The Community of Cross Lake, Manitoba:

An Analysis of Resource Use and Land Occupancy

by

By Ian D. McDonald

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of the Requirements of the Degree,
Master of Natural Resources Management

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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.

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ACKNOWLEDGEMENTS

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ABSTRACT

The subsistence economy is an integrated and dynamic component of the total economy of the community of Cross Lake, Manitoba, even though it is much reduced when compared to its historical importance. This practicum examines three distinct aspects of the Cross Lake subsistence economy: (1) The general area of resource harvesting activities, species harvested and seasonal harvest activities; (2) The use and meaning of community toponyms (local place names) and their implications as indicators of land use and occupancy; (3) Qualitative information regarding the historical and contemporary sturgeon fishery, and community perceptions of the causes of changes to this fishery. This practicum also documents the process used in the Cross Lake Harvest and Consumption Study (CLHCS) to develop a harvest location mapping system, evaluates the effectiveness of this system and provides context for interpreting the harvest location maps.

Analysis of the subsistence economy reveals an existing, but changing, system of resource based activities. Most resource harvesting activities, except for some big game hunting and sturgeon fishing, are conducted within the Cross Lake Registered Trapline Area/Resource Area. A variety of species are harvested, and resource harvesting activities take place throughout the year. The sturgeon fishery has been impacted by overharvesting and habitat loss, and reflects changes to the subsistence economy as a whole. The Lake Winnipeg Regulation/Churchill River Diversion Project is identified as a major source of environmental degradation by the people of the community of Cross Lake. However, it is difficult to clearly identify the relative impact of overfishing, habitat loss and changes in habitat quality on the sturgeon fishery.

Community toponyms indicate historical and contemporary use, occupancy and traditional ecological knowledge of the Cross Lake region. Toponyms such as "ministiko

noot sipaneek" (duck hunting islands) and "ka o pa pis kak" (goose hunting grounds) indicate locations where resource harvesting activities took place. Names such as "ka peet a way teek" (monster made a forest fire here) and "o mata wupi win eek" (circumcision point) indicate the relationship between culture and the land, and others such as "ka wa say kamisik" (stops things from going past) and "witigo wi see pee" (weedless bay) indicate knowledge of the ecology of the region. Toponyms were also shown to be a culturally sensitive and locally relevant method of recording land use, as compared to the use of grid squares used in the National Topographic System maps. The naming of places supports community claims of the region as homeland for the people of Cross Lake, and promotes the need for further community involvement in facilitating and directing natural resource developments and management practices.

The mapping system developed for the CLHCS was effective as a result of community input during the questionnaire development process and when the interviews were being conducted. The harvest location maps probably provide a conservative estimate of actual harvest areas used. Documentation of travel routes, camp sites, archaeological sites and other areas of community importance would provide a more complete picture of total community land use.

Chapter 1
INTRODUCTION

1.1 Background

Many aboriginal communities in northern Manitoba have a historical and continuing relationship with the natural environment. The subsistence economy is one part of this relationship, but is a component of the total community economy that has been generally declining in importance in northern Manitoba. Possible factors for this decline include changes to the natural environment, increased community populations and a shift from subsistence economies to economies based on industrial, information and service activities. Understanding various aspects of the subsistence economy, and some of the methods used to study it, are therefore important for understanding the impact of environmental change on northern aboriginal communities.

Land use studies have been conducted in Canada since the 1970s, and are a common method of describing the relationship between northern aboriginal communities and the land (Hrenchuk, 1993; Berkes et al., 1995). These studies have been used to describe the type and amount of resources harvested, land use areas (including areas such as resource harvest sites, travel routes, camp sites, areas of community importance and archaeological sites), seasonal resource harvesting activities and the economic importance of subsistence activities in northern communities. When combined with information such as the history and culture of the region, land use studies reinforce the cocept that the north was, and continues to be, a homeland for aboriginal people.

The Cross Lake First Nation is one of the many communities of northern Manitoba that has a society, culture and economy involving natural resource harvesting activities.

However, developments such as the Lake Winnipeg Regulation (LWR) hydroelectric development, forestry and mining, and natural disasters such as forest fires have affected the ability of the Cross Lake First Nation to maintain a subsistence economy. The performance of the subsistence fishery of Cross Lake and other lakes connected to the Nelson River system have been adversely affected by these developments and impacts (Bodaly and Rosenberg, 1990; Gaboury and Patalas, 1984). For example, unnatural water level fluctuations and decreased water levels have caused access problems, navigation problems and poor catch rates which have shut down the fishery of Cross Lake and impacted fishing in the Cross Lake region (Bodaly and Rosenberg, 1990). The domestic sturgeon fishery of the community of Cross Lake has been heavily impacted by overfishing and the loss of spawning habitat (Don Macdonald, pers. comm., 1994). Improving our understanding of the historical and present importance of the subsistence economy is required for establishing the impact of recent environmental and economic changes to the land and lifestyle of the people of Cross Lake.

1.2 Issue Statement

The Cross Lake Harvest and Consumption Study (CLHCS) was designed "to quantify changes in consumption levels of country foods in Cross Lake and to develop an understanding of the factors which may have affected any documented changes."[1]. The CLHCS consists of five research components: (1) Contemporary harvest of country foods; (2) Contemporary consumption of country foods; (3) Historical harvest of traditional foods; (4) Historical consumption of traditional foods; (5) Context of any documented changes in the harvest and consumption of country food over time. Although the work for this practicum is based around the CLHCS, results from this study will not be presented in

[1]Cross Lake Harvest and Consumption Study Proposal, 1994.

this practicum. Rather, this practicum is designed to complement the methodology and results of the CLHCS.

The research for this practicum was conducted: (1) To describe components of the subsistence economy of the community of Cross Lake; (2) To critique the process used for developing the resource harvest location maps used in the Cross Lake Harvest and Consumption Study. The first component of this practicum describes the extent and seasonality of subsistence resource harvest activities. The second component describes the process used to develop harvest location maps for the CLHCS in order to provide context for interpreting the maps and to continue the ongoing evaluation of mapping techniques in land use studies. Documenting toponyms of the Cross Lake region complements the first two sections by examining the relationship between the community of Cross Lake and the region, and by providing additional land use information. The final section provides a qualitative description of the traditional and contemporary sturgeon fisheries, and examines some of the changes, and community perceptions of these changes, that have occurred in this fishery over the past 30 years.

1.3 Objectives

The general purpose of this project was to document components of the subsistence economy of the community of Cross Lake, and to document and critique components of the CLHCS. Specifically, the objectives of this research were:

(1) To document the species currently harvested and the contemporary seasonal cycle of harvest activities by the community of Cross Lake

(2) To document and evaluate the process of determining contemporary harvest locations for the CLHCS.

(3) To document toponyms of the Cross Lake area.

(4) To compile historical and contemporary information of the Cross Lake domestic sturgeon fishery.

1.4 Methods

Information was gathered by: (1) Conducting formal and informal interviews with residents of the community of Cross Lake, Manitoba regarding subsistence resource harvesting activities, methods for developing a resource harvest location mapping system for the CLHCS and community toponyms; (2) Reviewing and compiling literature regarding the historical and subsistence fisheries of the community of Cross Lake. Details of the methods are provided in Chapter 3.

1.5 Definition of Terms

Co-management:

Co-management is the combination of local-level and state-level management systems. In the Canadian north, state level management is usually conducted by a central authority and is based on scientific information, while local-level management is decentralized, relies on self-regulation, and is based on "custom, practice, cultural tradition, and the local knowledge of land and animals."[2] Co-management initiatives are most effective when they combine the strengths of these two systems (Berkes et al., 1991).

Land Use:

Land use describes the interrelationship of the community and the resources of a particular geographic area (Hrenchuk, 1991). Previous land use studies have included resource

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[2]Berkes, F , Peter George and Richard J. Preston. 1991. Co-management: the evolution in theory and practice of the joint administration of living resources. Alternatives 18(2): 12-17.

harvesting areas, travel routes, campsites and areas identified as significant by the community.

Land Occupancy:

Land occupancy refers to a " group's collective sense of its own territory in relation to that of others...[which]...rests on the premise of traditional and continuing knowledge of the land and its resources."[3] The result of long term occupancy of an area is a territorial interest and a sense of ownership of an area by a community (Hrenchuk, 1991). Land occupancy differs from land use in that is based on the non-economic concepts of land use, such as residences, birth places, burial locations, travel routes, place names, spiritual locations, locations which appear in myths and in historic stories and spatial dimensions of traditional ecological knowledge (Brody, 1980; Hrenchuk, 1991).

Toponym:

A toponym is "A name of a place; in scientific terminology, a name designating a region...or indicating the location or place of origin of the thing named..."[4] Documenting community toponyms is one technique for demonstrating land use and land occupancy by communities (Muller-Wille, 1987; Hrenchuk, 1993).

Resource Area:

A community resource area, as defined by the *Northern Flood Agreement*, is approximately the size of its trapline zone but also includes the rivers and lakes which were traditionally available to and used by them as a source of food supply, income-in-kind and income

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[3]Hrenchuk, Carl. 1993. Native land use and common property: whose common? in Julian T. Inglis (ed.) *Traditional Ecological Knowledge: Concepts and Cases* Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Centre.

[4]Webster's New International Dictionary. 1950. Second Edition, Unabridged. New York: New York.

(Government of Canada/Government of Manitoba, 1977). Trapline zones are indicated by Registered Trapline (RTL) maps.

Subsistence Activity and Economy:

Subsistence activities are the use of resources "by a resident for direct personal or family consumption as food, shelter, fuel, clothing, tools or transportation; for the making and selling of handicrafts out of non-edible by-products of fish and wildlife taken for personal or family consumption; and for the customary trade barter, or sharing for personal or family consumption."[5] The subsistence economy is therefore the production that results from these activities.

Traditional Ecological Knowledge (TEK):

Traditional ecological knowledge has been defined as "a cumulative body of knowledge and beliefs handed down through generations orally and by example, about the relationship of living beings (including humans) with one another and with the environment."[6] TEK has been recognized as a source of both ecological information and as a system for resource management (Fast and Berkes, 1994).

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[5]McKerness, L. 1993. The Cross Lake Subsistence Study, Schedule B of The Cross Lake Settlement Agreement, Arbitration Order under the Northern Flood Agreement-Claim Nos. 44/110. p.5.

[6]Haugh, A. 1994. Balancing Rights, Powers and Privileges: A Survey and Evaluation of Natural Resource Co-Management Agreements Reached by the Government and First Nations of Manitoba. Practicum submitted to the University of Manitoba, Natural Resources Institute. pg. 17.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

This practicum covers a range of aspects of the Cross Lake subsistence economy, and therefore background information regarding five topics is provided: (1) The size and location of the community of Cross Lake; (2) The impact of the Lake Winnipeg Regulation/Churchill River Diversion hydroelectric project (LWR/CRD) on the environment of the Cross Lake region; (3) The use of aboriginal land use studies in northern Canada and their methodologies; and (4) Lake sturgeon ecology; (5) Aboriginal lake sturgeon fisheries. These topics provide the necessary background for understanding the operation of the subsistence economy, the context in which changes to the subsistence economy have taken place, and for understanding the need and requirements for critiquing the resource harvest location mapping methodology.

2.2 Cross Lake, Manitoba

The community of Cross Lake is located along the Nelson River where it enters Cross Lake (Figure 1). The Cross Lake First Nation is signatory to Treaty #5, and is one of the five First Nations covered by the Northern Flood Agreement. A 1992 survey by M.O. Harvey and Associates indicated a community population of 3,142, of which 2,759 were First Nation members. The total population of the community of Cross Lake in 1994 was estimated to be 4,000 (Ernie Scott, personal communication).

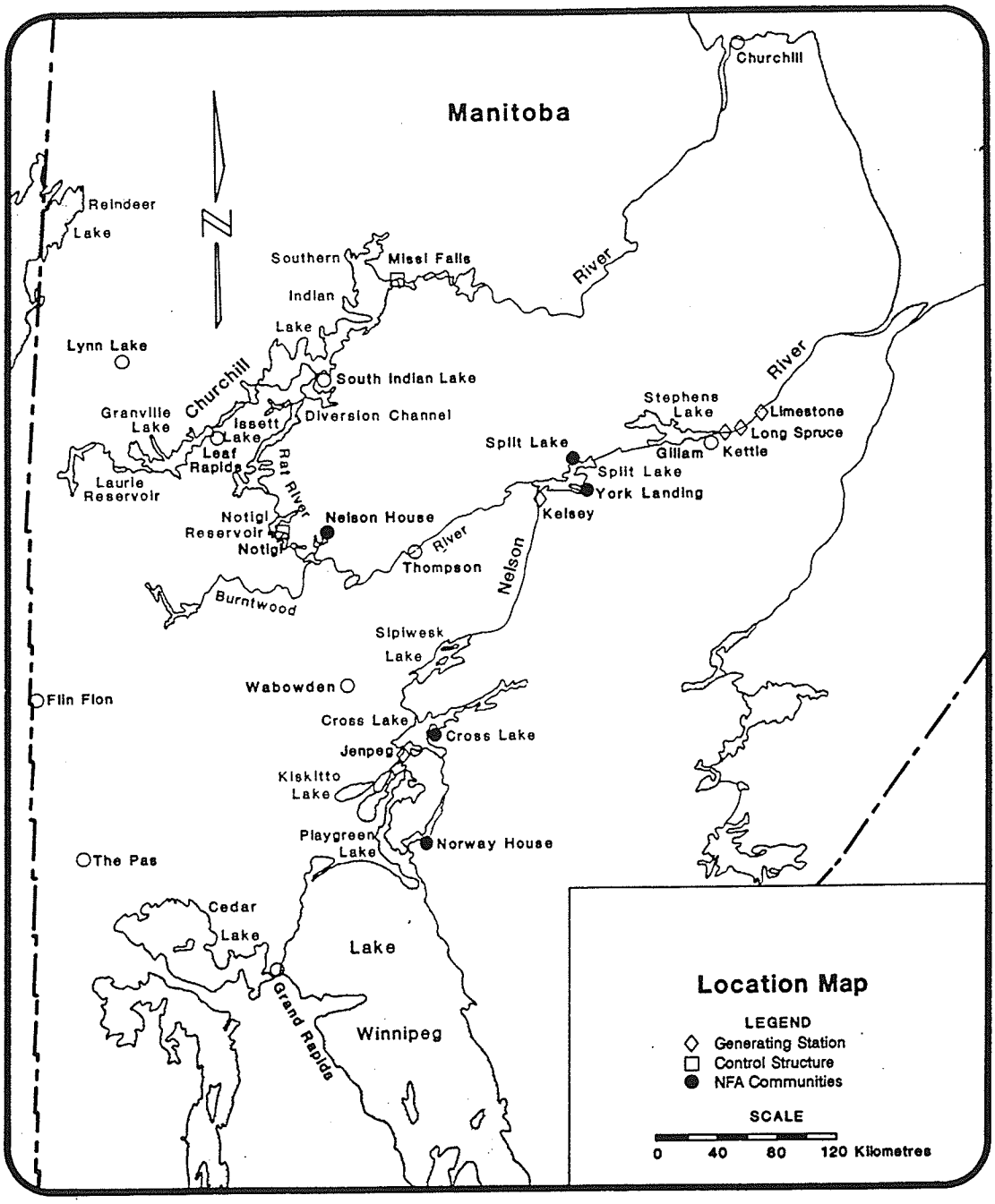

Figure 1: Location of the community of Cross Lake, Manitoba and the Lake Winnipeg Regulation-Churchill River Diversion Project. Other Northern Flood Agreement Communities are also identified (Source: Government of Canada, Department of the Environment, 1989)

2.2.1 History of Development

The name for the Cross Lake community comes from an English translation of the Cree word "Pemichigamow", meaning "it lies athwart" (Collinson et al., 1974). Cross Lake was one of the waterways traveled in the early part of the 18th century by the Swampy Cree who trapped in the Cross Lake region during the winter. The arrival of the Hudson Bay Company (HBC) in the 1770s brought the fur trade to the region. In 1886 a permanent trading post had been established at Cross Lake and many of the First Nation people were involved in both the subsistence and wage economies.

In 1875 the First Nation people of Cross Lake signed Treaty #5, and a reserve boundary was established. Between 1900 and 1940, infrastructure in the form of houses and air service was established in Cross Lake (M.O. Harvey and Associates Ltd., 1992). Regular air service and the development of a network of roads allowed the commercial fishery to expand after World War II. Since the mid-1960s, there has been increased involvement of the federal and provincial governments in the form of education, economic and resource development initiatives, social assistance and improved community services (Nelson River Group, 1984).

The major land uses of the Cross Lake community are trapping, commercial fishing, subsistence hunting and fishing, and forestry (Nelson River Group, 1986). The Cross Lake Registered Trapline area, which was mapped in 1949 and covers approximately 13, 986 km^2 (5,400 square miles)(Nelson River Group, 1986), is shown in Figure 2. Like many First Nation communities in northern Manitoba, Cross Lake has been affected by large scale natural resource developments which have changed the importance of the subsistence economy and patterns of land use. Forestry and hydroelectric development have both been a source of wage

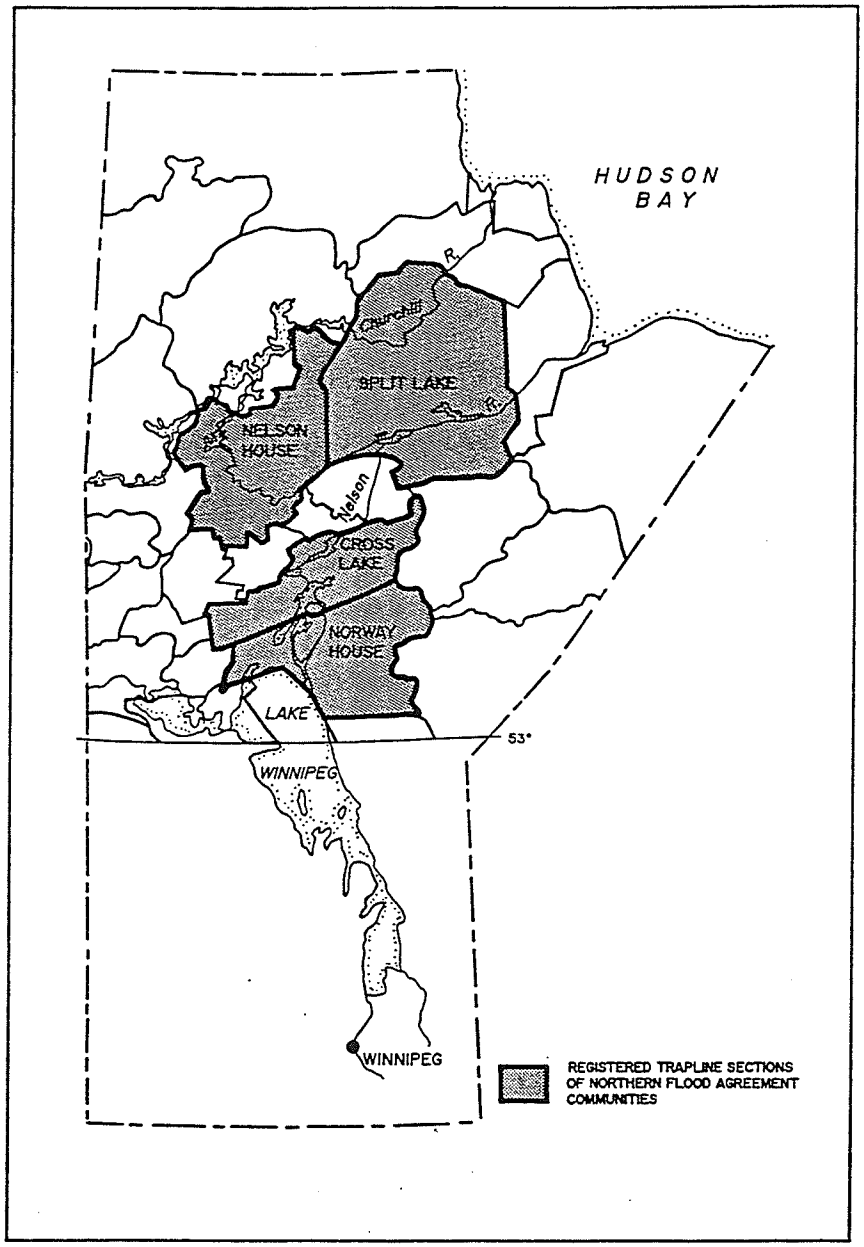

Figure 2: Registered Trapline (RTL) Area for the Cross Lake First Nation (Source: Usher and Weinstein, 1991) and other Northern Flood Agreement communities.

income. The recent discovery of an estimated 40 million tonnes of vanadium, titanium and iron on land owned by the Cross Lake First Nation has created the potential for further economic development for the community of Cross Lake (Wild, 1993).

