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AN AQUATIC RESOURCE SURVEY OF ISLANDS BORDERING VISCOUNT MELVILLE SOUND

LAND USE INFORMATION SERIES

Background Report No. 2

Canada

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APPENDIX I. MARINE FISH SPECIES DISTRIBUTIONS

Table 15. Distribution records of marine fish species caught in the Viscount Melville Sound study area.

Species Name: Scientific	Species Name: Common	Catch Location (Fig. 11) and Reference
F. Dalatiidae		
Somniosus microcephalus (Bloch & Schneider) 1801	Greenland shark	1 (Templeman 1963).
F. Salmonidae		
Coregonus sardinella Valenciennes 1848	least cisco	19, 23 (McAllister pers. comm.).
Salvelinus alpinus (Linnaeus) 1758	Arctic charr	18, 19, 23 (McAllister pers. comm.).
F. Gadidae		23 (Nigiyok pers. comm.), 15 (Sabine 1821).
Arctogadus glacialis (Peters) 1874	polar cod	1 (this report); 18, 19, 22 (Boulva 1972); 13 (Buchanan *et al.* 1977); 7 (MacDonald pers. comm.); 9, 10, 17, 18 (McAllister pers. comm.).
Arctogadus sp.	cod	8, 12, 18 (McAllister pers. comm.).
Boreogadus saida (Lepechin) 1774	Arctic cod	25 (this report); 1, 2, 3, 26, 27 (Bain and Sekerak 1978); 1 (Bain *et al.* 1977); 14 (Beak 1975); 1 (Green and Steele 1975, Holeton 1974); 18 (MacDonald 1954); 7 (MacDonald pers. comm.); 1, 2, 4, 5, 12, 15, 18, 20 (McAllister pers. comm.); 18 (Walters 1953).
Gadus ogac (Richardson) 1836	Greenland cod	22 (McAllister pers. comm.).
F. Anarhichadidae		
Anarhichas denticulatus Krøyer 1845	northern wolffish	18 (MacDonald 1954, McAllister pers. comm., Walters 1953).
F. Lumpenidae		
Lumpenus fabricii (Valenciennes) 1836	slender eelblenny	21 (this report).
F. Zoarchidae		
Gymnelis viridis (Fabricius) 1780	fish doctor	1 (this report); 13 (Buchanan *et al.* 1977); 1 (Green and Steele 1975, Holeton 1974); 1, 2, 5 (McAllister pers. comm.).
Lycodes mucosus Richardson 1855	saddled eelpout	13 (Buchanan *et al.* 1977); 1 (Green and Steele 1975); 26 (Manning and Macpherson 1955); 1, 2, 4, 26 (McAllister pers. comm.).
Lycodes pallidus Collett 1878	pale eelpout	18 (MacDonald 1954, McAllister pers. comm., Walters 1953).
Lycodes polaris (Sabine) 1824	Canadian eelpout	1 (Green and Steele 1975, McAllister pers. comm.).
Lycodes turneri Bean 1878	polar eelpout	1 (Holeton 1974).
F. Ammodytidae		
Ammodytes sp.	sand lance	20, 24 (McAllister pers. comm.).
F. Cottidae		22, 24 (McAllister pers. comm.).
Artediellus scaber Knipowitsch 1907	rough hookear	13 (Buchanan *et al.* 1977), 20 (McAllister pers. comm.).
Artediellus uncinatus (Reinhardt) 1835	Arctic hookear sculpin	1 (Holeton 1974).
Cottunculus sp.	sculpin	7 (McAllister pers. comm.).
Gymnocanthus tricuspis (Reinhardt) 1832	Arctic staghorn sculpin	16, 21, 25 (this report); 13 (Buchanan *et al.* 1977); 1 (Green and Steele 1975, Holeton 1974); 1, 18, 20 (McAllister pers. comm.).
Gymnocanthus sp.	sculpin	18 (McAllister pers. comm.).
Icelus bicornis Reinhardt 1841	twohorn sculpin	1 (Green and Steele 1975, Holeton 1974); 18 (MacDonald 1954, McAllister 1963); 1, 18 (McAllister pers. comm.); 18 (Walters 1953).
Icelus spatula Gilbert and Burke 1912	spatulate sculpin	13 (Buchanan *et al.* 1977), 1 (Green and Steele 1975, Holeton 1974, McAllister pers. comm.).
Myoxocephalus quadricornis (Linnaeus) 1758	fourhorn sculpin	16, 21, 25 (this report); 13 (Buchanan *et al.* 1977); 1 (Green and Steele 1975); 18 (MacDonald 1954); 1, 13, 18 (McAllister 1959); 1-5, 18, 19, 20, 23 (McAllister pers. comm.); 1, 18 (McAllister and Aniskowicz 1976); 15 (Sabine 1821); 18 (Walters 1953).
Myoxocephalus scorpius (Linnaeus) 1758	shorthorn sculpin	1 (Holeton 1974); 1, 3, 20 (McAllister pers. comm.).
Triglops pingelii Reinhardt 1831	ribbed sculpin	6 (this report); 13 (Buchanan *et al.* 1977); 1 (Green and Steele 1975); 1, 2, 4 (McAllister pers. comm.).
F. Cyclopteridae		
Eumicrotremus derjugini Popov 1926	leatherfin lumpsucker	13 (Buchanan *et al.* 1977), 18 (McAllister pers. comm.).
Eumicrotremus spinosus (Müller) 1777	Atlantic spiny lumpsucker	18 (MacDonald 1954, Walters 1953); 1, 18, 22 (McAllister pers. comm.).
Eumicrotremus sp.	lumpsucker	18 (McAllister pers. comm.).
F. Liparididae		
Liparis fabricii Krøyer 1847	gelatinous snailfish	1, 2 (Able and McAllister 1980); 1, 2, 4 (McAllister pers. comm.).
Liparis gibbus Bean 1881	dusky snailfish	1 (Able and McAllister 1980).
Liparis tunicatus Reinhardt 1836	kelp snailfish	1, 2, 3, 5, 20 (Able and McAllister 1980); 13 (Buchanan *et al.* 1977); 1-5, 20 (McAllister pers. comm.).
Liparis sp.	snailfish	11 (McAllister pers. comm.).
F. Gasterosteidae		
Pungitius pungitius (Linnaeus) 1758	ninespine stickleback	1 (Green and Steele 1975).

AN AQUATIC RESOURCE SURVEY OF ISLANDS BORDERING VISCOUNT MELVILLE SOUND, DISTRICT OF FRANKLIN, NORTHWEST TERRITORIES

by

D.B. Stewart and L.M.J. Bernier

April 1982

This report was prepared under contract for the Lands Directorate, Department of the Environment and the Northern Environmental Protection Branch of the Department of Indian and Northern Affairs.

Anadromous Arctic charr in Crooked Lake, on Prince of Wales Island, change from a silvery color to bright orange before spawning. These male charr, held by the senior author, were caught on August 24, 1981. The Dolphin River, which drains Crooked Lake, can be seen in the background.

Lakes and marine bays in the high arctic often remain ice-covered until August. This photo of Melville Island shows the ice covering Tingmisut Lake (foreground) and Weatherall Bay (background) on July 24, 1981.

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PREFACE

The Northern Land Use Information Series (NLUIS) is an on-going environmental research and information mapping program for northern Canada, which provides a convenient reconnaissance-level information base to facilitate regional planning and the application of the Territorial Land Use Regulations. This map series is jointly funded by the Department of Indian and Northern Affairs, and the Department of the Environment. Since 1971, 273 maps covering 2.4 million km^2 have been published for the Yukon Territory, most of the mainland Northwest Territories, and the north Baffin Island area. Information presented in map and text form includes a wide range of environmental-social topics such as wildlife information, fish resources, an ecological land classification, native land use data, historical sites, proposed resource development activities, areas of conservation interest, and other information to assist in land use planning and management. The program relies on the co-operation and assistance of several federal and territorial government departments, private research groups and local residents of the Yukon and Northwest Territories. Major participants include the federal Department of Fisheries and Oceans which provides the information on fish resources, the Northwest Territories Wildlife Service which is responsible for the terrestrial wildlife data, and the Lands Directorate of Environment Canada which produces the ecological land classification information, co-ordinates the socio-economic and cultural data collection, and is responsible for the overall production of the maps and texts.

In addition to the published maps, several reports such as this, have been prepared which are based on the background research used in the preparation of the maps. A list of these reports is included in the Appendix.

(The views expressed in this report are those of the author and do not necessarily reflect those of Environment Canada or the Department of Indian and Northern Affairs).

G.G. McLean
Program Coordinator
Land Use Information Series

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INTRODUCTION

This report documents the results of survey work conducted in the summer of 1981 for the Northern Land Use Information Series mapping program. This fisheries survey encompasses Bathurst, Melville, Prince of Wales and northern Victoria islands in the District of Franklin, Northwest Territories (Fig. 1). These islands border Viscount Melville Sound which is an area of interest for potential resource and transportation development.

The Northern Land Use Information Series is an environmental research and information mapping program for northern Canada, which provides a reconnaissance-level information base to facilitate regional planning and application of the Territorial Land Use Regulations. This report provides detailed information on the biology and utilization of fish species inhabiting the study area. The information has also been summarized in comments included on the individual land use maps.

During the survey, data were collected on freshwater and marine fish, planktonic and benthic invertebrates, water chemistry, and domestic and commercial fisheries. This report summarizes that information and briefly discusses previous freshwater and marine research in the area. Wildlife and botanical observations are included in appendices along with a list of other reports in the Northern Land Use Information Series.

The project was funded jointly by the Department of Indian Affairs and Northern Development, and the Lands Directorate of the Department of the Environment. The Department of Energy, Mines and Resources and the Department of Fisheries and Oceans provided logistic support.

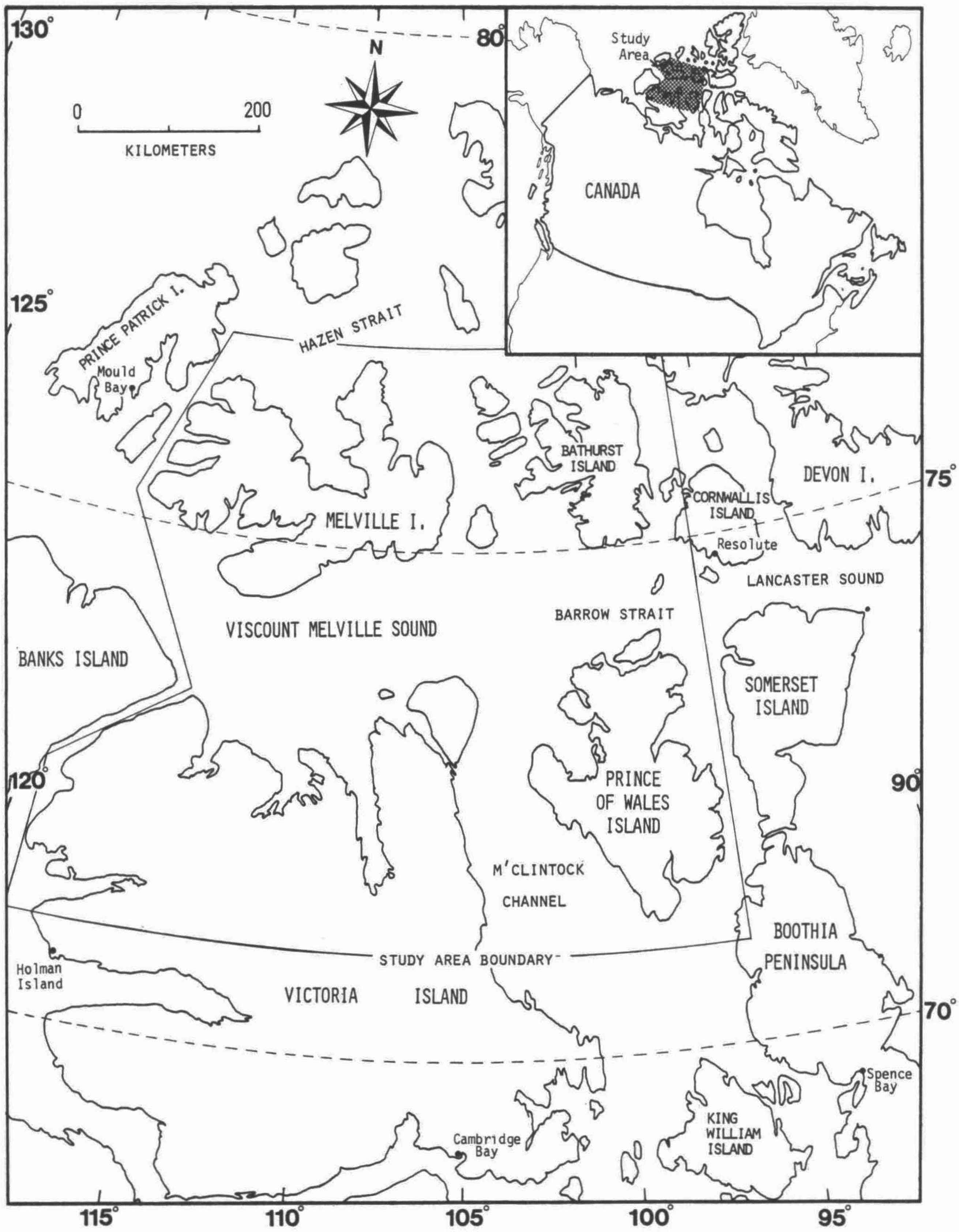


Fig. 1. Map of the Canadian Arctic Islands bordering Viscount Melville Sound showing the study area boundaries.

MATERIALS AND METHODS

Fish and related biota were collected between July 19 and September 3, 1981, from fresh and coastal marine waters of the islands bordering Viscount Melville Sound in the District of Franklin, Northwest Territories (Fig. 1). Sites were reached by using either a float-equipped Bell 206B Jet Ranger helicopter or an inflatable Zodiac boat. Freshwater and marine fish, planktonic and benthic invertebrates, surface water, and shoreline vegetation samples were collected. Fish were weighed and measured; their stomach contents and parasite loads were examined; and bone strontium content, age, sex, and maturity were determined. Zooplanktonic and zoobenthic species were identified and counted and total dissolved solid, nutrient, and ion concentrations and pH and conductivity were measured in samples of surface water.

Fish were caught using gillnets, hoopnets, and minnow traps. Gillnets were Lundgren's green multifilament nylon survey type, 1.8 m deep and 60 m long, consisting of six 10 m panels of 10, 19, 33, 45, 55, and 60 mm mesh sizes (bar measure). Nets were generally set offshore on the bottoms of lakes, large rivers and the ocean. Streams were sampled by setting two hoopnets across the channel. The upstream hoopnet caught fish moving downstream and vice versa. The hoops, 61 cm in diameter with 3.7 m wings, were covered by #35 delta nylon with meshes 3.2 mm square. Fry were caught in the shallows using cylindrical minnow traps made of galvanized wire. The traps were 44 cm long and 22 cm in diameter with meshes 6.2 mm square. Mouth openings, 2 cm in diameter, were located at each of the inverted conical ends.

In the field, fish were weighed (Accu-Weight spring scales, round weight 0 to 30 ± 0.5 g; 30 to 2000 ± 10 g; 2000 to 10000 ± 50 g), fork length (mm) was measured, and otoliths or scales were removed and stored in coin envelopes. Stomach contents were examined and a subsample of stomachs was preserved in 10% formalin for laboratory analysis. Sexual maturity was determined through gonad examination and the skin, mouth, gills, digestive tract, body cavity and swimbladder were examined for parasites. Complete digestive tracts and internal organs were removed from a subsample of fish and frozen for laboratory parasite analysis. Fish species identifications were confirmed by Dr. D.E. McAllister (pers. comm.) from representative preserved specimens sent to the National Museum of Natural Science (N.M.N.S.).

Otoliths were used to age Arctic charr *Salvelinus alpinus* and lake trout *S. namaycush*, following the technique of Grainger (1953). Least cisco *Coregonus sardinella* were aged from scales, read using a Leitz Trichinoscope (model IX-Q).

Anadromous fish have higher concentrations of strontium in their bones than do strictly freshwater fish as a consequence of higher strontium concentrations in saltwater than in freshwater (Behrens Yamada *et al.* 1979; Moreau and Barbeau 1979; Gaboury 1980). To determine whether anadromous Arctic charr inhabit Crooked Lake on Prince of Wales Island, a subsample of charr otoliths was assayed for strontium content. A 10 to 15 mg sample of otolith was dissolved in 1.0 ml of concentrated nitric acid (HNO_3), diluted to 10 ml, and analyzed by Direct Current Plasma Emission (DCP) at 407.7 nm, using aqueous standards (Hunt pers. comm.). To prevent alkali metal enhancement, samples were adjusted to 5 ppt lithium, using lithium chloride buffer. Samples of lake water, which were analyzed directly, and sediment were also assayed for strontium using DCP at 407.7 nm. Lake sediment samples were dried, ground, and filtered through a 100 mesh sieve. One gram samples of dry filtered sediment were dissolved in 5 ml of aqua regia (3:1, HCl to HNO_3) and each taken to a 50 ml volume for analysis.

Food items in stomachs were identified to at least order and stomachs were assigned fractional fullness values ranging from 0 (empty) to 1 (full), based on their apparent capacity and contents. In the laboratory, food taxa in the stomachs were separated, dried for at least 20 h at 38°C in a Chromalox AR-2519 oven, and weighed (±0.001 g) on a Mettler AC 440 balance to measure their relative contributions to the fish's diet.

Gonads were examined and degree of maturity was assigned according to the following scale:

Male	Female	Development
1	7	immature
2	8	mature
3	9	near ripe
4	10	ripe
5	11	ripe and running
6	12	spent
0		sex indistinguishable

Zooplankton were collected in single vertical hauls using a 73 micron mesh Wisconsin net with a 25 cm mouth diameter. Specimens were preserved in 10% formalin and species abundances were determined by dividing the number of individuals caught by the volume of water strained. Specimens were identified by Dr. and Mrs. K. Patalas who retain the collection.

Zoobenthic organisms were collected using an Ekman dredge with a 225 cm^2 mouth area. Samples were sieved in a conical sieve net of 500 μm mesh nitex and identified, where possible, to species. Representative specimens were sent to the N.M.N.S. Invertebrate Zoology Unit.

A helicopter is used to sample arctic lakes and rivers. Gillnets are set and retrieved, and water chemistry and zooplankton samples are collected, from the helicopter pontoons.

Fish moving up or downstream are caught alive in hoopnets. These hoopnets were situated at site 7 (76°24'N, 108°33'W) on Sabine Peninsula, Melville Island. Note the soil erosion.

Water samples were collected in liter polyethylene bottles held below the surface. Dissolved organic carbon; particulate carbon, nitrogen, and phosphorous; calcium, magnesium, potassium, sodium, chloride, and sulphate; and chlorophyll A samples were handled and stored as per Stainton *et al.* (1977). Stainton's sample storage methods were not followed for dissolved nitrogen and phosphorous or for specific conductance. The nitrogen and phosphorous samples were filtered but did not undergo UV combustion; specific conductance was measured on stored samples. These deviations in technique should not have seriously altered measurements because the samples were chemically dilute (Stainton pers. comm.). Laboratory pH measurements are reported and may differ slightly from actual lake values due to storage effects. Strontium excepted, all chemical analyses were performed by the Analytical Unit at the Freshwater Institute, Department of Fisheries and Oceans, in Winnipeg. Secchi depth, secchi color, and surface water temperature (± 0.1°C) were measured in the field.

Wildlife and botanical observations are included in appendices. The plant collections are housed in the Department of Botany herbarium at the University of Manitoba. Lichen samples were also collected and are in the possession of Dr. W. Maass at the National Research Council of Canada laboratory in Halifax.

RESULTS

Bathurst, Cornwallis, and Little Cornwallis Islands

General Description

Bathurst Island is the largest (16,380 km^2) of a complex of islands and islets located north of Viscount Melville Sound, between Melville and Cornwallis islands (Fig. 1). It has a convoluted coastline and no part of the island is more than 24 km from the Arctic Ocean.

There are three main physiographic areas within the Bathurst Island group (Fig. 2; Roots 1963; Kerr 1974). A low plateau underlain by carbonate beds constitutes the area south of Polar Bear Pass. The plateau is desolate, flat and featureless in the centre but dissected by narrow steep-walled valleys to the south and along the east coast. The drainage pattern is generally dendritic and most of the island's lakes are located near the south and east coasts of this region. Lowlands, less than 100 m in elevation, comprise the central and northern parts of Cameron Island. There the land slopes gently northwards and is underlain by poorly consolidated shale and sandstone. Streams in this area are short, braided with wide gravel fans at their mouths and lack headwater lakes. The largest physiographic area is a ridged upland which is separated from the southern plateau by Polar Bear Pass. It rises over 460 m above sea level (asl) and is overlain by sandstone felsenmeer or by glacial sands and gravels. Bedrock exposures are limited to stream valleys and a few northerly trending ridges. Lakes in this region are mainly situated along the northern coast of Bathurst Island.

Bostock (1970, 1972) recognizes only two physiographic regions in the Bathurst Island group, namely: Parry Plateau, which includes both plateau and upland, and Sverdrup Lowland - both of the Innuitian physiographic region.

Geology of the Bathurst Island group is complex, comprised primarily of middle and upper Devonian sediments of quartz sandstone, limestone, and shale (Thorsteinsson 1958; Kerr 1974, 1981). The islands were glaciated by the Laurentide (continental) Ice Sheet, as is evidenced by the presence of erratic boulders, patches of drift, and striated bedrock surfaces (Blake 1974; Barnett *et al.* 1976). Raised beaches, surface remnants of eroded reef knolls on the central uplands, and inland post glacial marine deposits provide evidence of marine submergence followed by rebounds of 70 to 100 m above the present sea level.

The climate is high arctic with a mean annual temperature range of 37 to 39°C and mean daily temperatures of near -33°C in January and below 4.5°C in July, although shallow lakes and isolated surfaces may become much warmer during the constant summer sunlight (Danks 1980; Maxwell 1981). Daily mean temperatures annually remain below 0°C from August 25 until June 15. Annual precipitation ranges from 125 to 150 mm, 35 to 40% of which falls as rain. Runoff begins in mid-June and peak stream flows

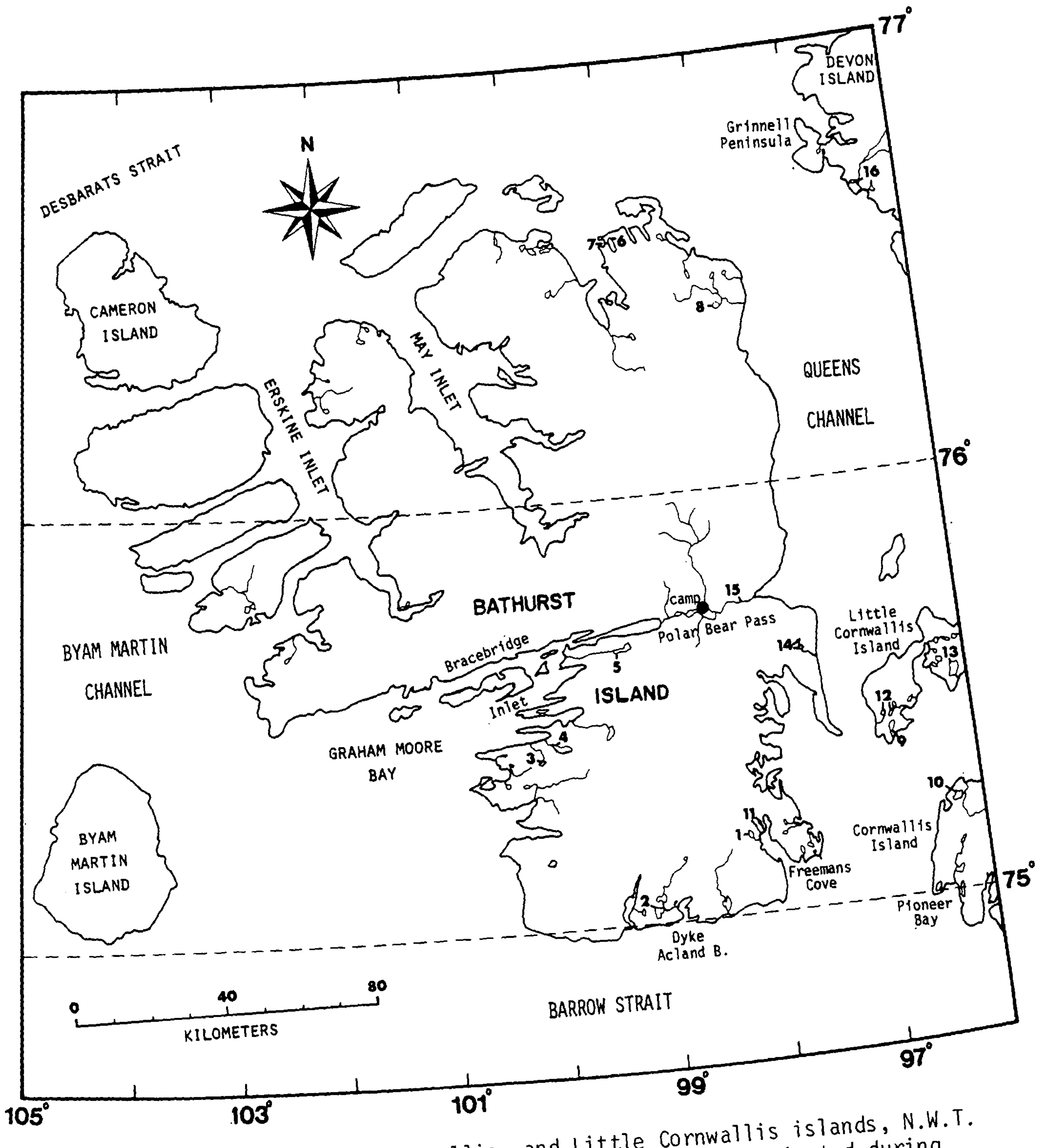


Fig. 2. Sites on Bathurst, Cornwallis, and Little Cornwallis islands, N.W.T. sampled during the 1981 fish survey (1-10) or investigated during previous research (11-16).

normally occur as a result of snowmelt, although orographic precipitation may cause extreme fluctuations in stream discharges (Wedel 1979). River flow probably stops altogether after mean daily temperatures drop below freezing in early September. Lakes may freeze to a depth of over 2 m (Schindler *et al.* 1974a; Fallis and Harbicht in prep.) and some sheltered deep lakes retain their icecover year-round. Sea ice is a mixture of new and multi-year types with variable clearing from year to year. Wind is predominantly from the northwest with an average speed of about 20 km/h (Danks 1980).

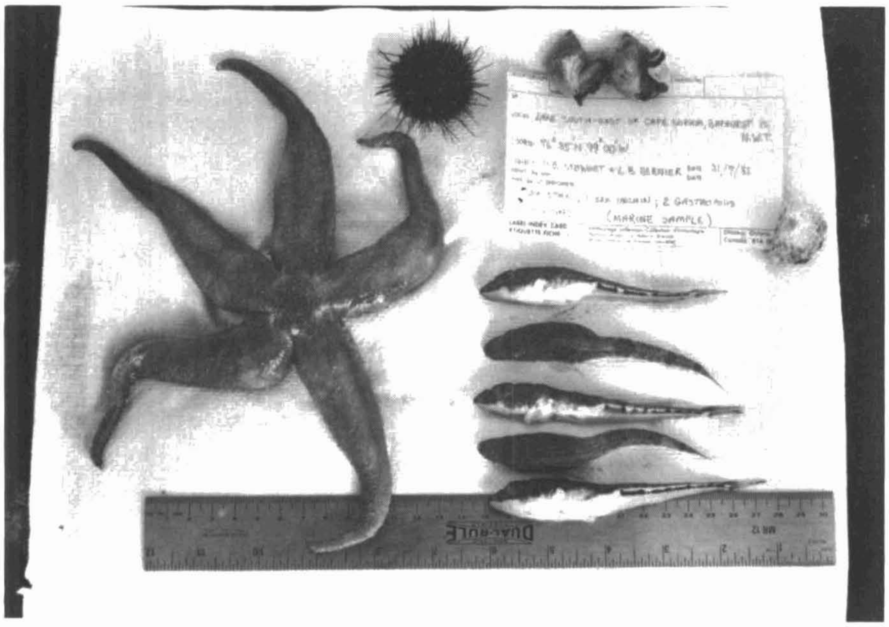
Vegetation is concentrated in low lying or sheltered areas and is exceedingly sparse in the dry uplands, particularly in areas of fragmented limestone and dolomite (Barnett *et al.* 1976; Wedel *et al.* 1978; Danks 1980). Elsewhere, saxifrage-based communities are most common, with Arctic willow, Arctic poppy, or grass species as co-dominants. Arctic willow and a variety of flowering plants vegetate the less exposed areas, while mosses and sedges dominate the wetlands (Appendix V). Plant root penetration is restricted by an underlying layer of permafrost and only the top 15 to 50 cm of soil thaws annually (Guilbault and Chacko 1978).

Forty-two bird species and eight terrestrial mammal species have been recorded on Bathurst Island (Tener 1963; Nettleship and Smith 1975; Miller *et al.* 1977; Danks 1980). During this survey, geese, eider ducks, jaegers, loons, and snowy owls were the most evident bird species; muskox, Peary caribou, and Arctic hare were the most commonly seen mammals (Appendix VI).

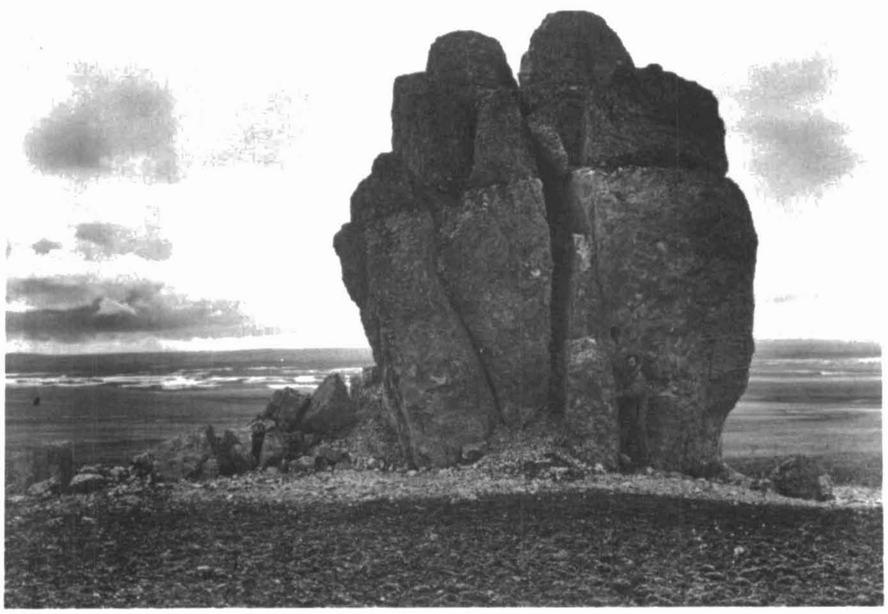
In 1968, a high arctic research station was established on Bathurst Island by the National Museum of Natural Science. The field station overlooks Polar Bear Pass, which bisects Bathurst Island from east to west. Since 1968 a variety of research projects have been conducted on plants, invertebrates, birds, and mammals of the area. This continuing research has been summarized by Danks (1980).

