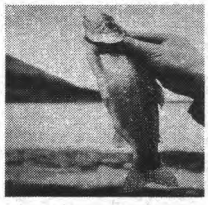
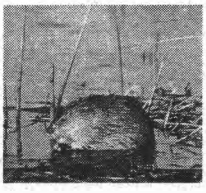
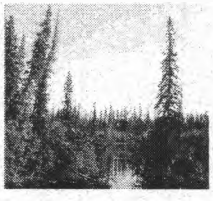
Canada Alberta Northwest Territories

Northern River Basins Study



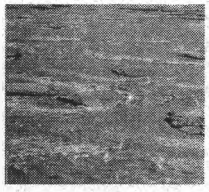


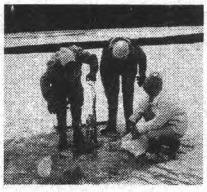




NORTHERN RIVER BASINS STUDY PROJECT REPORT NO. 30

DELTA BASINS CONTAMINANT SURVEY: MUSKRAT COLLECTIONS IN THE ATHABASCA RIVER DELTA, DECEMBER, 1992






Prepared for the
Northern River Basins Study
under Project 2391-B1

by
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PREFACE:

The Northern River Basins Study was initiated through the "Canada-Alberta-Northwest Territories Agreement Respecting the Peace-Athabasca-Slave River Basin Study, Phase II - Technical Studies" which was signed September 27, 1991. The purpose of the Study is to understand and characterize the cumulative effects of development on the water and aquatic environment of the Study Area by coordinating with existing programs and undertaking appropriate new technical studies.

This publication reports the method and findings of particular work conducted as part of the Northern River Basins Study. As such, the work was governed by a specific terms of reference and is expected to contribute information about the Study Area within the context of the overall study as described by the Study Final Report. This report has been reviewed by the Study Science Advisory Committee in regards to scientific content and has been approved by the Study Board of Directors for public release.

It is explicit in the objectives of the Study to report the results of technical work regularly to the public. This objective is served by distributing project reports to an extensive network of libraries, agencies, organizations and interested individuals and by granting universal permission to reproduce the material.

NORTHERN RIVER BASINS STUDY
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Green, J. E. 1994. *"Northern River Basins Study Project Report No. 30, Delta Basins Contaminant Survey: Muskrat Collections in the Athabasca River Delta, December, 1992".* Northern River Basins Study, Edmonton, Alberta.

Whereas the above publication is the result of work conducted under the Northern River Basins Study and the terms of reference for that project are deemed to be fulfilled,
IT IS THEREFORE REQUESTED BY THE STUDY OFFICE THAT;
this publication be subjected to proper and responsible review and be considered for release to the public.

F J Wrona — 28 Feb 94
(Dr. F. J. Wrona, Ph.D., Science Director) (Date)

Whereas it is an explicit term of reference of the Science Advisory Committee "to review, for scientific content, material for publication by the Board",
IT IS HERE ADVISED BY THE SCIENCE ADVISORY COMMITTEE THAT;
this publication has been reviewed for scientific content and that the scientific practices represented in the report are acceptable given the specific purposes of the project and subject to the field conditions encountered.
SUPPLEMENTAL COMMENTARY HAS BEEN ADDED TO THIS PUBLICATION: [ ] Yes [✓] No

P A Larkin — 17 Feb 94
(Dr. P. A. Larkin, Ph.D., Chair) (Date)

Whereas the Study Board is satisfied that this publication has been reviewed for scientific content and for immediate health implications,
IT IS HERE APPROVED BY THE BOARD OF DIRECTORS THAT;
this publication be released to the public, and that this publication be designated for: **[ ] STANDARD AVAILABILITY [ ] EXPANDED AVAILABILITY**

Bev Burns — April 7/94
(Bev Burns, Co-chair) (Date)

Lucille Partington — April 7/94
(Lucille Partington, Co-chair) (Date)

DELTA BASINS CONTAMINANT SURVEY: MUSKRAT COLLECTIONS IN THE ATHABASCA RIVER DELTA, DECEMBER, 1992

STUDY PERSPECTIVE

The perched and open basins of the Peace-Athabasca Delta are productive ecosystems that support a high diversity and large numbers of fish, wildlife and plant species. Because these are such productive areas, the perched and open basins are important resource harvest areas for local people. Local native communities therefore approached the Northern River Basins Study to determine whether these environments had been contaminated by the transport of contaminants, particularly contaminanted sediments, from upstream sites.

