

A Review of Information on Fish Stocks and Harvests in the Deh Cho Area, Northwest Territories

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PREFACE

This report was prepared under contract for the Department of Fisheries and Oceans, Central and Arctic Region, 501 University Crescent, Winnipeg, Manitoba, R3T 2N6. The Scientific Authority for this contract was Larry de March of the Resource Management Division.

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TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT/RÉSUMÉ	iv
INTRODUCTION	1
FORMAT	1
Fish harvests	1
Sport fishing lodges	4
Fisheries research licences	4
DISCUSSION	4
Migratory fish stocks	4
Winterkill and summer warming	6
Impact of development	6
ACKNOWLEDGMENTS	7
REFERENCES	7
PERSONAL COMMUNICATIONS	15

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1 Map of the Deh Cho area of the N.W.T., showing communities, waterbodies, and sport fishing lodges. The boundaries shown for the Deh Cho area are approximate and for the purposes of this report only	17

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 Harvests of fishes from the Deh Cho area of the N.W.T., by community and waterbody	18
- Fort Liard	18
- Fort Providence	19
- Fort Simpson	27
- Hay River	36
- Jean-Marie River	38
- Kakisa	41
- Nahanni Butte	47
- Nahanni National Park Reserve	50
- Trout Lake	54
- Tungsten	56
- Wrigley	58
2 Sport fishing lodges and their outpost camps in the Deh Cho area of the N.W.T.	65

Table

3	A summary of harvest and creel census data for sport fishing lodges in the Deh Cho area of the N.W.T.	66
4	Licences to take fish from the Deh Cho area of the N.W.T. for scientific purposes issued by the Department of Fisheries and Oceans (DFO), Central and Arctic Region, to DFO (1990-97) and non-DFO (1984-97) researchers	67

LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
1 Fish species reported from selected river drainages in the Deh Cho area of the N.W.T., and from Great Slave Lake	70

ABSTRACT

Stewart, D.B., and G. Low. 2000. A review of information on fish stocks and harvests in the Deh Cho area, Northwest Territories. Can. Manuscr. Rep. Fish. Aquat. Sci. 2549: iv + 73 p.

This document was prepared to assist the Department of Fisheries and Oceans (DFO) and the Renewable Resources Board, which may be appointed in the future, to co-manage fisheries in the Deh Cho area. It reviews information on stocks of fishes that are harvested for subsistence, commerce and sport in the area west of Great Slave Lake. The information is current to February 1999. It is summarized in tables that are organized hierarchically by community, waterbody, and then species. Recent recommendations by DFO concerning management of the fisheries or stocks are summarized, with a list of pertinent references. Information is also provided on sport fishing lodges operating in the area, and on Scientific Licences issued by DFO since 1984 for research in the area.

Key words: Subarctic zone; fishery management; subsistence fishing; commercial fishing; sport fishing; catch statistics.

par le MPO à des fins de recherche scientifiques dans la région.

Mots clés: Subarctique; gestion de la pêche; pêche de subsistance; pêche commerciale; pêche sportive; statistiques sur les prise.

RÉSUMÉ

Stewart, D.B., and G. Low. 2000. A review of information on fish stocks and harvests in the Deh Cho area, Northwest Territories. Can. Manuscr. Rep. Fish. Aquat. Sci. 2549: iv + 73 p.

Ce document a pour objet d'aider le ministère des Pêches et des Océans (MPO) et les Conseil des ressources renouvelables, qu'il soit constitué dans l'avenir, à gérer conjointement la pêche dans la région de l'ouest du Grand lac des Esclaves (région Deh Cho). Il contient des renseignements sur l'état des stocks de poissons capturés à des fins sportives, commerciales et de subsistance dans cette région. Ces données sont valides jusqu'en février 1999. Au moyen de tableaux, on en fait la synthèse de manière hiérarchique, selon la localité, le cours d'eau ou le lac, puis l'espèce visée. De plus, on présente un résumé des dernières recommandations du MPO concernant la gestion de la pêche et des stocks, accompagné d'une liste de références. Enfin, on donne des renseignements sur les pourvoiries de pêche sportive et sur les permis délivrés depuis 1984

INTRODUCTION

Land claims negotiations are ongoing between the Aboriginal peoples who have traditionally lived in the Deh Cho area, which lies west of Great Slave Lake, and the Government of Canada. One of the provisions of each recent Land Claim Agreement in the Northwest Territories has been the establishment of a Renewable Resources Board. A similar body is likely to be established upon settlement of the Deh Cho negotiations.

These Renewable Resource Boards typically have equal representation of the Aboriginal peoples of the Settlement Area and of members nominated by Government to represent the public interest, plus a chairperson. They are charged with providing advice or making decisions about wildlife management in the Settlement Area, including those on many matters now controlled by the federal Department of Fisheries and Oceans (DFO), the Canadian Wildlife Service, and the territorial Department of Resources, Wildlife and Economic Development (RWED). Their advice and decisions remain subject to review by the appropriate Minister of the Government of Canada or Minister of the Government of the Northwest Territories.

The purpose of this report is to provide DFO and any future Renewable Resources Board(s) with a summary of information on fish stocks and harvests in the Deh Cho area (Fig. 1). These stocks are harvested for subsistence, commerce and sport, mostly by aboriginal residents of the Northwest Territories and by visiting sport fishermen. As the bounds of the settlement area have yet to be established, this study may include some waterbodies that are outside the eventual land settlement area or that straddle settlement area boundaries. The study area does not include Great Slave Lake. Similar studies have been prepared for the Nunavut, Sahtu and Gwich'in settlement areas and for the North Slave and South Slave areas (Stewart 1994, 1996a+b, 1997, 1999).

The published and unpublished sources of information in this summary were identified by searches of bibliographic databases and published bibliographies (e.g. Nicholson and Moore 1982a-c), and by discussions with fishery managers and scientists knowledgeable of fisheries resources in the region. The bibliographic databases searched were the Aquatic Sciences and Fisheries Abstracts (ASFA), Arctic Science and Technology Information System (ASTIS), the DFO libraries WAVES database, and those of B.W. Fallis (DFO, Winnipeg),

and the authors. DFO files were also searched for unpublished information.

FORMAT

The summary is presented in tabular form, with the fishery data organized hierarchically first by community and then by waterbody and taxa. The objective of this is to enable fishery managers to quickly review the data on a community or species basis.

FISH HARVESTS (TABLE 1)

Information on the harvests of freshwater fishes from waterbodies in the Deh Cho area is summarized in Table 1. It is organized by community or park reserve, as follows: Fort Liard, Fort Providence, Fort Simpson, Hay River, Jean-Marie River, Kakisa, Nahanni Butte, Nahanni National Park Reserve, Trout Lake, Tungsten, and Wrigley. Waterbodies fished by their residents, or in the vicinity, are listed alphabetically for each community or park reserve. Where several species are harvested at a waterbody, they are listed alphabetically by common name. The Latin scientific name for each species is given in Appendix 1.

Where a waterbody is fished by more than one community, cross references have been included to avoid repetition. Cross references to waterbodies within the same community section are indicated by "see above" or "see below"; those to waterbodies within another community section are indicated by the community name and waterbody (e.g. see KAKISA--Tathlina Lake).

Included in Table 1 are those waterbodies that have a record of commercial, subsistence or sport harvest, or are listed in Schedule V of the Northwest Territories Fishery Regulations. A number of waterbodies for which no harvest data were found have also been included. They provide critical spawning and nursery habitats for fishes, and support important subsistence and sport harvests. Studies to predict the potential impacts of pipeline, highway, or mining developments or of harvesting have documented the biota of a number of these waterbodies. Where such information exists, the waterbody has been included together with a brief summary of the study results.

Each fishing location is identified by its proper geographical name (Canada 1980; NLUIS), and a latitude and longitude. In some cases, a local name or geographical feature is also included in brackets. The map coordinates for waterbodies not listed in the Canada Gazetteer were taken from Schedule V of the Northwest Territories Fishery Regulations, from the source of the data, or determined from 1:250,000 scale National Topographical Service (NTS) maps. An alphanumeric code that identifies the 1:250,000 scale NTS map upon which the waterbody coordinates are located is provided in brackets (e.g. "(95B)") at the end of the section on each waterbody.

For each waterbody with harvest data, the table identifies the species harvested and provides the harvest quota(s), the most recent harvest data, a summary of stock status if available, and a list of pertinent references. Species are treated separately if they have separate quotas. For each waterbody without harvest data, the table summarizes and references the results of pertinent fisheries research. The number of species reported by these studies precludes listing them individually for each waterbody. Species reported by the studies examined are listed in Appendix 1 for selected waterbodies. This listing is intended to support the comments in Table 1. It is not the result of an exhaustive review of the literature on species' occurrences.

All site specific harvest data located during this work for the Deh Cho area are summarized in Table 1. Non-site specific community harvest data have also been included, where available, for comparison.

The harvest quotas are from various sources, and some more closely reflect the stock status than others. The quotas of active commercial and sport fisheries are reviewed annually by DFO. If information from the harvesters or from sampling suggests that the fishery is not sustainable then the quota is adjusted downward. If that information suggests under-utilization then it may be adjusted upward, in the case of a commercial fishery, or be kept as is to improve the quality of the fishery, in the case of a trophy sport fishery. The experimental quotas, in square brackets, are interim quotas assigned for the purpose of obtaining samples from a fishery. In the past, experimental fisheries were known as exploratory or test fisheries. Abbreviations are used to indicate years when a harvest may have taken place but that no data are available "(NA)", and when a waterbody was opened for fishing by

Variation Order but not fished "(NF)". "No quota", or a blank quota cell in the table, indicates that DFO has not assigned a commercial quota to the waterbody, either as a whole or for a particular species. This does not necessarily mean that there are no commercial fishing opportunities in the waterbody or for the species.

The quota and harvest years are the same as the federal government fiscal year (e.g. the 1999 quota extends from 1 April 1999 to 31 March 2000). They are not the normal calendar years. There are two exceptions to this in the Deh Cho area. Prior to 1978 the quota year (fishing season) for Tathlina Lake extended from 1 November of the previous year to 31 October of the year listed (i.e. data presented for 1970 include harvests from 1 November 1969 to 31 October 1970) (Roberge et al. 1988). Beginning in 1978, the fishing season was changed to extend from 1 April of the year listed to 31 March of the following year as per most other fisheries. Because of this change the 1978 harvest data for Tathlina Lake are not comparable with other years. The second exception is the Kakisa Lake quota which, like Great Slave Lake, has been and continues to be open between 1 November and 31 October (Roberge et al. 1986). This is done at the request of the fishermen to ensure that there will be quota available for the winter fishery.

Unless otherwise indicated, the harvest statistics are for commercial fisheries and in kilograms round weight. A "round" weight is that of a whole fish, while a "dressed" weight is that of a fish with the viscera and gills removed. It was not always possible to separate the harvests by species for mixed species fisheries, or to determine how the data were collected. The commercial harvest data are from export or local sales records, and tend to be conservative as they do not estimate culls and personal use. Care, then, must be taken when interpreting these data.