Domestic Commercial, and Sport Fishing

There are no permanent settlements on Bathurst Island and the nearest domestic fishermen live 100 km to the southeast in the community of Resolute, on Cornwallis Island (Fig. 1). Residents of Resolute occasionally visit lakes on the south coast of Bathurst Island, near Freemans Cove and Dyke Acland Bay, or those adjacent to Pioneer Bay on Cornwallis Island (Fig. 2; Bissett 1967; Riewe 1976; Stevenson pers. comm.). Visits are made by snowmobile between April and June, usually in conjunction with late winter hunting trips. Arctic charr are caught by jigging through holes in the ice. No catch records are available but catches are probably small and very occasional.



Marine samples collected from an ice lead along the shore of Young Inlet (76°35'N, 99°00'W), near the outlet of a lake on Cape Sophia, Bathurst Island. The fish are ribbed sculpin (*Triglops pingelii*).



Outcrops of fossilized corals are located on the hillside of Polar Bear Pass, Bathurst Island.

There is no commercial fishing in the area, although sport fishermen from the Polaris Mine on Little Cornwallis Island occasionally angle landlocked Arctic charr from nearby Frustration Lake (Fig. 2, Site 12).

Previous Aquatic Research

Aquatic biological research on Bathurst Island has been limited to unpublished studies of freshwater invertebrates and phytoplankton (Danks 1980), and an aquatic resource survey of the proposed Polar Gas pipeline route (Hatfield *et al.* 1978). During the survey, Arctic charr were caught in three lakes near Freemans Cove (Fig. 2, sites 1 and 11) and in two lakes along the east coast (site 14). All of the lakes provide good spawning and overwintering habitat for charr and some of the lakes may support anadromous charr populations. Arctic charr fry were found in the outlet stream of one of the lakes (site 1) and fourhorn sculpin fry were caught in the Goodsir River (site 15).

Lois, Frustration, and Cominco lakes on Little Cornwallis Island (Fig. 2, sites 12 and 13) all support landlocked or lake-dwelling populations of Arctic charr (B.C. Research 1978, 1979; Hatfield *et al.* 1978). Frustration Lake on the western side of the island (site 12) serves as the water supply for the nearby Polaris lead-zinc mine. Garrow Lake (site 9), the mine tailings pond, is a meromictic lake with a distinct halocline at 20 m depth (B.C. Research 1975, 1978, 1979, 1981; Fallis and Harbicht in prep.). Fourhorn sculpin *Myoxocephalus quadricornis*, the copepod *Limnocalanus macrurus*, and the shrimp *Mysis relicta* inhabit the upper 20 m of Garrow Lake. Garrow Lake limnology has been studied in detail and water quality and biological heavy metal concentrations will continue to be monitored throughout the mines operation (Kuit pers. comm.).

Previous aquatic research on Cornwallis and Devon islands has been summarized briefly by Stewart and MacDonald (1981) who surveyed lakes on both islands. Arctic charr have been caught in two lakes on the Grinnell Peninsula of Devon Island (McAllister pers. comm.); Char, Meretta and Nelson lakes on Cornwallis Island have all been studied in detail (Johnson 1976, 1980, in press; Welch 1973; Kalff and Welch 1974; Schindler *et al.* 1974a, 1974b; Rigler 1975). Meretta Lake is the only known example of a high arctic lake that has been eutrophied.

Water quality and hydrological studies have been conducted along the proposed Polar Gas pipeline route across Bathurst and Cornwallis islands (Wedel and Way 1976; Guilbault and Chacko 1978; Wedel *et al.* 1978; Wedel 1979). These reports discuss the hydrological concerns associated with pipeline development.

The marine environment has been studied near Little Cornwallis Island, in conjunction with the Polaris Mine development (B.C. Research 1975, 1978, 1979, 1981; Fallis and Harbicht in prep.), and in coastal bays near the community of Resolute on Cornwallis Island (Holeton 1974; Green and Steele 1975; Welch and Kalff 1975). Distribution records of marine fish species are summarized in Appendix I (Table 15).

Survey Results and Discussion

Surface waters of four lakes on Bathurst Island were chemically similar (Table 2, sites 1, 6, 8, 9). All of the lakes were situated on sedimentary strata. They were oligotrophic with surface temperatures below 4°C, and a nearly complete covering of ice in late July. Lake water pH was slightly basic and conductivities ranged from 100 to 210 μS/cm, with calcium and magesium as the major contributing ions. The northern-most lake, which had the highest pH and conductivity, also contained moderate amounts of dissolved sodium and chloride ions. These lakes are chemically similar to other lakes with basins of sedimentary rock on Victoria Island (Table 12; sites 4, 7, 12) and on Devon, Cornwallis and Somerset islands (Stewart and MacDonald 1981).

Garrow Lake, on Little Cornwallis Island, is brackish and had much higher concentrations of potassium, calcium, chloride, and sulphate than other lakes in the area (Table 2, site 9). As a result of these ion concentrations, conductivity and pH were high. With the exception of suspended phosphorous, concentrations of dissolved and suspended carbon, nitrogen, and phosphorous were similar to those found in lakes on Bathurst Island. Chlorophyll A and suspended phosphorous were present in lower concentrations than in other lakes sampled. These surface chemistry measurements agree well with those reported by Fallis and Harbicht (in prep.).

The chemistry of Garrow Lake changed drastically with depth. In October there was a sharp halocline at a depth of about 20 m and water below that depth was anoxic and contained high concentrations of hydrogen sulphide. The bottom waters of Garrow Lake are more than twice the salinity of seawater and are warmer than the surface water. Fallis and Harbicht (in prep.) have put forward several hypotheses to explain the lake's origins.

Limnocalanus macrurus was the dominant zooplankton species in each of the lakes sampled on Bathurst and Little Cornwallis islands (Table 1). A harpacticoid species was also present in two of the lakes on Bathurst Island and in Garrow Lake, which also contained a species of marine cyclopinid. Crustacean zooplankton were less abundant in lakes on Bathurst and Little Cornwallis islands than in lakes on Victoria and Prince of Wales islands. Very large adult *Limnocalanus macrurus* were

Table 1. Zooplankton species and their abundance (mean number of individuals per litre) in four Bathurst Island lakes and one Little Cornwallis Island lake.

Sampling Site (Fig. 2)	1	5	6	8	9
Coordinates	75°12'N, 98°12'W	75°38'N, 99°19'W	76°35'N, 98°55'W	76°25'N, 98°00'W	75°23'N, 96°47'W
Date	19/7/81	31/7/81	31/7/81	31/7/81	2/8/81, (24/10/81)
Depth (m)	28	17	6	16	5 (20)
Number of Samples	4	2	2	2	2 (1)
Ph. Arthropoda					
Cl. Crustacea					
SCl. Copepoda					
O. Calanoida					
Limnocalanus macrurus	0.46	1.82	0.25	0.96	0.02 (0.01)
copepodids	0.37	1.46	1.70	0.04	0.08
nauplii	0.04	0.01	0.18		0.08
O. Cyclopoida					
Cyclopinidae					<0.01
O. Harpacticoida		0.01	<1.0	<0.01	0.47
Total ind/L	0.87	3.30	2.13	1.00	0.65 (0.01)
Number of species	1	2	1	2	3 (1)
Ph. Rotifera	37.07	19.74	32.33		1.44 (0.02)

Table 2. Water chemistry data (means of n samples) for four Bathurst Island lakes and one Little Cornwallis Island lake.

Sampling Site (Fig. 2)	1	5	6	8	9
Date	19/7/81	31/7/81	31/7/81	31/7/81	2/8/81
Field Data					
Surface water temperature (°C)	3.0	3.0	<1.0	1.5	1.0
Depth (m)	28.0	26.0	7.5	16.5	5.5
Time of day (h)	1200	2120	1330	1245	1615
Light conditions	clear, wind	cloudy, wind	cloudy, wind	cloudy, wind	broken cloud, wind
Secchi depth (m)	9.0	3.5	7.0	5.5	>5.5
Secchi color	light blue-green	dark forest green	evergreen	pale emerald green	emerald green
Laboratory Data					
Number of samples (n)	4	2	2	2	2
pH	7.72	7.88	7.92	7.39	8.12
Conductivity at 25°C (μS/cm)	122	145	210	100	6375
Total dissolved nitrogen (μg/L)	152	140	130	115	150
Total dissolved phosphorus (μg/L)	7	6.5	6	7.5	7.5
Dissolved organic carbon (μMole/L)	152	125	120	210	120
Nutrients (μg/L)					
Suspended nitrogen	31	<1	36	36	30
Suspended phosphorus	4	4	2	3	1
Suspended carbon	462	354	310	273	324
Chlorophyll A	0.7	0.8	0.6	0.2	0.1
Major Ions (mg/L)					
Sodium	2.96	1.38	11.8	2.08	10.4
Potassium	0.26	0.40	0.80	0.36	35.8
Calcium	12.7	24.2	20.8	13.8	72.8
Magnesium	6.48	1.48	6.32	6.44	1.32
Chloride	5.4	2.2	23.2	4.5	2000
Sulphate	1.3	3.6	5.3	4.4	190

the only crustacean zooplankters found in Garrow Lake when it was sampled through the ice in late October. Rotifers, while present in both samples, were rare in Garrow Lake.

Arctic charr and/or fourhorn sculpin were caught in all of the lakes sampled on Bathurst, Little Cornwallis, and Cornwallis islands (Appendix II, Table 16). These lakes were nearly covered by ice in late July and early August and all were deep enough to support overwintering fish populations. Six of the lakes had outlet streams that may permit charr to undertake seaward feeding migrations (Fig. 2, sites 1, 2, 4, 5, 9, 10). Catches per unit of sampling effort were very low, particularly in terms of the weight yield (11.4 to 35.9 fish/100 net m/24 h; 1.2 to 3.3 kg of fish/100 net m/24 h).

Arctic charr caught in this area were generally small and old, with condition factors below 1.0 and moderate to heavy *Diphyllobothrium* spp. infections (Table 3; Appendix II, Table 16). Three of the charr populations were kept landlocked by impassable outlet streams (Fig. 2, sites 3, 7, 8). The remainder inhabited lakes whose outlet streams had summer flows that appeared sufficient to permit fish movement to and from the Arctic Ocean (sites 1, 2, 4, 5, 9, 10). While fish caught in these lakes were likely lake dwelling, some of the lakes may also support anadromous charr. The low proportion of ripening mature fish, presence of domestic fisheries, and pilots' reports of large charr all suggest that there are anadromous charr in the lakes near Freemans Cove and Dyke Acland Bay (sites 1 and 2: Bisset 1967; Riewe 1976; Doyle pers. comm.). Since anadromous charr generally feed at sea during late July and early August, they may have been absent when the lakes were sampled (Johnson 1980; Gyselman 1982). Although it has a passable outlet, Garrow Lake is brackish and does not support Arctic charr (Fallis and Harbicht in prep.).

Length-frequency distributions of the charr populations tended towards bimodality, both in one of the landlocked lakes (Fig. 3a, site 6) and in a lake that may support anadromous charr (Fig. 3b, site 5). Bimodal length-frequency distributions are a common feature of unexploited Arctic charr populations in high arctic lakes with only one fish species (Johnson 1976, 1980, 1981, in press; Stewart and MacDonald 1981). Ages varied widely within each length class and with one exception the youngest mature fish were at least 13 years old (Table 4). This late maturation may reflect the small sample sizes since, in the largest sample individuals of both sexes matured by 7 years of age. The overall sex ratio favoured males by a ratio of 2:1 and individual charr do not appear to spawn annually since only 23% of the mature fish were entering spawning condition. In this area, spawning probably begins in mid to late August and continues into early September.

Table 3. Summary of age, length, and weight data for Bathurst Island and Cornwallis Island Arctic charr.

Sampling Location			Length (mm)		Weight (g)		Condition Factor[1]		Length-Weight Relationship[2]				Age (y)		
Site # (Fig. 2)	Coordinates	N	Mean (Range)	S.D.	Mean (Range)	S.D.	Mean	S.D.	y intercept (log a)	slope (b)	S.D. of b	r^2	n	Mean (Range)	S.D.
1	75°10.5'N, 98°09'W	10	375 (319 - 460)	39	517 (310 - 810)	156	0.960	0.108	-4.468	2.785	0.376	0.873	10	20.0 (15 - 24)	2.9
2	75°02'N, 99°09'W	27	298 (89 - 492)	109	294 (4.5 -1040)	266	0.793	0.082	-5.289	3.076	0.047	0.994	27	17.3 (6 - 25)	4.4
3	75°24'N, 100°06'W	16	464 (175 - 598)	121	996 (40 -1920)	512	0.854	0.131	-5.290	3.082	0.104	0.984	16	22.6 (8 - 30)	5.9
4	75°26'N, 100°00'W	7	349 (330 - 370)	14	380 (330 - 440)	43	0.895	0.036	-4.286	2.700	0.438	0.884	7	19.4 (13 - 23)	3.2
5	75°38'N, 99°19'W	61	208 (103 - 450)	109	144 (9 - 660)	194	0.814	0.081	-5.187	3.042	0.025	0.996	48	10.4 (4 - 26)	7.2
6	76°35'N, 98°55'W	31	318 (150 - 430)	66	285 (25 - 580)	145	0.792	0.132	-5.443	3.135	0.123	0.957	28	18.7 (14 - 22)	2.2
8	76°25'N, 97°58'W	7	382 (310 - 542)	80	597 (270 -1900)	582	0.888	0.159	-6.016	3.372	0.372	0.943	7	22.3 (18 - 37)	6.8
10	75°02.5'N, 96°17'W	8	293 (113 - 356)	88	228 (13 - 340)	120	0.784	0.082	-4.670	2.821	0.078	0.996	3	20.0 (18 - 22)	2.0

[1] condition factor = weight in g·(fork length in mm)$^{-3}$·10^5
[2] log weight in g = b·log length in mm + log a

Table 4. Summary of sexual maturity data for Bathurst Island and Cornwallis Island Arctic charr.

Site # (Fig. 2)	Date	N	Sex	Maturity: Immature	Mature	Near Ripe	Ripe	Ripe & Running	Spent	Unknown	Age of youngest mature fish (y)	Length of youngest mature fish (mm)
1	20/7/81	6	male		4	2					15	382
		4	female		2	2					19	460
		13	total		6	4				3		
2	20/7/81	14	male	3	8	3					15	192
		13	female	1	10	2					15	205
		27	total	4	18	5						
3	1/8/81	12	male	1	6	5					20	404
		4	female	1	2	1					21	418
		16	total	2	8	6						
4	1/8/81	5	male		5						19	350
		2	female		2						13	335
		7	total		7							
5	1/8/81	33	male	19	11	3					5	132
		30	female	16	13	1					7	126
		63	total	35	24	4						
6	31/7/81	25	male		19	6					14	275
		3	female		3						17	273
		28	total		22	6						
8	31/7/81	7	male		6	1					18	327
			female									
		7	total		6	1						
10	2/8/81	7	male	3	3	1					18	345
		1	female			1						
		8	total	3	3	2						

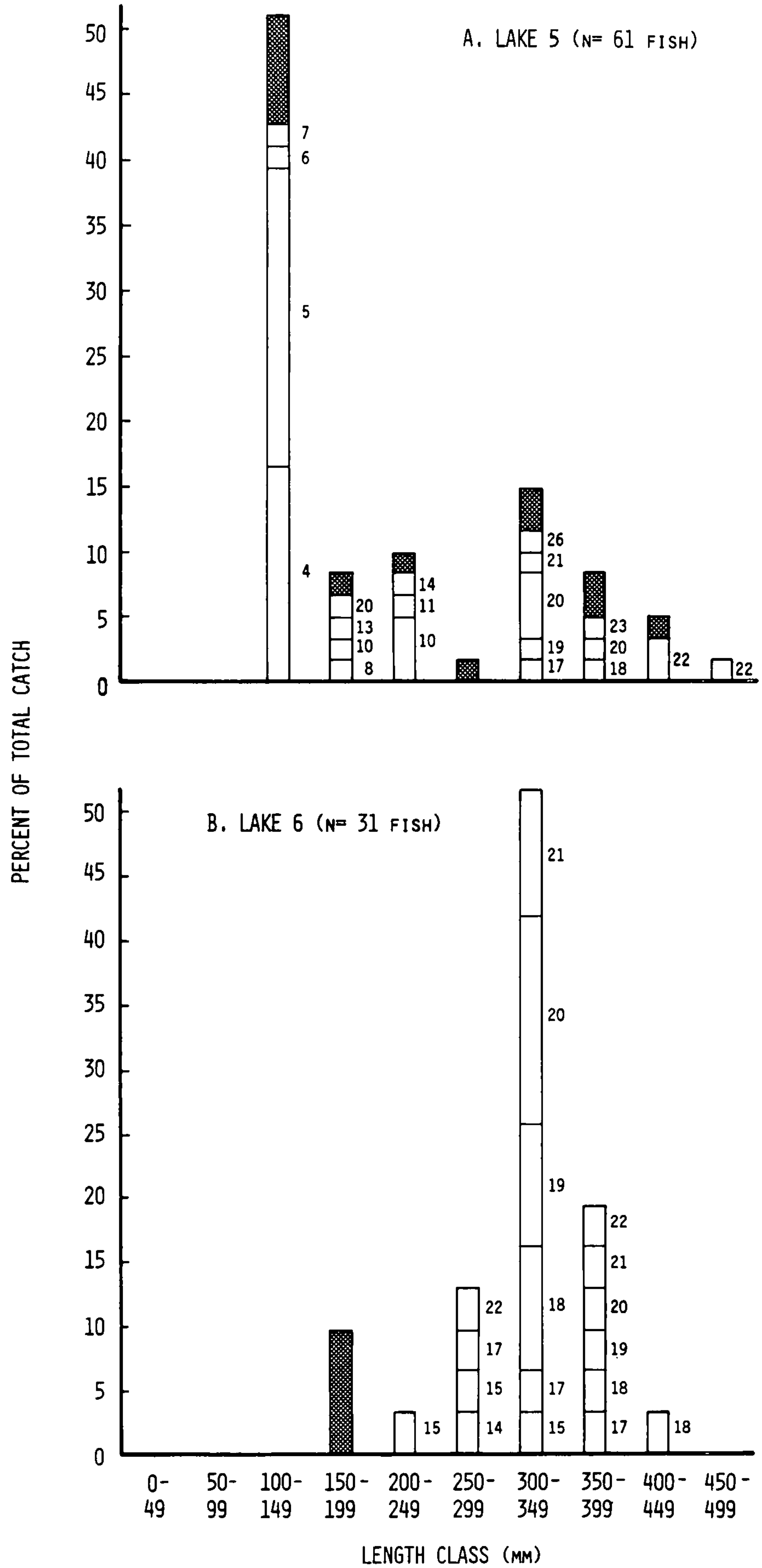


Fig. 3. Age-frequency distribution by length class in the catches of Arctic charr *Salvelinus alpinus* from (a) lake 5 (75°38'N, 99°19'W) and (b) lake 6 (76°35'N, 98°55'W) on Bathurst Island N.W.T. Stippling indicates fish that were not aged.

Charr were omnivorous although chironomid pupae constituted the bulk of their diet in most lakes with cannabalism prevalent in one landlocked lake (Appendix III, Table 20; Appendix V, Table 24). A variety of insects and crustaceans, plant material, fish eggs, and fish formed the remainder of their diets.

Most of the Arctic charr were infected with *Diphyllobothrium ditremum* or *D. dendriticum* which encysted in the gut wall (Appendix II, Table 16; Appendix IV, Table 22). *Cystidicola cristivomeri*, a species of nematode, was present in the swimbladders of charr in all but one lake (site 2). This may indicate that *Mysis relicta,* the intermediate host, is absent from the lake (site 2). Low level infections of the cestode *Eubothrium salvelini* were found in the digestive tracts of individual charr from all but two lakes (sites 1 and 10). Another intestinal cestode, *Proteocephalus arcticus,* occurred in two fish from separate lakes (sites 2 and 3). An acanthocephalan, *Echinorhynchus gadi*, was found in the intestine of individual fish from a variety of locations, sometimes in large numbers (sites 1, 4, 5, 10). *Salmincola* sp., a parasitic copepod, was found attached to the lining of the mouth cavity of charr in several lakes (sites 4, 5, 10). The presence of these parasite species, particularly *Diphyllobothrium* spp. and *Eubothrium salvelini,* and absence of marine parasites support the suggestion that these fish are from landlocked or lake-dwelling rather than searun populations (Dick and Belosevic 1981).

Fourhorn sculpin were the only other fish species inhabiting lakes in this area (Appendix II, Table 16). Those in Garrow Lake (site 9), while they have access to the sea, do not appear to feed at sea as they are smaller and slower growing than fourhorn sculpin found in the ocean (Fallis and Harbicht in prep.). Even landlocked fourhorn sculpin from northern Bathurst Island (site 6) are larger, perhaps because they eat the eggs and fry of charr which also inhabit the lake. Sculpin on western Cornwallis Island (site 10) also share their lake with charr but in addition, they have access to the sea. These fourhorn sculpin grow nearly as large as those in the ocean either from preying on charr or from undertaking seaward feeding migrations.

Marine fish caught in this area during the survey included polar cod *Arctogadus glacialis* and fish doctor *Gymnelis viridis* from Resolute Bay and ribbed sculpin *Triglops pingelii* from Young Inlet (Appendix II, Table 16). These fishes, together with a variety of marine invertebrates, are now housed in the National Museum of Natural Science collections in Ottawa.

Melville Island

General Description

Melville Island is situated north of Viscount Melville Sound between Bathurst and Prince Patrick islands (Fig. 1). It has a surface area of 42,000 km^2 but, because of the convoluted shoreline, no part of the island is more than 40 km from the Arctic Ocean.

The island is divided into three physiographically distinct areas, namely: Sverdrup Lowland and Parry Plateau of the Innuitian Region and Victoria Lowland of the Arctic Region (Bostock 1970, 1972). Sverdrup Lowland encompasses Sabine Peninsula, Emerald Isle, and Sproule Peninsula - the area directly south of Emerald Isle (Fig. 4). Developed on a structural basin of generally soft, poorly consolidated, and little deformed Mesozoic rocks, the lowlands rise gently from northeastern coastal flats to plateau elevations of about 150 m above sea level (asl). For the most part, they are rolling, scarped lowlands but locally, areas of upland and dissected plateau reach elevations of 400 m asl. Two prominent gypsum domes near the north end of Sabine Peninsula relieve the monotony of the terrain. They rise about 225 m above the surrounding plain where local relief is mostly less than 30 m. Many of the small rivers and streams that drain the area only flow during the snowmelt period and ponds and lakes only occur in a few localities (Tozer and Thorsteinsson 1964; Steen and Hora 1978). Parry Plateau to the south includes the remainder of Melville Island with the exception of southern Dundas Peninsula. Topography of this area has developed on Palaeozoic sedimentary rock which is gently folded in southeastern and central Melville Island but has undergone Tertiary faulting in the north and west. A rolling plain covers the southeastern and central area. It rises gently from the coasts to over 200 m asl and local relief is generally less than 50 m. In the Weatherall Bay area, to the north and west of 111° 30' W longitude, the island's landscape is rugged with coastal cliffs rising abruptly to plateau elevations of 300 to 550 m asl. Fault line scarps are the dominant topographical feature. The Parry Plateau area is generally well drained by ephemeral rivers and streams but ponds and lakes are rare (Bengyfield *et al.* 1977; McLaren 1981). They are limited to a few localities along the eastern half of the south coast and near Nias Point. Victoria Lowland, which encompasses southern Dundas Peninsula, rises from the coasts to form a level, youthfully dissected plateau which is 200 to 300 m asl and has developed on essentially horizontal, Palaeozoic sedimentary rock (Tozer and Thorsteinsson 1964). There are no lakes in the area.

Much of Melville Island is covered by Mesozoic or Palaeozoic sandstones, siltstones, conglomerates, and marine shales (Tozer and Thorsteinsson 1964; Thorsteinsson and Tozer 1970; Steen and Hora 1978). Limestone, coal, and volcanic rock are also present except in southern Dundas Peninsula.

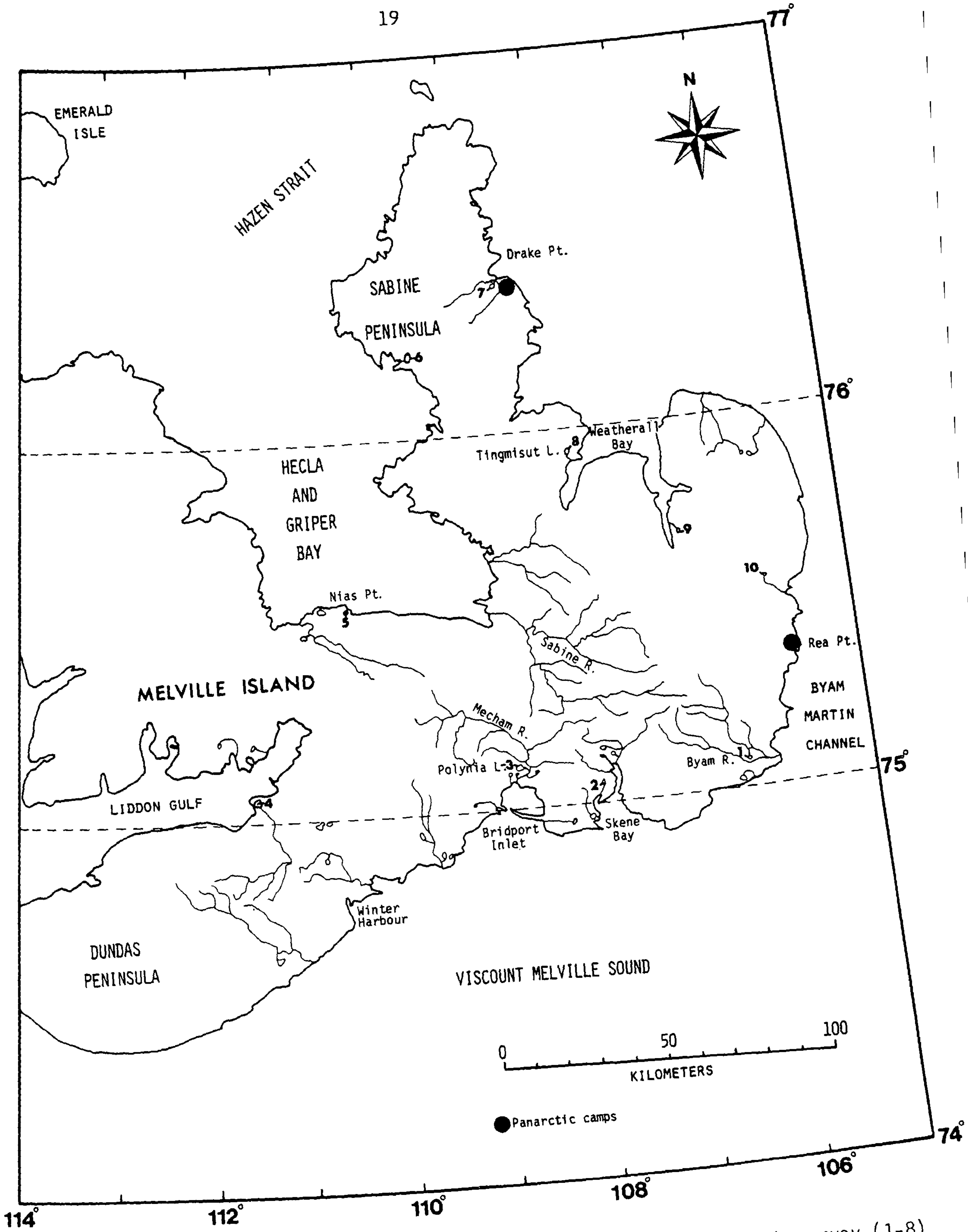


Fig. 4. Sites on Melville Island, N.W.T. sampled during the 1981 fish survey (1-8) or investigated during previous research (9, 10).

Most or all of Melville Island was glaciated in pre-Wisconsin times and local Wisconsin glaciation may have formed the fiord-like inlets that indent the island's southwestern coast (Tozer and Thorsteinsson 1964; McLaren and Barnett 1978). The last Laurentide Ice Sheet does not appear to have glaciated the island except in the Winter Harbour area which probably marked its northern limit. Today, several small ice fields cap the highlands of western Melville Island. Formed from wind drifted snow, they appear to be waning. Estimates of the maximum post glacial rebound range between 60 m asl in western Melville Island and 120 m asl in eastern Melville Island, where ice cover was either heavier or more recent. Marine shells have been collected from elevations of 90 m above the present sea level near Tingmisut Lake but evidence for marine emergence has not been found in southeastern Melville Island.

The climate is high arctic with a mean annual temperature range of 38 to 40°C and mean daily temperatures of between -35 and -33°C in January and 3 and 5°C in July (Thompson 1967; Fletcher and Young 1976; Steen and Hora 1978; Maxwell 1981). Darkness is continuous from November until early February and sunlight is continuous, albeit at a low angle of incidence, from late April until mid-August. Daily mean temperature remains below 0°C beginning August 20 to 25 and ending June 10 to 15. Annual precipitation ranges from 100 to 125 mm, between 35 and 40% of which falls as rain. River flow generally stops altogether after the mean temperature drops below 0°C and peak flows normally occur as a result of snowmelt, although orographic precipitation may cause extreme fluctuations in stream discharge (Wedel 1979; McLaren 1981). Some sheltered deep lakes may not lose their ice cover annually and multi-year sea ice dominates the channels both in summer and winter, reducing the maritime effect. Surface-based temperature inversions are common in this region and wind is predominantly from the northwest with an average speed of about 15 km/h (Fletcher and Young 1976; Maxwell 1981).

Vegetation is concentrated in low lying or sheltered areas and is exceedingly sparse in the dry uplands, particularly in areas of limestone or dolomite and at higher elevations in white sandstone (Tozer and Thorsteinsson 1964). Vegetation is highly variable and includes lichens, mosses, flowering plants, grasses, and dwarf shrubs (Steen and Hora 1978). The extent and type of vegetation cover present in an area depends largely on the surface materials present and the microclimate. Permafrost generally lies within a meter of the surface. Plant species collected during this project are listed in Appendix V and detailed information is available in Porsild (1957, 1964), Cody *et al.* (1976), and Steen and Hora (1978).

During this survey, snow geese and black brant were the most evident bird species and muskox and Peary caribou were the most commonly seen mammals (Appendix VI). Melville Island is an important refugium for muskox and supports a modest caribou population (Tener 1963; Parker *et al.* 1975; McLaren *et al.* 1977; McLaren and Renaud 1977a; Miller *et al.* 1977; Thomas *et al.* 1981). Bird species inhabiting Melville Island have been discussed by McLaren and Renaud (1977b) and Maltby (1978).

Erosion of sedimentary strata by a seasonal stream on north-eastern Bathurst Island. Similar erosion is found on Melville, Prince of Wales, Cornwallis, and Little Cornwallis islands.

South coast of Weatherall Bay, Melville Island, looking west. Note the ephemeral coastal streams and July pack ice.

