

**Quantifying the Subsistence Harvest
of the Cross Lake First Nation:
Development of the Harvest Study Questionnaire**

by

Kevin Warkentin

A Practicum Submitted
in Partial Fulfillment
of the Requirements for the Degree

Master of Natural Resource Management

Natural Resources Institute
The University of Manitoba
Winnipeg, Manitoba

July 1995



National Library
of Canada

Acquisitions and
Bibliographic Services

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque nationale
du Canada

Acquisitions et
services bibliographiques

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file *Votre référence*

Our file *Notre référence*

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-35090-8

**QUANTIFYING THE SUBSISTENCE HARVEST OF
THE CROSS LAKE FIRST NATION: DEVELOPMENT
OF THE HARVEST STUDY QUESTIONNAIRE**

By

Mr. Kevin Warkentin

A practicum submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfilment of the requirements of the degree of Master of Natural Resources Management.

©1995

Permission has been granted to the LIBRARY OF THE UNIVERSITY OF MANITOBA to lend or sell copies of this practicum, to the NATIONAL LIBRARY OF CANADA to microfilm this practicum and to lend or sell copies of the film, and UNIVERSITY MICROFILMS to publish an abstract of this practicum.

The author reserves other publication rights, and neither the practicum nor extensive extracts from it may be printed or otherwise reproduced without the author's permission.

ABSTRACT

This practicum was carried out as part of the Cross Lake Harvest and Consumption Study sponsored by the Cross Lake First Nation, Manitoba Hydro and the Government of Manitoba. It documents the development of a questionnaire designed to quantify the 1993/94 annual subsistence harvest of fish and wildlife by the Cross Lake First Nation. The questionnaire was adapted from one used in a previous study in the Mushkegowuk Region of Northern Ontario. In order to make the questionnaire pertinent to the harvesting practices of the Cross Lake First Nation, a species list and seasonal harvest cycle were developed, and the boundaries of the harvest area were defined. This information was gathered from key community informants prior to the development of the questionnaire, and during training and pretesting of draft questionnaires. Informants identified 39 subsistence species harvested, and divided the year into three seasons: summer/fall (July 1 to freezeup), winter (freezeup to breakup) and spring (breakup to June 30). The harvest area matched the area covered by the Cross Lake Resource Area/Registered Trapline (RTL).

The basic unit of study used was the household. This caused some problems with the administration of the questionnaire because of the difficulty of accounting for the harvests of all members of a household. A stratified sampling design was utilized in the selection of participants for the study, in which households were categorized on the basis of the time and effort put into harvesting by the most productive harvester in the household. The categories used were: **intensive** (spends a month or more at a time in the bush), **active** (spends a week or more at a time in the bush), **occasional** (spends a day or

weekend at a time in the bush) and non-hunter. A 100% sample was sought from the intensive category, while the active, occasional and non-hunter categories were randomly sampled at levels of 60%, 40% and 20%, respectively.

Common deficiencies in previous harvest studies were addressed through the use of specific methods designed to reduce the effects of response bias (intentional or inadvertent misrepresentation of harvests), non-response bias (the harvests of those not participating in the survey may be significantly different from those of respondents) and double counting (shared species, e.g. moose, is reported by more than one respondent). The development of a clear and concise questionnaire focusing on the most recently completed harvest cycle, the use of locally respected interviewers, an emphasis on community ownership and long term resource management, and the stratified sampling design were meant to address these deficiencies.

Community input also identified a possible gap in the harvest data obtained by the questionnaire. This gap was that fish harvested under the Cross Lake Domestic Fishing Program (DFP) would not be reported in the questionnaire due to the commercial nature of DFP harvests. The DFP brought a total of 209,783 pounds of fish into Cross Lake during the summer/fall 1993 to spring 1994 harvest cycle, representing an estimated 20,896 lake whitefish, 8,636 walleye, 9,864 northern pike and 6,844 coarse fish. These figures represent the amount of fish which must be added to those reported in the harvest study interviews in order to determine the full extent of the amount of local food available to the population of Cross Lake for the summer/fall 1993 to spring 1994 harvest cycle.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank the people of Cross Lake for their assistance and participation in this research. In particular, I would like to acknowledge the contributions of George Paupanekis, Darwin Paupanekis, Rita Monias, Nelson Miller, Donald McKay, Gordon McKay, Harvey Blacksmith, Earl Scott, Perry Ross and Peter John Halcrow in the development of the questionnaire and for their work as interviewers. I would also like to thank Nick Halcrow and Glen Smith for providing information regarding the Domestic Fishing Program.

Second, I would like to thank my advisor and committee members for their support and assistance: Dr. Fikret Berkes (NRI, advisor), Prof. Thomas Henley (NRI), Prof. Ruth Diamant (U of M, Foods and Nutrition) and Dr. R.A. (Drew) Bodaly (Freshwater Institute). Their input over the course of the last two years was appreciated and contributed greatly to the document before you.

I would like to thank "Doc", "Li'l Joe" and "The Kid" for making it a lot easier to get up every morning to come to school.

Finally, I would like to thank my wife, Kim, whose support, both moral and financial, gave me the opportunity and encouragement necessary to get through this stage of my life.

TABLE OF CONTENTS

Abstract	i
Acknowledgements	iii
List of Tables	vii
List of Figures	viii

Chapter	Page No.
----------------	-----------------

Chapter 1 INTRODUCTION

1.1 Preamble	1
1.2 Background	1
1.3 Issue Statement	3
1.4 Objectives	4
1.5 Brief Statement of Methods	4
1.6 Definition of Terms	5

Chapter 2 LITERATURE REVIEW

2.1 Cross Lake and Hydroelectric Development	9
2.1.1 The Cross Lake Community	9
2.1.2 The Jenpeg Dam and Lake Winnipeg Regulation	12
2.1.3 Effects on the Cross Lake Water Regime	14
2.1.4 Access	19
2.1.5 Cross Lake Fish Populations	20
2.1.6 Cross Lake Commercial Fishery	22
2.1.7 Cross Lake Subsistence Fishery	24
2.1.8 The Northern Flood Agreement	26
2.1.9 The Cross Lake Outlet Weir	27
2.2 Native Harvest Surveys	31
2.2.1 Previous Studies in Cross Lake	32
2.2.2 Methodology for Native Harvest Surveys	37
2.2.3 The Current Cross Lake Harvest Survey	42

2.3 Subsistence Economy	43
2.3.1 Subsistence Harvesting and Local Diet	44
2.3.2 Resource Harvesting and Traditional Ecological Knowledge	45
2.4 Summary and Conclusions	47
Chapter 3 METHODS	
3.1 Introduction	48
3.2 Subsistence Species List	49
3.3 Seasonal Cycle	50
3.4 Harvesting Area	50
3.5 Training and Pretesting	51
3.6 Stratified Sampling Design	52
Chapter 4 DEVELOPING THE QUESTIONNAIRE	
4.1 Introduction	55
4.2 Species List	55
4.3 Seasonal Cycle	58
4.4 Harvesting Area	60
4.5 Training and Pretesting	62
4.6 Stratified Sampling Design	65
Chapter 5 THE CROSS LAKE DOMESTIC FISHING PROGRAM (DFP)	
5.1 Introduction	67
5.2 DFP Harvests	68
5.2.1 Potential Waste and/or Spoilage	70
5.2.2 Calculating the Number of Fish Harvested	72

Chapter 6 DISCUSSION

6.1 Introduction 74

6.2 The Use of TEK and Community Input 74

6.3 Dealing with Bias and Other Harvest Study Problems 77

 6.3.1 Response Bias 77

 6.3.1.1 Poor Questionnaire Design 78

 6.3.1.2 Recall Failure 80

 6.3.1.3 Interviewer Introduced Bias 81

 6.3.1.4 Strategizing 85

 6.3.2 Non-response Bias 86

 6.3.3 Double Counting 87

6.4 Summary and Conclusions 91

REFERENCES 95

PERSONAL COMMUNICATIONS 100

APPENDICES

 Appendix A: Cross Lake Harvest Study Questionnaire 101

 Appendix B: Biological Species List for the Cross Lake Region 118

 Appendix C: Interviewer Training Manual 126

LIST OF TABLES

Table 1.	Age demographics of the Cross Lake Reserve and the Cross Lake Community	11
Table 2.	Fish species composition in the east basin of Cross Lake over three time periods	22
Table 3.	Surveyed Bands Consumption and Distribution of Fish and Game . .	34
Table 4.	Wildlife Harvest Studies by Region	36
Table 5.	Summary and Comparison of Wagner's Native Harvest Survey and the Wildlife Branch's <u>Five-Year Report</u>	39
Table 6.	Species harvested by the Cross Lake First Nation for subsistence purposes and their Cree translations	57
Table 7.	Results from community stratification, including desired and actual sample sizes and correction factors for each stratum	66
Table 8.	Total fish production by lake (in pounds) purchased by the DFP for summer/fall '93 (July 1 to freezeup)	68
Table 9.	Total fish production by lake (in pounds) purchase by the DFP for winter '93/'94 (freezeup to breakup)	69
Table 10.	Total fish production (in pounds) purchased by the DFP for the summer/fall '93 to spring '94 harvest cycle	70
Table 11.	Total weight (in pounds) of fish brought into the community by the DFP, including an estimate of fish given to mushers	71
Table 12.	Calculation of numbers of fish harvested under the DFP from total fish production for the summer/fall '93 to spring '94 harvest cycle	73

LIST OF FIGURES

Figure 1.	Key map indicating the location of Cross Lake, the Cross Lake community, Jenpeg and the Cross Lake outlet weir	10
Figure 2.	A comparison of monthly mean Cross Lake water levels from a) 1977-1989 (post-LWR) and b) 1967-1976 (pre-LWR)	17
Figure 3.	View of the effects of the 1980 summer drawdown of Cross Lake . . .	18
Figure 4.	The status of the Cross Lake commercial fishery from 1959 to 1990	23
Figure 5.	Effects of LWR and Churchill River Diversion on resource harvesting/ subsistence in NFA communities, with emphasis on the fishery . . .	25
Figure 6.	The Cross Lake outlet weir	28
Figure 7.	A comparison of actual post-LWR Cross Lake elevations to the state of nature simulation to the estimated elevations as a result of the outlet weir	30
Figure 8.	Seasonal cycle of major harvest activities by Cross lake community residents. Shaded areas indicate when resource harvest activities are taking place, unshaded areas mean no activity	59
Figure 9.	The Cross Lake RTL/Resource Area	61

Chapter 1

INTRODUCTION

1.1 Preamble

This practicum research is being conducted as part of the Harvest Study section of the Cross Lake Harvest and Consumption Study. The purpose of the Harvest and Consumption Study is "to quantify changes in the consumption levels of country foods in Cross Lake and to develop an understanding of the factors which may have affected any documented changes"¹. An important part of achieving this goal is quantifying the current annual harvest of the Cross Lake First Nation and comparing it to historical harvests to identify any temporal changes in the harvesting of key species. This information will be generated through the administration of a native harvest survey, the development of which is the focus of this research.

1.2 Background

Until the influx of European settlers, the domestic economy of aboriginal peoples was based on their surrounding natural environment. Their livelihood was maintained by the harvest of fish, wildlife and other natural resources in a self-sufficient economic system (Wagner, 1985). Because of the importance of the environment, the preservation of

¹Cross Lake Harvest and Consumption Study Contract, Schedule A, 1994, p.3.

animals and plants, and the protection of land, water and air from pollution were paramount in aboriginal culture (Smith, 1990).

However, the European settlement of Canada brought with it a commercial, market based-economy which viewed the "northern frontier", with its vast water, timber and wildlife resources, as a source of great economic potential. Since World War II, the development of these northern resources has displayed itself in the form of megaprojects, such as mining facilities, hydroelectric generation plants and timber and paper plants (Northern Manitoba Economic Development Commission, 1992a).

The development of these megaprojects in the north has impacted the cultures and lifestyles of aboriginal peoples in a number of ways. Hydroelectric development in particular has affected aboriginals in northern Manitoba. Flooding of upstream areas and the drawdown of lakes downstream of control dams and generating stations have altered both wildlife and fish habitats, affecting their populations and migration patterns. Also, as access to these remote areas has been opened up, non-native hunters and fishermen have put excess stress on the fish and wildlife populations, reducing the available harvest for aboriginal resource harvesters. The result has been that the traditional land use patterns, resource management systems, social well being and subsistence economies of many northern communities have been affected (Usher & Weinstein, 1991).

Although subsistence economies have existed for centuries, their importance in

aboriginal culture has only recently been recognized (Freeman, 1993). As acknowledgment increases, attempts to quantify subsistence harvests, through native harvest surveys, have become widely used. In northern Manitoba, these surveys are primarily conducted to identify changes in the native harvest as a result of hydroelectric development. This practicum does not attempt to deal with the cultural aspects of the subsistence harvest of the Cross Lake First Nation, but documents the development of a harvest survey designed to quantify their current annual subsistence harvest.

1.3 Issue Statement

Subsistence wildlife and fish harvesting continue in the Cross Lake region. However, the subsistence harvest of fish and wildlife in the area has never been accurately quantified. In order to identify temporal changes in the subsistence harvest, an accurate quantification of the current annual harvest needs to be conducted. This can then be compared to historical harvests, which will be estimated through the administration of a historical harvest questionnaire, to determine if the harvest levels have indeed been altered over time and, if possible, to identify the factors which have led to these changes. The identification of these relationships can be used in the future to predict impacts on native communities as a result of hydroelectric development.

1.4 Objectives

The objectives of this practicum are:

- 1) to review the literature regarding the history of the Cross Lake region, the effects of hydroelectric development, and general native harvest survey methodology;
- 2) to incorporate the knowledge of the Cross Lake First Nation in the design of a harvest study questionnaire;
- 3) to develop a questionnaire which accurately quantifies the current annual subsistence harvest of the Cross Lake First Nation and addresses the shortcomings of other questionnaire based harvest studies; and
- 4) to fill gaps in the study of fish harvests by estimating the amount of fish made available to Cross Lake by the Cross Lake Domestic Fishing Program (DFP).

1.5 Brief Statement of Methods

The development of the Cross Lake Current Annual Harvest Study Questionnaire entailed compiling a subsistence species list for the Cross Lake First Nation, developing a seasonal cycle for these species, determining the geographic boundaries of Cross Lake harvesting practices, training interviewers and pretesting the questionnaire. A stratified sampling design was used for determining total community harvests. Details on the methodology for developing the questionnaire and stratifying the community are described in Chapter 3.

1.6 Definition of Terms

Active hunter

An active hunter regularly engages in harvesting activities during the annual cycle, spending a week or more at a time in the bush.

Double counting

Double counting occurs when the same harvest is reported by more than one respondent.

Harvester population

The harvester population of a community is that portion of the total population that consists of potential hunters. The harvester population in this study will include males 16 years of age or older and female heads of households.

Informant fatigue

Informant fatigue occurs when informants have been subjected to too many questions and/or questionnaires. As a result, informants may provide inaccurate responses or refuse to participate in the survey altogether.

Intensive hunter

An intensive hunter regularly engages in harvesting activities during the annual cycle, spending a month or more at a time in the bush.

Native harvest survey

Native harvest surveys are surveys or questionnaires designed to produce quantitative estimates of the harvest of fish and wildlife species by a certain group of people, or in a specific area, over a given period of time (Usher & Wenzel, 1986).

Non-hunter

A non-hunter does not harvest any country foods.

Non-response bias

Non-response bias refers to the possibility that the harvests of those who do not participate in the study may be significantly different than the harvests of participants, and may skew projected community harvest totals (Usher and Wenzel, 1987).

Occasional hunter

An occasional hunter irregularly engages in harvesting activities during the annual cycle, spending a day or weekend at a time in the bush.

Projected numbers

Projected numbers are the community wide estimates extrapolated from the reported numbers in the sampling.

Random sampling

In random sampling, every member of the sample population has an equal chance of being selected.

Reported numbers

Reported numbers are the actual numbers reported by the people covered in the survey.

Response bias

Response bias refers to the possibility that the true answer to a question is different from the answer provided by the respondent, whether intentional or inadvertent (Usher & Wenzel, 1987).

Response burden

Response burden is a condition which results in inaccuracies and other problems caused by a long or otherwise inappropriate questionnaire and/or its administration (see also informant fatigue).

Stratified random sampling

As used in the present study, stratified random sampling is a sampling procedure in which the whole population is divided into strata characterized by different levels of involvement in the hunting, fishing, trapping economy. Each of these strata is randomly sampled. In this study, the hunter population was stratified into four groups (intensive, active,

occasional or non-hunter). To increase the accuracy of the study, the intensive and active categories were sampled more fully, with a 100% sample of intensive harvesters, and the community harvest projection adjusted accordingly. This ensured accurate representation of the entire community.

Subsistence harvest

Subsistence resource harvesting refers to non-commercial, consumption oriented, local food-getting activities (Berkes, 1988).

Chapter 2

LITERATURE REVIEW

2.1 Cross Lake and Hydroelectric Development

2.1.1 The Cross Lake Community

Cross Lake is situated in northern Manitoba, approximately 100 km north (downstream) of Lake Winnipeg on the Nelson River (Figure 1). The lakeshore provides a home to two adjoining communities: the Cross Lake First Nation, situated on Federal Reserve Land, and the unincorporated Community of Cross Lake, located on Provincial Crown Land. According to the most recent estimates by Manitoba Northern Affairs (1989), the combined population of the community and reserve was 3,553, consisting of 2,972 living on the reserve and 581 living in the community. Table 1 describes the age demographics of both the reserve and community as reported by Manitoba Northern Affairs (1989).

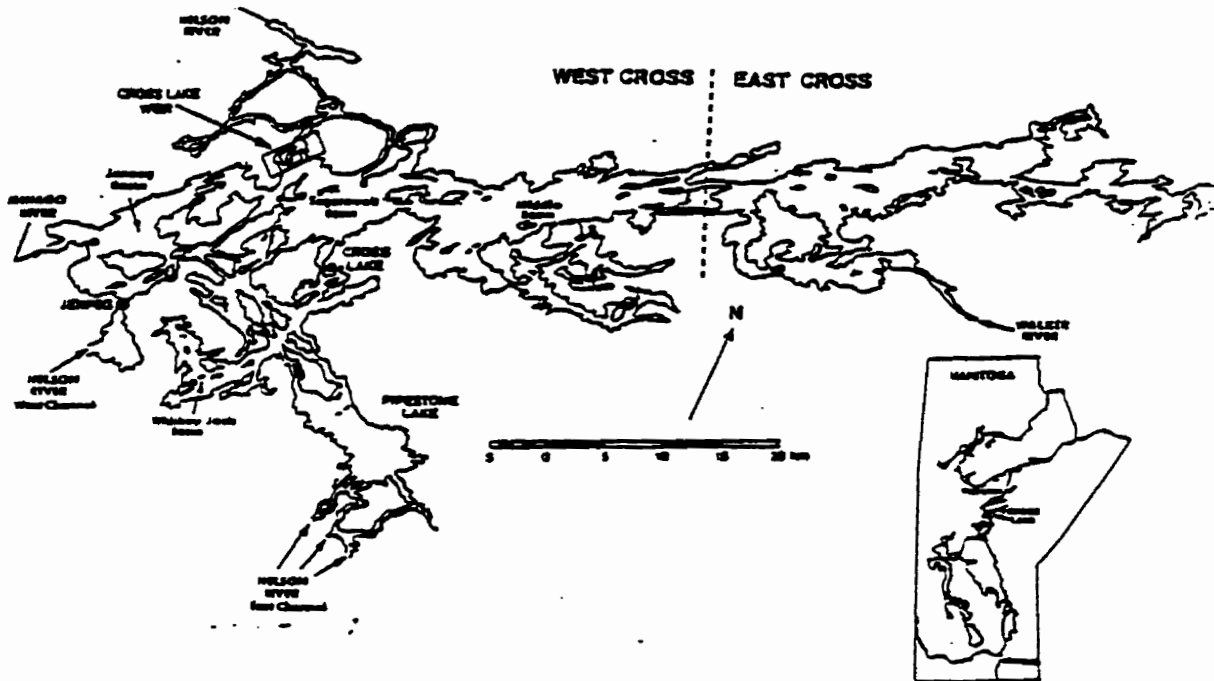


Figure 1. Key map indicating the location of Cross Lake, the Cross Lake community, Jenpeg and the Cross Lake outlet weir.

Table 1. Age demographics of the Cross Lake Reserve and the Cross Lake Community.

Age group (years)	1985 Community	1987 Reserve
0-4	84	370
5-14	136	753
15-19	73	339
20-24	61	339
25-34	82	523
35-64	117	536
65 and over	24	112
Age not stated	4	0
TOTAL	581	2972

According to Band Councillor Ernie Scott (pers. comm., 1994), the current combined population is approximately 4000, indicating that Cross Lake is a growing community.

The Community has only a public school (K-9) while the Reserve has both a public school and a high school, which is also attended by Community members. A Nursing Station is situated on Crown Land and services all people in the Cross Lake region. The region is accessible by both an all weather road and scheduled daily air service from both Winnipeg and Thompson. Communication systems include both a local radio and TV station, as well as telephone, postal services and a local newspaper. The region is serviced by Manitoba Hydro, and police (both R.C.M.P. and a First Nations police force), fire and ambulance services are provided (Northern Manitoba Economic Development Commission, 1992a).

Historically, the Cross Lake area was an important location along both the north/south and east/west trade routes. It also provided a summer location for Cree Indians to fish. Because of its location, the Hudson's Bay Company established a trading post at Cross Lake in 1884. Year round settlement of the area followed closely behind as traders, both white and Cree, were attracted to the post and its proximity to important trade routes. Settlers were also attracted by the availability of fish and wildlife in the surrounding area (Wilson *et al*, 1986). However, many aboriginals continued to hunt and fish for their livelihood, moving seasonally with the harvest cycle. Eventually, Treaties, education and health care programs encouraged the aboriginals to settle in permanent communities (Northern Manitoba Economic Development Commission, 1992b).

2.1.2 The Jenpeg Dam and Lake Winnipeg Regulation

One important event in the history of the Cross Lake First Nation and the Cross Lake community was the development of the Jenpeg Dam and Generating Station in 1974. The main function of Jenpeg is to regulate the levels of Lake Winnipeg, creating a natural reservoir for the Nelson River system, which currently generates about 75% of Manitoba's hydroelectric power (Manitoba Hydro, 1993).