2.3 Environmental Impact of the Lake Winnipeg Regulation/Churchill, Nelson Rivers Hydroelectric Project

Hydroelectric developments in Canada have increased in number, size and complexity in recent decades (Rosenberg et al., 1987). By 1972 there were some 365 hydroelectric projects in Canada which affected over 200 rivers and streams (Efford, 1975), while water diversions as a result of three major hydroelectric developments (the Churchill Falls Project, the Churchill-Nelson Diversion and the la Grande River Project) have made Canada the largest diverter of water in the world (Day and Quinn, 1987). The promotion of hydroelectric projects and water impoundments as developments that create limited environmental impacts (Manitoba Hydro, n.d.; Abelson, 1985) and utilize water that would otherwise be "wasted" (Bourassa, 1985; Kierans, 1988) has been refuted in the literature (e.g. Ellis, 1941; Geen, 1974; Efford, 1975; Baxter, 1977). Increasing environmental awareness in the late 1960s, and conflicts between northern people who rely on natural renewable resources and project proponents promoted the need for more comprehensive impact assessments (Rosenberg et al., 1987).

The Lake Winnipeg, Churchill, Nelson (LWCN) Rivers Hydroelectric Project is the major hydroelectric development in Manitoba, and created the first large river diversion and lake impoundment in a widespread permafrost zone (Newbury, 1992). The potential for hydroelectric development in northern Manitoba was recognized in the 1900s by federal water power surveys and was confirmed in the 1940s by provincial surveys (Hecky et al., 1984). Feasibility studies were conducted in the 1940s by the provincial government and

in the 1960s by Manitoba Hydro, which concluded that a high level impoundment of Southern Indian Lake and diverting water from the Churchill River to the Nelson River would optimize the generation of electricity (Hecky et al., 1984). The first generating station on the Nelson River (Kelsey) was completed in 1961, and the Jenpeg generating station was built in 1974. The diversion of flow from the Churchill River to the Nelson River basin (with the construction of the Missi Falls and Notigi control structures) has been operating since 1977. The Kettle and Long Spruce generating stations on the Nelson River were completed by 1978, while the Limestone generating station began operation in 1990 (Manitoba Hydro, 1991). Two control structures (Missi Falls and Notigi) regulate water flows through the Burntwood-Rat Rivers diversion which link the Churchill and Nelson Rivers (Figure 1).

An environmental impact assessment (E.I.A.) of the LWCN Rivers hydroelectric project was not initiated until construction of the project had begun. The first study of post development impacts was conducted by Underwood-McLellan and Associates Ltd. (1970), and a federal-provincial environmental impact assessment was conducted by the Lake Winnipeg, Churchill and Nelson Rivers Study Board between 1971 and 1975 (Collinson et al., 1974)). By this time Manitoba Hydro had already set the basic configuration of the project and the operating regime (Rosenberg et al., 1987), and therefore these studies could not consider project alternatives which did not include flooding and the Churchill-Nelson diversion (Efford, 1975; Waldram, 1988).

In 1977 the *Northern Flood Agreement* (NFA) was signed between the government of Canada, the government of Manitoba, Manitoba Hydro and the Northern Flood Committee (NFC; with representatives from Norway House, Nelson House, York Factory, Cross Lake and Split Lake). The NFC filed Claim 18 in 1981, which alleged that Canada, Manitoba and Manitoba Hydro had failed to conduct a long-term coordinated

ecological monitoring and research program which would evaluate the impact of the LWCN Rivers hydroelectric project on the communities of the NFC. In response to Claim 18, the Federal Ecological Monitoring Program (FEMP) was initiated in 1986. The objectives of the study were to determine the pre development and post development conditions of the LWCN Rivers hydroelectric project area, to forecast future ecological conditions and to advise the public of the FEMP results with a focus on areas of NFC community interest (Environment Canada and Fisheries and Oceans, 1992). This study was not a complete E.I.A. as it was conducted after the construction of the LWR/CRD hydroelectric project, and was limited by the dearth of pre-development environmental data (Environment Canada and Fisheries and Oceans, 1992).

An E.I.A. of the impacts of the Lake Winnipeg Regulation (LWR) on the community of Cross Lake was conducted in response to the Northern Flood Agreement Arbitrator's Interim Order (11-2) of November, 1982. The purpose of this E.I.A. was to determine the impact of the LWR on the community of Cross Lake and environment of Cross Lake region, identify the distribution of all quantifiable and qualitative impacts within the community, evaluate the effectiveness of mitigation measures and to prepare an environmental impact statement (Nelson River Group, 1986). The study focused on issues which were identified as important by the Cross Lake community, and involved community input and consultation.

2.3.1 Impact of Hydroelectric Development on the Cross Lake Resource Area

2.3.1.1 Water Levels and Flows

A number of studies of water levels and flows were conducted before the Jenpeg hydroelectric facility began operation in 1974 (e.g. Thomas, 1959; Cleugh, 1974) and after

(e.g. Water Resources Branch, 1975, Manitoba Hydro, 1982). Gaboury and Patalas (1981; 1982; 1984) summarize water level data from previous studies (Figure 3). They conclude that the Lake Winnipeg Regulation has caused dramatic fluctuations in spring and fall water levels, and has decreased the volume of Cross Lake by 53%, lake area by 26% and mean water depth from 2.4 m to 1.5 m. Winter drawdown has also increased since lake water level regulation (Government of Canada, Environment Canada and Department of Fisheries and Oceans, 1992, Vol. 1: p. 2-11). The Nelson River Group (Nelson River Group, 1984; 1986) similarly concluded that the LWR has reversed the natural flow regime, and that fluctuations in water levels have increased. The impacts of the LWR and the Churchill River Diversion (CRD) on Sipiwesk, Drunken, Pipestone, Walker, Kiskitto and Kiskittogisu lakes were not as severe as those for Cross Lake (Nelson River Group, 1984; 1986).

2.3.1.2 Erosion, Sediment Transport and Deposition

Erosion has not been identified and was not predicted to be a problem at Cross Lake because of the reduction rather than increase in lake volume (Nelson River Group, 1984; 1986). However, increased fluctuations of water levels causing increased re-suspension of sediments have been identified as the cause for increased water turbidity (Gaboury and Patalas, 1984; 1986).

2.3.1.3 Ice

Delayed freeze-up and increased slush ice downstream, and advanced freeze-up and irregular ice conditions along shorelines because of reservoir fluctuations have been documented as impacts of hydroelectric developments on ice conditions (Government of Canada, Environment Canada and Department of Fisheries and Oceans, 1992). Studies of

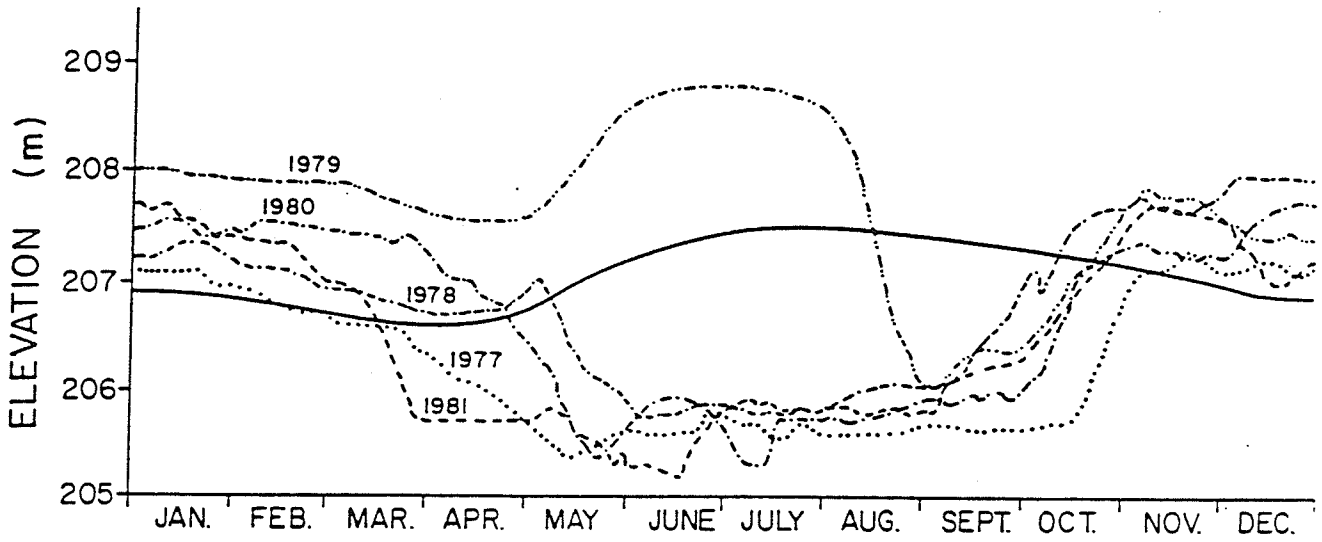

Figure 3: Comparison of average monthly water levels of Cross Lake, Manitoba under unregulated conditions (1918-73)(solid line) and daily levels recorded under regulation (1977-81)(dashed lines)(Source: Gaboury and Patalas, 1984)

changes in ice conditions in the Cross Lake region as a result of the LWR are contradictory. Pre-regulation ice conditions were documented by Manitoba Hydro in 1973 and 1974. Post-regulation studies have stated that ice thickness has increased (Manitoba Hydro, 1983), while The Nelson River Group (Nelson River Group 1984; 1986) documented community concern that there has been an increase in slush-ice as a result of the LWR.

2.3.1.4 Water Chemistry and Quality

Water quality data of Cross Lake (e.g. Thomas, 1959; Cleugh, 1974; Koshinsky, 1973) were collected before the LWR. Post development analyses of Cross Lake water quality by Gaboury and Patalas (1981; 1982), Duncan and Williamson (1988) and Ramsey et al. (1989) suggest that there were increases in carbon, potassium and water turbidity.

2.3.1.5 Biological Parameters

Studies of biological parameters have focused on the fisheries of Cross Lake, and to a lesser extent, of other lakes in the region. Pre-development impact studies provide baseline information about the benthic and fish communities of Cross Lake, and fisheries data and commercial harvest statistics for Pipestone, Walker, Playgreen, Kiskittogisu and Kiskitto lakes (Driver, 1965; Driver and Doan, 1972; Koshinsky, 1973). Studies of the post-regulation Cross Lake fishery by Gaboury and Patalas (1981, 1982) and The Nelson River Group (Nelson River Group, 1984; 1986) conclude that a number of significant fisheries impacts can be directly linked to the LWR. These include a decrease in primary and secondary productivity, losses of spawning and feeding habitat, reduced access to spawning and feeding areas, reduced reproductive success, changes in species composition and increases in the number of summerkill and winterkill events. Changes in species composition and a reduction in lake whitefish and walleye spawning success as a result of

the LWR was also documented for Pipestone Lake (Sopuck, 1987). Mercury levels in the lakes of the Cross Lake region were determined by Williamson (1980), while mercury levels in fish were determined by the Department of Fisheries and Oceans in 1982. Both of these studies indicate that mercury levels in fish of the Cross Lake area have not increased significantly since the development of the LWR.

A weir at the outlet of Cross Lake was constructed in 1991 to increase water levels in Cross Lake and to restore, as much as possible, the environmental conditions of the lake prior to the LWR. Monitoring of fish populations and a walleye and lake whitefish stocking program have been initiated in an effort to improve the Cross Lake fishery (Kroeker and Bernhardt, 1993).

2.3.1.6 Resource Harvesting Activities

A comparison of the pre-development and post-development subsistence fisheries in the Cross Lake region indicate that the LWR has had direct impacted this fishery. The Cross Lake region consists of 7 "on-system" lakes which are connected to the Nelson River, and 16 "off-system" lakes which are not. The "on-system" lakes were affected the most by the LWR (Gaboury and Patalas, 1984; Usher and Weinstein, 1991). Decreased fish populations have caused erratic catch success, while there have also been changes in catch composition and increases in the cost of fishing. Since the LWR there has been decreased participation in the commercial fishery in the Cross Lake region, while in Cross Lake the commercial fishery was closed in 1979 because of poor catch rates and access and navigation problems (Bodaly and Rosenberg, 1990; Usher and Weinstein, 1991). The commercial fishery remains closed in 1995. Access to fishing areas has decreased because of changes in water levels and because of propeller fouling as a result of increased aquatic macrophytes, while roads constructed as a result of Jenpeg provide easier access to

Kiskitto and Kiskittogisu Lakes and have decreased the cost of transporting fish to external markets (Nelson River Group, 1986). Changes in the water regime has also decreased the usefulness of traditional ecological knowledge (TEK), as fish locations and behavior have changed, some traditional travel routes are no longer navigable and new travel routes change unpredictably with water level fluctuations. Overall, impacts on fish populations as a result of the LWR have made subsistence fishing more expensive, less productive and less enjoyable (Usher and Weinstein, 1991).

In a study of the economy of the Cross Lake First Nation in 1972/73, Collinson et al. (1974) determined that income from the subsistence fishery was valued at $131,000 and made up 8% of the community income. However, the reliability of these figures is suspect because of: (1) Failure to report the size or the basis for selecting the sample of households; (2) Failure to report the selection of individual respondents; (3) Failure to report the instructions given to respondents; (4) Failure to describe problems with recall, definitions and in season variability; (5) The use of "meals" as the only source of measurement of food consumption; (6) The use of inappropriate portion sizes (Usher and Weinstein, 1991, p.15). Because this study does not appear to meet acceptable standards (Usher and Weinstein, 1991), these figures will not be considered in this practicum.

Changes to the trapping industry have also resulted from the LWR/CRD. Hilderman et al. (1982) documented losses in food production and indirect social and cultural effects from changes in beaver, otter, mink and muskrat trapping in the Cross Lake RTL/Resource Area as a result of the LWR. Trappers reported damage to beaver and muskrat habitat, and decreased reproduction of beaver and muskrat was anticipated because of changes in the water regime (Nelson River Group, 1986). Two reports (Hilderman et al., 1982; Nelson River Group, 1986) document changes in land use within the Cross Lake RTL/Resource Area as a result of the LWR. Forty eight traplines, affecting 80 full-time

and part time trappers, are estimated to have been affected by the LWR (Nelson River Group, 1986). The community trapline, which was used for recreation and youth education, was also damaged.

Decreased waterfowl populations in the Cross Lake area have been attributed to increased hunting pressure. The collection of fuelwood and timber has shifted from being a water-based activity to a road-based activity as a result of the construction of roads as a result of the LWR/CRD hydroelectric project (Nelson River Group, 1986).

2.4 Aboriginal Land Use and Occupancy Studies: Mapping Land Use

2.4.1 Introduction

Aboriginal land use studies have been conducted in Canada since the 1970s to document First Nation land claims, assess environmental impacts and to develop regional planning and resource management strategies (Usher and Wenzel, 1987; Fast and Berkes, 1994). These studies have been conducted across Canada: in the Northwest Territories (Freeman, 1976; Usher, 1990; Riewe, 1992; M.K.O. 1993), British Columbia (Brody, 1981), Saskatchewan (Ballantyne et al., 1976; Bergrand, 1978; Tobias, 1987; Tobias and Kay, 1994), Manitoba (Hrenchuk, 1991; Hill, 1993; MKO, 1993; Stock, 1994), Ontario (Hughes et al., 1983; Kayahna Tribal Council 1985; Thompson and Hutchinson, 1989), Quebec (Weinstein, 1976; JB&NQNHRC, 1982; JB&NQNHRC, 1988; Hydro-Quebec, 1993) and Labrador (Brice-Bennett, 1977a).

In most cases, these studies have included sections mapping land use or components of land use, such as harvest areas or travel routes. Documenting the development of the mapping techniques used in these studies, and understanding the

challenges of obtaining accurate spatial information is an important part of designing the mapping component of land use studies and in interpreting their results. This section concludes with land use information for the community of Cross Lake compiled from previous studies of the Cross Lake region, which provides anecdotal information regarding the extent of land use and serves as a baseline for resource harvest location information obtained through the CLHCS.

2.4.2 Land Use Mapping Techniques

Three main approaches have been used to map land use and occupancy in land use studies. The first documents harvest areas and harvest intensity, the second documents individual and community land use, and the third documents conflicting land uses in a region. The first two methods have been used mainly for aboriginal land claims, while the third method has been used in conflicts between communities wishing to protect subsistence economies and large scale resource developments.

