AN ASSESSMENT OF METHODS OF COLLECTING AND VALUING NATIVE SUBSISTENCE FISH AND MARINE MAMMAL HARVEST DATA IN THE NORTHWEST TERRITORIES

BY

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A practicum submitted to
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MASTER OF NATURAL RESOURCES MANAGEMENT

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ABSTRACT

Subsistence fish and marine mammal harvest and use are more than an economic practicality for native people of the Northwest Territories; such harvests represent a lifestyle adapted to resource exploitation possibilities of the Northwest Territories.

The potential threat of competing demands and/or negative impacts upon fish and marine mammals from northern economic development projects require a means to measure the baseline productivity and value of the subsistence lifestyle.

In the past, a number of studies have attempted to measure harvest of subsistence fish and marine mammals by native peoples of the Northwest Territories. A uniform method of collecting such data has never been designed, therefore difficulties of comparison among studies exist.

The objective of this study has been to examine and compare the various theoretical means to measure and value subsistence fish and marine mammal harvest. The method and reason for using each method are explained.

A single method cannot be recommended due to different reasons for collecting data. Also, local conditions affect method choice. Therefore, the value of this study has been to indicate the preferred measurement method for a particular end-use, and to highlight the importance of the collection method in the value of final data.

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DEFINITION OF TERMS

DOMESTIC ECONOMY: The method of exchanging goods and services in a society without the use of a medium of exchange, eg. money. Goods in a domestic economy are not assigned a financial value.

FISH: Whitefish, Arctic Cisco, Inconnu, Pike, Walleye, Arctic Grayling, Goldeye, etc.

MARINE MAMMAL: A marine mammal is an air breathing aquatic species. The marine mammals which are important to the native population of the Northwest Territories are seals, polar bears and Beluga whales.

NATIVE: A native person refers to a person of Indian or Inuit ancestry, whether that ancestry would legally qualify that person as full blooded Indian status or not.

SUBSISTENCE: In its narrowest sense, subsistence is a lifestyle where a person exists at a minimum nutritional level; ie. subsistence living. Subsistence used here is defined more broadly, to define the society in which most if not all worldly needs are manufactured within the family unit.

CHAPTER 1 INTRODUCTION

1.1 Preamble

Historically, native people in the Northwest Territories have relied upon harvests of fish and marine mammals, as well as other wildlife, for a large part of their domestic food needs. Although recent changes in the native way of life (urbanisation and wage employment) would be expected to diminish the importance of the production of subsistence foods, the decline in importance has not been as extensive, or as rapid as might be expected. Native people, especially in more remote areas, still depend heavily on domestic use of the fish and marine mammal harvest to fulfill a significant part of their domestic food needs.

Official interest in the quantity and value of subsistence fish and marine mammal harvest is derived primarily from three sources.

1. The Fisheries and Marine Service of Environment Canada is charged with management of the fish and marine mammal resources of, among other areas, the Northwest Territories. Ministerial Policy defines the priorities of fisheries management in the Northwest Territories as follows:

   i. Conservation of the resource and maintenance of the role that the resource plays in the marine or aquatic environment.
   ii. The needs of the native people for fish and marine mammals for food.
   iii. The needs of the commercial and recreational fisheries.(1)

While information and statistics on commercial and sport utilisation of fish and marine mammals are relatively available (from licenses, permits, and export permits) the quantity and value of fish and marine mammals used for

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1. Fisheries and Marine Service Memorandum - file 726-5-0, 1978.

domestic puposes is not so accessible.

2. Economic interest is expressed in the quantity and financial value of native subsistence fish and marine mammal harvest data by Canada Department of Indian Affairs and Northern Development. Area Economic Surveys undertaken in the past attempted to measure subsistence fish and marine mammal harvest of parts of the Northwest Territories.

In a more 'academic' sense, subsistence income cannot be ignored in the economic development of the Northwest Territories and its peoples, because:

> the major process of economic development by which labour from the subsistence economy is drawn into wage employment cannot be studied without taking into account the alternative opportunities, (or lack of them) as self-employed ... producers.[2]

3. From the cultural standpoint, the quantity and value of subsistence food production are important to an understanding of native lifestyle in the Northwest Territories. The Inuit Tapirisat has been involved in a number of studies of subsistence use of fish and marine mammals by the native peoples of the Northwest Territories, (Usher 1975, Depape et al. 1975).

Subsistence fish and marine mammal harvest data are of interest to the above agencies and to others (e.g. pipeline developers preparing impact cost assessments). The methods used to evaluate the quantity and value of native subsistence fish and marine mammal harvest data in the Northwest Territories significantly affect the outcome. Yet the methods used in any study are commonly not explicit, and frequently change from one study to another. Exactly what is measured and how it is measured is not clear, which leads to great difficulties in gaining overall catch and value statistics for the Northwest Territories, or comparing resource utilisation over time or among different areas.

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2. Myint, H. The Economics of Developing Countries, Hutchinson University Press, London. 1974. p.30.

Existing information on subsistence fisheries in the Northwest Territories may be categorized as follows:

(a) Historical - detailed data are available for certain geographic areas, e.g. Mackenzie Delta;
(b) Site Specific - detailed data are available for some individual communities, but not for others, e.g. Baker Lake;
(c) Time Specific - data are available for one year or season only in some communities, e.g. Lac la Martre.

The lack of comparability between among studies may lead to difficulties in ascertaining total subsistence fish and marine mammal use for the purposes of fisheries management. In addition, present and future subsistence fisheries studies may involve possible duplication due to lack of agreed collection and valuation methods by different agencies.

Where data on total fisheries use by the subsistence sector is poor, fisheries management of the total fisheries resource base for all uses cannot be effective. Effective fisheries management requires reliable data on the consumption of stocks by different demands upon the resource base.

1.2 Problem and Its Setting

1.2.1 Statement of the Problem

As subsistence food production is a cashless source of food income:

> ...if the standard of living of northern people is to be measured, it is essential to estimate the value of production from traditional activities.[3]

The overall problem of measurement of subsistence use of fish and marine mammals in the Northwest Territories can be seen as:

1. First, determination of volume ofproduction and its disposition and use.

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3. Palmer, J. Social Accounts for the North - Measurment of Income in Yukon and Northwest Territories. Department of Indian Affairs and Northern Development, Ottawa. 1973.

2. Second, evaluation of income in kind, specifically imputing a cash value to country food which is consummed domestically;
3. Third, examination of intangibles involved in any direct comparison of modern and traditional sectors of the economy, and limits which these place on the utility of imputing a value to income in kind.[4]

1.2.2 Study Area and Population

The study area of this practicum was the Northwest Territories (see Figure 1). Within the study area are a large number of marine and freshwater fish as well as marine mammals exploited by the native peoples.

The population of the study area is the native people of the Northwest Territories. Native people considered in this study may or may not be of Treaty status. The reason for this is that Indian Treaties do not cover large areas of the Northwest Territories, therefore the native people living there cannot be accorded a Treaty status.

The reasons for exclusion of non-native people from consideration in this study were:

1. Non-native peoples are commonly excluded by law from hunting or fishing for all their food needs.
2. Due to the reliance of most non-natives in the Northwest Territories on wage employment, such fishing that is done, is undertaken for pleasure purposes, and can be estimated from fishing licenses.

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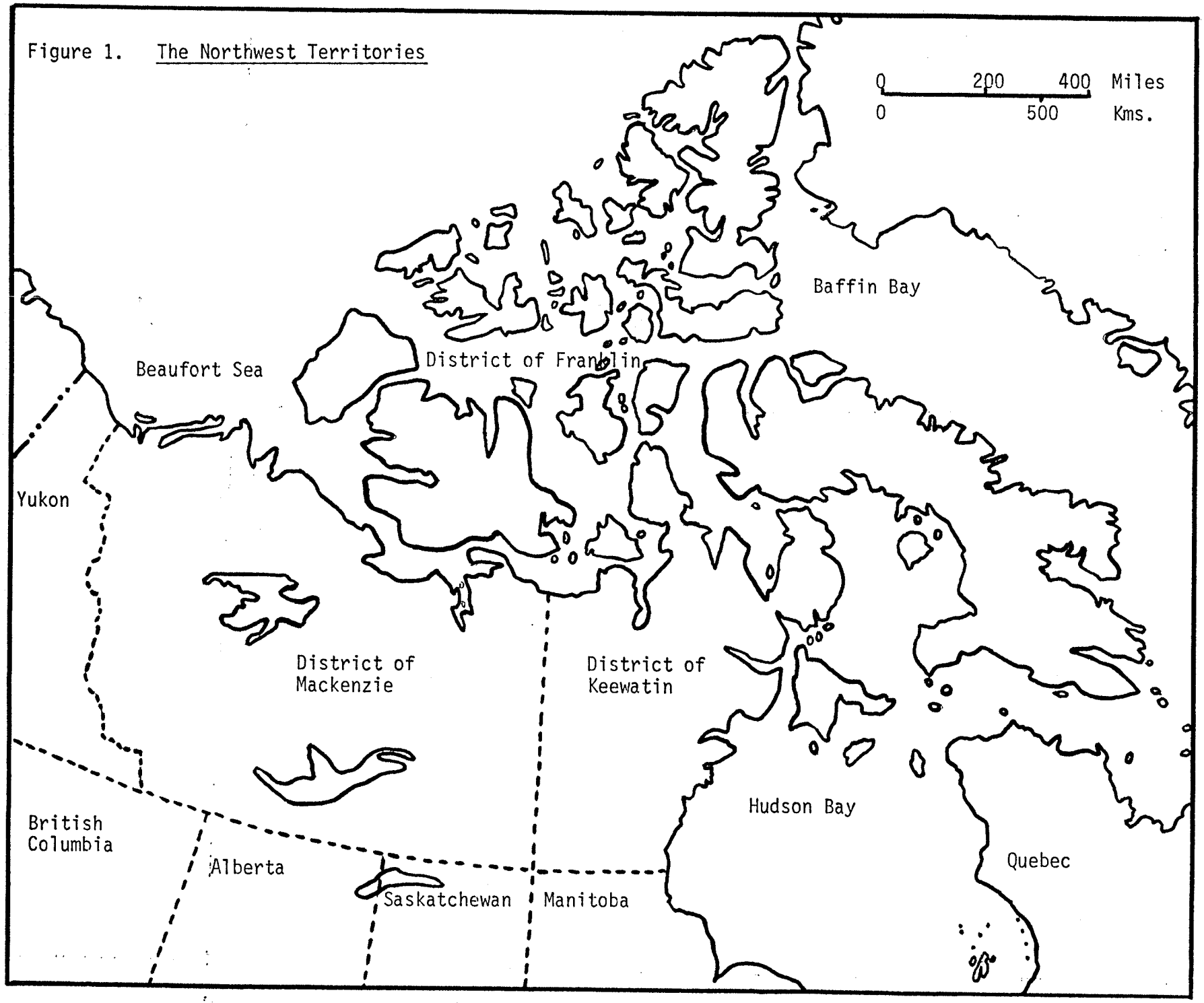
4. Withler, R.E. Review of the Literature on Domestic Fish Effect and the Mackenzie Valley Pipeline. Domestic Fisheries Collection, Freshwater Institute. 1975. p. 44.

Figure 1. The Northwest Territories



1.2.3 Study Goals and Objectives

The purpose of this study was to identify and evaluate methods of collecting and valuing data on the native subsistence fish and marine mammal harvest in the Northwest Territories. Evaluation of the strengths, weaknesses and likely cost of using different methods will aid in increasing the effectiveness of future data collection.

Future data collection may be for reasons of:

a. Economic evaluation of income in kind of native people;
b. Management of total fish and marine mammal resources requires information on subsistence exploitation of these resources;
c. Evaluation of native dependence on fish and marine mammal resources in an area. Compensation may be required if these resources are adversely effected by pipeline, road or other developments.

Efficent data collection requires the identification of what the information is required for. Thereafter the most cost effective and accurate means to collect the required data can be identified from this study.

