations were made in various other parts of the area.

2. The study of the benthonic and planktonic fauna in the region of Cape Hope's Advance, in July. This fills in a gap, both in time and space, in the collections made in the three previous years of the present survey.

3. Shark fishing in this same area (Cape Hope's Advance). In spite of sustained efforts to find shark in July, none was caught. This is in general agreement with the reports of Eskimos both at Cape Hope's Advance and at Burwell, that the shark do not appear until the late summer. At Burwell, a few shark were obtained by Eskimos, late in the 1949 season. There is no doubt that more energetic fishing efforts, and the supply of adequate fishing gear to the Eskimos, could result in a useful native fishery. Such a development would of course require a programme of considerable education for the natives, who are at present unaware of the value of the animal. The species concerned is the Greenland shark, Somniosus microcephalus.

4. Continuation of the study of the biology of the Atlantic cod (Gadus callarias) at Port Burwell. This being the fourth year of this study, there is now available for analysis a significant material of sex ratios, growth rates and age composition, and food habits of the Burwell cod, these cod being perhaps the most important of all the marine resources of Ungava Bay from the point of view of the possible development of an Eskimo fishery.

5. Fishing for shark and flatfish in the Burwell region, by long-line, for a few days in August. Results negative.

6. The recording of echo sounder tracks from several points where previous sounding work had been scanty or absent. These will be sent to the Hydrographic Service.

7. The investigation of the nature of the water and production at the Button Islands, supplementary to the work done during a short visit paid to these islands in August, 1949. The conditions in the Button Islands are significantly different from those only a short distance away, at Burwell, shown by differences in the plankton, and in the absence of Atlantic cod, at least during the first half of August. It is possible, but as yet quite undemonstrated, that the cod visit the Button Islands later in the season.

8. The census and general study of the seal and other sea mammals. From Mr. Grainger's report (below) it will be seen that the numbers of seals observed were considerable. Certainly more seals were seen in the 1950 cruise than in any other season. In the latter part of the season, in late August and early September, there was considerable seal hunting activity in the vicinity of the mouth of the Koksoak river, and on the way to and from Adlorilik fjord, many seals were observed, the precise numbers being uncertain. These were bearded seals (square flippers--Erignathus barbatus), ringed seals (Phoca hispida) and harp seals (Phoca groenlandica). Particularly striking was the number of harp seals seen during the summer, in the neighbourhood of Wakeham bay in late July, and at the head of Ungava bay in late August. Harbour seals were recorded at the Button islands. All the information collected on seals during the past four years will be collected together in due course for publication.

9. The study of the hydrography and fauna of Adlorilik fjord. Adlorilik is a deep indentation on the eastern shore of Ungava bay, with steep sides and in many respects answering to the general definition of a true fjord. The codfish, so far as the expedition was able to ascertain, do not penetrate as far south as Adlorilik, although there are native reports of their presence just north of the mouth of the fjord. Observations of considerable interest were made on the physical oceanography (hydrography) of this region, which cannot yet be treated in detail here. The fjord was visited in June, and again in late August.

I.B. Mr. Grainger's report on the operations up to August 23rd.

Narrative.

First of the "Calanus" party to arrive at Fort Chimo was Reid, engineer, who prepared the ship for launching between the third week of May and June 14, when Wilson, engineer, Lewis,

biologist, and Grainger, biologist, arrived. Launching of the "Calanus" took place on June 19, and following general preparations for sailing, the first cruise began on June 26, to Adlorilik, on the east side of Ungava bay. Ice was absent from the southern and largely free from the eastern edge of the bay, but heavy still on the west side. We arrived at Adlorilik on June 27, and left on June 30, calling in at George river on the way back to Chimo. Word reached us there that ice was heavy still on the west side of the bay, so on July 2 and 3 our native crew conducted a seal hunt about 20 miles off the mouth of George river, at the edge of the ice. At this time 8 seals were taken, 4 square flippers and 4 rings. We returned to Chimo on July 4.

With bad reports on ice we left Chimo for the second cruise on July 7, but reached only as far as Inukchulik, just south of Leaf river, where ice made impossible further progress. Attempts on the three succeeding days to get through the ice failed, and on July 9 a shift in wind forced the ice south and necessitated our sailing south to the Koksoak river, so back to Chimo. Here we had our radio transmitter repaired (it had become almost functionless), and on July 12, following bad weather, returned to the west side of the bay. Following a brief ice delay off Leaf river, we arrived at Imilik on July 13, and the Eider islands on July 16, trying at both places for shark. On July 17 we visited Cape Hope's Advance, and between this date and July 26 worked in this general region, chiefly between here and Koaktuk. During this time a quick run was made to Diana bay settlement to the south, to collect fuel oil.

On July 26 we sailed west towards Wakeham bay, arriving there on July 27. Here bad weather kept us in for 3 days, before beginning the hydrographic section to Lake harbour, where the "Calanus" arrived on August 1, encountering difficult ice conditions during the last 25 miles of the crossing.

It was decided here that further ice delays in northern Hudson strait, east of Lake harbour, could not be afforded, so the "Calanus" returned directly to Fort Chimo, instead of proceeding east to Resolution island. Arrival at Chimo was on August 6, and there a required engine part was received, after which we sailed to Burwell, arriving there on August 10, following weather delays. Cod jigging and shark long-lining were tried at Burwell, and on August 11 we set out for Resolution island, but were forced to hold up at the Button islands, in bad weather, for 3 days. On August 14, in a temporary wind let-up, it was decided to postpone the Resolution island trip, and to return to Burwell, where work was continued until August 19, when we returned to Chimo, arriving on August 20.

Because of unusually late ice in Hudson strait, and severe weather conditions, particularly in August, the program had not been completed, with the proposed hydrographic section across eastern Hudson strait and the study of cod at Resolution island not accomplished in 1950.

Physical oceanography.

Up to August 20 nine hydrographic stations were worked including one section across Hudson strait, from Wakeham bay to Big island, near Lake harbour. Others were done in the regions of biological work.

Forty-three water samples were taken, and temperatures recorded of various depths to 300 meters. Oxygen determinations were done in the field, while samples for salinity were brought back to Montreal. The lowest temperature recorded was -1.60, at 50 meters depth, in Hudson strait. Highest recorded temperature was 6.0, at the surface in June at Adlorilik.

Records of observed ice were kept throughout the work.

Plankton, benthos, littoral fauna.

Twenty-four plankton hauls were made up to August 20, from 15 to 60 minutes duration. Benthonic animals were collected from 12 stations, by use of a dredge. Littoral forms were taken from 14 points. As an addition to last year's work collections of marine plants were made at several littoral and benthonic stations.

Trawling, using the otter-trawl or beam-trawl, was not tried during this summer's work. Preliminary survey by echo sounder and dredge gave no evidence of trawling bottom superior to that found in 1949. In almost every use of the dredge difficulty was encountered, by rocks or thick mud causing it to catch on the bottom. It was concluded that the use of a trawl on such bottoms probably would have been quite impractical.

Fishing.

Cod fish were taken successfully at Burwell, after unsuccessful tries in the Cape Hope's Advance region, Diana bay, and the Button islands. According to word received at the Fisheries station at Burwell the cod arrived there on August 3, and were abundant at least until our departure on August 19. According to word from the same source as above, the cod remain at Burwell until the first substantial snowfall, usually in October.

All the cod were taken in Forbes Sound, and of them 210 were measured, sexed and otolithed. Stomach contents were taken from about 100. Size range varied from 380 to 740 millimeters. All were taken by jigging.

Tagging, to seek information on movements, was done on 91 cod, all at Burwell, marked with numbers "E. A. 83" to "E. A. 98" and "E. A. 101" to "E. A. 175". These were attached to the left gill cover. Cod were taken in near-shore waters, mostly between 10 and 25 fathoms depth, at various points in Forbes sound.

Cod jigging in the Button islands brought no positive results. Regions tried were about northern McColl island and off southeastern McColl island.

On August 14 a radio report from Resolution island indicated that cod had not appeared there yet, although such information cannot be considered as absolutely reliable. Cod are known there, however, and it was unfortunate that the "Calanus" could not study them as the program for 1950 had suggested.

Parasites were taken from cod observed at Burwell.

Fishing for flatfish in the Cape Hope's Advance area brought no positive results. Examination of cod stomachs and dredge hauls may reveal young of the fish, as occurred in 1949. There was no sign of the adults in 1950.