The general comments column of the tables provides a brief summary of the information available for each waterbody. It tells whether there is an established or experimental fishery, active or inactive or in conflict with other fisheries; when it was last sampled for, or by, DFO; what is known of the stock status; whether spawning or nursery habitats have been identified in the system; whether the waterbody has been stocked with fish; and recent recommendations by DFO concerning management of the fishery. Comments on habitat use and subsistence harvests are summaries of site-specific aquatic resource assessment research. Reference

material pertinent to each fishery is listed in brackets and cited in full in the bibliography.

General information for communities is discussed beside the community headings (e.g. FORT SIMPSON), whereas site-specific harvest data are discussed under the appropriate waterbody.

There are few data available on subsistence harvests in the Deh Cho area. Indeed, most of those described here were documented in the early 1970's, and their present status and extent have not been documented. Descriptions of the subsistence fisheries can be found in Sinclair et al. (1967), Radojicic (1968), Higgins (1969), Bissett (1972), Asch (1981), Gillespie (1981), Lutra Associates Ltd. (1989), and Rawson Academy of Aquatic Sciences (1990).

Sport fishing limits are listed in the annual Sport Fishing Guide for the Northwest Territories. Special limitations on sport fishing are in force for Arctic grayling and northern pike in the Mackenzie River and tributaries between 116° and 118° W longitude. These waters are closed to grayling fishing from 1 April to 31 May to protect spawning stocks. For the remainder of the year, the daily catch and possession limits are 1 grayling with a minimum fork length of 36 cm. For verification purposes the head must be kept attached. For northern pike in these waters, the daily catch limit is 2 fish and the possession limit is 3 fish. Only one pike in possession may be more than 90 cm in fork length. The N.W.T. Sport Fishing Licence is not valid in Nahanni National Park Reserve, where a separate National Parks Sport Fishing Licence is required.

Guest-bed capacities, which relate the estimated total sustainable yield of fish from a lake to the estimated harvest per sport angler (Roberge 1982), are included in Table 1. Only DFO's most recent guest-bed capacity estimate is included for each lake. This estimate may not correspond to the licensed guest-bed capacity of a lodge, since the Government of the Northwest Territories ultimately assigns the guest-bed capacity and licences the operation. Outfitters are now being assigned "guest-beds" for the lakes they frequent (A.C. Day, pers. comm.).

DFO guest-bed estimates are based on the rate of angler exploitation ($\text{kg Cha}^{-1}\text{Yr}^{-1}$) and other factors such as the presence of competing fisheries (Roberge 1982; A.C. Day, pers. comm.). A "high

quality" or "trophy" lake trout fishery, for example, has an exploitation rate of 0.05 to 0.10 kg of lake trout per hectare of lake surface area per year. At this low rate of harvest the lake should sustain a fishery for large lake trout. At a moderate rate of exploitation, 0.11 to 0.15 $\text{kg Cha}^{-1}\text{Yr}^{-1}$, the lake should sustain a "medium quality" fishery for moderate-sized lake trout; at a high rate of exploitation, 0.16 to 0.25 $\text{kg Cha}^{-1}\text{Yr}^{-1}$, it should sustain a "low quality" fishery for small lake trout. Prior to 1982, a fishery now described as a "medium quality" was described as a "high quality", and "low" as "medium". These earlier designations have been standardized to reflect the new, more conservative recommended exploitation rates.

At the request of some lodges and outfitters in the Northwest Territories, fishery managers are now recommending harvest quotas in terms of the number of fish that can be harvested annually by a lodge from a particular lake (A.C. Day, pers. comm.). This method of regulating the fishery has the advantage of not limiting the guest capacity of the lodge, which may offer other activities to its guests, while still limiting the harvest of fish by lodge guests to a sustainable level.

Table 1 summarizes information from studies directed towards the assessment and management of commercial, subsistence, and sport fisheries. It does not summarize other scientific research directed towards a more general understanding of the aquatic environment. Useful in this regard are the:

hydrological or hydrogeochemical studies of: MacKay 1965, 1966, 1967; Reeder et al. 1972; Prowse 1989;

aquatic resource assessments of: Shotton 1971, 1973; Hatfield et al. 1972; Brunskill et al. 1973a+b, 1975; Dryden et al. 1973; Stein et al. 1973; Jessop et al. 1974; McCart et al. 1974; Schultz International Ltd. 1974; Slaney and Co. 1974; Campbell et al. 1975; Jessop and Lilley 1975; Rosenberg and Snow 1975; Synergy 1975; Weins et al. 1975; Wickstrom 1978; McKinnon and Hnytko 1979; McCart and McCart 1984;

species accounts of: Fuller 1955; Harris 1962; Buchwald 1968; McPhail and Lindsey 1970; and Johnson 1976

reviews of: Doran 1974; Brunskill 1986; McCart 1986; Rosenberg 1986; and Bodaly et al. 1989.

Resource maps in the Northern Land Use Information Series (NLUIS), which were produced between 1972 and 1976 by the Lands Directorate of the Department of Fisheries and Environment, are also useful general references. They are referred to in text by number (e.g. NLUIS 95H) and have been available from the Surveys and Mapping Branch of the Department of Energy, Mines, and Resources in Ottawa.

SPORT FISHING LODGES (TABLES 2 and 3)

Table 2 summarizes information on the sport fishing lodges of the Deh Cho area (Fig. 1). The lodges are listed alphabetically. The latitude and longitude, operating season, guest-bed capacity, and species sought are listed for each lodge. Outpost camp locations, recent operating history, and the most recent DFO creel censuses are listed in the comments section, as are any pertinent references. The main sources of information for this table were the territorial Department of Resources, Wildlife, and Economic Development (M. Longlade, pers. comm.), the GNWT Explorers Guides 1988-98, and DFO (C. Craig, pers. comm.). Lodges located in communities or on the shores of Great Slave Lake, and outfitters operating from communities or with moveable camps, are not included in this summary. The outfitting operations are discussed in Table 1, with the other information on the lakes that they frequent.

Harvest and creel census data from sport fishing lodges in the Deh Cho area are summarized in Table 3. In a general comment for each lodge are listed its latitude and longitude, operating season, guest-bed capacity, targeted fish species, outpost camp locations, recent operating history, participation in fishery management studies, and pertinent references. Beneath this comment the fish species harvested are listed alphabetically. Harvest data for each species are listed by year. They include an estimate of the number of fish killed by the sport fishery, the average number of fish caught per angler hour, and an estimate of the total number of angler days. The sources of these data are described and referenced in a comments section.

FISHERIES RESEARCH LICENCES (TABLE 4)

Table 4 summarizes information on the Scientific Licences that DFO has issued to its personnel or to non-DFO personnel since 1984, for work in the Deh Cho area (J.T. Strong and D. Wright, pers. comm.). These licences permit them to take fish for scientific purposes. This information is organized alphabetically by licence holder. The area where the research was to take place, its purpose, and the year for which the licence was issued are shown for each licence holder. The years refer to the federal government fiscal year (see above). The outcome of the research is not discussed, but documents located are referenced.

In 1994, DFO began to distinguish between studies that take fish for scientific, educational, and public display purposes (J.T. Strong, pers. comm.) Since then, separate licences have been issued for each type of study, and studies that do not take fish (e.g. behavioural observations) no longer require a Scientific Licence. These licences are now issued under Section 52 of the Fishery (General) Regulations.

DISCUSSION

Three main fishery management issues stand out in the Deh Cho area: 1) the potential for overharvesting of migratory stocks which may also be fished in other areas, 2) the potential for damage to harvested fish stocks from winterkill or summer warming, and 3) the potential for adverse impacts from the development of pipeline, transportation and transmission line corridors, mining, and hydroelectric developments in the region or upstream.

MIGRATORY FISH STOCKS

A number of the fish species harvested in the Deh Cho area undertake seasonal migrations each year. These movements have important ramifications for the interpretation of Table 1 and for fishery management. Long distance migrants such as Arctic cisco, broad whitefish, chum salmon and inconnu may be vulnerable to harvest by Inuvialuit, Gwich'in, Sahtu, and Deh Cho fisheries. Inconnu tagged near Tsiigehtchic, for example, have been captured a year later 1,104 km upstream in the Liard River (Jessop and Lilley 1975). Shorter distance migrants such as Arctic grayling, longnose sucker,

northern pike, and walleye are not subject to harvest over such a wide area, but they too are predictably available to harvesters on a seasonal basis at known locations. Some of these fishes, perhaps all, also have discrete spawning stocks. Harvesters at a given location on the Mackenzie or Liard mainstem may then be harvesting fish from a number of different stocks; while harvesters at a smaller tributary stream may be concentrating their efforts on a single stock.

In terms of Table 1, this means that the harvest data for fisheries in the Mackenzie River and its larger tributaries do not relate to a single local population. Rather, they relate to a number of discrete stocks which may spawn in areas distant from the harvest site. Fisheries in the lower reaches of the Mackenzie Basin, then, directly affect those in the upper reaches, and vice versa. This is also true, but to a lesser extent, for species such as Arctic grayling, longnose sucker, and walleye that undertake shorter seasonal migrations. This makes it very difficult for fishery managers to determine the level of harvest that can be sustained at a particular location by a particular species, and to estimate the harvest pressure on a given fish stock. It also makes it increasingly important that managers understand stock dynamics and estimate stock size (Tallman 1997).

Movements of migratory coregonids, Arctic grayling, burbot, longnose sucker, northern pike, walleye, and other fish species have been examined in the upper Mackenzie Basin using mark-recapture tagging studies (e.g. Hatfield et al. 1972; Stein et al. 1973; Jessop et al. 1974; Jessop and Lilley 1975).

The complexities of identifying the individual stocks, estimating stock size, and determining the extent to which each is harvested by the various fisheries makes management of this resource in the Mackenzie basin extremely difficult. It emphasizes the need for close cooperation between resource management boards along the Mackenzie River.

The issue of overharvesting by commercial fisheries has not been a strong concern among fishery managers for the Deh Cho area, since there are few commercial fisheries. However, Kakisa and Tathlina lakes support important walleye fisheries which account for over 70% of the walleye harvested commercially each year in the N.W.T. (Roberge et al. 1986, 1988). Until recently, both of these fisheries appeared to be sustainable, except when winterkill events occur (see below). At writing, DFO fishery managers are re-assessing the Kakisa and

Tathlina lakes walleye stocks in response to concerns raised by commercial fishermen, who observed declines in the catch of fish per unit of fishing effort (CPUE) during the 1998 and 1999 fishing seasons. Other major commercial export fisheries have not developed in the Deh Cho area due to the poor economics of remote fisheries and high parasite cyst counts (*Triaenophorus crassus*) in the flesh of many lake whitefish populations (Table 1). These cysts reduce the market value of the whitefish and make them unacceptable for export to the United States, dressed or as fillets, if they contain more than 40 cysts/100 lb dr wt (i.e. ~ 40 cysts/45 kg dr wt).

The issue of overharvesting by subsistence and sport fishermen is particularly important for short distance migrants such as walleye in the Hay River and Arctic grayling in the Kakisa River and "Providence Creek". To date, however, these stocks do not appear to have been overharvested. The potential for overharvesting of long distance migrants such as inconnu is of lesser concern because these fish are presumed to make up a relatively small portion of the spawning stocks.