To increase the effectiveness of future data collection the following set of objectives were addressed:

1. The first objective was to identify the current background of subsistence use of fish and marine mammals by native peoples of the Northwest Territories. The prime consideration was the cultural mindset of the native harvester. This will also be explored in the current context of Native Land Claims and how this might affect data collection.
2. The second objective was to describe methods to determine the quantity and value of the native subsistence fish and marine mammal harvest in the Northwest Territories.
3. The third objective was to analyze methods of collecting and valuing data on subsistence fish and marine mammal harvest. Factors to be considered included:
   3.1 cost of method
   3.2 field practicality
   3.3 accuracy and coverage.

1.3 Justification for Study

Justice Berger provides one of the best summations of the need for an agreed effective means to gather data on the quantity and value of the subsistence fish and marine mammal harvest by native peoples of the Northwest Territories;

> Any assessment of the productivity, value and significance of the traditional sector of the economy of northern Canada must be based on accurate statistical data. They in turn must be based on precise, agreed definitions of terms and of the purposes for which the data are collected, and on an efficient and workable system for collecting and maintaining the data.[5]

This practicum was designed as an introduction to methods that could be used for the collection of data on native subsistence fish and marine mammal harvest in the Northwest Territories. Accuracy in this context has been balanced against applicability. Appendices A and B contain examples of specific study areas with precise definitions of species and measurement method. This study examines the generalized method of collecting and valuing subsistence fish and marine mammal use data for native people in the Northwest Territories. It is impossible for a study of this nature to specify exact collection methods, as these will and should be tailored to the specific location.

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5. Berger, T.R., Justice. Northern Frontier - Northern Homeland; Report of the Mackenzie Valley Pipeline Inquiry. Department of Indian and Northern Affairs, Volume 2, Ottawa, 1977. p.8.

It is important at this stage to understand that subsistence food production by native peoples in the Northwest Territories represents an important contribution to their material well-being. To illustrate the simple economic value (ignoring for the moment the cultural significance) of subsistence food production; the Canadian Arctic Gas Pipeline Study concluded that per capita income in Tuktoyaktuk in 1974 was $775[6]. Usher criticizes this statistical finding with the following argument;

> ...despite higher prices and greater needs in the North, a person from Tuktoyaktuk is, on average, manifestly better off than any resident of Toronto or Edmonton who actually lives on a similar amount.[7]

The line of reasoning is that native residents of Tuktoyaktuk are able to provide a significant part of their food needs from hunting and fishing. The ability to harvest fish and marine mammals is an important constituent of native subsistence food provision. If native people were unable to obtain subsistence meat the cost of replacements from the local stores would be high. Replacements are generally food imported from the South at great expense.

The importance of a study of methods of collecting data on methods of collecting and valuing native subsistence fish and marine mammal harvest is not because;

> It is generally thought important in modern industrial society to attach numerical values to human activity.[8]

The importance of subsistence food use and necessity for calculating its real

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6. Canadian Arctic Gas Pipeline. The Traditional Economy, Social and Economic Impact of the Proposed Arctic Gas Pipeline in Northern Canada.Calgary, Volume 2. 1974.
7. Usher, P.J.. Evaluating Country Food in the Northern Native Economy, in Arctic, Volume 29 (2), 1976. p. 116.
8. ibid p. 106.

value to native people, is primarily because of the prospect of increasing conflicts between uses of the resource in northern Canada. Underestimation or ignorance of the importance and value of the fish and marine mammal resources, denominated in terms northern developers can understand, may lead to incorrect decisions in development of Canada's Northlands.

1.4 Approach of Study

Constraints of time and finance imposed severe limitations on the scope of this study. Transportation in the Northwest Territories was a major expenditure item. Due to such constraints the study was developed to identify methods that had been, or could theoretically be used, to measure quantity and value of subsistence fish and marine mammal resources of the Northwest Territories. The study was developed from analysis of other studies and literature on native subsistence use of wildlife resources in the Northwest Territories.

Personal contact or correspondence with other researchers in the area of subsistence data collection, as well as wildlife officers and government officials was an important research tool. The wide diversity of experience represented by past researchers into subsistence harvest data collection proved to be extremely valuable. As financial constraints did not allow the field trial of any theoretical collection method the experience of researchers was used to express difficulties and advantages of different approaches to measuring and valuing native subsistence use of fish and marine mammals in the Northwest Territories.

The approach of this study was to define the reasons for collecting data on native subsistence fish and marine mammal harvest. Sociological understanding of the native lifestyle was viewed as important to any researcher proposing to measure subsistence harvests, therefore the various facets of native culture and subsistence harvests were explained.

Only after this groundwork, could the methods of data collection and valuation be addressed. Methods are examined from diferent bases with a view to explaining strengths and weaknesses.

CHAPTER 2 IMPORTANCE OF NATIVE LIFESTYLE

This chapter introduces the importance and scope of traditional native lifestyle. Subsistence production of food is perhaps the most obvious items to differentiate native people of the Northwest Territories from other peoples.

2.1 Subsistence Production and the Northern Native

The importance of fish and marine mammals used for domestic food purposes has many different facets. This section examines some of the major aspects of subsistence harvest.

2.1.2 Cultural Factors

Cultural factors of subsistence fish and marine mammal harvests asks the question: Why do native people still prefer to hunt and/or fish for their food? Native culture explains a great deal of the historical roots.

Until recent times, subsistence food production has represented the only means of survival for northern native peoples. The provision of sufficent quantity and quality of food has been critical, not only for survival, but also as an indicator of status within native culture.

> Another effect of the primacy of hunting as the sole means of subsistence was the relentless pressure it placed upon the male, not only to provide food, but to achieve success as a hunter,this being his supreme source

of validation and self esteem.[1]

The hunter has an important role in the northern native way of life, because food the native hunter can provide for themselves;

> ...has deep emotional significance for them, both in itself and as a symbol of independance in case of need - a need occasionally realized.[2]

White man's appearance in the Northwest Territories has been within living memory of some. White man's culture does not rely on wildlife harvests to the same extent as native culture. The continued right of access by native people to the products of the land was recognized in Treaty numbers 8 and 11 in the Northwest Territories, as well as other Treaties.

The Report of the Commissioners for Treaty number 8 typifies the necessary provisions;

> ...we had to solemnly assure them that only such laws as to hunting and fishing as were found necessary in order to protect the fish and fur bearing animals would be made, and that they (the native population) would be as free to hunt and fish after the Treaty as they would be if they never entered into it.[3]

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1. Lubart, J.M. Psychodynamic Problems of Adaption - Mackenzie Delta Eskimos. Mackenzie Delta Research Project Number 7, Northern Science Research Group, Department of Indian and Northern Affairs, Ottawa. 1970. p. 27.
2. Gourdeau, E. The Arctic Dilemna: Man and His Environment vs. Resource Development, Arctic Institute of North America, Montreal. 1971. p.197.
3. Morris A. The Treaties of Canada with the Indians. Clark & Co., Toronto. 1880. pp. 45-46.

Today the legal right of native people to harvest fish is enshrined in the laws of the Northwest Territories.[4] However it might be expected that the transition of native people from semi-nomadic hunting and fishing to settlement existence would diminish the importance of the legally acquired right to fish and hunt. The attractions of settlement life are however influenced by;

> The Eskimo is quite aware that most jobs available to him are temporary, generally of labourer level and glaringly indicative of his lower status.[5]

Native attachment to the land and the ability to use fish and marine mammal resources is of deep signficance to the future of land use in the Northwest Territories, because native culture is based around the concept that there exists...

> The right to avail himself of all available resources, food or implements.[6]

Within the native cultural framework, subsistence fish and marine mammal harvests are common indicators of status. These indicators of status are difficult to express in a white dominated society, where the native may find his status and self esteem sharply diminished.

2.1.2 Economic Factors

The financial cost of store-bought food in the Northwest Territories is high due to transport costs and isolation from main food-producing areas of the South. Even though parts of the Northwest Territories are accessible by road or rail, transport costs remain a signifigant item in the

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4. NWT Fisheries Regulations, section 22, January 15, 1980.
5. Lubart, J.M., op cit, p.39.
6. ibid, p. 23.

retail price of food. Virtually all store-bought food must be transported in from the South, as there is negligible conventional food production in the Northwest Territories for retail sale. Therefore, if locally harvested fish and marine mammals can displace store bought food, there is opportunity for a significant cost saving. The financial cost of store bought food vis-a-vis domestically produced food is illustrated by the following example;

> The DEW (Distant Early Warning) Line worker at Tuktoyaktuk in 1956-57 was spending 55 per cent of his wages on store food, whereas at Cape Dorset four years later the average familly expenditure on food hardly exceeded $300. But in the latter district 60 of the 75 families were living on the land, at a considerable distance from the settlement, and they were obtaining most of their food by hunting and fishing, which still left them spare moments for carving small figurines to sell in the world's art markets.[7]

Wage employment is extremely limited for native people in many settlements of the Northwest Territories, and it would be easy to assume that the native people in many parts of the Northwest Territories were on the brink of starvation due to the financial inability to purchase food. This conclusion would overlook the fact that;

> Traditional hunting and fishing represents an important source of income in kind, that is income in the form of harvested biomass... Food derived in this manner represents an alternative to monetary purchase of meat for which funds may not be available or purchase prices may be high in

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7. Jenness, D. The Economic Situation of the Eskimo, in V.F. Valentine and F.G. Vallee (Editors), Eskimo of the Canadian Arctic. McClelland & Stewart Ltd., Toronto. 1964. p. 134.

> relation to effort expended in traditional wildlife harvest.[8]

Productivity of the land in the Northwest Territories is limited and hunter/fishermen are dependant on a few species of animals for subsistence Disturbance or overexploitation of fish or marine mammals could have a deleterious effect on native resource utilisation. Unless native hunter/fishermen can diversify their consumption away from an impacted species, the only alternative is store-bought food. Given the high cost of this food in the Northwest Territories, the loss of the ability to harvest fish and marine mammals must result in a loss of income, of either cash or income in kind. The loss of welfare is identical.

2.1.3 Nutritional Factors

When it is proposed to substitute southern imported meats for fish and marine mammals, the first problem that arises, is what imported meat is offered as an alternative to fish and marine mammal products.

> Imported red meats appear to be the closest possible substitute for big game, imported domestic fowl for birds, and imported fish for local fish. Yet imported red meat and domestic fowl are not directly comparable to wild meat. Quite apart from such immeasurable qualities as preferences of taste and of cultural significance, they are not identical in nutritional content, particularly protein.[9]

Most wild meat produced from marine mammals of the Northwest Territories is higher in protein and other important vitamins and minerals than commonly cited southern imported alternatives. Protein content is perhaps one of the most important factors;

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8. Depape, D., W. Phillips, and A. Cooke. Socioeconomic Evaluation of Inuit Livelihood and Natural Resource Utilisation in the Tundra of the NWT. Inuit Tapirisat of Canada, Edmonton, 1975, p. 31.

9. Berger, T.R., op cit, p.14.

> Protein content is only one, although perhaps the most signifigant, means of comparing the nutritional qualities of country food and imported substitutes.[10]

Table 1 illustrates the comparison between the meat products produced from marine mammals harvested in Alaska and substitutes available from the mainland United States. The relative comparison between nutritional qualities of subsistence versus store-bought food in the Northwest Territories would be substantially similar.

Table 1.

Protein and Fat Content of Commonly Eaten Meats (%:uncooked portions)

Alaskan Eskimo Diet			United States Diet		
Item	Protein	Fat	Item	Protein	Fat
Ringed Seal	32	1.8	Veal Side	19	12
Walrus	27	12.0	Chicken	20	13
Bearded Seal	27	0.4	Lamb Side	16	28
Muktuk	12.3	1.2	-		

Source 11.

Dr. O. Shaeffer who compiled this table, specified sea mammals as a good source of iron and other minerals, while fish and seal livers were excellent sources of Vitamin A and D. Generally, fish are rich in protein (23 - 25 %) and Vitamin C (4 - 15 mg %).

10. Usher, P.J., op cit, p. 114.
11. Derived from Table 4, p. 24 of B.F. Friesen. Potential Inuit Benefits from Commercial and Sport Use of Arctic Renewable Resources. Inuit Tapirisat, Renewable Resources Project, University of Waterloo.1975..