The only sites of habitation on Melville Island are Rea Point, a staging area for Panarctic Oil's exploratory drilling program in the area, and Drake Point, a natural gas drilling camp. Neither site has a permanent population (Arctic Pilot Project 1980). A consortium led by Petro-Canada proposes to pipe natural gas from the Panarctic wells at Drake Point to Bridport Inlet, where gas liquefaction and harbour facilities are planned. Liquified natural gas would then be shipped south year-round through Viscount Melville and Lancaster sounds. These proposed developments, called the Arctic Pilot Project, have stimulated scientific research into the environmental impacts associated with pipeline and harbour construction in the area. Several of these studies are listed above and others, dealing with a variety of subjects ranging from archaeology to oceanography, have been referenced in the report of the panel assessing the environmental aspects of the project (Arctic Pilot Project 1980).

Domestic, Commercial, and Sport Fishing

Lakes on Melville Island are not fished either domestically or commercially because their distance from permanent settlements makes such fishing impractical.

Pilots occasionally angle for the small landlocked Arctic charr in Tingmisut Lake but sport fishing on Melville Island is rare (Doyle pers. comm.). If the proposed harbour and gas liquefaction facilities are installed at Bridport Inlet, a limited sport fishery may develop in the area. Before sport fishing is permitted, further research should be conducted to determine whether anadromous Arctic charr are present and to determine the optimal sustainable yields of fish populations in the lakes.

Previous Aquatic Research

Sabine (1821) was the first to examine fish from Melville Island. His report was inconclusive as to location and species as the specimens, probably Arctic charr, had been carried in the pocket of a lost sailor for some time before they were examined. Somewhere along the south coast of Melville Island, within 20 km of the shore, is a lake where small silvery fish can be caught by hand!

Only three other researchers have reported biological sampling of lakes and streams on Melville Island. In August 1976 Hennig (pers. comm.) sampled seven stream drainage systems, none of which contained water of sufficient depth to support overwintering fish, and one lake (Fig. 4, site 7). No fish were caught or seen either in the streams or in the lake which was 15 m deep near the centre, half covered by ice at the time of sampling, and very turbid. Sixteen drainage systems between Drake Point and Bridport Inlet, and along the south coast between Winter

Harbour and Skene Bay, were sampled during July and August 1977 by Bengyfield *et al.* (1977). With the possible exception of Mecham River, the streams sampled were too shallow to support overwintering fish populations and fish were not caught or seen in them. Arctic charr were present in all but two of fourteen lakes sampled along the south coast. However, data presented was not sufficient to determine whether any of the lakes contained anadromous populations. Chironomids were the main food consumed by the charr during the summer and swimbladder nematodes, stomach cysts, and intestinal tapeworms were common. Hatfield *et al.* (1978) sampled three lakes on Melville Island in 1977, along the proposed Polar Gas pipeline route. A single Arctic charr was caught in a lake north of Rea Point (site 10), and gill nets did not catch fish in Baldwin Lake (site 9) or in an unnamed lake on the west side of Sabine Peninsula (site 6).

Wedel and Way (1976) conducted water quality and hydrological studies along the proposed Polar Gas pipeline route across Melville Island and discussed the hydrologic concerns of pipeline development (Wedel 1979).

Ice biota, phytoplankton, macrophytes, zooplankton, zoobenthos, inter-tidal invertebrates, and marine fishes in Bridport Inlet were studied in 1977 by Buchanan *et al.* (1977). Their report (exclusive of mammals) contains the only detailed marine biological information available for Viscount Melville Sound and it assesses some potential effects of the Arctic Pilot Project on that environment. Smith and Hammill (1980) studied ringed seal *Phoca hispida* in Bridport Inlet and discussed the potential impacts of harbour development on marine mammals.

Survey Results and Discussion

Lakes on Melville Island all appeared to be monomictic with surface temperatures below 4°C in late July (Table 6). The deeper sheltered lakes were nearly covered by ice (Fig. 4, sites 3, 7, 8). Chemical testing showed water in Polynia Lake to be slightly acidic and to have a low conductivity and light penetration. These are probably attributable to the type of rock that forms the lake basin. It is sedimentary, soft, and appears to be sulphate rich and calcium poor. These effects are much more pronounced in the unnamed lake near Drake Point (site 7), where the light penetration is extremely low due to the erosion of unconsolidated surface material which is calcium poor and sulphate rich. The presence of chloride and sodium in higher concentrations than are generally found in Arctic lakes compensate for the low calcium concentrations so that conductivity resembles that found in most other Arctic lakes. Suspended carbon, nitrogen, and phosphorus concentrations are very high, probably reflecting the composition of surface materials, and dissolved phosphorous levels are extreme for an Arctic lake (60 μg/L). Meretta Lake on

Table 5. Zooplankton species and their abundance (mean number of individuals per litre) in two Melville Island lakes.

Sampling Site (Fig. 4)	3	7
Coordinates	75°06'N, 108°43'W	76°23.5'N, 108°33.5'W
Date	21/7/81	22/7/81
Depth (m)	7.2	14.2
Number of Samples	4	4
Ph. Arthropoda		
Cl. Crustacea		
SCl. Copepoda		
O. Calanoida		
Limnocalanus macrurus		0.83
copepodids		0.01
nauplii		0.35
O. Cyclopoida		
Cyclops scutifer	1.44	0.10
copepodids	3.97	
nauplii	3.26	0.01
Total ind/L	8.67	1.30
Number of species	1	2
Ph. Rotifera	70.83	1.43

Table 6. Water chemistry data (means of n samples) for two Melville Island lakes.

Sampling Site (Fig. 4)	3	7
Date	21/7/81	22/7/81
Field Data		
Surface water temperature (°C)	2.0	0.5
Depth (m)	7.2	14.3
Time of day (h)	0025	1910
Light conditions	sunny, calm	cloudy, wind
Secchi depth (m)	1.0	0.07
Secchi color	pale blue green	dirty grey brown
Laboratory Data		
Number of samples (n)	4	4
pH	6.46[1]	6.34
Conductivity at 25°C (μS/cm)	40	120
Total dissolved nitrogen (μg/L)	173[1]	270
Total dissolved phosphorus (μg/L)	9	60
Dissolved organic carbon (μMole/L)	105	280
Nutrients (μg/L)		
Suspended nitrogen	26	91
Suspended phosphorus	6	34
Suspended carbon	220	1090
Chlorophyll A	0.6	0.8
Major Ions (mg/L)		
Sodium	2.23	14.3
Potassium	0.62	1.94
Calcium	2.34	3.56
Magnesium	1.40	2.70
Chloride	3.02	18.3[1]
Sulphate	7.0	16.4

[1] n = 3

Cornwallis Island, which has been eutrophied by sewage from the Resolute airbase, contains only 38 μg of dissolved phosphorous/L (Stewart and MacDonald 1981).

Lakes in the Bridport Inlet area likely resemble Polynia Lake chemically, while the unnamed lake on the west side of Sabine Peninsula (site 6) probably resembles the lake near Drake Point (site 7). Tingmisut Lake and the lakes near Nias Point are more transparent and situated on sandstone and limestone. Their chemistry may resemble that of lakes on the west side of Bathurst Island (Table 2, site 5). Shoreline vegetation is very sparse except around the shores of lakes near the southern coast which support small areas of sedge and moss growth.

Rotifers and the crustacean *Cyclops scutifer* were present in both lakes sampled on Melville Island, but *Limnocalanus macrurus* was only found in the lake near Drake Point (Table 5). Zooplankters were more abundant in Polynia Lake than in similar lakes on Bathurst Island (Table 1). The abundance of *Limnocalanus macrurus* in the lake near Drake Point resembled that in Bathurst Island lakes but few *Cyclops scutifer* or rotifers were present. Predation by *Mysis relicta*, which were abundant in the lake, or the extreme turbidity may have reduced the zooplankton population.

Arctic charr and fourhorn sculpin were the only fish species caught in freshwater lakes on Melville Island. Charr are present in most lakes on the south coast (site 3; Bengyfield *et al.* 1977). Exceptions were the shallow plateau lakes which freeze to the bottom in winter and cannot support fish populations (site 1), and perhaps 'Water Supply' lake (Bengyfield *et al.* 1977). Some of the southern lakes, particularly Polynia Lake, may support anadromous charr populations. Polynia Creek which joins Polynia Lake to the Mecham River had a flow rate of 0.124 m^3/s on July 20. While this rate is low, fishes may have been able to navigate the channel which was a minimum of 10 cm deep and would be much higher during spring runoff or summer rains. Charr fry were caught in the stream channel. Fourhorn sculpin were caught in one freshwater and one brackish lake in this area (sites 2 and 4). Further samplings will probably discover relict populations of these marine fish in other lakes along the south coast.

Charr may be absent from the two unnamed lakes sampled on Sabine Peninsula (sites 6 and 7). Each lake has now been sampled twice, using a variety of gear types, without success. The abundance of *Mysis relicta* in the lake near Drake Point also suggests that fish may not be cropping the population. High particulate concentrations may make these lakes uninhabitable for charr, perhaps by reducing spawning success.

Tingmisut Lake supports a sparse population of slow-growing, land-locked Arctic charr (Appendix II, Table 17). Three charr, weighing a total of 1.2 kg were caught per 100 m of gillnet set for 24 h. Gonad maturation suggests that these fish spawn in mid to late August. Analysis of their stomach contents showed that plant material (*Nostoc* sp.), *Mysis relicta*, and chironomid larvae and pupae were the main foods eaten during late July (Appendix III, Table 20). All of the fish caught were parasitized by *Diphyllobothrium* sp., which were encysted in the gut wall. The nematode *Cystidicola cristivomeri* was common in the swimbladders and the parasitic copepod *Salmincola* sp. was common in the mouth cavity (Table 17). *Eubothrium salvelini*, a cestode, was present in the intestine of one fish.

Limited sampling in one of the lakes on Nias Point (site 5) failed to catch fish but further sampling may discover fish in two or three of the small lakes in that area.

Prince of Wales Island

General Description

Prince of Wales Island is situated south of Viscount Melville Sound between Somerset and Victoria islands (Fig. 1). It has a surface area of 33,000 km^2 and an irregular shoreline.

The island is divided into two distinct physiographic areas, Victoria Lowland of the Arctic Region and Boothia Plateau of the Kazan Region (Bostock 1970, 1972). Victoria Lowland covers most of the island. Developed on little deformed Palaeozoic sedimentary strata, it rises in steep coastal cliffs in the north but elsewhere, it forms low rolling plateaux. Escarpments divide Victoria Lowland into three regions. North of Scarp Brook there is an upland, 100 to 200 m above sea level (asl), which has few lakes but is well drained by periodic streams (Fig. 5). East of Crooked and Fisher lakes lies another rolling upland, 100 to 200 m asl, with a similar drainage pattern. A low region, less than 100 m asl with gentle relief, covers the rest of Victoria Lowland and contains most of the lakes and rivers on the island. Boothia Plateau, which is part of the Canadian Shield, includes the eastern third of Prescott Island and a narrow coastal band of Prince of Wales Island south to Transition Bay. The area is a rugged upland which rises abruptly to over 300 m asl, contains few lakes, and is drained by periodic streams (Manning and Macpherson 1961; Bostock 1970, 1972).

Palaeozoic sandstones, siltstones, limestones, dolomites, conglomerates, shales and gypsums, often in the form of unconsolidated glacial till, cover most of Victoria Lowland (Blackadar and Christie 1963; Fortier *et al.* 1963; Craig 1964). Most of the large lakes, including Crooked and Fisher lakes, are found in this region. The rugged Boothia Plateau region along the east coast is predominantly underlain by granitic gneisses of the Precambrian Shield which are sometimes overlain by sandstones, conglomerates, limestones, and shales.

The last Laurentide Ice Sheet covered Prince of Wales Island until between 9 and 10 thousand years ago and eskers, kames, drumlins and moraines are common, especially in the Ommanney Bay area (Craig 1964; Prest *et al.* 1972; Prest 1973). Maximum post glacial rebound was between 100 and 150 m above the present sea level and virtually all areas of the island that now contain lakes were once covered by ocean (Andrews 1972; Prest *et al.* 1972). Extensive raised marine beaches surround Crooked Lake and the Dolphin River outlet area (Plate 1; Wedel and Way 1976).

The climate on Prince of Wales Island closely resembles that of Bathurst Island (Thomson 1967; Fletcher and Young 1976; Maxwell 1981). There is a mean annual temperature range of 37 to 39°C with mean daily temperatures near or slightly below -33°C in January and between 3 and 5°C in July. The mean daily temperature remains below 0°C from August 25 to June 15 annually and surface based temperature inversions are frequent. Rainfall comprises 35 to 40% of the 125 to 150 mm of annual

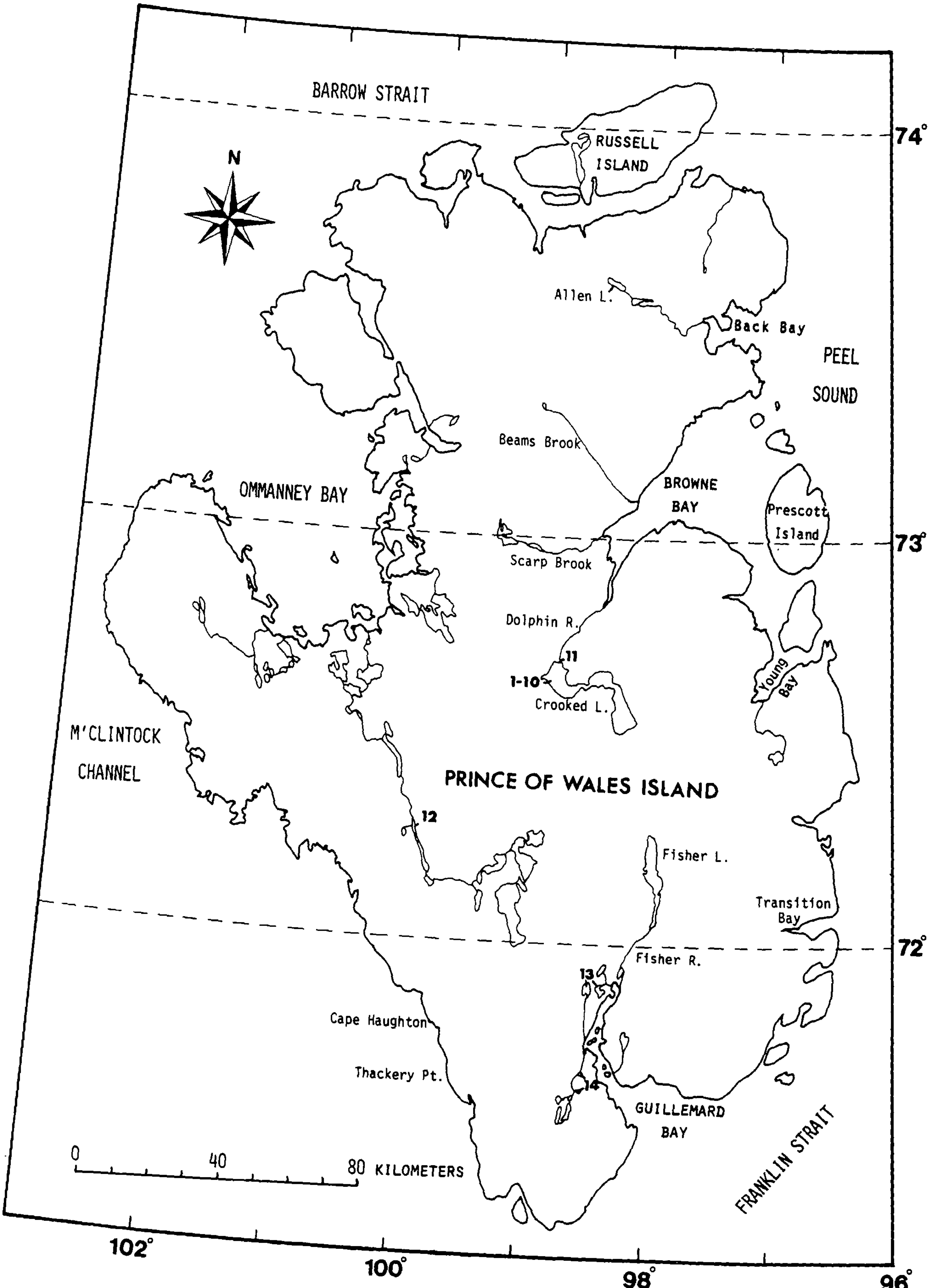


Fig. 5. Sites on Prince of Wales Island, N.W.T. sampled during the 1981 fish survey (1-11) or investigated during previous research (12-14).

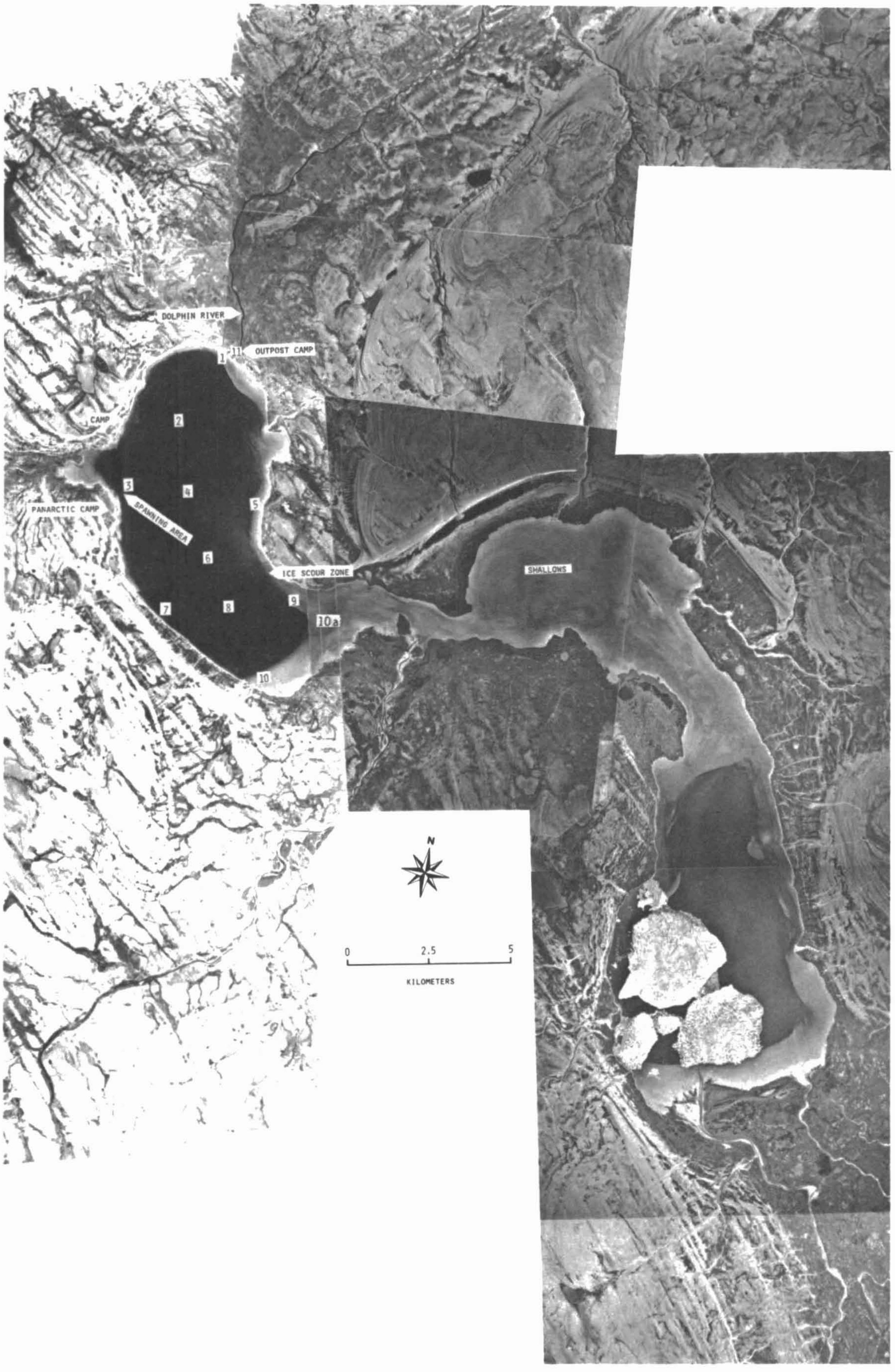


Plate 1. Photo mosaic of Crooked Lake, Prince of Wales Island, showing sampling sites and the probable area of Arctic charr *Salvelinus alpinus* spawning. Aerial photographs courtesy of the National Air Photo Library, Ottawa.

precipitation. During winter the plateaux are windswept and snow collects in sheltered low lying areas (Miller and Kiliaan 1980). Snowmelt and runoff on Prince of Wales Island occur in late June and early July. Peak stream flows normally occur as a result of snowmelt, although orographic precipitation may cause extreme fluctuations in stream discharges (Sekerak and Graves 1975; Wedel 1979). Sea ice surrounding the island is a mixture of first and multi-year types and the degree of summer clearing varies from year to year.

In 1981, lakes on the island were generally ice-free during August but shallow ponds were ice-covered by late August and edge-ice began forming on Crooked Lake in early September. Between August 20 and September 2, temperatures ranged from +13 to -12°C; there was only one frost free day; wind was generally from the southwest at 10 km/h, and it began snowing on August twenty-seventh.

Vegetation is sparse in exposed upland areas of Prince of Wales Island where lakes are nearly absent. Lichens are the main vegetative component in these areas, followed by mosses and a very few vascular plants. In dry gravelly regions, where topography offers slightly more protection, communities are dominated by Arctic avens and lichens. Saxifrages and/or Arctic willow, together with mosses and lichens dominate slopes and flats, and the sides and bottoms of valleys. Sedge-moss meadows are common in the Back Bay lowlands, throughout Allen, Crooked, and Fisher lake drainages, and on the coastal regions of southern Browne Bay (Manning and Macpherson 1961; Russell *et al.* 1979). Plants collected from the shoreline of Crooked Lake are listed in Appendix V (Table 22).

During their biological investigation of Prince of Wales Island, Manning and Macpherson (1961) found 36 bird and 8 terrestrial mammal species.. Since then, muskox and caribou on the island have been studied to assess the possible impacts of the proposed Polar Gas pipeline development on their populations (Miller and Gunn 1978, 1979; Russell *et al.* 1979; Miller and Kiliaan 1980). During this survey, 6 terrestrial mammal species and 12 bird species were identified in the Crooked Lake area (Appendix VI, Table 26).

Since Polar Gas proposed the construction of a natural gas pipeline along the island's north-south axis, there have been a variety of environmental impact studies conducted (eg. Sekerak and Graves 1975; Miller and Gunn 1979; Russell *et al.* 1979).

Domestic, Commercial, and Sport Fishing

There are no permanent settlements on Prince of Wales Island but three families from Resolute have a year-round camp at Back Bay (Stevenson pers. comm.). Between June and September, they net and angle anadromous Arctic charr along the bay shore, at the outlet of Allen Lake, and occasionally from inner Browne Bay (Fig. 5). Residents of Resolute also have an outpost camp on Crooked Lake (Plate 1). The camp is used during April and May and in October as a base for hunters, trappers, and fishermen from Resolute who operate in the area. Arctic charr and least cisco are netted and, in October 1981, three men caught 450 cisco in two days. Cisco are a prized food fish that are difficult for Resolute residents to obtain. The catch success prompted a request that a 454 km commercial quota be established on Crooked Lake least cisco, so that the fish can be sold through the Resolute Co-operative. Arctic charr and least cisco are caught in Fisher Lake by hunters and trappers from Resolute who occasionally visit the area in spring or fall (Bissett 1967).

Spence Bay residents are reported to have fished lakes in the Young Bay area in conjunction with marine mammal hunting (Brice-Bennet 1976), but have not fished the area recently (Lyall pers. comm.).

Panarctic Oil Limited operated a private sport fishing camp on Crooked Lake during the summers of 1980 and 1981. Between August 29 and 30, 1981, some 66 Arctic charr, weighing between 2 and 6.5 kg apiece, were kept by eleven guests who each angled about 8 h. Total annual catch for the camp was an estimated 150 fish.

Previous Aquatic Research

There have been three previous aquatic biological surveys conducted on Prince of Wales Island. Manning and Macpherson (1961) caught anadromous Arctic charr in inner Browne Bay from July 7 until the nets were taken in on September 9, 1958. They felt that the charr came from either Scarp Brook or the Dolphin River. No fish were caught in the Dolphin River when it was sampled on July 9 and 10 or on August 12 and 13; both anadromous and lake-dwelling forms of charr were caught in Crooked Lake between July 12 and 15. Andadromous charr were caught in Young Bay and seen at the mouths of Fisher River, two streams between Thackeray Point and Cape Haughton, and at the mouth of a stream in the southeastern corner of Ommanney Bay. Şekerak and Graves (1975) investigated aquatic resources along the proposed Polar Gas pipeline, including measurements of the physical characteristics of lakes and streams, water quality, primary production in lakes, stream benthic invertebrates, and fish. They caught anadromous Arctic charr in inner Browne Bay, in Crooked Lake and at the head of Guillemard Bay. Lake-dwelling charr were caught in Beams Brook, at Crooked Lake and in several of its tributary streams, and in lakes on the west side of Guillemard Bay (sites 13 and 14). de March and Eddy (1976) conducted a synoptic survey of aquatic habitats along the proposed pipeline route and caught Arctic charr in Crooked and Fisher lakes and least cisco in Fisher Lake and Ommanney River (site 12).

Water quality and hydrologic regimes along the proposed pipeline route were studied by Wedel and Way (1976).

Survey tent camp on Crooked Lake, Prince of Wales Island, August 27, 1981.

Adult female Arctic fox (*Alopex lagopus*) in summer pelage inspecting Arctic charr netted from Crooked Lake.

Survey Results and Discussion

Crooked Lake was the only lake studied on Prince of Wales Island. It was sampled between August 20 and September 3 in order to obtain more detailed local information on fishes inhabiting the survey area.

Limnology

Crooked Lake is the catchment basin of a 2100 km^2 watershed which empties into the Arctic Ocean via Dolphin River (Plate 1). As its name implies, the lake is crooked, with distinct north and south basins separated by a wide shallows. It is the largest lake on the island with a surface area of 12,610 ha, length of 27.4 km, and shoreline development index of 2.336. The northwestern basin is 7 m deep with a level bottom and clear water; the southeastern basin is shallow and turbid. Bottom vegetation and sediment in the upper 2 to 2.5 m of the lake have been disturbed by ice action. In this zone of ice scouring, the bottom substrates are rocks, pebbles, and sand while below it they are mud and detritus. The largest inflowing streams enter the south end of the lake and flow only during the summer. Many of the streams draining into Crooked Lake only flow during spring runoff or heavy rains and remain dry over most of the year. The Dolphin River drops the 14 m from Crooked Lake to the Arctic Ocean over a distance of 30 km. In mid-August 1975 it had a discharge of 15.7 m^3/s (Wedel and Way 1976).

Crooked Lake is probably a cold monomictic lake and has the short open water period characteristic of high arctic lakes (Hutchinson 1957; Schindler *et al.* 1974b; de March *et al.* 1977). Breakup and freeze-up dates are unknown, but there was a 1.7 m layer of ice on Crooked Lake in late May and early June, 1974 (Sekerak and Graves 1975). The lake was ice-free before our arrival on August 20 but shore ice was beginning to form by the end of August. Shallow lakes and ponds in the area were frozen over by September 3. During a calm sunny period between August 20 and 21, the surface water temperature rose to between 5.9 and 7.2°C. As the lake is relatively shallow and exposed, the warming was transient and strong winds mixed and cooled the lake waters over the following weeks. In 1974, fall winds cooled the lake below 4°C before allowing ice to form and during the winter the lake's northwestern basin was isothermal at 1.0°C (Sekerak and Graves 1975). Patterned ground on the bottom of the shallow southwestern basin, which may indicate complete freezing, is not evident in the northwestern basin (Wedel and Way 1976). Streams entering Crooked Lake and the Dolphin River probably freeze solid in the winter.

Crooked Lake is a clear oligotrophic lake that is chemically similar to other high arctic lakes situated on sedimentary strata (Schindler *et al.* 1974b; Stewart and MacDonald 1981). Lake water pH was slightly basic in late August and calcium and chloride were the major ions contributing to conductivity (Table 8). Dissolved organic carbon concentration was high, probably as the result of surface erosion caused by a recent snowmelt. Summer chemical composition of water in the Dolphin River was nearly identical to that in Crooked Lake (Sekerak and Graves 1975; Wedel and Way 1976).

Invertebrates

The crustacean zooplankters *Limnocalanus macrurus* and *Cyclops scutifer* were found throughout the northwestern basin of Crooked Lake during August (Table 7). *Cyclops scutifer* was the most abundant species with an average of 22.8 nauplii, 3.7 copepodids, and 0.5 adults per liter. *Limnocalanus macrurus* was less abundant with an average of 0.01 nauplii, 0.12 copepodids, and 0.12 adults per liter. *Daphnia* sp. were not collected in the zooplankton hauls but ephippia of the genus were found in the benthos (Appendix V, Table 23). The species may be benthic but was more likely entering winter dormancy. With mean abundances of 27.3 ind/L and 84.5 ind/L respectively, crustacean zooplankters and rotifers were abundant relative to populations in many other high arctic lakes (McLaren 1964; Rigler *et al.* 1974; Minns 1977; Stewart and MacDonald 1981).

The highest diversity and abundance of benthic invertebrates occurred below a depth of 6 m in the mud-detritus zone (Table 7). Ostracods and chironomids were the most abundant zoobenthic species. Two species of ostracods, one of which was scarce, and six species of chironomids were collected. Chironomids included: *Abiskomyia virgo* and *Pseudodiamesa arctica* which were most abundant, *Paracladius alpicola*, *Protanypus mario*, and two species of the genus *Microspectra* (Appendix V, Table 24). Foraminiferans, mermithid nematodes, the crustaceans *Limnocalanus macrurus* and *Mysis relicta*, and a trichopteran *Apatania zonella* were also present. *Mysis relicta* were abundant along the shallow sandy shores but, being strong swimmers, were probably quick enough to escape capture in the Ekman dredge that was used to collect benthic samples. There was a large emergence of chironomids, trichopterans, and tipulids during two warm windless days, August 20 and 21, but swarms soon disappeared when the weather cooled and winds rose.

Fishes

Crooked Lake contains two species of fish: Arctic charr, which are common throughout the area, and least cisco, which are at the extreme northeastern edge of their distribution. The more abundant charr occur in both lake-dwelling and anadromous forms while the cisco are strictly anadromous. They begin to spawn late in August and continue into September; spawning is not an annual event for individual fish. Both species are omnivorous and host a variety of metazoan parasites (Appendix II, Table 18).

Table 7. Zooplanktonic and zoobenthic species and their abundance in Crooked Lake, Prince of Wales Island (Fig. 5).