The Hay River walleye population is harvested mainly for sport and, to a lesser extent for subsistence. Because of the large sport fishery at Hay River, the stock has been monitored by DFO since 1972 (Gillman and Dahlke 1973; Falk and Dahlke 1975; Bond et al. 1978; Moshenko and Low 1980; Falk 1981; Clarke et al. 1989). Despite strong harvest pressure it seems to sustain itself, perhaps due in part to the fact that in some years the river is high and murky throughout the fishing season so catches are poor and the stock gets a rest courtesy of Mother Nature. The stock definition is unknown, except that harvested fish are not part of a spawning run as they are either immature or unripe adults. A spawning run may occur in the river just after break-up but be missed due to the severe runoff conditions. There is a large domestic fishing area off the mouth of the Hay River that is closed to commercial harvest (Fig. 1), so few Hay River walleye are taken by the commercial fishery. The Aboriginal food fishery also takes few walleye as most nets are set in Great Slave Lake or in deep areas of the river and do not take many walleye.

Concerned by the potential for overharvesting by sport fisheries, DFO monitored the Arctic grayling spawning runs at Kakisa River from 1974 to 1984 and studied the "Providence Creek" run from 1976 to 1978 (Table 1). These studies resulted in the lowering of catch and possession

limits to 3 daily and 5 in possession in the Mackenzie River management area (Mackenzie River and tributaries between 116 and 118 degrees west longitude) which includes the Kakisa River, Beaver Lake and the Mackenzie River to Mills Lake. In 1980, "Providence Creek" was closed to all recreational fishing during the grayling spawning season (April 15 to May 30) due to over-fishing concerns and the prevalence of snagging in this narrow stream. Effective 1991, catch and possession limits for Arctic grayling were reduced to 0 daily and 0 in possession (catch and release only) from April 1 to May 31, and to 1 daily and 1 in possession for the remainder of the season (June 1 to March 31). This measure was taken to allow the grayling stock to recover from the 1989 summer kill. Since then, the stock has recovered to the extent that, effective 1 April 2000, the April 1 to May 31 limits for Arctic grayling in the management area are being raised to 1 daily and 1 in possession.

WINTERKILL AND SUMMER WARMING

Two important fisheries in the Deh Cho area have suffered major setbacks resulting from large natural fish kills. Tathlina Lake winterkilled in 1942/43, adversely affecting the largest walleye fishery in the Northwest Territories. The lake may be subject to periodic kills due to its' shallow depth, but this problem has not recurred in recent years. Arctic grayling are recovering from a natural fish kill that occurred in the upper Mackenzie River, Beaver Lake and Providence Rapids area in August 1989. The kill adversely affected the Kakisa River, Providence Rapids and "Providence Creek" stocks and may have affected other grayling stocks downstream as far as the Rabbitskin River near Jean Marie River. The kill was attributed to unusually high water temperatures which weakened the fish and enabled the opportunistic pathogens *Aeromonas hydrophilia* and *Pseudomonas putrefaciens* to infect and kill them. The grayling stocks which spawn in Kakisa River and "Providence Creek" were severely depleted. Measures taken by fishery managers to facilitate stock recovery are described above.

It is unlikely that either of these natural events was preventable and, given the apparent trend toward climatic warming, they may become more frequent. Because they damage such important stocks, it may be worthwhile to investigate area limnology in the hope of gaining some predictive ability with respect to their short and long term effects on the commercial and sport fisheries

and local economy.

IMPACT OF DEVELOPMENT

Detailed aquatic resource assessment studies have been conducted along the length of the Mackenzie and Liard rivers in the Deh Cho area. These studies were conducted to predict and/or assess impacts of the construction and operation of the proposed Mackenzie Valley pipeline (e.g. Hatfield et al. 1972; Brunskill et al. 1973, 1975; Dryden et al. 1973; Jessop et al. 1973, 1974; Shotton 1973; Stein et al. 1973; Jessop and Lilley 1975; Rosenberg and Weins 1975, 1978; Rosenberg et al. 1977a+b), Mackenzie Highway (e.g. Porter et al. 1974; McKinnon et al. 1978; Katapodis et al. 1978), Liard Highway (e.g. Synergy West Ltd. 1975; Jones 1979; McKinnon and Hnytka 1979, 1985), Norman Wells Pipeline (e.g. Fernet 1987; McCart and McCart 1982; Young 1986; McKinnon and Hnytka 1988), mines (e.g. Sigma Resource Consultants Ltd. 1976; Sigma and Jemmett 1978; Moore et al. 1978; Ker, Priestman and Associates Ltd. 1980; Beak Consultants Ltd. 1981; MacDonald 1983), and other developments (e.g. Schultz International Ltd. 1971; Envirocon Ltd. 1976; Wickstrom 1979) on the aquatic ecosystems of these rivers and their tributaries. Most of these studies include data on limnology or stream hydrology, water chemistry, benthos, and fish. They examine fish growth, reproduction, diet, and movements in detail at many locations, often over several years and seasons of the year.

Some key impacts of development that have been identified are the potential for blockages of spawning runs, increased erosion that affects water quality and leads to the siltation of spawning habitats, disturbance of spawning or overwintering habitat, and the potential for overharvesting due to improved access. Based on this research DFO proposed guidelines designed to protect the fish resources in the N.W.T. from major disruptions resulting from the construction and operation of highway and road systems (Dryden and Stein 1975).

Overall, the existing knowledge of fisheries resources in the Deh Cho area is good relative to most other areas of the Northwest Territories. This is due largely to the detailed aquatic resource assessment studies conducted for the Mackenzie Valley Pipeline, Mackenzie Highway, and Liard Highway. To ensure effective long term fishery

management, however, it will be important to improve and document knowledge of the subsistence fisheries and their harvests.

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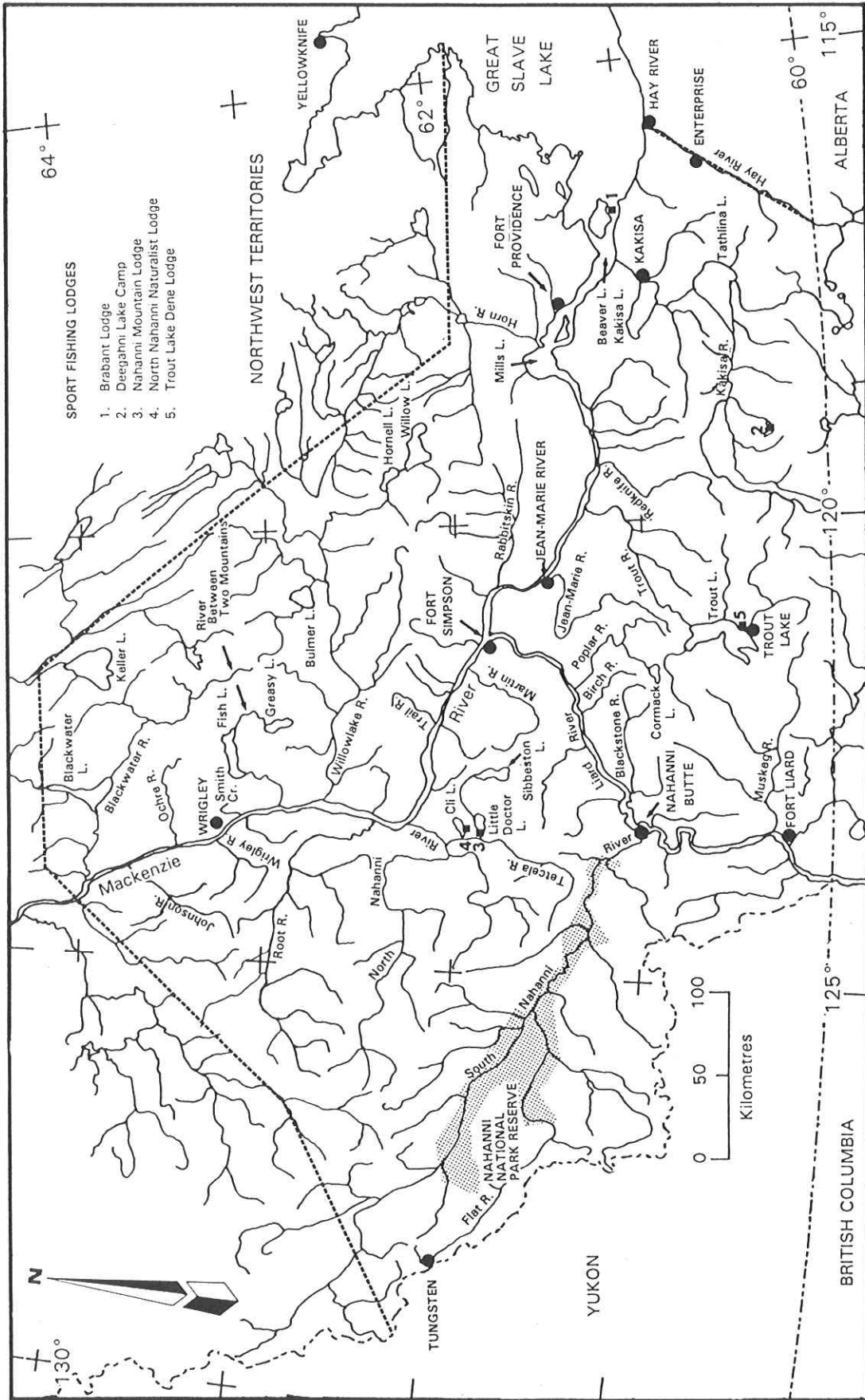


Figure 1. Map of the Deh Cho area of the N.W.T., showing communities, waterbodies, and sport fishing lodges. The boundaries shown for the Deh Cho area are approximate and for the purposes of this report only.