The first approach was originally used in the Fort George Resource Use and Subsistence Economy Study (Weinstein, 1976). Harvest areas and harvest intensities were mapped for approximately 40 species; including mammals, birds and fish. The harvest data was then converted into food weights, and the final maps indicated the spatial distribution of annual domestic harvests over a 60,000 km area. A similar approach was used in the Technology Assessment in Subarctic Ontario (TASO) studies (Hughes et al., 1993; Berkes et al., 1995) (Figure 4). This approach is an excellent method for mapping the intensity of land use over short periods of time, but may be affected by annual variability in land use patterns (Weinstein, 1993)

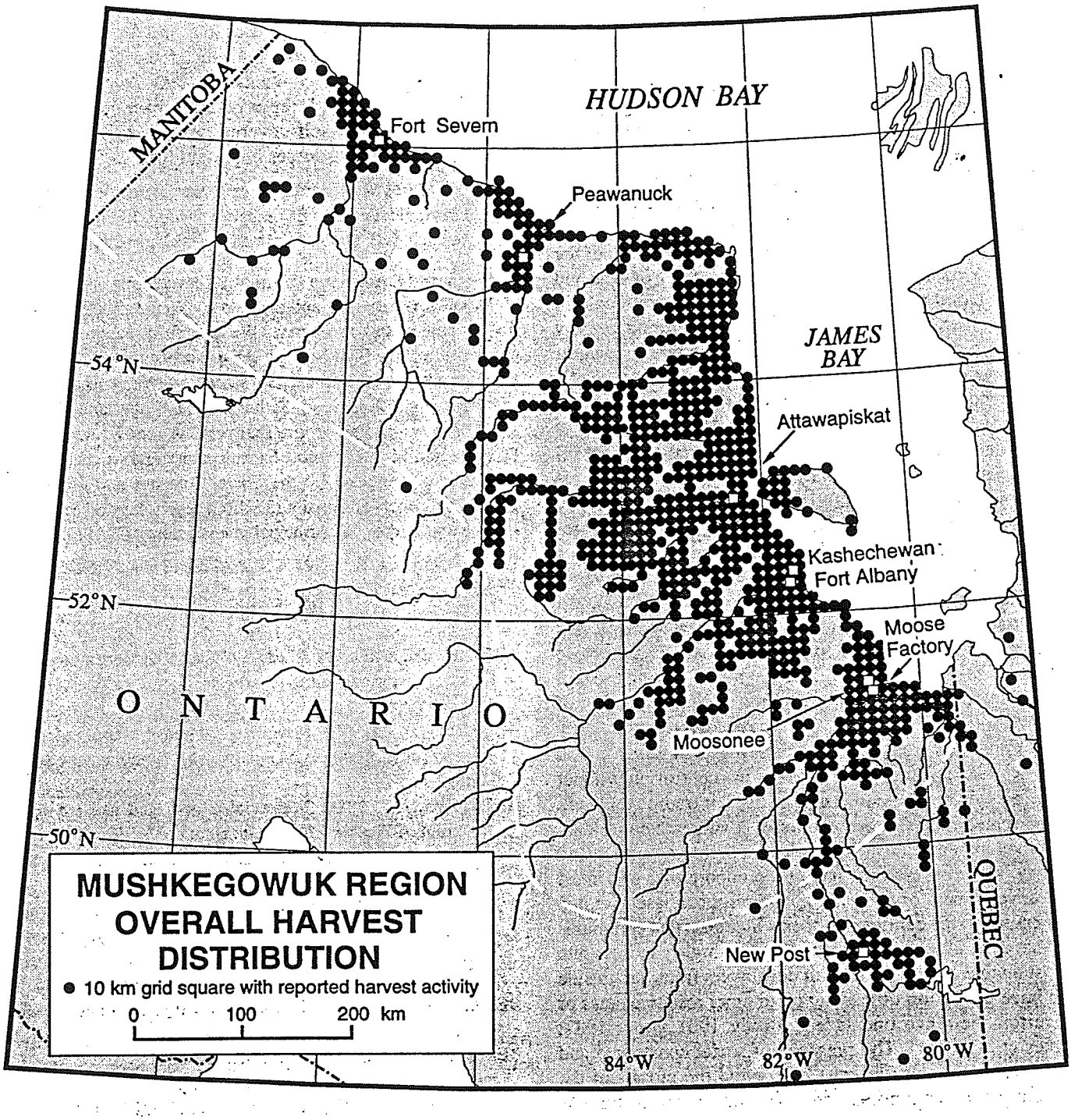

Figure 4: Resource harvest location map for Mushkegowuk Region, Ontario. Black dots indicate harvest areas for all major species, all seasons, all communities (Source: Berkes et al., 1995)

The second approach was developed for the Inuit Tapirisat Land Use and Occupancy Study (Freeman, 1976), and has been used since then in a number of other land use studies (e.g. Brice-Bennett, 1977b; Weinstein, 1979; Brody, 1981; Kayahna Tribal Council, 1985; Usher, 1990; Hrenchuk, 1991; Hill, 1992; Riewe, 1992). This approach is based on the creation of a map biography, which is "a map compiled by each hunter interviewed showing the areas he had hunted, trapped, fished and camped during his adult life" (Freeman, 1976). Community land use is determined by combining individual map biographies (Figure 5). The density of the lines indicating land use areas provide a crude estimate of the intensity of land use by the community, while the outer limit of these lines delineates the total area used within living memory.

The third method combines land use and occupancy techniques with the mapping of existing non-aboriginal land use and resource tenures in order to identify potential and existing land use conflicts. The first study to use this approach was the Northeast British Columbia Land Use and Occupancy Study (e.g. Union of British Columbia Indian Chiefs, 1980; Brody, 1982). This study involved 4 components: (1) A map biography survey; (2) A current subsistence harvest survey; (3) Documenting systems of land use, and: (4) Mapping and analyzing competing resource developments and the recreational harvest of wildlife. Spatial information of land use, land resource tenures, and agricultural and industrial resource land use were combined to indicate the extent of conflicting land uses. Both interviews and participant observation were important techniques for providing context for this spatial information. This included gaining an understanding of the systems of land tenure and resource management, and the conflicts between these systems and subsequent land settlement and resource developments (e.g. Brody, 1981). The use of this land use and occupancy mapping techniques was further diversified by the Nimpkish Valley Study (Weinstein et al., 1982; Weinstein, 1991). This study involved the mapping of land and resource tenures, resource use and aspects of bio-physical capability in order to

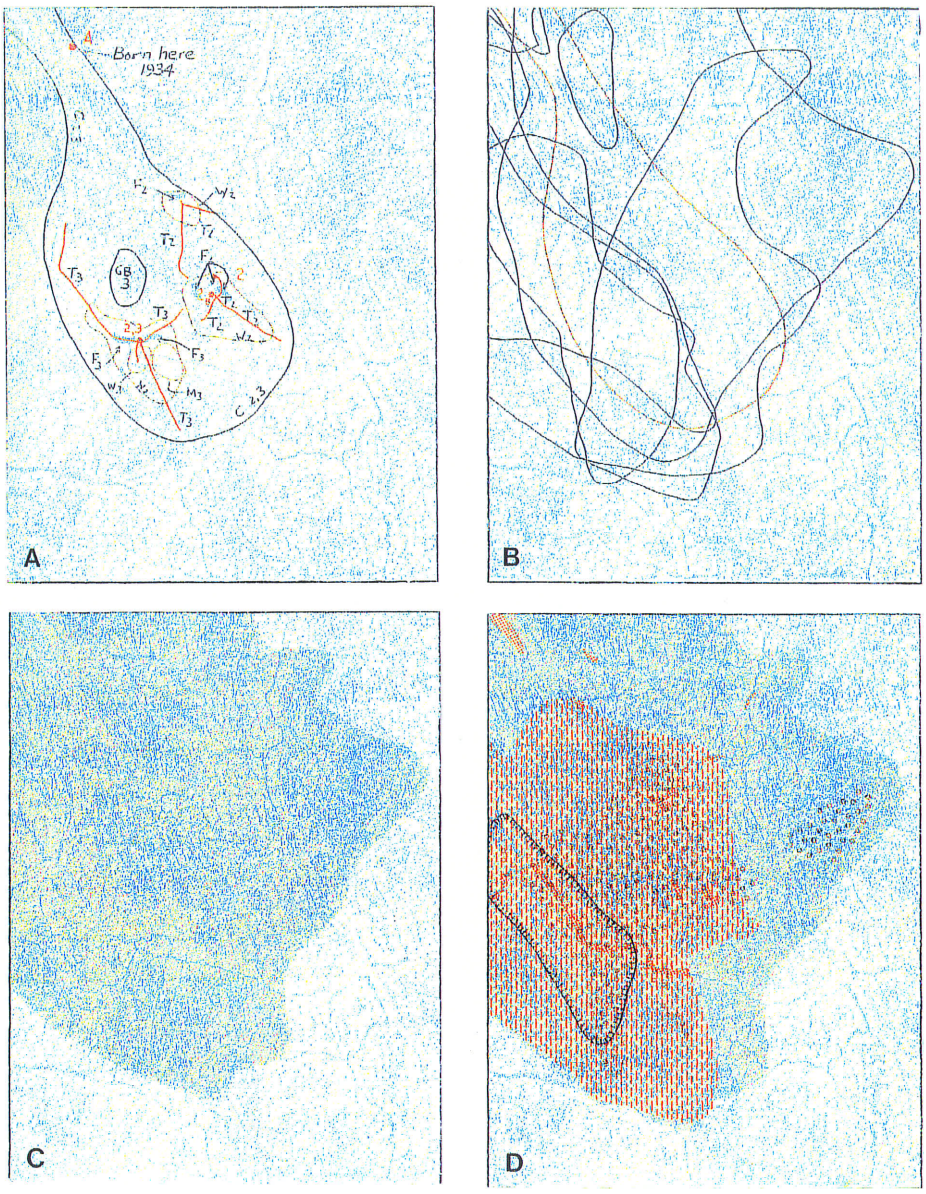

Figure 5: Stages of creating community land use maps from map biographies. (A) A single map biography of one hunter, indicating hunting areas for all species over multiple time periods; (B) Compiled map biographies of all hunters in an area for a single time period, caribou hunting locations only; (C) Combined caribou hunting areas of all hunters for a single time period; (D) Community land use map, combining hunting areas for multiple species (indicated by different colours and patterns) over a single time period (Source: Freeman, 1976)

demonstrate shortcomings in government resource management planning and to gain a better understanding of the spatial aspects of natural resource conflicts in the Nimpkish Valley (Weinstein et al., 1982; Weinstein, 1991).

2.4.3 Interviews

Aboriginal land use studies have relied on recall surveys rather than direct observation as the principal technique for collecting harvest data. This is because of the difficulties of observing native harvesters, who typically "foray repeatedly over large areas in small, mobile parties."[7] Direct observation techniques such as participant/observation are therefore used only for data verification rather than as a primary data collection technique. As a result of this reliance on recall surveys, interview techniques and content have to be carefully considered.

Slight variations in question wording can affect the size of the area indicated. Requesting respondents to identify struck and retrieve locations (locations where resources were "shot, trapped, netted, snared, as appropriate"[8] and then retrieved) is the most appropriate request, as this is the information which respondents commonly assume is being asked and is the information which they are the most likely to recall (Usher and Wenzel, 1987). In addition to appropriate terminology, any translations of land use questions in recall surveys must be done carefully in order that the original meaning does not become distorted (Freeman, 1976).

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[7]Usher, P.J. and G. Wenzel. 1987. Native harvest surveys and statistics: a critique of their construction and use. Arctic 40(2): 145-160.

[8]Usher, P.J. and G. Wenzel. 1987. Native harvest surveys and statistics: a critique of their construction and use. Arctic 40(2): 145-160.

The scale of the maps used in the interviews has also been recognized as an important issue (e.g. Freeman, 1976). Interviews can be conducted quickly if the respondents are familiar with the maps which are used, the maps should have sufficient detail for the purpose of the project and should be of a practical size for use and transportation.

Ensuring confidentiality of information is another important aspect, as interviews can involve revealing personal information or information of illegal activities (Tobias, 1987). Having the interviews conducted by trained community members, as was done in a number of studies (e.g. Hughes et al., 1993) makes the respondents more comfortable and can increase response rates (Usher and Wenzel, 1987).

2.4.4 Informant Recall

A critically important issue in land use studies is the ability and desire of interviewees to accurately recall harvest location information. Previous land use studies have concluded that information recall among Inuit is highly reliable within living memory, especially in relation to information about hunting and the environment (Arima, 1976). Similar conclusions regarding the extent and accuracy of information recall with regards to environmental knowledge have been documented for other aboriginal groups (e.g. Brice-Bennett, 1977a; Riewe,1991; Cooke, 1984). Concern about the accuracy of recall (*recall bias*) for harvest levels has been a factor in limiting the time scale for most resource harvest studies to the most recent one to two seasonal cycles. Accurately recalling fish harvests has been recognized as a problem in previous studies (Usher and Wenzel, 1987), while estimates of big game harvests are thought to be accurate for at least two seasonal cycles (Hughes, et al., 1993). Verification techniques include looking for consistencies in land use information gathered from individual interviews (e.g. the location of campsites)

(Freeman, 1976; Brody, 1981), comparing information with previous studies if they exist (Hughes, et al., 1993), participant observation and distributing journals to harvesters as a memory recall aid.

The problem of *strategic bias* results from respondents not wishing to provide accurate location information in order to deliberately influence the results of the study (Usher and Wenzel, 1987). Respondents can bias harvest location maps by either indicating resource harvest locations that were not used, or by failing to report resource harvest locations. There are no straightforward methods for eliminating strategic bias, although motivation for deliberately reporting inaccurate results can be reduced by ensuring respondent confidentiality and building trust between researchers and respondents (Usher and Wenzel, 1987).

2.4.5 Use of Land Use Studies

Land use studies have been conducted for different purposes, and have therefore led to different conclusions. Most have indicated that resource based activities are an important part of the economy and culture of aboriginal groups (Freeman, 1976; Brody, 1981; Hrenchuk, 1991; Hill, 1993). Studies of historical and contemporary land use have shown that in some cases land use has changed over time (Brice-Bennett, 1977a; Hill, 1993), and that these changes have resulted from ecological, seasonal and environmental factors (Brice-Bennett, 1977a). The impact of forestry, mining, hydroelectric facilities and petroleum developments have been mentioned in a number of land use studies. Hydroelectric developments were a common concern because of their potential and documented effects, such as the loss of land due to flooding and altered water regimes. These impacts have affected First Nation resource based activities, which in turn have had both direct and indirect effects on their economy and culture.

Previous land use studies have revealed inconsistencies in contemporary boundaries used to delineate land use by northern aboriginal communities. Two land use studies conducted in northern Manitoba both concluded that the RTL system typically under represents the areas used by First Nation communities in Manitoba (Hrenchuk, 1991; Hill, 1993). These studies have also criticized the RTL system for not accommodating flexibility in the use and location of traplines, which was common before its implementation in the 1940s (Hill; 1993).

2.4.6 Land Occupancy

Land use studies have also been used to document land occupancy. Land occupancy differs from land use as it delineates territoriality or ownership of an area by a community (Hrenchuk, 1993), rather than documenting the extent and intensity of the areas and resources used by a community. Land occupancy results from the long-term use of an area, and is manifested in the traditional ecological knowledge of the people (Hrenchuk, 1993).

The identification of land occupancy has become an important part of land use studies in northern Manitoba because of different views of land ownership held by the provincial government and northern aboriginal communities. Ownership and management of unoccupied Crown land is held by the provincial government; this land is typically considered to be public property to which access is open. Therefore, aboriginal communities have no management authority regarding these resources. However, the concepts of traditional use and occupancy of lands contradict these assumptions of ownership and rights to manage and use unoccupied Crown lands (Hrenchuk, 1993). Many northern aboriginal communities consider these areas as homelands as a result of continued use and intimate knowledge of the land by the communities (Hrenchuk, 1993).

These differences in opinion regarding ownership of the land have often resulted in "non-compliance with state-imposed regulation and allocation with respect to resources where there are resource pressures or conflicts."[9] Recognizing occupancy of northern regions by aboriginal communities in northern Manitoba is a first step towards solving some of these natural resource conflicts.

Demonstrating occupancy of an area by a community involves documenting knowledge of that area. Previous studies have done so by mapping travel areas, documenting the presence and geographic extent of traditional ecological knowledge, and by documenting local place-names, or toponyms (e.g. Muller-Wille, 1987; Hrenchuk, 1991). Toponyms are indicators of land occupancy, as they "...represent the intricate and intimate relationship between people and their environment in many ways and dimensions...In their context and application they convey the knowledge, use and occupancy of named spaces by the people to whom this land is their own, their homeland."[10] These techniques result in the identification of an area in which the community has extensive knowledge. This area typically consists of a well defined core and an outer region with less defined boundaries (Hrenchuk, 1993).

The documentation of community land occupancy in northern Manitoba has demonstrated: (1) The basis for differences in understanding of land and resource issues between the state and a northern aboriginal communities. These differences result from the presence of two concepts of land ownership: provincial and federal jurisdiction over land and resources in northern Manitoba resulting from *The Constitution Act, 1867*, and the

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[9]Hrenchuk, Carl. 1993. Native land use and common property: whose common? in Julian T. Inglis (ed.) *Traditional Ecological Knowledge: Concepts and Cases* Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Centre.

[10]Muller-Wille, Ludger. 1987. *Gazetteer of Inuit Place Names in Nunavik (Quebec, Canada)*. Avataq Cultural Institute, Inukjuak, Quebec.

territorial interest of aboriginal communities which has resulted from long-term use and occupancy of an area that has supported their culture and allowed for the survival of their people (Hrenchuk, 1993); (2) The existence and operation of traditional ecological knowledge of land occupied by northern aboriginal communities; (3) The contradiction between views of development which exist in northern Manitoba regarding natural resource developments. Northern Manitoba is often thought of as an unoccupied wilderness in mainstream Manitoba culture, a fact which has made large scale natural resource developments better able to succeed (Hrenchuk, 1993). However, land occupancy studies in Manitoba refute this wilderness paradigm: "If land use and occupancy studies were to be carried out across northern Manitoba, it is likely that this wilderness theme would be refuted at almost every point. These lands are known, named by local custom, and in use."[11] The recognition of land occupancy by aboriginal communities in northern Manitoba presents a new view of the impact of northern development: where developments were once considered to be impacting unoccupied, common property, they must now be considered to be impacting lands which are known, used and occupied by northern aboriginal communities (Hrenchuk, 1993).

2.4.7 Land Use by the Community of Cross Lake, Manitoba

Although a land use study of the community of Cross Lake has not been conducted, descriptions of historical and contemporary land use have been made. Historical land use patterns were based on accessibility from lakes and rivers which served as travel routes (Nelson River Group, 1986). Canoes, and later motor boats, were used to travel in a 40-60 km radius from the community. This included "the Minago River to the west, the

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[11] Hrenchuk, Carl. 1993. Native land use and common property: whose common? in Julian T. Inglis (ed.) *Traditional Ecological Knowledge: Concepts and Cases* Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Centre.

Nelson River on the south as far as Norway House, the Echimamish River on the south-east, the Walker River and Lake on the east and the Sipiwesk Lake on the north extending as far as Thicket Portage"[12] Water-based transport remains an important mode of travel, although waterways and portages used for transportation have changed with changes in water levels (Nelson River Group, 1986). Travel during the open water season has been restricted by lower water levels, and clogged props have become more common with the increased number of aquatic macrophytes. Increased slush ice in the winter has also been restricted travel, as these areas cannot be avoided as easily as before (Nelson River Group, 1986).

The construction of Jenpeg, and subsequent developments, have changed land use by the community of Cross Lake: "Over a period of 10 years the Cross Lake settlement was essentially transformed from an isolated community with no proper airstrip and no permanent road access to one with almost a year-round, all weather road access as well as a graveled all-weather airstrip"[13] (Nelson River Group, 1986). The all weather road linking provincial road 391 to Jenpeg was constructed as part of the Jenpeg facility, and was connected to Cross Lake in 1981. Additional roads from Jenpeg to Norway House, and from Jenpeg west along the Nelson River provide easier access to new areas, such as Ross Island and Kiskitto and Kisipachewak Lakes, and allow easier travel between communities (Nelson River Group, 1986). Disruptions to traditional land use as a result of the LWR has also been documented. The construction of a causeway, and eventually a bridge across the Minago River has limited boat travel, and has decreased the use of this area because of access problems (Nelson River Group, 1986).