Therefore, it is clear that southern imported meats cannot be regarded as a direct substitute for marine mammal meats. Such a substitution might leave native people deficent in many nutritional areas.[12] One difficulty is that the nutritional value of subsistence fish and marine mammal meat varies with the condition of the animal, as well as the season and location of capture.

There are also difficulties in regard to ascertaining the useable component of subsistence meat harvests.Many natives will consume parts of fish and marine mammals considered distasteful to southern tastes, e. g. Muktuk.

Due to nutritional and other differences, between native and southern food sources, great care must be excercised in the selection of what product is chosen as an alternative to wild meat. Specific valuation problems attendant to nutritional differences will be examined in Chapter 4.

2.2 Subsistence Use of Fish and Marine Mammals

Due to the dearth of statistics on the native subsistence harvest of fish and marine mammals in most of the Northwest Territories, it is impossible to specify the exact relationship between subsistence use of the resource, and the total available biota. The most common means

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12. One important factor to consider is the effect that changing lifestyles may have on the dietary requirements of native peoples. The increasing use of snowmobiles and a generally more sedentary life-style might be expected to reduce the need for native people to consume past levels of animal proteins. The bio-physical make-up of Canada's northern people is poorly understood, and the answer cannot be given to this question now.

for measuring the importance of the native subsistence fish and marine mammal harvest are various proxies which tend to indicate the importance locally of the subsistence harvest, or commercial usage of wildlife through permits etc. Both these measures tend to distort the importance of the subsistence fish and marine mammal harvest in the Northwest Territories.

Most licenses and permits measure only the commercial use of aquatic resources. The motivation for fishing and hunting extends beyond the desire for financial compensation and must include the provision of food. Most governmental statistics measure mainly the commercial sector of resource production, and there is no reason why subsistence production should be related to it in any way. An example would be using export licenses to evaluate fluctuations in the harvest of seals. The motives for commercial harvest are entirely different from the motives for harvest for subsistence food purposes. Low export prices decrease the attractiveness of exporting sealskins, yet the incentive for harvesting for food purposes is unchanged.

The fish and marine mammal resources of the Northwest Territories derive their importance from the historical necessity for food. A cultural framework has been built around subsistence fish and marine mammal use. Now the continued uninterrupted use of fish, marine mammals and other renewable resources of the Northwest Territories is embodied in political demands by groups representing the native population of the Northwest Territories.

2.3 Conflict of Use

The fishery resources of the Arctic can be harvested by either domestic, recreational or commercial fishermen. Because of the limited productivity of Arctic waterbodies, the choice of one form of fishery may preclude the existence of another form on the same portion of a lake or river.[13]

Table 2 illustrates competing demands for major species of fish in the Northwest Territories.

Table 2. Some Important Freshwater Fish in the Northwest Territories

Common Name	Domestic/Commercial	Sport
Arctic Char	+	+
Dolly Varden		+
Lake Trout	+	+
Lake Cisco	+	
Least Cisco	+	
Lake (Humpback) Whitefish	+	
Broad Whitefish	+	
Round Whitefish	+	
Inconnu	+	+
Arctic Grayling		+
Northern Pike	+	+
Burbot	+	

Source 14

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13. Friesen, B.F. Potential Inuit Benefits from Commercial and Sport Use of Arctic Renewable Resources. Inuit Tapirisat, Renewable Resources Project, University of Waterloo. 1975. p.118.
14. McCart, P.J., and J. Den Beste. Aquatic Resources of the Northwest Territories. Science Advisory Board of the Northwest Territories, Yellowknife. 1979. p.7. See also: Mcphail, J.D., and C.C. Lindsay. Freshwater Fishes of NW Canada and Alaska. Fisheries Research Board of Canada, Ottawa. 1970.

Conflict over aquatic resources in the Northwest Territories comes not only from competing consumption demands (domestic, sport or commercial utilisation), but also from developments that may negatively impact total quantity of the resource available for competing demands. A pipeline or road development that silts up spawning beds would be an example of an impact reducing total available quantity of fish for competing demands.

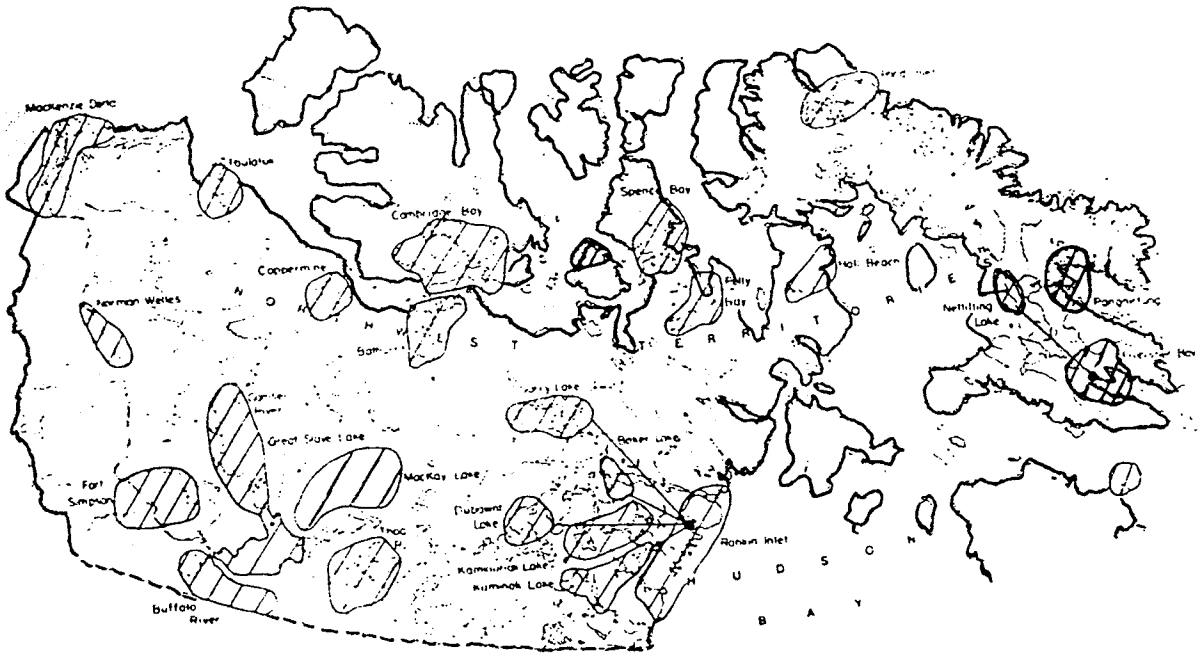
Table 2 indicates which species are exploited by competing demands: domestic/commercial and sport. It should be stressed that commercial fishery may not be competing with domestic fishing in any one location. Utilisation of the same species merely indicates that there is a potential for competing demands, if competing demands (sport and domestic/commercial) and applicable species are present.

Commercial fisheries are usually located in an area accessible to transportation for the export of fish catch. Therefore, although a species is listed as suitable for domestic and commercial harvest, commercial harvest may be precluded for economic reasons. Figure 3 illustrates the principal areas for commercial harvest.

Sport fishing is generally centred around either a fishing lodge, or road access. The principal areas for sport fishing are shown in figure 2.

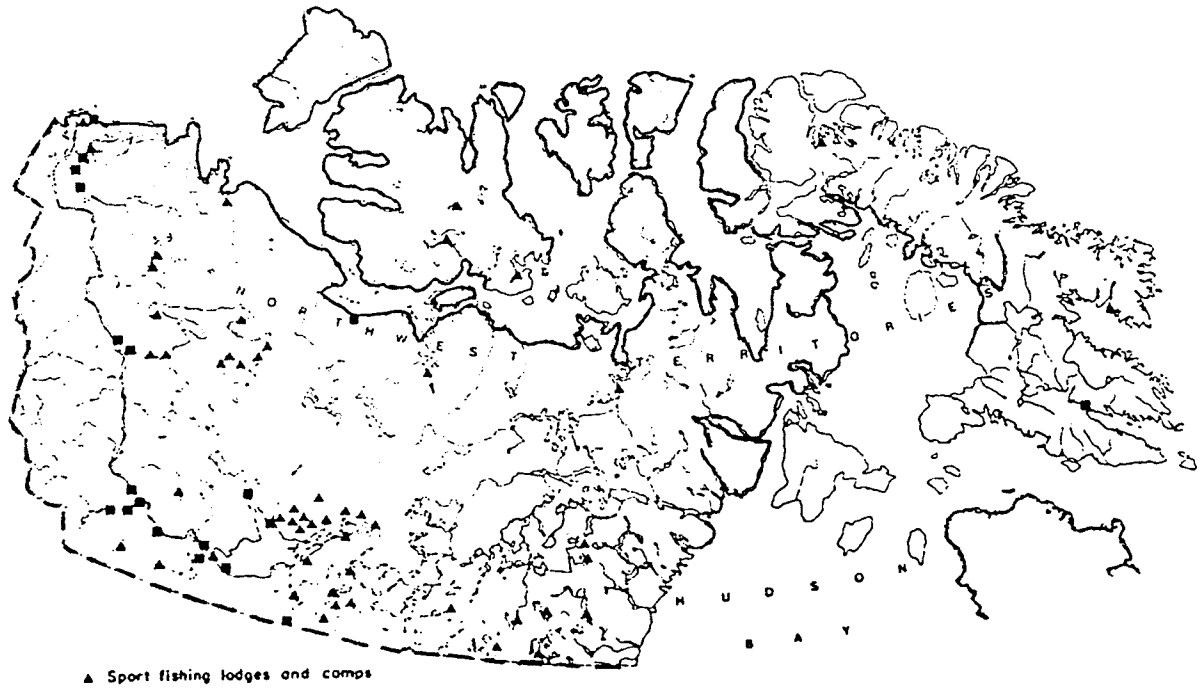
Marine mammals are generally not exploited for sport purposes. For marine mammals there exists a certain degree of conflict between domestic and commercial purposes. Commercial interest in marine mammals is mostly for pelts and ivory. Marine mammals harvested for commercial purposes can still be used for domestic food, therefore the degree of conflict is reduced.

Figure 2. Principal commercial fishery areas in the Northwest Territories.



15. ibid, p.7.

Figure 3. Location of sport fishing lodges and camps and location of concentrated sport fishing not associated with lodges and camps.



Negative impacts on fish and marine mammals from outside disturbances are a topical conflict over wildlife. Pipeline, road or other developments may disturb the spawning beds of fish, while marine mammals can be affected in other ways;

> Boat traffic has, in some instances, resulted in short-term changes in whale distribution. Reaction of whales to boats is variable, probably due to the interaction of a complex of factors.[16]

Much more serious in the context of oil pipeline developments, might be the possibilities of oil spills. Oil spills can physically kill most marine mammals or taint their food sources.

2.4 Summary

This chapter has sought to highlight the reasons for the importance of native domestic utilization of fish and marine mammal resources in the Northwest Territories. Conflicts do exist as to the utilization of the resources in the Northwest Territories, and the role of chapters 3 and 4 will be to identify the means to adequately value subsistence use of these resources to rationally compare the value of subsistence production with value yielded by other uses of the resources; and valuation gives a basis for compensation in the event of outside development work affecting native subsistence fish or marine mammal harvest.

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16. EF. Slayney and Co. Ltd. for Imperial Oil, Calgary, 1977 Whale Monitoring Program - Mackenzie Valley, Northwest Territories. 1977. p.41.

CHAPTER 3 MEASURING THE QUANTITY OF THE CATCH

3.1 Introduction

Subsistence use of fish and marine mammals could be measured at the following points:

a) Numbers of each species killed or caught.
b) Numbers of each species retrieved.
c) Numbers of each species consumed by man or dog, or otherwise used.

Each of these three measures will likely yield different results as they are measuring different things. The highest figure would be yielded by species caught or killed. This represents the number of animals removed from the environment by native action. Due to wastage, (eg. sinking of seals after shooting) the actual number retrieved would be lower. Similarly the number of each species actually consumed or used would be less than the number harvested.

All three points of measurement are valid, depending on what information is required. Therefore the methods used to collect data for one demand are unlikely to produce meaningful data for another demand.