Table 1. Harvests of fishes from the Deh Cho area, not including Great Slave Lake, by community area and waterbody.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
FORT LIARD			Aboriginal residents of Fort Liard harvested an estimated 20,318 kg of fish for subsistence in 1961-62. (Sinclair et al. 1967; Higgins 1969)
Bovie Lake 60°10'N, 122°56'W	lake whitefish, northern pike + walleye [300]	1983--NF; 1988--lake whitefish 55 kg.	DFO sampled fish in this lake on the Muskeg River system (see below) in August 1977, during studies for the Liard Highway. Lake whitefish, white sucker, and yellow walleye were sampled for data on growth, reproduction, and diet. Northern pike also occur in the lake. A small experimental harvest was taken from this lake in 1988, and a few lake whitefish were sampled. Residents of Fort Liard harvest fish from Bovie Lake for subsistence year-round except for brief periods during break-up, freeze-up, and mid-winter. (Synergy West Ltd. 1975; Foote 1979; McKinnon and Hnytka 1979; McGowan 1989; Yaremchuk et al. 1989; DFO 1991; NLUIS 95B) (95B)
Celibeta Lake 60°12'N, 122°20'W			Residents of Fort Liard harvest fish for subsistence from this lake on the Petitot River system (see below), a tributary of the Liard. (NLUIS 95B) (95B)
Fisherman Lake 60°20'N, 123°45'W			A baseline fisheries study of this lake on the Liard River system was conducted in August 1971 for the proposed Westcoast Transmission Company Limited pipeline between Pointed Mountain and Beaver River. Data were collected on water quality, benthos, waterfowl, and fish growth, reproduction, and diet. Lake whitefish, northern pike, walleye, and white sucker were sampled. A zoogeographic study of lake whitefish from Fisherman Lake also caught burbot, slimy sculpin, spottail shiner, and trout perch. The lake supports an important Aboriginal subsistence fishery. Residents of Fort Liard harvest lake whitefish, northern pike, suckers, and walleye from Fisherman Lake for subsistence year-round except for brief periods during break-up, freeze-up, and mid-winter. A sport fishing lodge operated at the lake in the early 1960's. (Schultz International Limited 1971; Foote 1979; NLUIS 95B) (95B)
Liard River 61°50'55"N, 121°18'30"W			A baseline fisheries study of this Mackenzie River tributary was conducted in 1971-72 for the Mackenzie Valley pipeline. Tributary streams affected by the Liard Highway and/or Norman Wells Pipeline were studied in 1974-77 and 1986, respectively. Fish species reported from the Liard River are listed in Appendix 1. A local population of inconnu may overwinter at the mouth of the Liard River. Ripe Arctic cisco have been caught in a side channel about 20 km upstream from the river mouth in mid-September 1988, and upstream near Fort Liard. Given their distance from the Arctic Ocean, these fish may be from a non-anadromous population. Spawning locations are unknown. (see also NAHANNI BUTTE--Grainger and Poplar rivers and FORT SIMPSON--Birch, Blackstone and Poplar rivers). (Hatfield et al. 1972; Stein et al. 1973; (McLeod and O'Neil 1983; Dillinger et al. 1992) In 1977, DFO Fish Inspection sampled whitefish from the Liard River commercial fishery for their heavy metal concentrations. (Wong 1986) (95H)
Muskeg River 60°19'N, 123°21'W			The Liard Highway crosses this tributary of the Liard River. Baseline fisheries studies were conducted in 1974 by Synergy West Ltd. and in September 1976 and May and August 1977 by DFO to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Lake chub, longnose dace, longnose sucker, northern pike, slimy sculpin, trout perch and white sucker were sampled. The river provides spawning and nursery habitat for a variety of fish species (see above Bovie Lake) (Synergy West Ltd. 1975; McKinnon and Hnytka 1979) (95B)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Petitot River 60°14'N, 123°29'W			This tributary of the Liard River was studied in 1986 during water crossing evaluations for the Norman Wells Pipeline. (Fernet 1986) (95B)
unnamed creek [Liard Hwy mi. 96.8] 60°43'N, 123°21'W			The Liard Highway (mile 96.8) crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry. No fish were caught but the creek appears to provide suitable fish habitat. (McKinnon and Hnytka 1979) (95B)
unnamed creek [Liard Hwy mi. 99.9] 60°43'N, 123°24'W			The Liard Highway (mile 99.9) crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry. The creek supports Arctic grayling. (McKinnon and Hnytka 1979) (95B)
unnamed creek [Liard Hwy mi. 115.7] 60°29'N, 123°27'W			The Liard Highway (mile 115.7) crosses this small tributary of the Liard River. In May and July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The creek provides spawning and nursery habitat for Arctic grayling. It also supports brook stickleback and longnose sucker. (McKinnon and Hnytka 1979) (95B)
unnamed creek [Liard Hwy mi. 121.1] 60°24'40"N, 123°21'W			The Liard Highway (mile 121.1) crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Arctic grayling and longnose sucker were sampled. The creek appears to provide suitable spawning and nursery habitat for Arctic grayling. Lake chub and white sucker have also been caught in the creek. (Synergy West Ltd. 1975; McKinnon and Hnytka 1979) (95B)
unnamed creek [Liard Hwy mi. 124.3] 60°22'30"N, 123°20'W			The Liard Highway (mile 124.3) crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Arctic grayling were sampled and may spawn in the creek. (McKinnon and Hnytka 1979) (95B)
FORT PROVIDENCE		ABORIGINAL FOOD FISHERY: Mackenzie River 6-22 July and 9 September to 14 October 1994: --8 Arctic grayling, --21 inconnu, --1,190 lake whitefish, --60 longnose/white suckers, --264 northern pike, --45 walleye.	Aboriginal residents of Fort Providence harvested an estimated 70,568 kg of fish for subsistence in 1961-62. (Sinclair et al. 1967) DFO has monitored Aboriginal food fishery by residents of Fort Providence at the Horn and Mackenzie rivers in the summer of 1994 and throughout the open water period since 1996. Harvests from the Mackenzie River are reported at left, and those from the Horn River are reported below. It is not known what portion of the community's total annual harvest from the Mackenzie River this represents, but data on winter fishing is very limited. (DFO 1996, 1997, 1998).