Sampling Sites	1	2	3	4	5	6	7	8	9	10	10a
Depth (m)	2	7	6	7	2	7	3	6.2	2.1	0.9	0.6
Secchi depth (m)	>2	5.5	3.3	6	>2	5.5	>3	4	>2.1	>0.9	>0.6
Secchi color (bright sun)		pale green	pale green	pale green		pale green		pale green			
Time of Day (h)	1420	1505	1540	1645	1638	1710	1735	1822	1757	1740	1710
Date	20/8/81	20/8/81	20/8/81	20/8/81	20/8/81	20/8/81	20/8/81	21/8/81	21/8/81	21/8/81	21/8/81
ZOOPLANKTON											
Haul depth	2.0	6.5	5.5	6.5	2.0	6.5	2.5	6.0	2.0	0.8	0.6
Surface water temperature (°C)	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.8	6.8	7.2
Species abundance (ind/L)											
Ph. Arthropoda											
Cl. Crustacea											
SCl. Copepoda											
O. Calanoida											
Limnocalanus macrurus	0.10	0.11	0.40	0.29	0.05	0.09	0.04	0.07	0.05	0.10	0.04
copepodids						0.23	0.12	0.27	0.20	0.50	
nauplii				0.03				0.03			
O. Cyclopoida											
Cyclops scutifer	0.50	1.05	0.51	0.61	0.10	0.32	0.12	0.42	0.85	1.37	
copepodids	2.05	4.40	5.51	6.35	1.20	5.58	1.08	4.32	4.35	5.88	0.17
nauplii	20.15	20.00	39.67	42.97	1.65	32.11	5.60	31.57	29.45	23.00	5.00
Ph. Rotifera	78.70	54.32	176.38	148.75	45.30	106.18	9.16	107.62	131.05	28.62	32.17
ZOOBENTHOS											
Bottom type	sand	mud, detritus	mud, detritus	mud, detritus	rock, sand, algae	mud, detritus	sand, moss	mud, detritus	sand	sand	sand detritus
Species abundance (ind/m²)											
Ph. Protozoa											
O. Foraminiferida	9								31		
Ph. Nematoda											
F. Mermithidae		13	18	9					4		9
Ph. Arthropoda											
Cl. Crustacea											
SCl. Copepoda											
Limnocalanus macrurus			4					13		18	
SCl. Ostracoda		867	898	987		369		476	9		
SCl. Malacostraca											
Mysis relicta						9		18			
Cl. Insecta											
O. Diptera											
F. Chironomidae	36	560	524	764	80	311	18	320	4(4)[1]		22
O. Trichoptera											
Apatania zonella							4				
Invertebrate eggs				13							

[1] larvae (pupae)

Table 8. Water chemistry data (means of n samples) for Crooked Lake, Prince of Wales Island.

Sampling Site (Fig. 5)	4
Coordinates	73°39'N, 98°42'W
Date	2/9/81
Laboratory Data	
Number of samples (n)	4
pH	7.69
Conductivity at 25°C (µS/cm)	185
Total dissolved nitrogen (µg/L)	185
Total dissolved phosphorus (µg/L)	8
Dissolved organic carbon (µMole/L)	287
Nutrients (µg/L)	
Suspended nitrogen	48
Suspended phosphorus	6
Suspended carbon	740
Chlorophyll A	0.5
Major Ions (mg/L)	
Sodium	2.87
Potassium	0.47
Calcium	29.2
Magnesium	3.83
Chloride	5.8
Sulphate	2.4

During August, charr were more abundant than cisco in Crooked Lake. An average of 38.8 charr and 6.4 cisco, weighing 16.5 and 2.6 kg respectively, were caught in 100 m of gillnet set over a 24 h period. These catch effort figures are conservative since one net was set for 160 h and anadromous fish were still re-entering the lake. The standing crop of fish in the lake was large compared with other lakes surveyed.

There were both fast and slow growing charr in Crooked Lake (Figs. 6 and 7). A 23 year old fish, for example, might be anywhere from 390 to 735 mm long. Where there was a wide range of sizes among fish of a given age, the fastest growing fish were in better condition and generally had much higher concentrations of strontium in their bones (Fig. 8; Appendix IV, Table 21). To build up strontium concentrations of 378 to 1069 μg/g of bone tissue, the charr must have had a high dietary intake of strontium (Behrens Yamada *et al.* 1979). Since there was only 50 μg Sr/L of lake water and 47.6 μg Sr/g of lake sediment, and since dietary differences between fish in the lake cannot account for differences in their bone strontium concentrations, these fish likely fed at sea where strontium concentrations are much higher (Moreau and Barbeau 1979; Gaboury 1980). Slow growing charr, with 39 to 207 μg Sr/g of bone tissue, were strictly lake dwelling. The exception was a large lake-dwelling male charr, 26 years old and 710 mm long, with only 170 μg Sr/g of bone tissue. Differences in growth rates were probably linked to differences in food availability between the marine and freshwater environments, but why one lake-dwelling fish outgrew its companions is unknown. High levels of *Diphyllobothrium* spp. in this fish suggest that it was a cannibal.

The charr population in Crooked Lake had a unimodal length-frequency distribution, instead of the bimodal distributions found in unexploited single species lakes (Johnson 1976, 1980, 1981, in press; Stewart and MacDonald 1981). There was a high proportion of young fish in the population (Fig. 6A, Table 9). In 1974, Sekerak and Graves (1975) caught many 1 year old fish and few fish aged 5 to 7 y. Seven years later, 40% of the charr caught were 8 year olds and the year classes between 12 and 14 y were weak (Fig. 7). The age-length relationship has remained roughly similar but there was a higher proportion of anadromous fish in the 1974 sample. The oldest and the largest charr caught were aged 29 y or 807 mm in 1974, and aged 28 y or 768 mm in 1981. Differences between the samples may be real or just sampling artifacts.

Anadromous charr were returning to Crooked Lake in late August and may have continued to return until mid-September. Some of the anadromous charr that were preparing to spawn in Crooked Lake were in moderate condition and had heavy encystations of *Diphyllobothrium* spp., suggesting that they had summered in the lake; others had few *Diphyllobothrium* spp. cysts and were in good condition, suggesting that they were recently returned from the sea (Appendix II, Table 18; Dick and Belosevic 1981).

Table 9. Summary of age, length, and weight data for fish in Crooked Lake, Prince of Wales Island.

Sampling Location			Length (mm)		Weight (g)		Condition Factor[1]		Length-Weight Relationship[2]				Age (y)		
Site # (Fig. 5)	Coordinates	N	Mean (Range)	S.D.	Mean (Range)	S.D.	Mean	S.D.	y intercept (log a)	slope (b)	S.D. of b	r^2	n	Mean (Range)	S.D.
Arctic charr															
1-10	72°40'N, 97°50'W	280	292 (97 - 768)	133	426 (6.5 -5100)	788	0.890	0.159	-5.453	3.163	0.028	0.978	269	10.9 (3 - 28)	5.6
Least cisco															
1-10	72°40'N, 97°50'W	53	342 (285 - 376)	20	410 (230 - 605)	76	1.007	0.136	-2.135	1.869	0.269	0.486	53	11.0 (6 - 17)	2.6

[1] condition factor = weight in g·(fork length in mm)$^{-3}$·10^5
[2] log weight in g = b·log length in mm + log a

Table 10. Summary of sexual maturity data for fish from Crooked Lake, Prince of Wales Island.

Site # (Fig. 5)	Date	N	Sex	Maturity: Immature	Mature	Near Ripe	Ripe	Ripe & Running	Spent	Unknown	Age of youngest mature fish (y)	Length of youngest mature fish (mm)
Arctic charr												
1-11	25/8-2/9/81	145	male	96	30	3	1	15			7	236
		136	female	89	31	7	6	3			8	242
		287	total	185	61	10	7	18		6		
Least cisco												
1-10	25/8-2/9/81	46	male		1	14	6	25			6	320
		7	female		4			3			6	300
		53	total		5	14	6	28				

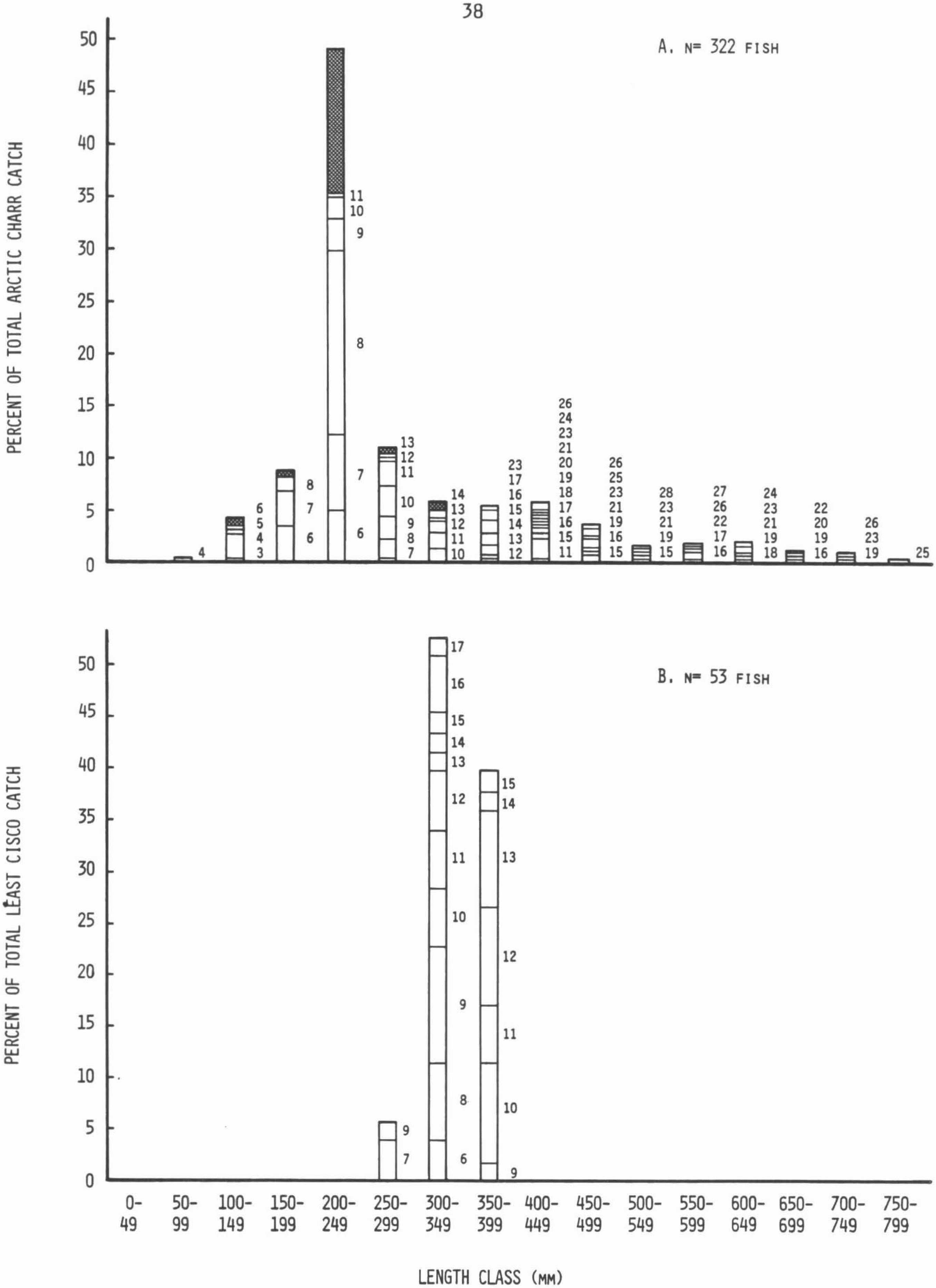


Fig. 6. Age-frequency distribution by length class in the catches of (a) Arctic charr *Salvelinus alpinus* and, (b) least cisco *Coregonus sardinella* from Crooked Lake, Prince of Wales Island, N.W.T. Stippling indicates fish that were not aged.

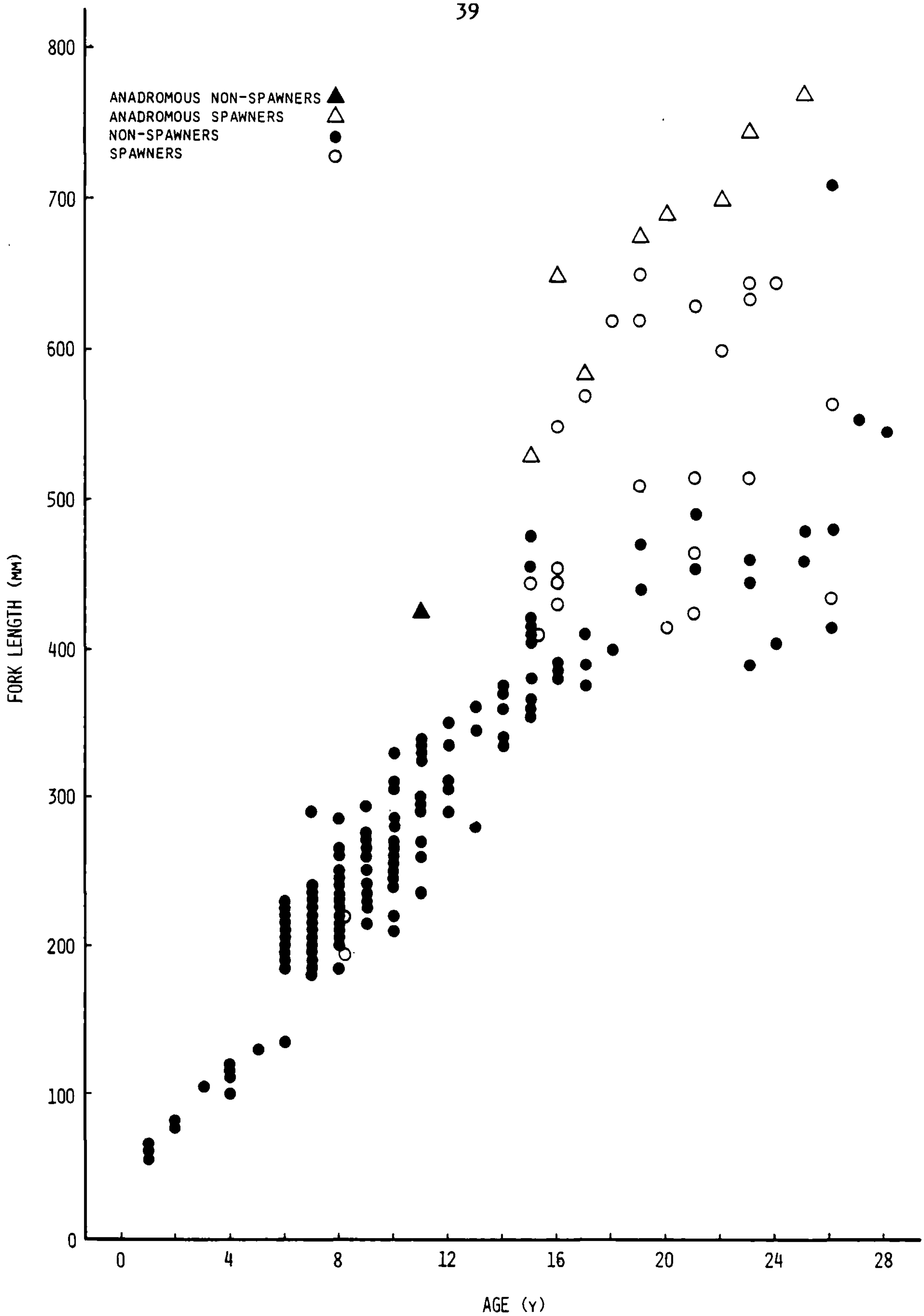


Fig. 7. Age-length distribution of Arctic charr *Salvelinus alpinus* from Crooked Lake, Prince of Wales Island, N.W.T. Anadromy was determined by bone strontium analysis; only the largest and smallest fish at selected ages were tested.

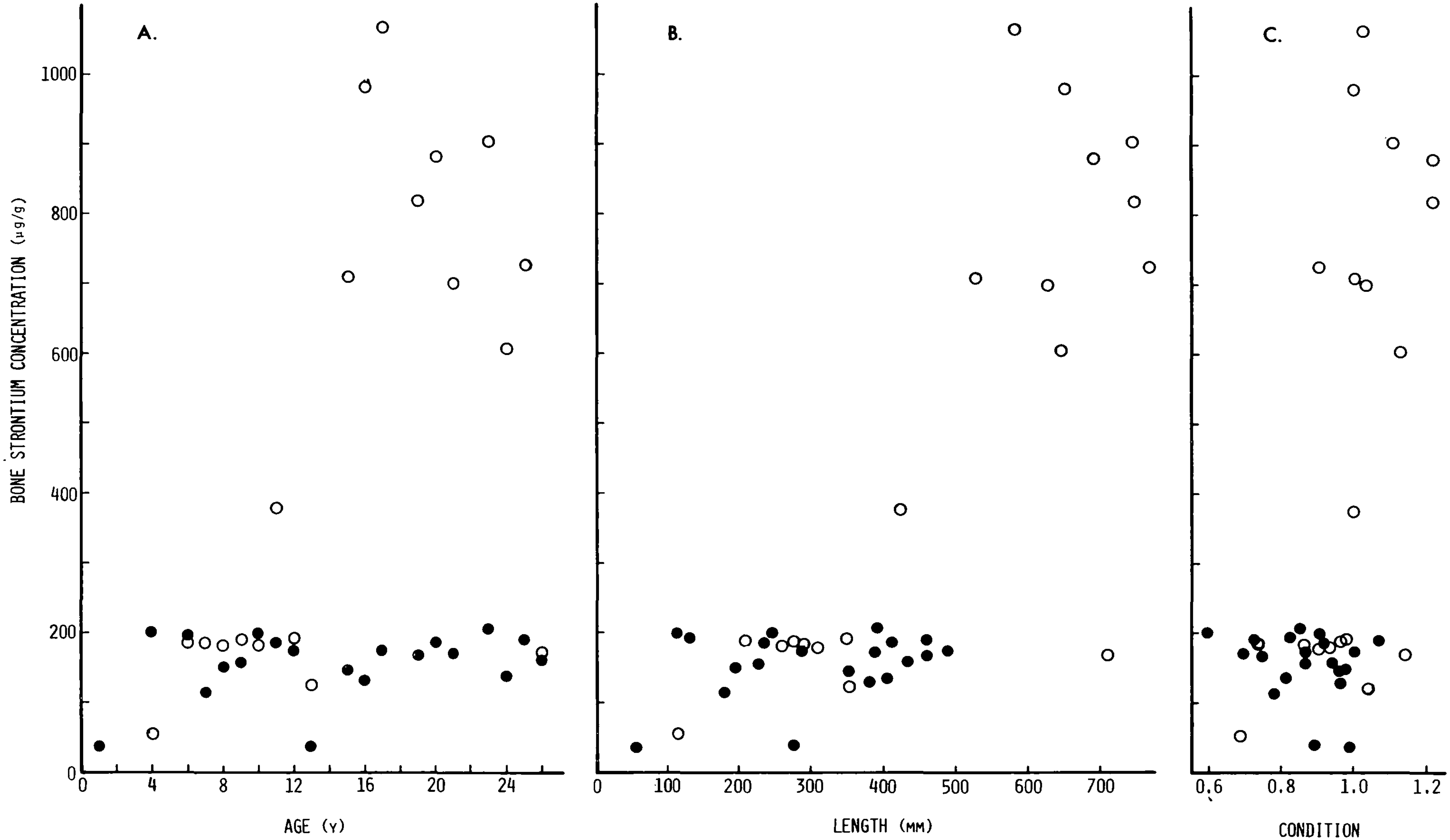


Fig. 8. Plots of (a) age, (b) length, and (c) condition versus bone strontium concentration for the largest (open circles) and smallest (closed circles) Arctic charr *Salvelinus alpinus* of each year class from Crooked Lake, Prince of Wales Island, N.W.T.

Charr caught during mid-July by Manning and Macpherson (1961) were a silvery green color. The small number of anadromous fish between the ages of 8 and 14 y, suggests that they had not yet returned to the lake (Fig. 7). Similar trends have been observed in other systems, where the largest anadromous charr are the first fish to leave the lake in spring and the first to return in fall (de March *et al.* 1977; Johnson 1980; Gyselman 1982).

Anadromous and lake-dwelling Arctic charr began to spawn during the last week of August and continued into September (Table 10). Most of the anadromous spawners were caught near the Panarctic fishing camp, on the west side of the northeastern basin of Crooked Lake (Plate 1). Bottom substrates in the area were mud. All but one of the anadromous charr were in spawning condition; they were a bright orange color and the males had well developed kypes (Fig. 7). Individual fish in the population did not spawn annually since only 36% of the mature charr were in spawning condition. The youngest mature charr were aged 7 y for males and 8 y for females and, with the exceptions of two 8 year old males, spawners were at least 15 years old (Table 10). Fish continued to spawn until at least 26 years of age so that an average lake-dwelling fish might spawn 3 or 4 times during its lifespan. The spawning frequency of anadromous charr could not be determined since not all of the anadromous charr had returned from the sea. The ratio of male to female fish caught was 1.07 to 1.0 while the ratio of male to female spawners was 1.19 to 1.0. After hatching, charr fry spent the summer in shallows where larger fish could not predate them.

Arctic charr in Crooked Lake were omnivorous (Fig. 9). Charr longer than 350 mm were cannibals and smaller charr made up 70 percent of their stomach contents. *Mysis relicta*, large chironomid larvae, algae balls (*Nostoc* sp.), and least cisco eggs were also important food items during late August. Smaller charr ate mostly small chironomid larvae, least cisco eggs, and algae balls. Whether algae balls were consumed for their food value or simply mistaken for eggs is unknown. Ostracods, hydracarina, trichopterans, copepods, plant material, and sand contributed little to the charr diet. Charr had not eaten and perhaps could not catch or eat the large cisco that inhabited the lake. Over 50% of the charr, including 8 of the 15 lake-dwelling spawners, had eaten before they were caught. Anadromous charr generally eat little while in freshwater (Johnson 1980; Gyselman 1982; Welch pers. comm.) and, in Crooked Lake, none of the anadromous spawners had eaten before they were caught. Charr caught in July and August 1974, ate the same foods as charr caught in August 1981 except that tipulids were also eaten (Sekerak and Graves 1975).

Metazoan parasites infected at least 65% of the charr caught in Crooked Lake. Thirty-two percent of the charr hosted *Diphyllobothrium* spp., 21% *Cystidicola cristivomeri*, 13% *Salmincola carpionis*, 5% *Echinorhynchus gadi*, 4% *Eubothrium salvelini*, 1% *Philonema agubernaculum*, and less than 1% *Proteocephalus arcticus* (Appendix II, Table 18;

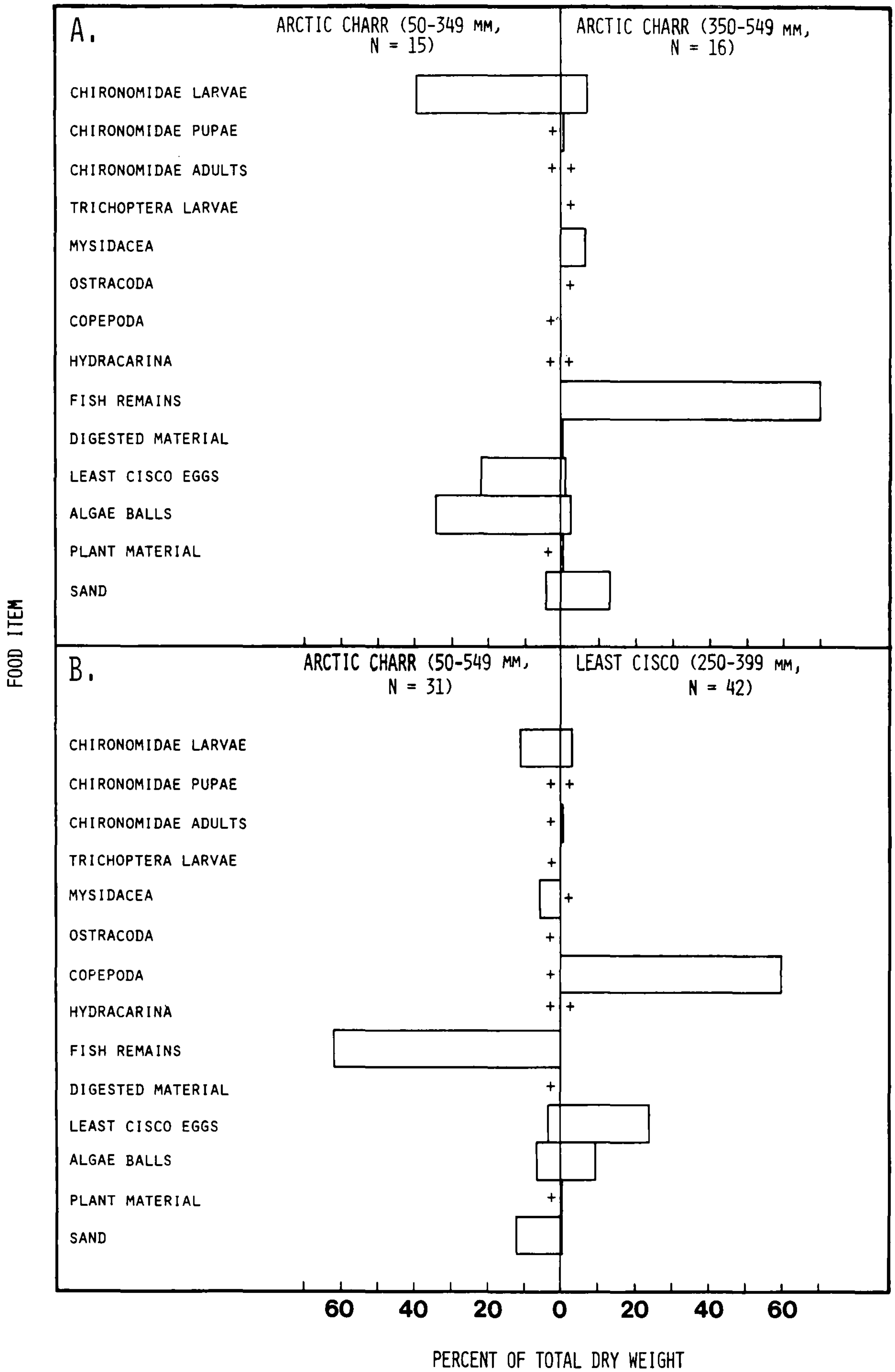


Fig. 9. Comparisons of stomach contents of (a) large and small Arctic charr *Salvelinus alpinus* and (b) Arctic charr and least cisco *Coregonus sardinella* caught in Crooked Lake, Prince of Wales Island, between 20 August and 3 September 1981.

Appendix V, Table 22). With the exception of *S. carpionis* which has no intermediate host, the levels of parasite infection were related to the fish's diets. The only parasite species found infecting charr younger than 6 y was *Philonema agubernaculum*.

Charr were infected with the cestode *D. ditremum* either by eating *Cyclops scutifer*, the first intermediate host, or by eating smaller infected charr (Noble and Noble 1976; Henricson 1978; Dick and Belosevic 1981). Cannibalism may explain the large numbers of *Diphyllobothrium* spp. encysted in the gut walls of some of the lake-dwelling charr. The absence of *Diphyllobothrium* spp. cysts in several large anadromous charr suggests that they had recently returned from the sea, since the marine sojourn appears to cause a reduction in numbers of the parasite (Dick and Belosevic 1981). Charr that are heavily infected with this parasite are normally in poor physical condition and have shorter lifespans (Henricson 1978; Stewart and MacDonald 1981).

Charr were infected with the swimbladder nematode *Cystidicola cristivomeri* by eating *Mysis relicta*, a crustacean vector of the parasite that was abundant in Crooked Lake (Eddy and Lankester 1978; Black and Lankester 1981). None of the anadromous charr were infected by this parasite, suggesting that they had not fed on mysids while in freshwater. Eddy and Lankester (1978) found a similar phenomenon in Stanwell-Fletcher Lake on nearby Somerset Island (Fig. 1). Only 6% of the charr were infected with both *Diphyllobothrium* spp. and *C. cristivomeri*.

Least cisco had not been caught in three previous summer samplings of fish in Crooked Lake (Manning and Macpherson 1961; Sekerak and Graves 1975; de March and Eddy 1976). During late August and early September, only large mature cisco were caught, but Inuit fishing in October caught a wide size range of ciscos in the lake (Stevenson pers. comm.). Their apparent absence from Crooked Lake during the summer, the presence of only large mature cisco in late August, and the discovery of cisco scales along the shores of the Dolphin River, all suggest that the population was anadromous (McPhail and Lindsey 1970; Alt 1980). Fry were the only evidence of cisco in Fisher Lake and the Ommanney River (Fig. 5, site 12) during the summer of 1975 (de March and Eddy 1976).

The Crooked Lake least cisco grew larger, 376 mm, and lived longer, 17 y, than cisco in most northern populations (Table 9; McPhail and Lindsey 1970; Alt 1980; MacDonald and Stewart 1980; Chang-Kue pers. comm.). The length-frequency distribution was tightly clumped and there was a wide range of ages in each length class (Fig. 6B). The fish appeared to reach near maximum size at about age 9 y and then stop growing. There may be a barrier to further growth past age 9 y as energy is diverted from growth to reproduction.

The cisco were spawning during late August and early September. Many of the adult fish were ripe and running and there were freshly spawned cisco eggs in the stomachs of both charr and cisco (Table 10; Appendix II, Table 18). The fish that had eaten cisco eggs, and 70% of the spawning cisco, were caught at three sites in the southeastern end of the northeastern basin of Crooked Lake (Plate 1, sites 5, 8, and 10). Over 90% of the cisco caught were male and the ratio of male to female spawners was fifteen to one. Male cisco were more mobile during the spawning season than females and began spawning at age 6 y. The youngest of three spawning female cisco was 10 years old and the presence of mature non-spawning cisco suggests that individual fish do not spawn annually.

Whereas Alt (1980) reported that Alaskan least cisco cease feeding prior to spawning, 44 of the 48 cisco that were spawning in Crooked Lake had fed before they were captured (Appendix II, Table 18; Appendix III, Table 20). There was limited dietary overlap between the charr and cisco (Fig. 9B). Cisco fed mainly on a crustacean zooplankter, *Cyclops scutifer*, which was abundant in the lake, and to a lesser extent on eggs of their own species, algae balls (*Nostoc* sp.), and chironomids. *Mysis relicta*, hydracarina, and plant material contributed little to their diet. Only the male ciscos had eaten cisco eggs. They were more efficient egg consumers than the charr, eating more eggs and fewer algae balls. Unlike the charr, the cisco were not cannibals.

Metazoan parasites infected at least 96% of the least cisco caught in Crooked Lake (Appendix II, Table 18). Ninety-six percent of the cisco hosted either *Diphyllobothrium dendriticum* or *D. ditremum*, 8% *Proteocephalus* sp., and 6% *Echinorhynchus gadi*. The high incidence of infection with, and moderate to heavy encystations of, *Diphyllobothrium* spp. relate directly to the heavy consumption of *Cyclops scutifer*, the parasite's intermediate host (Noble and Noble 1976; Hendricson 1978). *Proteocephalus* sp. and *E. gadi* were found in few fish and at low levels of infection. Very little information is available on parasitism of least cisco (Margolis and Arthur 1979).