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[12]Nelson River Group. 1986. Cross Lake: Environmental Impact Assessment Study. Vol. 1: Key Issues and Impacts.

[13]Nelson River Group. 1986. Cross Lake: Environmental Impact Assessment Study. Vol. 1: Key Issues and Impacts.

2.5 Subsistence Fisheries

Subsistence fisheries have been recognized as an important part of the economy of many First Nation communities in northern North America (e.g.. Tough, 1984; Tobias, 1987; Holzkamm et al., 1988; Berkes, 1990; Hopper and Power, 1991). Management of subsistence fisheries has been attributed to social controls that can be effective in preventing the over-exploitation of common property fisheries (e.g.. Berkes, 1977; Wheeler, 1988). Along with providing a means for meeting the dietary needs of the community, subsistence fisheries and other subsistence activities have been recognized as providing a feeling of interdependence and cooperation in a community: "...fish is not the only output; social, cultural and (for the young) educational benefits of subsistence fisheries cannot be quantified with the same currency of fish protein."[14] There is therefore a historical and continuing relationship between subsistence activities, certain aboriginal cultures and the sustainable use of common property fishery resources.

2.5.1 Aboriginal Lake Sturgeon Fisheries

The importance of lake sturgeon as a food source for First Nations in Manitoba, before and after non-Native contact is mentioned in a number of studies (e.g. Tough, 1984; Houston, 1987) and has been further documented for First Nations communities in Ontario (e.g. Holzkamm and McCarthy, 1988; Holzkamm et al., 1988; Michalenko et al., 1989; Hopper and Power, 1991). Michalenko et al. (1989) found that lake sturgeon made up 7% of the total edible wild meat harvested and 19.6% of the edible weight of all fish harvested by the community of Muskrat Dam in northern Ontario. Although sturgeon harvests made up a smaller proportion of the catch in the northern Ontario communities of Webique

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[14]Berkes, F. 1982. Energy subsidies and native domestic (subsistence) fisheries. Canadian Naturalist 109: 1011-1019.

(Hopper and Power, 1991) and Rainy River (Holzkamm and McCarthy, 1988; Holzkamm et al., 1988), and communities in northern Quebec (JBNQNHRC, 1982), they are identified as one of the most popular traditional foods. In the community of Muskrat Dam, sturgeon are ranked with moose and beaver as the most popular meats.

Most of the lake sturgeon fishing is conducted during the spring or early summer (Michalenko et al., 1989). A number of techniques were documented for harvesting sturgeon, including spears, gaffs, hook and line, nets, traps and weirs (Holzkamm et al., 1988). The sturgeon meat was cooked, dried or made into pemmican. The roe was also eaten. Sturgeon oil was used by the Ojibway of Rainy River, Ontario in the production of sturgeon pemmican or to make dried foods more palatable (Holzkamm et al., 1988). The inner membrane of the swim bladder was used by the same group to make a glue for paints (Holzkamm et al., 1988), and was an important trade item for the Ojibway of Rainy River, Ontario. Sturgeon skin was used in the production of items such as containers for carrying sturgeon oil (Holzkamm et al., 1988).

Studies of the fisheries in northern Ontario have also documented the presence of sturgeon management systems. Codes of conduct exist in the community of Muskrat Dam regarding checking nets, respect for traditional fishing territories and the activities which are permissible in fishing areas (Michalenko et al., 1989). The Ojibway community of Rainy River maintained a sustainable sturgeon fishery during the 19th century, which was eventually depleted as a result of the establishment of American and Canadian commercial fisheries (Michalenko et al., 1989).

In many areas of northern Canada, lake sturgeon stocks have been depleted (Lowery and Gair, 1992). Incorporating traditional ecological knowledge and aboriginal fishery management practices through co-management agreements has been recognized as a

potential approach to solving contemporary fishery management problems (e.g. Berkes et al., 1991). *The Nelson River Sturgeon Management Agreement* and *Winnipeg River Sturgeon Management Agreement* are two examples of co-management agreements which have been established in response to sturgeon management issues (Haugh, 1994).

The history of aboriginal lake sturgeon fisheries in northern Canada cannot be understood without also considering non-native commercial lake sturgeon fisheries. Lake sturgeon were initially considered to be commercially valueless in the early to mid 1800s. After 1860, the monetary value of sturgeon gained slow recognition, and an intensive lake sturgeon commercial fishery began (Houston, 1987). Along with the value of the meat for food, sturgeon oil was used in paints, eggs were made into caviar, the skin was tanned as a leather, and the inside lining of the swim bladder was made into isinglass which was used as a fining agent for beer and wine and in the production of glue (Holzkamm et al., 1988).

The commercial fishery for sturgeon in Manitoba began in the 1880s and was originally based on Lake Winnipeg and the Red and Assiniboine Rivers (Houston, 1987). Over-fishing and the subsequent decline in lake sturgeon stocks in 1890 prompted a closure of these fisheries in 1910, and led to an increase of fishing for lake sturgeon in the Nelson River. Over-fishing in Lake Winnipeg also led to the loss of this important food source for First Nations communities which had traditionally used this resource (Tough, 1984). The Nelson River commercial sturgeon fishery began in 1907, and has a history of overfishing and closures. The commercial fishery was closed five times; between 1911 and 1915, 1933 and 1936, 1947 and 1952, 1961 and 1969 and from 1992 to the present (Patalas, 1988). Despite commercial closures, fishing continued to deplete sturgeon stocks following World War I and during the depression (Lord, 1984). Presently, only the domestic sturgeon fishery of the Nelson River remains open. Overall, declines in lake sturgeon stocks in Lake Winnipeg and the Nelson and Churchill Rivers have been

attributed to the late maturity and intermittent spawning of lake sturgeon, overfishing and the loss or disruption of spawning habitat due to altered water regimes caused by the operation of the LWR/CRD (Scott and Crossman, 1973; Houston, 1987).

2.5.2 *The Nelson River Sturgeon Co-Management Agreement*

The Nelson River Sturgeon Co-Management Agreement was signed in 1992 to improve the management of the Nelson River lake sturgeon subsistence fishery. The Nelson River Sturgeon Management Board (with members from the Norway House, Cross Lake and Split Lake First Nations, the communities of Wabowden, Thicket Portage and Pikwitonei, the government of Manitoba, and ex-officio members from the Manitoba Keewatinowi Okimakanac and Manitoba Hydro) developed a draft plan to conduct research on sturgeon populations and the domestic consumption of sturgeon, and to educate people involved with the sturgeon fishery about the goals of the Nelson River co-management agreement. The Board has also taken initiatives to regulate the domestic harvest of sturgeon during the spring spawning runs through community education programs and by using community observers at popular sturgeon fishing locations (Lowery and Gair, 1992; Haugh, 1994).

2.6 Lake Sturgeon Biology

Lake sturgeon have a long life span compared to other freshwater fish. Male lake sturgeon have an average maximum age of approximately 55 years, while females have an average maximum age of approximately 80 years (Scott and Crossman, 1973). The maximum age of lake sturgeon increases for more northern, slower growing populations. Although lake sturgeon grow slowly, they can reach enormous sizes compared to other freshwater fish. The largest lake sturgeon recorded was caught in 1922 in Botchewana

Bay, Lake Superior and weighed 310 pounds. Other large lake sturgeon include 254 and 208 pound fish taken from Lake of the Woods in 1953 (the second fish was aged at 154 years), and a 154 pound fish taken from the Bay of Quinte, Lake Ontario in 1969. Lake sturgeon mature at approximately 20 years of age, although this varies with fish population and sex (Scott and Crossman, 1973). Figures 6 and 7 indicate the length-weight and mean age-specific fork lengths of lake sturgeon sampled from the Sipiwesk Lake commercial fishery in 1987 and 1988 (Patalas, 1988).

Spawning season for lake sturgeon ranges from early May to late June. Sturgeon begin to move into spawning locations just before or after the ice breaks up. They prefer to spawn in shallow water (2-15 feet) or at the foot of low waterfalls where there is a fast flow, while lake populations will spawn on rocky shoals if rivers are not available (Scott and Crossman, 1973).

Lake sturgeon are bottom dwellers which prefer mud or mud and gravel substrates, and live along shoals of large lakes and rivers (Scott and Crossman, 1973). They are primarily a freshwater fish, but are also found in the brackish water of the lower St. Lawrence River and the Hudson and James bays. They feed on small, benthic organisms by sucking food items from the substrate with their tubelike mouth (Scott and Crossman, 1973). Non-edible material is cast out of the mouth or under the opercula. Sensitive barbels located near the mouth of lake sturgeon are used to detect food in and on the substrate. Feeding typically ceases during spawning, but is known to continue throughout the winter in some populations (Scott and Crossman, 1973).

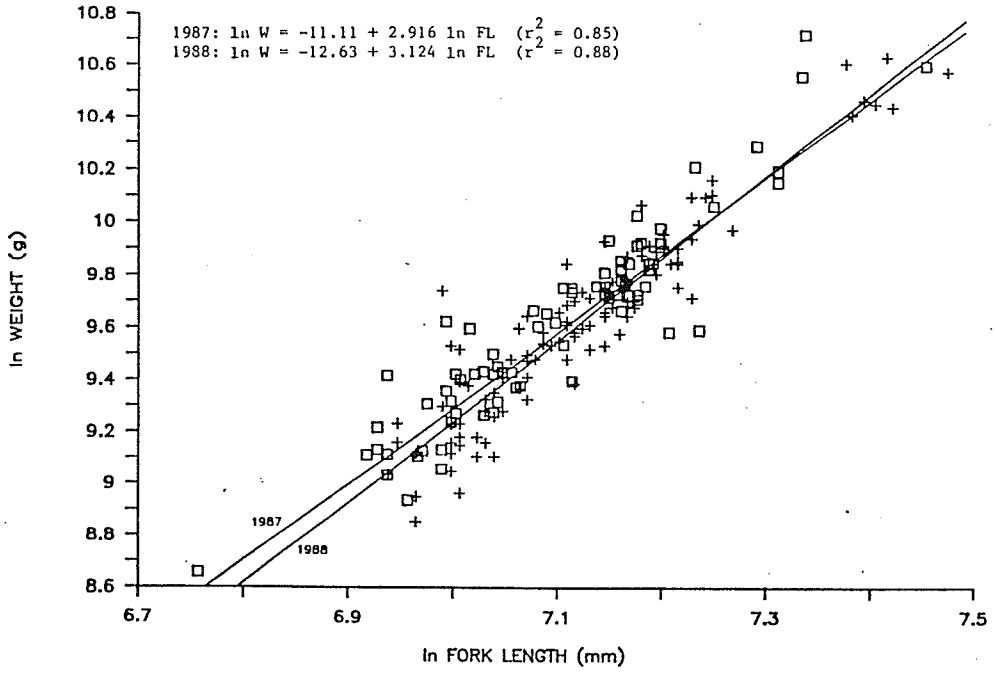


Figure 6: Length-weight relationship of lake sturgeon from the Sipiwesk Lake commercial fishery. Plots are based on individual sturgeon sampled from the Sipiwesk Lake commercial fishery in 1987 (squares) and 1988 (crosses) (Source: Patalas, 1988)

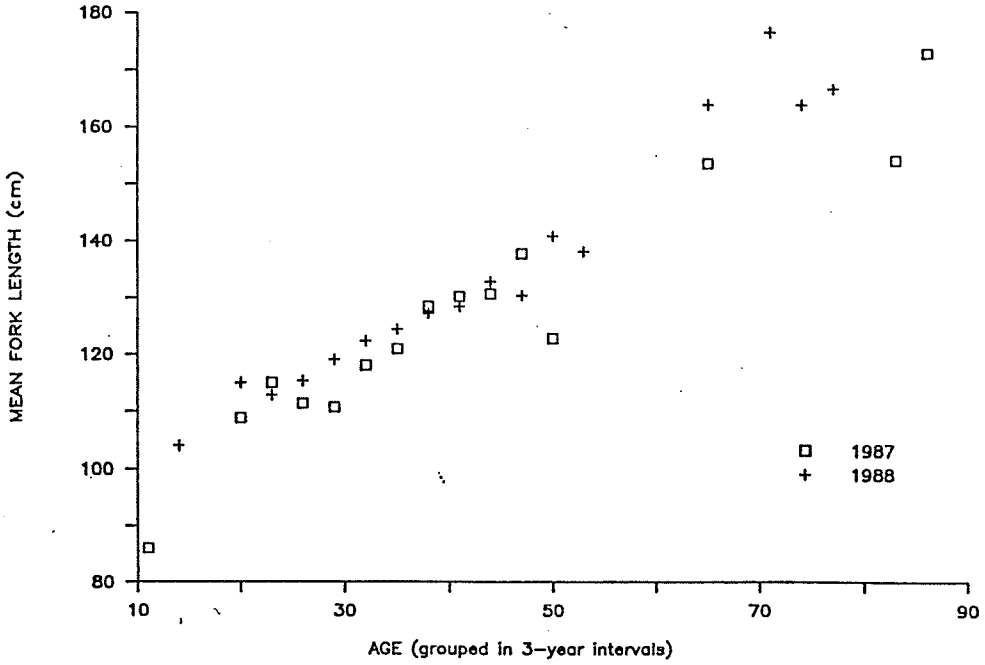


Figure 7: Mean age-specific fork lengths of sturgeon sampled from the Sipiwesk Lake commercial fishery, 1987 (squares) and 1988 (crosses) (Source: Patalas, 1988)

Chapter 3

METHODS

3.1 Introduction

To summarize the methods used, this study involved:

(1) Conducting formal and informal interviews with members of the community of Cross Lake who were familiar with the species harvested and the seasonal cycle of resource harvesting activities.

(2) Documenting and critiquing the process used to develop the resource location mapping system for the CLHCS.

(3) Conducting formal and informal interviews with community members who were familiar with toponyms of the Cross Lake area.

(4) Reviewing and compiling literature of the traditional and contemporary domestic sturgeon fishery of the community of Cross Lake.

3.2 Background Harvest Information

Initial community consultations were conducted from July 5 to July 8, 1994. The initial consultation process involved collecting background information on: (1) Species harvested; (2) The seasonal cycle of harvesting activities; (3) The general location in which contemporary harvesting activities occurred. Additional background resource harvesting information was gained during the researchers 7 week stay in the community (from June 28 to September 6, 1994).

The initial consultation process was conducted to adapt background harvest information from similar land use studies in order to make the study appropriate for use in the community of Cross Lake. This included refining the species list so that it only included species harvested in the Cross Lake region, recording the contemporary seasonal

cycle of harvest activities of Cross Lake community residents, and defining the general boundary of resource harvesting activities in order that maps for use during the interviews could be created which covered the entire harvest area. Preparations for the initial consultation involved: (1) Creating a list of all possible species that were found in the Cross Lake region. The species list from the TASO study (Hughes et al., 1993; Berkes et al., 1995) was used as an example to aid in the generation of a species list for the community of Cross Lake; (2) Providing pictures of local fish and wildlife to assist community members in identifying species harvested; (3) Bringing National Topographic System (NTS) 1:250 000 scale maps of the Cross Lake region in order to assist community members in identifying the extent of resource harvest areas.

The key informants used for determining background harvest information (George Paupanekis Sr. and Darwin Paupanekis) were selected by Councillor Ernest (Ernie) Scott and Nelson Miller of the community of Cross Lake. Darwin Paupanekis was an advisor to the Cross Lake Elders Council and had experience with managing community-based research projects in the community of Cross Lake. George Paupanekis Sr. is an elder in the community of Cross Lake. Ernie Scott and Nelson Miller selected these individuals because of their knowledge of the harvest activities of the community of Cross Lake.

The species list was adapted in consultation with Nelson Miller, Darwin Paupanekis and George Paupanekis Sr. George Paupanekis Sr. translated the list from English to Cree. Donald McKay provided the Cree word and English translation for "whistler" (goldeneye). George Paupanekis Sr. provided the harvest activities for one seasonal cycle. He was asked to provide a general description of the timing of resource harvesting activities: one which included both historical and contemporary harvest activities and which was not based on any particular season. This information was checked through formal and informal interviews with Darwin Paupanekis and Nelson Miller. The categorization

scheme used for this list (e.g. big game, small game, fish, furbearers) was based on the methodology of the TASO study (Hughes et al., 1993) and was adapted for use in the community of Cross Lake (the questionnaire used in the CLHCS is presented in Appendix A). The following changes were made to the categorization scheme as a result of this consultation: (1) Sturgeon were given their own category, and section, in the questionnaire because they are considered to be different from scale fish; (2) Black bear were included in the furbearers category as they are usually hunted for their fur rather than for their meat.

The general location of historical and contemporary harvest activities was determined through formal interviews with Nelson Miller and Darwin Paupanekis. 1:250,000 NTS maps of the Cross Lake area and surrounding regions, and an overlying map of the Cross Lake Resource Area were used to orient the respondents. 1: 250 000 scale maps were selected for use in this study because it is relatively easy to recognize features on these maps and because they were easy for the interviewers to transport and use during interviews.

3.3 Mapping Technique Review

Development of the harvest location mapping system took place during formal meetings from July 5 to July 8, 1994 and from August 2 to August 6, 1994. The mapping system was adapted from the TASO study (Hughes et al., 1993) through consultation with members of the Study team from the University of Manitoba and with Darwin Paupanekis, Peter John Halcrow and Donald McKay Sr. of the community of Cross Lake. Specific components of the mapping technique which were addressed included: (1) The need to identify harvest locations, land use areas or a combination of both; (2) The extent of the area that would be required for mapping harvest locations or land use; (3) Identifying harvest locations or land use areas beyond the boundaries of the harvest location maps; (4)

The size of the squares to be used when indicating resource harvest locations; (5) Appropriate terminology and question wording when asking for harvest locations. The critique of the mapping system was based on comparing approaches used in previous land use studies in Canada with the CLHCS mapping system.

The 8 NTS maps that were selected for the interviews following community consultation were: (1) 63 I (Cross Lake); (2) 63J (Wekusko Lake); (3) 63 K (Cormorant Lake); (4) 63 N (Kissising Lake); (5) 63 O (Nelson House); (6) 63 P (Sipiwesk Lake); (7) 53 M (Knee Lake); (8) 53 L (Oxford House). The maps were cut and glued together to create a continuous map surface. Lines were drawn on the map with a pencil which divided the 10 by 10 km grid squares on the NTS maps into 5 by 5 km squares. These squares were then coded with a highlighter. The NTS system was used for coding the 10 by 10 km squares, and these squares were then subdivided into four sections by assigning the number 1 to the top left corner, 2 to the top right corner, 3 to the bottom left corner and 4 to the bottom right corner. The decision to change from the 10 by 10 km grids used in the TASO study (Hughes, et al., 1993) to 5 by 5 km grids was made because it was thought that the 10 by 10 km grids would not provide enough detail to identify hunting areas in the final maps. The TASO study (Hughes, et al., 1993) was conducted over a larger area than the CLHCS, and therefore the use of 5 by 5 km grids for that study was inappropriate. An overlay of the Cross Lake RTL/Resource Area was used with the NTS maps in order to orient the respondents, and a list of toponyms commonly used by members of the community of Cross Lake were provided for respondents who were not fluent in English or who would prefer to use community names for locations rather than the NTS maps (see section 3.4 Collecting Toponyms of the Community of Cross Lake for information on the development of this list).