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
FORT PROVIDENCE, continued.		<p><u>5 June to 11 October 1996:</u> --8 inconnu, --674 lake whitefish, --23 longnose/white suckers, --243 northern pike, --59 walleye.</p> <p><u>9 June to 10 October 1997:</u> --30 Arctic grayling, --478 lake whitefish, --43 longnose/white suckers, --171 northern pike, --38 walleye.</p> <p><u>5 June to 8 October 1998:</u> --23 Arctic grayling, --9 inconnu, --629 lake whitefish, --101 longnose/white suckers, --337 northern pike, --32 walleye.</p> <p><u>9 June to 24 September 1999:</u> --23 Arctic grayling, --1 inconnu, --243 lake whitefish, --43 longnose/white suckers, --130 northern pike, --20 walleye.</p>	
Beaver Lake 61°07'N, 117°08'W			See below Mackenzie River--Beaver Lake/Brabant Island area. (85F)
Birch Lake [Hunt Lake] 62°04'N, 116°33'W			See below Horn River. (85K)
Bouvier River			See HAY RIVER--Bouvier River.
Fawn Lake [Third Lake] 62°11'N, 117°32'W			See below Horn River. (85K)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Horn River 61°30'N, 118°01'W		<p>ABORIGINAL FOOD FISHERY: <u>6-22 July and 9 September to 14 October 1994:</u> --12 inconnu, --307 lake whitefish, --59 longnose/white suckers, --128 northern pike, --43 walleye.</p> <p><u>22 June to 12 October 1995:</u> --6 Arctic grayling (6 kg), --1,466 lake whitefish (1,466 kg), --103 longnose/white suckers (155 kg), --525 northern pike (575 kg), --77 walleye (77 kg).</p> <p><u>5 June to 11 October 1996:</u> --2 inconnu, --1,777 lake whitefish, --607 longnose/white suckers, --853 northern pike, --240 walleye.</p> <p><u>9 June to 10 October 1997:</u> --33 Arctic grayling, --5 inconnu, --1,323 lake whitefish, --185 longnose/white suckers, --422 northern pike, --67 walleye.</p> <p><u>5 June to 8 October 1998:</u> --23 Arctic grayling, --5 inconnu, --925 lake whitefish, --189 longnose/white suckers, --417 northern pike, --28 walleye.</p> <p><u>9 June to 24 September 1999:</u> --26 Arctic grayling, --1,402 lake whitefish, --185 longnose/white suckers, --493 northern pike, --54 walleye.</p>	<p>A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1971-72 for the Mackenzie Valley pipeline. No fish samples were taken. Walleye run into the Horn River in the spring; whitefish spp. run into the river in September and return downstream before freeze-up. Both species presumably spawn in the system but the extent of their migrations and locations of spawning habitats have not been reported. Gravel beds below Horseshoe Rapids have been suggested as a possible spawning site. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; NLUIS 85K)</p> <p>Families from Fort Providence harvested an estimated 9,091 kg of lake whitefish, northern pike, and walleye for subsistence from the Horn River in the summer and fall of 1972. DFO has monitored all fishing activities at the Horn River during the open water season each year since 1994 (see column to the left). It is not known what portion of the total annual harvest the harvest reported during this period represents, but winter fishing in the area is limited. Most fishing takes place near the river mouth during the fall whitefish runs. There was no winter fishery at the Horn River in the winter of 1995/96. Residents of Jean-Marie River have also participated in this fishery. Many lakes on the Horn River system including Birch, Fawn (see above), Mink and Second (see below) have been fished for subsistence by hunters and trappers from Fort Providence, Rae-Edzo and/or Wha Ti. (Bissett 1972; Hatfield et al. 1972; DFO 1997; NLUIS 85E, 85K; DFO Hay River, unpubl. data) (85E)</p> <p>The lower reaches of the Horn River, including Fawn and Mink lakes, were proposed as a reserve by the International Biological Programme. (NLUIS 85K)</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Hornell Lake 62°20'N, 119°25'W			Fish are harvested for subsistence from this lake on the Willowlake River system by hunters and trappers from Fort Providence, Fort Simpson, and/or Wha Ti. In 1988, DFO estimated the guest bed capacity of Hornell Lake for a medium quality lake trout sport fishery at 4 to 7 beds. (M. Roberge, pers. comm.; NLUIS 85L) (85L)
Mackenzie River (116°W to 118°W)-- Beaver Lake/Brabant Island area	lake trout + whitefish 20,800		<p>This area of the Mackenzie River, at the outlet to Great Slave Lake, has been, and continues to be, an important fishery. McConnell estimated that over 20,000 lake whitefish were taken from the Beaver Lake area in the fall of 1887. Families from Kakisa Lake harvested 6,800 to 9,100 kg of whitefish for subsistence from Beaver Lake in the fall of 1972. Gillnets are set for subsistence harvest throughout Beaver Lake, but are most concentrated near Fort Providence. The Big Snye is not fished due to strong current. (Preble 1908; Bissett 1972; NLUIS 85F)</p> <p>The commercial quota in this area has not been opened as it would interfere with the established subsistence and sport fisheries. In any case, the lake whitefish in the area are parasitized by <i>Trieanophorus crassus</i>. (G. Low, unpubl. data)</p> <p>Guests of a sport fishing lodge located on Brabant Island (Brabant Island Lodge, see Tables 2 and 3) and itinerant anglers with boat access from Hay River or from the Highway #3 ferry crossing near Fort Providence fish for sport at Beaver Lake (61°07'N, 117°08'W) and in the Brabant Island area. Not many of these people are actually from Fort Providence. Anglers visit the area by boat beginning in late June or early July, and good catches of Arctic grayling and northern pike are recorded throughout the summer. Bishop (1967) studied the growth, reproduction, and diet of Arctic grayling in the Brabant Island area in June and July 1965 and July 1966. DFO conducted a partial creel census and biological sampling program in the Beaver Lake-Brabant Island area in the summers of 1972 and 1973. Most angling for grayling takes place in the clearer, faster waters adjacent Brabant, Lobstick, Naylor and Matheson islands (see Table 3 for harvest data). Growth and reproduction data from the grayling (n = 386) caught by DFO in 1972-73 were compared with data collected in 1965-66 by Bishop (n = 666). Over that period the mean length, weight, and age of the fish decreased. Concern was expressed that the grayling were susceptible to overfishing so, in 1974, a minimum size limit of 36 cm (~14") was imposed. A 1977 study by Renewable Resources Consulting Ltd. and a follow-up study conducted by DFO in June-July 1978, found that the mean length and age of grayling caught had stabilized, and that the trophy fishery was being maintained. Pike are abundant throughout the shallow inshore areas but are concentrated in portions of Beaver Lake (see Table 3 for harvest data). DFO Fishery Officers reported a decline in the size of northern pike angled from Beaver Lake after the 1950's. Large pike (>1100 mm fork length) were present in the 1972-73 samples but absent from the 1977-78 samples. In 1980, to protect these trophy fisheries, DFO fishery managers recommended a reduction in the daily catch and total possession limits to 3 and 5 respectively for both Arctic grayling and northern pike, imposition of a maximum size limit on northern pike such that only one of the retained fish is over 90 cm (~35") fork length, and the use of barbless hooks. They also recommended that there be a follow-up study in 3 years and a tagging study to assess the movements and distribution of the grayling and pike. (Bishop 1967; Gillman and Dahlke 1973; Falk and Gillman 1974, 1980; Renewable Resources Consulting Ltd. 1978; DFO unpubl. data)</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Mackenzie River (116°W to 118°W)-- Beaver Lake/Brabant Island area, continued.			The grayling stocks which spawn in the upper islands area do not appear to have been severely depleted by the 1989 die-off of Arctic grayling further downstream in Beaver Lake and the Mackenzie River. In 1995, spawning grayling were observed to be numerous in the spawning habitat bordering this group of islands. Diseased and scarred fish were not observed in this area. (DFO unpubl. data) (85F)
Mink Lake 61°54'N, 117°40'W			Fish may be harvested for subsistence or sport at this lake on the Horn River. (NLUIS 85F) (85F)
"Providence Creek"			See below unnamed creek [Providence Creek].
Rabbit Creek [Rabbit River] 60°28'N, 123°27'W			The Liard Highway crosses this small tributary of the Liard River. Baseline fisheries studies were conducted at the creek in 1974 by Synergy West Ltd. and in September 1976 and May and July 1977 by DFO to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Arctic grayling, longnose sucker, northern pike and slimy sculpin were sampled. The creek appears to provide suitable spawning and nursery habitat for Arctic grayling. (Synergy West Ltd. 1975; McKinnon and Hnytka 1979; NLUIS 95B) (95B)
Redknife River 61°13'N, 119°22'W			<p>In 1974-76, DFO studied the effectiveness of offset and spoiler baffles as aids to fish passage in culverts at the Mackenzie Highway crossing of the Redknife River. These baffle types were recommended as means of correcting existing culvert installations and for proposed stream crossings where alternative designs are not feasible. The maximum recommended slope is 5%. Minor problems were presented by ice, debris and sediment. During the study, hydrological measurements were taken at intervals throughout the year. "Devil Creek", a small tributary that enters the Redknife River from the east immediately above the Mackenzie Highway crossing, flows year-round. Fish captured using gillnets, beach seines, a trap net and a fish counting trap and fence were sampled for data on growth, reproduction, and diet. Fish were also marked using Floy spaghetti tags or fin clips to study their movements. Fish species reported from the Redknife River are listed in Appendix 1. (Jessop and Lilley 1975; Katapodis et al. 1978)</p> <p>Arctic grayling and longnose sucker migrate up the Redknife River in the spring (May) to spawn. The upstream grayling run typically coincides with peak spring discharge in the river. In 1974-76, high flow velocities in culverts at the Mackenzie Highway crossing prevented the run from accessing upstream spawning habitat. Anglers took advantage of this by fishing downstream of the crossing. Spawning did occur below the crossing and fry were observed on 22 May. The upstream sucker run arrives below the highway crossing 4-7 days after the grayling run, when discharges are beginning to decrease. In 1974-76, suckers were prevented from accessing upstream spawning habitat by the high flow velocities in the culverts. They spawned below the highway crossing and fry were observed below the highway crossing on 30 May. Following spawning both species are believed to return downstream to summer in the Mackenzie River or Mills Lake (see above). During the summer and early fall (June to mid-September) culvert discharges permitted immature and young-of-the-year Arctic grayling, longnose sucker, and northern pike to migrate upstream through the culverts. DFO recommended that weirs be installed at the downstream culvert</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Redknife River, continued.			<p>outlet to enable fish to enter the culverts and pass upstream. (Jessop and Lilley 1975; Katapodis et al. 1978)</p> <p>There is a recreational fishery for Arctic grayling at this small tributary of the Mackenzie River. Because the river is distant from the communities, fishing pressure is believed to be low. The stock does not appear to have been badly depleted by the 1989 die-off of Arctic grayling in the Mackenzie River. (DFO unpubl. data; NLUIS 85D+85E) (85E)</p>
Second Lake 62°06'N, 117°26'W			See above Horn River. (85K)