An important distinction must be made between subsistence production that is consummed by the hunter/fisherman and his family , and commercial production that is sold for money;

> Since then, (seal) skins have occasionally been sold, but this represents an effort to maximize the benefits from a resource harvested chiefly for food.[1]

This study examines subsistence use of fish and marine mammals in the

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1. Usher, P.J. Bankslanders: Economy and Ecology of a Frontier Trapping Community, Department of Indian Affairs and Northern Development, Ottawa. 1971. p. 56, Volume 2.

Northwest Territories by the native people. Commercial exploitation of a species (e.g. seals) may be concommitant with subsistence use, therefore total resource utilisation would not be the sum of the two different uses, as double counting has occured.

3.2 Methods of Measurement

This section explores three possible methods for estimating some parameter about a population.

3.2.1 Direct Observation

In the context of subsistence food harvest, this method necessitates the physical presence of the researcher at the time of harvest, retrieval or consumption. As the researcher would need to observe each member of the study population, this method is impractical as a primary source of statistics on any scale. Direct observation could best be used to corroborate information gathered by other methods. The role of direct observation would then be to check whether sampling or estimation methods are producing accurate data on subsistence fish and marine mammal harvest

3.2.2 Sampling

A sample is defined as;

> ... a subset of measurements selected from the population of interest.[2]

The population in question is the native population of the Northwest Territories, and sampling could be used at any of the three stages of subsistence food cycle illustrated in section 3.1.

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2. Mendenhall, W. Introduction to Probability and Statistics Fifth Edition, Duxbury Press, Massachusetts. 1979.

It is not proposed at this stage, to enter into a prolonged discussion of the theory of sampling, as this is available in most statistical textbooks. The concepts to be reviewed here, are those that apply specifically to sampling of native subsistence fish and marine mammal harvest.

3.2.2.1 Types of Sampling

The purpose of sampling is defined here as the means to identify the fish and marine mammal harvests by the native peoples of the Northwest Territories. The specific sampling of this population involves some important statistical items that must be considered prior to designing the sampling method.

Ratio Sampling of native peoples could be undertaken, based on the ratio of wildlife-dependant natives to natives not dependant on wildlife for sustenance. In this method, the ratio of these population groups would be as closely as possible matched in the ratio between these two groups in the sample. The James Bay and Northern Quebec Native Harvesting Research Committee stratified their sampling on the basis of age of respondents, as past experience had indicated that this was an important factor in the level of resource harvesting. Section 5.4 will indicate the difficulty of identifying natives as dependant or not on wildlife harvests. Therefore, another criteria must be identified to distinguish between natives dependant upon wildlife harvests for all their sustenance, and those who are only partly dependant upon such harvests.

Wage earning natives may still fish and hunt in their spare time, however the dependance, and therefore the level of harvests, would likely be lower. Ratio Sampling could differentiate between natives in wage employment, and those not in wage employment. Similarly, sampling might

be stratified on the basis of age of respondents. An attempt to use more than the two variables specified would be cumbersome and difficult to achieve sufficent sample size, given the relatively small population base of the native people of the Northwest Territories. Ratio Sampling would be based around a sample reproducing the same ratios of wage employment and age groupings, as exists in the study population.

Straightforward sampling of the native population on a random basis might approximate the harvest levels of all the native people only if subsistence harvests are normally distributed among the population. Given the degree of cultural and economic change occuring in the Northwest Territories, it is likely that the degree of harvesting by wage earning natives would be independant of, and unrelated to, the harvest levels achieved by non-wage earners. Each group would have its own distribution, and this should be recognized in the design of the sampling method.

3.2.2.2 Sample Size

> Definitive answers on sample size are difficult to achieve;
>
> The first question that comes up is, "How many people must be interviewed?" There is no general answer to this question. It depends on the nature of the information sought.[3]

In connection with native harvest of fish and marine mammals, various approaches have been used. The Baffin Regional Inuit Association has attempted to survey 100% of the hunters in its study area.[4] On the other hand, the James Bay and Northern Quebec Native Harvesting Research Committee have used the standard of sampling one-third of the hunters in

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3. Blankenship, A.B. How to Conduct Consumer and Opinion Research. Harper and Brothers Publishers, New York. 1946.

4. See Appendix B.

an area, as a basis for its sample, with a minimum of 10 hunters per age category.[5] In neither study has the purpose, costs or benefits of the chosen sample size been specified.

A larger sample size is more likely to give an accurate answer to data about the population parameters, however increasing the sample size is costly, and beyond a certain point unnecessary. Cost of study and accuracy are the two important variables in sampling;

> If a given degree of accuracy is required, he (the probability sampler) can design a sample that will achieve this objective with relatively low cost; if a given cost is specified,he can design a sample that will yield relatively low error.[6]

The precise answers to size of sample are dependant upon conditions in each study area and the desired cost or accuracy of the sample. Once these are identified, sample size determination is a relatively simple statistical task.

3.2.3 Estimation

Estimation or non-probability sampling in this context is an estimation of harvest levels by informed persons. The important variables in this method of data collection are:

1. Reliability of 'informed person'.
2. Population to which the estimate applies.

An example of such estimation is:

> A man working for wages full time, and hunting at weekends and during holidays...might reasonably expect to get 4 caribou, 30 geese, and 500 pounds of fish.[7]

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5. See Appendix A.
6. Lorie, J.H., and H.V. Roberts. Basic Methods of Market Research, Mcgraw-Hill Book Co. Inc., New York, 1951.
7. Usher, 1976, op cit, p. 115.

3.3 Measurement of Species Killed or Caught

Measurement of the number of each species killed entails counting of marine mammals shot, or fish netted. This measurement is most important for providing data on the removal of fauna from the natural environment. Native subsistence food use of these species would be some proportion of the total number of species killed, as wastage occurs prior to retrieval or consumption. The two most important forms in which this occurs are seals or other marine mammals sinking after being shot and killed, or fish in nets suffering predation prior to retrieval.

3.3.1 Cost of Methods

Direct observation of species killed would be extremely expensive, as each hunter or fisherman would have to be observed. In descending cost order would be sampling and then estimation. Direct observations of the and marine mammal kill have never been undertaken for the total population of a study area. Direct observation can best be used to check the data yielded by sampling or estimation, as the manpower costs of total direct observation make this method impractical.

In sampling the question would be, " How many fish and marine mammals did you kill?" As indicated in section 3.2 the cost of sampling is dependant upon the accuracy required, to which must be added, the relative accessibility of the study area, as costs are likely to increase as a function of distance from main transport routes.

Estimation is probably the cheapest form of gauging the kill of fish and marine mammals. This method depends on the cost of surveying knowledgeable persons in the study area.

3.3.2 Practicality

The practicality of measuring the kill of fish and marine mammals is extremely low. This measurement method identifies the quantity of species removed from the total stock, but does not answer the question of the quantity of fish and marine mammals valuable to the native population. The species important to the native population are only those which they succeed in retrieving after killing.

For the purposes of biological investigation of species utilisation, kill statistics could be valuable. However there are many problems in attempting to measure kill statistics. Native recall of fish and marine mammals killed is likely to be poor, as they have no need to quantify production.[8] The difficulties of recalling how many animals were harvested are difficult enough; to attempt to recall and measure those animals that were killed but lost prior to retrieval is even more difficult.

3.3.3 Accuracy and Coverage

Direct observation of kill would result in the most accurate and extensive statistics, but only at prohibitive costs. Estimation is dependant on the quality of informed opinion, and it is not possible to generalize about it.

Sampling can provide good quality information at low cost if the sampling method outlined in section 3.2.2 is incorporated in the original design. Sampling depends upon native recall of fish and marine mammals harvested. Therefore, it is important to sample on a regular basis, such that difficulties of recall are minimised.

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8. Personal Communication, Mr. R. Tinling, Department of Wildlife, Government of the Northwest Territories, Yellowknife, August, 1980.

3.4 Measurement of Species Retrieved

This measurement point gives the net number of each species that a hunter or fisherman recovers from the water. For fish, it is the number of whole fish actually removed from the net; for marine mammals, it is the number of each species which do not sink or escape after being killed. Measurement of species retrieved could take place at any point between actual physical retrieval from the water, and consumption or disposal.

3.4.1 Cost of Methods

The exact point of direct observation of species retrieved affects the cost. If observation of species retrieved were undertaken at the point of physical retrieval, it would entail the presence of the researcher at the time and place of kill. Conversely, if hunters return to a central location with their harvests, numbers could be counted there.

In some areas, intensive fisheries take place at certain times of the year, and certain fish can de directly measured as they dry. At Hay River, Iconnu and Humpback Whitefish are counted directly as they dry. The estimates for time taken for this method of measurement are 50 man/hours total for the fall fishery.[9]

Sampling of fish and marine mammals retrieved has been a common method of measurement. Appendices A and B contain examples of this method of sampling of species retrieved by native hunters and fishermen. In Frobisher Bay, the Baffin Regional Inuit Association paid fieldworkers $50 per month plus $1.50 per hunter interviewed in 1980. Additional to

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9. Personal Communication, Fisheries Officer, Hay River, July 1980.

this would be costs associated with administration, data analysis and transportation.

Estimates of retrieval cannot be costed in any meaningful way as there are too many variables. Generally, it will be the cheapest method of evaluating the harvest of fish and marine mammals.

3.4.2 Field Practicality

Measurement of species retrieved is considerabley simpler than attempting to measure species killed. This method indicates the physical number of each species important to the native economy. Native recall of species retrieved is likely to be superior to recall of species killed. If species can be measured at a central location where hunters return, the practicality of this method is enhanced. A major problem with measurement of species retrieved, particularly using the sampling method, is access to hunters. If native harvesters are away hunting or fishing during sampling, these people will not be included in the sample, and therefore their harvests will not be quantified.

Native recall, and willingness to quantify production is a critical factor with the sampling method. This difficulty is discussed at some length in Chapter 5.

3.4.3 Accuracy and Coverage

As a general rule, accuracy of species count will be greatest using the direct count method, lowest with estimation, and sampling dependant on size of sample and quality of sample selection.

Direct observation can be used as a useful adjunct to sampling, as a check upon the data produced. The James Bay and Northern Quebec Native Harvesting Research Committee was fortunate, in that at the time of their

study, Dr. Fikert Burkes of the Institute of Urban and Environmental Affairs at Brock University was observing native fishing at Fort George.[10] His direct count of catch values corroborated the sampling estimate gained from the same region.

The reliability of estimates is generally poor due to large numbers of variables, and to the unknown familiarity of the estimator with the real level of native harvesting. In circumstances where no other method is possible, particularly for reasons of cost, it can provide an estimate of the scale of country food harvested. Estimation of species harvested could be enhanced with the back-up of statistics on initial harvests. Annual changes in harvests could be estimated, with other methods used to check and correct the scale of change on a random basis.

3.5 Measurement of Consumption

Measurement of fish and marine mammal harvest at the point of consumption is defined here as measurement of species at the point of use as food by man or dog, sale of parts (e.g. fur) for cash, or use for other purposes (uncommon now, but formerly e.g. blubber for oil lamps).

Measuring consumption indicates the quantity of certain meats and byproducts consumed by man and dog, as well as production of commercial and personal items, e.g. furs. Additively, these items produced from subsistence production yield the economic value of wildlife harvests to native people.

3.5.1 Cost of Methods

The costs of consumption measurement are heavily dependant upon the location of consumption, as well as the number of different uses of a

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10. James Bay and Northern Quebec Native Harvesting Research Committee, op cit, Appendix V 1.

species. Fur Export Tax Returns may be used to estimate some value,[11] while other methods will need to be used for personal and dog use.

The literature contains no exact figures for the cost of direct observation of consumption, however due to the large manpower requirments the cost would likely be great. Direct observation would likely best be used to identify the consumptive uses of each species.

Sampling of consumption could probably be undertaken for approximately the same cost as the Baffin Regional Inuit Association had to pay fieldworkers ($ 50 per month plus $1.50 per interview - 1980 figures).

Estimation of consumption would have the lowest financial cost, which is impossible to define here, due to the cost varying with location and local conditions.

3.5.2 Field Practicality

Measurement of country food utilization at the point of consumption is considerably simpler if a fixed settlement is being surveyed; particularly so if hunters and fishermen return to the settlement to consume or dispose of their harvests.