In August 1992, staff from the NRBS, Alberta Environment and The Delta Environmental Management Group Ltd. traveled to the Athabascan Chipewyan Reserve southeast of Fort Chipewyan. With the assistance of members of the Chipewyan Band, sediment, water, fish and Rat Root (a medicinal herb) were collected from perched and open basins on the reserve. These samples have been submitted to analytical laboratories for contaminant analyses.

Related Study Questions

1a) *How has the aquatic ecosystem, including fish and/or other aquatic organisms been affected by exposure to organochlorines or other toxic compounds?*

3) *Who are the stakeholders and what are the consumptive and non-consumptive uses of the water resources in the river basins?*

4a) *Describe the contents and nature of the contaminants entering the system and describe their distribution and toxicity in the aquatic system with particular reference to water, sediment and biota?*

11) *Have the riparian vegetation, riparian wildlife and domestic livestock in the river basins been affected by exposure to organochlorines or other toxic compounds?*

12) *What native traditional knowledge exists to enhance the physical science studies in all areas of enquiry?*

It was also intended that muskrats would be collected in August. However, members of the Chipewyan Band advised that it would be much easier to collect muskrat after freeze-up. This report documents the collection of thirty muskrats from Big and Killer's lakes, two perched basins, on the Athabascan Chipewyan Reserve by a band member in December 1992.

The muskrats have been subsequently dissected for age and sex determination and tissue samples have been forwarded to analytical laboratories for contaminant analyses. The results of these analyses will be used to determine whether the muskrats are safe to eat and will be considered in contaminant fate and food chain modelling.

EXECUTIVE SUMMARY

Assessment of potential contaminant fate and effects processes and existing environmental quality within the Peace and Athabasca river basins is one of the primary research components of the Northern River Basins Study (NRBS). As part of this research, the Fort Chipewyan Community was requested to participate in a synoptic examination of potential food chain contamination in perched and open basins within the Peace and Athabasca River deltas. During August 1992, collection of surface sediments, several species of fish, several species of waterfowl and one aquatic plant species were completed within the Athabasca River delta. Muskrat samples were also to have been collected, but due to the scarcity of animals, collection was postponed until December 1992.

During 4 to 7 December 1992, Mr. Daniel Marcel, an experienced trapper in the Athabasca Chipewyan Band, obtained a total of 30 muskrat specimens from Big Lake (20 animals) and Killer's Lake (10 animals) in the southeastern area of the Athabasca River delta.

Due to a misunderstanding in the sample collection methodology by the local technician, the NRBS protocols for labelling and packaging specimens were not followed. However, precautions were followed to avoid contamination of samples by oil and gas products or smoking. When the samples arrived in Fort Chipewyan, they were transferred to contaminant-free plastic bags and stored in a walk-in freezer until they were shipped by air freight to the NRBS facility in Edmonton.

It is recommended that in future collections, that a technician familiar with the NRBS protocols for sample collection accompany the aboriginal technician to ensure that the protocols are followed.

ACKNOWLEDGEMENTS

The Delta Group Ltd. would like to acknowledge and express its appreciation to Mr. Daniel Marcel and Mr. Emil Trip de Roche for their contribution to the muskrat collection program. Their cooperation and assistance is greatly appreciated.

We also would like to acknowledge the assistance and cooperation of Mr. Greg Wagner, Project Liaison Officer of the Northern River Basins Study in resolving several logistical problems during the program.

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1.0 INTRODUCTION

The Peace-Athabasca delta is situated downstream of a number of developments which may contribute to detrimental changes in water quality and environmental health. These include oil sands projects, pulp and paper mills, mining projects, forestry harvesting, urban expansion, urban storm water runoff, municipal effluents, and agricultural developments. Northern residents which use the perched and open basins wetlands on the Peace-Athabasca deltas for resource harvesting have expressed concerns that upstream impacts on water quality and sediments may be affecting the resources of the delta.