The location code for identifying resource harvest areas was made up of three sizes of squares; 100 by 100 km, 10 by 10 km and 5 by 5 km. The 100 by 100 km set of squares were indicated by 2 capital letters (e.g. MR), the 10 by 10 km squares were indicated by 2 numbers (ranging from 00 to 99), and the 5 by 5 km squares were indicated by a 1, 2, 3 or 4. The final code for any location was therefore made up of two letters and three numbers (e.g. MR214) (Figure 8). If the respondent indicated the entire 10 by 10 km. area rather than the more specific 5 by 5 km area, then the final number in the code did not have to be entered (e.g. MR 21). Instructions regarding the use of this harvest location system were provided to the interviewers in the Harvest Study Interviewer Manual (see Appendix B), and training for using this systems, was provided during the questionnaire development and pretest stages of the contemporary harvest component of the CLHCS.

Although the mapping system was initially designed so that respondents would identify 5 by 5 km squares where resource harvest activities took place, the use of 5 by 5 km grids was discontinued after the interviews began because in many cases it was difficult for the respondent to identify the harvest locations to that level of detail. The use of 10 by 10 km squares was adopted thereafter, and the 5 by 5 km squares indicated in previously completed questionnaires were ignored.

Harvest activities that took place in locations outside of the NTS maps provided for the CLHCS were documented by recording the province where the activity took place, and landmarks which were close to the harvest location (e.g. town, city, highway number) on the questionnaire. This option was provided because it was indicated during the initial community consultations that some resource activities (particularly big game hunting) were

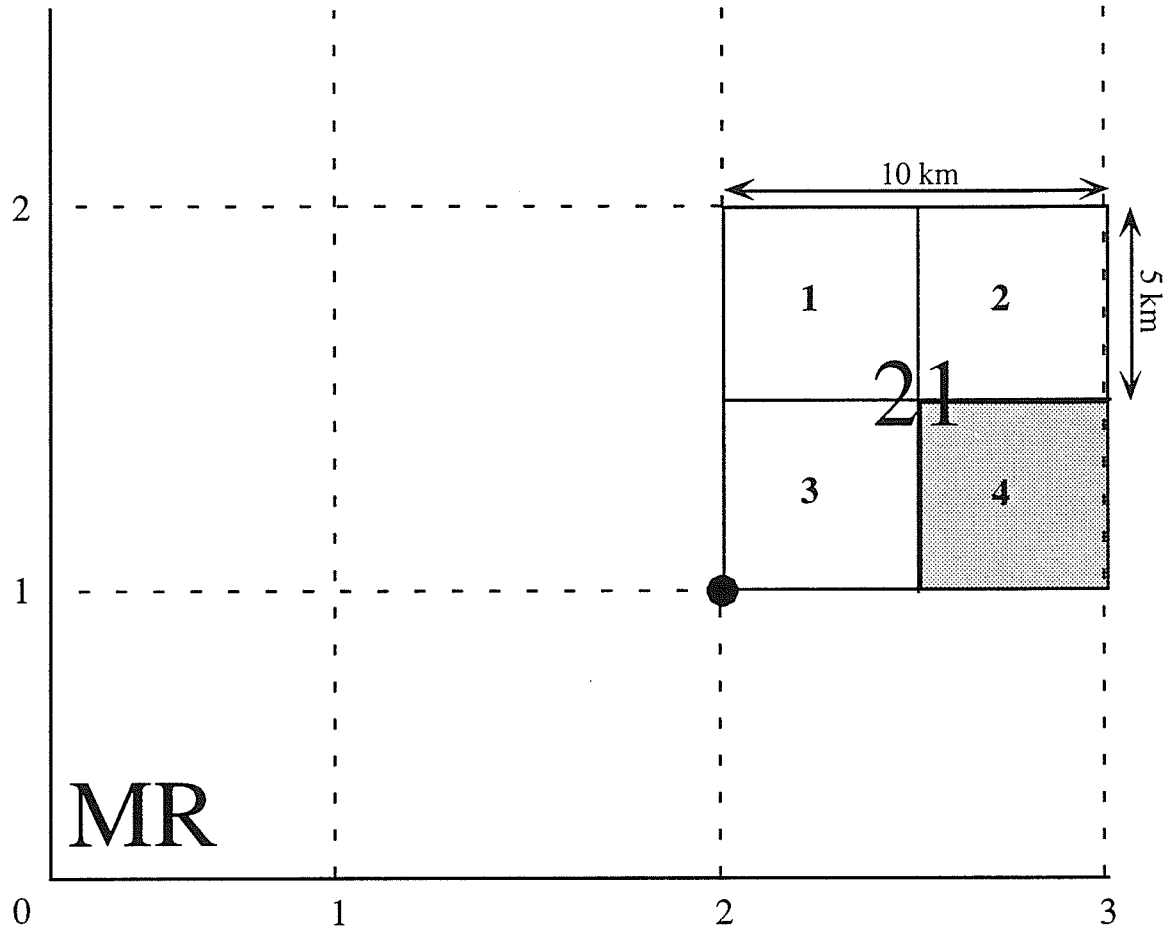


Figure 8: Modified National Topographic System (NTS) grid codes used to identify harvest areas for the Cross Lake Harvest and Consumption Study (CLHCS). Harvest locations were identified by indicating the 100 by 100 km grid letters (e.g. MR), then reading across the bottom of the map and up (to the black dot) to find the two 10 by 10 km grid numbers (e.g. MR21). The 5 by 5 km grid where the harvesting activity took place was indicated by the number 1, 2, 3 or 4 (e.g. MR214). The 5 by 5 km grid squares were created by dividing the existing 10 by 10 km NTS grid squares on the base maps used in the CLHCS.

taking place outside of the Cross Lake RTL/Resource Area, and sometimes outside of the province of Manitoba. Allowing the interviewers to record these distant harvest locations would therefore make the harvest location information more complete.

The interviews were not taped in order to make the interview process easier and to ensure confidentiality. Completed questionnaires were sent to the Natural Resources Institute of the University of Manitoba to be checked, and were then sent to Brock University for data entry. The harvest location maps for the CLHCS were created at Brock University using the SPANS geographic information system (GIS) software package (Hughes et al., 1993).

3.4 Collecting Toponyms of the Community of Cross Lake

Toponyms of the Cross Lake area were identified and recorded through formal interviews with members of the Cross Lake community. The location of toponyms were determined through interviews with Silas Ross, Charlie Osborne, Albert North and Russel Paupanekis of the community of Cross Lake. These key informants were selected by Darwin Paupanekis and Donald McKay Sr. because of their extensive knowledge of the Cross Lake region. The first three; Silas Ross, Charlie Osborne and Albert North are considered elders in the community of Cross Lake; Russel Paupanekis was chosen as a person who is intensively involved in a variety of resource harvesting activities. The 10 by 10 km square in which the toponym was located were recorded. This information was collected by Darwin Paupanekis, Peter John Halcrow and Donald McKay Sr. who were interviewers for the CLHCS. This information was collected in order to assist respondents in identifying harvest locations for the CLHCS.

Precise locations of these toponyms were recorded with my participation after the general locations were identified. Darwin Paupanekis and Horace Halcrow provided information to determine specific locations and Cree to English translations for the names and general locations of toponyms identified by Silas Ross, Russel Paupanekis, Charlie Osborne and Albert North. Darwin Paupanekis was involved in this component of the study because of his familiarity with community toponyms for regions west of Cross Lake, his familiarity with the list developed by Silas Ross, Russel Paupanekis, Charlie Osborne and Albert North, and because of his knowledge of the Cree and English languages. Horace Halcrow was selected by Darwin Paupanekis because of his knowledge of community toponyms for areas close to the community of Cross Lake. Specific locations of toponyms were marked on a sheet of mylar overlaying NTS 1:250, 000 scale maps of Cross Lake and the surrounding areas (the same maps used for the harvest locations were used for the toponyms). An overlay of the Cross Lake RTL/Resource Area was used with the NTS maps in order to orient the key informants.

These toponyms were written in the Latin alphabet by Darwin Paupanekis in a way recognizable to members of the community of Cross Lake. No attempt was made to re-write them in an othography recognized by linguists.

3.5 Collecting Historical and Contemporary Sturgeon Fishery Information

Information about the historical and contemporary sturgeon fisheries of the community of Cross Lake was compiled from four sources: (1) Documents regarding *The Nelson River Sturgeon Co-Management Agreement* from the Manitoba Department of Natural Resources office in Thompson, Manitoba and the Cross Lake First Nation (e.g. Nelson River Sturgeon Co-Management Board, 1994); (2) Formal interviews with Don Macdonald of the Department of Natural Resources in Thompson, Manitoba on August 24,

1994 and December 6, 1994; (3) Records from the court proceedings of NFA Claims number 110 and 44, held in the community of Cross Lake from November 4 to 7, 1991 (N.F.A. Claims Number 44/110, 1991); (4) The Domestic Sturgeon Fishing Claim study conducted by Symbion Consultants (Symbion Consultants, 1990). For this component of the study, interviews with Cross Lake community members were not conducted because of time and budget constraints.

The court hearings for NFA Claims number 44 and 110 involved witnesses from the community of Cross Lake: Sandy Beardy, Charles Osborne, Alexi Thomas, Malcolm Edward McKay, Wilfred Sinclair, Paul Cook and Gideon McKay. These community members were selected because of their past or present involvement in the sturgeon fishery. The witnesses were asked questions about the timing, technique and location of sturgeon fishing, the number of sturgeon caught, the length of sturgeon fishing trips, the reasons why they were involved in the sturgeon fishery, the extent of distribution of sturgeon within the community, uses of sturgeon and changes to the sturgeon fishery after the construction of the Jenpeg and Kelsey hydroelectric facilities.

Domestic sturgeon harvests for the Nelson River between 1991 and 1993 were based on catches that were either directly observed or were determined by talking to fishermen. Field workers from Thicket Portage (1992), Cross Lake (1993) and the Manitoba Department of Natural Resources (1991, 1992 and 1993) conducted the observations. Because the data only reflect catches which were confirmed through observation or questioning, these numbers are considered to be low estimates of the Nelson River domestic sturgeon harvest (Nelson River Sturgeon Co-Management Board, 1994).

Chapter 4

RESULTS

4.1 Introduction

The results of this practicum can be summarized in four parts, each to be discussed in the sections to follow:

(1) Information regarding the spatial extent of harvest activities, the species harvested and an outline of seasonal harvest activities.

(2) A review of the development of the harvest location mapping system.

(3) The location and name of 131 community toponyms, and comments regarding 14 of these toponyms.

(4) A compilation of information regarding the historical and contemporary sturgeon fisheries of the Cross Lake First Nation.

4.2 Resource Harvest Activities: General Harvest Area, Species Harvested and Seasonal Cycle of Activities

4.2.1 General Harvest Area

Community consultation revealed that most of the contemporary resource harvesting activities were conducted within the Cross Lake RTL/Resource Area. Big game hunting and sturgeon fishing were the only activities that were identified as taking place outside of the Cross lake RTL/Resource Area on a yearly basis. In both cases, the lack of a sufficient number of these resources within the Cross Lake RTL/Resource Area was identified as the reason for community members using other areas.

4.2.2 Species Harvested

The species presently harvested by community members of Cross Lake for domestic purposes consist of 7 species of waterfowl (fall ducks are lesser scaup, greater scaup, redheads, canvasbacks and ring-necked ducks), 8 species of fish, 13 species of furbearers, 4 species of big-game, 5 species of small game and 5 types of berries (Table 1). The term medicinal plants describes any plant harvested for medicinal purposes. A list of these plants was not developed for the CLHCS.

CATEGORY/SPECIES	CREE NAME
Waterfowl:	
Canada goose	niska, apish'chishkish
Mallard	en'inesip
Fall ducks	tukooukissipak, mushkegowusipak
Fish:	
Whitefish	attikamek
Tullibee	ukaauotunipi
Pickerel	ukaau
Jackfish	n'tonksew
White sucker	nameybin
Carp	maney'nameybin
Burbot (maria)	melato
Sturgeon:	
Lake sturgeon	nameo
Furbearers:	
Beaver	amisk

Muskrat	w'chask
Lynx	pisiw
Black bear	maskwa, usawusk
Marten	wapistan
Otter	nikik
Weasel	sihkusuu
Fox	mahkeshuu
Wolf	maheekun
Coyote	apish'chahikanish
Wolverine	ke'kwu'hakeow
Fisher	uchek
Red squirrel	anikwuchash
Big Game:	
Moose	mooswa
Caribou	atihk
White tailed deer	apischi'mosus
Elk	wapiti
Small Game:	
Sharp-tailed grouse	akiskuw
Spruce grouse	sehcheneuw
Ruffed grouse	paspaskuw
Groundhog	weenusk
Snowhoe hare	wabush, wapuss
Plants:	
Raspberries	anosh'kanek
Cranberries	we'sagimena
Blueberries	inimena

Strawberries	odeamena
Saskatoons	misaskatoomena
Medicinal plants	maskikiwatikwa

Table 1: Species harvested by Cross Lake community residents.

4.2.3 Seasonal Cycle

The seasonal cycle for contemporary resource harvesting activities is shown in Figure 9. Additional information describing the seasonal cycle of activities is presented below.

4.2.3.1 Waterfowl

Harvesting techniques for waterfowl vary with animal behavior and environmental conditions. Duck hunting is typically carried out over a larger area than goose hunting, because ducks are distributed over a large area in the spring and fall, while geese tend to return to the same areas during their migration. Duck hunting in the spring is typically conducted from a blind, because the lack of vegetation means there is little cover for the ducks, and they are difficult to approach. In the fall, ducks are hunted by travelling over large areas, as the ducks hide in cover provided by vegetation. Goose hunting is conducted from blinds in the spring and fall.

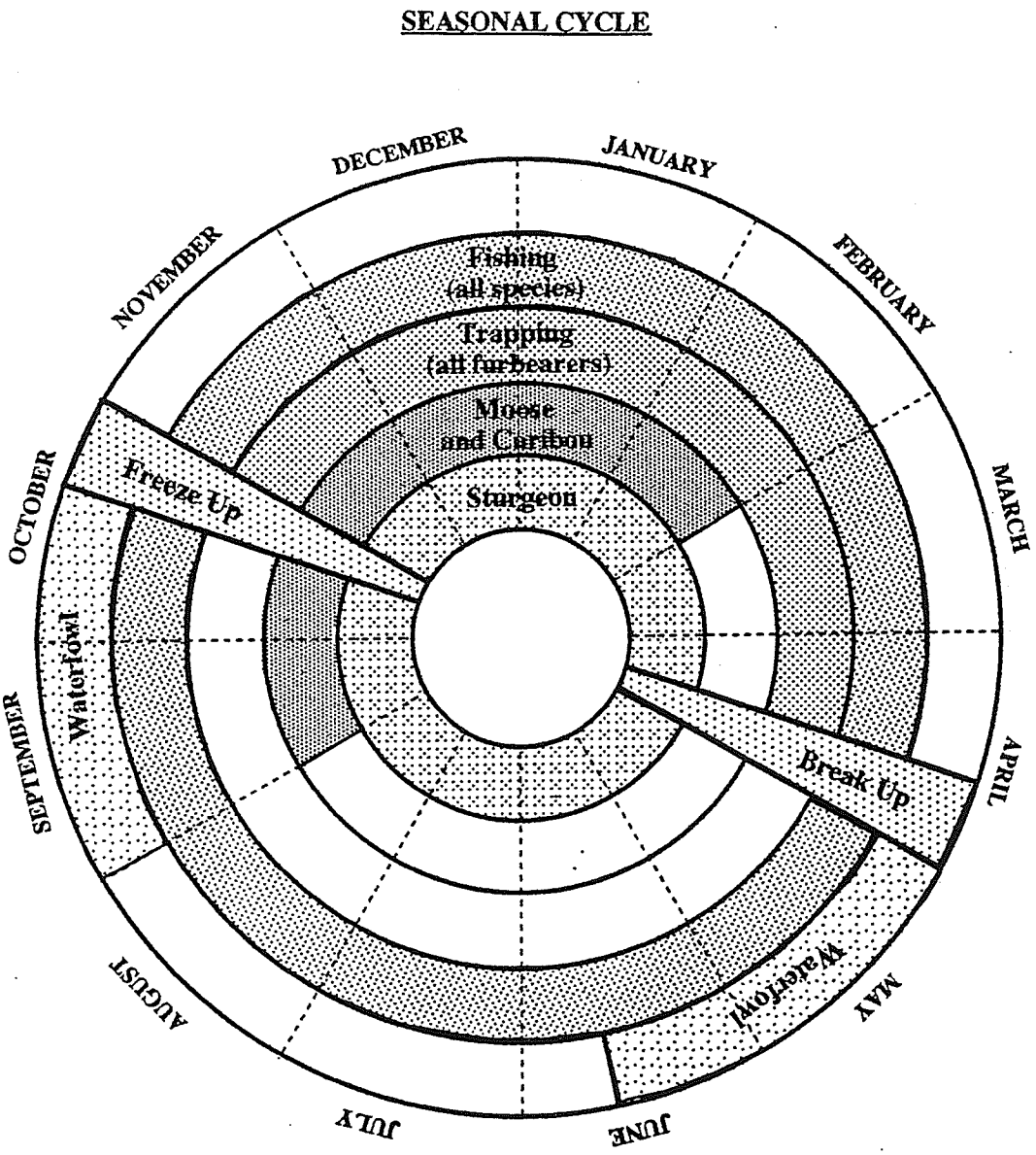


Figure 9: Seasonal cycle of major harvest activities by Cross Lake community residents. Shaded areas indicate seasons when resource harvest activities are taking place, unshaded areas indicate no activity.

4.2.3.2 Fish

Fishing (for all species except for sturgeon) was conducted throughout the year. Four and a quarter inch (10.8 cm) mesh nets were used to catch tulibee, white suckers and walleye, which were usually fed to dogs. Five and a quarter inch (13.4 cm) mesh nets were used to catch whitefish for human consumption. Lake trout are rare in the Cross Lake RTL/Resource area, and community members reported having to travel to Utik Lake (approximately 120 km from the community of Cross Lake) to catch them. There were reports of using wiers to catch fish while out on the trapline in the winter.

Changes to the water regime as a result of hydroelectric development was identified as impacting the domestic fishery. This feeling was mentioned by numerous members of the Cross Lake community during informal discussions. Whitefish, pickerel and jackfish were described as being scarce and less tasty following changes to the water regime. Nets were fouled and damaged more often because of increased debris in the water. Fishing areas were reported to be less accessible because of unpredictable fluctuations in water levels. These fluctuations meant that travel routes, the location of water hazards such as rocks and shoals and accessibility to portages and docks were constantly changing.