Since the 1950's, Lake Winnipeg has been viewed as having great potential to provide hydroelectric power for the Province of Manitoba. This was an offshoot of the original plan to regulate the levels of Lake Winnipeg as a method of flood control

downstream from the lake (Wilson *et al*, 1986). Lake Winnipeg Regulation (LWR) was also considered to be beneficial because of the seasonal disparity between natural Lake Winnipeg outflows and the seasonal electricity demands of the province. LWR would allow for summer outflows into the Nelson River to be reduced while water was stored in Lake Winnipeg. Outflows could then be increased during the fall and winter months when they were traditionally low and electricity demands were high (Manitoba Hydro, 1993).

In 1970, the Government of Manitoba granted Manitoba Hydro an Interim Licence to regulate Lake Winnipeg, followed by a Supplementary Interim Licence granted in 1972. However, as Wilson *et al* (1986) note, these licences failed to acknowledge any damage that may occur downstream of the Jenpeg Generating Station. To wit:

- The maximum allowable elevation of Lake Winnipeg was set at 715' (217.93m) above sea level (ASL). If lake levels rose above this, Manitoba Hydro was authorized to increase outflow from Jenpeg to a maximum, causing a severe and immediate increase in the levels of downstream lakes.
- The minimum allowable outflow from Jenpeg was set at 25,000 cubic feet per second (CFS) (707.93m³/s), which was just barely above the historic minimum flow recorded on the Nelson River. Thus, Manitoba Hydro was permitted to reduce the level of Cross Lake to its historic minimum at any time during the year.
- One of the licence provisions stated that the rate of discharge through Jenpeg could not fluctuate more than 15,000 CFS (424.76m³/s) during any

24 hour period. Historically, the largest fluctuation of inflows into Cross Lake were from 160,000 CFS (4530.72m³/s) to 24,600 CFS (696.60m³/s) over a 54 month period. Under the conditions of the licence, this fluctuation could be achieved over 9 days. This would represent a fluctuation of approximately 12' (3.66m) in the elevation of Cross Lake.

As these provisions indicate, limitations on the regulation of Lake Winnipeg imposed by the licence were primarily based on the negative effects that might occur on Lake Winnipeg. Many of the downstream effects, such as on Cross Lake, were not given adequate consideration in the granting of the operation licence. The result was that serious, unexpected impacts on the biological community of the lake, particularly the fish population, occurred. This in turn affected the structure of the aboriginal community as the fishery resource provided them with a source of subsistence, income and recreation.

2.1.3 Effects on the Cross Lake Water Regime

Records of the levels of Cross Lake are available from 1912 to 1976, the year that LWR was initiated. The following averages, however, do not include data from the years 1973-1975 as the outflows from Lake Winnipeg were affected by the construction of the Jenpeg Generating Station.

Pre-LWR, maximum lake elevations occurred during mid-summer. During these

months, the range of lake elevations was 679' (206.96m) to 680.5' (207.42m), with a long term average of between 679.5' (207.11m) and 680' (207.26m). Maximum monthly fluctuations varied from 1.5' (0.46m) to 3.2' (0.98m). The maximum average monthly fluctuation was 1.8' (0.55m) in May. This was mainly attributed to the spring ice breakup increasing inflows into Cross Lake. The mean monthly fluctuation for the rest of the summer was approximately 0.75' (0.23m) (Wilson *et al*, 1986).

Historically, the lowest elevations of Cross Lake were found just prior to the spring breakup in nearly all years prior to LWR. During the winter months, the range of lake elevation fell to between 677.5' (206.50m) and 679' (206.96m), with an average elevation of 678.5' (206.81m). The highest monthly fluctuations occurred during November, with an average of 1' (0.30m) and a maximum of 2' (0.61m). During the other winter months, average monthly fluctuations were approximately 0.5' (0.15m), with a maximum of 1.5' (0.46m) (Wilson *et al*, 1986).

Although actual post-LWR data exists for Cross Lake, Wilson *et al* (1986) recalculated the pre-LWR Cross Lake data as if LWR had been implemented during these years. This provides a more useful analysis of the effects of LWR on the water regime of Cross Lake as temporal differences between the data have been eliminated. There are two important conclusions which can be drawn from this analysis:

- 1) the normal seasonal water level fluctuations of Cross Lake would have been reversed, with minimum lake elevations occurring in mid-summer and maximum

levels during the winter in all but three years;

- 2) in the records from 1929 to 1981, the summer water level of Cross Lake would have dropped below 674' (205.44m) ASL in twenty of those years, 5' (1.52m) below normal and historically unprecedented.

With respect to the actual effects of LWR on Cross Lake, Figure 2 gives a graphical comparison of actual data from the 10 years prior to LWR to 10 years post-LWR that indicates the seasonal reversal of minimum and maximum lake elevations. Figure 3 shows the actual scene of the 1980 Cross Lake summer drawdown.

Besides the severe alteration of the Cross Lake water regime, LWR had numerous other effects on the physical characteristics of Cross Lake which had not been accounted for in the pre-project assessment (Bodaly & Rosenberg, 1990). Gaboury and Patalas (1982) report that the surface area of Cross Lake was reduced by 26%, and the overall volume by 53%, as a result of LWR. This resulted in a decreased mean water depth of 0.9m (2.95'), lowering the mean depth of Cross Lake to 1.5m (4.92'). A consequence of this decreased lake depth has been an increase in summer water temperatures in the lake. Gaboury and Patalas (1981) also report that LWR caused an increase in submergent vegetation in Cross Lake. This resulted in a significant reduction in the oxygen concentrations in the lake as decomposition of this vegetation ensued.

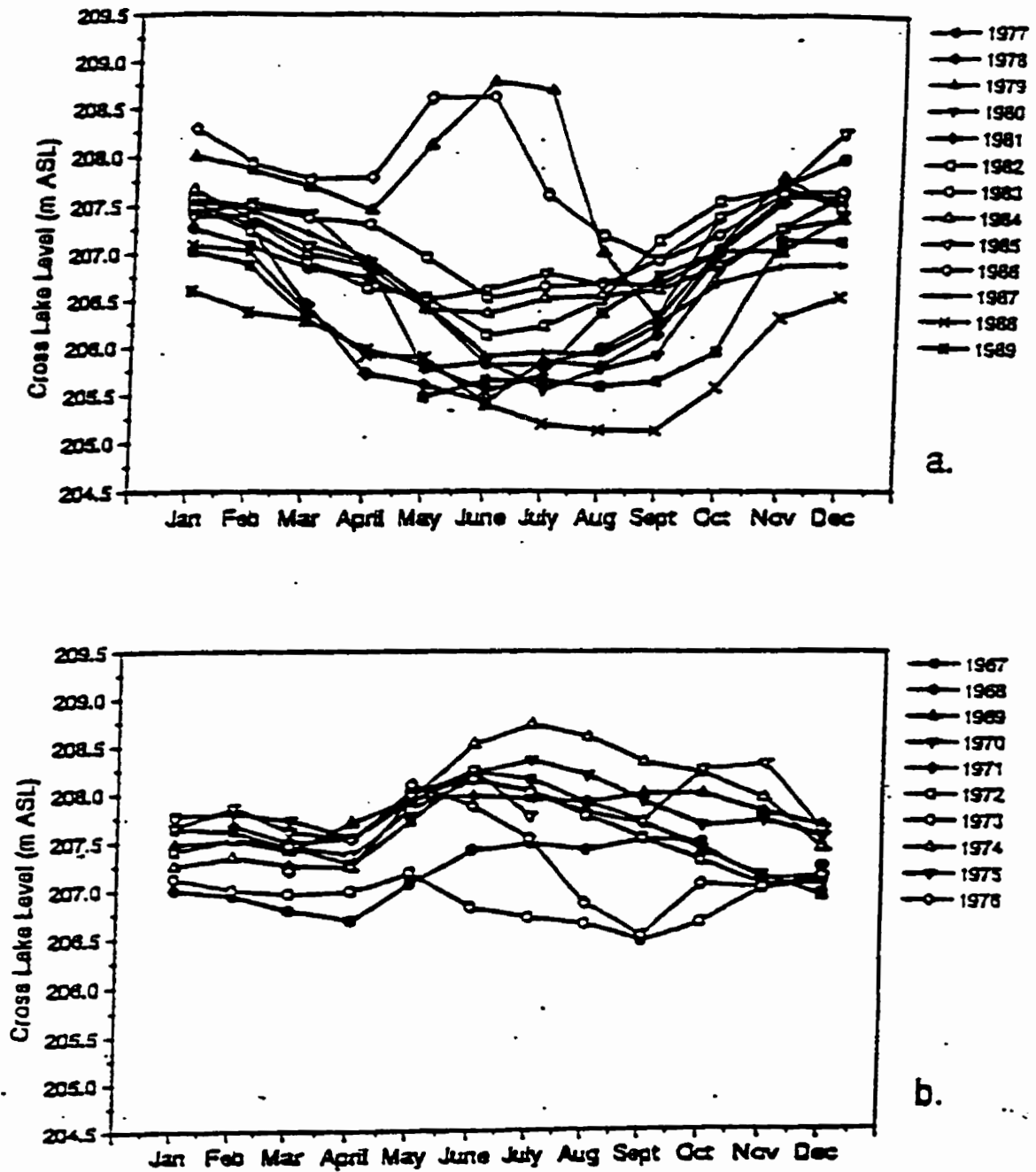


Figure 2. A comparison of monthly mean Cross Lake water levels from a) 1977-1989 (post-LWR) and b) 1967-1976 (pre-LWR) (Source: Ramsey & Patalas, 1992).



Figure 3. View of the effects of the 1980 summer drawdown of Cross Lake (top - before; bottom - after) (Source: Wilson *et al.*, 1986).

2.1.4 Access

Access to the traditional resource base has been inhibited as water levels of lakes downstream from Jenpeg have been reduced during the spring and summer months. Pre-LWR data indicates that the water levels of Cross Lake were at least 677' (206.35m) ASL for 75% of the open water season and above 680' (207.26m) ASL for 40% of the open water season. However, post-LWR, water levels often fell below 675' (205.74m) ASL, well below the historical minimums (Wilson *et al*, 1986). As a result of this decrease in lake levels, dangerous areas of rocks and reefs that had previously been underwater were exposed, causing damage to nets (Usher and Weinstein, 1991) and making navigation on the lake and surrounding rivers nearly impossible. As well, areas previously used for docking boats could not be used as they were no longer on the lake shore, inhibiting access.

This loss of access had drastic effects not only on the Cross Lake commercial and subsistence fisheries, as discussed above, but also on other traditional activities of the Cross Lake First Nation due to the historical reliance of the Cross Lake community on the lake and river systems of the area. These water systems afforded members of the community access to the resources of the area, providing food and materials for subsistence purposes as well as recreational opportunities. Wilson *et al* (1986) report that members of the community would often travel as far as 60 miles from the community for hunting, trapping, fishing and recreation depending solely on the navigability of Cross

Lake, the Minago, Nelson, Echimamish and Walker Rivers, and Walker and Sipiwesk Lakes for transportation. As these water bodies were subjected to the effects of summer lake drawdown, the Cross Lake First Nation lost access to their traditional land use areas. In order to pursue these traditional activities, community members were required to travel greater distances, incurring greater costs (Usher and Weinstein, 1991).

2.1.5 Cross Lake Fish Populations

Based on growth rate, age distribution and age of maturity, Gaboury and Patalas (1982) determined that the populations of the major commercial and domestic fish species harvested in Cross Lake, being lake whitefish (*Coregonus clupeaformis*), walleye (*Stizostedion vitreum*), and northern pike (*Esox lucius*), differed between east and west basins of Cross Lake. Therefore, all literature regarding species composition following 1982 is identified by basin.

The changes in the flow regime and physical characteristics of Cross Lake have had a two-fold effect on the Cross Lake fish populations. One effect of LWR has been the dramatic reduction of the standing stocks of all species in Cross Lake. Fish stocks of the major commercial and domestic species, declined from 1980 to 1986, with the resurgence of some species in the late 1980's (Kroeker & Bernhardt, 1993).

The decline in Cross Lake fish populations has been attributed to a number of

factors. Wilson *et al* (1986) report that the productivity of all levels of the food web in Cross Lake was impaired by the reduction in lake volume and area. The decreased water levels caused by LWR also resulted in a loss of fish habitat and changes to spawning grounds, making them either unproductive and/or inaccessible (Gaboury & Patalas, 1982). Reduced oxygen levels in the water during the summer, due to higher summer water temperatures and increased decomposition of vegetation, also stressed the fish populations (Gaboury & Patalas, 1982).

The second effect of LWR on the fish populations of Cross Lake has been the alteration of species composition in both Cross Lake basins. The data sets from these basins indicate a substantial decline in the abundance of lake whitefish in Cross Lake as a result of LWR. Table 2 presents species composition data from the east basin of Cross Lake, comparing pre-LWR, post-LWR and post-weir (covered in section 2.1.9) levels of the commercially and domestically important species in the lake. As the data indicates, the lake whitefish populations declined most in relation to the other species as a result of LWR, while walleye and lake cisco flourished. However, since the construction of the weir, northern pike have increased in relative abundance, while other species have decreased relatively. Data from the west basin indicate similar impacts.

Table 2. Fish species composition in the east basin of Cross Lake over three time periods.

Species	Pre-LWR*	Post-LWR**	Post-weir***
Lake whitefish	82%	7%	2%
Walleye	15%	35%	24%
Northern Pike	2%	9%	69%
Lake cisco	1%	49%	5%

* Commercial harvests (Koshinsky, 1973)

** Experimental gillnetting (calculations by Kroeker and Bernhardt, 1993, from data collected by Gaboury and Patalas, 1982)

*** Experimental gillnetting (Kroeker and Bernhardt, 1993)

2.1.6 Cross Lake Commercial Fishery

The Cross Lake commercial fishery has provided a source of income and employment for the Cross Lake First Nation since 1959 (Kroeker & Bernhardt, 1993). As Figure 4 indicates, commercial fish catches on Cross Lake, and therefore the value of the commercial fishery, increased steadily from 1960 to 1976, when LWR was initiated. Local participation in the commercial fishery remained constant at about 15 fishermen. During this time, annual commercial harvests ranged between approximately 28,000 and 75,000 kg (Usher & Weinstein, 1991).

However, commercial fish catches on Cross Lake quickly declined as a result of LWR, attributable to the effects of the altered water regime on the fish populations as well as the loss of access to the resource. By 1981, annual commercial harvests on Cross Lake

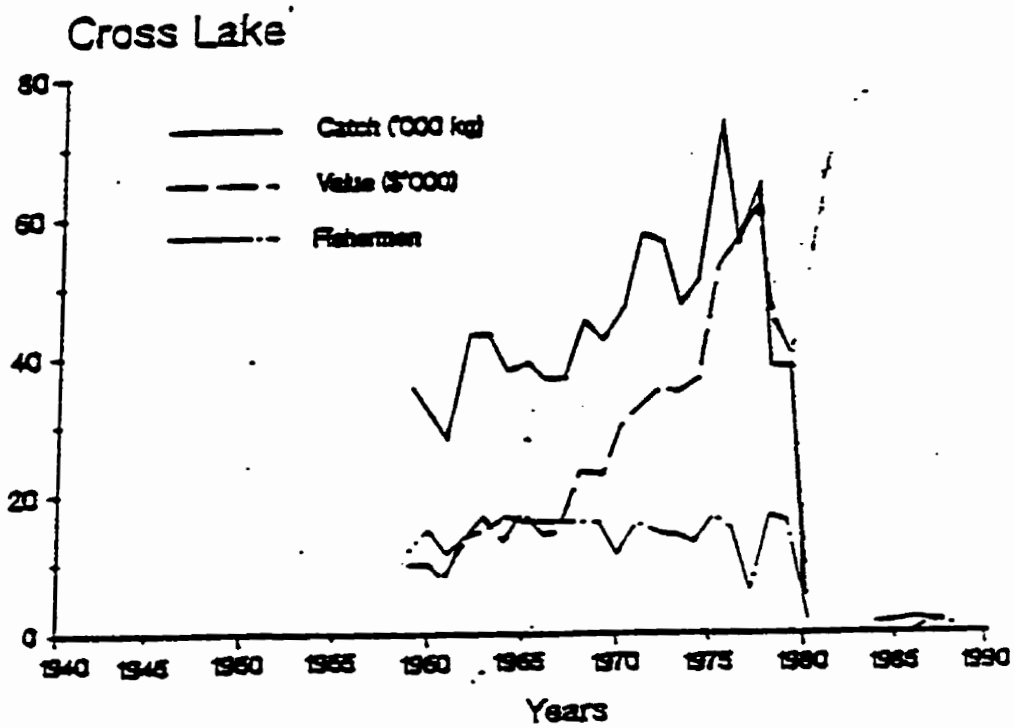


Figure 4. The status of the Cross Lake commercial fishery from 1959 to 1990 (Source: Usher & Weinstein, 1991).

had been reduced to zero because they could no longer support a steady source of income for the fishermen (Usher & Weinstein, 1991). This was contrary to the predictions of Koshinsky (1973), who estimated that LWR would only reduce, not prevent, the mobility of the Cross Lake fishermen and that the productivity of the Cross Lake fisheries would be maintained at 90-100% of pre-LWR levels.

2.1.7 Cross Lake Subsistence Fishery

Subsistence fishing plays a significant role in the social structure of native communities, providing subsistence foods, recreational opportunities and a sense of community cohesion, therefore any effects on the subsistence fishery could have significant effects on traditional lifestyles and communities (Usher & Weinstein, 1991).

Figure 5 indicates the ways in which LWR and the Churchill River Diversion has affected the social, cultural and political structure of affected communities, such as Cross Lake through the loss of the subsistence fisheries. Physical changes to the traditionally fished water bodies, through alteration of flow regime, damage to fish habitat, changes in the water quality and seasonal flooding and dewatering, have impacted the fish resources in terms of quality and overall stocks. This, in turn, has affected the subsistence harvesting practices of these communities. Land use patterns are altered through land loss caused by flooding and dewatering. The alteration of the abundance, productivity, marketability and palatability of the fish stocks has affected the fishing success and fishing

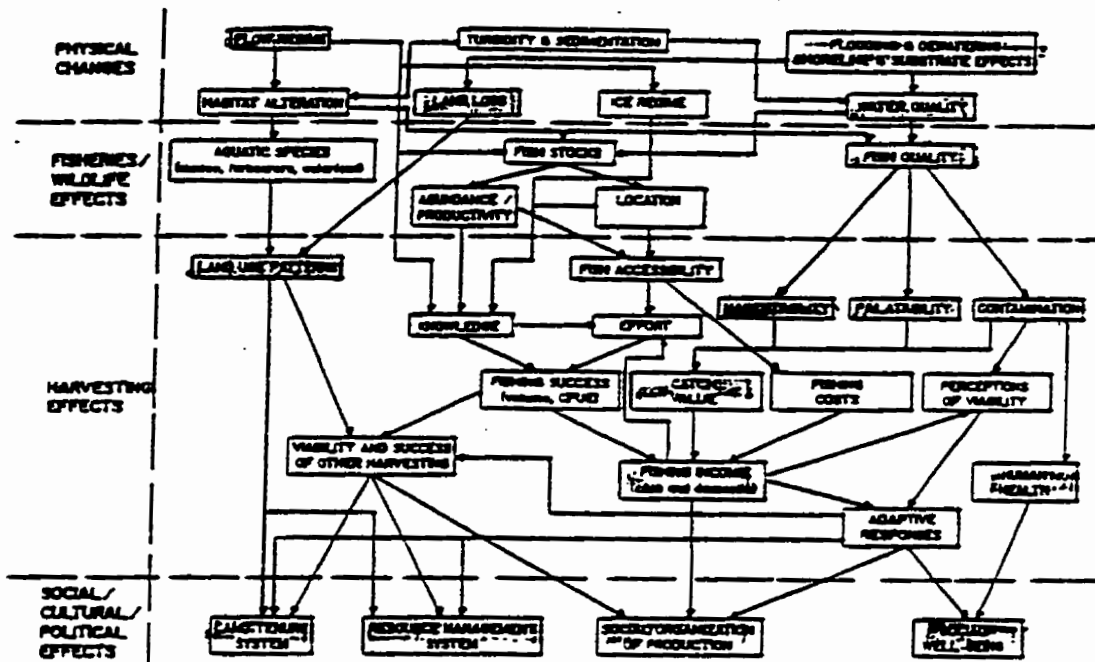


Figure 5. Effects of LWR and Churchill River Diversion on resource harvesting/subsistence in NFA communities, with emphasis on the fishery. Boxes indicate major categories of effects; arrows indicate pathways of probable cause and effect (Source: Usher & Weinstein, 1991).

income of these communities (Usher & Weinstein, 1991).

The overall consequence of these changes in harvesting practices of Cross Lake due to LWR has been a direct effect on the land tenure system, the resource management system, the social organization of production and distribution and the social well being of the community. These aspects are all very important in the social functioning of the community. The extent of these changes, however, is as yet undetermined as subsistence requirements are flexible and able to adapt to natural variations in species abundance, composition and access to resources (Usher & Weinstein, 1991).

2.1.8 The Northern Flood Agreement

The Northern Flood Agreement (NFA) was signed in December of 1977 by the Government of Manitoba, Manitoba Hydro, the Government of Canada and the Northern Flood Committee, representing the Cross Lake, Nelson House, Norway House, Split Lake and York Landing First Nations. As laid out in the agreement, its purpose is to ensure that all parties covered by the agreement are fairly and equitably compensated for the adverse effects that LWR and the Churchill River Diversion Project may have on these aboriginal communities. The NFA also commits Manitoba Hydro and the Manitoba Government to mitigating impacts in order to diminish, prevent or improve upon any adverse effects where possible (NFA, 1977).

With regards to adverse effects on fisheries, Article 19.4 of the NFA states that:

"The parties agree to negotiate, and Manitoba and/or Hydro agree to fund and implement, a program to provide for equitable compensation of all adverse effects on fishing activities within the Resource Areas (those areas covered by the NFA), arising directly or indirectly from the Project (LWR and the Churchill River Diversion), and to encourage the fishermen in each community to continue to fish, by appropriate means including income assistance and support payments and fishing rehabilitation and improvement and to provide for retroactive payment for adverse effects of the Project prior to the date of this Agreement."² (parentheses added)

As per this portion of the NFA, the Cross Lake First Nation has been receiving compensation payments from Manitoba Hydro and Manitoba Northern Affairs for the loss of both the subsistence and commercial fisheries as a result of LWR.