Victoria and Stefansson Islands

General Description

Victoria Island, with a surface area of 216,000 km^2, is the second largest island in the Canadian Arctic Archipelago. It is situated south of Viscount Melville Sound and neighboured by Banks Island to the west, Prince of Wales Island to the east, and the mainland to the south (Fig. 1). Stefansson Island, to the northeast, is almost an extension of Victoria Island's Storkerson Peninsula.

Victoria and Stefansson islands are divided into two physiographically distinct areas, the Shaler Mountain Belt and Victoria Lowland, both part of the Arctic Lowlands physiographic region (Bostock 1970, 1972). The Shaler Mountain Belt stretches from Amundsen Gulf to Hadley Bay (Fig. 10). It is bordered on the south by the north side of Prince Albert Sound and the west side of Hadley Bay, and on the north by the north side of Minto Inlet and the south side of Glenelg Bay; it includes the Shaler Mountains and Diamond Jenness Peninsula. This northeasterly-trending belt of Precambrian rocks is a region of plateaux and ridges, steep escarpments, linear valleys, buttes and cuestas. Summits are typically 200 to 400 m above sea level (asl) with local elevations reaching 550 m asl. Relief, particularly along the coasts, may change abruptly by over 200 m, and many of the large deep lakes in this region have precipitous outlet streams. Most of the rivers and streams are seasonal, although the Kuujjua River may flow year-round. Stefansson Island and the remainder of northern Victoria Island consist of monotonous lowlands, underlain by Palaeozoic sedimentary rock and dotted by innumerable lakes. Much of the lowlands lies within 200 m of sea-level and the highest ground is about 300 m asl. Local relief ranges from a few to over 60 m and glacial landforms dominate the landscape, causing rivers to follow irregular courses and drainage to be poor (Thorsteinsson and Tozer 1962; Fyles 1963).

Stefansson Island and much of Victoria Island are underlain by Palaeozoic dolomites, limestones, sandstones and shales (Thorsteinsson and Tozer 1962, 1970; Fyles 1963). The Shaler Mountain Belt of Victoria Island is comprised of some 3,000 m of sandstone, siltstone, shale, limestone, dolomite, and gypsum often overlain by up to 300 m of basaltic lava and conglomerate. Both the sedimentary and volcanic rocks enclose numerous gabbro sills. Quartzite, which underlies the sedimentary and volcanic layers, is only apparent in a small area near the southwest end of Hadley Bay where it has been exposed by uplift (Campbell 1981).

Victoria and Stefansson islands were covered by the Laurentide Ice Sheet and there is evidence of an older, possibly early Wisconsin glaciation (Fyles 1963). Drumlins, moraines, eskers, and raised marine beaches are all apparent when the country is viewed from the air. Together with radiocarbon dates of marine shells, found at over 80 m asl, they suggest that the last glaciers retreated in a southwesterly

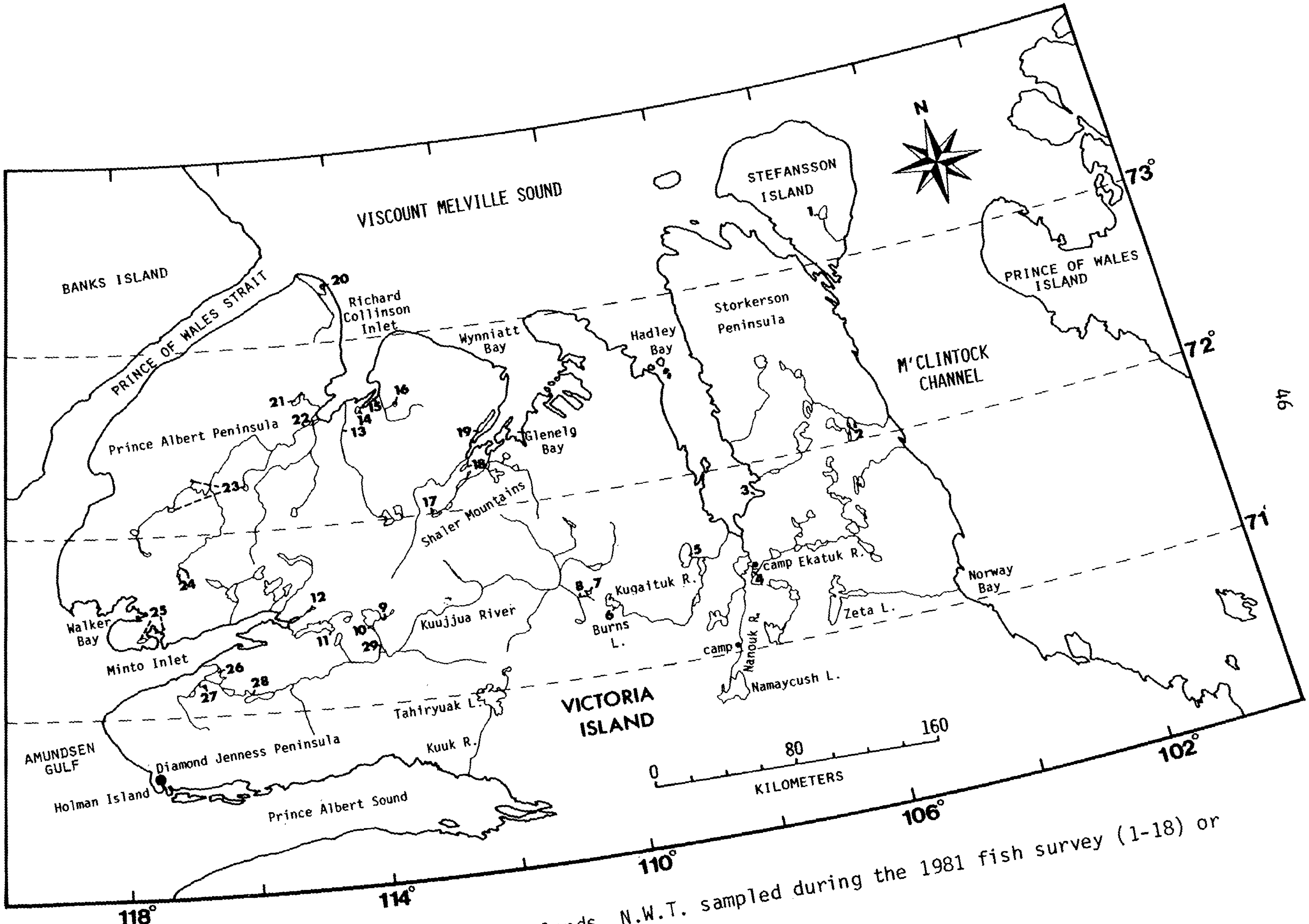


Fig. 10. Sites on Victoria and Stefansson islands, N.W.T. sampled during the 1981 fish survey (1-18) or investigated during previous research (19-28).

direction between 8,500 and 12,500 years ago (Fyles 1963; Prest *et al.* 1972; Prest 1973). Nearly all of the southeastern half of Victoria Island was once covered by ocean and since glaciation the islands have risen between 100 and 200 m asl, from northeast to southwest (Andrews 1972).

Climatic variation is greater on Victoria Island than on most other arctic islands due in part to its large size, close proximity to the mainland barrens, and variable coastal ice conditions. Multi-year sea ice, prevalent in Viscount Melville Sound, reduces the maritime effect on Stefansson and northeastern Victoria islands, causing climate there to resemble that on Bathurst Island. There is a mean annual temperature range of 38 to 40°C, with mean daily temperatures near -33°C in January and near 5°C in July (Thompson 1967; Fletcher and Young 1976; Maxwell 1981). The mean daily temperature remains below 0°C from August 22 to June 10. Precipitation in this area is 100 to 125 mm annually of which between 35 and 40% falls as rain. Southern and central Victoria Island have a climate very similar to the nearby mainland. This is due mainly to the close proximity of the two large land masses and to the relatively narrow and shallow channel separating island and mainland. This area has a greater mean annual temperature range than the rest of the island, 42 to 45°C, with mean daily temperatures near -35°C in January and reaching 10°C in July. The mean daily temperature remains below 0°C from the end of August until about the second week in June. Precipitation in this area is 100 to 150 mm annually of which between 50 and 60% falls as rain. The west coast of the island has a more moderate climate due to the maritime effect of open waters to the west. This is reflected in a smaller mean annual temperature range, 36°C, and mean daily temperatures above -30°C in January and near 8°C in July. Mean daily temperature remains below 0°C from the end of August until the last week in May. Precipitation is higher than elsewhere on the island, 125 to 175 mm, of which 45 to 55% occurs as rainfall.

Wind direction on the islands varies with location and season but the mean wind speed is generally 10 to 15 km/h. The net annual radiation received at the surface of southwestern Victoria Island, 15 kly, is nearly double that on Bathurst and Melville islands. Ice on Victoria Island's lakes and rivers begins breaking up in June, although some deep sheltered lakes in the Shaler Mountain Belt still had ice in mid-August. Freeze-up begins in late August and early September but may not be complete in some areas until October (Fletcher and Young 1976; Maxwell 1981; Dahlke pers. comm.).

Vegetation is more abundant and varied on Victoria Island than on the islands north of Viscount Melville Sound. Porsild (1957, 1964) and Porsild and Cody (1980) have described many of the plants that occur on the island. During the survey, a variety of bird species were identified, including sandhill crane, whistling swan, and yellow-billed loon (Appendix VI, Table 26). Peary caribou and muskox were the most evident mammal species.

There has not been the interest in natural resource development on Victoria Island that there has been on Melville and Bathurst islands, with the consequent lack of environmental research. However, the recent proposal by Polar Gas to build a natural gas pipeline along the western side of Victoria Island has and will stimulate research on the environmental impacts of pipeline development (eg. Williams *et al.* 1981).

Holman Island, one of two communities on Victoria Island, is the only community within the study area (Fig. 1). Established in 1940, when the Hudson's Bay Company moved its post there from Fort Collinson, it has a population of 358 persons and a thriving arts and crafts industry. Hunting, trapping and fishing remain important livelihoods for the residents. Cambridge Bay, a D.E.W. Line site and community of 907 persons, is situated on the south coast of Victoria Island. Its economy is based on commercial fishing and wage employment (Government of the Northwest Territories 1982).

Domestic, Commercial, and Sport Fishing

The main domestic fishing harvest on northern Victoria Island takes place near the outlet of Tatik Lake, on the Kuujjua River (Fig. 10, site 26; Dahlke pers. comm.; Kataoyak pers. comm.; Nigiyok pers. comm.). In early October, as soon as the snow and ice conditions permit travel, Inuit families travel from Holman Island to camp on the southwest shore of the lake. Up to twenty-nine fishermen are involved in the harvest and they catch between 2000 and 4000 Arctic charr, mainly anadromous, and 200 to 600 lake trout annually (Dahlke pers. comm.). Fish are caught using short gill nets set under the ice. They are frozen intact and either taken to the community or stored in ice houses for use later in the winter. In the spring, Tahiryuak Lake and a variety of smaller lakes (eg. sites 25 and 27) are fished, usually in conjunction with hunting or trapping activities (Farquharson 1976; Nigiyok pers. comm.). Arctic charr and lake trout are caught by jigging through holes cut in the ice. Summer fishing is generally coastal and Arctic charr, sculpin and cod are angled or caught in gill nets at the Kuujjua River mouth, along the shores of Minto Inlet, and offshore the community in July. Sculpin are not utilized or sought after, since they tangle the nets and have little food value, but the Holman Islanders value cod for their tasty livers (Nigiyok pers. comm.).

There are quotas on the number of anadromous Arctic charr that can be harvested commercially in the Norway Bay area (71°05'N, 104°48'W; 4500 kg round weight) and in the Kuujjua River-Minto Inlet area (71°16' N, 116°48'W; 600 kg round weight; Manual of Fisheries Acts and Regulations 1981). There is no record of commercial fishing in the Norway Bay river area, but the Kuujjua River-Minto Inlet area quota has been opened regularly and fish caught are sold through the Holman Island Co-operative.

Arctic Char Lodge and High Arctic Sportfishing Camps both operate outpost sport fishing camps near Hadley Bay on northern Victoria Island (Fig. 10). Both camps operate between mid-July and the last week of August and guests angle for trophy lake trout and Arctic charr. In 1981, during 679 man-hours fishing, guests of the High Arctic Sportfishing outpost camp angled 150 Arctic charr and 64 lake trout from the Nanouk River system (Carder pers. comm.). Forty-nine charr and 14 trout were kept and the remainder were released.

Inuit employees of Arctic Char Lodge, from Cambridge Bay, angle in the Nanouk and Ekatuk river systems for lake trout and Arctic charr. Fish are eaten fresh or dried for winter use (Amagonalk pers. comm.; Avaligak pers. comm.).

Until 1975, operators of the Great Bear Lodge, on Sawmill Bay of Great Bear Lake, flew anglers to an outpost fishing camp at the mouth of the Kuujjua River. Angling began in mid-July and continued through August. Between 1966 and 1975, 809 anglers kept 2479 anadromous Arctic charr (Dahlke pers. comm.). The outpost camp closed in 1976 as a result of poor catches the previous year and high travel costs.

There is no domestic or commercial fishing on Stefansson Island, but the largest lake on the island is occasionally fished by pilots and passengers of aircraft flying through the area. Large lake trout and Arctic charr can be caught in the lake (Fig. 10, site 1).

Previous Aquatic Research

Interest in the commercial potential of Arctic charr stocks has prompted several detailed, long term studies of charr biology in the Cambridge Bay area (Fig. 1). Anadromous charr, which have a greater commercial potential than landlocked and lake-dwelling charr, have had their life history and general biology studied with a view toward optimizing commercial yields through better understanding of the populations involved (Johnson 1975, 1976, 1980, in press; Kristofferson and Carder 1980; Carder 1981; Kristofferson and McGowan 1981; Gyselman 1982). Landlocked charr stocks in this area are often unexploited and provide valuable examples of fish populations that are free from human interference. For this reason, they have been studied with a view toward gaining a wider understanding of fish population ecology (Johnson 1962, 1975, 1976, 1980, 1981, in press; Hunter 1970).

While there is a wealth of information available on aquatic ecosystems immediately to the south, research within the study area on Victoria Island is scant. Johnson (1973, 1975, 1976, 1980, in press, pers. comm.) caught lake trout, lake whitefish *Coregonus clupeaformis*, Arctic cisco *C. autumnalis*, least cisco, and ninespine stickleback

Pungitius pungitius in Namaycush Lake and lake trout that had eaten both Arctic charr and fourhorn sculpin in Zeta Lake (Fig. 10). Williams *et al.* (1981) caught Arctic charr and lake trout in Tahiryuak Lake and at three other locations along the proposed Polar Gas pipeline route through the study area (sites 20, 21, 29). Arctic charr, lake trout, least cisco, whitefish (*Coregonus* sp.), ninespine stickleback, and fourhorn sculpin have all been reported to occur in the Kuujjua River (sites 26 and 28; McAllister pers. comm.; Nigiyok pers. comm.). Maurice Nigiyok (pers. comm.) of Holman Island reported catching Arctic charr (sites 22, 23, 25) or Arctic charr and lake trout (sites 19, 24, 26) in a variety of lakes and rivers on Prince Albert Peninsula. At present, both the domestic fishery at Tatik Lake and the sport fisheries near Hadley Bay are being monitored by researchers from the Freshwater Institute in Winnipeg (Carder pers. comm.; Dahlke pers. comm.).

A few species of marine fishes have been collected from within the study area off the west coast of Victoria Island (Appendix I, Table 15). As with the freshwaters, there has been far more marine research along the south coast of Victoria Island, near Cambridge Bay.

Survey Results and Discussion

Lakes sampled on Victoria Island were oligotrophic and had surface temperatures below 8.5°C in mid-August (Table 12). Six of the lakes tested were situated on sedimentary strata while the lake basin of a seventh was composed of igneous rock. All were ice free in mid-August, but several of the deep sheltered lakes in the Shaler Mountain Belt remained nearly ice covered (sites 9, 10, 11, 18). Surface waters of the lakes were chemically similar.

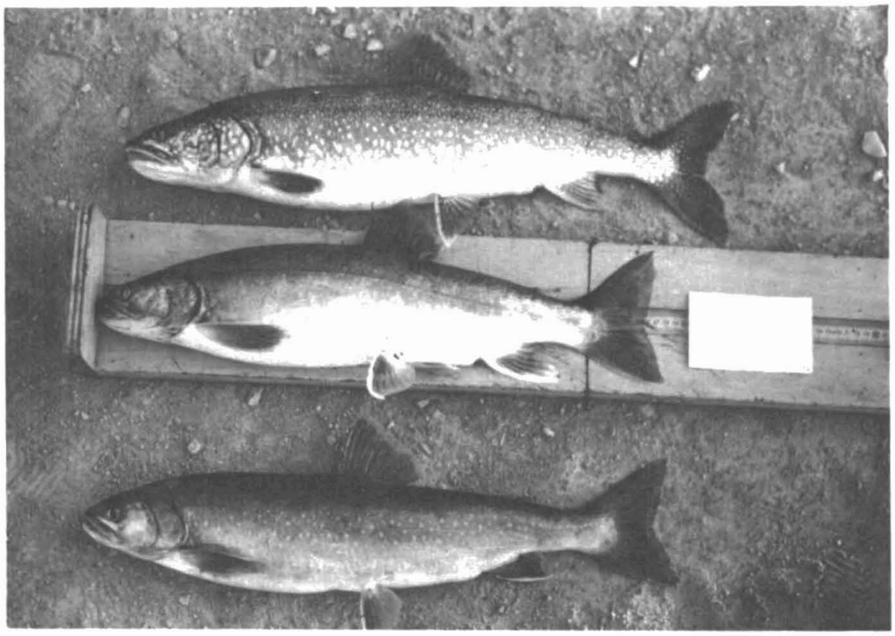
Lake water pH was slightly basic and ion concentrations were generally low (Table 12). In lakes on sedimentary strata conductivities ranged from 120 to 200 μS/cm, with the exception of a low lying coastal lake which had a conductivity of 350 μS/cm (site 14). Calcium and magnesium were the major contributing ions except in the coastal lake where higher sodium and chloride concentrations also contributed to the conductivity. The lake on igneous rock had a low conductivity, 60 μS/cm, probably because it lacked the calcium, magesium, and sulphate inputs from sedimentary erosion. Potassium concentrations were greatest in the low coastal lake (site 14, 7 m asl) and least in the high plateau lakes (sites 16 and 17, 170 to 200 m asl). Johnson (1964) found very similar ionic concentrations in Washburn (70°05'N, 107°30'W) and Zeta lakes. Concentrations of dissolved and suspended carbon, nitrogen and phosphorous, and chlorophyll A were similar to those found in lakes with sedimentary basins on Bathurst (Table 2), Cornwallis, and Devon islands (Stewart and MacDonald 1981). One shallow silty lake (site 2) had a relatively high dissolved organic carbon concentration, perhaps as a result of the erosion of unconsolidated surface materials.

Table 11. Zooplankton species and their abundance (mean number of individuals per litre) in seven lakes on Victoria Island.

Sampling Site (Fig. 10)	2	4	7	12	14	16	17
Coordinates	72°06'N, 105°37'W	71°24'N, 107°41'W	71°27.5'N, 110°25'W	71°32'N 114°57'W	72°37'N, 113°50'W	72°33'N, 113°16'W	72°00'N, 112°41'W
Date	13/8/81	13/8/81	11/8/81	8/8/81	8/8/81	8/8/81	9/8/81
Depth (m)	1.5	2	10.5, 17	22	9	5	2.5
Number of Samples	2	2	2	2	2	2	2
Ph. Arthropoda							
Cl. Crustacea							
SCl. Copepoda							
O. Calanoida							
Limnocalanus macrurus		0.04			0.23		
copepodids					0.62		
nauplii					0.03		
Diaptomus sicilis	1.00	0.22	3.94	0.51	0.19	0.76	0.12
copepodids	3.26	2.93	1.46	2.66	1.97	2.78	2.40
nauplii	1.33	0.36	0.72	1.28	1.61	0.14	2.28
O. Cyclopoida							
Cyclops scutifer	1.60	0.67	3.00	1.28		0.10	0.44
copepodids	4.67	1.42	12.06	17.62		0.90	4.28
nauplii	4.40	5.69	1.60	1.01		0.06	6.04
Cyclopinidae			<0.01				
SCl. Branchiopoda							
O. Cladocera							
Daphnia longiremis		0.58	0.32	0.77			0.01
Daphnia longispina microcephala			0.05	0.18			
Daphnia middendorffiana			0.06	0.50			
Daphnia middendorffiana x *pulex (?)*			0.08				
Daphnia schodleri				0.01			
Chydorus sphaericus							0.04
Total ind/L	16.26	11.91	23.29	25.82	4.65	4.74	15.61
Number of species	2	4	7	6	2	2	4
Ph. Rotifera	32.86	56.89	10.48	35.03		1.70	26.08

Table 12. Water chemistry data (means of n samples) for seven Victoria Island lakes.

Sampling Site (Fig. 10)	2	4	7	12	14	16	17
Date	13/8/81	13/8/81	11/8/81	8/8/81	8/8/81	8/8/81	9/8/81
<u>Field Data</u>							
Surface water temperature (°C)	6.0	8.4	7.6	7.7	4.8	8.0	8.2
Depth (m)	2.0	3.0	28	23	11	6.5	3.0
Time of day (h)	1730	1620	1845	1515	1750	1710	2005
Light conditions	overcast, fog	overcast, fog	cloudy, wind	overcast	overcast	overcast	overcast
Secchi depth (m)	>2	>3	11	11	4	>6.5	>3
Secchi color	pale green	pale green	pale blue	pale green	pale green	pale green	light green
<u>Laboratory Data</u>							
Number of samples (n)	2	2	2	2	2	2	2
pH	7.83	8.05	7.86	7.91	8.04	7.91	7.54
Conductivity at 25°C (μS/cm)	150	120	200	140	350	150	60
Total dissolved nitrogen (μg/L)	200	210	145	140	120	90	120
Total dissolved phosphorus (μg/L)	7	8	6	6	8	6	8
Dissolved organic carbon (μMole/L)	420	250	215	215	190	180	130
<u>Nutrients (μg/L)</u>							
Suspended nitrogen	40	26	46	36	42	21	36
Suspended phosphorus	4	3	6	2	4	2	2
Suspended carbon	380	254	440	320	396	220	333
Chlorophyll A	0.7	0.4	0.2	0.4	0.8	0.2	0.3
<u>Major Ions (mg/L)</u>							
Sodium	1.15	0.76	2.26	1.76	25.2	0.62	0.78
Potassium	0.31	0.26	0.28	0.51	1.15	0.13	0.16
Calcium	17.4	15.7	21.1	20.8	23.8	16.50	5.98
Magnesium	7.90	6.32	11.4	11.6	13.4	2.73	2.95
Chloride	2.0	1.2	6.1	3.0	50.5	1.0	1.1
Sulphate	2.0	1.6	1.4	4.6	3.5	1.2	0.8



Possible hybrid (center) between lake trout (*Salvelinus namaycush*, top) and Arctic charr (*S. alpinus*, bottom) from a lake on Stefansson Island (75°15'N, 105°12.5'W).

George Benoit angled lake trout from the lake on Stefansson Island near the northeastern edge of the species range.

Crustacean zooplankton on Victoria Island were least abundant in the northern lakes (sites 2, 14, 16; Table 11; Appendix V, Table 23). They contained *Diaptomus sicilis* and *Limnocalanus macrurus* (site 14) or *Cyclops scutifer* (sites 2 and 16). In mid-August more of the individuals were in the copepodid stage of development than were adults or nauplii. Travelling in a southwesterly direction, both the abundance and diversity of species increased. *Daphnia longiremis* and the three previously mentioned species were all present in a lake on the Nanouk River (site 4); most of the *Cyclops scutifer* were nauplii. Further to the west, in the Shaler Mountains, *Chydorus sphaericus* appears and again, nauplii and copepodids were the dominant stages (site 17). In the lakes draining into Minto Inlet five other pelagic species occur, *Daphnia longispina microcephala, D. middendorffiana, D. middendorffiana* x *pulex* and *D. schodleri* (site 17) or *Chydorus sphaericus* (site 12). These lakes have the greatest diversity of planktonic crustacean species so far reported from the Canadian Arctic Archipelago (Patalas pers. comm.). *Cyclops scutifer* copepodids were the most abundant crustacean zooplankters in mid-August. Keyhole Lake, on southern Victoria Island (69°22'45"N, 106° 14'W), had a species composition similar to the lake sampled in the Shaler Mountains, except the diaptomid species reported was *Diaptomus tyrellii* (Hunter 1970). *Cyclops capillatus* and *Eurycercus lamellatus*, which are not readily succeptible to net capture, were found in the stomachs of lake trout (site 18) and Arctic charr (site 13) respectively. Harpacticoid crustaceans were conspiciously absent from the samples and rotifers were not abundant. *Asplanchna* sp., a genus of large predatory rotifers, was found inhabiting two lakes in the Shaler Mountain Belt (sites 12 and 17).

Representatives of a marine cyclopinid species were found in one lake which had an elevation of over 650 m asl and was well inland (site 7). Cyclopinids were also found in Garrow Lake on Little Cornwallis Island (Table 1) and, like *Limnocalanus macrurus*, may be a glacial relict species. Johnson (1964) reported *Limnocalanus macrurus* from several lakes near Cambridge Bay but did not find them in Zeta or Namaycush lakes.

Arctic charr and/or lake trout were caught in all but two of the lakes sampled on Victoria and Stefansson islands (Appendix II, Table 19). A shallow silty lake on the Storkerson Peninsula (site 2) and an isolated hilltop lake near Richard Collinson Inlet (site 16) both appeared to lack fish. Reasons why one lake contained charr or trout while another contained both species remain unclear. The species seem to occur together in lakes where charr have, or recently had, access to the ocean, or in small, deep isolated lates (sites 1, 4, 5, 9, 14). Fish with morphological characters intermediate between lake trout and Arctic charr were caught on Stefansson Island and may have been trout-charr hybrids. While whitefish, cisco and stickleback inhabit southern Victoria Island they were not caught in northern lakes (Johnson 1975, 1976).

Catches per unit of sampling effort were highest when both trout and charr inhabited a lake but in general fish were neither abundant nor large. Where both species were present, between 5 and 21 fish or between 9 and 27 kg of fish were caught per 100 meters of net set in 24 h; when a single fish species was present, catches ranged from 4 to 16.5 fish or between 0.6 and 9.7 kg of fish/100 net m/24h. Anadromous fish inhabiting a system would substantially increase the yields.

Whether charr and trout occur together or alone, the trout appear to live longest and grow larger than all but the largest anadromous charr (Table 13). Only the Nanouk and Ekatuk river systems, Tatik Lake, and two rivers which drain into Richard Collinson Inlet (sites 13 and 22) are known to contain anadromous charr. Anadromous charr may also enter the Kugaituk River, perhaps as far as Burns Lake, lakes on the north side of Minto Inlet (site 25), and some of the river systems on the east side of Storkerson Peninsula.

On northern Victoria and Stefansson islands, spawning probably begins in early September and continues into October for both lake trout and Arctic charr. The low ratio of spawning to mature fish, 0.22 for charr and 0.55 for trout, suggests that individual fish do not spawn annually (Table 14; Appendix II, Table 19). The overall sex ratio favoured males by a margin of 1.7 to 1.0 in charr and 1.06 to 1.0 in trout. Males and females of both species began to mature by age 6 to 10 y, although some precocious males matured by 4 years of age.

Both charr and trout fed on a wide variety of items (Appendix II, Table 19; Appendix III, Table 20). Diet appears to be related both to habitat type and to size of the fish. Whether they were together or apart the diets of both species were quite similar in lacustrian environments. During mid-August, chironomids and fish formed the bulk of the diet for both species. Plant material, algae balls (*Nostoc* sp.), small mammals, and a variety of insects and crustaceans made up the remainder of their diets. The smaller fish favored smaller food items like dipterans and notostracans while larger fish were often piscivorous, sometimes cannibalistic. In river environments, where chironomids were scarce, charr ate trichopterans, notostracans, and tipulids (site 13). In one slightly brackish lake the lake trout ate mostly *Mysis relicta* while charr ate the isopod *Mesidotea entomon*. Amphipods, trichopterans, and chironomids made up the bulk of the remaining food. Both of these glacial relict species were abundant in the lake and the isopods, which may have lived in a more saline deeper layer of the lake, were generally smaller than their marine counterparts. Charr and trout caught in the deeper nets set in the lake were silver in color.

Table 13. Summary of age, length, and weight data for fish from Victoria and Stefansson islands.

Sampling Locations			Length (mm)		Weight (g)		Condition Factor[1]		Length-Weight Relationship [2]				Age (y)		
Site # (Fig. 10)	Coordinates	N	Mean (Range)	S.D.	Mean (Range)	S.D.	Mean	S.D.	y intercept (log a)	slope (b)	S.D. of b	r^2	n	Mean (Range)	S.D.
Arctic charr															
6	71°23'N, 109°55'W	17	379 (145 - 440)	65	522 (27.5- 640)	143	0.914	0.115	-4.802	2.914	0.128	0.972	17	15.8 (4 - 29)	5.7
14	72°37'N, 113°50'W	10	392 (288 - 444)	45	569 (240 - 850)	166	0.923	0.074	-4.320	2.723	0.199	0.959	10	15.3 (10 - 24)	4.3
lake trout															
1	75°15'N,105°12.5'W	13	599 (461 - 902)	143	2590 (1020-8440)	2242	1.023	0.083	-4.900	2.967	0.114	0.984	12	26.5 (21 - 50)	8.0
5	71°31'N, 108°33'W	9	369 (107 - 688)	267	1249 (9.5 -3100)	1448	0.904	0.138	-5.460	3.169	0.031	0.999	7	18.6 (6 - 31)	12.8
7	71°27.5'N,110°25'W	20	478 (103 - 665)	151	1362 (9 -2900)	735	0.997	0.155	-5.249	3.092	0.075	0.990	19	36.8 (6 - 56)	14.1
11	71°25.5'N,114°37'W	10	567 (483 - 756)	88	2030 (1000-4400)	965	1.073	0.186	-3.818	2.579	0.379	0.853	10	27.4 (14 - 36)	7.4
12	71°32'N, 114°57'W	19	554 (99 - 844)	150	1763 (10 -3100)	677	1.049	0.459	-4.058	2.648	0.213	0.901	18	32.6 (21 - 50)	9.3
14	72°37'N, 113°50'W	6	488 (450 - 507)	20	1447 (1100-1680)	228	1.248	0.171	-2.060	2.142	1.663	0.293	6	26.8 (19 - 32)	4.4
17	72°00'N, 112°41'W	10	295 (103 - 591)	222	747 (7 -2150)	954	0.908	0.188	-5.601	3.235	0.041	0.999	6	17.2 (7 - 32)	9.3

[1] condition factor = weight in g·(fork length in mm)$^{-3}$·10^5
[2] log weight in g = b·log length in mm + log a

Table 14. Summary of sexual maturity data for fish from Victoria and Stefansson islands.