4.2.3.3 Sturgeon

Sturgeon fishing is best from mid May to mid June, when they move into shallow, fast moving water to spawn. The predictability of the timing and location of sturgeon congregations during the spawning run, and the reduced effort required to catch them in shallow water makes sturgeon fishing easier than fishing in deep lakes. Fishing for sturgeon must be conducted in deeper water during the winter because the ice near rapids and falls is thin, and therefore dangerous. Recent reduced accessibility to sturgeon fishing

locations was also reported. The nature and cause of these problems was similar to those described for other fisheries.

4.2.3.4 Furbearers

Furbearers were typically trapped, but muskrat and beaver were also shot. Mink were trapped until mid-December, when their fur colour changes (this change was described as the fur becoming "sunburnt").

4.2.3.5 Big Game

Moose hunting was reported as being best during the fall and winter because it was easier to locate the animals during these seasons. Moose may also be hunted more effectively on foot during the winter because deep snow makes moose easier to follow and approach. In the past, moose hunting on foot was conducted with dogs, which would chase and surround the animal or force it to damage its legs by running through deep snow. Caribou hunting was reported as being best in September, although caribou would also be hunted on frozen lakes during the winter. Big game hunting was reported as being both a specific and opportunistic activity. Rifles are often carried while travelling, in case an opportunity to harvest big game arises. White tailed deer are rare in the Cross Lake RTL/Resource Area, and elk are hunted exclusively outside of the Cross Lake RTL/Resource Area.

4.2.3.6 Small Game

Small game hunting was reported as being an almost exclusively opportunistic activity. Hunting for grouse and groundhogs took place throughout the year, usually while

the harvester was involved in other resource based activities or while travelling. Grouse were reported as being fattest around November and December. Rabbits were snared throughout the year, but most intensely from September to spring break-up while people were out on the trapline. Snaring rabbits was indicated as being part of a routine of natural resource-based activities, and was relied on as a food source when other subsistence harvesting activities were unsuccessful or inadequate. Rabbit populations were reported to fluctuate (decline and recover) over a 6-7 year period. Snaring rabbits was also indicated as one of the first resource harvesting activities taught to young community members.

4.2.3.7 Opportunistic Hunting and Harvest Activity Routines

Hunting is mainly an opportunistic activity for some species (e.g grouse, groundhogs) and may be an opportunistic activity for others (e.g. big game). Opportunistic resource harvesting activities take place whenever individuals have the means to take advantage of a harvest opportunity (e.g. carrying a hunting rifle in a vehicle while travelling, carrying a fishing rod on a hunting trip). There can also be an overlap in land use activities, which means that hunting areas are not species specific and may also be travel routes or residences (e.g. houses, camps). The use of routines is an excellent example of how activities are combined. For example, trappers may have rabbit snares set while they are checking their traplines.

4.3 Mapping Harvest Locations: Technique Development

Four of the most important elements in designing the harvest area location questions were: (1) The understanding by the interviewers and respondents of the word "harvest"; (2) The wording of the location questions; (3) The ability of the interviewers and respondents

to understand the questions and mapping method; (4) Selecting appropriately sized squares for indicating where harvest activities had taken place.

4.3.1 Asking About Harvest Locations

Appropriate wording of the harvest location questions was an important step in attaining harvest location information. One of the challenges of wording harvest location questions is differentiating between areas where people hunted and areas where animals were killed and retrieved. Terminology will affect the location information, as hunting locations can cover large areas while kill sites tend to be more specific. For the CLHCS, harvest was defined as the location where game was struck and retrieved. This definition was used because it was thought that it would be easier for respondents to identify specific areas where game had been struck and retrieved than attempting to document all of the hunting areas which they had used in the past year. Hunting areas can be difficult to identify because hunting can be an opportunistic activity for many species, may be conducted in congruence with other resource harvesting activities (often as part of a routine), and because these activities can vary with the season and the species harvested.

The term "harvest" was used for geese and ducks (questions #19 and 20), sturgeon (question #31), furbearers (question #36), big game (question #41) and small game (questions #45 and 46) because it was felt that respondents would be able to provide struck and retrieve locations for these categories (Table 2). The term "harvest" was not used for fish (excluding sturgeon)(question #25) because of the difficulties of differentiating between areas where fishing was successful and where it was not.

The wording for the harvest location questions varied slightly because of differences in recall abilities and hunting techniques for different species categories.

Specific harvest sites were requested for big game, sturgeon and furbearers because it was felt that respondents would be able to identify specific harvest locations in these cases. Specific harvest locations for big game were also required because big game hunting can be an opportunistic activity, and not limiting location information to harvest sites would mean that areas such as travel routes and residences could be identified as harvest areas. More general harvest locations were requested for fish, small game and waterfowl because the harvesting of these resources tends to be spread over a larger area and because specific harvest events tend to be less memorable. Specific harvest locations for geese could have been asked, as geese were reported to use specific areas, but it was felt that using different questions for ducks and geese would confuse respondents. Small game hunting can also be an opportunistic activity, or can be part of a routine of harvest activities, and therefore the term "mostly" was used in these questions to promote the respondent to only identify main harvesting areas.

QUESTION NUMBER	SPECIES CATEGORY	QUESTION WORDING
19	Waterfowl	Where did you harvest geese mostly during the following seasons?
20	Waterfowl	Where did you harvest ducks mostly during the following seasons?
25	Fish	Where did you do most of your domestic fish harvesting for all species other than sturgeon during the following seasons?
31	Sturgeon	Where did you harvest sturgeon during the following seasons?
36	Furbearers	Where did you harvest furbearers...?
41	Big Game	Where did you harvest big game during the following seasons?
45	Small Game	Where did you harvest rabbits mostly...?

46	Small Game	Where did you harvest grouse mostly...?

Table 2: Harvest location question wording for the contemporary harvest component of the CLHCS. Variations in question wording reflect the ability of respondents to recall harvest locations for different species.

The time period of the questions also varied between species categories. The seasonal cycle was broken down into two or three distinct time periods for all categories except for small game in order to help respondents recall locations by allowing them to focus on short time periods. Harvest locations for waterfowl were requested for the fall of 1993 and the spring of 1994 because these are the seasons when waterfowl harvesting takes place. Harvest locations for the categories of fish and sturgeon were requested for the summer/fall of 1993, winter 1993/94 and spring of 1994. This represents the seasonal cycle previous to the beginning of the contemporary harvest study. Harvest locations for furbearers were requested for the fall of 1993, winter 1993/94 and spring of 1994. Summer was excluded from the furbearer category as trapping begins in the fall and ends with spring break-up. Harvest locations for big game were requested for the summer/fall of 1993 and winter of 1993/94. Spring was excluded from this category because most of the big game hunting is conducted from late summer to the end of winter. Harvest locations for small game were not separated into distinct time periods. It was felt that these locations would invariably be general because small game harvesting is opportunistic or is conducted as part of a routine, and therefore keeping these location questions as a single time period would make the interviews shorter without compromising the rigor of the questionnaire.

4.3.2 Harvest Locations: Incorporating Community Approaches for Describing the Land

The way that community members of Cross Lake identify their landscape was another important consideration in developing a mapping system for the CLHCS. The NTS grid system was used in the CLHCS because it is an efficient method of obtaining and entering location information during questionnaire based interviews, and because the Study team had experience with designing a database and creating maps using NTS codes. The presence of the RTL/Resource Area system is well known in the community of Cross Lake, and trappers are familiar with the boundaries of the Cross Lake resource area and with the locations of their traplines. A mylar overlay of the Cross Lake resource area was used with the NTS maps during the interviews in order to assist respondents with identifying resource harvest areas. Toponyms were also used to assist in identifying resource harvest areas. The use of toponyms was thought to be particularly important with older respondents, who may have been unfamiliar with the English names for these locations or who would have difficulty reading the NTS maps. In some cases, the interviewer wrote the Cree name of different areas on the NTS maps in order to make location resource areas faster for some respondents. Respondents could also identify their trapline area instead of individual squares if the entire area was used. The NTS codes of the traplines were pre-recorded and could be entered when the questionnaire was completed.

The identification of harvest areas outside of the Cross Lake RTL/Resource Area area was facilitated by the interviewers writing down the name of landmarks such as highways and towns close to these harvest areas. The use of areas outside of the Cross Lake RTL/Resource Area for resource harvesting activities (especially for hunting big game) was mentioned during the development and pretest of the questionnaire. These

locations were listed rather than shown on the harvest maps. The identification of these locations was important for providing a complete assessment of the land used by members of the community of Cross Lake.

4.4 Community Toponyms: Maps and Translations

Toponyms were collected for the area ranging from Hill Lake in the west to the eastern end of Cross Lake. The locations of 131 toponyms were identified (Maps 1 and 2). The Cree name and English translation for these toponyms are presented in Table 2. Additional comments regarding the name of 14 of the toponyms are presented in Table 3. The first map shows the toponym locations in the western half of the RTL/Resource Area; the second map shows the eastern portion.

Community Toponyms:
Map 1

Scale: 1:250 000

0 5 10 km

N

54°30′

54°15′

99°00′

98°00′

Community Toponyms:
Map 2

Scale: 1:250 000

0 5 10 km

N

55°45′

55°30′

98°00′

97°00′

NUMBER	CREE NAME	ENGLISH TRANSLATION
1	ay mistiko kothay ko see win	wiggle river
2	ka wa say kamisik	stops things from going past (C)
3	ka sapotaysko see wa kak	river lying in
4	ka ki pustake ministik	onion rapids
5	nikiko see pee	crooked poplar forest
6	asini kaako cheek	stops things from flowing past (C)
7	pas kwun ako seek	river flow meets bank (C)
8	ka pas kay ka mak	Hill lake
9	waskascoway kamo see pee	monster river
10	Ispokun see pee	Thomas's slide
11	ka see patchi wak	poplar forest
12	chicago see peek	little river lying in Hill lake
13	ka pas kay ka mak	Hill lake
14	wetigo wi paswan	all mud bay
15	iskowatch ka pmanakak	river opens up to the river
16	ma chan ace	blasted river
17	ka sa kana ska sik	place to stalk moose
18	a cheek ka nee pawit	caribou standing
19	pisewi sakykun	lynx lake
20	chee piee kamik	morgue
21	oop minigo skak	skunk river
22	ka peet a way teek	monster made a forest fire here

23	o ta soi moosway win eek	river comes up and turns
24	is putnay wi sakykun	river flowing underneath
25	ma ka tay sipi see pee	black duck creek
26	kees kway pay wi sakykun	Drunken lake
27	aleeki si wasa e kamak	frog bay
28	ka weeti wa koon skak	fish eggs
29	o patchi wa na seek	river flowing up
30	asini ka chi masoot	standing rock
31	minigo see peek	Minago river
32	ka ti pee chi to wak	going in (narrows), then opening (widening)
33	nay pay ma kak	shy bay
34	meen sin na kook	berry island
35	ka wa pa sik	river flows up
36	o pa kisi kay wi see peek	frog rapids
37	Ispokun sakykun	God rapids
38	ka pay kwutawakak	harvest grounds
39	N/A	Netchanais island
40	o pa kis oi see pees	lots of this plants growing here
41	iska watch ka ki poskak	whiteman did something here
42	ka waki ka ma sik	whiskey jack
43	we chaykasko si wi pawistik	grassy narrows
44	ka pe ta way stake	clearwater lake
45	ka na pey ko pasik	shallow marsh
46	tapa coi neek	snare bay
47	ka o papiskak	high rock

48	ministiko noot sipananeek	duck hunting islands
49	oop me to skak	poplar forest
50	kis sip panook	south end
51	kis sip panakak	south end
52	ka wa koon skasik	lots of fish eggs
53	witigo wi see pee	weedless bay (C)
54	say scatchewanak	floating rock
55	tipiskowi pesimi sakykun	flows off
56	sagitawi see peek	Pipestone river (C)
57	N/A	you can see the morning clearer
58	nistum kakiposkak	otter creek
59	ka waki meeto skak	this island is in the way
60	ospagan-sargregan	Pipestone lake (C)
61	kaispapiskak	high rock
62	N/A	drilling bay/point
63	wasy kamak	big bay
64	ka peetawapis kak	rock between the lake
65	kasi waskykuneek	old fort
66	atimo ministik	dog island
67	ka pimi seek	lying down (C)
68	ka pus kit seek	lying over
69	kapesana piskasik	boulder narrows
70	ka kinonakak ministik	long island
71	ka o pakoteek	island between the narrows
72	anay minigo skak	spruce point
73	omiskatawineek	found land

74	ka misa ka may koteeki	chain of islands along the shore
75	minigo skina gook	spruce island
76	opusko see wa kak	grassy narrows
77	we chay ko ministikook	foul smelling island (C)
78	wachusko nikapis	muskrat portage
79	na o nanik	main point
80	wachusko nikapis	muskrat portage
81	ka mis ty wa sa ak	big bay
82	ka pisko minigo skak	pile of spruce
83	kati kisipayak	at the end of the point
84	ka peeta way ka mak	into the lake
85	ay se pasko see wakak	going through weeds
86	se se qui ministik	rattle island
87	muskiki po sikun	constipated bear
88	ka pee ta wapiskak	rock splitting the river
89	ka wagi minigo skak	crooked spruce creek
90	ta wi ky kun eek	baseling island
91	awesa puski tay nuk	burning island
92	okowsipi	pickerel river
93	N/A	pickerel lake
94	pay puni po wakak	jack pine lake
95	ka wachusko weeschiskak	muskrat lake
96	o pathagawi pawistikos	jack pine rapids
97	o patha gawi sakykun	jack pine narrows
98	N/A	high ridge
99	opathagawi pawistikos	jack pine creek

100	opathagok	jack pine narrows
101	N/A	flat rock creek
102	ka sipi wanakak	river and lake
103	no chiskun an seek	branching out to a lake
104	kisipi kamak	the end of the lake
105	o mata wupi win eek	circumcision point (C)
106	muskego nikap	muskeg portage
107	o pa pooskitake	spruce burned point
108	nocisipananik	duck hunting area
109	pinesew-wacistonik	thunder nest (C)
110	ka pe tway kamak	inland lake
111	ka ta go tas tay sik	lake at the top of the river
112	kamistaiwasaak	big bay
113	kasakitawaksipi	mouth of the lake
114	namitosiskak	poplar point
115	ka o pa pis kak	goose hunting grounds
116	piskwutani skykuneek	high rock narrows
117	pimuski chapunee seek	dragging boat in shallow creek (C)
118	o pa tha gak	two lakes side by side
119	ka muskeg wa ka masik	branchless tree lake
120	ka neesos chay sigi	island lake
121	na nay way ka mak	along the shoreline
122	kapeaquaskisot	stands alone (C)
123	pay punipowi sakykun	overflow lake
124	pay punipokawi see pee	overflow river
125	N/A	jack point

126	pay puni powakak	river that goes into a round lake
127	mistye sakykun	big lake
128	kaagocikikoteskanak	hanging antlers
129	o nayka powin	bending standing narrows (C)
130	ka see pee wana kasik	narrow lake
131	wha sut nak	ridge bay

Table 3; Toponyms of the Cross Lake region. Numbers correspond to locations on Maps 1 and 2. English names marked with a (C) indicates that there are additional comments about the location (see Table 3).

NUMBER	COMMENTS
2 and 6	Wetlands physically and chemically filter the river water
7	There is a strong current coming out of the river, which flows over a bank in the mouth of the river
23	The river rises up and turns
53	Ice clears the weeds out of this bay every spring
56	Pipes for smoking tobacco were made out of stones from this river
60	Pipes for smoking tobacco were made out of stones from this lake
67	An old man with a bad back was always lying down here
77	A fish camp made this island smell bad
105	There was a man with a hole in his pants sitting on a rock here
109	There was a hole or a blind used by a warrior here
117	Travellers had to drag boats up the river here because the water is shallow
122	There was a single, old spruce tree standing on this island

129	There was a person standing here, who was bending over with his hands on his knees

Table 4: Comments describing selected toponyms of the Cross Lake region.

This list is by no means a complete record of the toponyms used by the community of Cross Lake. It is a sample which is limited to the main waterbody of Cross Lake and to the Minago River west to Hill Lake. The information is also limited by the number of informants and their experience on the land. It was mentioned during the interviews that individuals who are regularly engaged in resource harvesting activities in specific areas will have more detailed knowledge of these areas than what the informants could provide (e.g. trappers will have extensive knowledge of, and additional place names for, their traplines). The maps presented in this study therefore represent a sample of the toponyms used by the community of Cross Lake.

4.5 Sturgeon Fisheries of Cross Lake: Compilation of Community Information

4.5.1 Introduction

The documents reviewed for this practicum contained information on domestic sturgeon fishing techniques, the equipment used, the approximate size and number of sturgeon that were caught, the seasonal cycle of domestic fishing for sturgeon, traditional and contemporary sturgeon fishing locations, and traditional ecological knowledge related to sturgeon and the domestic sturgeon fishery. The review focused on qualitative information in the case of the historical sturgeon fishery, although some information regarding the size and number of sturgeon caught is included. Harvest numbers for the

contemporary sturgeon fishery at Landing River were included because of the systematic approach used to collect the data and because this methodology is well documented.

4.5.2 Historical and Contemporary Sturgeon Fishing Techniques

Sturgeon fishing was traditionally conducted with handmade gill nets, which were typically made by the older women in the community (N.F.A. Claims Number 44/110, 1991). The nets were constructed with "cotton shaving twine", as it was called in the sturgeon hearing transcripts (the material was probably linen rather than cotton; Dr. Fikret Berkes, personal communication). These nets had rock weights and wooden floats. "Cotton" nets which were manufactured in Winnipeg were available in Cross Lake in the 1920s, and nylon nets became available by the 1950s. Nylon nets were preferred to the handmade and commercially manufactured "cotton" nets despite their relatively high cost because they were stronger and more effective for catching sturgeon. Mesh sizes on the nylon nets range from 10 inches (25.4 cm) to 13 inches (33.02 cm), and lengths ranged from 50-200 yards (45-180 m). Nets of different lengths will be used in different fishing situations. Nets were selected based on the size of the fishing area, and must be the proper size if they are to be prevented from spinning. The fishermen interviewed used 2-4 nets before the construction of Jenpeg and 2-9 nets after the construction of Jenpeg (N.F.A. Claims Number 44/110, 1991). Decreased catch per unit effort after Jenpeg was built was given as the main reason for increasing the number of nets which were used.

For the historical and contemporary sturgeon fisheries, nets were checked every 3-4 hours during the day and were put in for an 8 hour set overnight (N.F.A. Claims Number 44/110, 1991). This overnight set was considered to be more productive than the day sets because of sturgeon move to the surface of the water at night. Sturgeon catches before construction of the LWR/CRD were reported as ranging between one to five fish per four-

hour set (N.F.A. Claims Number 44/110, 1991). According to one fisherman, the catch per trip was seven or eight sturgeon over two nights. According to another, the catch per trip was three to six sturgeon over two nights. The largest catch that was reported over one summer before construction of the LWR/CRD was 120 to 180 sturgeon in six, three day trips (equivalent to 20-30 sturgeon per trip) (N.F.A. Claims Number 44/110, 1991). The spawning runs were the most productive times to fish for sturgeon for both the contemporary and historical sturgeon fisheries, and there were reports of catching 20-27 sturgeon in one 2-3 day trip during the spawning season before construction of the LWR/CRD (N.F.A. Claims Number 44/110, 1991).