Direct observation as a method, would be largely unsuccessful, and extremely costly, in attempting to measure all consumption. This method could be used with success to distinguish the different uses of species, in order to avoid double counting of species from two products realized from a single animal. Cultural preferences are also an important factor;

> Cultural preferences vary with both locality and time, although certain broad generalizations can be made about the use of any particular animal.[12]

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11. Usher, 1975, op cit.
12. Usher, 1976, op cit.

The practicality of estimation is dependant upon the availability of a person who can guess the level of consumption of fish and marine mammal products.

3.5.3 Accuracy and Coverage

One of the main difficulties of measurement of species harvest at the point of consumption, is the establishment of the uses a species has. Most fish are consumed as food by either man or dog, while marine mammals may have multiple uses. The identification of the different uses resulting from a single species is important as otherwise counting of the end products of animals (food, furs etc.) might double-count some products, and therefore heavily overestimate the actual harvest of that species.

No matter which method is used to estimate consumption as a key to total harvest levels, the population covered is important. If hunters or fishermen leave the settlement for extended periods, the measurement of their consumption of fish and marine mammal products must be included.

3.6 Constraints

All of the methods of measuring domestic harvest outlined in this chapter have a common failing in respect of what they measure. All that is being measured is the kill, retrieval or consumption of one year or season. While it is possible to extrapolate these figures, it is risky to do so;

> Short-term, cyclic-like variations, as well as long term shifts in the availability of many Boreal and Arctic species, are well known. General inferences from occasional statistics are therefore extremely risky.[13]

13. Usher, 1976, op cit., p.107.

CHAPTER 4 MEASURING THE VALUE OF THE CATCH

4.1 Introduction

This chapter identifies the different means for financial valuation of native subsistence fish and marine mammal harvest. Many species yield commercial as well as subsistence products, thus as an example, the full value of a seal would be the value of the pelt plus the value of the meat produced. This chapter identifies only the valuation of the part of an animal used for food by native people.

There are distinct reasons for measurement of financial value of subsistence food production. The value may be measured in order to evaluate income in kind of native people, an approach taken by M. Pavich for the purposes of including the value of traditional activities in the Economic Accounts of each Territory, although she cautions;

> ... the suitability of the methodology for other uses should be examined before these results are applied to other types of analyses.[1]

The financial value of native subsistence fish and marine mammal harvests may also be desired for impact assessment of northern developments. Specifically, the question asked is what is the value of subsistence fish and marine mammal harvests to the native people of the Northwest Territories. The importance of the welfare value of subsistence fish and marine mammal use was not underestimated by Berger when he noted;

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1. Pavich, M. The Estimation of the Imputed Value of Traditional Activities, NWT and Yukon 1967 - 1974. Department of Indian Affairs and Northern Development, Ottawa, 1977. p.5.

> These figures do not and cannot indicate the intrinsic importance of hunting, fishing and trapping as social and cultural activities. Neither do they nor can they indicate the value to the native hunter of the environment that provides these resources.[2]

4.2 Measurment Requirments

4.2.1 Consumption

Assignment of financial values to subsistence food production can only occur in a situation where the products have an end use of consumptive importance to the native population. The provision of food and other materials from subsistence production is the measurement standard. Hunting or fishing for recreation, although difficult to identify and seperate, cannot be measured in the same economic terms as hunting or fishing for food and other materials. The purpose and therefore the value of the activity is different.

4.2.2 Products Realized

Throughout this study subsistence fish and marine mammal harvests have been charachterized as exclusively for use as food, however;

> ...more than one commodity may be obtained from a single animal.[3]

Generally, fish and marine mammals yield food (for human or dog consumption) for domestic or commercial purposes, and can be valued on this basis. Usher considers the non-food contribution of traditional harvests to account for about 10% of the value of the food produced,[4]

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2. Berger, Vol. 1, op cit, p. 104.
3. Usher, 1976, op cit, p.108
4. ibid, p.107.

however Usher cautions;

> ...the use to which the animal harvest is put varies both with locality and time. Only sporadic observations and measurement of this are available, and so caution is necessary in making generalizations from them.[5]

Due to the variability of use of animals from area to area, and the dearth of specific data related to valuation of non-food products yielded from fish and marine mammals, these products and their valuation are specifically excluded from this section. In actual measurements of the value of traditional products, specific localities may require valuation of these non-food products, but generally they are of minor importance in the Northwest Territories.

4.2.3 Consumed Portions

The portion of fish and marine mammals considered edible varies with time and location of capture. The James Bay and Northern Quebec Native Harvesting Research Committee caculated the edible portion of marine mammals in some detail (table 3). Usher estimated that 75% of the live weight of harvested fish is edible.[6]

However, for the purposes of financial valuation of fish harvest, it can be assumed that subsistence harvested fish can be substituted pound for pound for imported fish.Therefore, the only requirement is establishment of total weight of fish harvested. The James Bay and Northern Quebec Native Harvesting Research Committee calculated edible weights for marine mammals (table 3).

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5. Usher, 1976, op cit, p. 108.
6. Usher, 1970, op cit.

Table 3. Average Edible Weight Per Animal

Species	Average Edible Weight - Pounds	Kilograms	
Polar Bears	350	159	(7)
Seals	31.5	14.3	
White whale	232	105.4	(8)

Source (9)

The edible weight values are the quantity of edible meat produced on average, from each animal. This should not be taken to infer actual consumption, as some species, e.g. polar bear are taken primarily for their fur.

4.2.4 Human or Dog Food

Fish and marine mammals harvested by the native people for domestic purposes may be consumed as human or dog food. Valuation of subsistence food production requires reliable figures on the amounts of food consumed by dogs or humans;

> Of the total production of meat and fish, about two-thirds is used as human food and one-third as dog food, an estimate that takes into account the very great decline in the dog population throughout the Mackenzie Valley and Western Arctic during the 1970's. The amount of food production that is not used at all is thought to be very small and seems to be chiefly restricted to marine mammals and edible furbearers.[10]

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7. Probably too high for most of the Arctic, but correct in Quebec.
8. Brackel, W.D. Socioeconomic Importance of Marine Mammal Wildlife Utilization. Beaufort Sea Technical Report No. 32, 1977. p. 91.
9. James Bay and Northern Quebec Native Harvesting Research Committee. Vol. 1, table 39, p. 68. op cit.
10. Berger, Vol.2, p. 33, op cit.

4.3 Measurement Methods

Fish or marine mammal meats that are used for food can be valued in three ways;

1. Local exchange value.
2. Opportunity cost.
3. Substitution costs.

Each of these methods will be examined in the following subsections. Each method seeks to financially value each pound of fish or marine mammal meat used for food. Therefore important distinctions must be raised between:

a) Harvested meat used for human food.
b) Harvested meat used for dog food.

Specific information on species utilisation is extremely poor, and therefore certain generalisations have been adhered to in this section, in the absence of any more specific information;

> that seal meat and bear meat are entirely utilized as dog food, while the rest of subsistence meat production is utilized as human food.[11]

4.3.1 Local Exchange Value

The local exchange value is the sale price of subsistence meat products that one person would charge another if the food were bought or sold locally. There are impediments to using the local cash value of subsistence foods;

> In fact laws are enacted in the Territories which prevent the marketing of most wild meat.[12]

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11. Lu, C.M. Estimation of Net Imputed Value of Edible Subsistence Production in the NWT. Economic Staff Group, Department of Indian Affairs and Northern Development, Ottawa. 1972. p.6. Care should be taken, as some seal meat may be used for human consumption.

12. Pavich, op cit, p.10.

Notwithstanding legal restrictions, local exchange values involve determination of the financial value assigned to fish and marine mammals in trade;

> The transactions do not always occur, and even if they do, they may be in fulfillment of personal obligations, in which case there is no market transaction in the classical economic sense. Most food exchange takes place between relatives, with no money involved.[13]

Despite this, there has been a recent example of intersettlement trade in subsistence meat products, where kinship ties are weak, and thus a local exchange value can be identified. The trade has been on a small scale and run partly as a pilot project in inter-settlement trade. See Appendix C, Amarok HTA Country Food Store, Frobisher Bay.

4.3.2 Substitution Value

The cost of replacing or substituting present subsistence fish and marine mammal consumption is:

> ...a welfare equivalent measure, since it provides the answer to the question: 'If a man did not, or could not, obtain country food, how much would it cost him to feed his family by buying the equivalent food at the store'[14]

Substitution value of subsistence food consumption must determine:

a) What store bought foods can replace country foods?
b) How much store bought food replaces country foods?

Beef imported from the South has been put forward as a substitute for marine mammal meat, although the lack of comparability between marine

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13. Usher, 1976, op cit, p.112.
14. ibid.

mammal meat and beef has been recognized;

> We are at a loss to suggest a more appropriate value for marine mammal meat, particularly muktuk from beluga and narwhal, which has no easily perceived market equivalent.[15]

The quantity of store-bought food able to replace a unit of subsistence produced food is perhaps the most difficult quantity to determine. Cultural distaste will be examined in section 4.5; the question of nutritional comparison is examined here. Protein and vitamin content are important, in view of the lack of these in the diet of many northern natives.[16]

> In almost every category, weight for weight, northern country foods contain 25 - 50% more protein than imported southern foods.[17]

Berger used a correction factor to increase the amount of beef by 1.8 in order to equate the nutritional characteristics of the replacement foods with subsistence produced meats. Imported fish were assumed to be equal to the nutritional quality of subsistence produced fish.

The financial cost of replacement must be guided by the answer to the cost to the hunter of replacing subsistence produced meats. Retail prices would be logical, if it is retail prices that the hunter/fisherman will be forced to pay. Retail prices may decline if there is an increase in the sale of meats, as bulk freight rates reduce costs. The exact value assigned to replacement foods will depend on circumstances in each locality.

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15. Interdisciplinary Systems Ltd. Assessment of Socio-economic Impacts of Arctic Pilot Project on Selected High Arctic Communities, prepared for Petro-Canada, Winnipeg, 1978, p. 58.
16. Nutrition Canada, National Survey, Department of National Health and Welfare, Ottawa, 1973.
17. Friesen, op cit, p. 23.

4.3.3 Opportunity Costs

Opportunity cost is the cost of all inputs into subsistence harvests of fish and marine mammals, including the labour required, in terms of next most profitable use. Using opportunity costs requires the valuation of alternative employment prospects for labour and capital used in domestic harvests. Therefore, subsistence production would be tied to the money based economy...

> ...rather than identified or linked directly with a similar market opprtunity.[18]

The money based economy of the Northwest Territories bears little relation to the productive abilities of the subsistence sector, as it is influenced by factors outside the control of native people in the Northwest Territories.

The alternative employment prospects for land, labour and capital used in subsistence fish and marine mammal production cannot be valued in any meaningful way. Alternative employment prospects are lacking, and even when available, are likely to be beyond the skill level of native subsistence hunter/fishermen.

There are great difficulties in determination of opportunity costs of resources used in subsistence food production. Figures produced by this method have little meaning for valuation purposes, therefore the utility of this method is sharply limited.

4.4 Net Value of Production

The financial value of subsistence fish and marine mammal harvests include costs of inputs which had to be purchased, ie. fishing nets, boats, snowmobiles, ammunition, etc.

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18. Pavich. op cit, p.16.

Existing data on production costs are of poor quality. Examples of such estimates are:

1. 11% of producer prices;[19]
2. 25% of value.[20]

Estimates of production costs based on a percentage are deficient in many areas. For greater accuracy the costs of hunting and fishing must be determined in order to ascertain net value.

In the absence of generated data of the real cost of inputs into subsistence harvests, 25% of gross value of harvests is the recommended figure to use. This is based on an estimate of costs used by Usher in a seal hunting economy using guns and snowmobiles.

Data on the costs of subsistence fish harvests are of poor quality and therefore it is recommended that economic costs of subsistence fish harvests be calculated if possible, otherwise 25% of gross value as costs is the next best estimate.