Site # (Fig. 10)	Date	N	Sex	Maturity: Immature	Mature	Near Ripe	Ripe	Ripe & Running	Spent	Unknown	Age of youngest mature fish (y)	Length of youngest mature fish (mm)
Arctic charr												
6	12/8/81	12	male	1	9	2					13	382
		5	female		4	1					12	376
		17	total	1	13	3						
14	9/8/81	8	male		7	1					10	288
		2	female		2						14	390
		10	total		9	1						
lake trout												
1	2/8/81	8	male			8					22	462
		5	female		1	4					21	461
		13	total		1	12						
5	12/8/81	4	male	3		1					26	610
		4	female	2	1	1					28	688
		8	total	5	1	2						
7	12/8/81	12	male		3	9					8	238
		8	female		3	5					6	103
		20	total		6	14						
11	7/8/81	8	male		3	5					14	483
		2	female		2						31	582
		10	total		5	5						
12	8/8/81	8	male		4	4					23	400
		10	female		9	1					20	440
		18	total		13	5						
14	9/8/81	4	male			4						
		2	female		2							
		7	total		2	4				1		
17	10/8/81	2	male	1		1					19	532
		8	female	1	3	4					7	115
		10	total	2	3	5						

When lake trout and Arctic charr inhabit the same lake, the trout appear to host more parasite species and have higher levels of infection than the charr (Appendix II, Table 19; Appendix V, Table 22). *Proteocephalus arcticus*, an intestinal cestode that commonly occurs in charr, was only found in the trout on Victoria Island. This is the first report of lake trout in North America hosting *Proteocephalus arcticus*. *Salmincola edwardsii* parasitized both charr and trout. Most trout and charr were parasitized by *Diphyllobothrium* spp. and individual fish of both species hosted *Echinorhynchus gadi* or *Eubothrium salvelini*, but seldom both. An intestinal trematode, *Crepidostomum farionis*, was also found in one lake trout. In the slightly brackish lake (site 14), although *Diphyllobothrium* spp. were present, none of the six trout caught were infected. Fish in the lake were heavily infected with *Cystidicola cristivomeri*.

Marine sampling in Viscount Melville Sound captured fourhorn and Arctic staghorn sculpin, Arctic cod *Boreogadus saida*, and slender eel-blenny *Lumpenus fabricii* (Appendix II, Table 19, sites 3 and 15).

SUMMARY

Samples of water, aquatic biota, and terrestrial plants were collected between July 19 and September 3, 1981, from islands bordering Viscount Melville Sound in the Canadian Arctic Archipelago. Marine fishes and invertebrates were collected from the island's coastal waters and wildlife observations were recorded. Domestic, commercial and sport fishing activities and previous aquatic research in the area were summarized.

Deep sheltered lakes thoughout the area may not annually lose their ice cover and many of the lakes still had floating ice in mid-August. Only the largest rivers on Victoria Island flow year-round and stream flows on the other islands were either seasonal or ephemeral. New and/ or multi-year sea ice was present along all of the coastlines.

Chemistry of surface water samples reflected the basin type of the lakes where they were taken. Most of the lakes were situated on sedimentary rock and were cold and oligotrophic. They had basic pHs and conductivities in the range of 100 to 350 μS/cm, with calcium and magnesium as the major contributing ions. The ratios of total dissolved nitrogen to total dissolved phosphorus ranged from 15.0 to 28.5 and the lakes were nutrient poor. The highest conductivities in these lakes were due to higher sodium and chloride concentrations while the lower conductivities reflected low calcium concentrations. One lake in the Shaler Mountains of Victoria Island was situated on igneous rock; it was chemically similar to the lakes on sedimentary rock that had low calcium inputs. Two lakes sampled on Melville Island were situated on sedimentary rock with a high chloride and sulphate content. They had slightly acidic pHs and one lake was chemically dilute, with a conductivity of only 40 μS/cm. The other had high suspended carbon, nitrogen and phosphorus concentrations and was very turbid, probably as a result of surface erosion. The ratio of total dissolved nitrogen to total dissolved phosphorus was 4.5; suspended phosphorus concentrations were even higher than Meretta Lake, a eutrophied lake on Cornwallis Island.

Garrow Lake on Little Cornwallis Island was very different chemically than the other lakes sampled. It was meromictic with high concentrations of potassium, calcium, chloride, and sulphate and a conductivity of 6375 μS/cm. There was a halocline at a depth of 20 m, below which the lake was anoxic. Suspended phosphorus and chlorophyll A concentrations were low but dissolved solid concentrations were similar to other lakes with sedimentary rock basins.

Zooplankters in the study area were more abundant in lakes south of Viscount Melville Sound and more diverse on western Victoria Island. *Limnocalanus macrurus* and a harpacticoid species were the only crustacean zooplankters found on Bathurst Island; *L. macrurus* and/or *Cyclops scutifer* were found in lakes on Melville Island; and Garrow Lake, on Little Cornwallis Island, had *L. macrurus*, a harpacticoid species and a species of marine cyclopinid. Crooked Lake, on Prince of Wales Island, contained *C. scutifer*, *L. macrurus*, and a species of the genus *Daphnia*. *Cyclops scutifer* nauplii were the most abundant species and only ephippia of the *Daphnia* sp. were found. Crustacean zooplankters and rotifers were abundant in Crooked Lake relative to other populations sampled. Victoria Island had the greatest diversity of crustacean zooplankters. The northern lakes contained *Diaptomus sicilis* and *L. macrurus* or *C. scutifer*. They were joined by *Daphnia longiremis* and *Chydorus sphaericus* in lakes to the west and south. In lakes draining into Minto Inlet, five other pelagic species occurred: *Daphnia longispina microcephala*, *D. middendorffiana* x *pulex*, *D. middendorffiana*, *D. schodleri*, and *Chydorus sphaericus*. *Diaptomus sicilis* and/or *Cyclops scutifer* were the most abundant crustacean zooplankters in the Victoria Island lakes sampled and the majority were copepodids. *Cyclops capillatus* and *Eurycercus lamellatus*, which are not readily susceptible to net capture, were found in fish stomachs in lakes along the north coast. A marine cyclopinid species was found well inland in the headwaters of the Kuujjua River. Harpacticoid crustaceans were absent and rotifers were not abundant in samples from Victoria Island. *Asplanchna* sp., a large predaceous rotifer, was found in two lakes in the Shaler Mountain Belt of Victoria Island.

With few exceptions, lakes that did not winterkill contained fish. Landlocked and lake-dwelling Arctic charr *Salvelinus alpinus* and/or fourhorn sculpin *Myoxocephalus quadricornis* were caught in lakes on Bathurst, Little Cornwallis, and Cornwallis islands. Lake trout *S. namaycush* and lake-dwelling, landlocked and anadromous Arctic charr were caught in lakes and rivers on Stefansson and northern Victoria islands. Anadromous least cisco *Coregonus sardinella* and anadromous and lake-dwelling Arctic charr were caught in Crooked Lake on Prince of Wales Island.

Charr caught on the islands north of Viscount Melville Sound generally grew slower, reached a smaller maximum size, and lived longer than those caught to the south. Where anadromous and lake-dwelling charr were present in the same system, for example in Crooked Lake, the anadromous charr generally grew faster and to a larger size. Lake trout generally grew larger and lived longer than the charr and the least cisco grew larger and lived longer than those living further south.

The charr, trout and cisco were all spawning or preparing to spawn by late August. Charr began spawning in mid-August on Bathurst Island, in late August on Prince of Wales Island and in early September on Victoria Island. Least cisco in Crooked Lake were spawning in late August. In none of the species did individual fish appear to spawn annually.

All of the freshwater fish species were omnivorous, opportunistic feeders. Arctic charr throughout the survey area fed primarily on chironomid larvae and pupae and on smaller charr. Trichopterans, an isopod *Mesidotea entomon*, a crustacean *Mysis relicta*, plant material and fish eggs were also important foods depending on availability. Cannibalism was common among charr. Lake trout ate primarily chironomid larvae and pupae and fish. *Mysis relicta*, plant material and small mammals were also important foods. Least cisco ate large numbers of the crustacean zooplankter *Cyclops scutifer*, and algae balls (*Nostoc* sp.) and chironomids. Cisco eggs were eaten by the males of the species. Lake-dwelling Arctic charr and anadromous least cisco fed during spawning but anadromous charr did not.

Charr were parasited by *Cystidicola cristivomeri*, *Philonema agubernaculum*, *Diphyllobothrium dendriticum*, *D. ditremum*, *Eubothrium salvelini*, *Proteocephalus arcticus*, *Echinorhynchus gadi*, *Salmincola edwardsii*, and *S. carpionis*. Lake trout hosted all of the above parasites with the exceptions of *D. dendriticum*, *Philonema agubernaculum*, and *S. carpionis*. In addition trout hosted *Crepidostomum farionis* a species of trematode. When lake trout and Arctic charr were found to inhabit the same lake, trout in the lake had higher incidences and levels of metazoan parasite infections than did charr. *Proteocephalus arcticus*, which has hitherto only been reported from charr, was found in the lake trout. Least cisco hosted four species of metazoan parasites: *D. ditremum*, *D. dendriticum*, *Proteocephalus* sp. and *E. gadi*. Incidences and levels of infection by *Diphyllobothrium* spp., for which *Cyclops scutifer* and *Diaptomus* spp. serve as intermediate hosts, were high in all three fish species.

Seven species of marine fishes were caught during the survey, including: polar cod *Arctogadus glacialis*, Arctic cod *Boreogadus saida*, slender eelblenny *Lumpenus fabricii*, fish doctor *Gymnelis viridis*, Arctic staghorn sculpin *Gymnocanthus tricuspis*, fourhorn sculpin, and ribbed sculpin *Triglops pingelii*.

Most of the domestic fishing in the survey area takes place in Tatik Lake on the west side of Victoria Island. Anadromous Arctic charr are caught in nets set under the ice in early October by the residents of Holman Island. Least cisco are also sought after, by residents of Resolute who fish Crooked Lake, and cod are prized by Holman Islanders for their tasty livers. Lake trout are not as popular a food fish.

There are sport fishing camps on Crooked Lake and south of Hadley Bay on northern Victoria Island. Anadromous charr are angled at both locations and trophy trout are also caught at the Hadley Bay camps. Small numbers of anadromous Arctic charr are caught annually in Tatik Lake for commercial sale through the Holman Island Co-operative. Residents of Resolute, on Cornwallis Island, are currently investigating the possibility of establishing a commercial quota on least cisco in Crooked Lake.

A great deal more needs to be learned before we can effectively protect and manage aquatic resources in the Viscount Melville Sound area.

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APPENDIX I. MARINE FISH SPECIES DISTRIBUTIONS

5. Distribution records of marine fish species caught in the Viscount Melville Sound study area.

Species Name: Scientific	Species Name: Common	Catch Location (Fig. 11) and Reference
ıtiidae		
ıiosus microcephalus (Bloch & Schneider) 1801	Greenland shark	1 (Templeman 1963).
nonidae		
ɜgonus sardinella Valenciennes 1848	least cisco	19, 23 (McAllister pers. comm.).
ɔelinus alpinus (Linnaeus) 1758	Arctic charr	18, 19, 23 (McAllister pers. comm.).
idae		23 (Nigiyok pers. comm.), 15 (Sabine 1821).
togadus glacialis (Peters) 1874	polar cod	1 (this report); 18, 19, 22 (Boulva 1972); 13 (Buchanan 7 (MacDonald pers. comm.); 9, 10, 17, 18 (McAllister per
togadus sp.	cod	8, 12, 18 (McAllister pers. comm.).
eogadus saida (Lepechin) 1774	Arctic cod	25 (this report); 1, 2, 3, 26, 27 (Bain and Sekerak 197 *et al.* 1977); 14 (Beak 1975); 1 (Green and Steele 1975, 1974); 18 (MacDonald 1954); 7 (MacDonald pers. comm.); 12, 15, 18, 20 (McAllister pers. comm.); 18 (Walters 19
us ogac (Richardson) 1836	Greenland cod	22 (McAllister pers. comm.).
rhichadidae		
rhichas denticulatus Krøyer 1845	northern wolffish	18 (MacDonald 1954, McAllister pers. comm., Walters 195
ıpenidae		
penus fabricii (Valenciennes) 1836	slender eelblenny	21 (this report).
rchidae		
ıelis viridis (Fabricius) 1780	fish doctor	1 (this report); 13 (Buchanan *et al.* 1977); 1 (Green an Holeton 1974); 1, 2, 5 (McAllister pers. comm.).
ɔdes mucosus Richardson 1855	saddled eelpout	13 (Buchanan *et al.* 1977); 1 (Green and Steele 1975); 26 and Macpherson 1955); 1, 2, 4, 26 (McAllister pers. comm
des pallidus Collett 1878	pale eelpout	18 (MacDonald 1954, McAllister pers. comm., Walters 1953
des polaris (Sabine) 1824	Canadian eelpout	1 (Green and Steele 1975, McAllister pers. comm.).
des turneri Bean 1878	polar eelpout	1 (Holeton 1974).
ɪytidae		
ytes sp.	sand lance	20, 24 (McAllister pers. comm.).
dae		22, 24 (McAllister pers. comm.).
ɛllus scaber Knipowitsch 1907	rough hookear	13 (Buchanan *et al.* 1977), 20 (McAllister pers. comm.).
ɛllus uncinatus (Reinhardt) 1835	Arctic hookear sculpin	1 (Holeton 1974).
culus sp.	sculpin	7 (McAllister pers. comm.).
nthus tricuspis (Reinhardt) 1832	Arctic staghorn sculpin	16, 21, 25 (this report); 13 (Buchanan *et al.* 1977); 1 (Steele 1975, Holeton 1974); 1, 18, 20 (McAllister pers.
nthus sp.	sculpin	18 (McAllister pers. comm.).
icornis Reinhardt 1841	twohorn sculpin	1 (Green and S[illegible]

[illegible]lbert and Burke 1912

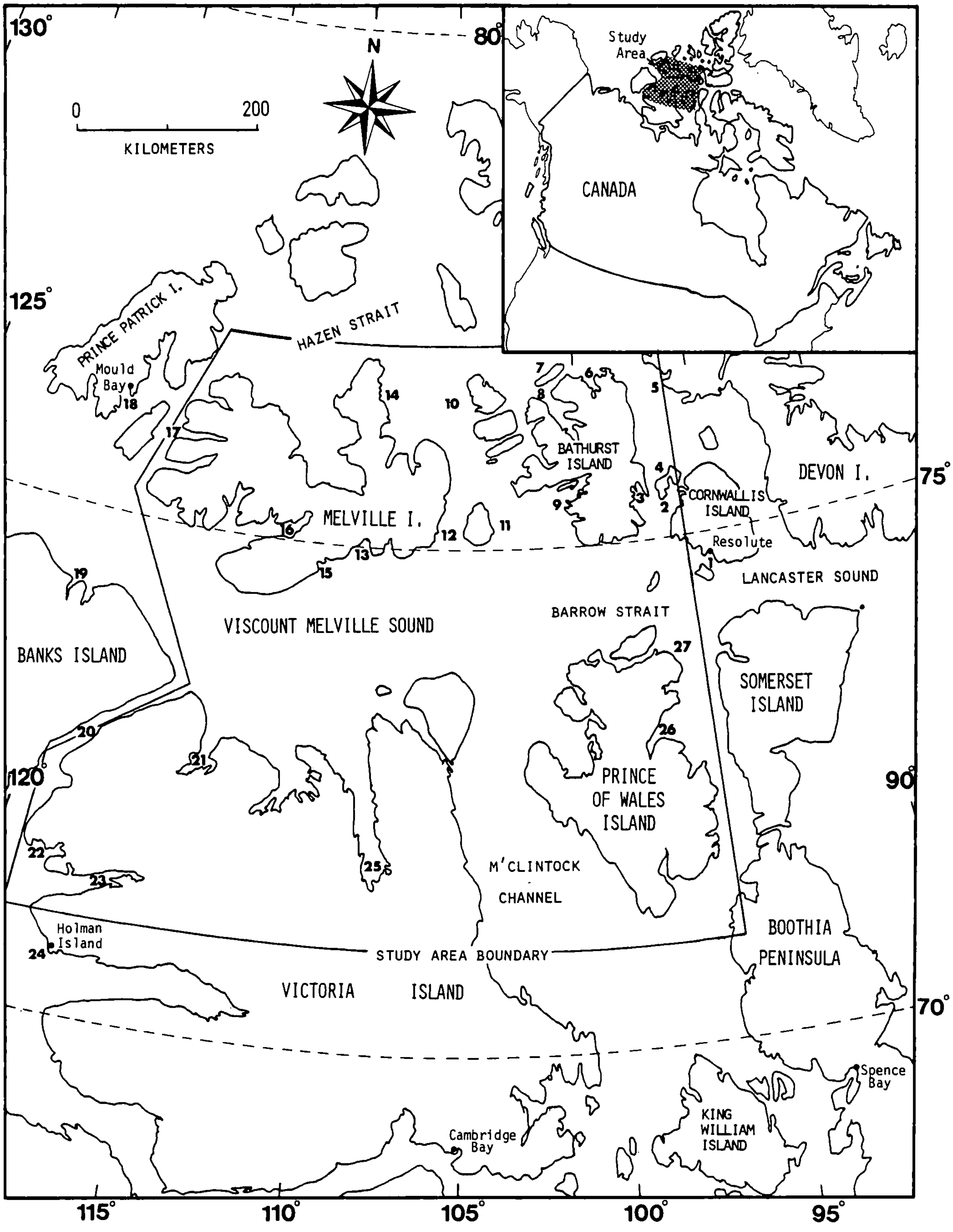

Fig. 11. Map of marine fish species catch locations (1-27) near islands bordering Viscount Melville Sound.

Distributions of Marine Fish Species

Little information is available on the distribution and biology of marine fish species occurring in the survey area, and often that information remains unpublished. Dr. D. E. McAllister, Curator of Fishes at the National Museum of Natural Sciences in Ottawa, has prepared a Bibliography of the Marine Fishes of Arctic Canada, 1771-1979 (Robinson and McAllister 1980) and, together with Dr. J. G. Hunter, is preparing a book on Marine Fishes of Arctic Canada. Dr. McAllister kindly supplied the authors with a pre-publication copy of his bibliography, and with information on specimens housed in the museum's collection.

A list of marine species in the survey area, together with approximate catch locations (Fig. 11) and references, has been included in Table 15. The expense and logistical difficulties connected with deep sea and/or long term sampling in the high arctic have limited studies to comparatively shallow, short term test fishing. Only at Mould Bay (Site 18), Bridport Inlet (Site 13) and Resolute Bay (Site 1) has there been concerted sampling.

One marine fish species that has been studied is the Arctic cod *Boreogadus saida*, a major food species for searun Arctic charr and a variety of seabirds and marine mammals (Milne and Smiley 1976; Bain and Sekerak 1978; Bradstreet 1980; Davis *et al*. 1980). Further sampling is needed to elucidate the distributions and biology of other marine fish species.

APPENDIX II. FISH DATA

EXPLANATION OF TABLES 16 TO 19

Symbols used in the tables:

* Water chemistry and zooplankton taken at this site.
1 Specimens available at National Museum of Natural Sciences, Ottawa.
\+ Age : fish aged to last countable otolith ring but is older than specified.
\+ Stomach : presence of most abundant food items.
\+ Parasites : presence of parasite species.

Number classification for stomach contents and parasite levels of infection:

dry weight (g)	number	number of parasites
< 0.001	1	1 - 25
0.001 - 0.005	2	26 - 50
0.006 - 0.010	3	51 - 100
0.011 - 0.050	4	101 - 200
0.051 - 0.100	5	201 - 500
0.101 - 0.500	6	501 - 1000
0.501 - 1.000	7	1001 - 2000
1.001 - 5.000	8	> 2000
> 5.000	9	

Fullness of fish stomachs (apparent):

o empty
1 full

Miscellaneous category for Tables 16 to 19 includes:

	item	site	contribution to diet	
Table 16.	digested remains	1, 2	5,4	
	crustacea remains	8	2	
	Arctic charr eggs	1, 2	1	
	sand	5	2	
Table 17.	sand	8	4	
Table 18.	digested remains	6	4	Arctic charr
	least cisco eggs	5	4, 5, 6	Arctic charr
	least cisco eggs	8	3, 6, 6	Arctic charr
	least cisco eggs	8	3, 7	least cisco
	least cisco eggs and/or sand	10	2, 2, 6	least cisco

Table 19.

item	site	contribution to diet
other Diptera	8, 10, 11, 13, 14	1 - 3
Hymenoptera	17	2
unidentified insects	13	1
Copepoda	6, 8, 18	1
Ostracoda	9, 17	1
Hydracarina	1, 9, 10, 11, 18	1
Sphaeriidae	13, 18	1
Nematoda (Mermithidae)	8	1
small mammal	5	9
bird feathers and/or sand	14	1

Table 16. Raw data from Arctic charr *Salvelinus alpinus*, polar cod *Arctogadus glacialis*, fish doctor *Gymnelis viridis*, fourhorn sculpin *Myoxocephalus quadricornis*, and ribbed sculpin *Triglops pingelii* caught in 1981 on or near Bathurst, Little Cornwallis, or Cornwallis islands.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents														Parasites							
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	other Diptera	Trichoptera	Hymenoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	fish remains	plant material	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola* sp.
Arctic charr																											
1*[1]	stream	27	0.1	0	0+																						
	75°10.5'N, 98°09'W	49	1.0	0	2																						
	19-20/7/81, 24 h	31																									
	hoopnet (BH 1)	55																									
		57																									
		52																									
	lake	104	7.0	0	4	0																					
	75°12'N, 98°12'W																										
	19-20/7/81, 23 h																										
	gillnet (B1)																										
	75°12'N, 98°12'W	367	410	2	21	1	+	+												+					+		
	19-20/7/81, 23 h	392	640	3	20	½											+										
	gillnet (B2)	460	810	9	19	0														1					+		
		388	520	2	19	½	+	+												+					+		
		359	420	2	23	½	+	+																	+		
		382	640	3	15		1	3						4				1	5	1					+	1	
		396	600	8	21		1	7										1		4					+		
		333	340	8	22		2	7				1						2									
		353	480	9	24		1	7	3	1								1	1	2					+	1	
		319	310	2	16		1	6										1		1					+		
2	lake	338	310	1	16	0														+							
	75°02'N, 99°09'W	248	120	8	15	½	+	+												+							
	19-20/7/81, 24.5 h	358	410	8	19	½	+	+												+							
	gillnet (B3)	427	510	8	15	0														+							
		417	550	2	16	0														+							
		492	1040	8	22	½	+	+												+							
		375	450	2	15	0														+							
		447	700	8	20	0														+							
		328	270	1	14		1	4	1	1							4	1	4	5							
	75°02'N, 99°09'W	436	660	2	18	½	+	+												+							
	19-20/7/81, 25 h	374	440	2	20	½	+	+												+							
	gillnet (B4)	364	360	8	25	0														+							
		425	640	9	23	0														+							
		385	460	2	16	½	+	+												+							
		275	145	2	21	½	+	+												+							
		214	85	9	21	0																					
		234	85	8	21	0														+							
		230	100	3	19	½	+	+												+							
		240	120	2	16		1	5					1							1							
		205	75	8	15		1	4											1	1							
		255	135	8	19	0														+							
		192	65	3	15	½	+	+												+							
		189	60	3	17	½	+	+												+							
		200	55	2	15	½	+	+												+							
		212	80	8	22	½	+	+												+							
		100	6.5	1	6	0														+							
		89	4.5	7	6		1	4							1	1				1		1					
3*	lake																										
	75°24'N, 100°06'W	480	960	2	27			1												6							
	31/7-1/8/81, 15 h	458	810	2	21			1	1											6							
	gillnet (B13)	469	960	2	21			3									9			6	1						
		175	40	1	8		2	4	2	2		1	1			1				1							
		598	1520	3	24	1	+	+																			
		588	1920	3	23												+			1	1				7		
		491	980	3	27		+	+												4	1						
		404	820	2	20		1	5	1	1	1	1	1					2		6	1	1					
	75°24'N, 100°06'W	525	1360	2	29		1	7		1	1		1					1		6							
	31/7-1/8/81, 15 h	580	1700	3	26	0														+							
	gillnet (B14)	520	1030	2	22	1	+	+												+							
		520	1070	8	30	0														+							
		520	1280	9	25	0														+							
		418	530	8	21	½	+	+												+							
		475	900	3	26	1	+	+												+							
		199	60	7	11	1	+	+												+							

Table 16 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents														Parasites							
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	other Diptera	Trichoptera	Hymenoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	fish remains	plant material	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola* sp.
4	lake	350	410	2	19		1	6		2										+					+		
	75°26′N, 100°00′W	330	330	8	19		2	4		2										+					+		+
	31/7-1/8/81, 15.5 h	360	420	2	20			1												1					+		
	gillnet (B11)	350	370	2	21		5	2	1									2		2	1				+		+
		335	340	8	13				1												1				+		
	75°26′N, 100°00′W	345	350	2	21		+	+												1					5	1	
	31/7-1/8/81, 15.5 h	370	440	2	23		+	+																	7	3	+
	gillnet (B12)																										
5[1]	stream	62	1.6	7																							
	75°38′N, 99°22′W	128	21.5	9	8																						
	31/7-1/8/81, 15.5 h																										
	hoopnet (BH 2)	163	40																								
		134	19																								
		116	14																								
		145	27.5																								
		77	2.8	1	2																						
		142	25																								
		132	21																								
		143	25																								
		128	18																								
		117	14.5																								
		121	15																								
	lake																										
	75°38′N, 99°19′W	119	13.5	7	5	1																					
	30/7-1/8/81, 38.5 h	126	14.5	8	7	0																					
	gillnet (B9)	132	19	2	5	1																					
		188	60	8	13	0																					
		123	14.5	1	6	1																					
		187	50	8	10	0																			+		
		212	80	8	14	0																			+		
		337	350	2	19		1	7												1					+		
		422	640		22		+	+												5	1				4	1	
		337	300	8	20		2	1												1					+		
		400	570	2	22		2	7		1			1							2					+		
		395	500	8				7										2		4							
		335	340	2	20		2	6																	+		
		326	220	8	26	0														+					+		
		205	70	1	10	1																					
		220	80	1	11	1														+							
		215	80	7	10	0																			+		
		197	60	8	20	0														+							
		237	100	8	10	0																					
		165	40	3	8	0																					
		125	17	7	5	0														+							
		127	16.5	7	5	1																					
		117	13.5	1	5	0																					
		125	15	7	5	0																					
		152	40	3			2		6					4					2						+		
		114	12.5	7		0																					
		120	16.5	1			6	2						1				1	2								
		131	17	7			2		6										2								
		125	15	8			4	2	5	2			1	2													
		122	14	1			5	2	1					3	1			2									
		118	11	7	5	0																					
		105	9	7	5	0																					
		114	12	7	4	0																					
		112	11	1	5	1																					
		123	13	1	4	1																					
		111	11	7	4	0																					
		103	9	1	4	1	+	+																			
		113	12	1	4	1	+	+																			
		112	10	7	5	1	+	+																			
		105	10	7	5	0																					
		117	12	1	5	0																					

Table 16 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents: fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	other Diptera	Trichoptera	Hymenoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	fish remains	plant material	miscellaneous	Parasites: *Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola* sp.
5	75°38'N, 99°19'W	386	560	3		1	+	+												+					+		
	30/7-1/8/81, 38.5 h	337	340	2		1	+	+																	+		
	gillnet (B10)	227	90	1		0																					
		263	150	8		1	+	+																	+		
		320	220	8		1	+																		+		
		405	580	2		1	+	+												+					+		+
		120	13	1	4	0																					
		117	14	7	4	0																					
		360	410	1	18	0														+					+		
		345	370	2	21	1	+													+					+		
		370	460	2	20	¼	+																		+		+
		358	370	2	23	½	+																		+		+
		329	300	2	17	1	+													+					+		
		450	660	2	22	½	+													+					+		+
		317	270	8	20	0																			+		
		116	12	1	4	1	+	+																			
		117	12	1	4	1	+	+																			
		138	20	7	4	0																					
		117	13	1	5	1																					
		110	10	1	5	1	+	+																			
6*[1]	lake	273	160	8	17		+	+												2					3		
	76°35'N, 98°55'W	369	440	2	17		+	+												1	1				6		
	30-31/7/81 21.5 h	384	440	2	21		+	+												1	1				6		
	gillnet (B7)	275	200	2	14	1		+												+					+		
		340	310	2	20		1	6										1		2					+		
		347	400	2	20		1	6						4		1				3					+		
		338	340	2	20			6												1	1				+		
		285	220	2	15			6												2					+		
		300	180	2	20			6												4					+		
		337	270	3	20	1														+					+		
		345	340	2	18	1		+												+					+		
		390	540	3	21			6												1					1		
		337	260	2	19	1														+					+		
		319	240	8	18	1														+					+		
		296	200	8	22	1														+					+		
		313	270	3	21	1														+					+		
		241	150	3	15	1														+					+		
		306	240	2	19	1														+					+		
		325	260	2	15	1														+					+		
		380	580	3	22	1														+					+		
		380	440	2	20	1														+					+		
		306	210	2	17	1														+					+		
		380	320	2	18	1														+							
		388	540	3	19	1														+					+		
		342	270	2	19	1														+					+		
		430	480	2	18	1														+					+		
		308	210	2	18	1														+					+		
		332	250	2	21	1														+					+		
8*	lake	542	1900	3	23		+	+												4	1				5		
	76°25'N, 97°58'W	330	320	2	18		6	2										1		1					+		
	30-31/7/81, 21.5 h	378	490	2	22		3	2									6			6					+		
	gillnet (B5)	420	490	2	37		4	7		2									2	6					+		
	76°25'N, 97°58'W	310	270	2	19		6	4										2		1					+		
	30-31/7/81, 21.5 h	327	290	2	18		6	6		2			1		1			2		1					+		
	gillnet (B6)	370	420	2	19		6	4										1		5					+		
10[1]	lake	356	340	1		1														+							
	75°02.5'N, 96°17'W	343	270	2		1														+					+		+
	1-2/8/81, 17 h	315	275	9		1														+							
	gillnet (C1)	204	70	1		1														+							
		113	13	1		0																					
	75°02.5'N, 96°17'W	351	300	2	22		+													3					5	5	
	1-2/8/81, 17 h	316	250	2	20		+													3					5	2	
	gillnet (C2)	345	310	3	18		+													3						1	

Table 16 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents: fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	other Diptera	Trichoptera	Hymenoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	fish remains	plant material	miscellaneous	Parasites: *Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola* sp.
Polar cod[1]																											
	Resolute Bay	57	1.2																								
	74°41'N, 94°50'W	63	1.7																								
	28/7/81	71	2.3																								
	weasel trawl	62	1.6																								
Fish doctor[1]																											
	Resolute Bay 74°41'N, 94°50'W 28/7/81 weasel trawl	130	9.4																								
Fourhorn sculpin																											
6*[1]	lake	175	29	2																							
	76°35'N, 98°55'W	150	25.5	8																							
	30-31/7/81, 21.5 h gillnet (B7)	163	28	8																							
9*[1]	Garrow Lake	132	11																								
	75°23'N, 96°47'W	125	8.5																								
	1-2/8/81, 17 h	156	20.5																								
	gillnets (LC1, LC2)	157	19.5																								
		113	7																								
		125	10																								
		137	16.5																								
		148	16																								
		128	10.5																								
		115	7.5																								
		123	8																								
		131	9																								
		112	5.5																								
		104	4.5																								
		102	4																								
		119	9.5																								
		133	15																								
10*[1]	lake	200	60																								
	75°02.5'N, 96°17'W	183	40																								
	1-2/8/81, 17 h	199	50																								
	gillnet (C1)	185	40																								
		185	40																								
	75°02.5'N, 96°17'W	188	50																								
	1-2/8/81, 17 h	179	35																								
	gillnet (C2)	208	70																								
Ribbed sculpin																											
7[1]	Young Inlet	116	8.0	8																							
	76°35'N, 99°00'W	119	6.5	8																							
	30-31/7/81, 21.5 h	122	10.0	2																							
	gillnet (B8)	112	8.0	8																							
		107	7.5	8																							

*1 See start of Appendix II for table explanation.