The average size of the sturgeon which were caught before Jenpeg was built was consistently estimated at approximately 50 inches (127 cm), with an average weight of 30 to 60 pounds (13.5 to 27 kg). "Small fish" were estimated at 20-25 pounds (9 to 11.25 kg) before Jenpeg was built, and one fisherman reported throwing these back in order that they would grow and be caught in the future. The largest sturgeon caught before Jenpeg was built was reported at 119 pounds (53.55 kg).

The fishermen reported having "limits" when fishing domestically, which were based on the amount of effort that they wanted to spend and the capacity of their boat. The fishermen reported being able to carry 20 whole sturgeon in a boat, and even more if the sturgeon were cut up and dried. Fewer sturgeon than their limit were sometimes taken if the fishermen expected to be involved in other resource harvesting activities during their trip, and extra space was sometimes left in case hunting opportunities arose.

Fishing was conducted with partners, and typically involved 2-3 people per boat. The catch was divided among the people in the boat. Fishermen used 18-foot canoes which were paddled, and later on powered by small outboard motors (usually 7

horsepower). These small motors were practical because they were easy to carry over portages. Canoes were gradually replaced with aluminum boats, which are typically 16-18 feet in length. Outboard motors ranging from 15-60 horsepower are presently used, with the size of the motor depending on the preference of the fisherman and the areas which are typically fished (larger motors are preferred for lake fishing because of long travelling distances and the ability of larger boats to handle high waves).

Sturgeon fishing took place throughout the year, but was most common from late May to June when the sturgeon are spawning. Fishing often began as soon as the ice break-up occurred in May, or shortly after trappers returned to the community in May. The fast current of the Nelson River causes early ice break-up and therefore allows fishing to be conducted this early. Fishing continued into the fall, and was conducted during the winter when people were out on the trapline. Winter is considered to be the least productive season for sturgeon fishing, and often involves a number of attempts in different locations before sturgeon can be found.

Sturgeon spawning takes place from late May to late June, and a number of natural indicators were used by the fishermen to determine when the sturgeon would be moving into the shallow spawning sites. The distinct shrill scream of a species of frog and the presence of fish flies are two indicators. The development of the leaves of a certain species of tree to half of their full size was the most common indicator mentioned by the fishermen.

4.5.3 Historical and Contemporary Sturgeon Fishing Locations

Most of the sturgeon fishing by Cross Lake residents was conducted at rapids along the Nelson River, or in lakes near the Nelson River. Traditionally, families would set up fish camps at these locations and would be involved in a variety of resource harvesting

activities (moose hunting and snaring rabbits were mentioned most frequently). Traditional fishing locations of the community of Cross Lake include Sipiwesk Lake, Cross Lake (at Whitemud Falls and Ebb and Flow Rapids), Duck Lake, Bladder Falls, Duck Lake Rapids, Bladder Rapids, Eves Rapids, Little Manitou Rapids, Redrock Rapids, Ebb and Flow Rapids, Eves Rapids, Ominawin (now called Jenpeg), and Hill Rapids (Symbion Consultants, 1990; N.F.A. Claims Number 44/110, 1991). All of these locations are within the Cross Lake RTL/Resource Area. Because of the decline of sturgeon at these locations, sturgeon fishing is now also being conducted at Cauchon Lake and at Landing River (Map 3).

4.5.4 Use of Sturgeon

Sturgeon was described as one of the most popular traditional foods. Sturgeon meat was boiled, dipped in flour and fried (with the skin on), smoked and ground to make sturgeon flakes, barbecued over an open fire, or baked in an oven or over a fire (Symbion Consultants, 1990; N.F.A. Claims Number 44/110, 1991). Soup was made from boiled sturgeon by adding oatmeal and flour to the juice. Sturgeon meat could be preserved for about a week by smoking, or was buried in the permafrost before ice houses and refrigeration were available in the community (Symbion Consultants, 1990; N.F.A. Claims Number 44/110, 1991). Sturgeon were used for a variety of other purposes besides their meat. Sturgeon oil was collected by boiling the head and the body, and skimming the oil from the top of the water. The oil was added to bannock, used to enrich meat (e.g. moose meat), as a medicine, for lamp oil and for softening hides during the skin preparation process. Caviar, which was made from sturgeon eggs, was considered to be a delicacy. The liver could be fried with the caviar or boiled and eaten. The bladder was used for making glue. The skin of the sturgeon was used to make containers (often to carry sturgeon oil) or to make drum skins. The intestines could also be eaten after being cleaned,

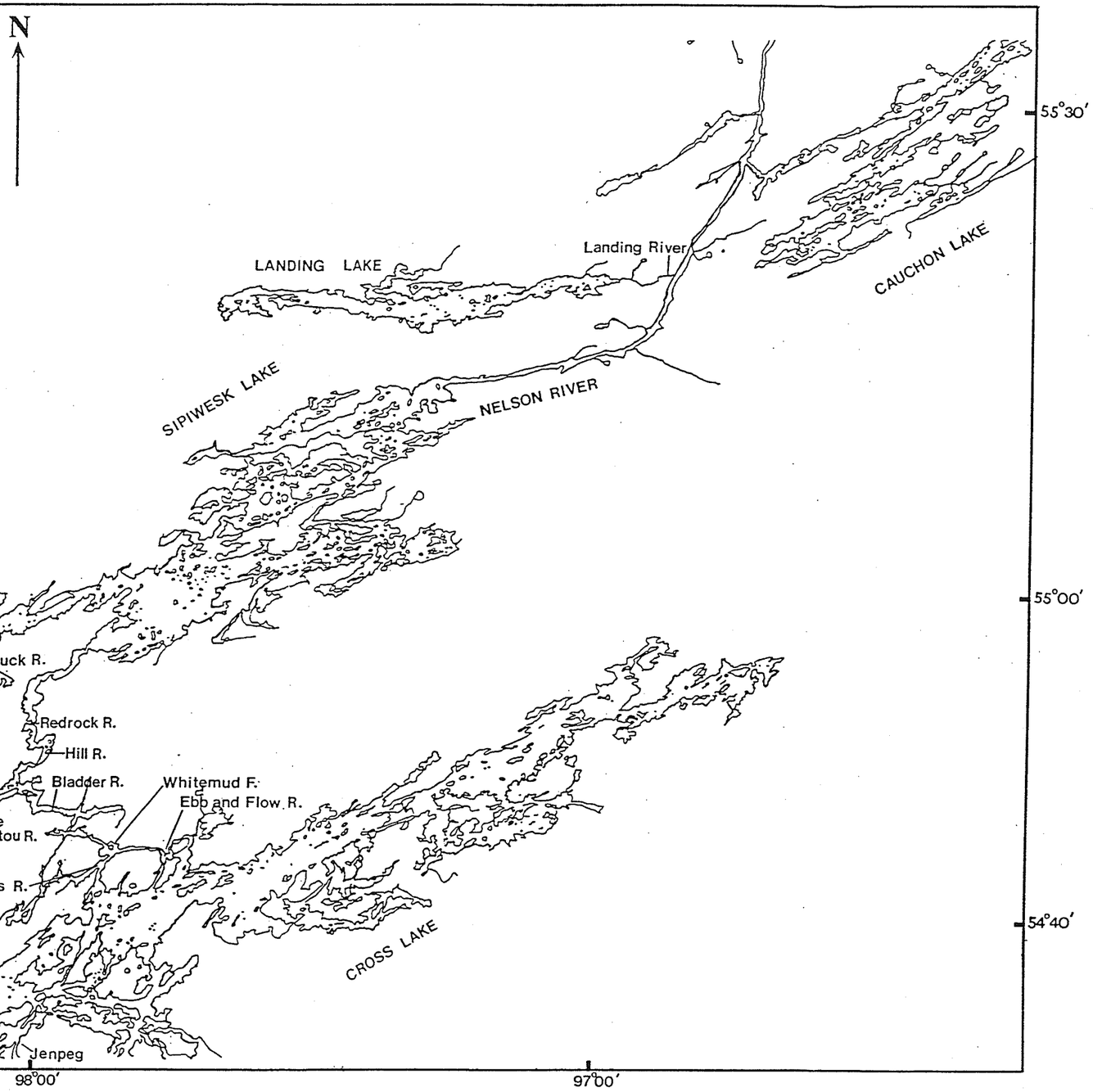
Traditional and Contemporary Sturgeon Fishing Locations: Cross Lake First Nation

Map 3

Scale: 1:500 000

0 — 10 — 20 km

(For fishing locations: R=Rapids, F=Falls)



or were fed to the dogs (Symbion Consultants, 1990; N.F.A. Claims Number 44/110, 1991).

4.5.5 Local Knowledge of Sturgeon

The fishermen mentioned a number of aspects about sturgeon behavior in the transcripts (N.F.A. Claims Number 44/110, 1991). Spawning time was well known, along with the preference of sturgeon for shallow fast moving areas with a rocky substrate. The fast current was recognized as important for the survival of the eggs. The fishermen also indicated that during the summer, sturgeon swim to deeper, cooler water during the day, and return to the surface at night. The fishermen were less familiar with the size at which sturgeon spawn, the age of sturgeon at different lengths and the life span of sturgeon.

All of the sturgeon fishermen reported sharing their catch with other community members upon returning to the community (N.F.A. Claims Number 44/110, 1991). Most of the sturgeon were given away to other community members, while enough meat for a few meals was kept by the fisherman. The sturgeon were often cut into strips before they were distributed. Part of the reason for sharing a high proportion of their catch was that sturgeon meat does not keep well, and therefore must be eaten as soon as possible. None of the fishermen sold the sturgeon to other community members, but did report receiving support in kind such as oil, gasoline and cigarettes before or after their fishing trips.

4.5.6 The Impact of Hydroelectric Development on the Sturgeon Fishery: Community Perceptions

All of the sturgeon fishermen were asked to report changes to the sturgeon fishery following the construction of the LWR (N.F.A. Claims Number 44/110, 1991). Reported changes include a gradual decline in the number of sturgeon in the Nelson River system, so that many of the traditional sturgeon fishing areas no longer support any sturgeon. This has resulted in most of the fishermen from the community of Cross Lake having to travel to Landing River during the spawning season in order to catch sturgeon. The fishermen also reported a change in the taste and smell of the sturgeon, and that the sturgeon are generally thinner than those caught before the LWR was built (the average weight of sturgeon caught in recent years was reported by one fisherman at approximately 30 pounds, or 13.5 kg). The fishermen stated that there has not been a change in the length of sturgeon being caught. However, they did report that the sturgeon being caught since the construction of the LWR/CRD were thinner.

Cross Lake residents provided a number of reasons for the decline in the quantity and quality of sturgeon since the construction of the LWR: (1) There has been a decrease in food for the sturgeon. The fishermen suspect that a decline in clams, snail, fish flies and crayfish has resulted from the intermittent dewatering of feeding areas used by sturgeon; (2) Increased water turbidity; (3) Changes in water temperature; (4) Sound from construction of the LWR scared the sturgeon away (only at the Jenpeg site) (N.F.A. Claims Number 44/110, 1991)

The fishermen also stated that travelling by water to fishing locations is more difficult since the LWR because of low and unnaturally fluctuating water levels (N.F.A. Claims Number 44/110, 1991). These changes in the water regime have meant that: (1)

Traditional travel routes have been changed, and new routes have to be learned; (2) Fluctuating water levels make these new routes change; (3) Fast water areas have become more dangerous to navigate in some cases; (4) The characteristics of the water currents have changed, which affect fishing and navigation; (5) There is more debris in the water which makes navigation and fishing difficult; (6) New shoals and rocks damage boats and fishing equipment; (7) Changes in water levels have affected access to fishing areas (e.g. portages and docks are no longer at the shoreline). All of these factors are reported to have contributed to making fishing for sturgeon more difficult and expensive, and have therefore led to a decline in the amount of domestic sturgeon fishing that has been conducted by Cross Lake residents.

4.5.7 Contemporary Sturgeon Fishery: Harvest Levels

Most of the sturgeon presently caught by residents of Cross Lake come from the Landing River area (Don Macdonald, personal communication). Despite the high travel costs of fishing at Landing River for Cross Lake residents, the large sturgeon run which it supports during the spring spawning season makes this area an attractive fishing location. Table 4 summarizes the estimated number and weight of sturgeon caught in the commercial fishery of the Nelson River between 1986 and 1990, and the domestic fishery at Landing River from 1991 to 1993. Cross Lake residents account for at least half of the sturgeon harvested at Landing River each year between 1991 and 1993. The other communities involved in harvesting sturgeon at Landing River are Thicket Portage, Norway House and Split Lake (Nelson River Sturgeon Co-Management Board, 1994).

YEAR	ESTIMATED WEIGHT (lbs)	NUMBER	HARVESTED BY CROSS LAKE (#)	HARVESTED BY CROSS LAKE (%)
1986-1990	4,775 + domestic N/A	N/A	N/A	N/A
1991	9,600	372	311	83
1992	7,000	276	151	54
1993	7,500	296	181	61

Table 4: Estimated commercial and domestic sturgeon catches from the Nelson River, Manitoba. 1986-1990 estimated weight is an average of commercial catches (domestic catch unknown) from downstream of Sipiwesk Lake. 1991-1993 figures are domestic catches from the Nelson River (mainly at Landing River) (Source: Nelson River Sturgeon Co-Management Board, 1994)

Chapter 5

DISCUSSION and RECOMMENDATIONS

5.1 Overview

The review of the subsistence economy of the community of Cross Lake indicates that: (1) A range of subsistence harvest activities are being conducted throughout the year, and most of them are conducted within the boundaries of the Cross Lake RTL/Resource Area; (2) There is an extensive number of toponyms known by some community members. These toponyms demonstrate geographic and traditional ecological knowledge of the region, and document historical events and cultural activities to an extent that demonstrates occupancy of the region by the community of Cross Lake; (3) Sturgeon fishing was an important component of the historical subsistence economy, indicated by the communities' knowledge of the sturgeon resource and the integration of sturgeon in the culture of the community of Cross Lake. The importance of this resource as a food source has been diminished as a result of decreased sturgeon numbers and quality, and the increased effort required to catch sturgeon in the Cross Lake region.

The review of the mapping technique used in the CLHCS: (1) Adds further analysis of approaches used for mapping harvest locations and allows for more accurate interpretation of the CLHCS harvest location maps; (2) Confirms the importance of involving community members in the process of developing harvest location documentation systems.

5.2 Background Harvest Information

Documenting the general area used for resource harvesting, species harvested and seasonal cycle of harvesting activities provides a cursory look at the subsistence economy of the community of Cross Lake. The general extent of land use reported by the community supports the anecdotal land use information that is presented in the literature. A more detailed analysis of the spatial extent of land use will be presented in the CLHCS, and could be further defined by mapping other uses of the region. The impact of development on land use patterns (e.g. due to the belief that ice conditions are unsafe, improved access to areas as a result of road construction) would provide valuable information about some of the reasons for changes in land use. The species list and seasonal cycle of resource harvest activities provide a necessary background for examining resource harvest activities, and should be augmented with additional information gathered through further interviews with community members and participant/observation.

Combining resource harvesting activities, and conducting resource harvesting activities as part of a routine of activities were mentioned during the consultation process but were not investigated in detail. Further study of these practices would provide a more complete understanding of the subsistence economy by providing information on: (1) The amount of effort devoted to each of these resource harvesting activities; (2) Why different resource harvesting activities are carried out in similar areas; (3) The importance in the subsistence economy of species for which quantitative and spatial harvest information is difficult to determine (e.g. small game). Additional components of the subsistence economy which were mentioned by the community, and which also warrant further investigation, include the historical and contemporary use of resources harvested for subsistence, gender roles in the subsistence economy, and the relationship between culture and resource-based activities. The historical and contemporary consumption and historical

harvest components of the CLHCS will be an important step in investigating some of these areas.

The contemporary subsistence economy of the community of Cross Lake is similar to those reported for other aboriginal communities in northern Manitoba (e.g. Hrenchuk 1991; Hill 1993). It remains part if the total economy of the community, but its structure and importance has changed in part as a result of environmental degradation, increased populations and "modernization" of the community economy. Environmental degradation has resulted from a number of factors: (1) Resource developments such as hydroelectric development, forestry and mining; (2) Improved access to resources; (3) Population increases in the communities which has increased the demand for resources. New mining development has already begun in the Cross Lake region, and has the potential to further impact living resources as the population of Cross Lake and industrial activities increase. The impact of the LWR/CRD on the aquatic environment of northern Manitoba has been well documented (e.g. Government of Canada, Environment Canada, Department of Fisheries and Oceans, 1992). Other studies have attempted to document the impact of this development on northern aboriginal communities such as Cross Lake (e.g. Nelson River Group, 1984;1986; Usher and Weinstein, 1991). The need of Cross Lake residents to travel outside of the Cross Lake RTL/Resource Area to hunt for big game and to fish for sturgeon is a clear indication that there are not enough of these resources locally to support the needs of Cross Lake residents.

5.3 Evaluating Use of the Mapping Technique

The harvest location mapping technique used for the CLHCS developed into an effective system for documenting specific harvest locations. The main issues related to the quality of the mapping system were: (1) The impact of question wording on the information

provided during interviews; (2) The impact of response bias; (3) The importance of community involvement in the mapping system development and implementation process.

The wording of questions designed to determine harvest locations was an essential part of developing an effective mapping system. The decision to use struck and retrieve locations for 5 of the 6 species categories was made for similar reasons given in other reviews of land use and occupancy studies: these locations are easier to recall than hunting areas, and are probably the locations given during recall studies anyway (Usher and Wenzel, 1987). Difficulties of obtaining accurate fish harvest data through recall harvest studies have been reported in the literature (e.g. Usher and Wenzel, 1987), but differences in harvest locations as a result of opportunistic hunting, the use of resource harvesting routines and hunting techniques are not well documented.

Opportunistic hunting (which was common for big game and small game) can create large hunting areas, which will not be recorded in harvest location maps unless game is retrieved. This is one reason why only indicating struck and retrieve locations tends to under-represents hunting areas. Opportunistic hunting may result in an overlap in harvest areas with species such as small game and big game, as small game may be harvested while people are hunting moose or deer. Resource harvesting activities which are conducted as routines may also result in certain activities being reported as occurring in similar areas. For example, snaring rabbits and setting fish nets may be conducted as part of a daily routine when people are on the trapline. Therefore, there may be relatively more overlap in harvest locations for rabbits, fish, furbearers than for other resource harvest activities. Routines may therefore be one reason for spatial relationships between different resource harvesting activities.

Differences in hunting techniques may vary seasonally within a species category and between species categories, and in turn may influence harvest locations. The following example indicates how hunting techniques can influence the size of harvest areas. The area required for duck hunting varies seasonally because of differences in the amount of cover. There is little cover for ducks in the spring, which meant that hunting from a blind is an effective technique. In the fall, ducks are more effectively hunted by covering larger areas and flushing them out of cover. Goose hunting differs from duck hunting, as geese tend to have much more predictable flight paths. Therefore, a smaller area is required for hunting geese in both the spring and in the fall.