2.1.9 The Cross Lake Outlet Weir

As part of the "fishing rehabilitation and improvement" clause of Article 19.4 of the NFA, Manitoba Hydro constructed the Cross Lake outlet weir, located in the centre channel of the lake outlet into the Nelson River, in the summer of 1991 (Figure 6). The purpose of the weir is to establish a new water regime on Cross Lake which, as nearly as possible, resembles the pre-LWR water regime. (Kroeker & Bernhardt, 1993).

The weir, which acts as an overflow dam, prevents water from leaving Cross Lake

²Northern Flood Agreement, 1977, p.50.



Figure 6. The Cross Lake outlet weir (Source: SOE, 1993).

and entering the Nelson River if lake elevations fall below the level of the weir. The most important aspect of the weir is that it can maintain spring and summer lake level minimums at an elevation that is no less than the historical minimum (Kroeker & Bernhardt, 1993) (Figure 7). This is because the top of the weir is at the same elevation as this historical minimum. If lake water levels fall below this level, the weir obstructs further outflows from Cross Lake, maintaining this minimum lake elevation. The weir also serves to reduce seasonal fluctuation to within historical limits (Kroeker & Bernhardt, 1993).

The primary objective Manitoba Hydro hopes to achieve by constructing the outlet weir is to increase the fish populations of Cross Lake. By raising the summer minimum water levels on Cross Lake, fish will again be able to access their spawning grounds and reproduce. The fish repopulation effort on Cross Lake is also being assisted by the Manitoba Department of Natural Resources, who have initiated a fish restocking program. 7.3 million whitefish fry were released into Cross Lake in 1992, followed by the release of 18 million fry in 1993 (Kroeker & Bernhardt, 1993). A total of 26.5 million walleye fry was also released into Cross Lake in 1991 and 1992 (Kroeker & Bernhardt, 1993). However, preliminary analysis of 1992 experimental catch data from Cross Lake indicates that the walleye populations may already be able to support a commercial fishery (Davies, pers. comm., 1994), therefore the walleye restocking program was deemed unnecessary and discontinued (Macdonald, pers. comm., 1994).

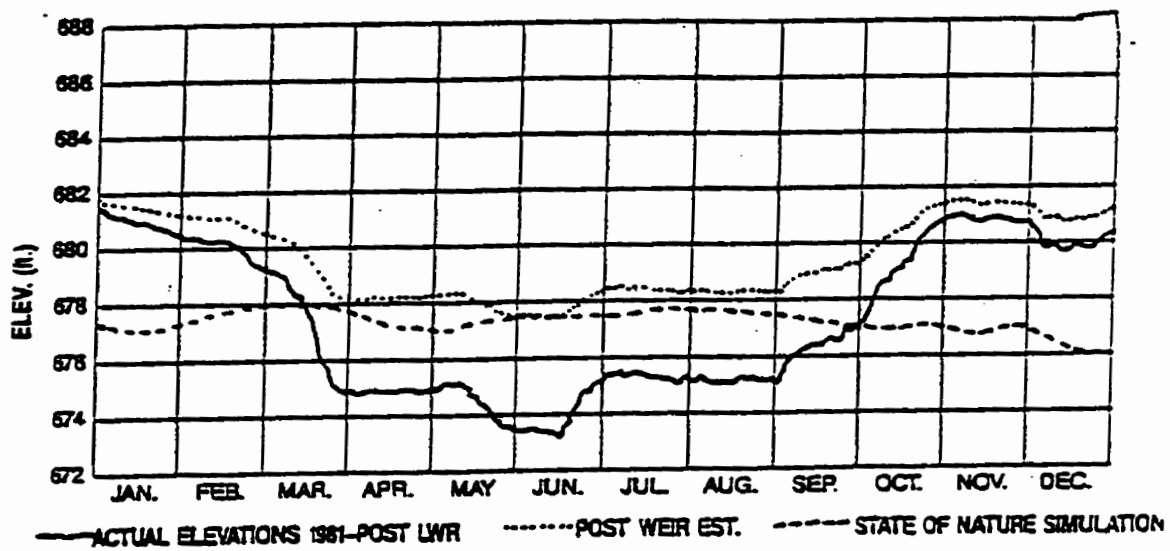


Figure 7. A comparison of actual post-LWR Cross Lake elevations to the state of nature simulation to the estimated elevations as a result of the outlet weir (Source: Manitoba Hydro, 1991).

To determine the effects of the outlet weir and the fish restocking program on the Cross Lake fish populations, a five-year environmental monitoring program was initiated in 1992 by Manitoba Hydro and the Cross Lake First Nation. Preliminary data analysis from the 1992 and 1993 field seasons has indicated very little in the way of formulating substantial conclusions regarding the potential for the Cross Lake commercial and subsistence fisheries to be reestablished (Kroeker & Bernhardt, 1993).

2.2 Native Harvest Surveys

As outlined in the above sections, the development of the hydroelectric potential of the Nelson River system has had significant effects on the water regime of Cross Lake, thereby affecting the fish and wildlife harvest of the Cross Lake First Nation. However, the extent of these effects has never been accurately quantified. In order to identify and quantify changes in the harvesting practices and success of the Cross Lake First Nation, a native harvest survey must be conducted.

Quantitative estimates of native harvests over a certain time are termed "native harvest surveys". These native harvest surveys serve a number of purposes. They can be used in pre- and post-project impact assessments of development projects as they provide an indication of species abundance and harvesting effort in a specific region or for a specific group of people. Native harvest surveys can also be used to develop local resource management and allocation strategies, economic planning in communities who

rely on the subsistence harvest, and impact mitigation and/or compensation programs (Usher & Wenzel, 1987).

2.2.1 Previous Studies in Cross Lake

Data used in early native harvest surveys were obtained primarily through one of three sources: administrative data sets, individual investigations reported in the social science or biological literature and area economic surveys (Berkes, 1989). Since the early 1970's, comprehensive native harvest surveys have been conducted throughout most of northern Canada, focusing particularly on Quebec and the Northwest Territories. These surveys have been used to identify and quantify the impacts of development projects on aboriginal communities as well as in the preparation of aboriginal land settlement claims (Usher & Weinstein, 1991). However, "although Treaty Indians exercise their right to hunt for subsistence throughout Manitoba, neither the harvest by species nor the geographic breakdown of the harvest is routinely or systematically assessed".³ Indeed, only one native harvest survey focusing on northern Manitoba communities has been performed, that by Wagner in 1985.

The objective of Wagner's study was to provide an accurate assessment of the subsistence fish and wildlife harvests of 10 northern Manitoba communities in order to

³State of the Environment Report for Manitoba, 1993, p.72.

determine the significance of the subsistence harvesting in Manitoba's aboriginal communities. The communities Wagner surveyed were Berens River, Brokenhead, Cross Lake, Hollow River, Mathias Colomb (at Pukatawagan), Pine Creek, Rolling River, Sioux Valley, Split Lake and The Pas. Through the administration of questionnaires in the 10 communities, which included cluster bands around the aforementioned communities, Wagner collected data on the consumption of fish and wildlife by household and calculated the per capita consumption of food and monetary value of consumption for each of the communities.

One of the most interesting points that Wagner inferred from his study was that the two communities with the lowest per capita consumption of subsistence foods (disregarding those communities surrounded by agricultural land who had limited access to fish and wildlife), were Cross Lake and Split Lake (Table 3). Out of the 10 communities, these were the only two affected directly by hydroelectric development, as they are on the Nelson River system and therefore are affected by the Lake Winnipeg Regulation/Churchill River Diversion Project. Although Wagner's study design did not enable him to conclude that there was a causal relationship between hydroelectric development and the low per capita consumption of subsistence foods in those communities, feedback from members of the Cross Lake community following the completion of the survey indicated that they felt that "the decreased water level caused by the construction of the hydro generating station at Jenpeg has had a severe effect on local moose, fish and waterfowl...Because of the decrease in the local moose population, Band members sometimes hunt for moose far

Table 3. Surveyed Bands Consumption and Distribution of Fish and Game.

Band	Total Consumption All Species (lb)	Per Capita Consumption (lb)	Per Capita Distribution (lb) (Fish Omitted)
Berens River	46,400	60	25
Brokenhead	11,900	60	35
Cross Lake	111,900	55	15
Hollow Water	27,600	65	20
Mathias Colomb	115,000	90	35
Pine Creek	38,000	90	50
Rolling River	11,700	45	40
Sioux Valley	32,800	45	45
Split Lake	63,000	55	15
The Pas	119,500	95	70

Source: Wagner, 1985.

from their own community. Some people do not eat fish because they are afraid fish tissue may contain elevated concentrations of mercury."⁴

In comparison to other native harvest surveys conducted throughout Canada, the results of Wagner's study indicate that the subsistence harvest in northern Manitoba is lower than in any other regions for which information exists in central, subarctic and arctic Canada. As Table 4 indicates, the potential edible weight⁵ of the wildlife harvest in northern Manitoba's aboriginal communities (excluding agricultural communities) is 52 kg/yr per capita. This is by far the lowest subsistence wildlife harvest in all of Canada, where potential edible weights in other regions range from a high of 410 kg/yr per capita for Northern Quebec Inuit to 75 kg/yr per capita in the Hudson Bay Lowlands (Fast & Berkes, 1994).

⁴Wagner, M. W., 1985, p.13.

⁵Potential edible weight is based on the weight of food from the wildlife harvest. It may differ from the actual amount of food eaten (ie. there may be wastage). In the James Bay harvesting surveys, as summarized in Fast and Berkes (1994), this calculation takes into account the average size of animals in the area, Cree eating habits, and the age and sex composition of animals harvested.

Table 4. Wildlife Harvest Studies by Region.

Region	Year	Potential Edible Weight (kg) ¹	Population	Per capita (kg/year)	Reference
Baffin Region ²	1984	924,635	2,689	344	Parsons, 1985
Koorwin ³	1981-82	829,440	3,769 ⁴	220	Gamble, 1984, 1987
	1982-83	793,003	3,882	204	Gamble, 1984, 1987
	1984-85	895,298	3,999	224	Gamble, 1984, 1987
Northern Quebec Inuit ⁵	1976	1,403,846	3,427 ⁶	410	JB&NQNERC, 1988
	1977	1,181,159	3,530	335	JB&NQNERC, 1988
	1978	852,432	3,636	234	JB&NQNERC, 1988
	1979	1,096,408	3,745	293	JB&NQNERC, 1988
	1980	1,100,179	3,857	285	JB&NQNERC, 1988
Northern Quebec Cree ⁷	1974-75	918,182	6,267	147	JB&NQNERC, 1982
	1975-76	783,909	6,462	121	JB&NQNERC, 1982
	1976-77	876,954	6,626	132	JB&NQNERC, 1982
	1977-78	766,964	6,870	112	JB&NQNERC, 1982
	1978-79	809,181	7,022	115	JB&NQNERC, 1982
Hudson Bay Lowlands ⁸	1981-82	9350,147	4,700 ¹⁰	75	Thompson & Hutchinson, 1989
	1982-83	351,595	4,700	75	
Muskokowick ¹¹	1990	686,713	6,470	106	Berkes <i>et al.</i> , 1992
Northern Manitoba ¹²	1983-84	355,529	6,808	52	Wagner, 1985

1. Calculated by converting the number of animals harvested into food weights. Does not include berries, wild rice or waterfowl eggs.

2. Fests Basin only. Includes Cape Dorset, Hall Beach, Igloodik, Lake Harbour and Samiituaq.

3. Includes Baker Lake, Charnfield Inlet, Coral Harbour, Eskimo Point, Rankin Inlet, Repulse Bay, and Whale Cove.

4. Population given only for 1983. Other years estimated on the basis of 3% per year adjustment.

5. Includes Kuujuarjuk, Imujuk, Akulivik, Salluit, Kangiqsujuaq, Quaqon, Kangisuk, Aupituk, Tasuq, Kuujuq, Kangqsalujuaq, Killiniq, and Chisasibi.

6. Population given only for 1976. Subsequent years are estimated on the basis of 3% per year increase.

7. Includes Great Whale, Fort George, Point Hills, Esomain, Rupert House, Noranda, Mistassin, and Warwamp.

8. Includes Moose Factory, Moosonee, Witsik (Peawauk), Fort Severn, Attawapiskat, Katchewau, Fort Albany, and Moose River Crossing. Some communities did not participate in the study and their harvests were estimated on the basis of adjacent communities.

9. Beaver, muskrat and otter (considered commercial species), were not included in the questionnaire.

10. Resident native population (Inuit status). OMNR Moosonee District (OMNR, 1985).

11. Includes Moose Factory, Moosonee, New Post, Fort Albany, Attawapiskat, Katchewau, Peawauk and Fort Severn.

12. Includes the communities of Berens River, Cross Lake, Hollow Water, Mathias Colony (at Peawanauk), Split Lake and The Pas. Excludes agricultural communities. Wagner's harvest numbers were converted into potential edible weights using conversions in Berkes *et al.*, 1992.

Source: Fast & Berkes, 1994.

2.2.2 Methodology for Native Harvest Surveys

Many native harvest surveys come under much scrutiny for their methodology. Although some surveys have been conducted in a scientific manner, meeting basic standards of measurement and repetition allowing for comparison of data over space and time (ie. JBNQ, 1976a,b,c, 1982a,b), many others lack a uniform and reliable method for acquiring the harvest data, making temporal and/or spatial comparison of the data impossible.

One source of data often scrutinized is administrative records. The primary weakness with this system of data collection is that the licensing procedure, by which administrative data are collected, is designed to gather harvest data from commercial and recreational resource harvesters only. However, as most native harvests are for subsistence purposes, no licence is required as status Indians are exempt, through treaties and land claim rights, from requiring a licence for subsistence harvesting (Usher & Wenzel, 1987). Much of the historical data used in native harvests surveys, therefore, comes from the reports of conservation officers who estimated these harvests by unstated, and likely inconsistent, methods (Usher & Weinstein, 1991).

This lack of a consistent and accurate methodology was one of the criticisms of the Five Year Report to the Legislature on Wildlife, a document released by the Manitoba Wildlife Branch which attempted to quantify the total subsistence harvest in Manitoba. In

that report, the Wildlife Branch based its harvest estimates on hunter questionnaires, hunter checks and subjective estimates by field staff. The results of their study indicated that for moose, elk and white-tailed deer, females and young animals comprised 75% of the aboriginal harvest. The Wildlife Branch concluded that the populations of these species were in decline as the portion of the populations critical to their regeneration was being removed by "uncontrolled hunting" (primarily subsistence harvesting). In addition, the study reported that the annual subsistence harvest of waterfowl in Manitoba was expected to be 10,000 by 1985 (Manitoba Department of Natural Resources, 1983). These findings, however, were questionable due to the method of data acquisition and provided an unfavourable analysis of the aboriginal subsistence harvest in Manitoba. The dissatisfaction of Manitoba's aboriginal communities with the report led to Wagner's native harvest survey. Although the statistical validity of Wagner's study is also open to scrutiny, his methods were more thorough than those of the Wildlife Branch. Wagner found that the subsistence harvest in Manitoba for large game actually consisted primarily of adult males. Also, the duck harvest for The Pas alone in 1985 was over 10,000, and the total subsistence harvest of waterfowl for the 26 Bands in Wagner's study was over 80,000. Table 5 summarizes and compares these and other findings of Wagner's native harvest study and the Wildlife Branch's Five-Year Report. The wide discrepancies in the results of the two studies indicate the need for developing and adhering to accurate and consistent methodology when conducting native harvest surveys.

Table 5. Summary and Comparison of Wagner's Native Harvest Survey and the Wildlife Branch's Five-Year Report.

Wildlife Branch 1983 60 Bands	T.A.R.R. 1985 26 Bands
No information	\$2.3 million for 26 Bands*
No information	44 - 93 lb. meat per capita consumed (includes fish)
No information	\$111 - 208 per capita fish and wildlife consumption
No information	16 - 70 lb. meat per capita distributed in community
Moose kill 25% bulls	Moose kill 64% bulls
Deer kill 25% bucks	Deer kill 66% bucks
Elk kill 25% bulls (Duck Mountains only)	Inadequate data base for conclusion
3000 moose killed (60 Bands)	1300 moose killed for 26 Bands
12,000 deer killed (60 Bands)	1900 deer killed for 26 Bands
10,000 ducks and geese killed (60 Bands)	44,500 ducks and 36,000 geese killed for 26 Bands
No information	478,000 lb. fish for 26 Bands

* Replacement value of fish and wildlife consumed (1985\$)

Source: Wagner (1985)

According to Usher and Wenzel (1987), attempts at developing more complete historical administrative data sets specifically with regards to native harvests have been hampered by two other problems. First, the data collected is often limited in scope. Surveys sometimes offer no differentiation between species within a classification (ie. geese, ducks, seals and caribou), and may, in fact, lack reporting requirements for some species altogether. Secondly, harvest data are often incomplete and/or inaccurate due to the unreliability of hunter recall over long periods of time, the variability of response rates (which are rarely recorded), and the possibility of hunter bias in the harvest report.

Usher & Wenzel (1987) conclude that, because of these deficiencies in administrative harvest records, they should not be used in an attempt to quantify native harvests. However, they can be useful in identifying trends in native harvests with regards to particular key species. Use of administrative records to survey the historical harvests of aboriginal communities can prove useful in recognizing the effects of unnatural changes to the environment (such as development projects) on the traditional harvests of key species. Although small alterations can not be identified because of the lack of uniformity in the data collection process, significant differences would be apparent.

Reviewing the social science and biological literature as a means of conducting a native harvest survey has also been criticized. Many projects have been undertaken by individuals or groups attempting to estimate subsistence harvests in a specific area. These estimates are often substantially more accurate than administrative records as they are

compiled primarily through hunter recall, not through the reports of conservation officers. However, these studies lack the necessary uniformity that allows for comparison of results to other harvest surveys because they are undertaken by separate groups who are motivated for distinctly different reasons. Therefore, these reports can not be used in a comparative manner to accurately quantify changes in the subsistence harvest (Usher & Wenzel, 1987).

Although the more recent comprehensive studies may be methodologically more sound than early native harvest surveys, they face many of the same problems that all other harvest surveys face, namely the lack of reporting requirements. Subsistence harvesters are not required to report their harvests, and thus do so voluntarily (Berkes, 1989).

One method of data collection which would virtually eliminate the ambiguousness of survey results would be participant observation in the survey process. By observing actual harvests in the field, the researcher would not have to rely on hunter recall, and therefore be subject to recall inaccuracies, in estimating the subsistence harvest. It is not possible, however, to utilize participant observation to any great extent in the collection of harvest data because of the nature of the subsistence harvest operation. Generally, harvesting occurs in small groups covering large areas, making it impossible for the researcher to observe all harvesting efforts. Participant observation can, however, be used to verify the harvest reports to some extent and is useful when used in conjunction with harvester recall (Usher & Wenzel, 1987).

2.2.3 The Current Cross Lake Harvest Survey

The current survey is designed to alleviate many of the methodological obstacles that have occurred in most previous harvest surveys. The first point of difference is that this study will utilize stratified sampling procedures when selecting interviewees. The harvester population of the Cross Lake First Nation will be stratified according to intensity of harvest activities (intensive, active, occasional and non-hunter). This is due to the fact that not all potential harvesters in the community can be interviewed. In stratifying the sample, representation from each category of harvester is assured. This will result in a more accurate tabulation of the total subsistence harvest for Cross Lake. This form of sampling differs greatly from that utilized by Wagner (1985), who randomly interviewed members of the community from a list of local hunters, trappers and fishermen. Wagner, however, may have missed many of the more significant resource harvesters (in terms of harvest intensity) in the community and his estimates may be too low. On the other hand, his harvest estimates may be too high because only the intense harvesters in the community were surveyed. Stratified sampling in the current study will greatly reduce this risk.

A second area of difference is that the current survey will be very specific with regards to breaking down the subsistence harvest by species. Appendix B provides a comprehensive list of fish, mammal and bird species which could possibly be found in the Cross Lake region. From this list, the species harvested by the Cross Lake First Nation were identified and included in the questionnaire. This ensures that the total subsistence

harvest by species is accurately catalogued. By contrast, Wagner's study (1985) did not distinguish between different species of ducks and geese, making his results fairly general.

2.3 Subsistence Economy

The importance of the subsistence harvest in aboriginal culture and everyday life is appreciated when one recognizes the continued presence of the subsistence economy in aboriginal communities. The findings of Wagner's harvest survey (1985) give some indication of the continued role of the subsistence economy in Manitoba's aboriginal communities. Wagner equated the per capita distribution of meat within the community, including meat both given away and received, to signify domestic economic activity. The higher the distribution of subsistence foods, the more important was the role of the domestic economy. As with the per capita consumption of foods (as discussed above), the lowest distribution of country foods occurred in the two communities affected by hydroelectric development (see Table 3). This is most likely due to the reduced availability of country foods in these communities. It is most important to note from Wagner's study that the domestic economy does still play an important role in Manitoba's aboriginal communities.

In the *Northern Manitoba Benchmark Report* (1992b), the Northern Manitoba Economic Development Commission valued the local food harvests and consumption of northern aboriginal communities at between \$500 and \$4000 for a household of five over

one year (based on the 1985 value of the cost of replacement if goods had been purchased from the store). The importance of this evaluation of the subsistence economy can be seen when compared to the overall monetary income of aboriginal households in northern Manitoba. The *Benchmark Report* reported the annual household income (from employment and transfer payments) of First Nation communities in northern Manitoba at \$19,000. According to these statistics, the addition of the subsistence economy would increase the income of aboriginal households anywhere from 2.6% to 21%.

An important component of the subsistence economy in nearly all northern aboriginal communities is the subsistence fishery. This is due to the vast fishery resources available to most communities. In the James Bay and Northern Quebec regions, the subsistence fishery accounts for anywhere from one-quarter to one-half of the entire subsistence harvest (Berkes, 1989). In that report, Berkes also reports that the subsistence fishery contributes approximately 60 kg/yr per capita to native harvesters, compared to the average Canadian's consumption of 7 kg/yr.