4.5 Limitations

Subsistence hunting and fishing is a way of life for the native people of the Northwest Territories. Financial valuation of a subsistence life style involves attaching values to intangibles;

> In the attempt to evaluate wildlife in monetary terms many problems, disagreements, and misunderstandings have developed. The problems are conceptual, theoretical and practical. The disagreements must be worked out by clarifying the

19. Lu, op cit, p.4.
20. Usher,1976, op cit, p. 116.

> capabilities and limits of economic analysis. Economic values are important in our decision making process even if the final decision is a political one.[21]

The political allocation decision regarding fish and marine mammal usage must be grounded in economic comparison, and this will likely be based on;

> The value of wildlife to a subsistence economy,as a source of food, is at least equivalent to the market value of alternative sources of protein.[22]

Substitution of imported meats run into problems of acceptability to native people, although in the technical sense imported meat is equal to all the qualities of subsistence meats. Economics can value the cost of imported food, but cannot take account of the fact that;

> Native people like country food better than store bought food....hence the acceptance of anything which might be substituted for it, entails an absolute loss of welfare of incalculable proportions for native people.[23]

There is no way of putting an accurate market price on native welfare loss from buying store-bought food. Properly, this should be considered a political consideration, and will be examined in the next chapter.

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21. MacDonnell, B. Economic Valuation of Wildlife, A literature Review, unpublished paper, p. 22.
22. ibid, p.6.
23. Usher, 1976, op cit, p.117

CHAPTER 5 POLITICAL AND CULTURAL IMPEDIMENTS

5.1 Introduction

The purpose of this chapter is to highlight some of the impediments to the collection and valuation of subsistence fish and marine mammal harvest by native people in the Northwest Territories.

Measurement of these data is not a simple statistical sampling technique, as there are cultural and political factors surrounding subsistence food harvest that may diminish the value of even the best designed statistical package. The political controversy native subsistence fish and marine mammal usage at the local level may mean a complete lack of cooperation from local native people. The goal of this section is to indicate the basis and reason for native reluctance to participate in studies of the fish and marine mammals that they harvest.

5.2 Land Claims

From the earliest days of European settlement in Canada, colonial governments have recognized that native people had an interest in the land, which had to be dealt with prior to non-native use of the land. The numbered Treaties served to extinguish the right of native ownership of land in most of Canada, in exchange for certain governmental obligations and the setting aside of Indian reserves.

In the Northwest Territories, there is only one Indian reserve, at Hay River, otherwise the native people of the Northwest Territories do not consider that they have relinquished legal title in the land. The native sentiment is that the contractual obligations under Treaty number 13 has never been formalized, and that the native people have not yet withdrawn their right of ownership of any land.

The implication of Land Claims to subsistence use of fish and marine mammals is due to the comprehension that the native peoples'...

> ...concerns begin with the land, but are not limited to it; they extend to renewable resources...[1]

Native Land Claims are under negotiation at the present time and one view that has been expressed about the lands and resources of the Northwest Territories;

> Aboriginal rights mean that the native people who occupy certain lands have special rights there.[2]

The wildlife resources of the Northwest Territories are of vital importance to the native way of life and culture, and through a percieved right of property in these resources, they are embodied in the Land Claims Settlement demands;

> The game, fish, and fur, and the other renewable resources of the land are the foundation upon which the native people believe their economic future can and should be established. They seek to defend what is for many of them a way of life, and at the same time, to modernize and expand the native economy.[3]

The fish and marine mammal resources of the Northwest Territories are recognized by the native population as a central element of the Native Land Claims Settlement. Prior to final settlement of native claims to proprietory right in the land of the Northwest Territories, measurement of native utilisation of resource use may be interpreted as in native title to those resources, and thus to title in the land.

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1. Berger, op cit, p. 163.
2. Usher, P.J., The Committee for Original People's Entitlement,1973, p.25.
3. Berger, op cit, p. 185.

Measurement of native subsistence use of fish and marine mammals may be interpreted as a prelude to the restriction of the native right of access to these resources. This conflicts directly with the native view of aboriginal title in the land through aboriginal title in the wildlife resources of the land.[4]

5.3 Management of Data Collection

Land Claims and the concept of aboriginal title to land involve the right of access to wildlife resources, including fish and marine mammals. Surveys of the quantity of fish and marine mammals harvested may be interpreted as a potential interference with the native right to harvest wildlife resources. If a survey of harvest levels is conducted without the prior involvement or consent of the native people the hunter/fishermen feel there is no reason to quantify production.[5] Indeed, given the perceived demand for production information, hunter/fishermen have incentives to under or over-report actual production.

There may be political demands for local native control of data collection. It is important to involve local native people at all stages of design and implementation of a system to collect data of wildlife harvests. Failure to do so, may result in a lack of participation by some people in the study.

Where native occupation of traditional fishing and hunting areas is questioned, the native desire to protect these areas may lead to overstating the actual production. Where compensation is presented as a prospect for disrupted fish and marine mammal harvests, there is a distinct gain to be made from overstatement of actual production. Lastly, native hunting

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4. Personal Communication, Mr. R. Tinling, Department of Wildlife, Government of the Northwest Territories, Yellowknife, August, 1980.
5. Tinling, R.B., Domestic Fisheries in the Mackenzie Valley, Department of Indian and Northern Affairs, Ottawa, 1972, p.3.

culture places credence in the hunting ability for prestige, therefore exaggeration of actual production increases the social prestige of hunter/fishermen.

The critical issue in reporting native subsistence fish and marine mammal harvests is that if methods are to be successful they will...

> ...require the approval and, indeed the active support of hunters and trappers.[6]

One method used to gain the active support of the local people in reporting harvests, is the inclusion of them in the planning and implementation stages;

> Inuit people and organizations have frequently stated their concern over their lack of involvement in managing the resources of their region. This study has received an enthusiastic response from the hunters and trappers of the Baffin Region. It gives them the opportunity to participate directly in collecting data for managing wildlife resources on which they depend.[7]

However, native organisation control of harvesting research does not always guarantee active participation from all communities, as there may be internal political conflicts, as occurred with the James Bay and Northern Quebec Native Harvesting Research Committee;

> It should be noted that the communities of Povungnituk and Ivujivik, and a portion of Sugluk refused to participate in the research. As in phase 1 this refusal continued to be based on political differences between

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6. Berger, op cit, p. 34.
7. Baffin Regional Inuit Association, Proposal for Continuation of the Harvesting Study in the Baffin Region, NWT, April 1981 - March 1982, BRIA, Frobisher Bay, November 1980.

> these communities and the Northern Quebec Inuit Association rather than dissatisfaction with the research itself.[8]

Most communities of the Northwest Territories have Hunter Trapper Associations or other native organisations. These native organisations are vitally concerned with native use of wildlife resources, for as Berger recommended;

> All aspects of harvest research, including technical aspects, must be devised in full consultation with, and implemented with the full agreement and cooperation of both the native people's organizations that are specifically concerned with game, and their political organizations.[9]

5.4 Participation in Hunting and Fishing

In white cultured society, trapping, hunting or fishing are considered occupations just as much as factory employment. In the native lifestyle in the Northwest Territories, hunting and fishing are the way of life, central to the cultural set of many communities, and wage employment is seen as supporting domestic food provision. Wage employment can provide the financial means to purchase the tools with which to hunt and fish. Wage employment is a means to an end, not an end in itself.

This factor is important in the measurement of subsistence fish and marine mammal harvests, as there is a temptation, as Arctic Gas assumed, to consider that persons in wage employment are not part of the subsistence economy. An example of the Arctic Gas method is;

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8. James Bay and Northern Quebec Native Harvesting Research Committee, Research to Establish Present Levels of Native Harvesting. Volume 2, Montreal, 1979, p. 10.
9. Berger, op cit, p.35.

> A survey made in 1972 revealed that only 96 persons out of a study region population of 23,600 and a male working age population of 7,830 were actively engaged in full-time and regular part-time trapping.[10]

By comparison, the Indian Brotherhood of the Northwest Territories claimed 1,075 actively engaged in trapping. The discrepancy highlights an important factor; trappers do not necessarily have to be engaged in full-time or regular trapping to consider themselves dependant upon the land.

Similarly, native use of fish and marine mammal resources may occur on a part-time basis in addition to wage employment. All native people are potential users of domestic fish and marine mammals, therefore it is important not to exclude a portion of the native population from the subsistence sector because of wage employment.

A better approach might be;

Males $\rangle$ 18 - Non-hunters (sick,etc) = Hunters

Source (11)

Any harvests by males under the age of 18 or by females would be counted in the family total. The James Bay and Northern Quebec Native Harvesting Research Committee pioneered this method.

In this manner, all native users of subsistence fish and marine mammal resources, whether full-time or part-time, would be considered in a survey of harvests.

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10. Arctic Gas Application, Section 14c, prepared by Gemini North, 1974, p.17.

11. James Bay and Northern Quebec Native Harvesting Research Committee, op cit, p.10.

CHAPTER 6 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This study has reviewed different methods to measure and value the subsistence fish and marine mammal harvest by native peoples in the Northwest Territories. The cultural importance of subsistence food production was reviewed for historical relevance and background to present data collection. Also, cultural background is the basis of many political difficulties hampering data collection. This method of analysis was followed because:

1. The theoretical bases of different methods of measurement of harvest and value were important to consider.
2. This approach allowed consideration of methods that may not have been previously used in measuring subsistence fish and marine mammal harvests.
3. Different requirments for data on native harvest and value have not yet been specified, and it is likely that different requirments for information could use different methods of measurement, depending on the information required.
4. There are seperate difficulties associated with measurement of harvest and value, and in combination, cultural difficulties are of increased importance. Seperate analysis allowed a breakdown of problem analysis at each stage.

The purpose of this chapter will be to reassemble the components of measuring the quantity and value of native subsistence fish and marine mammal harvests, such that a desired measurement requirement will be able to use a particular combination of methods.

6.2 Harvest Measurement

6.2.1 Data Requirements

The best method of measuring native subsistence harvests cannot be identified in isolation of the question of the purpose of the required data. Chapter 1 introduced some of the agencies interested in subsistence harvest data:

1. Department of Fisheries and Oceans,
2. Department of Indian and Northern Affairs,
3. Inuit Tapirisat of Canada/Industry.

The three agencies mentioned indicate the three primary directions of requirements for data collection: biological, economic and impact Assessment respectively. Each of these requirements, and illustrative agencies will require different information from harvests of fish and marine mammals.

Biological interest as expressed by Canada Fisheries and Marine Service will require data on total biota removed from the environment. Economic interest, as expressed by the Department of Indian and Northern Affairs will be interested in answering questions of the value of subsistence fish and marine mammal harvests to the native people. Lastly, a body such as the Inuit Tapirisat of Canada will require data on biota utilised by native people, such that Land Claims areas can be assessed, and if necessary, compensated for, in the event of reduced harvests.

6.2.2 Biological Data Collection

Biological data collection requires data on number of species removed from a specified waterbody. Sampling of native hunter/fishermen by means of ratio sampling (section 3.2.2.1) would be the best approach terms of maximising information output and minimising cost. There might

be a place for limited direct observation of actual harvests and the loss of species occuring prior to retrieval. Native recall of past harvest levels is complicated by difficulty of distinguishing between animals which escaped, and those that were killed, but lost prior to retrieval.

6.2.3 Economic Data Collection

Economic valuation of subsistence fish and marine mammal harvests requires data on the species utilised by native peoples. Specifically, this is the end product of subsistence harvests. As non-food products are estimated to be low in importance and value, these can be excluded for the moment. Care must be excercised, because non-food subsistence use of fish and marine mammals may change over time. The point of measurement for economic interest in subsistence harvests, is at the point of consumption. Direct observation may be applicable, as at Hay River, where Whitefish are openly dried, after a short-term intensive fishery. However, it is likely that some consumption will take place outside the community, and therefore direct measurement may be difficult to achieve.

Estimation could be used as a starting point, estimating the likely consumption of fish and marine mammal products by native people, but the variable quality of this data limits its usefulness. Household surveys on a regular basis would be the best approach to evaluate economically important species, and the quantity utilised by the native people.

As indicated in section 3.1, a species may be harvested for both commercial and subsistence use. While these uses are legally and financially separable, (ie. quantity of seal pelts sold=number of export licences granted) the functional seperation is not so clear. It may be

possible to measure certain subsistence use of species from statistics on commercial exploitation, however, as with seals on Banks Island, subsistence consumption may continue irrespective of the actual volume of skins sold. Low skin prices may discourage commercial sales, and therefore reduce apparent harvest levels, yet the basic motives behind subsistence harvest and consumption of the species operates according to a different criteria, and is therefore unaffected.