The influence of bias and recall problems were another potential source of inaccuracy in the development of this mapping system. Strategic bias has been identified as a difficult problem to assess and eliminate (Usher and Wenzel, 1987). In the CLHCS, attempts were made to limit strategic bias by ensuring respondent confidentiality and by using community members to conduct the interviews. As with other harvest and land use studies, the impact of strategic bias on the CLHCS is difficult to assess, but is thought to be minimal in the case of harvest location mapping. The impact of information recall problems were minimized by limiting the time period requested to one seasonal cycle, and by dividing the seasonal cycle into appropriate sections. These breakdowns were species specific, and were based on seasonal landmarks which would be easily recognized by community members (e.g. break-up and freeze-up).

Including the community in developing and implementing a methodology for identifying harvest areas was an essential part of the mapping system development process. Community input for designing the harvest location questions, developing and implementing initiatives that arose during questionnaire development (e.g. selecting informants for the toponym maps and managing this process), pretesting the questionnaire

and conducting the interviews was essential for developing a culturally appropriate and effective questionnaire. Feedback from the interviewers following the commencement of the Study allowed for adjustments to the harvest location technique to be made as required, which allowed minor but potentially damaging problems to be corrected. The necessity of incorporating community members in community-based researched has been well documented, and the CLHCS is another example of the appropriateness of this approach.

The following recommendations are based on the above discussion of the harvest location mapping process: (1) As a result of only identifying specific harvest sites, the harvest location maps will under-represent the amount of land used for resource based activities by the community of Cross Lake. The addition of other indicators of land use, such as residences, birth places, burial locations, travel routes, additional toponyms, spiritual locations, locations which appear in myths and in historic stories and spatial dimensions of traditional ecological knowledge in further studies would be valuable additions for providing a more complete indication of land use; (2) The influence of opportunistic hunting, resource harvest routines and hunting techniques should be considered when interpreting the CLHCS resource harvest location maps and when designing land use studies using similar techniques to the CLHCS.

5.4 Use of Toponyms

The sample of toponyms presented in Chapter 4 demonstrate occupancy of the region by the community of Cross Lake, and indicate the presence of traditional ecological knowledge of the Cross Lake region. The sample of toponyms presented in this practicum include physical descriptions of the landscape, ecological processes, harvesting areas for different species, references to historical occurrences and people, and community lore. As this sample of community toponyms was collected for regions which the key informants

were familiar, these maps do not delineate the extent of land occupancy by the community or the spatial extent of traditional ecological knowledge. Further description of the toponyms of the community of Cross Lake would be useful for understanding the geographic extent of Cross Lake community and to better understand the relationship between the people and the land.

The evidence of land occupancy provided by the community toponyms has similar implications to other land occupancy studies in northern Manitoba (e.g. Hill, 1993; Hrenchuk, 1993). Because the concept of land occupancy indicates past and present ownership of the resources of the area, it helps to provide reasons for natural resource management conflicts which have and continue to exist between the community and the provincial and federal governments. It must be recognized that the basis of these conflicts is a questioning by the community of the right of the state to manage resources, when the land was historically, and continues to be, occupied by the community. The presence and content of these community toponyms also support the paradigm of northern Manitoba as a homeland for northern aboriginal communities, rather than as an unoccupied wilderness. If the evidence for this land ownership is accepted, then there is further reason for including northern aboriginal communities in the planning and decision making process for future developments in northern Manitoba. There is evidence that acceptance of this concept of ownership is slowly progressing (e.g. Haugh, 1994), although the involvement of aboriginal communities in managing natural resources in Manitoba remains biased towards provincial and state authorities (Haugh, 1994).

5.5 Sturgeon Fishery

The compilation of information on the historical and contemporary sturgeon fisheries provides information on a single sector of the Cross Lake subsistence economy.

The historical sturgeon fishery was an integral part of the subsistence economy: sturgeon was a popular food and a resource with many uses, sturgeon were historically shared between families and other community members, sturgeon fishing was and remains an important and popular cultural activity. Sturgeon management systems appear to have been based on limiting catches by need and the ability to transport and preserve sturgeon.

Cross Lake residents demonstrate similar knowledge about sturgeon behavior as the information reviewed in the scientific literature (e.g. knowledge of spawning times, spawning locations, preferred habitats during different seasons, feeding locations and diet, and daily movement patterns). The use of environmental signals (e.g. frog calls and the size of leaves) to indicate sturgeon spawning times undoubtedly results from long-term involvement by the community in the sturgeon fishery, and represents an understanding and use of the natural environment which is not well documented in the literature. Further investigation of traditional ecological knowledge and its role in the subsistence economy would help to fill this information gap.

Quantitative information regarding the length and weight of sturgeon caught before the construction of the LWR/CRD is not comparable to data provided for the Sipiwesk Lake commercial sturgeon fishery (Patalas, 1988). The size and weight of sturgeon reported in the court transcripts were much larger than those caught in the 1987 and 1988 Sipiwesk Lake commercial fisheries. This leads to two possibilities: (1) Larger sturgeon were caught before the LWR/CRD was constructed than were caught in the 1987 and 1988 Sipiwesk Lake commercial sturgeon fisheries; (2) Quantitative information presented in the court transcripts is unreliable as a result of difficulties of recalling this information over long time periods. It is difficult to assess which of these possibilities, or what combination of the two, is most accurate without further study. Future historical studies should consider the use of more appropriate measurements (e.g. boat loads of sturgeon) when

dealing with the challenges of verifying information acquired through long-term information recall.

Community members reported that the sturgeon fishery was impacted by changes to the aquatic environment as a result of hydroelectric development. Slow growth rate and lengthy time to maturity make sturgeon susceptible to environmental change, although the relative impact of overfishing and habitat loss on local sturgeon populations remains unclear. However, it is clearly reported that relatively recent (since the construction of the LWR/CRD according to Cross Lake residents) problems with catching sturgeon and participating in the sturgeon fishery have had a negative effect on the people involved with fishing for sturgeon (N.F.A. Claims Number 44/110, 1991).

Community sturgeon fishermen reported changes to the aquatic environment which reflect impact studies of the LWR/CRD on the aquatic environment of the Cross Lake region (e.g. Government of Canada, Environment Canada and Department of Fisheries and Oceans, 1992). Community sturgeon fishermen indicated increased water turbidity and the dewatering of certain areas as impacts of the LWR/CRD. Changes in water quality were also suspected as another impact of the LWR/CRD by the fishermen. These environmental changes are suspected as the cause of the skinnier and less tasty sturgeon that have been caught since the development of the LWR/CRD (N.F.A. Claims Number 44/110, 1991). Future efforts to study the impact of the LWR/CRD on the sturgeon population would benefit from using community information as a starting point for identifying potential impacts. Information regarding the historical and contemporary sturgeon fisheries gathered through participant/observation and interviews with Cross Lake community members involved in the sturgeon fishery would be a valuable addition to the information compiled in this practicum, and would help to further define the changing role of the sturgeon fishery and of the subsistence economy.

5.6 Summary

This practicum provides a basic understanding of the subsistence economy of the community of Cross Lake. The subsistence economy continues to provide resources for domestic use, defines, in part, the culture and history of the people, and provides evidence of historical and contemporary use and occupancy of the Cross Lake region. The review of the sturgeon fishery provides specific qualitative information about one aspect of the subsistence economy, and some of the perceptions of change to the fishery as a result of resource developments from the "outside". Further studies of the subsistence economy which examine its importance in the changing community economy, and the integration of resource based and other activities in the total community economy, would help to provide context for the baseline information of the subsistence economy presented in this practicum. The results from the CLHCS will be an important first step in providing this information.

The review of harvest location mapping technique used for the CLHCS compiles information regarding mapping techniques used in previous land use and occupancy studies, discusses their application in the CLHCS and provides information which is useful for interpreting the harvest location maps developed for the CLHCS. The review supports previous conclusions regarding wording of harvest location questions, the use of harvest locations as a component rather than a complete indicator of land use, and the necessity of community involvement in all aspects of the methodology development and study implementation process. The combination of information regarding the development of the mapping technique with information regarding the subsistence economy presented in this practicum indicate: (1) The historical and contemporary importance of the subsistence economy: (2) Changes to this sector of the economy (which may have taken place as a result of changes to the natural environment, increased community populations and

"modernization"); (3) The need for sharing management functions and authority with aboriginal communities in northern Manitoba in order to ensure that future developments are sustainable and culturally appropriate.

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Dr. Fikret Berkes, Professor and Director, Natural Resources Institute, University of Manitoba. Winnipeg, Manitoba.

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.

APPENDIX A

Cross Lake Contemporary Harvest Study Questionnaire

CROSS LAKE HARVESTING RESEARCH, 1994/95

1) Questionnaire No. ___ ___ ___ - ___
(1 2 3 4)

2) Date of interview (day/month/year) ___ ___/___ ___/___ ___
(5 6 7 8 9 10)

3) Interviewer _____ Code ___
(11)

PARTICIPANT'S PROFILE:

4) Where is your present residence? ___
(12)
1 = Saggitawak
2 = Halfway Point
3 = Wapak
4 = Natimik
5 = Non-Treaty (Community)
6 = Sawmill Road
7 = Mission Point

5) Did you have wage employment at some point between July 1, 1993 and July 1, 1994? ___
(13)
1 = no
2 = seasonal/casual jobs
3 = part-time & year-round
4 = full-time & year-round
5 = on pension
6 = self-employed

6) What is your present marital status? ___
(14)
1 = single
2 = widowed
3 = divorced
4 = separated
5 = married or common law

7) Are you the head of the household you live in? ___
(15)
1 = yes, male head of household
2 = yes, female head of household
3 = not head of household

IF "1", IN YOUR REPORT YOU MUST INCLUDE THE CATCHES OF ALL ADULT FEMALES (INCLUDING YOUR WIFE) AND ALL CHILDREN BORN ON OR AFTER JULY 1, 1978 LIVING IN YOUR HOUSEHOLD.

IF "2", IN YOUR REPORT YOU MUST INCLUDE THE CATCHES OF ALL ADULT FEMALES (INCLUDING YOURSELF) AND ALL CHILDREN BORN ON OR AFTER JULY 1, 1978 LIVING IN YOUR HOUSEHOLD.

IF "3", GO TO QUESTION #11 AND REPORT ONLY YOUR OWN CATCH IN YOUR REPORT.

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	27
canoe	28
snowmobile	29
snowshoe	30
truck/automobile	31
airplane	32

1 = yes
2 = no

15) Do you own your own:

motor boat	33
snowmobile	34
truck/automobile	35

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? ___ 37
1 = not a goose hunter
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

spring '94 ___ ___ 94 95

(total) ___ ___ ___ 96 97 98

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? ___ 99
1 = yes
2 = no

FISH:

22) Did you do any domestic fishing (including angling) for all species other than sturgeon between July 1, 1993 and July 1, 1994? ___ 100
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? ___ 101
1 = not a fisherman
2 = other (specify) _____
-- 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 '93/94			spring '94			(total)			
Whitefish	___ 102	___ 103	___/ 104	___ 105	___ 106	___/ 107	___ 108	___ 109	___ 110	___ 111	___ 112	___ 113	___ 114
Tullibee	___ 115	___ 116	___/ 117	___ 118	___ 119	___/ 120	___ 121	___ 122	___ 123	___ 124	___ 125	___ 126	___ 127
Pickerel (walleye)	___ 128	___ 129	___/ 130	___ 131	___ 132	___/ 133	___ 134	___ 135	___ 136	___ 137	___ 138	___ 139	___ 140
Jackfish (pike)	___ 141	___ 142	___/ 143	___ 144	___ 145	___/ 146	___ 147	___ 148	___ 149	___ 150	___ 151	___ 152	___ 153
Suckers	___ 154	___ 155	___/ 156	___ 157	___ 158	___/ 159	___ 160	___ 161	___ 162	___ 163	___ 164	___ 165	___ 166
Carp	___ 167	___ 168	___/ 169	___ 170	___ 171	___/ 172	___ 173	___ 174	___ 175	___ 176	___ 177	___ 178	___ 179
Maria (burbot)	___ 180	___ 181	___/ 182	___ 183	___ 184	___/ 185	___ 186	___ 187	___ 188	___ 189	___ 190	___ 191	___ 192
Other fish (specify)													
_____	___ 193	___ 194	___/ 195	___ 196	___ 197	___/ 198	___ 199	___ 200	___ 201	___ 202	___ 203	___ 204	___ 205
_____	___ 206	___ 207	___/ 208	___ 209	___ 210	___/ 211	___ 212	___ 213	___ 214	___ 215	___ 216	___ 217	___ 218
_____	___ 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 ___ 232 ___ 233 ___ 234

winter '93/94 ___ 235 ___ 236 ___ 237

spring '94 ___ 238 ___ 239 ___ 240

(total) ___ 241 ___ 242 ___ 243

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? ___ 244
1 = yes
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? ___ 246
1 = not a sturgeon fisherman **Go to question #33**
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 ___ ___ ___ 250 251 252 (total) ___ ___ ___ ___ 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 ___ ___ ___
269 270 271

spring '94 ___ ___ ___
272 273 274

(total) ___ ___ ___
275 276 277

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 ___
279

10" net ___
280

1 = yes
2 = no

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? ___ 282
1 = not a trapper
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	___ 283	___ 284	___ 285	Fox	___ 304	___ 305	___ 306
Muskrat	___ 286	___ 287	___ 288	Wolf	___ 307	___ 308	___ 309
Lynx	___ 289	___ 290	___ 291	Coyote	___ 310	___ 311	___ 312
Marten	___ 292	___ 293	___ 294	Wolverine	___ 313	___ 314	___ 315
Otter	___ 295	___ 296	___ 297	Fisher	___ 316	___ 317	___ 318
Weasel (ermine)	___ 298	___ 299	___ 300	Red squirrel	___ 319	___ 320	___ 321
Mink	___ 301	___ 302	___ 303	Black/brown bear	___ 322	___ 323	___ 324

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? ___ 338
1 = never hunt big game
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?

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

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

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

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

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

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, 1993 and July 1, 1994? ___ 435
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? ___ 436
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?

___ ___ ___ days
455 456 457

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	___ 458	1 = yes 2 = no
Wood for construction	___ 459	
Berries	___ 460	
Medicinal plants	___ 461	

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

Firewood	___ ___ ___ 462 463 464	cords
Wood for construction	___ ___ ___ ___ 465 466 467 468	logs
Berries	___ ___ ___ 469 470 471	gallons

THANK YOU, WE APPRECIATE YOUR HELP !

INTERVIEWER'S COMMENTS

APPENDIX B

Cross Lake Contemporary Harvest Study Interviewer 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, 19, 24, 25, 29, 31, 35, 39 and 41.

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 <u>part-time & year round</u> employment would be working part time at the Northern throughout the year, while an example of <u>seasonal/casual</u> 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 is 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.

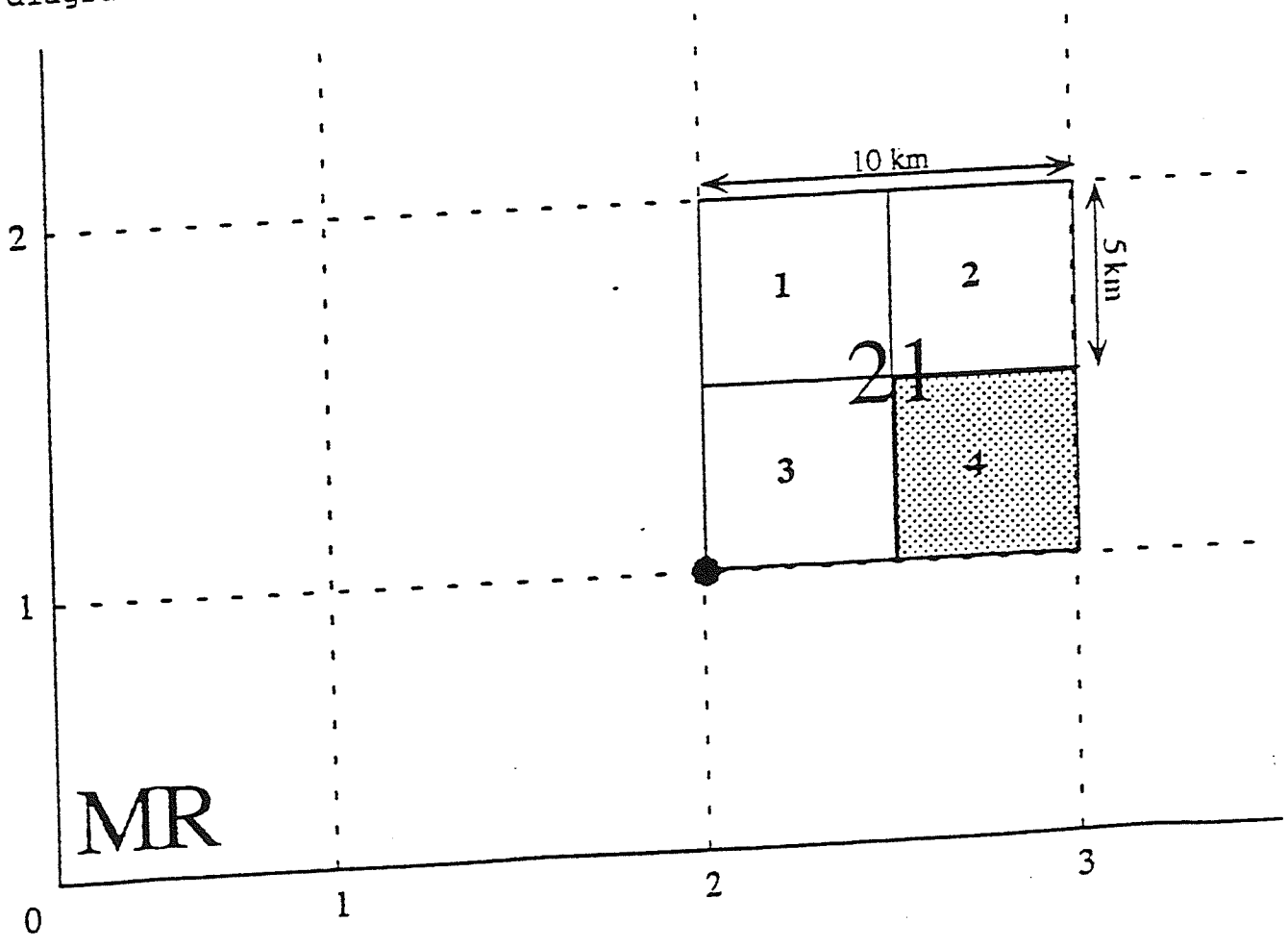
14. This includes vehicles which are used for commercial and domestic harvesting purposes. For this question it doesn't matter if the equipment is owned, rented or borrowed.

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 he 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 <u>include commercial and domestic catches</u> 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 <u>domestic</u> 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 kill per person", 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).

<u>Completing the Questionnaire</u>

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.