2.3.1 Subsistence Harvesting and Local Diet

Because of the continued role of the subsistence economy and subsistence harvesting in aboriginal culture, the loss of traditional food resources can seriously alter the cultural and social characteristics of aboriginal communities. The traditional food supply provides aboriginal communities with a substantial portion of their daily

consumption of food and nutrients, as well as a source of recreation and socializing (Wein, 1994). Although the consumption of traditional food sources by the Cross Lake First Nation has never been accurately quantified (which is one of the objectives of the Cross Lake Harvest and Consumption Study), the consumption of other Cree Nations in the boreal forest zone have. Wein (1994) reports that the Cree and Chipewyan communities near Wood Buffalo National Park continue to utilize 30 traditional food species an average of 319 times annually (nearly once a day). In addition, traditional animal species account for one-third of the total flesh-food intake in these areas.

2.3.2 Resource Harvesting and Traditional Ecological Knowledge

The importance of resource harvesting in aboriginal culture requires that the local resource users develop resource management systems that ensure the continuous availability of local resources. The basis for these local resource management systems, such as the control of the subsistence fishery and other resource harvesting activities, is traditional ecological knowledge (TEK).

TEK is based on observation and experience gathered over many generations. Over this time, aboriginal communities have developed a strong understanding of the long term relationships that are inherent in ecosystems and important for their preservation. By applying TEK to natural resource management, traditional communities have been able to use resources efficiently and sustainably.

One of the main problems with many past scientific studies is that TEK has not been given credibility within the scientific community as a viable source of information. It is obvious to the scientist that local traditional resource users have immense knowledge and experience with regard to their immediate environment, as TEK has been accumulated and passed down through the generations and is based on first hand experience (Johannes, 1989). The results of this detailed knowledge are evident in the fishing success of the Robinson-Huron Treaty area of Ontario, as reported in Berkes (1989). Reports from this area indicate that the native subsistence fishery, utilizing all methods, is 21 times more productive per person-day of effort compared to non-native recreational angling. When only angling by natives is considered, the native fishery is still over four times as productive.

It has, however, taken the scientists a long time to realize that this vast source of information has been available to them (Johannes, 1989). Therefore, the role of the scientist in native resource use studies should be to recognize that there is a problem, but not be asked to provide answers using his or her own knowledge (Ludwig *et al*, 1993). Johannes (1989) emphasizes using TEK to assist the scientist in asking the right questions and understanding where and when to look for answers.

2.4 Summary and Conclusions

The subsistence harvest of many aboriginal communities, including Cross Lake, continues to be an important part of the local culture, providing food, recreation and a source of social gathering. It is also the basis of the local economy in many of these communities. Because of these roles, effects on the subsistence harvest caused by the development of northern resources will invariably affect the community.

Native harvest surveys are a method of quantifying the subsistence harvest by species over a geographic area. These surveys can then be used to identify and quantify changes in the subsistence harvest. However, in order to be useful for temporal and/or spatial comparison, surveys must be comprehensive and designed so that they are accurate and statistically valid. The current study will build on the experience of previous surveys, using the knowledge and experience of local resource harvesters as its basis for information, to address the methodological problems that often restrict the usefulness of other studies. The result will be an accurate quantification of the current harvest of the Cross Lake First Nation that will allow for comparison to other studies. These comparisons can then assist in identifying the possible effects of future developments which may impact other aboriginal communities.

Chapter 3

METHODS

3.1 Introduction

The Cross Lake Current Annual Harvest Questionnaire was adapted from the harvest questionnaire administered in the Mushkegowuk Region of Northern Ontario (Berkes, 1992). The purpose of the Mushkegowuk study was to assist local First Nations with the development of natural resource co-management, self-government and sustainable regional development strategies, partly through the estimation of the extent of subsistence harvesting in the region. These harvest estimates will also be used to assess the social and environmental impacts of potential hydroelectric development in the area. In the Mushkegowuk study, a questionnaire was administered to potential hunters from the region, which were defined as all males 18 years of age and older and female heads of households. Because the large number of potential hunters in the region made it impossible to interview them all, a stratified sampling design was used. The list of hunters was stratified, with each person placed into one of the following groups according to the intensity of their harvesting activity: intensive, active, occasional and non-hunter. Random sampling was done within each stratum. Selected respondents were questioned on the size of their harvests for each species by season, harvest locations, hunting success, hunting effort and local management techniques being employed. Reported harvests were then projected for each stratum and added together to get projected subsistence harvest for the region.

The main steps used in adapting the Mushkegowuk questionnaire for the Cross Lake harvest study were:

- 1) developing a subsistence species list;
- 2) defining the seasonal cycle;
- 3) defining the harvesting area;
- 4) training interviewers and pretesting the questionnaire.

As well, whereas the basic harvest unit in the Mushkegowuk study was the individual harvester, the Cross Lake study utilized an entire household as the harvest unit. The development of the community household list, stratification and sampling design are also discussed in this chapter.

3.2 Subsistence Species list

A complete species list of all fish, bird and mammal species inhabiting the area was compiled from reference material. This list was then shown to key informants from the community who were familiar with the harvesting practices of the Cross Lake First Nation to determine which species were harvested for subsistence purposes. The completeness of the species list was important in ensuring that all subsistence species would be identified and included in the questionnaire, thereby ensuring that the entire subsistence harvest would be reported.

The subsistence species list was also translated into Cree to ensure that there would

be no misunderstanding regarding harvest data for any species, as well as to make the study relevant to the harvesting practices of the Cross Lake First Nation.

3.3 Seasonal Cycle

With the assistance of key informants from the community, a seasonal cycle of harvesting activities as conducted by the Cross Lake First Nation was generated. The informants were asked to identify the seasons as they were perceived by the Cross Lake First Nation, and during which seasons each of the subsistence species identified in section 3.2 was harvested.

3.4 Harvesting Area

In order for respondents to identify where they harvested species, base maps of the resource area needed to be generated. Using the information provided by key community informants as they viewed maps of Cross Lake and the surrounding area, the geographic boundaries of the primary hunting and fishing regions used by members of the Cross Lake First Nation were determined. The specifics of the mapping methodology used for this study can be found in McDonald (1995).

3.5 Training and Pre-testing

Local residents of Cross Lake were hired and trained to administer the questionnaire to the harvester population. Hired interviewers were fluent in English and Cree to ensure no misunderstanding or misrepresentation of the questionnaire during its administration. The hiring of locally respected interviewers was done to increase the credibility of the study within the community, as well as to make respondents to the questionnaire more comfortable with the survey process.

The training process was conducted over one week within the community of Cross Lake, during which time the interviewers became familiar with the questionnaire and with the art of questionnaire administration and etiquette. This training period also served as a pretesting exercise, during which time the interviewers provided feedback to the study team regarding the appropriateness and specific wording of questions. The interviewers were also required to interview each other a number of times as well as key informants from the community, at which time the clarity of the questionnaire and the efficiency of its administration were scrutinized. Changes were made where necessary to address shortcomings.

3.6 Stratified Sampling Design

A stratified sampling design was utilized for this study, based on the household as the basic reporting unit. This study design involved developing a list of all households of the Cross Lake First Nation and the Cross Lake Community, and stratifying this list according to harvest intensity.

The use of the household as the basic unit of study was done on the recommendation of a community member who had previous survey experience in Cross Lake. In order to stratify the community based on households, a list of all households on the Cross Lake Reserve as well as the Cross Lake Community was obtained from community records, stating the name of the head of each household. Using key community informants, this list was stratified, placing each household into one of the following categories based on the harvest intensity of the most intensive harvester living in that household during the summer/fall 1993 to spring 1994 annual harvest cycle:

- **intensive** regularly engages in harvesting activities during the annual cycle, spending a month or more at a time in the bush
- **active** regularly engages in harvesting activities during the annual cycle, spending a week or more at a time in the bush
- **occasional** irregularly engages in harvesting activities during the annual cycle, spending a day or weekend at a time in the bush
- **non-hunter** does not harvest any country food

Following the completion of the household stratification, the size of the sample to be taken from each stratum was determined using the following figures based on the experience of Berkes (pers. comm., 1994):

intensive	100%
active	60%
occasional	40%
non-hunter	20%

The above sampling frame was chosen to ensure representation of the more intensive categories and to increase the confidence level of the projected community harvest estimate (Usher and Wenzel, 1987). Due to the small number of intensive harvesters in Cross Lake, it was decided that a 100% sample (or census) of that stratum could be conducted. For all other strata, random sampling with replacement was conducted to determine which households would be interviewed. Lists of alternate households for each stratum (except for the intensives) were also produced using random sampling, in the event that a chosen household could not be completed or refused to participate. Reported data from a stratum will be projected to the entire stratum using correction factors, and the stratum totals added together to get the community harvest total. This methodology has been proven as an accurate method of estimating a subsistence harvest (Berkes, 1994), short of interviewing all potential harvesters which was not an option for this study because of the large size of the community.

The use of households as the basic reporting unit also required clearly defining the reporting requirements within a household to ensure that the harvests of all household members would be included in the total household harvest. In all selected households, the head of the household was asked to complete a questionnaire. In the case of male heads of household, the respondent was asked to include the harvests of all females living in his household, including his wife, as well as the harvests of all males who were under 16 for the entire summer/fall 1993 to spring 1994 harvest cycle. Female heads of household were asked to include the harvests of all other females and all males who were under 16 for the entire harvest cycle. In all cases, males over 16 years of age for the entire harvest cycle were asked to complete their own questionnaires.

Chapter 4

DEVELOPING THE QUESTIONNAIRE

4.1 Introduction

The final 1993/94 Cross Lake Annual Harvest Study Questionnaire is attached in Appendix A. The results from the primary adaptations of the Mushkegowuk harvest questionnaire to the Cross Lake study, that is the species list, seasonal cycle, harvest area and pretesting, are reported in this segment of the practicum. The results from the stratification process are also provided.

4.2 Species List

The complete list of fish, mammal and bird species known to inhabit the Cross Lake region is attached in Appendix B. Those species harvested by the Cross Lake First Nation for subsistence purposes are listed in Table 6, with their Cree translations as used by the Cross Lake First Nation. For example, the terms "mushkegowusipak" and "tukooukissipak" refer to fall ducks, depending on the time of year that they are harvested, and include the canvasback, lesser scaup, greater scaup and ring-necked duck. These terms were typically used by Cross Lake hunters and therefore were used in the questionnaire instead of the individual species.

The list also includes five types of berries, which were grouped together as

"berries" in the questionnaire as it was unnecessary to separate them and simplified reporting requirements.

Table 6. Species harvested by the Cross Lake First Nation for subsistence purposes and their Cree translations.

Waterfowl	
Canada goose	niska, apish'chishkish
Mallard	en'inesip
Whistler (Common goldeneye)	bekawkosip
Fall ducks	tukooukissipak, mushkegowusipak
Fish	
Lake whitefish	attikamek
Cisco (tullibee)	otunipi
Walleye (pickerel)	ukaau
Northern pike (jack or jackfish)	n'toknsew
Lake sturgeon	namao
Suckers	nameybin
Carp	maney' nameybin
Burbot (maria)	melato
Furbearers	
Beaver	amisk
Muskrat	w'chashk
Lynx	piwiw
Black/brown bear	muskwa, usawusk
Marten	wapistan
Otter	nikik
Weasel (ermine)	sihkusuu
Fox	mahkeshuu
Wolf	maheekun
Coyote	apish'chahikanish
Wolverine	ke'kwu'lakeow
Fisher	uchek
Red squirrel	anikwuchash
Big Game	
Moose	mooswa
Caribou	atihk
White-tailed deer	apishchi'mosus
Elk	wapiti
Small Game	
Sharp-tailed grouse	akiskuw
Spruce grouse	sehchenuw
Ruffed grouse	paspaskuw
Groundhog (woodchuck)	weenusk
Snowshoe hare (rabbit)	wabush
Berries	
Raspberries	anosh'kanek
Cranberries	we'sagimena
Blueberries	inimena
Strawberries	odearmena
Saskatoons	misaskatoomena

4.3 Seasonal Cycle

Through consultation with key community informants, it was determined that the hunting practices of the Cross Lake First Nation could be grouped into three seasons: spring, summer/fall and winter. The spring season starts with breakup, which normally occurs during the middle of April, and ends on June 30. Summer/fall lasts from July 1 until freezeup, which is usually around the middle of October. The winter season lasts from freezeup to breakup and, at six months in length, is the longest season.

The seasonal cycle in Figure 8 indicates the time of year that each species in the subsistence harvest is harvested by members of the Cross Lake First Nation. Waterfowl are harvested in both spring and summer/fall. Fishing, for all species including sturgeon, is conducted year round. Trapping of furbearers occurs exclusively during the winter months. Big game harvesting takes place during the summer/fall and winter seasons. Small game harvests, although not indicated on the seasonal cycle, occur year-round.

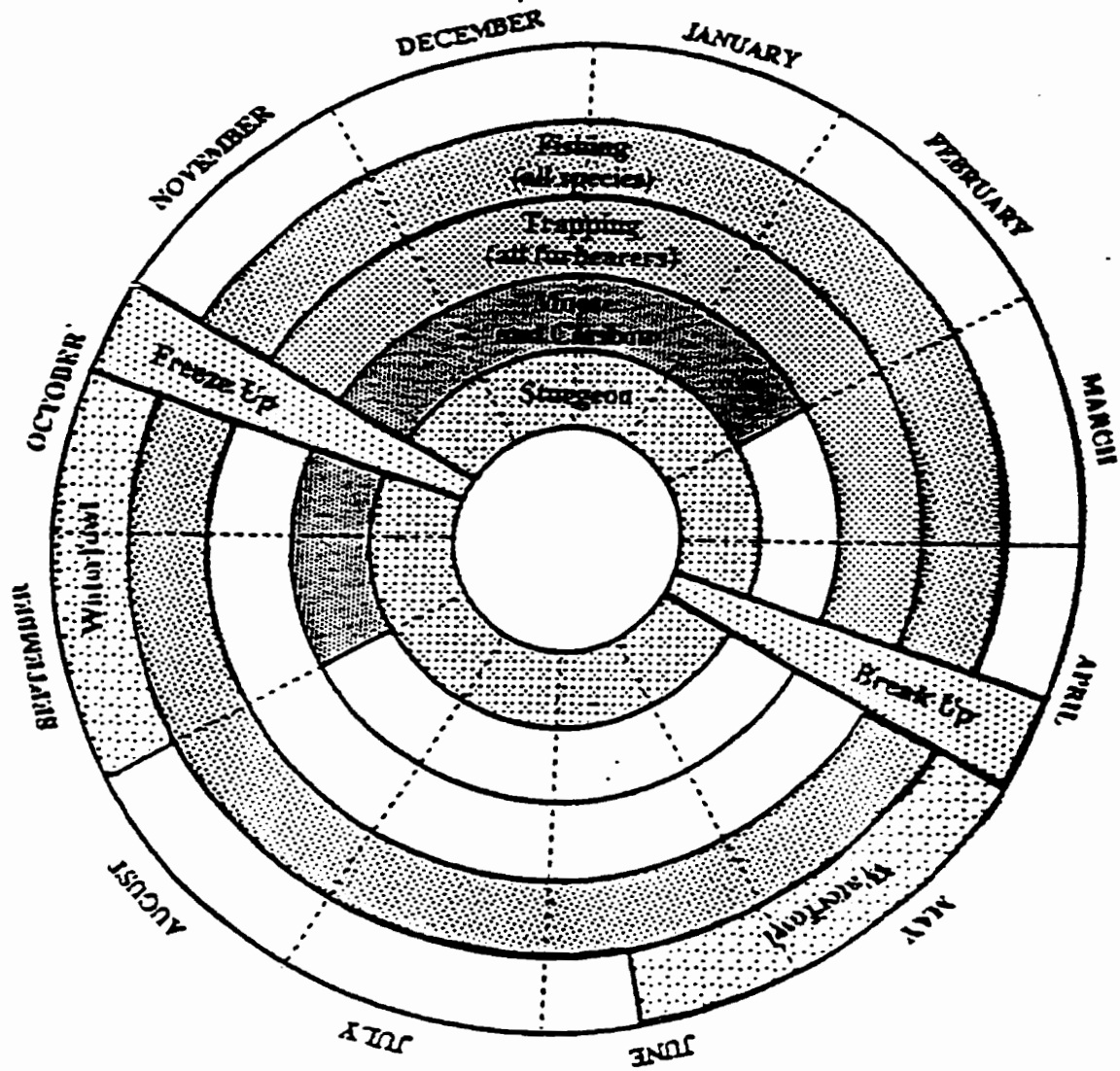


Figure 8. Seasonal cycle of major harvest activities by Cross Lake community residents. Shaded areas indicate when resource harvest activities are taking place, unshaded areas mean no activity (Source: McDonald, 1995)

4.4 Harvesting Area

Harvesting activities of members of the Cross Lake First Nation were determined to fall primarily within the Registered Trapline (RTL)/Resource Area of the Cross Lake First Nation, with a few exceptions for big game and sturgeon harvests. The Cross Lake RTL/Resource Area is outlined in Figure 9. The use of the maps that were generated for determining harvest locations is discussed in McDonald (1995).

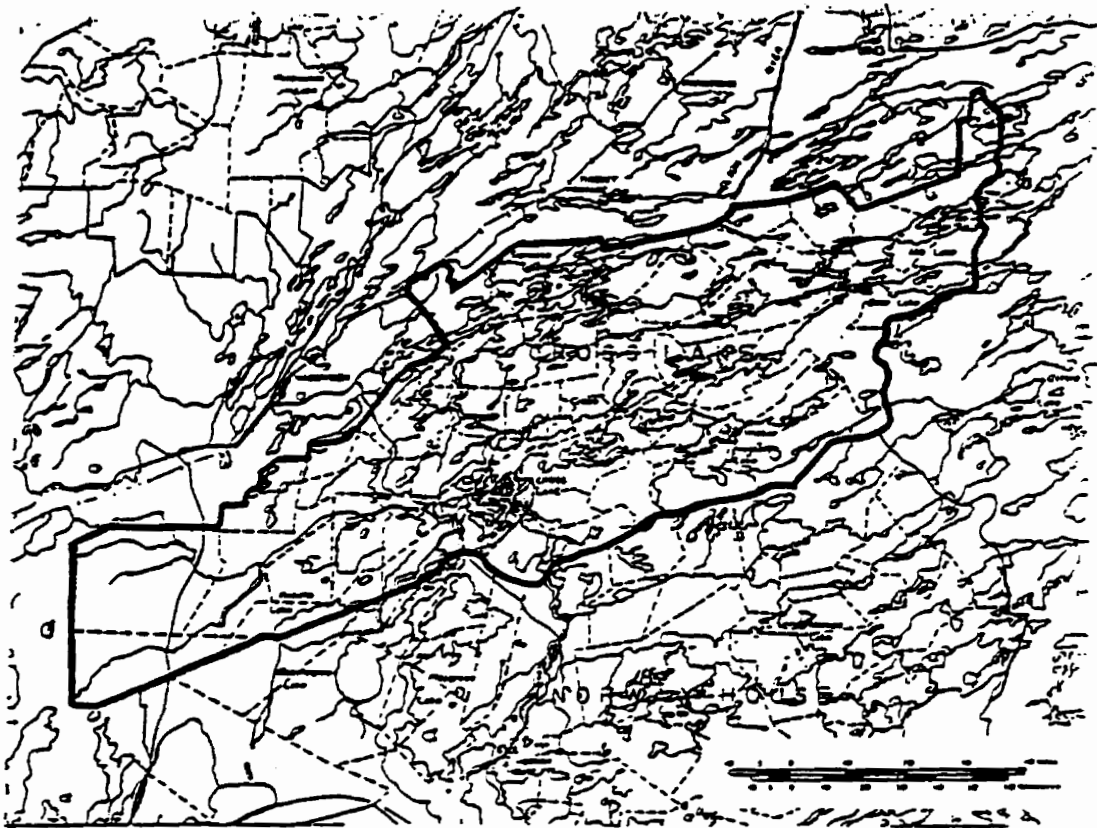


Figure 9. The Cross Lake RTL/Resource Area.

4.5 Training and Pre-testing

Most adjustments to the specific nature and wording of questions asked were made during the training and pretesting phase of this research on the recommendation of community members. The following list identifies those questions which were altered from Berkes (1994) during training and pretesting (other than those where the alteration was based on the specifics of the subsistence harvest of the Cross Lake First Nation, such as species and harvest cycle) and the reason for these changes.

- General: Throughout the questionnaire, "last year" was replaced with "during the following seasons" to make the period of time being discussed easier to understand. In the pretest, respondents associated "last year" with the previous calendar year, which was not the desired time frame.
- Q#4 Identifies specific areas of residence on the Cross Lake Reserve and the Cross Lake Community.
- Q#5 Terms used reflect the types of employment available in Cross Lake. "Job" was changed to "wage employment" to avoid misinterpretation as some may consider subsistence resource harvesting as a job.
- Q#6 Determines marital status of respondent and covers all potential responses by Cross Lake community members.
- Q#7 Because of the choice of households as the basic study unit, this question was required in order to determine what the reporting requirements of the

respondent were. The specific requirements of individuals are discussed in Chapter 6 of this research.

Q#8/9/10 16 was identified as the age at which a male would be considered an adult in Cross Lake and would conduct his own harvesting (as opposed to 18 in the Mushkegowuk study). Males born prior to July 1, 1978, would have been 16 during the entire summer/fall 1993 to spring 1994 harvest cycle. Question 10 identifies the number of males within the household 16 and over during the summer/fall 1993 to spring 1994 harvest cycle that need to be interviewed in order to complete the household harvest.

Q#14 Provides information on the type of transportation used for subsistence harvesting purposes in the Cross Lake region. This information may be useful for interpreting patterns of land use. The term "domestic" was added to the question to clarify that this question only includes vehicles used for domestic (or subsistence) purposes.

Q#19/20 Define the current resource harvest areas for geese and ducks, respectively. Hunting locations for geese and ducks were separated because it is possible to collect more accurate information regarding goose hunting locations. Duck hunting occurs over large, less specific areas.

Q#21 Provides information regarding the collection of bird eggs, identified as part of the traditional harvest of the Cross Lake First Nation.

Q#26 Provides information regarding the collection of fish eggs, identified as part of the traditional harvest of the Cross Lake First Nation.