Extensive fishing for shark in the area of Cape Hope's Advance and in Diana bay in July, and at Burwell in August brought nothing. Shark lines were laid around Cape Hope's Advance from July 16 to July 26, at the Eider islands, off Hope's Advance to the north, and to the west in Diana bay. Negative results backed up what information could be received from the local natives and missionary who, although apparently unable to say just when shark might be found in the area, agreed generally that they were there "not now", but "later", presumably in August and perhaps September. Definitely the shark is known in the area and has been taken, at least in whale nets. No interest is taken in them there, as at Burwell, where they have been referred to as great nuisances in what must have been a more abundant past.

Long-lines were laid in water from 20 to 150 fathoms, in most cases with the majority of or all hooks raised off the bottom by means of floats. This keeping of the hooks free from the bottom was considered advisable as a result of experience in 1949, when it was found that benthonic invertebrates cleaned the bait from hooks and so possibly reduced fishing efficiency. As a result of this bait was found to remain on nearly all hooks when recovered.

The usual method in laying of lines was to have one anchored line attached to a marker buoy on the surface, and to attach the hook line to this, about 5 to 10 fathoms from the bottom, and suspend it with floats, usually empty oil drums, anchoring its distal end to the bottom. On some lines hooks were placed deliberately on the bottom, to give a greater depth range to the hooks used. Bait used was chiefly seal fat and meat, with smaller amounts of white whale, sculpin, bacon fat, and at Burwell, cod, tried.

It may fairly be concluded from these fishing attempts that shark, if present at all in this region during fishing operations, were in quite small number, and the combination of fishing results with local information gathered, would point to July at least as an unsatisfactory time for shark fishing around Cape Hope's Advance and Diana bay. Perhaps better results could be obtained in August or September.

Shark fishing was tried, too, in the Burwell area, where similar attempts were carried on in 1949. Fishing was tried in Forbes sound only, in depths from 10 to 50 fathoms, with lines similar to those used on the west side of the bay. Word was received that 3 shark had been sighted before our arrival in Mission cove, but no other reports were received about shark there during the summer of 1950, at least until August 19.

One interesting report from local natives about the taking of three shark on one line was received, but the exact time of capture and origin of the line are obscure. It may be that these shark were taken on a line set (and lost) by the "Calanus" in July, 1949, or the capturing line may have been one left in 1949 for the Burwell natives to use, the latter perhaps more probable in view of the capture of these shark not taking place until the autumn of 1949. Regardless of this 3 shark were taken at Burwell in the fall of 1949, and were not used by the natives in any way.

Stomach contents were taken from several char, trout, and salmon, taken at various points throughout the summer.

Sea mammals.

Sixteen seals, 2 walrus, and one white shale were taken by the crew of the "Calanus" up to August 20. Stomach contents, when present, were taken from all these.

Seals were few in the open water of eastern Ungava bay in late June, when one ring seal was taken at Adlorilik. On July 2 and 3 four squareflippers and four rings were shot at the edge of the ice about 20 miles off George river. At least three times this number were sighted on this occasion. Few were seen on the west side of the bay in early July, even in the ice, and throughout July only three were taken, one ring seal at Imilik and two squareflippers at Koaktuk. At Wakeham bay on July 29 and 30 harp seals were seen in abundance, at least ten showing themselves within sight of the "Calanus". None was taken, but one small ring seal was shot. On July 5 about a dozen square flippers and what appeared to be ring seals were observed between Payne bay and the Koksoak river, in comparatively ice-free water. At the Button islands on August 13 about ten harbour seals were observed lying on a sheltered beach, and of these four were taken. On August 19 one very small ring seal was shot at Burwell, the only seal sighted during our stay at Burwell. During the summer sealing was apparently moderately good around Koaktuk, but only a few had been taken by the Burwell natives, whose big catch occurs later in the autumn.

Two walrus were seen by the "Calanus" and both taken. The first, a young female, estimated at one year, was taken near the "Calanus" anchorage near the mouth of Wakeham bay. The second, a large male, was sighted on an ice pan about half way across Hudson strait, on August 4, shot, and hauled onto a large ice pan, where the "Calanus" Eskimos reduced him to dog food.

On July 23 a ten foot, female white whale was taken in shallow water near the deserted trading post at Diana bay. This animal was badly ripped, the result, the Eskimos claimed, of a fairly large, darkly coloured whale, called Teekagolee, possibly the Killer Whale.

At least three of these were sighted during the summer, one near Koaktuk, one in Lenz strait, north of Killinek island, and one, or two, in Forbes sound, Burwell.

I.C. Narrative of operations from August 23rd to the end of the season.

One last cruise of some ten days was made to Adlorilik fjord, on the eastern side of Ungava bay, which had also been visited for a few days earlier in the season, at the end of June. The cruise was made for several purposes, first because of the general scientific interest of hydrographic conditions in fjords, this being the only inlet in the Ungava bay region which shows anything like the definitive conditions of a fjord, with shallow threshold at the mouth, deeper water inside, and fairly steep sides. The maximum depths found inside, however, were nevertheless disappointingly small, a deep "hole" of over 90 fathoms being recorded by the echo sounder close inside the mouth, and depths of a little under 50 fathoms in the central part of the fjord.

The hydrographic results, so far as can be determined at the present, before the salinity titrations have been completed, were very interesting, in that the temperatures at all depths from 10 to 80 metres were markedly higher inside the fjord than outside it, which is the reverse of the expected results. The salinities should help a great deal to explain this unexpected result. The oxygen concentrations were of the same order both inside and outside the threshold.

Cod-jigging in Adlorilik, and at its mouth, gave negative results. Dredging and plankton hauling, along routine lines, were carried out at several stations in the fjord.

The beaching of the "Calanus" was delayed some eight days owing to the fact that heavy weather had forced us to postpone our arrival back at the base, so that the spring tide at the beginning of September could not be used. During the period of waiting, the new cradle was put together, and the old one dismantled, the ship was painted and generally cleaned up, and the equipment on board, and stored on shore at Chimo, was put in order and an inventory made. The ship was beached without hitch, and the party was ready to leave the airfield on September 17th. We arrived at Montreal on September 21st.

II. Summary of Results of 1947-1950.

II.A. Development of native fisheries in Ungava bay.

In 1951, the "Calanus" will be moving out of the area of Ungava bay. The past four seasons of work have shown the following:

1. Good or even mediocre trawling grounds in Ungava bay do not exist, or at least have not been found. It has therefore not been possible to discover definitely what the yield of shrimp-fishing would be. Shrimp traps were not used; this is a possibility which could be investigated later in the program--it would be a good thing for the "Calanus" to spend a season once more in Ungava bay, at some future date, for purposes of comparison with the present information.

2. The amount of Atlantic water which at present penetrates into Ungava bay cannot be very great, judging from temperatures and salinities, both of which are low. There is thus not any good probability that the Atlantic cod, or the Atlantic salmon, will extend their range or their numbers beyond the present level in the near future. (Cod at Burwell, Atlantic salmon in rivers of the eastern part of the bay, as far as and including the Koksoak).

3. The adult stock of the arctic halibut, the young of which were found in some numbers at Burwell, have not been located. This may be due to the general failure of the longlining technique in this area (confirmed by the commercial efforts at Resolution Island--see below), and probably means that these fish are not useable by the Eskimos.

4. The Atlantic cod at Port Burwell and the waters of Killinek island generally, perhaps extending also for a few miles to the south, have been shown to offer good possibilities for development as a local native fishery. The problem of the means of development, involving the bringing of Eskimos to Burwell, the financing of the purchase of boats, the purchasing of the fish and their processing, and so on, lies outside the scope of this report, since it falls into the category of development of the native economy and therefore into the purview of the Department of Resources and Development.

5. Shark. In spite of the small number of shark seen and caught during the past four seasons, it is still my opinion that a shark fishery can be developed, to the great benefit of the Eskimos. It appears quite clear that the shark arrive in Ungava bay, certainly at Port Burwell and possibly, or probably, at Cape Hope's Advance, late in the season, too late for the "Calanus" operations to catch them. What is needed here is experimental fishing in September and October, perhaps also later in the season still, and above all, patience: It will take some time, measured in years, to convince the Eskimos that the shark is a useful and not a useless animal. As to this last point, reference is made to the shark fishery of the Greenlanders, and of the Norwegians. The

former has been carried on in west Greenland since about 1805, and the latter for several centuries, mainly in waters east of Greenland.