Assessment of potential contaminant fate and effects processes and existing environmental quality within the Peace and Athabasca river basins is one of the primary research components of the Northern River Basins Study (NRBS). As part of this research, the Fort Chipewyan Community was requested to participate in a synoptic examination of potential food chain contamination in perched and open basins within the Peace and Athabasca River deltas. The project involved the collection of surface sediments in the wetlands, benthos (if available), vegetation, fish, muskrats and young-of-the-year waterfowl (see Terms of Reference, Appendix 1). Due to the time of year and logistical constraints, the community decided to proceed with collection of samples on the Athabasca River delta during summer 1992.

The Delta Environmental Management Group Ltd. (The Delta Group) was retained by the NRBS in July 1992 to work cooperatively with the Athabasca Chipewyan Band to:

- select specific perched basin wetlands and/or open basin wetlands in the Athabasca deltas for sampling;
- select preferred indicator species and substances for sampling in these basins;
- coordinate the field sampling program; and
- liaise with the Northern River Basins Study office and Alberta Environment.

The preferred sampling location on the Chipewyan Reserve No. 201 was Big Lake (referred to locally as Big Johnny Lake), which is located on the east side of the Athabasca delta, directly north of the branching of the Athabasca River into Goose Island Channel and Big Point Channel (Figure 1). Flour Bay and Big Egg Lake (South) were identified as alternate sample sites.

During August 1992, collections on the Athabasca delta included:

- sediment samples from Big Lake and Flour Bay,
- water samples from Flour Bay,
- Northern Pike (*Esox lucius*), Walleye (*Stizostedion vitreum*), and Lake Whitefish (*Corogonus clupeaformis*) from Flour Bay,
- Canvasback (*Aythya valisneria*), Green-winged teal (*Anas crecca*), Blue-winged teal (*Anas discors*), Mallard (*Anas platyrhyncos*), American Wigeon (*Anas americana*), and American Coot (*Fulica americana*) from the Flour Bay area, and
- Sweet Flag (*Acorus americanus*), referred to locally as rat root (Green 1992; Wagner 1992), from the outlet of Jackfish creek into Richardson Lake.

Muskrats (*Ondatra zibethicus*) were also to have been included in the collections, but too few animals were observed to permit adequate sampling. Instead, it was jointly decided by the NRBS and the Athabasca Chipewyan Band that muskrat specimens would be obtained by trapping as soon ice conditions were safe for winter travel (i.e., late November to early December).

This report summarizes information on the muskrat collection program on the Athabasca River delta during early December 1992.