unnamed creek [Providence Creek] 61°15'N, 117°34'W			<p>Arctic grayling and northern pike migrate into this small tributary of the Mackenzie River to spawn at ice-breakup in May. Detailed studies of grayling ecology were conducted at the creek by Bishop in May 1966, using a variety of capture methods, and by DFO in spring 1976, 1978, and 1979. DFO captured fish by dip net from pools below the Highway #3 crossing in the first two years, and at a fish weir installed about 30 m downstream from the highway crossing in 1979. Data were collected on growth, reproduction, diet, behaviour, and movements. In 1979, 467 grayling moved upstream past the weir between 17 and 21 May; 471 moved downstream from 21 to 26 May. A Peterson mark-recapture estimate of the population size was 805 grayling. The main run of pike occurs a little before the main run of grayling, but both species spawn in the same area at the same time. Spawning was observed between the highway crossing and the second major beaver dam. In 1966, grayling were observed spawning between 19 and 23 May; in 1979, they were observed spawning between 17 and 21 May. DFO marked 384 grayling using Floy spaghetti tags to follow their movements. Most of the tagged fish recaptured were returning to Providence Creek to spawn but some fish were recaptured up to 72 km away near at Lobstick Island. (Bishop 1967; 1971; Falk et al. 1982)</p> <p>Beaver dams on the creek sometimes reduce grayling spawning habitat by preventing fish passage and flooding spawning habitat. However, the dams may also ensure water levels are maintained after the freshet, allowing eggs to incubate and hatch and larval fish or fry to migrate downstream to the Mackenzie. (DFO unpubl data.)</p> <p>Prior to 1975, the sport fishery at Providence Creek was limited to a few anglers from the Fort Providence-Hay River area. Aboriginal residents of Fort Providence would also harvest fish from the creek on occasion for subsistence (mainly dog food). Fishing effort was sporadic and harvests seldom exceeded 100 fish. The Mackenzie River is unsafe to cross at this time of year, so few people from Fort Providence are able to access the fishery. Since 1975, studies of the creek have increased local awareness of its Arctic grayling and northern pike populations. Most anglers are campers using the Kakisa River campground or workers from the immediate area who drive to the creek for an evening of fishing. Angling takes place during the spring spawning period in the lower reach of the creek from below the highway crossing to the first beaver dam. Because grayling seldom feed during the spawning period they are not normally vulnerable to legal angling methods, so anglers may resort to illegal fishing methods such as snagging, snaring, and spearing. This disrupts the spawning grayling and forces them upstream to less favourable spawning habitat. Concern over the potential for overfishing at the creek and its effects on sport fisheries elsewhere</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek [Providence Creek], continued.			<p>have prompted DFO studies to support management of the fishery. A partial creel census conducted by DFO in 1979 found that anglers interviewed harvested 130 grayling (0.7 grayling per angler hour) and 13 pike. This was considered to be a minimum estimate of their harvest. To protect the grayling stock, Providence Creek was closed to all recreational fishing between April 15 and May 30, effective 1980. (Falk et al. 1982)</p> <p>On May 6 and 7, 1987, Michigan State Fish and Wildlife, stripped 40 female grayling from the Providence Creek run to collect 200,000 fertilized eggs for re-introduction of the species in the state of Michigan, USA. (see Table 4, J.A. Scott)</p> <p>The Arctic grayling population in Providence Creek is recovering from a natural fish kill that occurred in the upper Mackenzie River, Beaver Lake and Providence Rapids area in August 1989. The kill was attributed to unusually high water temperatures which weakened the fish and enabled the opportunistic pathogens <i>Aeromonas hydrophilia</i> and <i>Pseudomonas putrefaciens</i> to infect and kill them. The grayling stock that spawns in Providence Creek was severely depleted. Effective 1991, catch and possession limits for Arctic grayling were reduced to 0 daily and 0 in possession (catch and release only) from April 1 to May 31, and to 1 daily and 1 in possession for the remainder of the season (June 1 to March 31). This measure was taken to allow the grayling stock to recover from the 1989 summer kill. (DFO unpubl. data)</p>
unnamed lake [McEwan Lake] [MacEwan Lake] 60°49'N, 119°57'W	lake trout + whitefish 600 northern pike and walleye--no quota	<p>1960--lake whitefish 2,208 kg; 1961--lake whitefish 769 kg; 1968--lake whitefish 3,126 kg; 1974--NF; 1975--lake whitefish 577 kg; 1978--NF; 1979--lake whitefish 590 kg; 1980--lake whitefish 272 kg; 1981-86--NF; 1988--lake whitefish 600 kg; 1989-94--NF.</p> <p><u>By-catch:</u> 1960--northern pike 23 kg; --walleye 47 kg; 1961--northern pike 85 kg; 1968--northern pike 98 kg; 1975--walleye 2 kg; 1988--walleye 30 kg.</p>	<p>Families from Fort Providence harvested an estimated 9,091 kg of whitefish, northern pike, and walleye for subsistence from Reade and McEwan lakes in the winter of 1972. (Bissett 1972)</p> <p>Commercial harvests of lake whitefish have been taken sporadically from this lake on the Trout River system by fishermen from Fort Simpson and Hay River since 1960, with small by-catches of northern pike and walleye. DFO sampled burbot, lake whitefish, and northern pike in 1960 and lake whitefish and walleye in 1975. Detailed studies were conducted of the growth and mortality of the lake whitefish which at that time were from an unexploited population. The lake whitefish were infested with cysts of the parasite <i>Triaenophorus crassus</i> at a rate of 4 per 45.5 kg (100 lbs) of flesh. (Kennedy 1963; Healey 1975; Yaremchuk et al. 1989; DFO 1991,1992a+b, 1993, 1994, 1995, 1996, unpubl. data; NLUIS 85D)</p>
unnamed lake [McQueen Lake] 60°56'N, 119°52'W	lake trout + lake whitefish [227]	1978--NF.	An experimental fishery was planned for this lake in 1978. There is no record of harvest. In 1985, DFO recommended against sport fishing lodge development on the lake. (Yaremchuk et al. 1989; B. Wong, pers. comm.)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed lake [Reade Lake] 60°54'N, 119°55'W	lake trout + whitefish 300	1960--lake whitefish 237 kg; 1969--lake whitefish 1600 kg; 1989-94--NF;	Families from Fort Providence harvested an estimated 9,091 kg of whitefish, northern pike, and walleye for subsistence from Reade and McEwan lakes in the winter of 1972. (Bissett 1972) DFO sampled lake whitefish from Reade Lake in June 1960. The fish were infested with cysts of the parasite <i>Triaenophorus crassus</i> at a rate of 27 per 45.5 kg (100 lbs) of flesh. Experimental fisheries planned for Reade Lake in 1989 and 1990, were not conducted. In 1985, DFO recommended against sport fishing lodge development on this small lake. (DFO 1992a+b, 1993, 1994, 1995, 1996, unpubl. data; NLUIS 85D; B. Wong, pers. comm.)
unnamed lake 61°06'N, 119°46'W			Trappers from Fort Providence have harvested northern pike, walleye and whitefish from this lake in winter for subsistence. (NLUIS 85E) (85E)
unnamed lake 61°50'N, 119°28'W	lake trout + whitefish 1,700		This lake has a commercial harvest quota but no record of fishing. (85E)
unnamed lake 61°51'N, 119°27'W	lake trout + whitefish 1,500		This lake has a commercial harvest quota but no record of fishing. (85E)
unnamed lake 61°51'N, 119°32'W	lake trout + whitefish 800		This lake has a commercial harvest quota but no record of fishing. (85E)
Willow Lake 62°10'N, 119°08'W	lake trout + whitefish 1,400	1972--? 1977--lake trout + lake whitefish 816 kg 1978--NF; 1985--NF; 1990--NF.	DFO sampled lake trout and lake whitefish from this headwater lake on the Willowlake River system for growth data in 1972--presumably from a commercial harvest. A commercial harvest of lake trout and lake whitefish was taken from this lake in September 1977. Samples from this fishery suggested that lake trout and lake whitefish in the lake were relatively large and old, and that the lake was not being over-harvested at that time. The lake has periodically been opened for commercial harvest since then, but there is no record of fishing. DFO sampled burbot, lake trout, lake whitefish, longnose sucker, and northern pike from Willow Lake for data on growth, reproduction, and parasites in March 1999. Fish are harvested for subsistence from Willow Lake by hunters and trappers from Fort Providence, Fort Simpson, and/or Wha Ti. (Yaremchuk et al. 1989; DFO 1992b, unpubl. data; NLUIS 85L; G. Low, unpubl. data) Sport anglers have visited the lake since the 1970's, as guests of Willow Lake Lodge or Aurora Marketing Ltd., an outfitter based in Fort Providence (see Table 2). The amount of sport fishing on the lake is unknown. In 1988, DFO estimated the guest bed capacity for the lake at 10-15 beds, given that the lake had not been fished commercially since 1977. Willow Lake Lodge is now used as a youth camp and no longer offers commercial sport fishing packages. (M. Roberge, pers. comm.) (85L)
Willowlake River			See WRIGLEY--Willowlake River.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
FORT SIMPSON			<p>DFO conducted detailed studies of the aquatic resources of the Mackenzie River in the Fort Simpson area from 1971 through 1974. The purpose of these studies was to gather baseline data with which to assess potential environmental impacts related to the Mackenzie Valley pipeline (e.g. Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973). The results of these studies are discussed in greater detail later in this section and throughout this report. The population of catchable northern pike in the mainstem of the Mackenzie River in the Fort Simpson area was estimated from tag returns at between 4,500 and 5,200 fish. (Stein et al. 1973)</p> <p>Aboriginal residents of Fort Simpson harvested an estimated 10,227 kg of fish for subsistence in 1961-62, and 89,545 kg in 1964. In 1988, Lutra Associates Ltd. surveyed Aboriginal residents of Fort Simpson for information on their subsistence harvests. They did not estimate the annual harvest. Fish are an important dietary item for community residents. Most fish are harvested using gillnets, but some are taken by angling. In summer and fall (June to October), residents fish for subsistence near the community in the Mackenzie River and in the Liard River upstream from its confluence with the Mackenzie. They also fish at Antoine, Little Doctor, Sibbeston, and Tsetso lakes (see below) In winter (November to March), most fishing activity occurs at lakes near winter camps or traplines. Bulmer, Cli, Little Doctor, Mustard, Sibbeston and an unnamed lake (Notawohka)(see below) are some of the lakes commonly fished. Fort Simpson residents eat the flesh of all species harvested and sometimes the liver and/or eggs. Fish are also fed to dogs. Lake whitefish and northern pike are the main species harvested. The whitefish and walleye are favourite local foods while the pike are used for dog food. Most fish are stored frozen, rather dried or smoked. Inconnu, longnose and white sucker, Arctic grayling, and burbot are also harvested. (Sinclair et al. 1967; Lutra Associates Ltd. 1989). [NOTE: Lutra Associates Ltd. 1989 indicated that broad whitefish were one of the main fish species harvested. This is unlikely. In 1971, DFO researchers caught 472 lake whitefish in the area and only 1 broad whitefish. (Hatfield et al. 1972)]</p> <p>Two outfitters, Cherokee Enterprises and North Nahanni River Boat Tours, offer summer boat tours on the Mackenzie River from Fort Simpson. Cherokee Enterprises takes guests eastward from the community as far as the Trout River. North Nahanni River Boat Tours takes guests on the Mackenzie, North Nahanni, Root, Ram, and Tetcela rivers. Guests of both outfitters fish for Arctic grayling, northern pike, and walleye. (M. Longlade, pers. comm.)</p> <p>In the mid-1980's DFO measured the concentration of the organic insecticide toxaphene in livers of burbot from the Mckenzie River at Fort Simpson. (Muir et al. 1990)</p>
Antoine Lake [Jackfish Lake] 61°41'45"N, 121°41'W			Residents of Fort Simpson have fished for subsistence from fall through spring in support of trapping activities at this headwater lake on the Martin River system (see below). (NLUIS 95H) (95H)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Birch River 61°21'N, 122°04'W			The Liard Highway crosses this small tributary of the Liard River. Baseline fisheries studies of the Birch River were conducted in 1971-72 for the Mackenzie Valley pipeline and in 1974 and 1977 for the Liard Highway. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. A 3 m waterfall located 8 km upstream from the river mouth prevents upstream fish migration. Arctic grayling, brook stickleback, lake chub, longnose dace, longnose sucker, slimy sculpin, and trout perch live in the Birch River below the falls. This reach of river provides spawning and nursery habitat for Arctic grayling, longnose sucker, and other species. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; McCart et al. 1974; Synergy West Ltd. 1975; McKinnon and Hnytka 1979; NLUIS 95G) (95G)
Blackstone River 61°05'N, 122°55'W			The Liard Highway crosses this Liard River tributary at several locations (mile 66.0, 67.0, 67.3, 71.8). Baseline fisheries studies of the Blackstone River were conducted in 1971-72 for the Mackenzie Valley pipeline and in 1974 and 1977 for the Liard Highway. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Arctic grayling, lake chub, longnose sucker, northern pike and cyprinids were sampled. Twelve species of fish have been caught in the Blackstone River. The system is an important migration route and provides spawning and nursery habitat for a variety of species, including Arctic grayling and longnose sucker. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; McCart et al. 1974; Synergy West Ltd. 1975; McKinnon and Hnytka 1979; NLUIS 95H). (95G)