6. Seal. The numbers of seal recorded, both from the observation of the scientific parties and from the take of native hunting parties, during the 1947-50 period, have been greater than one might expect if the evidence of native initiative and nutrition alone were taken into consideration. The hunting parties are never many, consisting only of the more enterprising and energetic Eskimos, but the take of seal by these parties is not inconsiderable, and the seal population of Ungava bay is apparently able to stand the drain without harm; possibly it could stand a greater take. It should be remembered that the seal-hunting season over most of the bay is short, especially for ringed and bearded seals, being confined almost to the few weeks during which the ice is breaking up and leaving the bay, in June and part of July. Winter sealing is from all accounts impossible, as would be expected from the high tides of that area, which cause strong currents and keep the ice in constant movement, with frequent breaks. Winter sealing is thus restricted to very limited areas, and even then on a very limited scale, due to the danger of these conditions.

During the open-water season, however, after the ice has left the bay, seals are still met with, though possibly not in quantities which would justify special sealing expeditions. The Button islands appear to offer fairly good sealing conditions all summer long, but the number of Eskimos that visit them is exceedingly small; one or two families from Burwell. Again, the harp seal which pass through McLelan strait on the fall migration provide the Burwell natives with vitally important winter food and dog-feed; but no other natives, from other parts of the bay, ever make use of this source of supply. Undoubtedly the problems involved here are sociological rather than marine-biological; it is necessary to induce the Eskimos to travel farther afield, and to use resources which they at present ignore. They need more and better boats, and above all a stimulus, by example or financial gain, or both, to lift them out of their present lethargy. New Peterhead boats cannot be bought on three-dollar foxes, so that at the present rate there will come a time not very far away, when there are no more native-owned boats on the bay, and then the situation will be very much worse than it is now.

7. White whale (beluga). The numbers of white whale seen in the past four seasons have been almost negligible; but it is plain, nevertheless, that full use of the white whale which do visit Ungava bay is not made. This applies particularly to Payno bay, as has been pointed out in previous reports.

8. Atlantic salmon and arctic char. The work of the Fisheries Research Board Eastern Arctic Investigations is predominantly marine; but attention has been paid to the freshwater environments when time allowed. Henry Hildebrand made a study of the freshwater during the winter in 1948, and information on the abundance

of the salmon and char has been collected in the summer seasons. It is clear that the run of both salmon and char cannot be relied upon from year to year to produce a constant supply of fish. It is also clear that the rivers which are not close to trading posts are not used to the extent to which they could usefully be used. There are annual fisheries, with gill nets, on the George and Koksoak rivers, but the rivers in between, and north of the George, are hardly touched. This is because of disinclination, or in some cases (owing to the lack of boats and cheap fuel oil), because of economic impossibility. The population is far too much bound in its distribution to the trading posts, the ready sources of tobacco, flour, edible fats and tea.

II.B. General scientific results, 1947-50.

1. Physical oceanography.

From the 1947 reconnaissance, there is a good material of temperatures, salinities and oxygen concentrations at the standard "biological" depths, covering the coastal or inshore waters of Ungava bay from Payne bay right round to Port Burwell, and extending out to a maximum distance of about 25 miles; there are also a few stations made in 1948, off Burwell. From the 1949 season, there is a considerable material of physical oceanographic data, including three sections from Akpatok island to Burwell, Payne bay and the Koksoak river. In 1950, in addition to routine measurements for comparison with former years, a section was made across Hudson strait at the level of Lake Harbour. It is hoped that it will be possible to have all these data worked up into an account of the oceanography of Ungava bay during the next twelve months, for publication.

2. Fishes.

The paper on the fishes of Ungava bay, based on the 1947-49 collections and field work, is almost ready for publication. Most of the records are new, and the paper should be a useful contribution to the ichthyology of arctic and subarctic waters. There is a special material on the Atlantic cod at Port Burwell, including stomach contents, parasites, length measurements, sex ratios and ages (from otoliths read at St. Andrews through the good will and helpfulness of Dr. A. W. H. Needler and Dr. W. R. Martin). This account of the biology of the Atlantic cod will be published separately. (The only other fish given this special treatment is the arctic char--in Frobisher bay, not Ungava bay).

3. Sea mammals.

As soon as time permits, the collection of material on the seals (abundance records, food habits, parasitization, etc.) will be put in order and published.

4. Plankton.

The collection of plankton, from all depths, is very large, being made in all four seasons. Most of it has now been sorted out into its constituent parts, and Miss Marion Fox is at present occupied in the detailed analysis of the copepod population, with special reference to the summer biology of the more abundant species. This latter study will provide the first paper on the copepod plankton, to be followed by a systematic account of the whole collection. This is long and exacting work, but the results will justify it. We have as yet no published study of the copepods of the northern Canadian waters for comparison with the extensive work of Scandinavian and other zoologists.

The amphipods of the plankton, together with the benthonic amphipods, have been identified in part by Mrs. Scott, of this University, who has also analyzed the size distribution and breeding cycles, of the Chaetognatha.

Closing nets were used very little in the collection. The vertical distribution of the plankton, therefore, is to be studied from the analysis of a large number of horizontal hauls with open nets, a method which appears to yield consistent results. It is planned to use Clark-Bumpus samplers in future years, for the more exact quantitative study of the plankton.

5. Benthos.

The collections of benthonic fauna from all depths in Ungava bay have been sorted out into systematic groups, by Mr. Grainger and by Mr. Arthur Dawson, who volunteered for this job for a short time in the summer of 1950. Mr. Grainger has been studying the annelids, but had to leave them for the time being in favour of urgent work on the arctic char. Mr. Dawson has identified and labelled all the molluscs from the 1947 and 1949 collections (the amount of benthos collected in 1948 was small). Mr. Hubert Squires, while at McGill University, undertook the identification and general study of the decapod crustacea, together with the larvae in the plankton, and he is continuing this work in his spare time at St. John's, Newfoundland. As mentioned above, Mrs. Scott has identified most of the benthonic amphipods.

6. Littoral fauna.

Littoral fauna was collected when time allowed, principally in order to make a study of the gradient of distribution from Port Burwell (considerably Atlantic) round the shores of Ungava bay to Cape Hope's Advance (closer to the arctic condition). This collection has so far not been analyzed; there are clearly points of interest here, notably in the wintering powers of Balanus, the distribution of Balanus, Mytilus and Littorina, and the striking contrast between the littoral faunas of Burwell and the Button islands.

7. Eskimo ecology.

Although it is the official business of the Department of Resources and Development to develop and look after the economy of the Eskimos from all practical angles, the study of that economy, expressed as a part of the whole marine ecology of Ungava bay, is a legitimate field for the present organization (Eastern Arctic Investigations) to invade. In the course of the 1947-50 field seasons, a great material of notes on the life of the Eskimos of Ungava bay, particularly as it affects or could be affected by maritime resources, has been compiled, largely in journal form. This has not yet been collated into final form. It will appear, when ready, as a statement of the possibilities offered by the Ungava bay waters, and a study of the problems to be tackled before those possibilities can be realized.

III. Arctic Char, Frobisher bay, and Atlantic cod, Resolution Island.

It will be remembered that in 1948, Mr. Grainger accompanied the Shaw Steamship Company's schooner "Alfred and Emily" on a commercial fishing venture into Frobisher bay, as observer for the Fisheries Research Board. His work has already been reported upon, and his results have been brought into final form for publication. In 1950, the Shaw Steamship Company was again granted a license to fish for arctic char in Frobisher bay, against all expert advice. Again, the terms of the license included the stipulation that the Company's vessel, this time the steamer "Arctic Sealer", should carry an observer, who should be given every facility for the research work covered by his instructions. Mr. John Wright, a student at Sir George Williams College, Montreal, filled this position in 1950. His report forms Appendix A, below.

Mr. Wright carried out his instructions, which were detailed, most faithfully, and brought back very valuable material from his work on the arctic char at Frobisher bay and on the Atlantic cod taken in Acadia cove, Resolution island. He also made small collections of the littoral fauna, and made what observations were possible on the sea mammals encountered during the voyage.