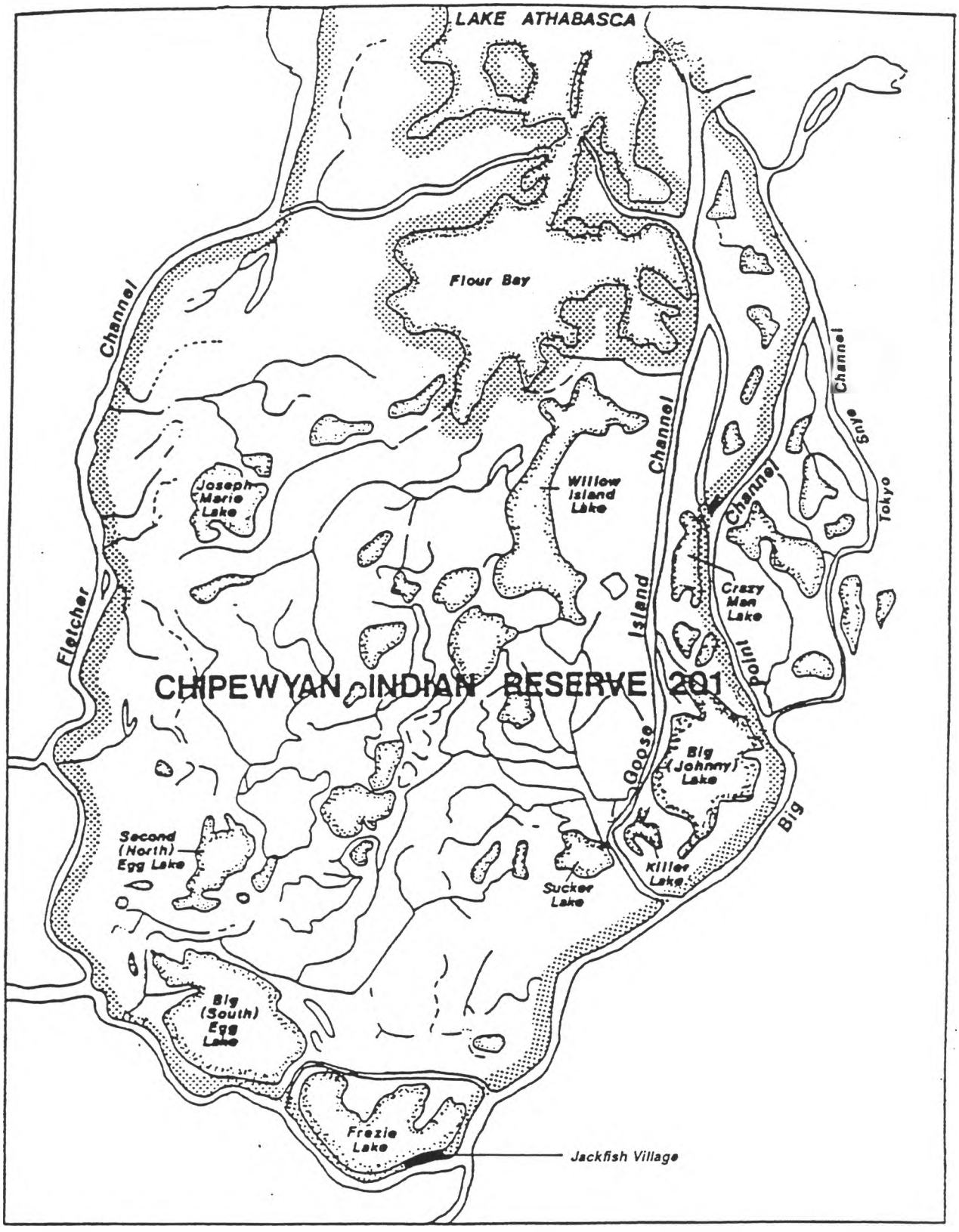

Figure 1. The Athabasca Chipewyan Reserve No. 201 showing the location of Big Lake, Jackfish village, Flour Bay and Big Egg Lake (South).

2.0 THE MUSKRAT COLLECTION PROGRAM

2.1 COLLECTION OF SPECIMENS

Mr. Daniel Marcel, an experienced trapper and member of the Athabasca Chipewyan band, was retained to identify possible trapping areas for muskrat and to collect the muskrat samples. He also provided all of the trapping equipment. Mr. Emil Trip de Roche coordinated logistical arrangements with Mr. Marcel, and was responsible for the shipping of muskrats from Fort Chipewyan to the NRBS in Edmonton. Funding was not sufficient to allow a technician or biologist with The Delta Group to accompany Mr. Marcel during the collection program.

Prior to the start of the trapping program, Mr. Marcel was to have been briefed on the handling and packaging of specimens, and precautions to avoid possible contamination of the specimens during transport back to Fort Chipewyan. Unfortunately, neither The Delta Group nor the NRBS were informed of the start of the trapping program until it had been completed. As a result, the packaging and labelling protocols recommended by the NRBS (see Terms of Reference, Appendix 1) were not followed. However, as Mr. Marcel had assisted in the collections of samples during August 1992, he was aware of the need to avoid contact of any sampling equipment or specimens with gas and oil products, as well as to not smoke during the collection and handling of samples.

On 4 December 1992, Mr. Marcel inspected a number of perched basin wetlands in the south-central and southeastern portion of the Athabasca Chipewyan Reserve No. 201 for signs of muskrat activity (houses, active pushups).

Based on the observed levels of muskrat activity, an unspecified number of traps were set in in the southern third of Big Lake and in the adjacent Killer's Lake on 5 December 1992 (Table 1). Trap sets consisted of No. 3 leghold traps with green willow branches as a bait and trap anchor. Traps were set in active pushups and houses.

All traps were checked by Mr. Marcel on 6 and 7 December 1992. All traps were removed on the latter date.