- Q#27-32 Sturgeon were separated from other fish because this distinction is made by the Cross Lake First Nation, based on the cultural and historical significance of the sturgeon, as well as their status as a food delicacy.
- Q#29 Requires harvest information from the two calendar years previous to the summer/fall 1993 to spring 1994 harvest cycle. Because of the importance of sturgeon, it was determined that accurate recollection over this time period was possible. Calendar years were used to facilitate recollection in this case as pretesting indicated that harvest cycles were difficult to recollect for this time frame.
- Q#32 Specific mesh sizes are used for sturgeon harvesting, and will give an indication of the size of sturgeon being caught.
- Q#35/36 "Last fall", "last winter" and "last spring" are common terms used by harvesters of furbearers and facilitated recollection.
- Q#38 Because moose is the primary big game species being harvested by the Cross Lake First Nation, and because of the relatively small quantity of moose harvested by any one household, it was determined that respondents would not have difficulty recalling the sex and age of moose harvested.
- Q#39 Due to the relatively small number of big game harvested in any year, it was determined that respondents could recall these harvests for two years previous to the summer/fall 1993 to spring 1994 harvest cycle. Calendar years were used to facilitate recollection in this case as harvest cycles proved difficult to recall for this time frame.

Q#44 Generally, small game harvesting is a purely opportunistic activity, with snares set out as part of a daily routine or while other harvesting activities are being conducted. Rabbit hunting is the exception, therefore only the amount of effort put into rabbit harvesting was asked.

Q#47/48 These questions were added as wood and plant products are also part of the subsistence harvest of the Cross Lake First Nation. In addition to firewood, trees are also harvested specifically for the construction of houses and cabins, therefore they were included separately. Also, the collection of medicinal plants is a continuing traditional practice, and their inclusion was requested.

4.6 Stratified Sampling Design

The most recent maps available from the Cross Lake Reserve and Cross Lake Community indicated that a combined 630 households were present. Table 7 shows the stratification of this household list based on the harvest intensity of the most intensive harvester in each household, the number of households in each stratum that made up the desired sampling frame, the actual number of households that were interviewed and the correction factor for each stratum. The correction factor is the number by which the reported harvest for a stratum will be multiplied to project the total harvest for that stratum and is equal to the number of households in a stratum divided by the number of households interviewed.

Table 7. Results of community stratification, including desired and actual sample sizes and correction factors for each stratum.

Stratum	Number of households in stratum	Desired sample size	Actual sample size	Correction factor
Intensive	31	31 (100%)	23 (74%)	1.348
Active	139	83 (60%)	79 (57%)	1.759
Occasional	261	105 (40%)	87 (33%)	3.000
Non-hunter	199	40 (20%)	50 (25%)	3.980
TOTAL	630	259 (41%)	239 (38%)	-

Note: There is no correction factor for the total sample due to the nature of stratified random sampling, where the projected harvest is calculated for each stratum individually.

Chapter 5

THE CROSS LAKE DOMESTIC FISHING PROGRAM (DFP)

5.1 Introduction

Through discussions with key community informants, it was determined that one portion of the subsistence harvest of the Cross Lake First Nation would not be captured by the Cross Lake Harvest Study Questionnaire. These are fish harvested under the Cross Lake DFP, which are considered commercial harvests by the fishermen, and therefore would not be reported in the questionnaire, but are consumed as a subsistence food by members of the community.

The Cross Lake DFP was created under Claim 110 of the NFA to compensate for impacts on the domestic fishing activity of the Cross Lake First Nation as a result of modification of the water regime in the Cross Lake RTL/Resource Area due to the construction, operation and maintenance of the Jenpeg Generating Station. Under the DFP, fish are supplied for local consumption and participation by community members in domestic fishing activities is encouraged. DFP harvests make a large contribution to the total domestic fish harvests of the Cross Lake First Nation, therefore the inclusion of DFP harvests are important in calculating the total current annual amount of fish available for consumption in Cross Lake.

5.2 DFP Harvests

The time period for current annual harvests used by the Cross Lake Harvest Study Questionnaire extended from July 1, 1993 up to and including June 30, 1994. The harvests reported to the DFP during this time and the location of the harvests are summarized in Tables 8 and 9.

Table 8. Total fish production by lake (in pounds) purchased by the DFP for summer/fall '93 (July 1 to freezeup).

Water Body	Walleye	Lake whitefish	Northern pike	Coarse*
Pickerel R.	2775	159	1508	5062
Minago R.	3101	286	1392	6034
Walker L.	11255	31538	8316	7611
Semple L.	665	13768	76	0
Wilkins L.	0	3204	0	0
TOTALS (lbs)	17796	48955	11292	18707

* sucker, cisco, mullet

Table 9. Total fish production by lake (in pounds) purchased by the DFP for winter '93/'94 (freezeup to breakup).

Water Body	Walleye	Lake whitefish	Northern pike	Coarse
Pickereel R.	426	1952	5704	1961
Minago R.	379	424	7647	1138
Walker L.	487	1535	4767	7253
Semple L.	0	2815	0	0
Wilkins L.	0	3017	0	0
Bear L.	1741	10391	15465	2821
Utik L.	1045	13227	4427	2272
Logan L.	0	498	0	0
Cotton L.	159	664	507	669
Fox L.	0	196	133	938
Dugas L.	0	1197	453	0
White Rabbit L.	67	834	442	0
Whistler L.	0	1344	76	0
Duck L.	0	0	194	0
Drunken L.	57	150	423	0
Sipiwesk L.	17	2131	113	0
Solomon L.	388	0	0	0
TOTALS (lbs)	4766	40375	40351	17052

No fish harvests were reported under the DFP during the spring of 1994 (breakup to June 30) due to a lack of financial resources to pay for these harvests (Nick Halcrow, pers. comm., 1995).

Table 10 summarizes the total amount of fish purchased by the DFP (at Freshwater Fish Marketing Corporation prices) from Cross Lake fishermen for distribution in the community during the summer/fall '93 to spring '94 harvest cycle, the time frame covered by the Cross Lake Harvest Study Questionnaire.

Table 10. Total fish production (in pounds) purchased by the DFP for the summer/fall '93 to spring '94 harvest cycle.

Walleye	22562
Lake whitefish	89330
Northern pike	51643
Coarse	35759
TOTAL	199294

5.2.1 Potential Waste and/or Spoilage

According to Nick Halcrow and Nelson Miller (pers. comm., 1995), few if any fish were wasted once they were sold to the DFP. Fish brought into the DFP were graded, and fishermen were only paid for fresh, firm fish. Other softer fish were given to mushers for dog food. According to Nelson Miller (pers. comm., 1995), fish given to mushers and not recorded under the DFP may have been on a scale of about five pounds per 100 pounds of fish harvested, thus the above numbers only represent 95% of the domestic fish harvest that must be added to the Cross Lake Harvest Study data in order to

determine the total current annual domestic fish harvest of the Cross Lake First Nation. Table 11 includes this extra weight in determining the total weight of fish coming into the community by fishermen harvesting under the DFP.

Table 11. Total weight (in pounds) of fish brought into the community by the DFP, including an estimate of fish given to mushers.

Walleye	23749
Lake whitefish	94032
Northern pike	54361
Coarse	37641
TOTAL	209783

It is difficult to estimate the amount of spoilage that may be a part of DFP harvests. As Cross Lake has no large refrigerated storage facility, fish are not stored in the community. According to Nelson Miller and Nick Halcrow (pers. comm., 1995), all fish brought into the community and purchased by the DFP are delivered (that is, none are disposed of by the DFP). Spoilage may occur if people take too much fish for themselves or if they do not have fridges or freezers. However, according to a survey conducted by Nelson Miller, 96% of respondents had either a fridge or a freezer or both. Therefore, it is unlikely that a significant amount of DFP harvests spoiled before they were consumed.

5.2.2 Calculating the Number of Fish Harvested

The unit of measure for calculating domestic fish harvests used by the Cross Lake Harvest Study was the number of fish caught. However, DFP records were kept according to the round weight of fish sold to the program. In order for DFP data to be compatible to the data collected by the Harvest Study, the numbers of fish caught were calculated from the weight of fish brought in. These calculations are summarized in Table 12. Mesh sizes were provided by Nick Halcrow and Glen Smith. The size range and mean size are conservative estimates from gill net selectivity curves. Average fish weights are taken from the length by weight curve in Berkes (1977). These weights were confirmed by Glen Smith (pers. comm., 1995) who indicated the following average round weights of fish purchased by the DFP:

- walleye - 2.75 lbs.
- lake whitefish - 4.5 lbs.
- northern pike - 5.5 lbs.
- coarse fish - 5.5 lbs.

Table 12. Calculation of numbers of fish harvested under the DFP from total fish production for the summer/fall '93 to spring '94 harvest cycle.

	Walleye	Lake whitefish	Northern pike	Coarse
mesh size used	4 ¼"	5 ¼"	5 ¼"	5 ¼"
size range	45-70cm*	40-65cm**	n/a	n/a
mean	50cm	51cm	n/a	n/a
avg. weight (lbs) (from length x weight curve)†	2.75	4.5	5.5	5.5
total weight (lbs) of DFP fish	23749	94032	54361	37641
estimated numbers of fish	8636	20896	9864	6844

* Hamley and Regier (1973)

** Berkes and Gönenc (1982)

† Berkes (1977)

The number of fish indicated in Table 12, a total of 46,240 fish, represents the best estimate for revising Cross Lake First Nation domestic fish harvest totals, as collected by the Cross Lake Harvest Study, for the summer/fall '93 to spring '94 harvest cycle.

Chapter 6

DISCUSSION

6.1 Introduction

The discussion of this research will focus on two elements of the development of the Cross Lake Current Annual Harvest Questionnaire: 1) the use of TEK and community input in the development of the questionnaire, and 2) how the methodology used dealt with bias in the design of the overall harvest study and of the questionnaire itself. Both the positive and negative aspects of the methodology are discussed.

6.2 The Use of TEK and Community Input

The most significant aspect of the Cross Lake Current Annual Harvest Questionnaire was the use of community input and TEK in its development. Although the questionnaire was adapted from an existing harvest study (Berkes *et al*, 1994), significant changes were made based on information provided by key informants from the Cross Lake First Nation. This is a case where Johannes' (1989) suggestion of using TEK to ask the right questions is taken very literally.

The species list, seasonal cycle and harvest area maps were generated in order to make the questionnaire pertinent and relevant to the harvesting practices of the Cross Lake First Nation. The information provided by key community informants in these areas comes from knowledge not found in any reference material, but is gained through

experience and communicated orally, which is the essence of TEK. The development of an appropriate questionnaire was not possible without this knowledge base.

Input into the development of the specific wording for the questionnaire was also based on information provided by community members, namely the interviewers hired to administer the questionnaire. One alteration made throughout the questionnaire based on this input which will ultimately make harvests reported in the interviews more accurate was the use of the term "during the following seasons" instead of "last year". During pretesting, it was determined that respondents associated "last year" with the previous calendar year, in this case 1993. This was, however, not the desired time frame for the study as it did not represent the most recently completed harvest cycle and therefore would not facilitate recollection. The exception was when harvests previous to the summer/fall 1993 to spring 1994 harvest cycle were requested, as for sturgeon and big game. In these cases, the use of the harvest cycle (ie. summer/fall 1991 to spring 1992 and summer/fall 1992 to spring 1993) confused respondents. In these instances, the use of calendar years was able to produce more accurate responses while still including all desired harvest seasons.

Other specific input to the questionnaire gained through key community informants was that the collection of bird and fish eggs, as well as wood and plant products, also constituted part of the subsistence harvest. These items were not included in the species list and would have been left out of the questionnaire if they had not been identified during

pretesting. Specific information regarding harvesting practices for small game, such as that it is opportunistic and therefore the amount of effort difficult to quantify, was also provided through the training and pretesting of the questionnaire. This input from key informants ensured that only relevant questions were asked.

The Cross Lake First Nation further participated in the design of the study through the formation of a Community Advisory Committee (CAC). This committee, consisting of band members of differing age, sex and stature within the community, guided the design and administration of the questionnaire. The CAC was responsible for overseeing the development of the questionnaire with the community's interests in mind, and for offering advice and voicing concerns regarding aspects of the study which may have been unclear or inappropriate.

All changes made to the questionnaire itself based on community input contributed positively to the accuracy and legitimacy of the overall study. The information provided by the CAC and key community informants resulted in a thorough questionnaire that, even following a lengthy statistical, technical and scientific analysis, did not undergo significant changes prior to its finalization and acceptance by all parties involved. The inclusion of the Cross Lake First Nation and the knowledge of its residents in all facets of the study design led to the development of a questionnaire that is appropriate for administration to the Cross Lake First Nation. However, the accuracy of results provided by the questionnaire have also been enhanced by this use of community information through the

use of appropriate expressions and translations, and through a sense of ownership and responsibility, as is discussed in the following section.

6.3 Dealing with Bias and Other Harvest Study Problems

According to Usher and Wenzel (1987), many harvest studies are criticized because of deficiencies in their development and administration. In particular, harvest studies are subject to a number of biases and other flaws, such as response bias, non-response bias and double counting, which ultimately affect the accuracy of the reported and, therefore, the projected community harvest estimate. The methodological aspects of the design and administration of this study used to minimize the impact of these potential problems are discussed below. Unfortunately, the success of these measures can only be generalized at this time. An interviewer evaluation process is currently being conducted, whereby interviewers are providing feedback to the Study Team regarding the administration of the questionnaire, such as whether respondents had difficulty with certain questions or aspects of the study.

6.3.1 Response Bias

Response bias refers to the possibility that the "true" answer to a question may be different than the answer provided by the respondent, whether intentional or inadvertent. This may be the result of poor questionnaire design, recall failure, interviewer introduced

bias or strategizing (Usher and Wenzel, 1987).

6.3.1.1 Poor Questionnaire Design

Poor questionnaire design can lead to inaccurate responses if questions are unclear or ordered in a confusing manner. In an attempt to minimize these problems, questions in the Cross Lake Harvest Study Questionnaire were simply worded to facilitate ease of understanding and could be easily translated into Cree if the respondent had difficulty with English. For all sections of the questionnaire (ie. waterfowl, fish, sturgeon, etc.), questions were worded identically and were asked in the same order: quantity of harvest, effort, location. Seasonal data was asked in a chronological order (summer/fall '93, winter '93/'94, spring '94).

Poor questionnaire design can also lead to informant fatigue, which occurs when respondents have been subjected to too many questions or questionnaires. In order to minimize informant fatigue, the questionnaire for this study was limited to necessary questions only, resulting in a length of 48 questions which took approximately 1 hour to complete for intensive harvesters.

A negative aspect of limiting the length of the questionnaire to minimize the effects of informant fatigue was that the questionnaire contained no checks to verify reported data. Incorporating these verification questions into the questionnaire would have been difficult,

however, due to the simple and straightforward nature of the questions that were posed. It would have been difficult to ask different questions designed to elicit the same responses without insulting the intelligence of respondents and risking the chance of respondents refusing to participate.

Informant fatigue, as caused by being subjected to numerous questionnaires, was particularly an issue for this study as a number of other surveys, including other domestic harvest surveys, have been conducted in Cross Lake in the recent past. To counter this problem, interviewers for this study were trained to explain the need for this study, the benefits to the Cross Lake First Nation that would result from long term resource management and, in general, how it addressed the deficiencies of the previous studies. The Band Chief also addressed the Cross Lake First Nation and encouraged their participation in the survey.

It is difficult to determine whether informant fatigue played a significant role in affecting reported harvests for this study. Interviewers, in their evaluation, report that respondents did not have any obvious difficulties in answering any of the questions. The only measure of its effect currently available is the number of selected respondents who refused to participate in the study. Ten selected respondents refused to participate, which amounts to about 4% of the total sample frame.

6.3.1.2 Recall Failure

Recall failure refers to inaccuracies in responses due to imperfect recollection of harvests. A number of steps were taken to minimize recall failure. The questionnaire focused on subsistence harvests from the most recently completed harvest cycle (summer/fall '93 to spring '94) to facilitate recollection. Also, the respondents were asked to recall harvests by season, not for an entire year. Finally, as noted above, the same format was used for each section of the questionnaire, facilitating recollection through repetition.

The occurrence of recall failure is a part of every questionnaire based harvest study, as it requires respondents to recall specific past events, in this case, harvests which occurred months or years ago. Another harvest study method which is also utilized and which reduces or even eliminates the effects of recall failure is the use of calendars to collect harvest data. This method requires the harvester, or the entire household depending on the study design, to record daily harvests on a calendar, which are then collected and analyzed. Only daily recall is required. This method of data acquisition, however, was not an option for this study as the specified time frame for study was the most recently completed harvest cycle, not the current one.

Preliminary results from the interviewer evaluation report indicate that recall failure may not have significantly affected reported harvests in the questionnaires. Interviewers,

when asked whether respondents had any obvious difficulties recalling harvests for any of the species, indicated that this was not a problem for most respondents. Respondents also did not appear to have difficulty recalling harvest effort or locations.

6.3.1.3 Interviewer Introduced Bias

Interviewer introduced bias is a problem with most harvest studies because harvest reporting is done through personal interviews (Usher and Wenzel, 1987). This bias can occur either as a result of improper survey administration, such as leading respondents during the interview, or if the respondent feels uncomfortable with the interviewer, hindering the accuracy of responses.

This study attempted to minimize interviewer introduced bias by utilizing respected Cross Lake residents as interviewers and subjecting interviewers to a rigorous training process prior to the administration of the survey. The residents hired for the Senior Interviewer positions, whose primary responsibilities were overseeing the study from within the community, screening completed questionnaires and liaising with the Cross Lake Harvest Study Team in Winnipeg, were recommended by Cross Lake Band Councillors and had previous experience with surveys conducted in Cross Lake. Other interviewers hired were well known, responsible members of the community with whom most respondents could feel comfortable and confident reporting harvests to. This was important, since harvests are considered very personal and the confidentiality of reports

would be crucial.

Hired interviewers were subjected to a week long training session during which time they familiarized themselves with the overall study and the harvest questionnaire, and underwent instruction in questionnaire administration. Also, all interviewers were provided with a training manual which outlined specifically what information was being requested by each question and how the question should be administered (Appendix C). The manual was designed to be used as a reference during the administration of the questionnaire and focused on the difficulties that arose during the training sessions, particularly with mapping coordinates and reporting requirements within a household, limiting interviewer bias and/or errors.

The use of local interviewers had both positive and negative effects on the survey. As mentioned above, most respondents did feel comfortable providing the interviewers with their personal harvest information. In many cases, at least one of the interviewers knew the respondent and would then interview that household. This reduced the chance of an respondent being confronted by a stranger. Respondents were also insured that their harvest records would remain confidential, which facilitated participation.

The use of local interviewers, however, also posed some problems with the administration of the study. Interviewers were offered a financial incentive for every questionnaire completed. Although selected interviewers were chosen on recommendation

of key community members and, in some cases, had proven themselves in previous surveys with members of the Cross Lake Study Team, it is possible that some interviews were done hastily. For example, a number of questionnaires, primarily those from non-hunting households, were submitted with entire pages crossed out. In some instances, this included the first question from a section of a questionnaire, asking the respondent whether (s)he, or anyone else the respondent should be reporting for, had harvested waterfowl, etc., over the harvest cycle. In these cases, a "no" answer should have been entered by the interviewer instead of crossing out the question. The high number of non-hunting households interviewed (the only category to have reached the desired sample size) also may be an indicator that, in some instances, interviewers chose easier and less time consuming households to interview rather than intensive, active or occasional resource harvesters.

The study was also affected by the resignation from the study of the first Senior Interviewer due to other commitments. A comparison of questionnaires received by the Cross Lake Study Team and invoices submitted by interviewers for completed questionnaires indicates a discrepancy of 15 questionnaires. It is likely that at least some of these questionnaires were completed and paid for, but not submitted for analysis following the Senior Interviewer's resignation. In particular, this affected one intensive household, for which questionnaires were reportedly completed but were not submitted. In this and other similar cases, interviewers did not want to return to households to redo interviews out of a sense of decency to the respondent. As the intensive category was

subjected to a 100% sample, no alternates were available.

Finally, according to the interviewer evaluation, as the study progressed and the number of households available to be interviewed decreased, some interviewers became frustrated by the lack of work and chose to resign. The lack of a continuous source of income was also troublesome if interviewers were able to find other steady employment and were therefore forced to resign. In total, eight community interviewers were utilized for this survey during its administration, whereas an original group of three were trained. Training of newly hired interviewers had to be conducted in the community by the Senior Interviewer without the assistance of the Cross Lake Study Team. This may have affected the ability of newly hired interviewers to understand and properly administer questionnaires.

Most of the problems caused by the use of community interviewers could have been resolved had a member of the Cross Lake Study Team been present throughout the administration of the surveys. Interviewer feedback indicates that they would have liked to have had weekly meetings with a member of the Cross Lake Study Team, where concerns and issues could be raised while they were still fresh in their minds. The presence of a coordinator from the Cross Lake Study Team may also have limited the amount of non-hunting households interviewed, relative to the other harvest intensity categories, as interviewers could have been assigned specific households. Unfortunately, due to the lengthy questionnaire development process, time constraints on the researcher,

and budgetary constraints on the project, it was not possible for a member of the team to be present in the community throughout the administration of the questionnaire. Although daily telephone contact was maintained with the Senior Interviewer, personal contact would have been more effective in dealing with problems as they arose. In future harvest studies, this researcher would recommend the continuous presence in the community of a study team member to act as an administrator and coordinator.

6.3.1.4 Strategizing

Strategizing or strategic bias refers to instances where the respondent can realize personal gains by providing inaccurate responses to questions. This may have been an issue in this study as the residents of Cross Lake were aware of the fact that the results of the study were to be used in negotiations with Manitoba Hydro and the Province of Manitoba. To minimize strategizing, it was stressed to the community that the study was being conducted by and for the residents of Cross Lake, and that results of the study were important for devising a long term local fish and wildlife management plan in the Cross Lake region. Because of the importance of subsistence harvesting activities in the culture of aboriginal communities and their interest in preserving domestic harvesting possibilities for the future, it was felt that this would discourage respondents from intentionally misrepresenting their harvests. It is also important to note that the questionnaire made no mention of negotiation or compensation.

Strategizing could have been further reduced through the use of backup questions designed to elicit the same information. However, as noted above with regards to informant fatigue, it was felt that the accuracy of results would have been compromised by the addition of more questions. The interviewer evaluation reports indicate that strategizing may only have been a problem for sturgeon harvests, as some respondents were hesitant or reluctant to answer questions in that section. This is not surprising, as the issue of adverse effects on sturgeon is one of the major points of contention in the compensation negotiations between the Cross Lake First Nation and Manitoba Hydro.