A total of 2,167 arctic char were taken by the fishing vessel in Frobisher bay, most of them from off the mouth of the Sylvia Grinnell river, a smaller number from the Bay of Two Rivers, on the opposite side of Frobisher bay. Owing to an infringement of the license regulations, the fishing operations were stopped on the orders of the local R.C.M.P., and were not resumed until one week later (on August 18). The average weight of the fish caught was approximately $6\frac{1}{2}$ lbs.

Mr. Wright had opportunity, in the two weeks before the "Arctic Sealer" arrived at Frobisher (during which time he was already there) to collect some of the small char in local streams, and also some of the first of the upstream migrants. During the whole fishing season, he measured, sexed and otolithed (and scaled) 234 fish, preserved 76 fish entire (including the young non-migrants, possibly also some downstream migrants), and tagged 32 fish. The number tagged would have been greater had not the fishing license been suspended. One fact of some interest arising out of his field work is that the eggs in the ovaries of the sea-run fish caught in August were all very much smaller than those of the July fish. The significance of this has not yet been discovered. It did not occur in 1948. Work on this collection is beginning now, at the time of writing (December first).

Atlantic cod in Acadia cove, Resolution island, were fished by the "Arctic Sealer" during nine days (August 31 to September 1), the total catch being 2,510 fish, all of which were salted. A sample of 99 fish were measured, sexed and otolithed, showing an average length of 64.7 cm. Sixteen fish were tagged, and stomach contents collected from a sub-sample.

It is apparent that the cod arrive at Resolution island somewhat later than at Burwell; according to local reports, which may or may not be reliable, they appear sometime between August 20 and 25. The fish were all caught by hand line and jig. One trawl was attempted, with 104 hooks suspended some two fathoms above the bottom, but no fish were caught at all by this technique. This is not only in accordance with the experience of the Ungava bay experimental fishing, but goes one step further in trying a line with the hooks raised above the bottom, which was still unsuccessful. The experiment was tried by Mr. Shaw on my suggestion; he had been informed that the ordinary long lines had been entirely unsuccessful at Burwell.

The cod in Acadia cove are described as being soft of flesh, a character which was blamed for the high rate of loss of fish from the jig hooks. An observation of some interest, made by Mr. Wright, is the abundance of shrimp in Acadia cove. Many of the cod stomachs were full of them, and they were also seen, and caught, in the surface waters of the cove. This was not observed at Burwell, where the shrimp play only a minor role in the food of the cod, at least in August. We have as yet no information on the September conditions at Burwell.

IV. Weather Re-supply Mission.

It was decided, as an experiment, to send a Fisheries Research Board observer in the Canadian Party attached to the Resupply Mission run by the United States Navy to supply the far northern weather stations. Accordingly, Mr. A. H. Lawrie of the University of Toronto, joined Mr. J. W. Burton's party, equipped with various fishing and collecting gear. It was not anticipated that Mr. Lawrie would be able to do very much original field work because of the extreme inelasticity of the organization of the Resupply Mission, and the known shortages of boats and time. Since it was suggested, however, that in the following season (1951) the Canadian Observers might take along a boat of their own for their own scientific and exclusive use, it seemed worth while to give Mr. Lawrie the opportunity of familiarizing himself with the terrain and with the possibilities for constructive field work.

The part of Mr. Lawrie's report which deals with his observations in freshwater and salt water biology is attached to this report as Appendix B. His full report contains a general narrative and sections on ice, terrestrial mammals, birds, and plants.

It is quite obvious that Mr. Lawrie has managed to get the most possible out of a not very satisfactory situation. The opportunities for field work were extremely limited. He has brought back a small collection of marine plankton and notes on the distribution and abundance of certain fishes and marine mammals, largely collected by conservation with residents in the field. Fishing by hand lines produced almost nothing, as was expected. The following comments on the information obtained should be inserted here:

1. Greenland shark. Greenland shark have been known from the Thule district for a very long time, but no effort is made to catch them, owing to the fact that the area is rich in game much more attractive to the Polar Eskimos--seal and walrus, and bear.

2. Halibut. As Mr. Lawrie's report suggests, the halibut taken at Thule is almost certainly the arctic, or Greenland, halibut, Reinhardtius hippoglossoides. The arctic halibut is also caught in large numbers in the central part of west Greenland, especially in Disko bay, and even in the Julianchaab district, but the important halibut of the southern part of the coast generally is the Atlantic halibut, Hippoglossus hippoglossus.

3. In the paragraph on the harbour seal, Lawrie refers to native reports of "a large edition of the Ringed Seal" which they know from west of Pond inlet. Occasional reports exist of the hooded seal (Crystophora cristata) from the waters of northern Baffin bay; and it is not improbable that the seal referred to by the Eskimos is the hooded seal, the more so since the Eskimo word for the hooded seal means in fact "big ringed seal" (Natserssuak in Greenland; in Ungava bay Netchivak).

4. Attention is drawn to Mr. Lawrie's observations on the harp seal. The harp seal has for some years been reported as becoming somewhat more abundant in the northern part of its summer range in Canada and Greenland. It is definitely not a negligible resource in the eastern arctic of Canada. Compare the 1950 records of harp seals seen in Ungava bay (above).

V. Future field work,

V.A. "Calanus".

The plans recommended for the "Calanus" in 1951 are as follows:

1. A brief visit to Adlorilik in the early part of the season, before the western part of the bay is clear of ice. This for the purpose of hydrographic investigation of the early spring conditions, for comparison with the autumn conditions already studied.

2. The investigation of the coastal waters between Diana bay and Wakeham bay, during the latter part of July and early August. For general experimental fishing, and searching for trawling grounds.

3. Crossing from Diana bay (fuel depot) to Lake Harbour. A native pilot will be obtained at Lake harbour, and the "Calanus" will then proceed down the southern coast of Baffin island, making such observations and collections on the way as time permits. If possible, a visit will be made to Acadia cove, Resolution island, to investigate the possibility of shrimp resources suggested by the work of Mr. Wright in 1950 (above).

4. The "Calanus" will then proceed to Frobisher bay, making straight for the airfield in order to make the necessary preparation for the beaching of the ship. Any time then remaining in the season will be spent in the waters of Frobisher bay itself.

5. This programme will require certain arrangements for the surface transportation of equipment, which are of vital importance. The following will be readied for shipment from Chimo to Frobisher, probably by the "C. D. Howe" or other convenient vessel:

The new cradle, dismantled.

Timbers, 8" by 10", now at Chimo.

Hardwood rollers.

Wire, jacks, sledge hammers, etc., used in beaching.

Cases of food supplies and other equipment and supplies, now at Chimo, which have already been packed for shipment.

6. It would be best if one of the party, probably myself, were to be flown to Frobisher bay at the same time and by the same aircraft as the Chimo party, to spend the summer working on the arctic char and at the same time make the choice of beaching site and arrange for the installation of the winch. This could be done

without going beyond estimates, because the important equipment is already in our inventory; and the remainder can be taken out of "Calanus" estimates. It would greatly facilitate the beaching operation, and relieve the pressure on the "Calanus" party to get to Frobisher in plenty of time for these necessary and time-consuming preliminaries. The cost of the extra length of charter flight, to Frobisher, is already in the "Calanus" estimates. The decision as to who should do this Frobisher work can remain in abeyance for the moment.

7. The pilot and native crew taken on at Chimo will be left at Koaktuk, Cape Hope's Advance for transportation home to Chimo by native Peterhead boat. The necessary money for this is included in the estimates. In the same way, the Lake harbour pilot will be returned from Frobisher bay.

8. It is proposed to construct, at McGill University, a light trawl for the somewhat difficult trawling conditions in these waters. This will in effect be a beam trawl about 10 feet wide, with the frame at the mouth made of pipe. The bag will be of $1\frac{1}{2}$ to 1 inch mesh, and within the mouth of the trawl there will be a very wide mesh wire screen. Most of the trouble in the waters hitherto dredged and trawled has been caused by large boulders getting inside the dredge or trawl; the wide mesh screen is designed to keep such boulders away from the bag. The trawl is not designed for possible commercial use, but for the collection of the bottom fauna, especially fish.

9. A Clark-Bumpus plankton sampler will be added to the equipment, in order to permit accurate quantitative work on production and distribution. Phosphates will be estimated as well as oxygen.