Table 17. Raw data from Arctic charr *Salvelinus alpinus*, Arctic staghorn sculpin *Gymnocanthus tricuspis*, and fourhorn sculpin *Myoxocephalus quadricornis* caught in 1981 on Melville Island, Northwest Territories.

						Stomach contents							Parasites			
Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	fullness	Chironomidae larvae	Chironomidae pupae	Mysidacea	fish remains	plant material	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Cystidicola cristivomeri*	*Salmincola* sp.
Arctic charr																
1	lake 75°04′N, 106°18′W 20-21/7/81, 14 h gillnets (M1, M2)	no fish in either net														
2	lake 75°03′N, 107°51′W 20-21/7/81, 13.5 h gillnets (M3, M4)	no charr in either net														
3*[1]	Polynia Creek 75°01′N, 108°39′W 20-22/7/81, 34 h hoopnets (MH 1)	27	0.1	0	0+											
	Polynia Lake 75°06′N, 108°43′W 20-22/7/81, 35 h gillnet (M5)	108	9	8												
	75°06′N, 108°43′W 20-22/7/81, 34.5 h gillnet (M6)	102	6	7	3											
5	lake 75°33′N, 111°27.5′W 21-22/7/81, 23 h gillnet (M10)	no fish														
6	lake 76°12′N, 109°35′W 22-24/7/81, 43 h gillnets (M11, M12)	no fish in either net														
7*	stream 76°24′N, 108°33′W 22-24/7/81, 41.5 h hoopnets (MH2)	no fish														
	lake 76°23.5′N, 108°33.5′W 22-24/7/81, 41 h gillnets (M13, M14)	no fish in either net														
8[1]	Tingmisut Lake 75°56′N, 107°53′W 22-24/7/81, 39 h gillnet (M15)	360	350	2	21			+					1		6	
		383	510	2	18		+	+		+			1	1	5	
		342	380	9		0							+		+	+
	75°56′N, 107°53′W 22-24/7/81, 39 h gillnet (M16)	385	420	8			2	2	2		4		+		+	+
		353	360	3				1	2			4	+			+
		393	400	2			2		4		1		+			+
Arctic staghorn sculpin																
4[1]	brackish lake 75°03′N, 111°30′W 21-22/7/81, 23.5 h gillnets (M7, M8, M9)	181	80	8												
		147	40	8												
Fourhorn sculpin																
2[1]	lake 75°03′N, 107°51′W 20-21/7/81, 13.5 h gillnet (M3)	138	13.5	8												
		141	13.5	8												
		133	8.0	2												
4[1]	brackish lake 75°03′N, 111°30′W 21-22/7/81, 23.5 h gillnets (M7, M8, M9)	152	30	2												
		170	40	2												
		135	20	2												

*[1] see start of Appendix II for table explanation.

Table 18. Raw data from Arctic charr *Salvelinus alpinus*, and least cisco *Coregonus sardinella* caught in 1981 on Prince of Wales Island, N.W.T.[1]

						Stomach contents														Parasites						
Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Trichoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	mermithid nematodes	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola carpionis*
Arctic charr																										
1*	Crooked Lake	291	220	1	11	0																				+
	72°41′N, 98°49′W	675	3100	5	19	0																				+
	24-25/8/81, 14 h	460	820	8	23	0																		+		
	gillnet (PW1)	404	540	8	24	0																		+		+
		334	300	2	12	0														+						
		305	280	2	10		4										1		4					+		
		258	150	7	10		1		1											4						
		242	120	8	8		6		1		1						1		3	1	1					
		236	110	2	7																			+		
		245	120	7	8		5										1		2							
		245	130	2	8	0														+						
		223	100	7	8	0																		2		
		216	80	7	7		5										1		2	1				+		
		214	80	1	6	1	+																			
		205	60	1	6	0																				
		226	90	1	6	0														+						
		200	65	7	7	1	+																			
		200	65	7	8	0																				
		203	80	7	6	0																				
		199	60	1	6	0																				
		197	60	7	7	¼	+																			
		192	60	1	7	1	+																			
		179	45	7	7	0																				
		240	115	7	8	0																				
		197	60	7	8	¼	+																			
		118	11	1	4	0																				
		115	9	1	4	0																				
		105	7	7	3	0																				
2*	Crooked Lake	570	1740	3	17+	0															1					+
	72°40′N, 98°51′W	408	630	5	15		3	1				2					1		2					5		
	24-25/8/81, 14 h	407	540	2	17	0																		+		
	gillnet (PW2)	415	535	2	26	0																		+		+
		386	510	2	16	0																		+		
		246	130	2	9	0																		+		
		195	70	1	6		6										2		1	1	1					
		202	80	1	7		6										2		2	1	1					
		206	80	7	8	0														+						
		220	100	7	8	0														+						
		208	75	7	7	1	+													+						
		197	70	7	7	1	+																			
		207	80	7	6	0														+						
		228	95	7	8	0																				
		222	90	7	8	1	+																			
		202	70	7	6	1	+																			
		212	80	7	6	0														+						
		203	70	7	8	1	+																			
		213	80	7	8	0																				
		185	55	1	8	1	+													1						
		184	55	1	6	1	+																			+
		200	60	7	6	0																				
		199	65	1	8	0																				
		380	530	2	16		2			2	1						3		8					+		
3*	Crooked Lake	644	2850	5	23	0														1						
	72°39′N, 98°53′W	277	190	8	13	0																		+		
	24-25/8/81, 14 h	632	2800	11	23	0														1						+
	gillnet (PW3)	650	2750	11	16	0														3	1					+
		745	4600	5	23	0														1						+
		768	4100	5	25	0														1	1					+
		423	760	8	11	1													+					+		
		643	3000	5	24	0														5						+
		698	3550	5	22	0																				+
		748	5100	5	19	0														3						
		584	2050	10	17	0														1						+
		627	2550	11	21	0														2						+
		245	130	1	8	1	+																			
		191	60	1	6	1	+													1						
		202	75	7	8	1	+																			
		201	75	7	8	0																				
		618	2500	10	19	0																				
		400	550	8	18	0														1				+		
		230	115	1	9	0														1						
		240	100	7	9	0																				
		235	110	7	9	1	+																			

Table 18 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents														Parasites						
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Trichoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	mermithid nematodes	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Philonema oguberaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola carpionis*
3*	Crooked Lake	196	60	1	7	¼	+													1						
	72°39'N, 98°53'W	214	90	1	7	0																				
	24-25/8/81, 14 h	207	70	1	7	0																				
	gillnet (PW3)	564	1800	5	26	0														6				+		
4*	Crooked Lake	275	200	2	9	0																				
	72°39'N, 98°49'W	334	340	8	14	1	+																	+		+
	24-25/8/81, 14 h	253	140	1	10	0														1						
	gillnet (PW4)	710	4100	2	26	-0														6	1			+	1	+
		478	1040	8	25		1	4	1							7	1			3	1			+		+
		513	1620	5	23	0															1	1		+	1	
		383	550	2	16	0																		+		
		221	80	1	8	¼						+												+		
		208	70	7	7	0																		+		
		208	80	7	8	0																				
		270	170	1	11	0																		+		
		268	160	7	9	0																		+		
		206	65	1	6	¼	+													2						
		230	95	1	8	0														1						
		222	90	1	7	0																				
		352	420	8	15	0																		+		
		211	90	1	7	¼	+													1						
		210	85	1	8	¼	+																			
		222	95	7	6	0														1						
		223	85	1	6	¼	+													1						
		198	95	1	7	¼	+													1						
		210	70	7	8	0														2						
		197	65	7	6	¼	+																			
		390	490	8	23		7	1			1		1				1							+		
5*	Crooked Lake	444	860	5	16							7						4		1	1			+	1	+
	72°39'N, 98°46'W	514	1300	5	21	0																		8	4	
	26-28/8/81, 35 h	290	240	7	11		1	1										6	5	1				+		
	gillnet (PW5)	256	150	2	9	1	+																	+		
		416	760	2	15		2	1			1						2	7	6					+		
		477	930	2	26	0														1						+
		598	2000	5	22	0														1						+
		325	320	8	11	0																		+		
		330	330	8	10	1	+													1						
		261	170	7	10	0														1						
		260	170	1	10	1	+																	+		
		232	100	7	8	0														1						
		315	330	8			1		1		1							6	5							
		252	140	7		0																				
		223	100	7		0																		+		
		120	13	1		0																				
		115	12	7		0																				
		117	11	1	4	0																				
		117	14	1	4	0																				
		118	12	7	4	0																				
6*	Crooked Lake	507	1290	9	19				1			5							4	1						
	72°38'N, 98°47'W	425	705	9	21	0																		+	2	+
	26/8-2/9/81, 160 h	465	900	9	21	0																		+	1	+
	gillnet (PW6)	356	445	8	15	0																				
		337	420	8	11	0																		+		+
		360	430	8	14	1																		+		
		467	760	2	19	¼																				
		455	850	2	15	0																				
		388	505	8	17	1	+																	+		
		368	540	8	14	0																		+		
		345	410	1	13	0																		+		
		380	420	8	15	1																				
		308	305	7	12	0																				
		293	220	1	9	0														3						
		233	130	1	8	0														1						
		226	120	1	8	1	+																			
		205	80	7	8	0																				
		185	60	1	7	0																				
		197	75	1	7	0														2						
		202	80	7	7	0																				
		190	70	1	7	0																				
		210	80	1	6	0																				
		211	90	7	8	0																				
		266	185	1	9	0														2						
		207	85	1	10	0																				

Table 18 Cont'd.

						Stomach contents														Parasites						
Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Trichoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	mermithid nematodes	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola carpionis*
6*	Crooked Lake	211	90	7	9	0																				
	72°38'N, 98°47'W	205	75	7	6	0																				
	26/8-2/9/81, 160 h	194	60	1		1	+																			
	gillnet (PW6)	218	100	1	8	0																				
		280	185	1	10	0														3						
		211	70	7	7	0														1						
		214	90	7	8	0																				
		258	155	1	8	0																				
		236	110	1	8	0																				
		265	170	1	9	0														1				+		
		288	240	7	12	0																				
		197	70	1		0																				
		200	80	1	8	0														1						
		217	100	1	8	0																				
		350	420	8	12	0																		+		
		216	105	3	8	0														1						
		224	90	7	9	0														1						
		204	80	1	7	0																		+		
		195	70	7	6	0														1.						
		242	130	7	8	0														2						
		440	720	2	19+		1									7				1	1					
		445	720	2	23	0																		+		+
		225	110	7	8	0														1						
		373	390	8	14	0																				+
		356	470	2	13												1		2					+		
7*	Crooked Lake	453	920	9	16	0														1				+		+
	72°37'N, 98°49'W	429	860	3	16		1					7	1											+	1	+
	26-28/8/81, 35 h	364	380	8	15	0																		+		
	gillnet (PW7)	412	750	5	20							4												+	1	
		432	760	9	26		+					+											1	5	1	
		407	560	8	15		+																	5	3	+
		405	610	2	15	0																		+		+
		390	520	2	17	0																		+		
		256	130	7	11	0														3	1			1		+
		226	100	7	9	0																		+		
		237	110	7	8	0																		3	1	
		235	120	7	8	0																				
		247	120	1	9	0														2						
		233	110	1	8	0																		+		
		247	130	7	8	0														2						
		189	60	7	6	0																				
		337	330	2	14	0																		+		+
		221	90	1	8	0														2						
		224	90	1	8	0																				
		225	100	7	9	1						+								1				+	1	
		236	100	1	8	0														2						
		210	75	7	8	0																		+		
		230	105	7	8	1																				
		225	100	1	7	0														1						
		197	60	1	6	1	+																			
		246	135	7	10	0														3				2	3	
		236	115	1	8	0														2						
		183	45	1	6	0																				
		127	15.5	1	5	0																				
		107	8	1	4	0																				
8*	Crooked Lake	333	365	7			1										1	6	6							+
	72°37.5'N, 98°46'W	550	1700	10	16	0														1						+
	29-30/8/81, 22 h	373	460	8	17	0																				
	gillnet (PW8)	453	810	2	21		2	1									1	4	3					+	1	+
		334	400	2	11		1	1									1	6	6							
		487	800	2	21	0																		+		+
		414	640	8	15	1												+	+							+
		305	290	2	12	0																		+		+
		223	95	7	7	½												+		2						
		235	100	1	8	1	+													2						
		295	220	1	11	0																				
		282	200	1	8	1	+													1						
		207	75	1	7	½	+													1						
		218	90	1	8	0																				
		251	120	7	10	½	+																			
		191	60	1	7	½	+													1						
		193	70	4	8	1	+																			
		216	80	7	10	0																		+		
		258	145	1	8	0														2						
		290	180	7	7	0														2						
		225	100	1	8	0																				
		282	180	1		0														1						
		238	115	1	8	0														1						

Table 18 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents														Parasites						
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Trichoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	mermithid nematodes	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola carpionis*
9*	Crooked Lake 72°38′N, 98°42.5′W 29-30/8/81, 22 h gillnet (PW9)	268	200	8	10	0														1						
		272	200	8	9	0																				
		261	175	2	8	0																				
		260	165	2	8	0														2						
		299	240	7	11	0																				
		457	690	2	25		1		1											3			1	+		+
		617	2250	9	18				1											4						+
		328	360	2	11	1													+							
		246	130	7	10	1	+													1						
		552	1050	8	27	¼										+				3						+
		205	70	7	7	0																				
		189	60	1	6	1	+																			
		190	60	1	7	1	+																			
		238	120	1	8	0														2						
		194	60	1	6	0			+											3	1	1		3	1	
		221	90	7	8	0														2						
		201	60	1	6	½	+													2						
		204	70	1	6	0														1						
		225	90	7	9	¼	+													1						
		212	70	7	8	0																				
		349	350	7		0																				
		218	90	1	7	¼	+																			
		217	90	7	7	0																				
		216	86	7	6	0																				
		248	130	1		0														2						
		235	120	1	11	0														1						
		300	230	1	11	0														1						
		286	220	8	11	0														1				+		
		108	10	1	4	0																				
		232	110	1	8	0																				
		213	80	7	8	0														1						
10*	Crooked Lake 72°36.5′N, 98°43′W 29-30/8/81, 22 h gillnet (PW10)	690	4000	5	20	0														1						+
		295	230	1	11	0														1						
		443	980	10	15	¼													+	2			1			
		545	1760	2	28											9				2	1			+	1	
		528	1480	10	15	0																				+
		221	90	1	8	0														1						
		221	85	7	7	1	+																			
		230	110	7	7	0														1						
		222	100	1	7		4										1		2							
		235	120	7	7	0																		+		
		264	150	1	9	0														1				+		
		310	280	7	10	1	+																			
		233	110	7	8	0														2						
		282	195	7	10									4						1						
		241	125	7	10	0																		+		
		237	110	1	10	0																		+		
		211	80	1	8	0																				
		270	175	7	10	1	+																			
		247	125	1	8	0																				
		305	240	7	10	0														3						
		110	9	1	4	1	+																			
		132	19	1	6	0																				
		97	6.5	1	4		5		1								1	2								
		243	130	1	8	½	+																			
		473	860	8	15	0														1						+
11*	Dolphin River 72°42′N, 98°47′W 25-30/8/81, 122 h minnow traps (PWT1-3)	78	3.8	7	2	0																				
		82	4.5																							
		57	1.7																							
		64	2.3																							
		61	2.1																							
		58	1.8																							
		63	2.2																							
		61	1.9																							
		54	1.3																							
		64	2.1																							
		59	1.8																							
		51	1.1	0	1		2	1															1			
		56	1.5	0	1		2		1						1											
		58	1.8	0	1		3	1	1																	
		73	3.0	0	2		1	1							1											
		64	2.5	0	1		1	2							2											
		60	1.7	0	1																					

Table 18 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents														Parasites						
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Trichoptera	Hydracarina	Mysidacea	Ostracoda	Copepoda	mermithid nematodes	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus* sp.	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola carpionis*
Least cisco																										
1*	Crooked Lake	372	420	11	12		1	1	2					4					1	4						
	72°41'N, 98°49'W	347	340	5	17									4						3						
	24-25/8/81, 14 h	350	510	5	11		1							4						2						
	gillnet (PW1)	342	400	3	16	0														2						
2*	Crooked Lake	349	440	5	14		2							4						2						
	72°40'N, 98°51'W	352	420	11	15	0														2						
	24-25/8/81, 14 h	353	470	4	13		1	1						4						3						
	gillnet (PW2)	345	390	3	16		1							3						4						
		285	230	5	9	0														3						
3*	Crooked Lake	360	420	4	12		1	1						3						1						
	72°39'N, 98°53'W	345	320	5	12			1	1											4						
	24-25/8/81, 14 h																									
	gillnet (PW3)																									
4*	Crooked Lake	292	250	8	7	0														2						
	72°39'N, 98°49'W																									
	24-25/8/81, 14 h																									
	gillnet (PW4)																									
5*	Crooked Lake	376	570	5	10		1	1						4			1			2						
	72°39'N, 98°46'W	375	605	8	13															2						
	26-28/8/81, 35 h	332	400	5	8														2	2						
	gillnet (PW5)	334	340	3	10	1													+							
		335	400	4	10															2						
		305	300	3	8				1					2						1						
		320	380	3	6	1														1						
		337	420	5	15												3			3		2				
6*	Crooked Lake	371	470	8	10		2	1				1					1			3						
	72°38'N, 98°47'W																									
	26/8-2/9/81, 160 h																									
	gillnet (PW6)																									
7*	Crooked Lake	356	490	3	13	0														2					1	
	72°37'N, 98°49'W	300	280	8	6	0														1						
	26-28/8/81, 35 h	331	350	2	9		1	1				2		4						2		1				
	gillnet (PW7)	361	360	3	10		+													4		2			1	
8*	Crooked Lake	347	430	5	11				1					4					1	1						
	72°37.5'N, 98°46'W	337	400	4	9				1					4				1	3	2						
	29-30/8/81, 22 h	353	470	3	9				1					5						1						
	gillnet (PW8)	350	480	5	11		1		1					4				1		1						
		339	380	3	16		1							4			1			1						
		320	350	3	9		1		1					2						1						
		344	400	4	12				1					4						1						
		343	410	4	11			1						4						2						
		363	460	3	10		5	1	2		1	1		4				6	6	4						
9*	Crooked Lake	365	380	11	10		1	1	2					3			1			5						
	72°38'N, 98°42.5'W																									
	29-30/8/81, 22 h																									
	gillnet (PW9)																									
10*	Crooked Lake	350	500	5	12		1	1						5				1	2	3						
	72°36.5'N, 98°43'W	355	500	5	12		1							2						2						
	29-30/8/81, 22 h	344	430	3	11		1							4						1		1				
	gillnet (PW10)	342	410	5	9				1					5						2						
		344	420	3	12		1					1		3			1			1						
		340	320	5	12		1							5			1	1	6	2						
		342	410	3	13									4						2						
		355	500	5	11		1							4			1			2						
		354	480	5	14		1		1					5				3	2	2						
		293	240	5	7									4						3						
		362	480	5	13		1							3						3						
		326	405	5	8		1	1						6						2						
		324	360	5	9		1		1					4						1						
		352	500	5	12		1		2					6			1			3					1	
		367	420	5	13		1		1					5			1	2	1	3						
		342	415	5	10	1																				
		333	450	5	9									2						3						
		336	380	5	8		1	1						4			1			1						

*[1] See start of Appendix II for table explanation.

Table 19. Raw data from Arctic charr *Salvelinus alpinus*, lake trout *S. namaycush*, Arctic cod *Boreogadus saida*, slender eelblenny *Lumpenus fabricii*, Arctic staghorn sculpin *Gymnocanthus tricuspis*, and fourhorn sculpin *Myoxocephalus quadricornis* caught in 1981, on or near Stefansson or northern Victoria islands, Northwest Territories.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents: fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Tipulidae	Trichoptera	Notostraca	Isopoda	Mysidacea	Amphipoda	Cladocera	fish remains	plant material	algae balls	miscellaneous	Parasites: *Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola edwardsii*
Arctic charr																												
1	lake	558	2000	3	20			+	+																			
	75°15'N, 105°12.5'W	557	1900	9	23		+														1	1						
	2/8/81, 4 man h	574	1900	9	21	0															3							
	rod and reel	240					1	7									2			1								
2*	lake	no fish																										
	72°06'N, 105°37'W																											
	12-13/8/81, 16 h																											
	gillnets (V29, V30)																											
5	lake	660	3300	9	21		2		5												+							
	71°31'N, 108°33'W																											
	10-12/8/81, 39.5 h																											
	gillnet (V23)																											
6	lake	410	600	2	14		1	3										4	1	1	1							
	71°23'N, 109°55'W	409	510	2	29			4																				
	10-12/8/81, 40.5 h	376	550	8	12		1	2																				
	gillnet (V21)	413	610	2	13		3	4													2							
		375	440	8	13		2	4													2							
	71°23'N, 109°55'W	410	610	2	14	½	+	+													+							
	10-12/8/81, 40.5 h	420	620	2	20	0															+							
	gillnet (V22)	375	550	2	15	1	+	+												+	+							
		440	620	3	19	1	+	+																				
		145	27.5	1	4	1	+	+																				
		382	610	2	13	½	+	+																				
		366	520	2	14	1	+	+																				
		400	520	3	26	1	+	+													+							
		420	640	2	17	½	+	+													+							
		378	510	8	18	½	+	+													+							
		362	520	9	13	1	+	+																				
		358	420	8	14	1	+	+													+							
8	stream	120	16.5	8	4		1													3								
	71°27.5'N, 110°28'W	46	0.6	0	1		1	1	1			2				1		1		1								
	11-12/8/81, 27.5 h	77	2.5																									
	hoopnet (VH2)	70	1.5																									
9	lake	574	2100	2	19		2	6			2				2			4	4	6	1							+
	71°28'N, 113°45'W	562	1750	2	17		3	6							3			2		2	1							+
	6-7/8/81, 14.5 h																											
	gillnet (V1)																											
13[1]	river	275	260	1																								
	72°31'N, 114°05'W	408	840	8	11		2	1		5	8	6				2		5		6								
	8-9/8/81, 24 h	315	390	7	8		2	2		4		7						3		1	+							
	gillnet (V16)	527	1240	9	15	0															2							1[2]
14*	lake	410	620	2	16									4							1					+		
	72°37'N, 113°50'W	444	850	3	13	0																				+		
	8-9/8/81, 20 h	415	620	8	24		1	2					8							5						+		
	gillnet (V14)	422	640	2	14	½							+													+		
		288	240	2	10	1																				+		
		420	640	2	14				1				7	1				3		6	1					+		
	72°37'N, 113°50'W	390	630	8	14	0															1					3		
	8-9/8/81, 20 h	342	380	2	13										6			1		2	1					+		
	gillnet (V15)	395	570	2	13				2	4			6		6						2					+	1	
		392	500	2	22	0																				+		
16*	lake	no fish																										
	72°33'N, 113°16'W																											
	8-9/8/81, 20.5 h																											
	gillnets (V11, V12)																											

Table 19 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents: fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Tipulidae	Trichoptera	Notostraca	Isopoda	Mysidacea	Amphipoda	Cladocera	fish remains	plant material	algae balls	miscellaneous	Parasites: *Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola edwardsii*
Lake trout																												
1[1]	lake	870	6330	3		0																1						
	75°15'N, 105°12.5'W	902	8440	3	50+												9					1	1					1
	2/8/81, 4 man h	538	1530	3	22		4	6									8			1	2		2					
	rod and reel	513	1390	3	24		+														1	1	1					
		461	1020	9	21		+														1	1	1					
		462	1020	3	22		+		+													1	1					
		509	1400	9	23			+	+													1	1					1
		562	1920	9	27			8	8											1								
		616	2300	9	23			4									9					1	3					1
		711	3050	3	26	0															1		4					
		578	2250	3	26												9				3	1	1					1
		526	1430	3	22			+	+												2		4					
		545	1590	8	32			8	4		2									1	2		1					
4*	lake	525	1540	8	19	1											+				3	2	3			2	1	
	71°24'N, 107°41'W																											
	12-13/8/81, 13 h																											
	gillnet (V31)																											
	71°24'N, 107°41'W	550	1820	8	28		+														1		1			8	1	
	12-13/8/81, 13 h	555	1740	8	28		+														1	1	1			6	1	
	gillnet (V32)	525	1560	3	25												+					1	5	1		2	1	
5[1]	lake	634	2600	9	30		2										7			2	+							
	71°31'N, 108°33'W	655	2900	8	31	0															1	1						
	10-12/8/81, 39.5 h	688	3100	9	28												8			9	1	1	1					
	gillnet (V23)	107	9.5	7			4	2				2				1				1								
		109	10	1			2					2								2								
		110	9	1	3																							
	71°31'N, 108°33'W	610	2450	3	26			1													1							
	10-12/8/81, 39.5 h	219	100	7	6	1	+	+													+							
	gillnet (V24)	190	60	1	6	0															+							
7*	lake	103	9	9	6	0																						
	71°27.5'N, 110°25'W	103	7	9		0																						
	11-12/8/81, 24 h	548	1500	3	56			1										1		1	1							
	gillnet (V25)	486	1360	9	44		2				1						4				+							
		514	1540	9	52		2											1			1							
		495	1350	3	38		1	1									5				2		1					
		540	1420	9	28												4				2							
		497	1360	3	28	¼	+	+											+		+							
		554	1480	8	34	¼	+	+											+		+							
		527	830	2	53	¼	+	+													+							
		484	1220	3	39	0															+							
		555	1570	3	48	½	+	+											+		+							
		483	1300	3	40	½	+	+													+							
		515	1480	3	27	0															+							
		538	1480	3	26	0															+							
	71°27.5'N, 110°25'W	530	1640	3	48	1											+				+							
	11-12/8/81, 24 h	560	1900	8	31	0															+							
	gillnet (V26)	665	2750	8	49	0															+							
		628	2900	2	44	1											+				+							
		238	140	2	8	1	+	+													+							
9[1]	lake	653	2500	8	40		1	2							2			1			1	1	1					
	71°28'N, 113°45'W	113	11																									
	6-7/8/81, 14 h	497	1340	8	21		6	1			1				2		4	1	1		1						1	
	gillnet (V2)	539	1540	2	23		1	6			1										1	1						+
	71°28'N, 113°45'W	695	3800	3	40	¼											+				+							
	6-7/8/81, 14 h																											
	gillnet (V1)																											
10	lake	551	2100	8	41		8	4										5	4	5								
	71°25'N, 113°58'W	465	1200	2	19		8	6			1					1		4		5	1		1					
	6-7/8/81, 14.5 h																											
	gillnet (V3)																											
	71°25'N, 113°58'W	573	2650	8	43		9	5										7	6	8								
	6-7/8/81, 14.5 h																											
	gillnet (V4)																											

Table 19 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents															Parasites							
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Tipulidae	Trichoptera	Notostraca	Isopoda	Mysidacea	Amphipoda	Cladocera	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Proteocephalus arcticus*	*Crepidostomum farionis*	*Pilonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola* [illegible]
11	lake	687	2850	2	23		2	6			3						6			1	+	1	1					
	71°25.5'N, 114°37'W	540	1750	3	28		8	8	+									7	6	6	1		1					
	6-7/8/81, 16.5 h	521	1800	3	37		6	6										6	6	5	1					+		
	gillnet (V5)	484	1550	3	36		8	7	+		3							5	4	4	1							
		557	1600	3	25		8	8	+								2	5	5	2	1	1	1					
	71°25.5'N, 114°37'W	582	1900	8	31	1															+							
	6-7/8/81, 16.5 h	756	4400	8	33	¼											+											
	gillnet (V6)	483	1000	2	14	¼	+	+													+							
		541	2100	3	28	1	+	+													+							
		517	1350	2	19	1	+	+													+							
12*[1]	lake	99	10																									
	71°32'N, 114°57'W	472	1080	8	21		4	5			2					4			2		+					+		
	7-8/8/81, 18 h	463	1120	2	22			3			3						1				+	1						
	gillnet (V7)	545	1920	3	29	0															+							
	71°32'N, 114°57'W	555	1740	8	38		1	4								4		2	2		1							
	7-8/8/81, 18 h	684	2900	8	29	0															+							
	gillnet (V8)	440	1920	8	20		2	4			1					6					1		1					
		585	1570	2	43		1	6								1					1							
		575	2000	3	29+	¼	+	+													+							
		664	2200	8	26	0															+							
		844	2000	9	40	¼	+	+											+		+							
		615	1300	2	50	¼	+	+													+							
		558	1880	2	26	¼	+	+													+							
	71°32'N, 114°57'W	685	3100	8	48	0															+							
	7-8/8/81, 18 h	619	2200	8	31	¼	+	+													+							
	gillnet (V9)	610	1680	8	37	0															+							
		400	1390	3	23	1	+	+													+							
	71°32'N, 114°57'W	599	2100	8	32	0															+							
	7-8/8/81, 18 h	510	1380	3	42	1	+	+											+		+							
	gillnet (V10)																											
14*[1]	lake	507	1540	3	26	0																				5	1	
	72°37'N, 113°50'W	488	1680	3	28	0																				5		
	8-9/8/81, 20 h	485	1100	3	29	¼								+												+		
	gillnet (V15)	500	1500	8	32	0																					5	
		495	1620	3	19+									8				2								7	8	+[2]
		450	1240	8	27						1				3											+		
•	stream	61		0																								
	72°37.5'N, 113°45'W																											
	8-9/8/81, 20 h																											
	hoopnets (VH1)																											
17*[1]	lake	115	12.5	8	7	1																						
	72°00'N, 112°41'W	130	18.5	9	7	1															+							
	9-10/8/81, 27.5 h	118	13.5	8		1																						
	gillnet (V19)	112	10	9		1															+							
		544	1860	8	19												9				1							
		537	1520	9	19		2	1			2						6		1	2	1	1						
		591	2150	9	32										3						2							
		168	40	1		1																						
	72°00'N, 112°41'W	532	1840	3	19		1	1									4	4	2	2	1					+		
	9-10/8/81, 27.5 h	103	7	7																								
	gillnet (V20)																											
18[1]	lake	270	200	2	11		7	3								1		1		1	1							
	72°09'N, 112°08'W	364	470	2	13		6	3										3		1	1		1					
	9-10/8/81, 27.5 h																											
	gillnet (V17)																											
	72°09'N, 112°08'W	115	17	9																								
	9-10/8/81, 27.5 h	105	10	9	6																							
	gillnet (V18)																											

Table 19 Cont'd.