6.3.2 Non-response Bias

Non-response bias refers to the possibility that the harvests of those who do not participate in the study may be significantly more or less than the harvests of participants, and may skew projected harvests for the community (Usher and Wenzel, 1987). Non-response bias can only be eliminated if every member of a community participates in the study. However, because of the large population of Cross Lake, this was not an option.

This study utilized harvester stratification to minimize the effects of non-response bias. This method has been proven to be accurate method of estimating community harvests when not all harvesters can be interviewed (Usher and Wenzel, 1987; Berkes, 1994). Instead of random or haphazard sampling (Manitoba Department of Natural Resources, 1983; Wagner, 1985), households in Cross Lake were stratified according to

harvest intensity based on the amount of effort put into the harvest. Four harvest categories were used (intensive, active, occasional and non-hunter) with the household being stratified according to the most intensive harvester in the household. Sampling was then conducted within each stratum. Due to the small size of the intensive category (31 households), it was possible to subject that stratum to a 100% sample (or census), while all other categories were randomly sampled, with decreasing sample sizes as harvest intensity decreased. Reported harvests from the active, occasional and non-hunting strata could then be projected to that entire stratum, and added together with those reported by the intensive harvesters, to estimate the total subsistence harvest of the Cross Lake First Nation. This sampling design ensured coverage of members from each harvest intensity and that a large percentage of harvesters was surveyed, making community harvest projections more accurate and limiting the effects of non-response bias.

6.3.3 Double Counting

Double counting occurs when the same harvest is reported by more than one individual, resulting in inflated projected community harvests. This was potentially a problem for this study because of the use of households as the harvest unit. Double counting was minimized by clearly outlining the reporting requirements for members of each household. Male heads of households were asked to report their own harvests plus the harvests of all females and all males under 16 (as of the beginning the harvest cycle in question) living in his household. Female heads of households were asked to report for

themselves plus all other females and all males under 16 (at the beginning of the harvest cycle) living in her household. All males over 16 in each household reported for themselves in separate questionnaires. The harvests reported from all questionnaires in a household were then added together to get the total household harvest. Interviewers understood these requirements, and were trained to remind participants of their reporting requirements before conducting as well as throughout the administration of the questionnaire. This information was also outlined in the interviewer training manual (Appendix C) to avoid possible mistakes.

There are two negative aspects associated with the choice of households as the basic unit for this study. The first is that heads of households, whether male or female, were required to report not only their own harvests, but also the harvests of all males under 16 as well as all other females living in that household. It is therefore likely that the harvest reported by the head of household would be somewhat inaccurate as (s)he would have to estimate these other harvests. As is indicated in the community profile in section 2.1.1 of this document, the most recent estimates from the Cross Lake Reserve and Community indicate that 38% of residents are under 15 years of age and would therefore have had their harvests estimated by the head of the household. When this figure is combined with the number of female non-head of households in Cross Lake who would not have been interviewed (estimated by the researcher to be 50% of the remaining adult population), it is likely that between 60 and 70% of Cross Lake residents would have had their harvests estimated by the head of the household. Although it was established through key

community informants that most subsistence harvesting was conducted by the males 16 and over in the community, the likelihood that some harvests were estimated is present and could therefore lead to inaccuracies in the study results.

It must also be mentioned that the use of households as the basic unit of study precluded the determination of the source of the harvest when a head of household was interviewed, as household heads were required to include the harvests of other household members in their report. The questionnaire also did not identify the age of harvesters in any case, only that they would have been 16 or over during the harvest cycle. As mentioned above, 38% of the combined Cross Lake Reserve and Cross Lake Community is composed of people under 15 years of age. Because of the availability of public school and high school education to this portion of the community, their contribution to the total subsistence harvest may be minimal. Decreased subsistence harvesting in Cross Lake may, therefore, also be affected by the trend of the younger generation to move away from a traditional way of life as other opportunities present themselves.

Another problem that arose from the use of households as the basic unit of study occurred in situations where not all harvesters from a household could be interviewed, either because certain household members could not be reached or because they refused to participate. This was the case for 14 of the households. The Cross Lake Study Team determined that incomplete households could be included in the study if the majority of the subsistence harvest had already been reported, or if the subsistence harvest of the missing

individual(s) could be estimated by another household member. To determine whether the majority of the harvest would or would not have been reported through existing interviews from a household, a list of incomplete households stating the missing household members was given to key community informants. These informants were able to provide the researchers with information regarding the harvesting intensity of missing household members. Following this procedure, it was determined that eight of the 14 incomplete households could still be included in the study as either the majority or all of the household harvest had already been reported.

Double counting was also likely to occur when big game harvests were reported, as all members of a hunting party shared credit for a kill. To alleviate this problem, respondents were asked to report the average number of people in a hunting party for big game harvests. This was not difficult for respondents since they generally hunted with the same people. The reported harvest was then divided by the number of hunters in the party to get the harvest for each respondent. For example, if five hunters each reported the same bull moose in their questionnaires and that the hunting party had five people in it, each would receive credit for $1/5$ of that moose in their individual reports with a total of one moose reported in the subsistence harvest estimate.

6.4 Summary and Conclusions

The Cross Lake First Nation has historically relied on the subsistence harvest and its associated activities to provide food and social and cultural continuity, as well as recreational opportunities for members of the community. Subsistence harvesting practices have influenced local land tenure systems, resource management, social organization and social and economic well being. These aspects of the Cross Lake traditional lifestyle, however, have been affected by hydroelectric development in the region.

Although subsistence harvesting by the Cross Lake First Nation continues, the extent of this harvest has never been accurately quantified. The questionnaire resulting from this research is designed to quantify the subsistence harvest of the Cross Lake First Nation for the summer/fall 1993 to spring 1994 harvest cycle. The questionnaire asks information regarding which species were harvested, when they were harvested, and the location of harvests. The information used to develop this questionnaire and to ensure its pertinence to the harvesting practices of the Cross Lake First Nation, was provided by key community informants familiar with subsistence harvesting practices in the region. These informants provided information regarding which species were harvested, the seasons during which harvesting of each species occurred and the harvesting area utilized by residents of Cross Lake.

Projected harvest estimates resulting from the administration of the questionnaire

will set the current biological parameters of production for the system, and allow for both historical and future harvest comparisons in order to identify temporal changes in the subsistence harvest of the Cross Lake First Nation. The results of the study will be available as a planning tool for the Cross Lake First Nation for long term resource management in the area.

Because the size of the harvester population in Cross Lake (630 households) precluded a full census of all potential harvesters, a sample of these had to be taken. An important aspect of the design of this study was the use of stratified random sampling in the selection of participants. Stratified random sampling involves the categorization of harvesters according to harvest intensity, with each category being sampled individually, and the total community harvest estimate being the sum of the projected harvests within each category. This method has been proven as being able to accurately quantify a subsistence harvest in situations where not all harvesters can be interviewed, by ensuring that the harvests of a representative sample from each harvest category are included in the study. In the current study, 23 of 31 intensive households, 79 of 139 active households, 87 of 261 occasional households and 50 of 199 non-hunter households were surveyed, for a total of 239 out of 630 households in the community.

Verification of results through participant observation would have enhanced the accuracy of reported harvests. However, due to time constraints on the part of the researcher and a lack of hunting and fishing parties going out during the summer, this was

not possible. The projected harvest estimates for the community will, however, be reviewed by the Cross Lake Community Advisory Committee as verification, and any discrepancies or concerns regarding the accuracy of the projected harvest data will be addressed. An order of magnitude check will also be available for the harvest data through the administration of a study which will quantify the consumption of all foods (subsistence and store bought) in the community.

Community informants also identified a gap in the subsistence questionnaire data, that being the contribution of the Cross Lake Domestic Fishing Program (DFP) to the available fish harvest in Cross Lake. The analysis presented in this practicum indicated that 209,783 pounds of fish, or an estimated combined total of 46,240 lake whitefish, walleye, northern pike and coarse fish, were brought into Cross Lake under the DFP during the summer/fall 1993 to spring 1994 harvest cycle. Assuming a population of 4000 was sharing this harvest, the per capita value of DFP fish was approximately 24 kg/year. By comparison, Wagner's (1985) study estimated a per capita value of only 25 kg/year for all fish and game consumed in Cross Lake. Thus the DFP represents a significant contribution to the overall available harvest, assuming that the fish harvested were in fact consumed. The relationship between harvest and consumption, which is beyond the scope of the present study, may be addressed in the overall Cross Lake Harvest and Consumption Study.

Finally, the development and administration of this questionnaire addressed some

of the deficiencies of other harvest studies, such as **response bias** (intentional or inadvertent misrepresentation of harvests), **non-response bias** (the harvests of those not participating in the survey may be significantly different from those of respondents) and **double counting** (shared species, e.g. moose, is reported by more than one individual). These biases, if not accounted for, can have a significant impact on the accuracy of data collected. By including the knowledge of key informants in the development of the questionnaire, particularly in the nature and specific wording of questions, and by using locally respected individuals to conduct the interviews, the study sought to minimize the effects of these biases.

The Current Harvest Study, including both the harvesting and the mapping (McDonald, 1995) components, is the most detailed such study yet undertaken in Manitoba. As such, it fills an important gap as identified by the Northern Manitoba Economic Development Commission (1992a). Together with the Historical Harvest Study (which was in progress in 1995/96) and the Consumption Study (1994 - 1996), it will lead to a reliable assessment of the traditional food gathering economy in Cross Lake.

REFERENCES

- Ayles, H., S. Brown, K. Machniak and J. Sigurdson. 1974. *The Fisheries of the Lower Churchill Lakes, the Rat-Burnswood Lakes and the Upper Nelson Lakes: Present Conditions and the Implications of Hydroelectric Development*. Report of the Lake Winnipeg, Churchill and Nelson Rivers Study Board, Fisheries and Limnology, Appendix 5, Vol. 2 - I. xii + 99 p.
- Banfield, A.W.F. 1974. *The Mammals of Canada*. University of Toronto Press, Toronto, Ontario. xxv + 438 p.
- Bellrose, F.C. 1976. *Ducks, Geese and Swans of North America*. A Wildlife Management Institute Book. Stackpole Books, Harrisburg, PA. 543 p.
- Berkes, F. 1977. Fishery Resource Use in a Subarctic Indian Community. *Human Ecology* 5(4):289-307.
- Berkes, F. 1988. Subsistence Fishing in Canada: A Note on Terminology. *Arctic* 41(4): 319-320.
- Berkes, F. 1989. Native Subsistence Fisheries: A Synthesis of Harvest Studies in Canada. *Arctic* 43(1): 35-42.
- Berkes, F., P.J. George, R.J. Preston, A. Hughes, J. Turner and B.D. Cummins. 1994. Wildlife Harvesting and Sustainable Regional Native Economy in the Hudson and James Bay Lowland, Ontario. *Arctic* 47(4):350-360.
- Berkes, F. and T. Gönenc. 1982. A Mathematical Model on the Exploitation of Northern Lake Whitefish with Gill Nets. *North American Journal of Fisheries Management* 2:176-183.
- Bodaly, R.A. and D.M. Rosenberg. 1990. Retrospective Analysis of Predictions and Actual Impacts for the Churchill-Nelson Hydroelectric Development, Northern Manitoba, p.221-242. In: Delisle, C.E. and M.A. Bouchard (eds), *Managing the Effects of Hydroelectric Development Vol.9*, Collection Environnement et Geologie, University of Montreal.
- Cross Lake Harvest and Consumption Study Contract*. 1994. Winnipeg, Manitoba.
- Freeman, M.M.R. 1993. The International Whaling Commission, small-type whaling, and coming to terms with subsistence. *Human Organization* 52:243-251.

- Fast, H. and F. Berkes. 1994. Native Land Use, Traditional Knowledge and the Subsistence Economy in the Hudson Bay Bioregion. Technical Paper for the Hudson Bay Programme.
- Gaboury, M.N. and J.W. Patalas. 1981. An interim report on the fisheries impact study of Cross and Pipestone Lakes. Man. Dep. Nat. Res. MS Rep. No. 81-22, 190 p.
- Gaboury, M.N. and J.W. Patalas. 1982. The Fisheries of Cross, Pipestone and Walker Lakes, and effects of hydroelectric development. Man. Dept. Nat. Res. MS Rep. No. 82-14, 198 pp.
- Gaboury, M.N. and J.W. Patalas. 1984. Influence of water level drawdown on the fish populations of Cross Lake. Can. J. Fish. Aquat. Sci. 41:118-125.
- Gamble, R.L. 1984. A preliminary study of the native harvest of wildlife in the Keewatin Region, Northwest Territories. Can. Tech. Rep. Fish. Aquat. Sci. 1282: 48 p.
- Gamble, R.L. 1987. Native harvest of wildlife in the Keewatin Region, Northwest Territories for the period October 1984 to September 1985. Can. Tech. Rep. Fish. Aquat. Sci. 1544: 59 p.
- Godfrey, W.E. 1986. *The Birds of Canada*. National Museums of Canada. Ottawa, Ontario. 595 p.
- Hamley, J.M. and H.A. Regier. 1973. Direct estimates of gillnet selectivity to walleye (*Stizostedion vitreum vitreum*). J. Fish. Res. Board Can. 30:817-830.
- JBNQ. 1976a. Research to establish present levels of harvesting by native peoples of Northern Quebec. Part I. *A report on the harvests by the James Bay Cree*. Montreal. xxviii + 376 p.
- JBNQ. 1976b. Appendices for research to establish present levels of harvesting by native peoples of Northern Quebec. Part I. *A report on the harvests by the James Bay Cree*. Montreal. 569 p.
- JBNQ. 1976c. Research to establish present levels of harvesting by native peoples of Northern Quebec. Part II. *A report on the harvests by the Inuit of Northern Quebec*. Montreal. 230 p. + appendices.
- JBNQ. 1982a. *The wealth of the land - wildlife harvests by the James Bay Cree, 1972-73 to 1978-79*. Quebec City. xxxviii + 811 p.

- JBNQ. 1983b. Research to establish present levels of native harvesting - harvests by the Inuit of Northern Quebec. Phase II (Yrs. 1979 and 1980). Montreal. xx + 152 p.
- JBNQ. 1988. Final report: Research to establish present levels of harvesting for the Inuit of Northern Quebec, 1976 - 1980. Quebec City. 170 p.
- Johannes, R.E. 1989. Fishing and Traditional Knowledge. In: Johannes, R.E. (ed), *Traditional Ecological Knowledge: A Collection of Essays*, The World Conservation Union (IUCN), Cambridge, UK.
- Johnsgard, P.A. 1973. *Grouse and Quails of North America*. University of Nebraska Press, Lincoln, Nebraska. xx + 553 p.
- Koshinsky, G.D. 1973. *The limnology-fisheries of the Outlet Lakes area: Present conditions and implications of hydroelectric development*. Report of the Lake Winnipeg, Churchill and Nelson Rivers Study Board. Technical Report, Appendix 5, Vol. 2. 156 p.
- Kroeker, K. and W.J. Bernhardt. 1993. *Cross Lake outlet control weir post-project fish stock assessment: 1992*. North/South Consultants Inc. Wpg., MB., 83 p.
- Ludwig, D., R. Hilborn and C. Walters. 1993. Uncertainty, Resource Exploitation, and Conservation: Lessons from History. *Science* 260:17,36.
- Manitoba Department of Environment. 1993. *State of the Environment Report for Manitoba*. Winnipeg, Manitoba. 167 p.
- Manitoba Department of Natural Resources. 1983. *Five Year Report to the Legislature on Wildlife: Year Ending March 31, 1982*. Winnipeg, Manitoba. iv + 150 p.
- Manitoba Hydro. 1989. *Lake Winnipeg Regulation*. Manitoba Hydro Public Affairs information sheet.
- Manitoba Hydro. 1991. *The Cross Lake Weir*. Manitoba Hydro Public Affairs information sheet.
- Manitoba Hydro. 1993. *Manitoba Electrical Facts From the Year Ended March 31, 1993*. Manitoba Hydro Public Affairs information sheet.
- Manitoba Northern Affairs. 1989. *1989 Community Profiles*. Government of Manitoba. Winnipeg, Manitoba. 109pp.

- McDonald, I. 1995. *The Community of Cross Lake, Manitoba: An Analysis of Land Occupancy and Resource Use*. M.N.R.M. Practicum, Natural Resources Institute, University of Manitoba, Winnipeg, Manitoba.
- Northern Flood Agreement*. 1977. Government of Manitoba, Manitoba Hydro-electric Board, Northern Flood Committee, Government of Canada, 74 p.
- Northern Manitoba Economic Development Commission. 1992a. *A Benchmark Report*. The Northern Manitoba Economic Development Commission: Thompson, Manitoba.
- Northern Manitoba Economic Development Commission. 1992b. *Working Matrix of Services and Infrastructure by Community*. The Northern Manitoba Economic Development Commission: Thompson, Manitoba.
- Pattimore, J.H. 1985. *Inuit wildlife harvest for 1984 in the Baffin Region*. Baffin Region Inuit Association, Frobisher Bay, NWT. 124 p.
- Ramsey, D.J. and J.W. Patalas. 1992. *Impact of Lake Winnipeg Regulation and Churchill River Diversion on Fish Populations in the Rat-Burnwood and Nelson River Systems*. Agassiz North Associates Limited. Wpg. MB.
- Regier, H.A. and D.S. Robson. 1966. Selectivity of Gill Nets, Especially to Lake Whitefish. *J. Fish. Res. Board Can.* 23(3):423-454.
- Smith, E. (ed). 1990. *Sustainable Development Through Northern Conservation Strategies*. The University of Calgary Press, Calgary, Alberta.
- Thompson, J.E. and W.A. Hutchison. 1989. *Resource use by native and non-native hunters of the Ontario Hudson Bay Lowland*. Ontario Ministry of Natural Resources. 150 p.
- Usher, P.J. and M.S. Weinstein. 1991. Towards assessing the effects of Lake Winnipeg regulation and Churchill River diversion on resource harvesting in native communities in northern Manitoba. *Can. Tech. Rep. Fish. Aquat. Sci.* 1794: vi + 69 p.
- Usher, P.J. and G. Wenzel. 1987. Native Harvest Surveys and Statistics: A Critique of Their Construction and Use. *Arctic* 40(2): 145-160.
- Wagner, M.W. 1985. *T.A.R.R. Centre Domestic Harvesting Survey*. Treaty & Aboriginal Rights Research Centre of Manitoba, Inc. Wpg, Manitoba.

- Webb, R. 1973. *Wildlife Resource Impact Assessment - Lake Winnipeg, Churchill and Nelson Rivers Hydroelectric Projects: No.1 - Outlet Lakes*. Report of the Lake Winnipeg, Churchill and Nelson Rivers Study Board, Wildlife Studies, Appendix 6 - B.
- Wein, E.E. 1994. The Traditional Food Supply of Native Canadians. *Canadian Home Economics Journal* 44(2):74-77.
- Wilson, J.H.C., K.H. Doan, D.O. Palubeskie, H. Bostrom and J.S. Richmond. 1986. *Cross Lake Environmental Assessment Volume 1: Key Issues and Impacts*. The Nelson River Group, Environmental Consultants, Winnipeg, MB.

PERSONAL COMMUNICATIONS

- Berkes, F. 1994. Natural Resources Institute, University of Manitoba, Wpg., MB.
- Davies, S. 1994. North-South Consultants Inc., Wpg., MB.
- Halcrow, N. 1995. Cross Lake Domestic Fishing Manager, 1994. Cross Lake, MB.
- Macdonald, D. 1994. Manitoba Department of Natural Resources, Fisheries Branch, Thompson, MB.
- Miller, N. 1995. Cross Lake Domestic Fishing Manager, 1991-1993. Cross Lake, MB.
- Scott, E. 1994. Cross Lake Band Councillor. Cross Lake, MB.
- Smith, G. 1995. Cross Lake Domestic Fishing Manager, 1995. Cross Lake, MB.

APPENDIX A

Cross Lake Harvest Study Questionnaire

Questionnaire No. _ _ _ - _

List of other male adults to be interviewed _ _ _ - _
_ _ _ - _
_ _ _ - _

HARVEST STUDY CONSENT FORM

The purpose of this study is to report harvest levels of traditional foods by the Cross Lake First Nation. The study team from the University of Manitoba has been asked by the Chief and Band Council of the Cross Lake First Nation to carry out this study.

We would like to ask you some questions about your land use and harvesting activities. We would also like to ask you a few questions about your household. The questions will take about one hour. Your answers will help figure out land use, all activities of hunting, fishing and trapping by the harvesters of the Cross Lake First Nation. The results of the study will be used by the Cross Lake First Nation and other parties to the Cross Lake Harvest and Consumption Study, the Government of Manitoba, Manitoba Hydro and the University of Manitoba.

You can choose whether or not to answer these questions. All your answers will be kept confidential. If you are willing to be interviewed, your answers are very important to us. The more people that help in this study, the stronger our document will be.

Please feel free to ask any questions you may have about the study. Before we start, there is a consent form to sign to show if you agree to take part.

CONSENT: I have had the study explained to me and I agree to be interviewed. I understand that this is voluntary, and that I can refuse to answer any questions.

Signature of participant:

Thank you.

- 8) How many children (born on or after July 1, 1978) are living in your household (including own children, grandchildren, and other children)? 16 17
- 9) Other than your partner (or yourself), how many female adults (born before July 1, 1978) are living in your household? 18 19
- 10) Other than yourself (or your partner), how many male adults (born before July 1, 1978) are living in your household? 20 21

NOTE TO INTERVIEWER: LIST IN THE CONSENT FORM THOSE MALE ADULTS BORN BEFORE JULY 1, 1978. THEY NEED TO BE INTERVIEWED IN ORDER TO COMPLETE THE HOUSEHOLD HARVEST. IF ANY OF THESE PEOPLE ARE NOT AVAILABLE, MAKE SURE THE HEAD OF THE HOUSEHOLD INCLUDES THEIR HARVESTS IN HIS OR HER REPORT.