10. Personnel. E. H. Grainger and W. E. Wilson, and myself, will return to the field next year. It is possible that John Lewis will also be available. We have still to find a student engineer to work with Wilson. Wilson will have to be flown from Frobisher by R.C.A.F., since his medical studies require him to be back by the first week in September. It is understood that this will be possible.

V.B. Arctic char.

The full arctic char field investigation, planned for next season at Frobisher bay and involving the employment of two zoologists, has had to be eliminated for reasons of economy. If the plan mentioned in section V. A., of flying one man to Frobisher bay, can be carried out, he will continue the work begun by Grainger in 1948 and Wright in 1950. If not, then the work on the char, for the time being at least, will be confined to the working out of the material collected by these, especially the latter, since Grainger's work is already completed.

One of the most important and helpful things to be done in this matter is the study of the otoliths and scales, to discover a reliable means of aging the fish.

There is much field work still to be done on the char in Frobisher bay, for which it is hoped arrangement can be made in 1952, when the "Calanus" is based there. The "Calanus" can then act as transportation for the arctic char party, and the area covered can be much extended. There is important work to be done in the early part of the season, on the seaward migration of the char and on the biology of the young first or second-year (perhaps much older) fish which do not migrate. Much of this will be done, of course, in fresh water, and the equipment of the party must include suitable craft for use on lakes and along the shore, and the necessary things for the setting up of inland base-camps. This can be considered in detail later.

The general objects of the study are (1) to estimate the abundance of the char in the Frobisher bay area; (2) to discover the rate of growth and of reproduction; and (3) to calculate from this the maximum take which the stock will stand.

V.C. Atlantic salmon in Ungava bay.

At some time in the future, when funds are available, a field study of the Atlantic salmon (Salmo galar) of Ungava bay should be made, along the same lines as the present study of the arctic char in Frobisher bay. This is required because of the great variability of the salmon run in those rivers of the eastern and southern Ungava bay drainage, and because it is highly desirable to find out the relative numbers of salmon which normally ascend the several rivers. It is still stated occasionally, by former residents of Ungava bay trading posts, that the salmon could stand a repetition of the former commercial effort, or at least that they could provide more for the natives than at present they do. The first claim seems very doubtful, but the second may well be correct; it is important to put them on the basis of direct study, instead of conjecture.

V.D. Beaufort sea.

Included in the estimates for 1951-52 was an item to cover the sending of one zoologist to accompany the naval expedition to the Beaufort sea. It is not necessary to describe here the work which such a zoologist could do. The area has never been investigated - with the single exception of some land-bound work done on the Canadian Arctic Expedition, southern party, 1913-16. The expedition was not designed for marine work, and the marine results were therefore very small. Everything, therefore, has to be done from the beginning. An outline of a suggested programme was offered in 1946. The lines which obviously must be followed are approximately the same as for the "Calanus" work in Ungava bay. Certain types of fishing, as for instance seine-fishing from shore, are clearly much more profit-

able in the Beaufort sea than they are in Ungava bay, and the bottom is probably much more suitable for trawling. It is very probable that fishing on a commercial scale is possible in the Beaufort sea.

VI. Bishop Mountain House, McGill University.

The Board was fortunate in being able to adapt three rooms on the top floor of Bishop Mountain House, through the good will of McGill University, and with the ready agreement, also, of the Arctic Institute of North America, who occupy the rest of the building. The Board pays no rent for this space, which consists of two good-sized rooms for office and general use (map work, writing, etc.) and one converted bathroom which functions as a small laboratory.

The present salaried staff of the Eastern Arctic Investigations consists of E. H. Grainger, who looks after most of the correspondence, organization, maintenance and sorting of the collections, and is engaged in the working out of part of the field work; and Miss Marion Fox, at present working on the copepods of Ungava bay and also on secretarial and typing work. Miss Fox, who is employed full time, does most of her work in the Department of Zoology, for the laboratory space available at Bishop Mountain House is limited. Mr. Grainger is on part time salary.

For 1951, starting in the fall, it is planned to employ four salaried members: Two zoologists of M.Sc. or Ph.D. level, one zoologist and general assistant (Miss Fox), and one technician and secretary. There may still be a problem of laboratory space, but until the space for biological sciences generally is enlarged at McGill, it will be quite possible to carry on as at present.

Appendix A

Report of John Wright, observer on board the

"Arctic Sealer", 1950.

Arctic Char, Frobisher Bay

Arrived at Frobisher bay on the night of July 18, 1950. I contacted R.C.M.P. Constable Johnson who was of great assistance to me. He showed me the general layout of the Base and gave help to me whenever I needed it.

Except for two days it drizzled I had very fine weather for the 2½ weeks I was ashore before the "Arctic Sealer" arrived.

The young arctic char were only found in small streams or brooks that led into the Sylvia Grinnell river. I tried catching them in the river itself but I got negative results.

The minnow traps proved to be the best method for catching the young arctic char. I had a hand net made and it proved to be of great use in the smaller brooks, many of which seemed to be drying up. I tried using the seines on many different occasions and under different conditions but they did not prove to be of any use. The Sylvia Grinnell river itself was too swift and one could not walk out far enough into the river for the seines to be effective. The total number of young arctic char preserved was 53, the largest being 17.4 cm., the smallest 4.8 cm.

I collected littoral fauna and algae, and preserved the algae in the following way: After it was partly dried, I rolled it up in cheese cloth that had been soaked in a 5% solution of formaldehyde and sea water. Later I wrapped it in newspaper.

I went fishing with my 4" and 5" mesh nets on four different nights in order to get some large arctic char to examine. The nets are of too fine a twine for fishing. A thicker twine would not get so snarled up. Also the nets should be dyed a green colour (Shaw dyed them for me) for in the daylight the arctic char see the nets and swim around them. I have seen this done. The successful Eskimos set their nets (coloured white) in the darkest part of the night or throw rocks behind the fish in order to scare them into their nets.

I offered the Eskimos a few cigaretts per fish if they would bring me their catch so that I could examine them. Some of them did. As a rule the Eskimos gut their fish as they are caught and I found that it is hard to change their ways.

Also I preserved some sticklebacks. These were found in small shallow brooks that ran into the Sylvia Grinnell river.

I visited some lakes but I had negative results. On August 5, 1950, I boarded the "Arctic Sealer". I received all the help I required from Mr. W.A. Shaw, "pop" Shaw and crew. Only 11 days were spent fishing for arctic char at Sylvia Grinnell river:

- Aug. 5 - 9, incl. Fishing.
- Aug. 10-18, incl. No fishing. License lost, due to infringement of terms.
- Aug. 19-22, incl. Fishing. Of the nets set only 2 taken up, due to ice.
- Aug. 23. No fishing. Sylvia Grinnell blocked with ice.
- Aug. 24-25, incl. No fishing. Stormy.
- Aug. 26-27, incl. Fishing. Fish slackening off.

Fishing in Bay of Two Rivers:

- Night of Aug. 19. 1 net.
- Night of Aug. 20. 3 nets.
- Aug. 21-23, incl. 3 nets.
- Aug. 25-28, incl. 4 nets. (Fish slackening off, only 50 arctic char caught during these past 4 days).

I estimated the weight of the average arctic char to be $6\frac{1}{2}$ lbs. The scales on the "Arctic Sealer" were not accurate.

The great majority of arctic char seemed to be free of all external parasites. About one-third were observed to have internal parasites (in body cavity or intestinal tract). Only about one-eighth of the examined arctic char were observed to have external parasites. These parasites were found attached to the gills (only a few attached themselves to any one fish). A very few fish had both internal and external parasites. I observed that many of the arctic char caught at the Bay of Two Rivers had parasites attached to the lining on the inside of their mouths and on their tongues. I only discovered this parasite at the end of the season.

32 arctic char of all sizes were tagged. These were all tagged in the Sylvia Grinnell river and approaches to it. I had planned to tag many more, but due to the temporary loss of the fishing license this could not be done.

Arctic char - Otolithed, sexed and measured	--	234
Preserved entire	--	76
Tagged	--	<u>32</u>
Total		<u>342</u>

Information required by the Department of Fisheries:

a) Fishing area - general location.

Near Koojesse Inlet and Bay of Two Rivers.

1. In the salt waters of Sylvia Grinnell river -- starting 75 yards away from the falls, toward ocean and in approaches to Sylvia Grinnell river.