Site	Sampling location, Date, Set time, Gear	Length (mm)	Weight (g)	Sex	Age (y)	Stomach contents															Parasites							
						fullness	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Tipulidae	Trichoptera	Notostraca	Isopoda	Mysidacea	Amphipoda	Cladocera	fish remains	plant material	algae balls	miscellaneous	*Diphyllobothrium* spp.	*Eubothrium salvelini*	*Protocephalus arcticus*	*Crepidostomum farionis*	*Philonema agubernaculum*	*Cystidicola cristivomeri*	*Echinorhynchus gadi*	*Salmincola edwardsii*
Arctic cod																												
3[1]	Hadley Bay 71°49'N, 107°28'W 12-13/8/81, 16.5 h gillnet (V27)	182	45	2																								
Slender eelblenny																												
15[1]	Richard Collinson Inlet 72°38'N, 113°40'W 8-9/8/81, 20 h gillnet (V13)	153	8.5																									
		170	11																									
Arctic staghorn sculpin																												
3[1]	Hadley Bay 71°49'N, 107°28'W 12-13/8/81, 16.5 h gillnet (V27)	116	19	2											6													
	71°49'N, 107°28'W 12-13/8/81, 16.5 h gillnet (V28)	87	6																									
15[1]	Richard Collinson Inlet 72°38'N, 113°40'W 8-9/8/81, 20 h gillnet (V13)	139	40																									
		174	70																									
		124	22																									
		137	40																									
		129	27.5																									
Fourhorn sculpin																												
3[1]	Hadley Bay 71°49'N, 107°38'W 12-13/8/81, 16.5 h gillnet (V27)	174	60	2																								
15[1]	Richard Collinson Inlet 72°38'N, 113°40'W 8-9/8/81, 20 h gillnet (V13)	181	60																									
		224	110																									
		202	75																									
		171	45																									
		185	60																									
		94	3																									
		153	35																									
		135	21																									

*[1] See start of Appendix II for table explanation.

[2] *Salmincola* sp.

APPENDIX III. SUMMARY OF FISH STOMACH CONTENTS

Table 20. Stomach contents of fish caught in the survey area during July and August, 1981.

Catch Data				Food Items (% Total Dry Weight)																			
Species	Sampling Site	Number of Stomachs Sampled	Total Fish Catch	Chironomidae larvae	Chironomidae pupae	Chironomidae adults	Tipulidae	other Diptera	Trichoptera	Hymenoptera	Hyracarina	Notostraca	Isopoda	Mysidacea	Amphipoda	Ostracoda	Copepoda	Cladocera	Nematoda	fish remains	plant matter	algae balls	miscellaneous[3]
Arctic charr	Bathurst Is. (Fig. 2)																						
	1	5	11(2)[1]	<	96.5	<		<		<				<						●	<		2.4
	2	4	27(11)	<	75.8	<		<			<					<	<			8.2	<		15.9
	3	6	16(3)	<	8.7	<	<	<	<	<	<						<			91.2	<		
	4	5	7	2.9	91.2	<		3.6													2.2		
	5	11(1)	61(29)	7.7	74.7	16.4		<			<			<		<					<		<
	6	6	31	<	98.2									1.8			<				<		
	8	6	7	49.1	40.2			<			<					<				10.2	<		<
	Melville Is. (Fig. 4)																						
	8	4(1)	6(1)	4.3	2.2									32.6						●	37.0		23.9
	Prince of Wales Is. (Fig. 5)																						
	1-10	43(12)	322(185)	10.8	<	<			<		<			5.6		<	<			61.8	<	6.4	15.3
	11	5	17(1)	81.8	9.1	<													9.1				
	Stefansson Is. (Fig. 10)																						
	1	1	10	<	99.7						<									<			
	Victoria Is. (Fig. 10)																						
	5	1	1	2.6		97.4																	
	6	5	17(1)	10.8	79.2												<				10.0	<	
	8	2	6	<	<	<		58.3				41.7					<	<	<		<		
	9	2	2	1.5	63.3				<		<				1.8	<					4.7	2.6	25.7
	13	3(1)	4(1)	<	<		3.9	<	65.2[2]			22.5						<			1.8		6.2
	14	7(2)	10(3)	<	<	<		<	<				78.1	<	13.6						<		6.5
Lake trout	Stefansson Is. (Fig. 10)																						
	1	6	48	<	5.8	1.6			<		<									92.6			
	Victoria Is. (Fig. 10)																						
	5	6(1)	9(2)	<	<							<						<		43.3			56.1
	7	5	20(7)	1.6	<				<											98.4	<	<	<
	9	3	5	40.8	51.0				<						<					7.8	<	<	
	10	3	3	86.7	1.6			<	<		<							<			3.2	1.0	7.5
	11	5	10	50.5	31.5	●		<	<		<									<	8.7	5.2	3.0
	12	5	19(6)	6.0	69.5				1.1									21.8		<	<	1.1	
	14	5(3)	6(3)						<					99.1	<						<		
	17	4	10	<	<				<	<					<	<				99.7	<	<	<
	18	2	4	97.7	1.6						<						<	<			<		<
Least cisco	Prince of Wales Is. (Fig. 5)																						
	1-10	46(4)	53(5)	3.2	<	<					<			<			62.1				<	9.4	24.2
Arctic staghorn sculpin	Victoria Is. (Fig. 10)																						
	3	1	2												100.0								

< Food items less than 1% of total dry weight
[1] (empty stomachs)
[2] Trichoptera larvae with sand cases
[3] Miscellaneous includes:

- mammal remains ---------- Victoria Is., site 5.
- bird feathers ---------- Victoria Is., site 14.
- digested remains ------- Bathurst Is., site 1, 2.
- crustacean remains ------- Bathurst Is., site 8.
- unidentified insects ----- Victoria Is., site 13.
- charr eggs -------------- Bathurst Is., site 1, 2.
- cisco eggs -------------- Prince of Wales Is., site 5, 8, 10.
- molluscs - Sphaeriidae --- Victoria Is., site 13, 18. and/or sand.

● Food items found only during field examinations.

APPENDIX IV. BONE STRONTIUM MEASUREMENTS

Table 21. Length, condition, and bone strontium concentration of the smallest and the largest Arctic charr of a given age found in Crooked Lake, Prince of Wales Island.

Age (y)	Length (mm)	Weight (g)	Condition Factor[1]	Bone Strontium (μg/g)
1	58 -	1.8 -	0.992 -	39 -
4	115 117	9 11	0.592 0.687	201 56
6	132 210	19 80	0.826 0.864	195 186
7	179 290	45 180	0.785 0.738	117 183
8	193 258	70 155	0.974 0.903	152 182
9	226 275	100 200	0.866 0.962	158 190
10	246 310	135 280	0.907 0.940	202 182
11	235 423	120 760	0.925 1.004	187 378
12	288 350	240 420	1.005 0.980	174 192
13	277 356	190 470	0.894 1.042	41 126
15	352 528	420 1480	0.963 1.005	147 710
16	380 650	530 2750	0.966 1.001	131 986
17	388 584	505 2050	0.865 1.029	172 1069
19	467 748	760 5100	0.746 1.219	168 820
20	412 690	750 4000	1.072 1.218	188 883
21	487 627	800 2550	0.693 1.034	171 702
23	390 745	490 4600	0.826 1.112	207 906
24	404 643	540 3000	0.819 1.128	138 609
25	457 768	690 4100	0.723 0.905	193 728
26	432 710	760 4100	0.943 1.146	160 170

[1] condition factor = weight in g $\cdot$(fork length in mm)$^{-3} \cdot 10^5$

APPENDIX V. GEOGRAPHICAL DISTRIBUTIONS OF:

Fish parasites
Zooplankton
Chironomidae
Plants

Table 22. Metazoan parasites of fish caught in the Viscount Melville Sound study area, 1981.

Species		Island																						
		Bathurst (Fig. 2)							Cornwallis (Fig. 2)	Melville (Fig. 4)	Prince of Wales (Fig. 5,6)	Victoria (Fig. 10)												
Host	Parasite	1[1]	2	3	4	5	6	8	10	8	1-10	1	4	5	6	7	9	10	11	12	13	14	17	18
Arctic charr	<u>Nematoda</u>																							
	Cystidicola cristivomeri White 1941	●		●	●	●	●	●	●	●	●											●		
	Philonema agubernaculum Simon & Simon 1936										●													
	unidentified		●																		●			
	<u>Cestoda</u>																							
	Diphyllobothrium ditremum (Creplin 1825)	●	●	●	●	●	●	●	●	●	●	●												
	Diphyllobothrium dendriticum (Nitzsch 1824)	●																						
	Diphyllobothrium sp.[2]		●	●	●	●	●	●	●	●	●	●		●	●		●				●	●		
	Eubothrium salvelini (Shrank 1790) Nybelin 1922		●	●	●	●	●	●		●	●	●												
	Proteocephalus arcticus Cooper 1921		●	●							●													
	<u>Acanthocephala</u>																							
	Echinorhynchus gadi Zoega in O.F. Müller 1776	●			●	●			●		●											●		
	<u>Copepoda</u>																							
	Salmincola sp.				●	●			●	●											●			
	Salmincola edwardsii (Olsson 1869) Wilson 1915																●							
	Salmincola carpionis (Krøyer 1837) Wilson 1915										●													
lake trout	<u>Nematoda</u>																							
	Cystidicola cristivomeri White 1941												●						●	●		●	●	
	unidentified																	●						
	<u>Cestoda</u>																							
	Diphyllobothrium ditremum (Creplin 1825)											●	●											
	Diphyllobothrium sp.[2]											●	●	●		●	●	●	●	●			●	●
	Eubothrium salvelini (Shrank 1790) Nybelin 1922											●	●	●			●		●	●			●	
	Proteocephalus arcticus Cooper 1921											●	●	●		●	●	●	●	●				●
	<u>Trematoda</u>																							
	Crepidostomum farionis (O.F. Müller 1780) Lühe 1909												●											
	<u>Acanthocephala</u>																							
	Echinorhynchus gadi Zoega in O.F. Müller 1776												●				●					●		
	<u>Copepoda</u>																							
	Salmincola sp.																					●		
	Salmincola edwardsii (Olsson 1869) Wilson 1915											●					●							
least cisco	<u>Nematoda</u>																							
	unidentified										●													
	<u>Cestoda</u>																							
	Diphyllobothrium ditremum (Creplin 1825)										●													
	Diphyllobothrium dendriticum (Nitzsch 1824)										●													
	Diphyllobothrium sp.[2]										●													
	Proteocephalus arcticus Cooper 1921										●													
	<u>Acanthocephala</u>																							
	Echinorhynchus gadi Zoega in O.F. Müller 1776										●													

[1] sample site
[2] plerocercoids
● species present

Table 23. Distribution of crustacean zooplankton in selected lakes in the Viscount Melville Sound study area, 1981.

Species[1]	Island																					
	Bathurst (Fig. 2)					Little Cornwallis (Fig. 2)	Melville (Fig. 4)		Prince of Wales (Fig. 5)	Victoria (Fig. 10)												
	1	2	5	6	8	9	3	7	1-10	2	4	5	6	7	8	10	12	13[4]	14	16	17	18
Copepoda																						
Cyclops capillatus Sars 1863													?[2]									■
Cyclops scutifer Sars 1863							●	●	●	●	●			●			●			●	●	
Cyclops vernalis Fischer 1853															?							
Cyclopinidae						●								●								
Diaptomus sicilis Forbes 1882										●	●			●			●		●	●	●	
Limnocalanus macrurus Sars 1863	●		●	●	●	●		●	●		●								●			
Harpacticoida		■	●		●	●																
Cladocera																						
Chydorus sphaericus (O.F. Müller) 1785															■						●	
Daphnia longiremis Sars 1861											●			●			●				●	
Daphnia longispina microcephala Sars 1891												■		●			●					
Daphnia middendorffiana Fischer 1851														●			●[3]					
Daphnia middendorffiana x *pulex* (?)														●								
Daphnia schødleri Sars 1862																	●					
Daphnia sp.									●[3]							■[3]						
Eurycercus lamellatus (O.F. Müller) 1785																		■				

[1] Specimens identified by and housed in the collection of Dr. and Mrs. K. Patalas at the Freshwater Institute in Winnipeg.
[2] specimens from fish stomachs, species identifications not certain.
[3] adults with ephippium or ephippia only
[4] river
● species caught in zooplankton hauls
■ species found in fish stomachs

Table 24. Distribution of Chironomidae (Order Diptera) in the Viscount Melville Sound study area, 1981.

Species[1]	Bathurst Island lakes (Fig. 2)				Prince of Wales Island (Fig. 5)	Victoria Island lakes (Fig. 10)								
	1[2]	5	6	8	1-10	5	6	7	9	10	11	12	13[3]	18
Abiskomyia virgo Edw.					●				●		●			
Glyptotendipes sp.								●						
Heterotrissocladius oliveri Saeth.	●	●								●		●		●
Micropsectra sp.	●		●		●[4]	●	●				●			
Orthocladius (s.s.) *oharensis* Sop.			●				●							
Paracladius alpicola (Zett.)	●				●						●			
Phaenopsectra sp.							●		●					
Procladius (s.s.) sp.													●	
Protanypus morio Zett.					●				●	●	●			
Psectrocladius (s.s.) sp.													●	
Pseudodiamesa arctica (Mall.)	●	●	●	●	●					●		●		●
Smittia sp.												●		
Stictochironomus cf. *rosenscholdi*													●	
Thienemannimyia sp.									●					

[1] Type specimens identified by and available from Mr. Bohdan Bilyj at the Freshwater Institute in Winnipeg.
[2] sample site
[3] river
[4] two species present
● species present

Table 25. Plant species collected in the Viscount Melville Sound study area (1981) and in the Lancaster Sound study area, 1980 (Stewart and MacDonald 1981). These collections are housed in the Department of Botany herbarium at the University of Manitoba, Winnipeg with other specimens which await identification.

Species and classification	Common Name	Location, habitat type, and date					
		Bathurst Is.	Melville Is.		Pr. of Wales Is.	Devon Is.	Baffin Is.
		Fig. 2, Site 1 75°10.5'N, 98°09'W moist soil 19/7/81	Fig. 4, Site 3 75°01'N, 108°39'W sandy, dry 20/7/81	Fig. 4, Site 5 75°33'N, 110°26.5'W shale, dry 22/7/81	Fig. 5, Site 1 72°40'N, 98°53'W rocky, moist 31/8/81-2/9/81	Maxwell Bay 74°52.5'N, 91°17'W rocky, dry 3/8/80	Erichsen Lake 70°37.5'N, 80°55'W sand esker 26/8/80
Kingdom Fungi							
Cl. Ascomycetes							
Thamnolia sp.				●	●		
Kingdom Plantae							
Div. Bryophyta							
Cl. Musci							
Bryum		●			●		
Cirriphyllum cirrosum		●			●		
Rhacomitrium sp.				●			
Div. Spermatophyta							
S. Div. Angiospermae							
Cl. Monocotyledoneae							
F. Gramineae							
Alopecurus alpinus	foxtail	●	●		●		●
Arctagrostis latifolia							●
Festuca brachyphylla[1]	fescue						●
Poa arctica	blue grass						●
Poa sp.	blue grass		●				
F. Cyperaceae							
Eriophorum sp.	cotton grass	●					
Carex misandra	sedge	●					
F. Juncaceae							
Luzula confusa	wood rush			●			●
Cl. Dicotyledoneae							
F. Salicaceae							
Salix arctica	Arctic willow	●			●		●
Salix sp.						●	
F. Saxifragaceae							
Saxifraga caespitosa ssp. *uniflora*	tufted saxifrage	●	●		●		
S. caespitosa ssp. *caespitosa*	tufted saxifrage				●		
S. cernua	nodding saxifrage				●		
S. flagellaris ssp. *platysepala*	spider plant	●					
S. Hirculus var. *propinqua*	yellow marsh saxifrage	●			●		
S. nivalis	alpine saxifrage			●	●		●
S. oppositifolia	purple saxifrage	●			●	●	●
S. tricuspidata	prickly saxifrage						●
Saxifraga sp.		●					
F. Caryophyllaceae							
Lychnis apetala[2]	bladder-campion					●	
Silene acaulis var. *exscapa*	campion						●
Stellaria sp.	chickweed		●				
F. Polygonaceae							
Oxyria digyna	mountain sorrel		●				●
F. Cruciferae							
Cardamine bellidifolia	bitter cress	●					
Cochlearia officinalis	scurvy-grass		●		●		
Draba alpina var. *nana*[3]		●			●	●	
Parrya sp.					●		
F. Papaveraceae							
Papaver radicatum	Arctic poppy	●	●	●	●	●	●
F. Rosaceae							
Dryas integrifolia	mountain avens					●	
Potentilla sp.	cinquefoil		●				
F. Ericaceae							
Cassiope tetragona	Arctic white heather						●
Vaccinium uliginosum	bilberry						●
F. Plumbaginaceae							
Armeria maritima var. *siberica*	leadwort						●

● species collected
[1] *F. ovina* var. *brachyphylla*
[2] *Melandrium apetalum* ssp. *arcticum*
[3] *D. bellii*

APPENDIX VI. BIRD AND MAMMAL OBSERVATIONS

Table 26. Wildlife sightings in the Viscount Melville Sound study area between July and September, 1981.

Species and Location	Date	Number Adult	Number Young
BATHURST ISLAND			
Arctic Hare			
75° 33′N, 97° 38′W	30/7/81	2	
75° 41′N, 98° 49′W	"	1	
75° 45′N, 98° 23′W	"	9	
Peary Caribou			
75° 49′ N, 98° 17′W	30/7/81	1	
75° 51′ N, 98° 50′W	"	5	1
76° 16.6′N, 97° 48′W	"	14	
76° 28.6′N, 97° 45′W	"	3	
75° 31.5′N, 99° 40′W	31/7/81	3	
76° 30.4′N, 98° 10′W	"	3	
76° 31′ N, 98° 34′W	"	3	2
76° 33′ N, 98° 22′W	"	7	6
76° 35′ N, 98° 37′W	"	2	1
Black Brant			
75° 24′ N, 100°24′W	24/7/81	10	
75° 25.5′N, 100°27′W	"	11	
75° 28.4′N, 99° 54′W	30/7/81	6	
75° 29′ N, 99° 33′W	"	24	
75° 38′ N, 99° 18′W	"	11	
Brant			
75° 38′ N, 99° 18′W	30/7/81	16	
75° 28.4′N, 99° 54′W	31/7/81	6	
75° 51′ N, 97° 35′W	"	3	
Eider ducks (sp. ?)			
76° 23.5′N, 97° 42′W	30/7/81	~100	
76° 30.4′N, 98° 10′W	31/7/81	~ 20	
Loon (sp. ?)			
75° 27.5′N, 99° 59′W	31/7/81	2	1
75° 28.4′N, 99° 54′W	"	2	
75° 32′ N, 99° 38′W	"	2	
Muskox			
75° 36′ N, 97° 43′W	30/7/81	9	3
75° 39′ N, 97° 54′W	"	1	
75° 39′ N, 99° 18′W	"	13	3
75° 43.5′N, 98° 07′W	"	1	
75° 44.5′N, 98° 27′W	"	1	
75° 29.6′N, 99° 43′W	31/7/81	22	
75° 32′ N, 99° 34′W	"	11	2
75° 32′ N, 99° 40′W	"	10	5
75° 32.5′N, 99° 30′W	"	1	
75° 56′ N, 97° 40′W	"	7	2
75° 28.4′N, 99° 51′W	1/8/81	17	2
75° 34′ N, 98° 05′W	"	13	2
75° 37.5′N, 99° 18′W	"	11	3
75° 38′ N, 99° 10′W	"	5	2
Parasitic Jaeger			
75° 28.4′N, 99° 54′W	31/7/81	2	
75° 43.6′N, 98° 26′W	"	4	
Polar Bear			
75° 21.5′N, 100°45′W	30/7/81	1	1
76° 25′ N, 98°00′W	31/7/81	1	
Ringed Seal			
75° 07′ N, 98° 00′W	30/7/81	18	
76° 35′ N, 99° 04′W	"	1	
75° 30′ N, 99° 52′W	31/7/81	1	
Snow Goose			
75° 42.5′N, 98° 41′W	24/7/81	20	10
75° 13′ N, 96° 14′W	30/7/81	10	
75° 27.5′N, 99° 59′W	"	8	11
75° 28.4′N, 99° 54′W	"	18	
75° 29.5′N, 99° 53′W	"	9	8
75° 42.5′N, 98° 41′W	"	90	19
76° 18′ N, 97° 51′W	"	6	10
76° 19′ N, 97° 51′W	"	11	14
75° 27.5′N, 99° 55′W	31/7/81	19	7
75° 27.5′N, 99° 59′W	"	17	22
75° 28.4′N, 99° 54′W	"	23	6
75° 32′ N, 99° 38′W	"	26	18
75° 42.5′N, 98° 41′W	"	75	40
Snowy Owl			
75° 38′ N, 99° 22′W	30/7/81	3	
75° 37′ N, 99° 22′W	31/7/81	1	
76° 12′ N, 97° 34′W	"	1	
Walrus			
76° 15′ N, 97° 35′W	30/7/81	2	
BYAM MARTIN ISLAND			
Peary Caribou			
75° 14′ N, 104°05′W	20/8/81	7	2
Muskox			
75° 17′ N, 104°40′W	20/8/81	1	
GRIFFITH ISLAND			
Beluga Whale			
74° 29′ N, 95° 50′W	13/8/81	22	11
MELVILLE ISLAND			
Arctic Fox			
75° 06′ N, 108° 39′W	22/7/81	1*	
Peary Caribou			
75° 02′ N, 107° 42′W	22/7/81	7	
Black Brant			
76° 12.5′N, 109° 35′W	24/7/81	48	
Muskox			
74° 57.5′N, 108° 01′W	20/7/81	5	3
74° 58.3′N, 108° 01′W	"	1	
74° 59′ N, 108° 16′W	"	38	6
75° 00′ N, 108° 20′W	"	6	2
75° 00′ N, 108° 23′W	"	8	
75° 00′ N, 108° 25′W	"	8	2
75° 01′ N, 106° 45′W	"	8	3

Table 26. Cont'd.

Species and Location	Date	Number Adult	Number Young
Muskox cont'd			
75° 04.5′N, 106° 31′W	21/7/81	13	3
75° 05.7′N, 106° 18′W	"	20	2
75° 13′ N, 105° 58′W	"	1	
75° 17.2′N, 105° 52′W	"	10	2
75° 03.6′N, 111° 00′W	22/7/81	4	1
75° 04′ N, 111° 00′W	"	2	
75° 05.5′N, 106° 46′W	"	1	
75° 06.8′N, 108° 37′W	"	20	6
75° 17.3′N, 111° 09′W	"	17	3
75° 34′ N, 106° 05′W	"	1	
75° 47.3′N, 109° 20′W	"	10	2
75° 50.4′N, 109° 26′W	"	13	2
75° 29′ N, 105° 56′W	24/7/81	4	
75° 50.7′N, 109° 15′W	"	1	
76° 06.3′N, 108° 32′W	"	14	2
Seals (sp. ?)			
75° 03′ N, 107° 41′W	22/7/81	2	
75° 33.5′N, 110° 23′W	"	1	
76° 08′ N, 108° 12′W	24/7/81	1	
Snow Goose			
75° 01′ N, 106° 22′W	21/7/81	2	?
75° 01′ N, 106° 26′W	"	8	10
75° 02.5 N, 106° 18′W	"	2	?
75° 03′ N, 107° 51′W	"	7	4
75° 04′ N, 106° 18′W	"	2	5
PRINCE OF WALES ISLAND			
Arctic Fox			
72° 42′ N, 98° 48′W	25/8/81	2	
72° 40.5′N, 98° 54′W	28/8/81	1	
72° 39′ N, 98° 55′W	29/8/81	1	
Arctic Hare			
72° 40.5′N, 98° 54′W	30/8/81	>2*	
Arctic Tern			
72° 40.5′N, 98° 54′W	20/8/81 to 2/9/81	+	
Arctic Wolf			
72° 40.5′N, 98° 54′W	30/8/81	1	
Peary Caribou			
73° 11.8′N, 99° 08′W	13/8/81	4	
72° 39′ N, 98° 57′W	20/8/81	4	
72° 37.5′N, 98° 37′W	21/8/81	4	
72° 40.5′N, 98° 54′W	"	4	
72° 42′ N, 98° 51′W	30/8/81	12	
Beluga Whale			
73° 02.5′N, 97° 45′W	19/8/81	>50**	
Black-Bellied Plover		+	
Brant		+	
Glaucous Gull		+	
Gyrfalcon		+	
Lapland Longspur		+	
Long Tailed Jaeger			
72° 40.5′N, 98° 54′W	20/8/81 to 2/9/81	+	
Muskox			
73° 39′ N, 97° 52′W	6/8/81	7	2
73° 47′ N, 97° 40′W	"	3	
73° 18′ N, 98° 47′W	13/8/81	~30	
73° 26.5′N, 98° 25′W	"	1	
Oldsquaw		>50	
Parasitic Jaeger			
72° 40.5′N, 98° 54′W	20/8/81 to 2/9/81	+	
Polar Bear			
72° 35′ N, 98° 22′W	21/8/81	1	
Red Throated Loon		+	
Snow Bunting		+	
Snowy Owl			
72° 40.5′N, 98° 54′W	20/8/81 to 2/9/81	+	
VICTORIA ISLAND			
Peary Caribou			
71° 28.3′N, 113° 31′W	6/8/81	1	1
71° 28.3′N, 113° 42′W	"	1	1
72° 36′ N, 113° 54′W	8/8/81	3	
71° 48′ N, 115° 33′W	9/8/81	4	
71° 55.7′N, 115° 04′W	"	1	1
72° 03′ N, 114° 34′W	"	1	
71° 25′ N, 109° 58′W	12/8/81	1	
71° 25.6′N, 110° 04′W	"	1	
71° 26.4′N, 109° 29′W	"	1	
71° 27.5′N, 108° 13′W	"	1	1
71° 27.5′N, 109° 27′W	"	1	
Glaucous Gull			
71° 26.5′N, 107° 41′W	12/8/81	~15	
Rough-legged Hawk			
71° 28′ N, 108° 03′W	11/8/81	2	2
Lemming			
71° 26.5′N, 107° 41′W	12/8/81	3	
Loon (sp. ?)			
71° 32′ N, 114° 55′W	7/8/81	3	
71° 32′ N, 114° 55′W	8/8/81	1	
71° 32′ N, 114° 04′W	"	2	
Muskox			
71° 28.3′N, 113° 43.5′W	6/8/81	2	
71° 18.2′N, 115° 39′ W	7/8/81	6	1
71° 27′ N, 115° 11′ W	8/8/81	1	

Table 26. Cont'd

Species and Location	Date	Number Adult	Number Young
Muskox cont'd			
71° 37.5´N, 114° 58´W	8/8/81	10	2
72° 13´ N, 114° 22´W	"	6	3
72° 30´ N, 114° 21´W	"	4	2
72° 33´ N, 114° 05´W	"	7	3
72° 33´ N, 114° 11´W	"	7	3
72° 34´ N, 113° 32´W	"	6	
72° 34´ N, 114° 13´W	"	2	
72° 35.5´N, 113° 59´W	"	1	
72° 36´ N, 113° 28´W	"	10	2
72° 37.2´N, 113° 46´W	"	4	1
72° 38.3´N, 113° 41´W	"	15	2
71° 08´ N, 116° 30´W	9/8/81	1	
71° 18.2´N, 115° 31´W	"	6	2
71° 31.2´N, 116° 14´W	"	1	
71° 35.4´N, 116° 09´W	"	11	3
71° 39.4´N, 116° 01´W	"	1	
71° 42´ N, 115° 56´W	"	1	
71° 43´ N, 115° 54´W	"	11	2
71° 45´ N, 113° 53´W	"	11	2
71° 57´ N, 113° 00´W	"	10	2
72° 09´ N, 112° 19´W	"	7	2
72° 13.8´N, 113° 00´W	"	15	
72° 18´ N, 113° 25´W	"	5	2
72° 29.3´N, 114° 10´W	"	2	
72° 34´ N, 113° 25´W	"	7	
72° 34.5´N, 114° 11´W	"	5	1
72° 36.3´N, 113° 58´W	"	4	
72° 37´ N, 113° 25´W	"	7	1
72° 37.2´N, 113° 39´W	"	1	
72° 05.6´N, 112° 22´W	10/8/81	9	2
72° 08.7´N, 112° 11´W	"	2	
72° 12.7´N, 112° 34´W	"	5	
72° 17´ N, 114° 43´W	"	6	2
72° 25.7´N, 114° 30´W	"	3	
72° 29.6´N, 114° 20´W	"	7	
72° 33´ N, 114° 13´W	"	6	2
71° 12.5´N, 109° 10´W	11/8/81	6	1
71° 15´ N, 108° 15´W	"	1	
71° 24.7´N, 109° 38´W	"	1	
71° 28´ N, 108° 03´W	"	7	2
71° 28´ N, 108° 13´W	"	3	1
71° 28´ N, 110° 31´W	"	1	
71° 30.5´N, 108° 47´W	"	15	2
71° 26.8´N, 108° 12´W	12/8/81	3	1
71° 27´ N, 110° 17´W	"	2	2
71° 28´ N, 110° 29´W	"	1	
71° 31´ N, 107° 42´W	"	6	
71° 36.7´N, 107° 45´W	"	1	
72° 01.5´N, 106° 34´W	"	5	
71° 07.7´N, 108° 06´W	13/8/81	3	
71° 10.5´N, 108° 00´W	"	1	
71° 14.4´N, 107° 57´W	"	10	
71° 14.7´N, 107° 56´W	"	1	
72° 09´ N, 105° 10´W	"	8	
Rock Ptarmigan			
71° 02´ N, 108° 05´W	11/8/81	1	4
Sandhill Crane			
71° 12.6´N, 116° 44´W	9/8/81	2	
Seal (sp. ?)			
71° 49´ N, 107° 28´W	12/8/81	1	
Snowy Owl			
71° 59.8´N, 106° 29´W	12/8/81	2	
72° 00.5´N, 106° 41´W	"	1	
72° 02´ N, 106° 04´W	"	1	
71° 22´ N, 107° 44´W	13/8/81	1	
71° 26´ N, 107° 41´W	"	1	
Whistling Swan			
71° 03.2´N, 117° 07´W	9/8/81	4	2
71° 07´ N, 116° 59´W	"	1	
71° 08.6´N, 116° 54´W	"	2	
71° 09.6´N, 116° 52´W	"	2	
71° 13´ N, 116° 44´W	"	2	3
71° 15´ N, 115° 56´W	"	2	
71° 17.3´N, 115° 41´W	"	2	
71° 46.5´N, 115° 39´W	"	2	3
Yellow Billed Loon			
72° 00.2´N, 112° 43´W	9/8/81	1	

* footprints
** includes young
± numbers not counted

APPENDIX VII. LAND USE INFORMATION SERIES REPORTS

LAND USE INFORMATION SERIES REPORTS

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