6.2.4. Impact Assessment

The important factor in measurement of subsistence fish and marine mammals in respect of Land Claims and impact assessment, is location of harvests. For both requirements, location establishes subsistence land areas important to the native people. This factor must be included in which ever method is used. . The Inuit Land Use and Occupancy Project undertaken by Milton Friedman Research Ltd., sought to identify areas historically important to the native people. Methods used for the purposes of impact assessment or Land Claims would require greater precision.

Estimation of harvest is unlikely to be sufficently accurate to satisfy this criteria, so for the purposes of maximising information output, sampling would be the best approach. Direct observation of harvest areas utilised would be both cumbersome and expensive to undertake on a large scale.

Precise identification of the location of harvests of different species requires a great deal of information recall by the hunter/fishermen, and may be met with some resistance. Aspects and problems associated with native resistance to collection of data on harvest levels will be reviewed in section 6.2.5.

6.2.5. Problems with Harvest Data Collection

Possible native resistance to data collection of harvest levels should not be underestimated, and would clearly be minimised if it is considered at the data collection design stage. Some of the unwillingness to quantify harvest quantity and/or location may be based in ignorance of the reasons for the data. Generally, such misunderstanding of the reasons for harvest research are best avoided by including the native people through their Hunter-Trapper Associations, prior to iniation of the research. For the purpose of this study, such data collection difficulties shall be termed political. The political acceptability of harvest data collection must be assured, otherwise possible native resistance to data collection may confound even the best designed statistical package. Consultation with native people in the proposed study area must be undertaken at the earliest stage, such that they have an input into the design of the study and are involved in its implementation and success.

In addition to political unwillingness to yield data, harvest data collection questions may run into cultural difficulties. Most native hunter/fishermen can quantify numbers of big game harvested, but cannot apply a numerical value to quantities of fish harvested. Recall of the number of times nets were checked can usually be ascertained, but there are great difficulties with remembering the number of fish yielded from each netcheck. Here lies the advantage of direct observation, to provide a sampling method to measure average catch of fish for different locations and different times of year. Direct observation acts as a control on survey questions of the number of fish yielded from each netcheck.

6.3 Value Measurement

6.3.1 Data Requirements

Applying a financial value to subsistence harvests is defined here as estimating a dollar value to fish and marine mammal products harvested by native people, that are useful to the subsistence provision of food or other valuables, and therefore specifically excludes commercial sale of all or part of any species. Commercial values of products yielded by species would be based on the sale price minus the cost of production.

Valuation of subsistence harvests of fish and marine mammals are important for measurement of the 'subsistence' income of native people, and for the purposes of establishing a basis of the value of these harvests to native people. Three methods of valuation were suggested in section 4.3, without clarifying which was the best method to use in the Northwest Territories.

6.3.2 Valuation Methods

Little local exchange of fish and marine mammal products take place in the Northwest Territories. Even where local sale of products take place, this may be in fulfillment of kinship ties, or sale of surplus products by a hunter/fisherman. In neither case does the sale price reflect the full economic value of the traded resource. The cash economy of the Northwest Territories is in its infancy for most native people, and therefore local exchange values should not be a basis, at the present time, for establishing a dollar value of fish and marine mammal products.

The lack of other employment opportunities for the native capital and labour used in fish and marine mammal harvests would result in an extremely low dollar value of fish and marine mammals using the Opportunity Cost approach. Even if other employment opportunities are available, they

may not be in the cash economy, and would therefore still defy valuation in a dollar figure. Where native cash employment opportunities do exist, wages may frequently be low, due to the relatively low skill level of native peoples in the context of the cash society. Therefore it is proposed that economic conditions in the Northwest Territories, as they relate to the native population result in the Opportunity Cost method being impractical to the correct valuation of fish and marine mammal harvests.

Substitution Costs answer a welfare question, because they address the level of compensation necessary to replace fish and marine mammal harvests. The advantages and disadvantages of the Substitution Cost Basis for valuing fish and marine mammals were examined in section 4.3.2. In view of the theoretical weakness and impracticality of the other methods suggested, as much as the applicability of this method, Substitution Costs are recommended as the only logical means to identify value of subsistence harvests of fish and marine mammals to the native people.

6.3.3 Identification of Products

The first step in measuring the value of harvest levels is to identify the products measured. Although these are primarily food, subsistence products may extend to implements and clothing in different areas or at different times. For this reason, identification and valuation of non-food products can only take place at the field level, using the method of costing the alternatives available in the absence of the subsistence harvests.

Identification of which species are consumed as food and quantities utilized would be an outcome of a consumption quantity study. If harvest or retrieved quantities of fish or marine mammals are measured, then account

must be taken of wastage, loss and commercial sale. Product identification would then proceed to identify species consumed, and by whom they are consummed. Clearly the cost of replacing food used for dogs is less than food used for humans. The next problem is to apply a dollar value to each unit of fish or marine mammal meat used as food.

6.3.4 Identification of Substitution Items and Costs

There is no simple means to specify which imported meats can replace subsistence fish and marine mammal products. Some of the difficulties attendant to Substitution Cost valuation were discussed in section 4.3.2. The main difficulty is to identify products that can adequately replace locally produced meats. Equality of nutritional quality of imported meats with subsistence fish and marine mammal meats is the only rational basis of comparison, after which cultural distate must be considered. Table 1 contained an example of some wildlife meats of Alaska and commonly cited alternatives from the South. The quantity of imported meats must be greater than the quantity of local meats in order to equalize the nutritional characteristics. The Substitution Cost relevant to native people of a study area must be the price they will have to pay to obtain those meats. An important consideration to include is that the valuation of meats that would technically replace subsistence fish and marine mammal meat, cannot honestly hope to place a dollar value on what these meats mean to native peoples. It is impossible to value a way of life, and this should be recognized at an early stage in the valuation process.

6.3.5 Net Value

In order to establish the net value of subsistence fish and marine mammal harvests to native people, it is necessary to value the inputs into hunting and fishing activity. Data for the financial costs of wildlife harvests are difficult to ascertain. In the absence of any further study to establish prouction costs, guidelines established in section 4.4 are recommended. Production costs amount to 25% of the gross value of production, unless more accurate figures can be ascertained.

6.4 Conclusions

6.4.1 Harvest Measurement

The exact method used to collect data on quantity of each species harvested must be selected in light of demands for the information. Each section has laid out the basic principles of measurement for each purpose. These basic principles are designed to be adapted to conditions existant in a particular study area, and thus the degree of specification has necessarily been tempered by the desire to retain the basic flexibility of the model method.

6.4.2 Value Measurement

The financial value of subsistence use of fish and marine mammals necessarily indicates consumption as food or other products. Substitution costs have been selected as the only realistic means, given the present state of the cash economy in the Northwest Territories, to place a dollar figure on subsistence use of fish and marine mammals.

6.5 Recommendations

Measurement and valuation of subsistence fish and marine mammal harvests are rarely quantified in the Northwest Territories. Therefore, it is proposed to highlight some of the more important areas where further research could be most beneficial.

The relationship between number of species killed and number retrieved is poorly understood. Underlying all of this is a generally poor understanding of what particular species are used for. Sociological preferences in different parts of the Territories dictate different uses of a species. This knowledge would be extremely valuable to enhancing understanding of native lifestyle.

A fundamental problem in establishing a dollar value for native harvested resources, is the lack of a concise list of which meats and products could be substituted for a given unit of subsistence wildlife food production. This problem cuts across disciplines of nutrition, sociology and economics. Without an understanding of which products will be acceptable substitutes for foregone wildlife harvests, establishment of a value of harvests is difficult to achieve.

A notable weakness in the measurement of value of subsistence food harvests is the inability to quantify production costs. Recent changes in lifestyle of Canada's northern peoples (snowmobiles, guns, oil heat etc), are believed to have increased production costs. Existing figures on production costs are of questionable reliability.

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APPENDIX A

James Bay and Northern Quebec Native Harvesting Research Committee

This research committee was the first study to rely extensively on native control and administration of data collection of country food harvests. Also this study is notable for the comprehensive investigation of the background difficulties involved in the collection of data on native subsistence use of wildlife resources.

The research commenced in 1976 with an attempt to establish harvest levels prior to 1976. The study population for the first stage of data collection was the Cree population of 7 communities near to James Bay. The target population was 1440 male hunters over the age of 18 years.

The design of the study was based on sampling the male head of each household, so as to quantify harvests by women and children in each family, and sampling of each male over the age of 18 years, who would not be included in family totals. Total survey population was identified from Indian Band lists updated by discussion with community leaders in order to identify:

a) Males who passed their 18th birthday since the compilation of the last Band Lists.

b) Males who could no longer be considered part of the active hunting population by reason of absence from the study area, or sickness, or old age.

In order to economise on time and costs, a one-third sample of the eligable hunting population was designed to be selected as a sample population. Added to this simplification was the desire to take account of

the age of respondents, as past studies had indicated that this was an important variable in the level of harvests reported by a hunter. Three age groups were selected; more than 46 years old; between 27 and 46 years; and under 27 years old. For each of these age groups, it was desired to sample one third of the eligable hunter population, with the provision of a minimum sample size of 10 hunters. The sampling approach was by use of interviews to record harvests of 34 species of wildlife commonly harvested in the area.

The Research Committee report contains discussion of the number of years that the hunter might be expected to recall. Harvests for fur-bearers, large mammals and porcupine were requested for a three year period; geese harvest were collected for two years; and harvests of small game, ducks, loons, and fish were requested for only a one year period,as it was felt that there would be difficulties of recall for these species.

The Research Committee worked under wider terms of reference than this study can consider, so the sections in the James Bay and Northern Quebec Native Harvesting Research Committee Report that deal with fish and Marine Mammal harvests will be highlighted.

In addition to asking for recall of fish harvests, the Research Committee report sought to establish internal checks in the survey process by asking for information on the number of nets set, frequency of checking, number of days that nets were set, and average number of fish caught in each net check. This allowed projections of the upper limit of fish harvests.

As stated in the introduction, the Research Committee study was broken down into a sampling method used to establish historic harvest levels, and a more intensive data collection of all hunters in the area after July 1977. The method used to collect statistics from hunters on an on-going basis was through use of data recording calenders distributed to all hunters. An example of one of these calenders is shown in figure four. The initial distribution of calenders was collected in January 1977 and fieldworkers reviewed the calenders in the presence of each hunter condenscing and checking the information provided. The average rate of hunter response in the thirteen communities involved in the study was 89%, with five communities recording 100% response rates. This second part of the Research Committee study was concerned with the harvests of the Inuit of Northern Quebec.

It is important not to underestimate the contribution of Inuit members of the Coordinating Committee. There were a number of outward signs of native control of data collection; regular broadcasts on local radoi by Inuit members, stressing continual and accurate data collection. Community visits by Inuit fieldworkers probably played an important role in maintaining dialogue between the communities being surveyed and the Research Committee and its perceived objectives. Native involvement in the planning and implementation stages is less obvious as a contributing factor for the willingness of hunters to participate in the study and quantify their harvests and report them.