2. In Bay of Two Rivers, 12 miles distant from Sylvia Grinnell river on western side of Bay. Though fishing operations started here only on August 20 until August 28, many arctic char were caught for the number of nets set. All were large fish.

b) Type and quantity of fishing equipment.

Altogether there were 14 nets of 6 inch mesh used. The nets were 50 meshes in depth:- Length, approximately 35 fathoms mounted. 11 of the 14 nets were made of linen, other 3 nets were made of hemp.

c) Daily records of fishing.

Saturday	- Aug. 5, 1950	- 6 nets used - <u>298 char caught</u>
Sunday	- Aug. 6, 1950	- 9 nets set, - 8 cases canned - <u>319 char caught</u>
Monday	- Aug. 7, 1950	- 9 nets set - 1 net had to be taken up, due to a white whale - 24 cases canned - <u>159 char caught</u>
Tuesday	- Aug. 8, 1950	- 8 nets set - 25½ cases canned - <u>349 char caught</u>
Wednesday	- Aug. 9, 1950	- 12½ cases - R.C.M.P. cancelled Shaw's license due to 1 net near the Falls being more than two-thirds across river - <u>338 char caught</u>
Thursday	- Aug. 10, 1950	- All nets taken up.

- Friday - Aug. 18, 1950 - Company received permission to
reset nets
- 2 nets set.
- Saturday --Aug. 19, 1950 - 10 nets out,
- 26 char caught
- Sunday - Aug. 20, 1950 - 100 fish taken this A.M.
- Took up 2 nets damaged by ice.
- Put out 1 net.
- 10 nets in water today.
- 107 fish this P.M.
- Froze 100 arctic char.
- Pickled 107 arctic char.
- 207 char caught.
- Monday - Aug. 21, 1950 - 8 nets out this A.M.
- 1 net taken up.
- 7 nets out this P.M.
- 98 char caught.
- Tuesday - Aug. 22, 1950 - 2 nets taken up, due to ice.
- 5 nets out -- no nets outside river (ice)
- 198 arctic char brought from 3 nets at
Bay of Two Rivers.
- 12 char taken from Sylvia Grinnell.
- 210 char caught.
- Wednesday --Aug. 23, 1950 - 51 char from Bay of Two Rivers.
- 17 fish out of the 51 taken to Base.
- unable to look at 6 nets up river due to
the river being blocked with ice.
- Thursday - Aug. 24, 1950 - No fishing; too stormy.
- Friday - Aug. 25, 1950 - " " " ♪
- Saturday - Aug. 26, 1950 - 25 char from Bay of Two Rivers.
- 70 char from Sylvia Grinnell river.
- 8 nets out -- 5 at Sylvia Grinnell river
and 3 at Bay of Two Rivers.
- 95 char caught.
- Sunday - Aug. 27, 1950 - 3 nets in Sylvia Grinnell river.
- 17 char taken from Sylvia Grinnell river.

d) General Information.

Varieties, numbers, and weight of fish caught.

Varieties:- 1.

Total number arctic char caught :- 2,167.

Average weight:- $6\frac{1}{2}$ lbs., approximately.

Method of processing, curing and packaging fish.

Caught.

Three methods of preserving the arctic char were used:-
canning, freezing and pickling.

Canning:- 88 cases of 48, 1-lb, tins each.

Freezing:- 500 fish, approximately.

Pickling:- 4 tierces plus 2 bbls.

Due to the commercial fishing operation for arctic char not being continuously carried out in the month of August and no commercial fishing done at all in July, the egg measurements are not complete. I observed in the latter part of July, though no measurements were taken then, that the eggs in the female arctic char were much larger than in the arctic char caught in August. The measurements of eggs in August are from 0.7 mm. to 2mm.

The stomach contents of the arctic char were fairly constant throughout the time examined. Approximately half of all the char stomachs examined were full. Approximately $\frac{1}{4}$ of all the char stomachs examined were empty. This was before license was cancelled.

When the license was regained, approximately 40% of arctic stomachs were full, another 40% empty. The remaining stomachs were half full or thereabouts.

From a few large frozen arctic char (caught in the early part July) that I examined for color I found that their ventral surface was a rose-pink color. During August I found some char with a slight pink color (ventral) but not many.

When the fishing license was cancelled I was still allowed to use my 4- and 5- inch mesh nets. Also I got permission to use 2 smelt nets (approx. 1 inch) and one of Mr. Shaw's 6-inch mesh nets. It was during this time that I lost my 4- and 5-inch mesh nets. Either drift ice or white whales, pursued by Eskimos, took them.

Many red-throated loons were caught in the nets. One day alone the fishermen found 7 of these birds in the nets. All were dead.

Seals were not very plentiful in the waters about the U.S. Air Base. That is where the Eskimos camped. Only a few lone seals could be seen here. The Mountie also said that the seals were scarce.

About Aug. 18, 1950 we observed two small herds of seals near the Bay of Two Rivers.

At the end of August large herds of seals were reported further down in Frobisher Bay. We passed some of these herds on our way to Resolution island.

Many foxes were sighted at the Bay of Two Rivers. I observed red foxes on the east side of the Bay, while only blue foxes on the western side of the Bay. There were a few crosses on each side. They were very tame.

Mr. Wright's statistics on the char (length, sexes, etc.) are not included here.

Cod Fishing, Acadia cove, Resolution Island.

a) Fishing area, general location:- Acadia cove.

b) Type and quantity of fishing equipment:- Jigs were used for catching cod, except one day, a trawl was set, but it caught no fish and was taken up next day. Bait used was waste pieces of arctic char, left over from canning and kept frozen until used as bait.

c) Daily record of cod caught:-

Thursday	- Aug. 31 --	40
Friday	- Sept. 1 --	300
Saturday	- Sept. 2 --	300
Sunday	- Sept. 3 --	250
Monday	- Sept 4 --	20
Tuesday	- Sept. 5 --	400
Wednesday	- Sept. 6 --	400
Thursday	- Sept. 7 --	250
Friday	- Sept. 8 --	<u>550</u>
Total number		2,510

General record of cod fishing.

Fishing location: Acadia cove and the entrances to Acadia cove.

Type, length, depth and mesh of nets set and lifted: None.

Type and length of lines set and overhauled-- number of hooks--bait used: A trawl, 104 fathoms long, with 104 hooks was taken up after one day and night. Bait used was pieces of arctic char left over from canning and kept frozen until used as bait (tails, fins etc.) The trawl was set in 18 fathoms of water in Acadia cove itself. The hooks used were about 2 fathoms from bottom.

Varieties, numbers, and weight of fish caught: Atlantic cod. The number caught was 2,510. Weight, 6 to 8 lbs.

Method of processing, curing and packaging fish caught: The cod were salted in tierces, the number of tierces being 14½.

Eight days and one night were spent in fishing for cod. From the night of August 31, when we arrived in Acadian cove, to September 8 inclusive.

The men stationed at the weather station said that the cod had just arrived a week before we came. The cod, though plentiful, were found only in certain areas of Acadia cove and in the entrances to Acadia cove. Most of the cod caught were taken in the entrances to Acadia cove.

The stomachs of all cod caught up till September 5, approx. were gorged full. After September 5, the stomachs of the cod caught, with a few exceptions, were normally full.

The cod were jigged. By this method a great number of them were lost--about 40% to 50% of the catch.

The fishermen claimed that the jigs they were using were too large for these cod. The average jig measured about 9 inches, approx., in length. The flesh of the Acadia cove cod is soft. This is another reason why the jigs came out.

At the beginning, most of the cod were hooked in the stomach or tail. Later more of the cod were hooked by the mouth.

Many shrimp were present about Acadia cove. Some of which I preserved. The waters here seemed to be alive with all kinds of life. A small shrimp net was made and tried inside Acadia cove with little results--a few small shrimp. The fish that had much shrimp in their stomachs were caught in the entrances to Acadia cove.

Appendix B

Extract from :

Field Report of a Biological Reconnaissance of the
Eastern Canadian Arctic Archipelago, July - Sept.
1950 ("Weather Resupply Mission").

Fauna

by A.H. Lawrie.