A total of 20 muskrat specimens were obtained from Big Johnny Lake and 10 specimens were collected from Killer's Lake (Table 1)(Figure 2). Detailed information on the handling of specimens was not available. Based on information from Mr. Marcel and Mr. Trip de Roche, it is understand that animals from each of the two collection areas (Big Lake and Killer's Lake) were not placed in individual contaminant-free plastic bags, but were initially stored together in separate green plastic garbage bags for each collection site. None of the specimens were labelled. Animals collected on 6 December were

Table 1. Summary of trapping locations and numbers of muskrat collected at each location during the Delta Basins Contaminant Survey, 4 to 7 December 1992. (Note: as the exact location of each collection site within Big Lake and Killer's Lake could not identified by D. Marcel, only an approximate legal descriptions is provided for the general collection area. The UTM coordinates indicated below are for the approximate centre of the general collection areas).

Trapping Location	Location (Legal)	Location (UTM)	Numbers of Muskrat Collected
Big Lake	N-half, T109 R5 W4	095 825 (Map 74L/7)	20
Killer's Lake	Section 24 T109 R6 W4	085 825 (Map 74L/7)	10

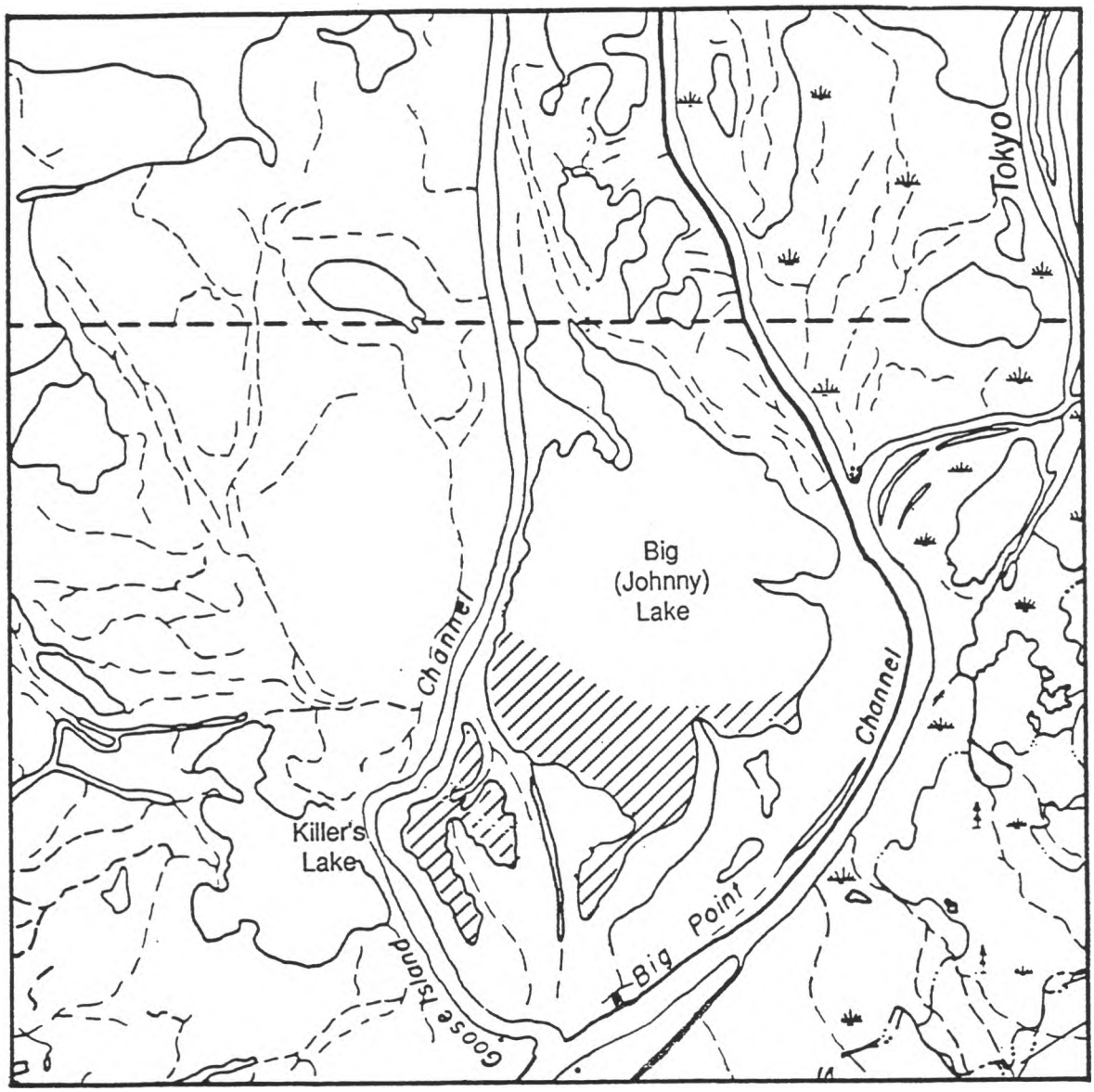

Figure 2. Location of trapping areas for muskrat on the Athabasca River delta during the Delta Basins Contaminant Survey, 4 to 7 December 1992. Traps were set in the south end of Big (Johnny) Lake and the perimeter of Killer's Lake (as indicated by hatched areas).

stored in a wooden shed at ambient outdoor temperatures. As overnight temperatures were in the range of -9.8C to -13.0C, it is reasonable to assume that the samples would have frozen quickly. Following the collection of the muskrat specimens and traps on 7 December 1993, all muskrat specimens were transported by snowmobile and sled back to Fort Chipewyan.

It is understood that on receipt of the specimens in Fort Chipewyan, Mr. Trip de Roche transferred all specimens into separate contaminant-free plastic bags. All specimens were stored in the walk-in freezer at the Alberta Fish and Wildlife Division office in Fort Chipewyan until shipment to the NRBS facilities in Edmonton.

2.2 RECOMMENDATIONS FOR FUTURE COLLECTIONS

For future collections, it is recommended that a technician, familiar with the handling, labelling and transport protocol for samples, accompany the aboriginal technician during sample collections to ensure that the NRBS sample collection protocols are followed.

3.0 LITERATURE CITED

Green, J.E. 1992. Progress Report. Delta Basins Contaminant Survey: Northern River Basins Study. Project 2323-B1. Prep. for the Northern River Basins Study by The Delta Environmental management Group Ltd. 8 pp.