Bluefish Creek 61°02'N, 123°26'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1972-74 for the Mackenzie Valley pipeline. Bluefish Creek is a major nursery and suspected spawning area for Arctic grayling, and a nursery area for cisco spp., lake whitefish, and northern pike. Aboriginal residents of Fort Simpson traditionally harvested Arctic grayling in the spring as they descended the creek, presumably after spawning. A weir or "barrier" was constructed across the stream and 200 or more fish could be harvested in a night, at a time of year when food was often in short supply. (Preble 1908; Stein et al. 1973; Jessop et al. 1974; Jessop and Lilley 1975) (95G)
Bulmer Lake 62°48'W, 120°45'W			Lake whitefish, northern pike, and walleye from this lake on the Willowlake River (see WRIGLEY--Willowlake River) were sampled in 1974, during fisheries studies for the Mackenzie Highway. There is a fall spawning migration of lake and round whitefish from Bulmer Lake into the Willowlake River. Residents of Fort Simpson harvest whitefish for subsistence at Bulmer Lake (Lilley 1975; NLUIS 95I) (95I)
Cli Lake 61°59'N, 123°18'W	lake trout + lake whitefish [2,800]	1979--NF; 1982--NF; 1995--1 burbot; --166 lake trout, --128 lake whitefish.	During an experimental fishery in March 1996, DFO collected data on the catch effort, growth, and flesh mercury concentrations of fish from this lake on the Tetcela River system, a tributary of the North Nahanni River. Burbot, lake trout and lake whitefish were sampled. Experimental fisheries were planned for this lake in 1979 and 1982, but there is no report of harvest. Fish are harvested from Cli Lake for subsistence and sport by residents of Fort Simpson and for subsistence by residents of Wrigley in September. North Nahanni Naturalists Lodge is located on Cli Lake (see Table 2). (Bissett 1972; Yaremchuk et al. 1989; NLUIS 95J; G. Low, unpubl. data) (95G)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Little Doctor Lake 61°53'N, 123°16'W	lake trout + lake whitefish [2,300]	1982--NF, 1995--6 burbot, --19 lake trout 29 kg, --39 lake whitefish 34 kg, --13 northern pike, --11 sucker, --37 walleye 48 kg.	In 1971, DFO conducted a limnological survey of this lake on the Sibbeston River (see below). Data were collected on the lake morphometry; temperature, pH and dissolved oxygen profiles; water chemistry; phytoplankton, zooplankton, and zoobenthos. Fish were captured using multi-mesh experimental gillnets and rod and reel. Data on the catch effort and on fish growth, reproduction, and diet were reported. Arctic grayling, lake cisco, lake trout, lake whitefish, longnose and white sucker, northern pike and walleye were sampled. Lake whitefish were infested with cysts of the parasite <i>Triaenophorus</i> sp. at a rate of over 35 per 100 pounds of round fish. A zoogeographic study of lake whitefish from Little Doctor Lake, in 1979, reported the occurrence of 12 fish species in the lake. An experimental fishery was planned for this lake in 1982, but there is no record of harvest. During a stock survey of this lake in December 1996, DFO collected data on catch effort, growth and flesh mercury concentrations from burbot, lake trout, lake whitefish, northern pike, sucker and walleye. Arctic grayling, longnose sucker, northern pike and walleye from Little Doctor Lake are reported to run upstream and downstream into the Sibbeston River, in the spring. Fish are harvested from the lake for subsistence and sport year-round. In 1987, DFO estimated the guest bed capacity of Little Doctor Lake for a low quality lake trout sport fishery at 4 to 6 beds. (Stephansson 1973; Falk 1979; Foote 1979; Yaremchuk et al. 1989; NLUIS 95G; DFO unpubl. data; G. Low, unpubl. data; M. Roberge, pers. comm.) (95G)
Mackenzie River --Fort Simpson area			DFO conducted detailed studies of the aquatic resources of the Mackenzie River in the Fort Simpson area from 1971 through 1974. The purpose of these studies was to gather baseline data with which to assess potential environmental impacts related to the Mackenzie Valley pipeline (e.g. Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973). The results of these studies are discussed throughout this section under individual water courses that were sampled either near their confluence with the Mackenzie or upstream. The Mackenzie River near Fort Simpson is a major nursery area for longnose sucker. (Stein et al. 1973)
Manners Creek 61°46'10"N, 121°11'40"W			This small tributary of the Liard River supports northern pike. (NLUIS 95H) (95H)
Martin River 61°55'25"N, 121°34'45"W			Baseline fisheries studies of this Mackenzie River tributary were conducted in 1971-74 for the Mackenzie Valley pipeline and Mackenzie Highway. Data were collected on hydrology, water chemistry and benthos and on fish growth, reproduction and diet. Fish species captured are listed in Appendix 1. Arctic lamprey, Arctic grayling, burbot, longnose sucker, northern pike, and trout perch spawn in the Martin River and spawning of 6 other species is suspected. There is a downstream movement of fish in the river from mid-November to mid-December. Small numbers of adult and juvenile Arctic grayling, northern pike and white sucker and larger numbers of Arctic lamprey, lake chub, trout perch, and slimy sculpin appear to overwinter in the system. The river mouth is an important nursery area for the confirmed spawning species and for walleye and lake whitefish. Residents of Fort Simpson fish for subsistence and sport at the river mouth in the spring and fall. (see above Antoine Lake) (Hatfield et al. 1972; Dryden et al. 1973; Shotton 1973; Stein et al. 1973; Jessop et al. 1974; McCart et al. 1974; Porter et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975; Rosenberg and Snow 1975; NLUIS 95G+95H) (95H)
Matou River			See NAHANNI BUTTE--Matou River.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Mustard Lake [Trout Lake] 62°00'N, 120°05'W			Fish have been harvested for sport and subsistence from this headwater lake on the Rabbitskin River (see JEAN-MARIE RIVER--Rabbitskin River). The status of a sport fishing camp for northern pike that operated at the lake in the past is unknown. (NLUIS 95H + 95I) (95H)
North Nahanni River 62°15'N, 123°20'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1971-72 for the Mackenzie Valley pipeline. Lake chub spawn in the North Nahanni River in May. Lower sections of the river provide nursery, and possibly spawning, habitat for Arctic grayling, chub spp., longnose sucker, and round whitefish. Guest of North Nahanni River Boat Tours, an outfitter based in Fort Simpson who offers summer boat tours of the North Nahanni, may fish for Arctic grayling, northern pike, and walleye. See below Ram, Sibbeston and Tsetso rivers and WRIGLEY. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; NLUIS 95J; M. Longlade, pers. comm.) (95J)
Poplar River 61°21'50"N, 120°52'15"W			The Liard Highway crosses this small tributary of the Liard River. Baseline fisheries studies of the river were conducted in 1971-72 for the Mackenzie Valley pipeline and in 1973-74 and 1977-78 for the Liard Highway. Two large culverts were installed at the highway crossing during the winter of 1970-71. DFO studied the river to assess fish habitat protection requirements related to highway development in August 1977, and in the spring and summer of 1978 Aquatic Environments Limited studied the effects of the culverts on fish passage. Data were collected on stream hydrology, water quality and fish growth, reproduction, diet, and movements. The river provides important nursery, spawning, and overwintering habitat for a variety of species including Arctic grayling, longnose sucker, mountain whitefish, and northern pike. Fish passage upstream of the highway was blocked by high flow velocities in the culverts until after the spawning periods for Arctic grayling and northern pike were over. Only longnose sucker, which spawn later in the season were able to migrate to spawning areas upstream of the highway crossing. Strong concerns were expressed that the migratory populations of grayling and pike had been drastically reduced since installation of the culverts and might be eliminated from the river. See above TROUT LAKE--Cormack Lake. (Hatfield et al. 1972; Renewable Resources Consulting Services Ltd. 1972; Dryden et al. 1973; McCart et al. 1974; Synergy West Ltd. 1975; Rosenberg and Snow 1975; Jones 1979; McKinnon and Hnytka 1979; NLUIS 95H) (95H)
"Providence Creek"			See FORT PROVIDENCE--unnamed creek [Providence Creek].
Rabbitskin River			See JEAN-MARIE RIVER--Rabbitskin River.
Ram River 62°01'N, 123°41'W			This tributary of the North Nahanni River (see above) provides nursery habitat for Arctic grayling, lake trout, longnose sucker, and whitefish. Guest of North Nahanni River Boat Tours, an outfitter based in Fort Simpson who offers summer boat tours of the Ram River, may fish for Arctic grayling, northern pike, and walleye. (NLUIS 95G; M. Longlade, pers. comm.) (95J)
River Between Two Mountains			See WRIGLEY--River Between Two Mountains.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Sibbeston Lake 61°45'N, 122°45'W	lake trout + whitefish 500	1976--lake trout + lake whitefish 738 kg; 1977--NF; 1981--NF; 1983-86--NF; 1990-91--NF; 1993--NF; 1996--138 lake whitefish, --4 northern pike, --7 sucker, --5 walleye.	A commercial harvest of lake trout and lake whitefish was taken from this lake on the Tetcela River (see below) in 1976. Sibbeston Lake was opened for commercial fishing periodically from 1977-93 but there is no record of harvest. During an experimental fishery in November-December 1997, DFO collected data on catch effort and fish growth and reproduction and flesh samples were collected for mercury analysis. Lake whitefish, northern pike, sucker and walleye were sampled. Residents of Fort Simpson and Wrigley harvest fish for subsistence from Sibbeston Lake in June through September. (Bissett 1972; Yaremchuk et al. 1989; DFO 1992b, 1993, 1995; NLUIS 95G; G. Low, unpubl. data) (95G)
Sibbeston River 61°52'N, 123°28'W			This river drains Sibbeston Lake via Little Doctor Lake (see above) into the Tetcela River (see below). Arctic grayling, longnose sucker, northern pike and walleye are reported to run upstream and downstream from Little Doctor Lake into the Sibbeston River in the spring. (NLUIS 95G) (95G)
Spence River			See JEAN-MARIE RIVER--Spence River.
Tetcela River 62°02'N, 123°32'W			Baseline aquatic studies of this tributary of the North Nahanni River were conducted in 1976-77 for Nahanni National Park Reserve and in 1980-81 for Cadillac Exploration Limited's Prairie Creek Project (61°33'N, 124°48'W), a proposed lead-zinc-copper-silver mining and milling operation. Data were collected on stream hydrology, water chemistry and benthos and on fish growth, reproduction, and diet. Species reported from the river and its tributary stream, Sundog Creek, include Arctic grayling, burbot, lake chub, longnose dace, longnose sucker, mountain whitefish, northern pike, slimy sculpin, and trout perch. The river is a nursery and probable spawning area for Arctic grayling and may provide overwintering habitat for fish. Guest of North Nahanni River Boat Tours, an outfitter based in Fort Simpson who offers summer boat tours of the Tetcela River, may fish for Arctic grayling, northern pike, and walleye. (see above Cli, Little Doctor, Sibbeston, and Tsetso lakes) (Wickstrom 1977; Ker, Priestman and Associates Ltd. 1980; Beak Consultants Ltd. 1981; NLUIS 95G; M. Longlade, pers. comm.) (95J)
Trail River 62°05'N, 122°12'W			Baseline fisheries study of this tributary of the Mackenzie River were conducted in 1971-74 for the Mackenzie Valley pipeline and in 1981 for the Interprovincial Pipeline. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. A fish weir was constructed across the Trail River in 1973-74 to monitor fish movements and obtain spawning population estimates. Arctic grayling (n = 400-500), longnose sucker (n = 50), and northern pike (n = 200) migrate upstream to spawn in May, spawn in mid-May to early June, and then return downstream into the Mackenzie River. Trout perch also spawn in the Trail River, which is a nursery area for the spawning species and burbot. Most grayling tagged at the Trail River were recaptured either in the spring at the Trail River or in the summer near the confluence of the Liard and Mckenzie rivers. Tagged grayling ranged up to 124 km upstream on the Mackenzie River. Most pike tagged at the Trail River were recaptured either in the river or nearby in the Mackenzie River. Tagged pike ranged 115 km upstream to the Spence River (see JEAN-MARIE RIVER--Spence River). The presence of well-oxygenated free water in March suggests that fish may overwinter in the river. (Hatfield