Invertebrates

Terrestrial invertebrates were rarely seen at the stations visited and very few were collected. Mosquitoes which were abundant at Grondal were not seen north of that point either in Greenland or in the archipelago. However, they were reported to occur at Eureka during the warmest part of the day for a few weeks in midsummer while at Alert it is claimed that they first appeared June 25th. No biting flies were observed. A single midge (Chironomidae?) was seen while ashore at Cape Camperdown. Two small dipterous larvae (Tipulidae?) were taken from soil adhering to the roots of a plant collected by Doctor V.K. Prest at Lincoln Bay. An adult Tipulid was collected at Dobbin Bay, while at Dundas Harbour Doctor V.K. Prest secured a Lepidopterus larva which subsequently spun up and emerged and a single Fritillary was collected at Eureka. This material has been sent to Doctor T.N. Freeman of the Taxonomic Unit, Division of Entomology, Ottawa for determination.

Fresh water aquatic invertebrates were also poorly represented. Despite diligent search none were found in fast flowing streams either at Thule or at Dobbin Bay. The large Notostracan Lepidurus glacialis and the Anostracan Branchionecta paludosa were common, the latter abundant in sedgy pools at Thule but were not observed elsewhere. A single Copepod and several specimens of a Cladoceran were obtained from a pool on a gravel bench at the foot of Cape Camperdown. These two forms await identification. No other fresh water aquatic invertebrates were observed.

Shore collections were made at Thule, at Cape Camperdown and Dobbin Bay, and at Dundas Harbour, while the shores at Resolute Bay and Eureka were searched without success. These collections are all small, which is to be expected in view of their hasty nature, but which also reflects a real paucity of littoral fauna probably to be correlated with the almost year round ice action on the shores. Thus at both Cape Camperdown and Dobbin Bay the shores were strewn with ice whose scouring action precluded the growth of any fixed forms either plant or animal. At these stations nothing was found except a few Amphipods which await determination. Even at Thule and Dundas Harbour where the shores are ice free for a longer period each year the aspect

was barren and the majority of the specimens found were entangled in the holdfasts of kelps washed ashore. Gastropods and Pelecypods together with a few encrusting Bryozoa comprise the majority of the scant collections from these two localities and these too await determination.

Collections of bottom fauna were not undertaken due to lack of a dredge but quite by accident some forms were obtained from Dobbin Bay. The waters in the approaches to the bay are shallow and in the course of making plankton hauls with a number 5 Net the bottom was scraped by accident. Its sandy nature revealed five such samples were taken. (Unfortunately, one of these was lost in the transfer at sea referred to in the narrative.) The material has not yet been identified but is rich in Ophiuroids and Echinoids, in Mysidacean crustaceans and Amphipods, and contains Polychaete worms, a small Anthozoan and a very large Pycnogonid. In addition to this material a few Gasteropods were secured in odd ways, one being taken from the mouth of a sculpin caught in North Star Bay and a second, from the same locality, was taken from the anchor chain as it was brought in. Both specimens have been sent to Doctor Wm. Clench of the Museum of Comparative Zoology at Cambridge, Mass. for determination.

Every effort was made to secure plankton samples wherever possible but, due to various factors, the results were rather unsatisfactory. The difficulties may be stated briefly as lack of time, lack of an adequate boat, restrictions on the use of boats and finally lack of experience.

It was only possible to spend eight hours on this work during the whole summer. This limitation was imposed in part by **weather** and/or ice conditions as at Resolute Bay, but principally by the unavailability of boats. As observed in the narrative boats were at a premium when unloading operations were being carried out, all landing craft being either in active use or on stand by duty. Moreover, since boats could not be released to observers directly their use required that they be manned by Coastguard or Navy personnel - and boatmen could not often be spared from their other duties.

In consequence the use of a landing craft was only obtained once, for an hour, in the harbour at Thule. A Coastguard power boat, known as a Greenland Cruiser, was made use of for an hour and a half at Thule and again for two and a half hours at Eureka. Unfortunately, this boat was not entirely adequate. Deck space was small and very sharply cambered but most important the diesel engine could not be throttled down to a speed sufficiently slow to allow proper use of the nets. Hence the boat was run in fits and starts with the result that tows at constant depths were out of the question. However awkward these difficulties may have been they were minor compared with those in operating from the ice skiffs which were the only craft available at Dobbin Bay and Dundas Harbour. Carried aboard U.S.S. Edisto for the use of ice parties in crossing leads they proved hopelessly inadequate either for that purpose or for plankton sampling. At best, oared power restricted their radius of action and they were extremely difficult to row due to the fact that they were in poor repair and their oarlocks would scarcely remain in the worn out thimbles. It was a feat of patience and endurance to successfully complete a single haul with one.

As a rule boats were required to remain within a mile or so of the ships in case they should be needed for any reason. In most instances this meant sampling in a shallow roadstead. For example the harbour in North Star Bay, at Thule, rarely exceeds twelve fathoms in depth and little of Wolstenholme Fiord itself exceeds twenty fathoms. There was no opportunity to select favourable locations for hauls.

Last but not least the service personnel who manned the boats had little interest in, or knowledge of, what was required and co-ordination between intention and execution was not good. Moreover, the writer's own lack of experience in this work and the need for experimentation on his part contributed to the lack of team work. It might be mentioned that the same boat crew was rarely available twice in a row.

In consequence of all the foregoing the series of samples obtained was limited both as respects number and representative nature. Of the 21 taken, 7 were smashed and lost in the transfer from Edisto to Eastwind on August 21st. The remaining 14 are itemized below.

<u>Place</u>	<u>Duration</u>	<u>Net</u>	<u>Depths</u>	<u>Remarks</u>
Thule	3 mins.	1'- No.5	2 M.	5 samples lost
	5 "	1M- No.0	0-10 M.	
Maury Bay	5 "	1'- No.5	13 M.	Horizontal
	?	1'- No.18	30 M.	Vertical
Wrangel Bay	?	1'- No. 18	25 M.	Vertical
Dobbin Bay	5 mins.	1'- No. 5	6 M.	2 samples lost
Dundas Harbour				Horizontal
	5 mins.	1'- No. 5	0 M.	
Eureka	5 mins.	1M- No. 0	8 M.	
	5 mins.	1'- No. 5	3 M.	Horizontal
	5 mins.	1M- No. 0	0 M.	
	5 mins.	1'- No. 5	9 M.	
	5 mins.	1M- No. 0	10 M.	
	5 mins.	1'- No. 5	13 M.	
	5 mins.	1M- No. 0	15 M.	
	5 mins.	1M- No 0	19 M.	

This material has not yet been identified so that it is only possible to make the most general remarks about it. At Thule the pteropods Limacina arctica and Cleone limacina together with Ctenophores and Copepods were abundant in surface waters, while close to the bottom at 13 metres large numbers of Copepods, Amphipods and Mysids replaced them.

The two vertical hauls in Kennedy and Robeson Channels were virtually negative containing only a few copepods and Larvaceans together with some phytoplankton. It is tempting to believe that this reflects a reduced fauna under the heavy and continuous ice cover but unfortunately the tows were too shallow and too few to establish this.

At Dobbin Bay Pteropods were virtually absent and the single surviving jar resembles those from the northern channels described above. However, the water was very shallow, 13 or 14 metres at best,

and most effort was spent in obtaining samples from the sandy bottom which proved surprisingly productive as previously noted.

At Dundas Harbour time was short and a high wind made the ice skiff nearly unmanageable so that the samples are probably far from reliable. Limacina arctica was present at the surface but uncommon although the eskimo claimed that at times the harbour is alive with this Pteropod. Moderate numbers of Copepods, a few Mysids and a very small Sculpin Fry virtually complete the collection.

At Eureka the samples were taken in Slidre Fiord, and the upper ten metres or so found to contain little beyond a few Copepods and Chaetognaths together with some phytoplankton. From 10 to 20 metres large numbers of Chaetognaths, Copepods and Medusae were found together with the odd Ctenophore. Pteropods were absent. Unfortunately the Greenland Cruiser was required for hydrographic work and the lower limit of the occupied stratum was not determined. It is of interest that these hauls were made between midnight and 2 A.M. when the sun was just barely above the horizon. Whether the organisms would have been deeper the following noon was undetermined for the boat could not be obtained the next day.

It is intended that this material be worked over during the winter and more precise, if limited, information should then be available and will be submitted in an appendix to the Combined Report.