ᓄᐊᑎᕐᓂ NOVEMBER 76

ᐱᓕᕆᔨ 1 WEEK 1 | ᐱᓕᕆᔨ 2 WEEK 2 | ᐱᓕᕆᔨ 3 WEEK 3 | ᐱᓕᕆᔨ 4 WEEK 4 | ᐱᓕᕆᔨ 5 WEEK 5

ᐅᓪᓗᒥᐅ ᐊᑐᓕᐅᑎᑐᑎᑐ SPECIES	NOVEMBER 1-7		NOVEMBER 8-14		NOVEMBER 15-21		NOVEMBER 22-28		NOV. 29 - DEC. 5	
	ᓄᓇᕗᑦ ZONE 1	ᓄᓇᕗᑦ ZONE 2	ᓄᓇᕗᑦ ZONE 1	ᓄᓇᕗᑦ ZONE 2	ᓄᓇᕗᑦ ZONE 1	ᓄᓇᕗᑦ ZONE 2	ᓄᓇᕗᑦ ZONE 1	ᓄᓇᕗᑦ ZONE 2	ᓄᓇᕗᑦ ZONE 1	ᓄᓇᕗᑦ ZONE 2
ᓇᖅᑭᑦ /Ringed Seal										
ᐅᖃᐅᓇᑦ /Bearded Seal										
ᖃᓄᐃᓕᑦ /Harp Seal										
ᖃᓄᐃᓕᑦ /Ranger Seal										
ᖁᓕᓪᓚᑦ /Beluga Whale										
ᐊᓂᓴᑦ /Walrus										
ᐊᓂᑦ /Polar Bear										
ᑐᑐᑦ /Caribou										
ᑎᓪᓗᒍᑦ /Arctic Fox										
ᐊᓕᔪᑦ /Wolf										
ᖃᐅᔨᑦ /Snow Geese										
ᓴᓐᓂᑦ /Canada Geese										
ᑎᑎᑦ /Duck										
ᑎᑎᑦ ᓚᐅᒃ /Duck Eggs										
ᐅᓚᑦ /Rabbit										
ᐊᒥᑦ /Ptarmigan										
ᐊᒥᓕ /Grouse										
ᐊᒥᓗᐊ /Partridge										
ᐅᐱᑦ /Owls										
ᐊᖏᓚᑦ /Murre										
ᐊᓯᓪᓚᑦ /Guillemont										
ᓗᓂᑦ /Loons										
ᑐᑭᓯᑦ /Moose										
ᐊᑦᓚᑦ /Black Bear										
ᖃᓄᖅᑐᑦ /Otter										
ᐱᓕᕆᓚᑦ /Lynx										
ᑎᓚᑦ /Weasel										
ᖁᓕᓂᔪᑦ /Porcupine										
ᐊᑦᑲᓇᑦ /Arctic Char										
ᓴᓚᑦ /Salmon										
ᐊᓯᓕᒃ /Lake Trout										
ᐅᓚᑦ /Cod Fish										
ᑲᓇᑦ /Whitefish										
ᓴᓚᑦ /Brook Trout										
ᓴᓇᓚᑦ /Sculpin										
ᓂᓚᑦ /Land-locked Char										
ᐊᓪᓚᒃ ᐊᑐᓕᐅᑎᑐᑎᑐ OTHER SPECIES										

ᐅᖃᐅᓯᖏᑦ COMMENTS

Figure 4

Appendix B

Baffin Regional Inuit Association Havesting Study

This study was initially proposed by the Baffin Regional Inuit Association in 1976, but not started until funding was forthcoming from the Department of Indian Affairs and Northern Development in 1979. Data collection commenced in January 1980.

The study area of this study covered fourteen Inuit communities in the Baffin Region, which included Baffin Island and its offshore islands, the Melville Peninsula, Cornwallis, Ellesmere and other High Arctic Islands and the Belcher Islands in Hudson Bay.

The approach of this study was to include 100 per cent of the male hunter population in the study area over the age of 18 years. The 1200 hunters selected did not exclude those who were sick or did not harvest, as this was ascertained at the survey stage.

Each hunter participating in the study was given a calender and field note book, on which he recorded monthly totals of harvest data. Examples of calender are included in figures five, six, seven and eight. In addition, a fieldworker interviews each hunter once a month in order to assign a hunter to one of the following categories:

1. Hunted,
2. Did not hunt,
3. Out hunting,
4. Could not reach,
5. Out of town,
6. Other. (See figure nine).

ᐃᖁᓕᑦ ᑎᓯᐊᓴᖅ MIGRATING CHAR			
ᐊᓯᔾᔨᖅᑎ HUNTER 1		ᐊᓯᔾᔨᖅᑎᐅᑦ ᐊᐃᒃᓱᒻᒪ HUNTER 2	
ᓄᒥᑦ ᓄᑭᑦ PLACE	ᖁᑦᓯᓂᑦ NUMBER	ᓄᒥᑦ ᓄᑭᑦ PLACE	ᖁᑦᓯᓂᑦ NUMBER
ᐃᕆᓕᖅ LANDLOCKED CHAR			
ᐊᓯᔾᔨᖅᑎ HUNTER 1		ᐊᓯᔾᔨᖅᑎᐅᑦ ᐊᐃᒃᓱᒻᒪ HUNTER 2	
ᓄᒥᑦ ᓄᑭᑦ PLACE	ᖁᑦᓯᓂᑦ NUMBER	ᓄᒥᑦ ᓄᑭᑦ PLACE	ᖁᑦᓯᓂᑦ NUMBER

Figure 5.

	ᐊᓗᓕᖅᑎ HUNTER 1	ᐊᓗᓕᖅᑎᐅᑉ ᐊᐃᒃᓱᒻᒪ 2
ᓇᓪᓕᖅ RINGED SEAL		
ᐅᒡᓘᒃ BEARDED SEAL		
ᖁᐃᑭᓗᒃ HARP SEAL		
ᐊᒃ ᓇᓪᓕᓀᒃ HOODED SEAL		
ᖁᖅᓯᒋᐊᖅ HARBOUR SEAL		
ᐊᐃᐅᕐ WALRUS		
ᖃᓄᐃᓕᖅ ᐊᒥᓱᒍᐊᖅ NARWHAL		
ᖃᓄᐃᓕᖅ ᖁᐅᓗᓴᖅ BELUGA		
ᓇᓄᖅ POLAR BEAR		
ᐃᓕᖃᐅᑦᑕ ᐊᓯᖏᓪᓗᑎᑦ OTHERS		

Figure 6.

	ᐊᓯᔾᔨᖅ HUNTER 1	ᐊᓯᔾᔨᖅᑕᒃ ᐊᐃᒃᓱᒻᒪ 2
ᐊᖏᑦᑐᖅ ROCK PTARMIGAN		
ᑲᒍᖅ SNOW GOOSE		
ᓂᖅᓯᖅ CANADA GOOSE		
ᓂᖅᓯᖅᓄᖅ BRANT		
ᐊᑦᑕᐊᖅᓴᑦ ᐊᑦᑐᖅ OLDSQUAW		
ᒥᑎᖅ COMMON EIDER		
ᐊᑦᓴ MURRE		
ᐱᒃᓗᐅᓯᖅ GUILLEMOT		
ᑎᑦᒥᐊᑦ ᐊᓗᑦᑐᑦ OTHER BIRDS		

Figure 7.

	ᐊᓯᔾᔨᖅ HUNTER 1	ᐊᓯᔾᔨᖅᑎᒃ ᐊᐃᒪᓕᒃ 2
ᑐᑦᑐ CARIBOU		
ᐅᒥᓘᒪᑦ MUSK-OX		
ᐅᑲᓪᓗᖅ ARCTIC HARE		
ᐊᒪᑭᖅ WOLF		
ᑎᑭᓚᓂᐊᖅ ᖃᓄᖅ WHITE FOX		
ᐊᓕᕆᖅ ᖃᐅᔨᓚᑐᖅ BLUE FOX		
ᑎᑭᓛᓂᐊᖅᓯᑦ ᑲᔪᖅᑐᖅ RED FOX		
ᐱᓯᑦᑎᑦ ᐊᓯᕆᑦ OTHERS		

Figure 8.

GRISE FIORD
ᐊᐅᓪᓚᑐᖅ

MONTH
ᑕᕐᕋᖅ _____

HOUSE NUMBER ᐃᑦ ᓄᖓ	HUNTER ᐊᓗᓯᖅᑎᑎ	HUNTED ᐊᓗᓯᓪᓗᐅᑎᒍᖅ	DID NOT HUNT ᐊᓗᓯᓪᓗᐅᑦᑎᒍᖅ	OUT HUNTING ᐊᓗᓯᖅᓂᒪᓴᖅ	OUT OF TOWN ALL MONTH ᓄᓇᒥᓂᑦ ᓄᑦ ᓂᒪᓴᖅ ᐵᕕᓂᒪᖅ	COULD NOT REACH ᓇᓂᔭᕆᐅᑦᑎᒍᖅ	OTHER ᐊᓂᒋᑦ
02	Aksayuk Ningiuq ᐊᒃ ᕆᔨ ᓂᒋᐅ						
6	Larry Aulaluk ᓄᑎ ᐊᐅᓪᓗ						
07	Jimmy Nauya ᔭᒥ ᓇᐅᔭ						
09	Ramaile Aqiaruq ᕆᒪᐃᓪ ᐊᖏᐊᑭ						
10	Simeonie Akpaliapik ᓂᒥᐅᓂ ᐊᒃ ᐸᓪᐊᐱ						
11	Josephie Palaygaq ᔨᓂᐱ ᐸᓪᐅᒪ						
13	Paul Qasaluaq ᐸᐅ ᖃᕆᓄᐊ						
15	Jopie Kiguta ᔨᐱ ᑭᔪᑕ						
15	Charlie Noah ᕆᓪ ᓄᐊ						
16	Qavavauq Kiguta ᖃᓪᓪᐊᐅ ᑭᔪᑕ						
17	Lutie Piyamini ᓄᑎ ᐱᔨᒥᓂ						
18	Lasalusie Aqiaruq ᓪᕆᓄᓂ ᐊᖏᐊᑭ						
22	Pauloosie Nungaq ᐸᐅᓄᓂ ᓄᒐᖅ						
24	Jaloo Kiguta ᔨᓄ ᑭᔪᑕ						
24	Tukiqi Kiguta ᑐᑭᖏ ᑭᔪᑕ						
26	Josephie Kiguta ᔨᓂᐱ ᑭᔪᑕ						
27	Elijah Nutaraq ᐃᓪᐃᔨ ᓄᑕᕐᖅ						
28	Aimosie Nutarajuq ᐃᒧᓂ ᓄᑕᕐᔪ						

-80-

Figure 9.

The Inuit control and participation in all stages of the study is an important factor:

> The fifteen community fieldworkers employed by the project are all Inuit. The importance of their role cannot be over-emphasised as they provide the critical link between hunters and the supervisory staff.[1]

Each fieldworker was elected from the community he served, thus maintaining local content in the study. Regular contact is maintained with the field-workers, both by telephone and personal contact. In each community, the local Hunter - Trapper Association was asked to support the study through the setting up of community meetings to explain the study prior to iniation of the study, and hunters were asked to take part in the study.

As with the James Bay and Northern Quebec Native Harvesting Research Committee hunters are kept informed of the study by radio and newspapers. This serves an important role in maintaining participant hunter interest in the study.

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1. Baffin Region Inuit Association Harvesting Study, Interim Report, Frobisher Bay, 1981, p. 17.

APPENDIX C

Intersettlement Trade - Amarok HTA Country Food Store

The attached tables summarize the trade in country food for Amarok Country Food Store in Frobisher Bay. The information is provided for referance of financial valuation of country food when traded outside direct families.

The most valuable use of this data for the period April 1, 1979 to March 31, 1980, is the financial value assigned to country food. Figures have been rounded, and due to the existance of free or split charters, figures provided here may not balance exactly with the store's financial statement.

Source: Mr. B. Hunter, Resource Development Officer, Wildlife Service GNWT, Frobisher Bay. June 5, 1980.

Table 4. Species Value of Country Food in Frobisher Bay

	Country Food Purchases			Approximate Freight rate to Frobisher	Landed Cost
	lbs	$/lb	$	$/lb	$/lb
Allen Island					
char	880	1.25	1100	.20	1.45
	1734	1.50	2601	.20	1.70
Amadjuak Lake					
char	6341	.45*	2853	-	.45
Arctic Bay					
char	960	1.30	1248	.21	1.51
	513	1.45	744	.21	1.66
muktuk	1708	1.35	2305	.21	1.56
Broughton Island					
seal	331	.75	248	.25	1.00
Frobisher					
seal	200	.75	150	-	.75
walrus	1060	.32	335	-	.32
Grise Fiord					
muskox	980	1.40	1372	1.18	2.58
	173	1.60	277	1.18	2.78
Hall Beach					
caribou	3671	1.00	3671	.22	1.22
Igloolik					
caribou	3049	1.00	3049	.66	1.66
char	962	1.00	962	.66	1.66
muktuk	745	1.22	909	.66	1.88
	365	1.60	585	.66	2.26

* handling costs