- 11) Are you a harvester of traditional foods? 22
1 = intensive
2 = active
3 = occasional
4 = non-hunter
- 12) With how many Cross Lake households do you regularly share your harvest? 23 24
- 13) How many other Cross Lake households regularly share their harvest with yours? 25 26

14) FOR HARVESTING PURPOSES, do you use:

motor boat	<u>27</u>
canoe	<u>28</u>
snowmobile	<u>29</u>
snowshoe	<u>30</u>
truck/automobile	<u>31</u>
airplane	<u>32</u>

1 = yes
2 = no

15) Do you own your own:

motor boat	<u>33</u>
snowmobile	<u>34</u>
truck/automobile	<u>35</u>

1 = yes
2 = no

HARVEST RECORDS

WATERFOWL:

16) Did you hunt waterfowl between July 1, 1993 and July 1, 1994? 36

IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO INCLUDE THE CATCHES OF ALL ADULT FEMALES AND ANY CHILDREN BORN ON OR AFTER JULY 1, 1978.

1 = yes

2 = no

If "yes", continue with question #17

If "no", why not?

1 = not a goose hunter 37

2 = other (specify) _____

-- Continue with question #21

17) About what number of the following kinds of waterfowl did you kill during the following seasons?

	fall '93	spring '94	(total)
Canada Geese	38 39 40	41 42 43	44 45 46
Mallards	47 48 49	50 51 52	53 54 55
Whistlers (Common Goldeneye)	56 57 58	59 60 61	62 63 64
Fall Ducks	65 66 67	68 69 70	71 72 73
Other waterfowl (specify)			
_____	74 75 76	77 78 79	80 81 82
_____	83 84 85	86 87 88	89 90 91

18) About how many days did you spend waterfowl hunting during the following seasons?

fall '93 92 93

(total) 96 97 98

spring '94 94 95

- 19) Where did you harvest geese mostly during the following seasons?

fall '93 _____
(square no. of location on map)

spring '94 _____
(square no. of location on map)

- 20) Where did you harvest ducks mostly during the following seasons?

fall '93 _____
(square no. of location on map)

spring '94 _____
(square no. of location on map)

- 21) Did you collect gull eggs in the spring of 1994? _____

1 = yes

2 = no

99

FISH:

- 22) Did you do any domestic fishing (including angling) _____
for all species other than sturgeon between 100
July 1, 1993 and July 1, 1994?

**IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO
INCLUDE THE CATCHES OF ALL ADULT FEMALES AND ANY
CHILDREN BORN ON OR AFTER JULY 1, 1978.**

1 = yes

2 = no

If "yes", continue with question #23

If "no", why not?

1 = not a fisherman

2 = other (specify) _____

101

-- Continue with question #26

23) About how many of the following kinds of fish did you harvest during the following seasons (not including commercial catches)?

	sum/fall'93	winter'93/4	spring '94	(total)
Whitefish	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	102 103 104	105 106 107	108 109 110	111 112 113 114
Tullibee	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	115 116 117	118 119 120	121 122 123	124 125 126 127
Pickrel (walleye)	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	128 129 130	131 132 133	134 135 136	137 138 139 140
Jackfish (pike)	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	141 142 143	144 145 146	147 148 149	150 151 152 153
Suckers	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	154 155 156	157 158 159	160 161 162	163 164 165 166
Carp	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	167 168 169	170 171 172	173 174 175	176 177 178 179
Maria (burbot)	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	180 181 182	183 184 185	186 187 188	189 190 191 192
Other fish (specify)	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	193 194 195	196 197 198	199 200 201	202 203 204 205
	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	206 207 208	209 210 211	212 213 214	215 216 217 218
	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u> / <u> </u>	<u> </u> <u> </u> <u> </u>
	219 220 221	222 223 224	225 226 227	228 229 230 231

24) About how many days did you spend domestic fishing for all species other than sturgeon during the following seasons?

summer/fall '93	<u> </u> <u> </u> <u> </u>	
	232 233 234	
winter '93/94	<u> </u> <u> </u> <u> </u>	(total)
	235 236 237	<u> </u> <u> </u> <u> </u>
spring '94	<u> </u> <u> </u> <u> </u>	
	238 239 240	

25) Where did you do most of your domestic fish harvesting for all species other than sturgeon during the following seasons?

summer/fall '93 _____
(square no. of location on map)

winter '93/94 _____
(square no. of location on map)

spring '94 _____
(square no. of location on map)

26) Did you collect any fish eggs last year? _____
1 = yes 244
2 = no

STURGEON:

27) Did you do any sturgeon fishing between July 1, 1993 and July 1, 1994? _____ 245
IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO INCLUDE THE CATCHES OF ALL ADULT FEMALES AND ANY CHILDREN BORN ON OR AFTER JULY 1, 1978.

1 = yes
2 = no

If "yes", continue with question #28
If "no", why not?

1 = not a sturgeon fishermanGo to question #33 246
2 = other (specify) _____

-- Continue with question #29

28) About how many sturgeon did you catch during the following seasons?

summer/fall '93 _____
247 248 249

winter '93/94 _____ (total) _____
250 251 252 256 257 258 259

spring '94 _____
253 254 255

29) About how many sturgeon did you catch (excluding commercial catches) in ...

1992
 260 261 262

1991
 263 264 265

Note to interviewer: Go to question #33 if respondent answered no to question #27. Otherwise, continue with the next question.

30) About how many days did you spend sturgeon fishing during the following seasons?

summer/fall '93
 266 267 268

winter '93/94 (total)
 269 270 271 275 276 277

spring '94
 272 273 274

31) Where did you harvest sturgeon during the following seasons?

summer/fall '93 _____
 (square no. of location on map)

winter '93/94 _____
 (square no. of location on map)

spring '94 _____
 (square no. of location on map)

32) Which of the following net sizes did you use to fish sturgeon?

8" net
 278

9" net 1 = yes
 279 2 = no

10" net
 280

Other mesh or line (specify) _____

FURBEARERS:

33) Did you harvest any furbearers (including black/
brown bear) between July 1, 1993 and July 1, 1994? 281
IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO
INCLUDE THE CATCHES OF ALL ADULT FEMALES AND ANY
CHILDREN BORN ON OR AFTER JULY 1, 1978.

1 = yes

2 = no

If "yes", continue with question #34

If "no", why not?

1 = not a trapper

282

2 = other (specify) _____

-- Continue with question #37

34) How many of the following kinds of furbearers did you
harvest between July 1, 1993 and July 1, 1994?

Beaver	<u>283</u>	<u>284</u>	<u>285</u>	Fox	<u>304</u>	<u>305</u>	<u>306</u>
Muskrat	<u>286</u>	<u>287</u>	<u>288</u>	Wolf	<u>307</u>	<u>308</u>	<u>309</u>
Lynx	<u>289</u>	<u>290</u>	<u>291</u>	Coyote	<u>310</u>	<u>311</u>	<u>312</u>
Marten	<u>292</u>	<u>293</u>	<u>294</u>	Wolverine	<u>313</u>	<u>314</u>	<u>315</u>
Otter	<u>295</u>	<u>296</u>	<u>297</u>	Fisher	<u>316</u>	<u>317</u>	<u>318</u>
Weasel (ermine)	<u>298</u>	<u>299</u>	<u>300</u>	Red squirrel	<u>319</u>	<u>320</u>	<u>321</u>
Mink	<u>301</u>	<u>302</u>	<u>303</u>	Black/brown bear	<u>322</u>	<u>323</u>	<u>324</u>

35) How many days did you spend harvesting furbearers ...

last fall ('93) days
 325 326 327

last winter ('93/94) days
 328 329 330

last spring ('94) days
 331 332 333

(total) days
 334 335 336

36) Where did you harvest furbearers ...

last fall ('93) _____
 (square no. of location on map)

last winter ('93/94) _____
 (square no. of location on map)

last spring ('94) _____
 (square no. of location on map)

BIG GAME:

37) Did you hunt moose, caribou, white-tailed deer or _____
other big game between July 1, 1993 and July 1, 1994? 337

**IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO
INCLUDE THE CATCHES OF ALL ADULT FEMALES AND ANY
CHILDREN BORN ON OR AFTER JULY 1, 1978.**

1 = yes

2 = no

If "yes", continue with question #38

If "no", why not?

1 = never hunt big game _____
 338

2 = other (specify) _____

-- Continue with question #42

38) How many of the following kinds of big game animals did you harvest during the following seasons?

	s/f'93		w'93/94		total		Avg # of people in party	Avg kill per person
Moose								
bull	<u>339</u>	<u>340</u>	<u>341</u>	<u>342</u>	<u>343</u>	<u>344</u>	<u>345</u>	<u>346</u>
cow	<u>347</u>	<u>348</u>	<u>349</u>	<u>350</u>	<u>351</u>	<u>352</u>	<u>353</u>	<u>354</u>
yearling	<u>355</u>	<u>356</u>	<u>357</u>	<u>358</u>	<u>359</u>	<u>360</u>	<u>361</u>	<u>362</u>
calf	<u>363</u>	<u>364</u>	<u>365</u>	<u>366</u>	<u>367</u>	<u>368</u>	<u>369</u>	<u>370</u>
Caribou	<u>371</u>	<u>372</u>	<u>373</u>	<u>374</u>	<u>375</u>	<u>376</u>	<u>377</u>	<u>378</u>
White-tailed deer	<u>379</u>	<u>380</u>	<u>381</u>	<u>382</u>	<u>383</u>	<u>384</u>	<u>385</u>	<u>386</u>
Other (specify)								
_____	<u>387</u>	<u>388</u>	<u>389</u>	<u>390</u>	<u>391</u>	<u>392</u>	<u>393</u>	<u>394</u>

39) How many of the following big game did you harvest in
 ...

	1992		1991	
Moose	<u>395</u>	<u>396</u>	<u>397</u>	<u>398</u>
Caribou	<u>399</u>	<u>400</u>	<u>401</u>	<u>402</u>
White-tailed deer	<u>403</u>	<u>404</u>	<u>405</u>	<u>406</u>
Other (specify)				
_____	<u>407</u>	<u>408</u>	<u>409</u>	<u>410</u>

40) How many days did you spend especially hunting for big game during the following seasons?

	summer/fall '93	winter '93/94	(total)
Moose	<u>411</u> <u>412</u>	<u>413</u> <u>414</u>	<u>415</u> <u>416</u>
Caribou	<u>417</u> <u>418</u>	<u>419</u> <u>420</u>	<u>421</u> <u>422</u>
White-tailed deer	<u>423</u> <u>424</u>	<u>425</u> <u>426</u>	<u>427</u> <u>428</u>
Other (specify)			
_____	<u>429</u> <u>430</u>	<u>431</u> <u>432</u>	<u>433</u> <u>434</u>

41) Where did you harvest big game during the following seasons?

	summer/fall '93	winter '93/94
Moose	_____	_____
	(square no. of location on map)	
Caribou	_____	_____
	(square no. of location on map)	
White-tailed deer	_____	_____
	(square no. of location on map)	
Other (specify)		
_____	_____	_____
	(square no. of location on map)	

SMALL GAME:

42) Did you hunt or snare small game between July 1, 435
1993 and July 1, 1994?

**IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO
INCLUDE THE CATCHES OF ALL ADULT FEMALES AND ANY
CHILDREN BORN ON OR AFTER JULY 1, 1978.**

1 = yes

2 = no

If "yes", continue with question #43

If "no", why not?

1 = never hunt small game

2 = other (specify) _____

-- Continue with question #47

43) About how many of the following kinds of small game did
you kill between July 1, 1993 and July 1, 1994?

Sharp-tailed
grouse 437 438 439

Spruce grouse 440 441 442

Ruffed grouse 443 444 445

Groundhog 446 447 448

Rabbit (snowshoe hare) 449 450 451

Other (specify) _____
452 453 454

44) How many days did you spend hunting rabbits between
July 1, 1993 and July 1, 1994?

455 456 457 days

45) Where did you harvest rabbits mostly between July 1,
1993 and July 1, 1994?

(square no. of location on map)

- 46) Where did you harvest grouse mostly between July 1, 1993 and July 1, 1994?

(square no. of location on map)

WOOD AND PLANT PRODUCTS:

- 47) Did you collect any of the following for domestic use between July 1, 1993 and July 1, 1994?
IF YOU ARE THE HEAD OF YOUR HOUSEHOLD, REMEMBER TO INCLUDE THE HARVESTS OF ALL ADULT FEMALES AND ANY CHILDREN BORN ON OR AFTER JULY 1, 1978.

Firewood	<u> </u>	
	458	
Wood for construction	<u> </u>	
	459	1 = yes
		2 = no
Berries	<u> </u>	
	460	
Medicinal plants	<u> </u>	
	461	

- 48) About how much of the following did you harvest for domestic use between July 1, 1993 and July 1, 1994?

Firewood	<u> </u>	<u> </u>	<u> </u>	cords
	462	463	464	
Wood for construction	<u> </u>	<u> </u>	<u> </u>	<u> </u> logs
	465	466	467	468
Berries	<u> </u>	<u> </u>	<u> </u>	gallons
	469	470	471	

THANK YOU, WE APPRECIATE YOUR HELP !

INTERVIEWER'S COMMENTS

APPENDIX B

Biological Species List for the Cross Lake Region

Biological Species List for the Cross Lake Region

FISH	SOURCE
* Lake whitefish (<i>Coregonus clupeaformis</i>)	Ayles <i>et al</i> (1974)
* Cisco or tullibee (<i>Coregonus artedii</i>)	"
* Walleye or pickerel (<i>Stizostedion vitreum</i>)	"
* Northern pike or jackfish (<i>Esox lucius</i>)	"
* White sucker (<i>Catostomus commersoni</i>)	"
Longnose sucker (<i>Catostomus catostomus</i>)	"
* Redhorse sucker (<i>Moxostoma macrolepidotum</i>)	"
Sauger (<i>Stizostedion canadense</i>)	"
* Burbot or maria (<i>Lota lota</i>)	"
* Lake sturgeon (<i>Acipenser fulvescens</i>)	"
Yellow perch (<i>Perca flavescens</i>)	"
Goldeye (<i>Hiodon alosoides</i>)	"
Mooneye (<i>Hiodon tergisus</i>)	Gaboury & Patalas (1982)
Freshwater drum (<i>Aplodinotus grunniens</i>)	"
* Carp (<i>Cyprinus carpio</i>)	"
Lake trout (<i>Salvelinus namaycush</i>)	"
Lake chub (<i>Couesius plumbeus</i>)	Ayles <i>et al</i> (1974)
Longnose dace (<i>Rhinichthys cataractae</i>)	"
Iowa darter (<i>Etheostoma exile</i>)	"
Johnny darter (<i>Etheostoma nigrum</i>)	"
Fathead minnow (<i>Pimephales promelas</i>)	"
Mottled sculpin (<i>Cottus bairdi</i>)	"
Slimy sculpin (<i>Cottus cognatus</i>)	"
Blacknose shiner (<i>Notropis heterolepis</i>)	"
Emerald shiner (<i>Notropis atherinoides</i>)	"
Spottail shiner (<i>Notropis hudsonius</i>)	"
Ninespine stickleback (<i>Pungitus pungitus</i>)	"
Brook stickleback (<i>Culaea inconstans</i>)	"

* indicates species in the subsistence harvest

MAMMALS

SOURCE

BIG GAME

- * Moose (*Alces alces*) Wagner (1985)
- * Caribou (*Rangifer tarandus*) "
- Elk (*Cervus elaphus*) Banfield (1974)
- * White-tailed deer (*Odocoileus virginianus*) "

FUR BEARERS AND SMALL GAME

- * Black bear (*Ursus americanus*) Wagner (1985)
- * Beaver (*Castor canadensis*) "
- * Muskrat (*Ondatra zibethicus*) "
- * Snowshoe hare or rabbit (*Lepus americanus*) "
- * Lynx (*Lynx lynx*) "
- * Fox (*Vulpes vulpes*) Webb (1973)
- * Wolf (*Canis lupus*) "
- * Coyote (*Canis latrans*) Banfield (1974)
- Porcupine (*Erethizon dorsatum*) "
- * American Marten (*Martes americana*) Webb (1973)
- * Fisher (*Martes pennanti*) "
- * Wolverine (*Gulo gulo*) "
- * American Mink (*Mustela vison*) "
- * Ermine (*Mustela erminea* and *M. nivalis*) "
- * Otter (*Lontra canadensis*) "
- Woodchuck (*Marmota monax*) Banfield (1974)
- Raccoon (*Procyon lotor*) "
- Flying squirrel (*Glaucomys sabrinus*) "
- * Red squirrel (*Tamiasciurus hudsonicus*) Webb (1973)

- Chipmunk (*Eutamias minimus*) Banfield (1974)
- Northern bog lemming (*Synaptomys borealis*) "
- Deer mouse (*Peromyscus manicularus*) "
- Meadow jumping mouse (*Zapus hudsonius*) "
- Meadow vole (*Microtus pennsylvanicus*) "
- Gapper's red-backed vole (*Clethrionomys gapperi*) "
- Heather vole (*Phenacomys intermedius*) "

* indicates species in the subsistence harvest

BIRDS

SOURCE

SMALL GAME

* Ruffed grouse (<i>Bonasa umbellus</i>)	Johnsgard (1973)
* Spruce grouse (<i>Dendragapus canadensis</i>)	"
* Sharp-tailed grouse (<i>Tympanuchus phasianellus</i>)	"
* Willow ptarmigan (<i>Lagopus lagopus</i>)	"

WATERFOWL

* Canada goose (<i>Branta canadensis</i>)	Bellrose (1976)
Snow goose (incl. Blue Goose) (<i>Chen caerulescens</i>)	"
White-fronted goose (<i>Anser albifrons</i>)	"
Ross's goose (<i>Chen rossii</i>)	"
* Mallard (<i>Anas platyrhynchos</i>)	Bellrose (1976)
Gadwall (<i>Anas strepera</i>)	"
* Green-winged Teal (<i>Anas crecca</i>)	"
Blue-winged Teal (<i>Anas discors</i>)	"
* Northern Pintail (<i>Anas acuta</i>)	"
* Black Duck (<i>Anas rubripes</i>)	"
Common Merganser (<i>Mergus merganser</i>)	"
Red-breasted Merganser (<i>Mergus serrator</i>)	"
Hooded Merganser (<i>Lophodytes cucullatus</i>)	"
* Greater Scaup (<i>Aythya marila</i>)	"
Lesser Scaup (<i>Aythya affinis</i>)	"
American Wigeon (<i>Anas americana</i>)	"
* Northern Shoveler (<i>Anas clypeata</i>)	"
Ruddy Duck (<i>Oxyura jamaicensis</i>)	"
* Wood Duck (<i>Aix sponsa</i>)	"
* Canvasback (<i>Aythya valisineria</i>)	"
Redhead (<i>Aythya americana</i>)	"
Ring-necked Duck (<i>Aythya collaris</i>)	"
White-winged Scoter (<i>Melanitta fusca</i>)	"
Surf Scoter (<i>Melanitta perspicillata</i>)	"
* Common Goldeneye (<i>Bucephala clangula</i>)	"
* Bufflehead (<i>Bucephala albeola</i>)	"

* indicates species in the subsistence harvest

OTHER WATER BIRDS

Common Loon (<i>Gavia immer</i>)	Godfrey (1986)
Horned Grebe (<i>Podiceps auritus</i>)	"
Pied-billed Grebe (<i>Podilymbus podiceps</i>)	"
Red-necked Grebe (<i>Podiceps grisegina</i>)	"
American Coot (<i>Fulica americana</i>)	"
Double-crested Cormorant (<i>Phalacrocorax auritus</i>)	"
American Bittern (<i>Botaurus lentiginosus</i>)	"
Great Blue Heron (<i>Ardea herodias</i>)	"
American White Pelican (<i>Pelecanus erythrorhynchos</i>)	"
Tundra Swan (<i>Cygnus columbianus</i>)	Bellrose (1976)

OTHER

Common Snipe (<i>Gallinago gallinago</i>)	Godfrey (1986)
Sandhill Crane (<i>Grus canadensis</i>)	"
Killdeer (<i>Charadrius vociferus</i>)	"
Franklin's Gull (<i>Larus pipixcan</i>)	"
Bonaparte's Gull (<i>Larus philadelphia</i>)	"
Herring Gull (<i>Larus argentatus</i>)	"
Ring-billed Gull (<i>Larus delawarensis</i>)	"
Common Tern (<i>Sterna hirundo</i>)	"
Caspian Tern (<i>Sterna caspia</i>)	"
Black Tern (<i>Chlidonias niger</i>)	"
Golden Eagle (<i>Aquila chrysaetos</i>)	"
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	"
Northern Harrier (<i>Circus cyaneus</i>)	"
Sharp-skinned Hawk (<i>Accipiter striatus</i>)	"
Northern Goshawk (<i>Accipiter gentilis</i>)	"
Cooper's Hawk (<i>Accipiter cooperii</i>)	"
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	"
Broad-winged Hawk (<i>Buteo platypterus</i>)	"
Osprey (<i>Pandion haliaetus</i>)	"
American Kestrel (<i>Falco sparverius</i>)	"
Merlin (<i>Falco columbarius</i>)	"
Rock Dove (<i>Columba livia</i>)	"
Short-eared Owl (<i>Asio flammeus</i>)	"
Long-eared Owl (<i>Asio otus</i>)	"
Great Horned Owl (<i>Bubo virginianus</i>)	"
Barred Owl (<i>Strix varia</i>)	"
Great Gray Owl (<i>Strix nebulosa</i>)	"
Northern Saw-whet Owl (<i>Aegolius acadicus</i>)	"