Wagner, G. 1992. Project 2323-B2 - Delta Basins Contaminant Survey. Memorandum dated 8 December 1992. Northern River Basins Study. 4 pp.

4.0 APPENDIX: TERMS OF REFERENCE

TERMS OF REFERENCE

Project 2391-B1 - Contamination within depositional environments of the Peace-Athabasca Delta

I. Project Description

These terms of reference are provided in support of project #2391-B1, which is part of the Spring/Summer 1992/93 study program. This project is being carried out based on requests from northern residents to test for evidence of ecosystem contamination in traditional harvest areas located in the Peace-Athabasca Delta. The basic requirement is to conduct a synoptic examination of contamination throughout the food chain of one or two of the perched or open basins in the Delta. Site selection and specimen collection will be carried out with help and advice from native communities in the Fort Chipewyan area.

II. Statement of Work (Requirements)

1. The consultant will coordinate the selection of sampling sites and the collection of specimens from perched or open basins of the Peace-Athabasca Delta with native communities in the Fort Chipewyan area.

2. The consultant will arrange for the collection of the following:
   a. Vegetation
   b. Muskrats
   c. Waterfowl young-of-the-year
   d. Fish, as available

3. Collections must be treated in such a manner that they can be used for chemical analyses of dioxins, furans, PCBs, PAHs, chlorophenolics, toxaphene and other insecticides and heavy metals. Only fresh specimens are to be collected. These are to be placed in contaminant-free bags (provided by the Northern River Basins Study) in the field and placed on ice for shipment back to Fort Chipewyan. Specimens must not, however, be stored in ice for longer than twelve hours. Smoking in proximity to specimens is not to be permitted because of the possibility of contamination. Once in Fort Chipewyan, specimens are to be stored in the freezer at the Fish and Wildlife office.

4. All collections are to be correctly labelled as to the date of collection and sampling location.

5. The consultant will also facilitate water, sediment and benthos sampling with staff from Alberta Environment.

6. The consultant must also be available to discuss the collection program and possibly the analytic results of the collection program with native communities between September 1st, 1992 and March 31st, 1992.

III. Reporting Requirements

The consultant will be required to submit a complete list of all collections made under this contract and to provide a letter report indicating the rationale for the sites selected and describing any outstanding issues raised by the community representatives at the site selection and sampling meetings to the Northern River Basins Study office by September 30th, 1992.