Fish

Attempts to catch fish were made by jig and baited lines at all points where the mission called and were generally unsuccessful. Moreover, members of the crews of both ships whiled away much of their spare time in fishing and were equally unsuccessful. Long line fishing was never attempted principally because, boats being hard to come by, there was no assurance that the gear could be revisited or picked up. At Thule the handsome sum of six Sculpins (Myoxocephalus groenlandicus) was the total catch, all species, by all methods. Elsewhere no fish at all were secured. Information obtained by interview is summarized below.

Greenland Shark (Somniosus microcephalus)

Reported to occur in Wolstenholme Fiord and Inglefield Gulf. However the Danes have yet to catch one.

Dundas Harbour eskimo report it as common at Pond Inlet on the opposite side of Lancaster Sound but as absent from the Devon Island coast.

It is not reported elsewhere.

Arctic Char (Salvelinus alpinus)

This fish was reported by Kelsall (1948) from Thule but not mentioned by Mr. Krogh this summer. The latter did state that it is taken in small numbers at Inglefield Gulf.

R.C.M.P. personnel at Dundas Harbour report land locked populations of small char in two small lakes inland from the post.

A similar population is reported from the lake north of the airstrip at Resolute Bay where they are said to be numerous and to range from 8 to 12 inches in size with a 17 inch maximum.

It is not reported elsewhere.

Greenland Sculpin (Myoxocephalus groenlandicus)

Sculpins were reported to occur at Dundas Harbour and Resolute Bay and their remains have been found washed up on the beach at Eureka.

Halibut (Reinhardtius hippoglossoides?)

Reported to be taken in small numbers by the natives at Inglefield Gulf and Savigsivik, north and south of Thule respectively. Mr. Krogh was emphatic that this was not the halibut of the south Greenland fisheries.

No other reference to flat fish was obtained except the statement that the skeleton of a small one had been found on the beach at Slidre Fiord (Eureka). None have been caught there by the station personnel who, in fact, have never been able to catch any fish.

There are various reports of a small smeltlike, or herring-like fish from various points. Kelsall (1948) mentions having seen them thrown up on the ice by the icebreaker; Dundas Harbour natives describe such a fish as seal food; and weather station personnel at Resolute Bay report finding them washed up on the beach from time to time. Unfortunately none were seen.

Mammals

Nomenclature follows Anderson (1946) and subspecific nomenclature has been largely omitted.

Harbour Seal (Phoca vitulina)

This animal was not seen in the arctic archipelago nor is reported to occur there. However it is known from Pond Inlet across Lancaster Sound from Dundas Harbour. In this connection, the R.C.M.P. Special Constables at Dundas Harbour, who are Pond Inlet natives, report that they take a large edition of the Ringed Seal in Croker Bay to the west of the post. This report is most difficult to interpret when it is remembered that these men are thoroughly familiar with Ringed, Harp and Harbour Seals. It would be interesting to see a specimen.

Ringed Seal (Phoca hispida)

This species was seen through-out the summer whenever the ships were operating in pack ice. It was first encountered southwest

of Cape York Greenland in about 75 N latitude where it was associated with an ice stream some fifteen miles wide and well out to sea. Twenty adults and three light coated young were seen there on July 25th.

On the return trip from Thule to Lincoln Bay, August 1st to 12th 59 were seen and these were all associated with pack ice. However, the species is perhaps even commoner in the fiords during the summer according to the Danes at Thule.

The species is said to be common the year round at Dundas Harbour and also at Resolute Bay. The R.C.M.P. meat cache at the former contained thirty-five or forty animals and one was seen at the latter just off the landing beach.

They are reported to be occasional at Alert.

None were observed en route to Eureka and they are said to be only occasional there. However the remains of a dead one was viewed there August 24th.

Some idea of the abundance of this little seal may be had from the fact that over 3,000 hides have been traded at Thule this year, over and above the local consumption which is considerable. The hides are largely exported to south Greenland.

Harp Seal (Phoca groenlandica)

The occurrence of this seal at Thule was definitely established by the presence of the hide of a grey young in the administration store. Mr. Krogh states that about 50 are taken each year by the natives of Thule district and that all are young seal invariably.

At Dundas Harbour they are reported to be fairly common from mid June to mid October (break-up to freeze-up). These animals too are said to be young.

The species had not been seen (recognized?) at either Resolute Bay or Eureka.

The following report was had from Alert of the 15 seals thus far seen there - "the seals were of two colours; the largest were light coloured and spotted while the smaller were a solid light colour!"

Three Harp Seal were seen on the return trip from Thule to Lincoln Bay, August 1st to 12th, all were on the ice, and all were grey young.

On August 17th, four herds of about a dozen each were seen in Radstock Bay, southwestern Devon Island, while I was on a helicopter reconnaissance. Two more herds of three and eleven were seen in Lancaster Sound off Cape Ricketts on the same flight. It was not possible to age these animals.

On August 26th a herd of twelve, including one clearly marked adult

was seen in Hell Gate. No seal at all had been seen north of Hell Gate.

Whether there is, or is not, a differential distribution of young and adult harps it is apparent that they are more widely distributed in the archipelago and more common than has been indicated by previous missions.

Bearded Seal (Erignathus barbatus)

A solitary Bearded Seal was observed about 150 miles south of Cape York, Greenland and 50 miles or more out to sea on July 24th.

On the round trip from Thule to Lincoln Bay, August 1st to 12th six were seen on the ice of Kane Basin and Kennedy Channel.

It was not reported from Alert.

At Dundas Harbour and Resolute bay the species is said to be regular in small numbers the year round.

It is said to have been seen at Eureka.

Some idea of the comparative abundance of the Bearded Seal is had from the fact that the Greenlanders in the Thule district annually take from two to three hundred.

Atlantic Walrus (Odobenus rosmarus)

Walrus were seen only four times during the summer by members of the mission: three in northern Baffin Bay, off Etah, two on an ice pan off Dobbin Bay, 32 in Gascoyne Inlet, southwest Devon Island and two on an ice floe at the south end of Norwegian Bay, on August 1st, 10th, 17th and 26th.

They are reported not to have been seen at either Eureka or Alert.

Where they do occur they are reported to be migratory. Thus at Thule they appear off Saunders Island at the mouth of Wolstenholme Fiord from mid June to July and are then taken by shooting and harpooning. They then move north reaching the vicinity of Etah in August before turning south to reach Thule again in September when they are again hunted. The fall kill in 1949 at Thule was only 19 walrus, not enough for the peoples needs, and there was starvation among both the dogs and the natives. In the spring of 1950, 41 were taken. It is of interest that the Danes salt the hides, which weigh an average of 60 to 70 kilos and bring 15 Kr. in trade, and ship them to the U.S.A. and Germany.

At Dundas Harbour the spring migration is westward along Lancaster Sound as soon as the ice goes out and the fall migration returns from that direction in late September or early October. The movement is said to be a large one and the annual kill by the R.C.M.P. detachment is of the order of ten walrus. The winter of 1949/50 was

unusual at Dundas Harbour in that there was much open water in Lancaster Sound and walrus were occasional all winter.

At Resolute Bay walrus were said to have been much more common during the 1950 summer than in previous years.

Atlantic Killer Whale (Grampus orca)

This species was not observed but is said to occur in Lancaster Sound. Eskimos at Dundas Harbour assert that when Killers are about the seals are driven close to and even out onto the shore.

White Whale (Delphinapterus leucas)

This species was not observed during the course of the summer although the flesh of a freshly killed one was seen hanging on the meat caches in the native village at Thule, July 26th. This was considered an event for the Beluga is rare at Thule although about 10 are taken each year by the Greenlanders at Inglefield Gulf.

At Dundas Harbour on the other hand there is a regular spring and fall migration "in thousands" moving west at break-up and east at freeze-up. Two were secured there in the spring of 1950.

They were reported to have been fairly common off Resolute Bay during the present summer.

They have not been seen at Eureka or Alert.

Narwhal (Monodon monoceros)

This species was not observed during the summer. It is very rare at Thule but fairly common at Inglefield Gulf where ten native hunters take about 100 per year.

It is reported to be regular at Pond Inlet but only occasional at Dundas Harbour where none have been seen for the last three years.

It has not been seen at Resolute Bay, Eureka, or Alert.

Bowhead Whale (Balaena mysticetus)

This species was not observed during the course of the summer but Const. E.E. Jones, R.C.M.P. reported seeing one at Dundas Harbour in the fall of 1949.