Northern Hawk-Owl (<i>Surnia ulula</i>)	Godfrey (1986)
Boreal Owl (<i>Aegolius funereus</i>)	"
Common Nighthawk (<i>Chordeiles minor</i>)	"
Belted Kingfisher (<i>Ceryle alcyon</i>)	"
Northern Flicker (<i>Colaptes auratus</i>)	"
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	"
Downy Woodpecker (<i>Picoides pubescens</i>)	"
Hairy Woodpecker (<i>Picoides villosus</i>)	"
Three-toed Woodpecker (<i>Picoides tridactylus</i>)	"
Black-backed Woodpecker (<i>Picoides arcticus</i>)	"
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	"
Eastern Kingbird (<i>Tyrannus tyrannus</i>)	"
Tree Swallow (<i>Tachycineta bicolor</i>)	"
Bank Swallow (<i>Riparia riparia</i>)	"
Cliff Swallow (<i>Hirundo pyrrhonota</i>)	"
Barn Swallow (<i>Hirundo rustica</i>)	"
Blue Jay (<i>Cyanocitta cristata</i>)	"
Gray Jay (<i>Perisoreus canadensis</i>)	"
Black-billed Magpie (<i>Pica pica</i>)	"
Chimney Swift (<i>Chaetura pelagica</i>)	"
American Crow (<i>Corvus brachyrhynchos</i>)	"
Common Raven (<i>Corvus corax</i>)	"
Black-capped Chickadee (<i>Parus atricapillus</i>)	"
Boreal Chickadee (<i>Parus hudsonicus</i>)	"
Red-breasted Nuthatch (<i>Sitta canadensis</i>)	"
Brown Creeper (<i>Certhia americana</i>)	"
Sedge Wren (<i>Cistothorus platensis</i>)	"
Winter Wren (<i>Troglodytes troglodytes</i>)	"
Swainson's Thrush (<i>Catharus ustulatus</i>)	"
Hermit Thrush (<i>Catharus guttatus</i>)	"
American Robin (<i>Turdus migratorius</i>)	"
Northern Shrike (<i>Lanius excubitor</i>)	"
Bohemian Waxwing (<i>Bombycilla garrulus</i>)	"
Cedar Waxwing (<i>Bombycilla cedrorum</i>)	"
European Starling (<i>Sturnus vulgaris</i>)	"
Solitary Vireo (<i>Vireo solitarius</i>)	"
Red-eyed Vireo (<i>Vireo olivaceus</i>)	"
Philadelphia Vireo (<i>Vireo philadelphicus</i>)	"
Warbling Vireo (<i>Vireo gilvus</i>)	"
Tennessee Warbler (<i>Vermivora peregrina</i>)	"
Orange-crowned Warbler (<i>Vermivora celata</i>)	"
Nashville Warbler (<i>Vermivora ruficapilla</i>)	"
Black-and-white Warbler (<i>Mniotilta varia</i>)	"

Black-throated Green Warbler (<i>Dendroica virens</i>)	Godfrey (1986)
Cape May Warbler (<i>Dendroica trigrina</i>)	"
Magnolia Warbler (<i>Dendroica magnolia</i>)	"
Yellow-rumped Warbler (<i>Dendroica coronata</i>)	"
Bay-breasted Warbler (<i>Dendroica castanea</i>)	"
Blackpoll Warbler (<i>Dendroica striata</i>)	"
Palm Warbler (<i>Dendroica palmarum</i>)	"
Yellow Warbler (<i>Dendroica petechia</i>)	"
Mourning Warbler (<i>Oporornis philadelphia</i>)	"
Connecticut Warbler (<i>Oporornis agilis</i>)	"
Canada Warbler (<i>Wilsonia canadensis</i>)	"
Wilson's Warbler (<i>Wilsonia pusilla</i>)	"
Ovenbird (<i>Seiurus aurocapillus</i>)	"
Northern Waterthrush (<i>Seiurus noveboracensis</i>)	"
Common Yellowthroat (<i>Geothlypis trichas</i>)	"
American Redstart (<i>Setophaga ruticilla</i>)	"
Rose-breasted Grosbeak (<i>Pheucticus ludovicianus</i>)	"
Le Conte's Sparrow (<i>Ammodramus leconteii</i>)	"
Sharp-tailed Sparrow (<i>Ammodramus candacutus</i>)	"
Vesper Sparrow (<i>Pooecetes gramineus</i>)	"
Savannah Sparrow (<i>Passerculus sandwichensis</i>)	"
Song Sparrow (<i>Melospiza melodia</i>)	"
American Tree Sparrow (<i>Spizella arborea</i>)	"
Chipping Sparrow (<i>Spizella passerina</i>)	"
Dark-eyed Junco (<i>Junco hyemalis</i>)	"
Harris' Sparrow (<i>Zonotrichia querula</i>)	"
White-throated Sparrow (<i>Zonotrichia albicollis</i>)	"
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)	"
Fox Sparrow (<i>Passerella iliaca</i>)	"
Lincoln's Sparrow (<i>Melospiza lincolni</i>)	"
Swamp Sparrow (<i>Melospiza georgiana</i>)	"
Red-winged Blackbird (<i>Agelaius phoeniceus</i>)	"
Yellow-headed Blackbird (<i>Xanthocephalus xanthocephalus</i>)	"
Rusty Blackbird (<i>Euphagus carolinus</i>)	"
Brown-headed Cowbird (<i>Molothrus ater</i>)	"
Common Grackle (<i>Quiscalus quiscula</i>)	"
House Sparrow (<i>Passer domesticus</i>)	"
Red Crossbill (<i>Loxia curvirostra</i>)	"
White-winged Crossbill (<i>Loxia leucoptera</i>)	"
Pine Grosbeak (<i>Pinicola enucleator</i>)	"
Purple Finch (<i>Carpodacus purpureus</i>)	"
Common Redpoll (<i>Carduelis flammea</i>)	"
Pine Siskin (<i>Carduelis pinus</i>)	"

OCCASIONAL SPECIES

Rock Ptarmigan (<i>Lagopus mutus</i>)	Johnsgard (1973)
Black-crowned Night-Heron (<i>Nycticorax nycticorax</i>)	Godfrey (1986)
Sora (<i>Porzana carolina</i>)	"
Yellow Rail (<i>Coturnicops noveboracensis</i>)	"
Greater Yellowlegs (<i>Tringa melanoleuca</i>)	"
Lesser Yellowlegs (<i>Tringa flavipes</i>)	"
Solitary Sandpiper (<i>Tringa solitaria</i>)	"
Spotted Sandpiper (<i>Actitis macularia</i>)	"
American Woodcock (<i>Scolopax minor</i>)	"
Semipalmated Plover (<i>Charadrius semipalmatus</i>)	"
Piping Plover (<i>Charadrius melodus</i>)	"
Rough-legged Hawk (<i>Buteo lagopus</i>)	"
Olive-sided Flycatcher (<i>Contopus borealis</i>)	"
Eastern Phoebe (<i>Sayornis phoebe</i>)	"
Least Flycatcher (<i>Empidonax minimus</i>)	"
Alder Flycatcher (<i>Empidonax alnorum</i>)	"
Yellow-bellied Flycatcher (<i>Empidonax flaviventris</i>)	"
Horned Lark (<i>Eremophila alpestris</i>)	"
Golden-crowned Kinglet (<i>Regulus satrapa</i>)	"
Ruby-crowned Kinglet (<i>Regulus calendula</i>)	"
Snow Bunting (<i>Plectrophenax nivalis</i>)	"
Evening Grosbeak (<i>Coccothraustes vespertinus</i>)	"

APPENDIX C

Interviewer Training Manual

HARVEST STUDY INTERVIEWER MANUAL

Introduction to the Research

Growing recognition of the importance of the subsistence economy in native communities in northern Canada has led to attempts to quantify the magnitude of this economy. In northern Manitoba, these attempts have usually been motivated by the need to document the impact of the Lake Winnipeg, Churchill, Nelson Rivers (LWCN) Hydroelectric Project, for purposes of compensation and mitigation.

On April 27, 1993, the Cross Lake First Nation, the Province of Manitoba, and the Manitoba Hydro-Electric Board entered into an Agreement which was affirmed by the Arbitrator under the Northern Flood Agreement. Part of the terms of this agreement was that the parties undertake and implement a comprehensive study of domestic harvest and consumption of traditional food and resources by the people of Cross Lake.

Previous studies designed to quantify the Cross Lake subsistence economy have been poorly conceived and implemented, undocumented, and/or inadequately funded to meet the objectives of past investigations. The Cross Lake Harvest and Consumption Study is based on proven scientific methodologies which will ensure the information will be useful to the community.

The objective of the Cross Lake Harvest and Consumption Study is to quantify changes in consumption levels of country food in Cross Lake and to develop an understanding of the factors which may have affected these changes. To achieve this purpose, it will be necessary to not only document consumption levels of country food over time, but also to assess changes in the harvesting of country foods over time, and the context within which these changes have occurred. Determining the amount and location of current harvests of country food is the first component of this study.

Information about current harvests of country food will be collected by using a questionnaire, which will be administered to a sample of heads of households and males who were born before July 1, 1978. When the study is completed in 2 years, reports will be produced which will be used in negotiations between the Cross Lake First Nation, the Government of Manitoba, and the Manitoba-Hydro Electric Board. It is therefore important that the information given here is complete and as accurate as the people can make it. It is the job of the local interviewer to do this.

In order to do this work well, the interviewers will need to understand the questionnaire and the research: why it is being done, who is doing it, and how it can help the Cross Lake community. Interviewers should be able to answer questions about the study. This manual is designed to help the interviewers do this, although they can get help from other members of the Study team if they have further questions.

General Instructions for Interviewers

1. If you know that an adult male household member will be impossible to reach, then ask the head of the household to include their catch in their report. Write on the comment sheet (at the end of the questionnaire) that this questionnaire includes the catch of both the head of the household and the adult male who cannot be reached.
2. When entering numbers in the questionnaire (eg. question 18), mark the numbers in the lines which are provided, starting from the right. For example, if someone killed 7 mallards it would look like . . 7.
3. After the questionnaire is completed, numerical entries should be totalled where required. This applies to questions 18, 23, 24, 28, 30, 35, 38 and 40.
4. At the end of the questionnaire there is a list of Cree names for the species harvested. Make sure that the person being interviewed knows which species they are giving harvest data for.
5. For the purpose of this study, the seasonal cycle begins on July 1, 1993. For the purpose of the study the seasons are:
Summer/fall: July 1 to freezeup
Winter: Freezeup to breakup
Spring: Breakup to June 30
6. Fill in any blank spaces in the questionnaire with a line if any of the questions do not apply to the respondent. This will tell other members of the study team that the question was not accidentally skipped.
7. Only include the harvest of traditional resources which were used by the community. For example: If a person lived outside of the community for part of the year and hunted, then these catches would not be recorded unless the meat was sent back to Cross Lake. This must be done because the questionnaire is designed to determine how much traditional food is being harvested by the Cross Lake community.
8. If the respondent harvests an animal which they were not actively hunting (eg. shooting a duck while goose hunting) or which is part of a daily routine (eg. setting snares while on the trapline), then enter the amount of time for that activity as 1 day each time it was done. If fish from a commercial catch are used for domestic purposes, ask the respondent to estimate the amount of time that was spent harvesting fish for domestic consumption. This will provide the Study team with the best possible estimate of the amount of time that the respondent was involved in the activity.

How to Fill Out the Questionnaire

Consent Form: (1) Each questionnaire will be given a number at the beginning of the interview, which will be entered on both the consent form and in question 1. There are also spaces provided for entering the questionnaire number(s) of any additional interviews which need to be conducted in the household (these additional interviews will be identified when question #11 is answered).

(2) Read the consent form to explain why the study is being done. Inform the person of how long the interview will take and how many questions will be asked. If the person would like to look at the questionnaire, or answer a few of the questions before deciding to do the interview, this is fine.

(3) If the person decides to do the interview, make sure that the person signs the consent form. If the person does not wish to sign the consent form, but still wishes to do the interview, then the interviewer can sign the consent form for the respondent. Remember to write in the name of the respondent on the consent form if you sign your name for them.

(4) If the person declines to do the interview, the reason for declining should be noted on the consent form by the interviewer.

(5) The consent form will be removed by Darwin Paupanekis once he has checked to make sure that the questionnaire is complete. This will ensure that the information on the questionnaire remains confidential.

4. Ask the respondent to indicate where they are presently living.
5. If a respondent falls into more than one of the categories, then record which category best fits their wage employment over the last year.

An example of part-time & year round employment would be working part time at the Northern throughout the year, while an example of seasonal/casual employment would be working construction contracts when they are available.

6. The term "married" includes common law marriages. Ask the respondent to indicate their present marital status.
7. **MALE HEADS OF HOUSEHOLD REPORT THEIR CATCH, AND THE CATCH OF ANY FEMALES (INCLUDING THEIR PARTNER) AND ANY CHILDREN LIVING IN THE HOUSEHOLD.**

FEMALE HEADS OF HOUSEHOLD REPORT THEIR CATCH, AND THE CATCH OF ANY OTHER FEMALES AND ANY CHILDREN LIVING IN THE HOUSEHOLD.

ANY MALES LIVING IN THE HOUSEHOLD WHO WERE BORN BEFORE JULY 1, 1978 REPORT THEIR CATCH IN A SEPARATE INTERVIEW. WRITE THE NAME OF THESE PEOPLE, WHO ARE TO BE INTERVIEWED LATER, IN QUESTION #10 WHEN YOU CONDUCT THE INITIAL INTERVIEW WITH THE HEAD OF THE HOUSEHOLD.

8, 9, 10. Only the heads of households will answer these questions. Skip to question #11 for males who were born before July 1, 1978 and who are not the head of the household. The respondent should only indicate children, female adults and male adults which are presently living in the household.

11. Intensive hunter: Regularly engaged in harvesting activities during the annual cycle, and usually spends a month or more at a time in the bush.

Active hunter: Regularly engaged in harvesting activities during the annual cycle, and usually spends a week or more at a time in the bush.

Occasional hunter: Irregularly engaged in harvesting activities during the annual cycle, and usually spends a day or a weekend in the bush.

Non-hunter: Does not harvest country food at all.

12, 13. Only include traditional resources which are shared within the community. For example: If meat were sent to a family in Winnipeg it would not be included as a household in this question.

15. This includes vehicles which are used for commercial and domestic harvesting purposes. For this question it doesn't matter if the equipment is owned, rented or borrowed.

16, 22, 27, 33, 37, 42. If the person answers "no" to part 1 of any of these questions, then fill out part 2 to indicate the reason why they weren't involved in this resource harvesting activity. Then follow the instructions in bold, which indicate the next question to continue with.

If person chooses "other" in part 2, the interviewer should make a note of why the person did not harvest that type of traditional food. The interviewer should then give Darwin Paupanekis this information, who will keep a record. This separate record will make it easier for the Study team to review these comments when the data is analyzed.

18, 24, 30, 35, 40, 44. Ask the respondent to include time spent travelling to hunting, trapping and fishing locations when they estimate how much time they spent at each of these activities.

19, 20, 25, 31, 36, 41, 45, 46. The information from these questions is important because it is the basis of the land use maps which will be created for the final report. The study requires that people indicate 5 by 5 km squares where harvesting took place. Squares where harvesting activities took place are written in the questionnaire using the National Topographic System (NTS) code. This code is made up of 3 sizes of squares. The largest set of squares are indicated by 2 capital letters (eg. MR), the 10 by 10 km squares are indicated by 2 numbers (ranging from 00 to 99) and the 5 by 5 km squares are indicated by a 1, 2, 3 or 4 (see diagram). Therefore the final code for a location will have two letters and three numbers (eg. MR214). Make sure to include any zeros, if applicable, when indicating the 10 by 10 km squares (eg. write 02 instead of just 2). If a person indicates an entire 10 by 10 km square, then you don't need to enter the final number, as all four of the 5 by 5 km squares will be considered as marked (eg. MR21). If the number for the 10 by 10 km square is not written on the map, then figure out the number by following the example in the diagram below. Find the bottom left corner of the 10 by 10 km square (the one marked with the large black dot in the diagram). Then find the number on the bottom of the map which lines up with this corner (in the diagram it lines up with the number 2), and then the number on the side of the map which lines up with this corner (in the diagram it lines up with the number 1). Combine these numbers, the bottom number first and the side number second, to get the 10 by 10 km square number (in the diagram the combined number is 21).

If harvest activity took place in a location which is not on the NTS maps (eg. hunting for big game in Saskatchewan), then indicate the location by naming the province in which the resource harvesting activity took place and a landmark which is close to the location (eg. a town and highway, highway intersections). Mark the location on a roadmap if an obvious landmark does not exist. Make sure that location is written on the questionnaire, and that the Study team will be able to find the landmark which you indicated. Please remind the person being interviewed that the questionnaire is confidential, and that this information will make the study complete and accurate.

23, 28. This includes fish caught for domestic use by angling and with nets. If fish are sold later on (e.g. smoked and then sold), still include these fish in your report. Fish which are caught for dog food are also included in this question.

29, 39. For these questions, report harvest levels of sturgeon and big game for the two years previous to the study. We are collecting this additional information in order to make the study more complete.

34. The respondent should include commercial and domestic catches of furbearers. This includes furs which are discarded (e.g. damaged by predators, used for bait). This is unlike questions 18, 24, 29, 31, 39, 41, 44 and 49 which only ask for domestic harvests. Remember that for the purpose of this study, black bear are considered to be a furbearer.

36. If the respondent can provide specific trapping locations, then record the square numbers as is done with other questions using the coded maps. If the person traps in all areas of their trapline, and cannot indicate specific areas, then write the trapline number in the space.

38. For "Average number of people in the party", record the average number of hunters if there was more than 1 kill. For example: If there were 2 hunters for the first kill and 4 hunters for the second kill, then write in "3".

38, 39. For these questions, "harvest" means to kill and retrieve the animal. Do not include animals which were not found.

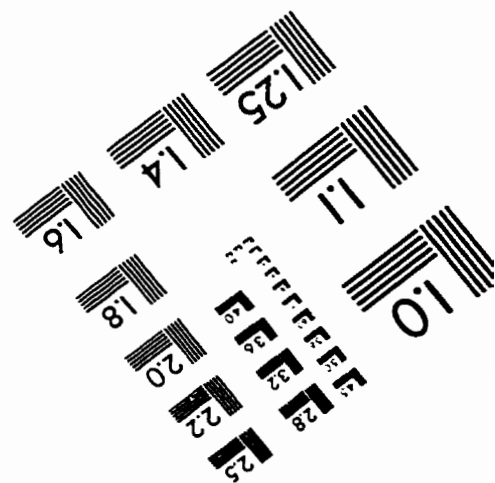
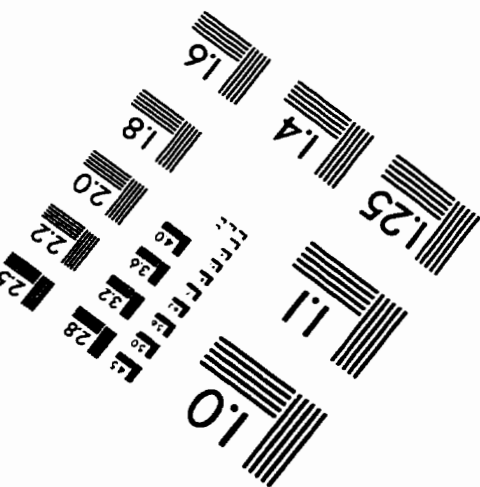
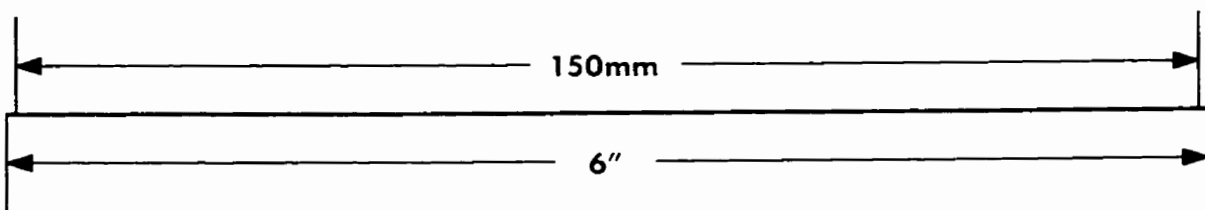
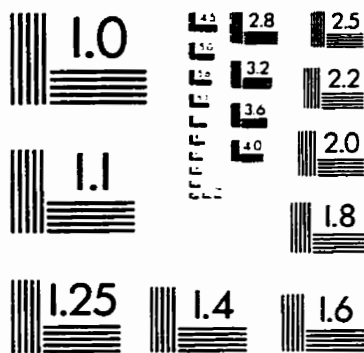
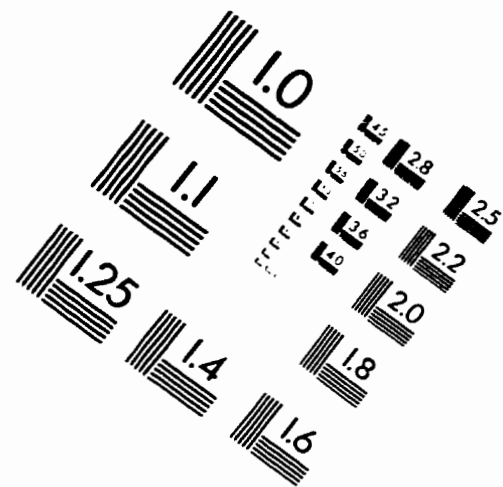
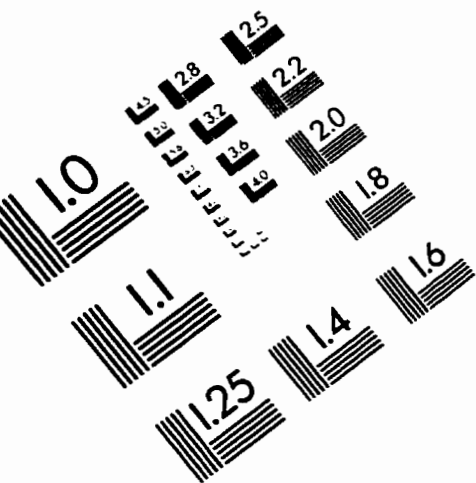
47, 48. "Wood for construction" includes wood which is cut by the respondent for purposes other than firewood (eg. building a cabin on a trapline).

Completing the Questionnaire

1. When the interview is completed, the questionnaire is reviewed by the Junior Interviewer to make sure that it is complete. If any components are missing, make sure to go back and complete them.
2. The questionnaire is then given to Darwin Paupanekis. As the Senior Harvest Interviewer, he will also read it over to make sure it is complete and will store it for safekeeping. The consent form will be removed to make the questionnaire confidential, and the information will be analyzed by the Study team.
3. Any additional comments which the Junior Interviewer may have should be written on a separate piece of paper and given to Darwin Paupanekis. These comments could include noting the willingness of the person to be interviewed, when people are available to be interviewed and how well people can answer the questions. It would be especially helpful to note any people who are willing to talk about harvesting country food before Jenpeg was built, as this is another component of the Study which will be conducted later.

Comments from the interviews which may be helpful for the consumption survey should also be recorded. The purpose of this is to make the second set of interviews run as smoothly as possible. A blank sheet of paper is provided at the end of the questionnaire for these comments.

IMAGE EVALUATION TEST TARGET (QA-3)



APPLIED IMAGE . Inc
 1653 East Main Street
 Rochester, NY 14609 USA
 Phone: 716/482-0300
 Fax: 716/288-5989

© 1993, Applied Image, Inc., All Rights Reserved