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Trail River, continued.			et al. 1972; Stein et al. 1973; Jessop et al. 1974; Jessop and Lilley 1975; McCart and McCart 1982; Fernet 1986; NLUIS 95I + 95J) (95I)
Trout River			See TROUT LAKE--Trout River.
Tsetso Lake 61°51'N, 123°01'W	walleye 800	1979-80--NF; 1983-86--NF; 1990-93--NF; 1996--204 lake whitefish, --3 northern pike, --105 walleye.	This lake on the Tetcela River, a tributary of the North Nahanni, has been opened for commercial harvest periodically since the late 1970's, but no harvest has been reported. During an experimental fishery in November-December 1997, DFO collected data on catch effort and fish growth and reproduction from Tsetso Lake. Lake whitefish, northern pike, and walleye were sampled. Flesh samples were collected for mercury analysis. (Yaremchuk et al. 1989; DFO 1992b, 1993, 1994, 1995; G. Low, unpubl. data) (95G)
unnamed creek [Liard Hwy mi. 63.0] 61°06'50"N, 122°50'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 63.0] 61°06'50"N, 122°50'W.
unnamed creek [Liard Hwy mi. 63.7] 61°06'N, 122°51'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 63.7] 61°06'N, 122°51'W.
unnamed creek [Liard Hwy mi. 59.3] 61°09'N, 122°46'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 59.3] 61°09'N, 122°46'W.
unnamed creek [Liard Hwy mi. 51.9] 61°13'N, 122°37'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 51.9] 61°13'N, 122°37'W.
unnamed creek [Liard Hwy mi. 50.7] 61°13'30"N, 122°35'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 50.7] 61°13'30"N, 122°35'W.
unnamed creek [Liard Hwy mi. 48.9] 61°14'30"N, 122°32'30"W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 48.9] 61°14'30"N, 122°32'30"W.
unnamed creek [Liard Hwy mi. 43.8] 61°16'N, 122°24'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 43.8] 61°16'N, 122°24'W
unnamed creek [Liard Hwy mi. 45.9] 61°16'N, 122°29'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 45.9] 61°16'N, 122°29'W.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek [Liard Hwy mi. 29.8] 61°16'30"N, 122°01'30"W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 29.8] 61°16'30"N, 122°01'30"W.
unnamed creek [Liard Hwy mi. 39.6] 61°18'N, 122°17'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 39.6] 61°18'N, 122°17'W.
unnamed creek [Liard Hwy mi. 42.8] 61°18'N, 122°23'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 42.8] 61°18'N, 122°23'W.
unnamed creek [Liard Hwy mi. 38.5] 61°19'30"N, 122°14'W			See NAHANNI BUTTE--unnamed creek [Liard Hwy mi. 38.5] 61°19'30"N, 122°14'W.
unnamed creek [Liard Hwy mi. 8.0] 61°25'N, 121°27'W			The Liard Highway (mile 8.0) crosses this small tributary of the Liard River. In August 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Longnose sucker spawn in the lower reaches of this creek. (McKinnon and Hnytka 1979) (95H)
unnamed creek [Liard Hwy mi. 14.1] 61°25'N, 121°37'30"W			The Liard Highway (mile 14.1) crosses this small tributary of the Liard River. In July-August 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Arctic grayling feed in the lower reaches of this creek. (McKinnon and Hnytka 1979) (95H)
unnamed creek 61°53'30"N, 121°23'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1972 for the Mackenzie Valley pipeline. This creek is a major nursery area for northern pike. (Stein et al. 1973 [fig 16, no 7]) (95H)
unnamed creek 61°56'N, 122°08'W			This small tributary of the Mackenzie River is accessible from the Mackenzie Highway. The creek is a spawning and nursery area for lake chub. (McCart et al. 1974; NLUIS 95J) (95G)
unnamed creek [Roundup Creek] 61°57'40"N, 121°35'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Valley pipeline. (Jessop et al. 1974) (95H)
unnamed creek 61°59'N, 122°14'W			This small tributary of the Mackenzie River is accessible from the Mackenzie Highway. The creek is a spawning and nursery area for Arctic grayling and slimy sculpin. (McCart et al. 1974; NLUIS 95J) (95G)
unnamed creek 61°59'N, 122°17'W			This small tributary of the Mackenzie River has a zinc deposit at its mouth and is accessible from the Mackenzie Highway. The creek is a spawning and nursery area for Arctic grayling. (McCart et al. 1974; NLUIS 95J) (95G)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek 62°00'30"N, 121°47'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1972-73 for the Mackenzie Valley pipeline. Arctic grayling spawn in this creek following ice breakup in late May, and use the creek as a nursery area.. (Stein et al. 1973 [fig 16, no 5]; Jessop et al. 1974) (95I)
unnamed creek [Secret Creek; Rockbottom Creek] 62°00'30"N, 121°54'W			A baseline fisheries study of this small tributary of the Mackenzie River was conducted in 1972-74 for the Mackenzie Valley pipeline. Arctic grayling and longnose sucker spawn in Secret Creek in late May or early June and use the creek as a nursery area. (Stein et al. 1973; Jessop et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975) (95I) Note: In 1971-73, the entire creek was referred to as Secret Creek. In 1974 the east branch was referred to as Secret Creek and the west branch as Rockbottom Creek.
unnamed creek [Drift Pile Creek] 62°02'30"N, 121°59'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1973 and 1974 for the Mackenzie Valley pipeline. The river is a nursery area for Arctic grayling. (Stein et al. 1973 [fig 16, no 4], Jessop and Lilley 1975) (95I)
unnamed creek 62°03'N, 122°07'30"W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1974 for the Mackenzie Highway (mile 328). Arctic grayling spawn in this creek following ice breakup in late May. (Jessop and Lilley 1975) (95J)
unnamed creek 62°04'N, 121°59'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1972 for the Mackenzie Valley pipeline. This creek is a major nursery area and suspected spawning area for longnose sucker. (Stein et al. 1973 [fig 16, no 3]) (95I)
unnamed creek [Shale Creek] 62°04'N, 122°12'W			Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1972-74 for the Mackenzie Valley pipeline and Mackenzie Highway. Arctic grayling spawn in this creek following ice breakup in late May. The creek provides nursery habitat for grayling and slimy sculpin. A zinc deposit has been located near the river mouth. (Stein et al. 1973 [fig 16, no 1]; Jessop et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975; NLUIS 95J) (95J)
unnamed lake 63°06'N, 121°12'W			This lake has been fished by trappers from Fort Simpson. (NLUIS 95P) (95P)
unnamed lake [Berry Lake] 63°07'N, 121°11'W	lake trout + lake whitefish [1,000]	1982--NF.	An experimental fishery was planned for this lake in 1982. There is no report of harvest. (Yaremchuk et al. 1989) (95P)
unnamed lake [Jackfish Lake] 60°57'N, 119°52'W			In 1985, DFO recommended against sport fishing lodge development on this small lake. (B. Wong, pers. comm.) (85D)
unnamed lake [Little Dal Lake] 62°43'N, 126°41'W			This headwater lake on the Redstone River, a tributary of the Mackenzie (see Stewart 1996) supports Arctic grayling and lake trout. Guests at the nearby South Nahanni Outfitters camp (62°42'N, 126°40'W) may fish for sport at the lake. (NLUIS 95L) (95L)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed lake [Long Lake] 63°10'N, 121°16'W	lake trout + lake whitefish [1,400]	1982--NF.	An experimental fishery was planned for this lake in 1982. There is no record of harvest. (Yaremchuk et al. 1989) (95P)
unnamed lake [McEwan Lake] [MacEwan Lake] 60°49'N, 119°57'W			See FORT PROVIDENCE--unnamed lake 60°49'N, 119°57'W [McEwan Lake; MacEwan Lake]. (85D)
unnamed lake [McQueen Lake]			See FORT PROVIDENCE--unnamed lake [McQueen Lake].
unnamed lake [Notawohka Lake or Notena Lake] 61°09'N, 120°16'W			Residents of Fort Simpson harvest fish for subsistence from this lake on the Trout River system (see TROUT LAKE--Trout River). (Lutra Associates Ltd. 1989)(95H)
unnamed lake [Reade Lake] 60°54'N, 119°55'W			See FORT PROVIDENCE--unnamed lake 60°54'N, 119°55'W [Reade Lake].
Willow Lake			See FORT PROVIDENCE--Willow Lake.
Willowlake River			See WRIGLEY--Willowlake River.
ENTERPRISE -- see HAY RIVER.			
HAY RIVER			DFO studied and described the domestic fishery in the vicinity of Hay River in the fall of 1958. Residents of Hay River harvested an estimated 12,273 kg of fish for subsistence from October 1959 to March 1960; and 46,680 kg in 1961-62. (Keleher and Haight 1959; Sinclair et al. 1967)
Axe Creek [Axe River] 61°16'N, 118°46'W			There is a recreational fishery for Arctic grayling at this small tributary of the Mackenzie River. Because the river is distant from the communities, fishing pressure is believed to be low. The stock does not appear to have been affected by the 1989 die-off of Arctic grayling in the Mackenzie River. (DFO unpubl. data; NLUIS 85E) (85E)
Beaver Lake			See FORT PROVIDENCE--Brabant Island/Beaver Lake.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Bouvier River 61°14'N, 119°02'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1974 for the Mackenzie Valley pipeline. Arctic grayling and longnose sucker migrate up the Bouvier River in spring, presumably to spawn. The river is a nursery area for Arctic grayling. There is a recreational fishery for Arctic grayling at the Bouvier River but, because it is distant from the communities, fishing pressure is believed to be low. The stock does not appear to have been affected by the 1989 die-off of Arctic grayling in the Mackenzie River. (Jessop and Lilley 1975; NLUIS 85D+E) DFO unpubl. data) (85E)
Dogface Lake [Trefiak Lake]			See KAKISA--Dogface Lake [Trefiak Lake].
Hay River 60°51'50"N, 115°44'W		<p><u>Sport harvest:</u> 1975--2,120 walleye (860 kg), 1.23 walleye/angler/hr. 1978--2,484 walleye, 1986--3,155 walleye</p> <p><u>Aboriginal food fishery harvest during the whitefish run in September and October 1996:</u></p> <p>--19 burbot (38 kg), --3 inconnu (12 kg), --1 lake trout (3 kg), --3,420 lake whitefish (3,420 kg), --84 longnose sucker (168 kg), --30 northern pike (60 kg), --19 walleye (19 kg)</p>	<p>The Hay River is a spring migration route for walleye and spawning longnose sucker, and a fall spawning migration route for lake whitefish and small numbers of chum salmon. The Louise and Alexandra falls form an impassable barrier upstream. The northern pike, non-migrant whitefish and various forage species are likely resident in the river. Longnose suckers run into the Hay River following ice break-up in the spring to spawn, in May to mid-June, and then return to Great Slave Lake. Inconnu may once have spawned in the river but are now only occasional visitors. Lamprey ammocoetes (young) are found in the lower 32 km of the Hay River. A number of ammocoete beds (spawning locations) have been documented in the river. Spawning occurs prior to July 8. Fish species reported from the Hay River are listed in Appendix 1. (Fuller 1955; Harris 1962; Buchwald 1968; Nursall and Buchwald 1972; Bond et al. 1978; Moshenko and Low 1980; Clarke et al. 1989; NLUIS 85B; G. Low, unpubl. data)</p> <p>Lake whitefish are harvested for subsistence in the east and west channel and occasionally upstream from Vale Island. Domestic gillnets are not to span more than two thirds of the river. In 1996, DFO collected data on the aboriginal food fishery at the Hay River during September and October, the period when most fish are harvested, however the total annual harvest is unknown. In 1997, the basic needs level was estimated at 15,000 kg of lake whitefish. (NLUIS 85B+C; DFO unpubl. data)</p> <p>Residents of Hay River harvest mainly walleye but also burbot, inconnu, and northern pike for sport from the Hay River in June through October, mostly near the community in the vicinity of Vale Island, but some upstream at the crossing of Highway 6 and at the base of Louise Falls. DFO surveyed the walleye sport fishery in 1975, 1978, and 1986. Partial creel censuses were conducted in 1972 and 1974, a questionnaire survey in 1979, and there are also DFO data from 1983. Over this period, the fishing effort increased substantially while the catch per unit effort decreased by 30%, from 1.2 to 0.8 walleye per angler hour. However, the mean length of fish sampled increased from 338 to 365 mm, and the mean age from 5 to 7 years-- suggesting that recruitment is adequate to meet the need of stock replacement. The stock definition is unknown, except that the fish are not part of a spawning run -- most are either immatures or unripe adults that feed in the river during summer and early fall. The stock is not harvested by the Great Slave Lake commercial fishery, since the Hay River domestic zone protects stocks in an area 5 statute miles offshore between Point de Roche in the west and Fish Point to the east (Fig. 3). In 1989, DFO recommended that current regulations be maintained, a creel census with biological sampling be repeated every 3 years, and a tagging program be implemented to determine</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Hay River, continued.		.	movement patterns of the walleye. (Gillman and Dahlke 1973; Falk and Dahlke 1975; Bond et al. 1978; Moshenko and Low 1980; Falk 1981; Clarke et al. 1989; DFO unpubl. data) (85B)
Redknife River			See FORT PROVIDENCE--Redknife River.
unnamed creek [Providence Creek]			See FORT PROVIDENCE--unnamed creek [Providence Creek].
unnamed lake [McEwan Lake; MacEwan Lake] 60°49'N, 119°57'W			See FORT PROVIDENCE--unnamed lake 60°49'N, 119°57'W [McEwan Lake; MacEwan Lake].
JEAN-MARIE RIVER			<p>Aboriginal residents of Jean-Marie River harvested an estimated 6,818 kg of fish for subsistence during the first week of October 1961, 30,091 kg of fish in 1961-62, 9,091 kg in 1965, and 6,818 kg in 1966. (Sinclair et al. 1967; Higgins 1969)</p> <p>In 1988, Lutra Associates Ltd. surveyed Aboriginal residents of Jean-Marie River for information on their subsistence harvests. They did not estimate the annual harvest. Arctic grayling excepted, fish are harvested using gillnets. They are an important dietary item for community residents who eat the flesh of all species harvested and sometimes the liver and/or eggs. Lake whitefish and occasional broad whitefish are a favourite local food. They are eaten fresh, dried or frozen for storage, or fed to dogs. Longnose sucker and Arctic grayling are harvested in the spring (April to June) and lake whitefish, inconnu, northern pike, longnose sucker, and burbot in summer (June to August) from the Mackenzie River and its tributaries. Arctic grayling are caught by angling as a recreational activity. The fall (September and October) harvest from the Mackenzie River is dominated by lake whitefish. In winter (November to March), fish are caught using nets set under the ice in the Mackenzie River and at "Ekali" and "Sanguez" lakes (see below unnamed lake [Ekali Lake] and unnamed lake [Sanguez Lake]). Residents expressed concern in the survey over the quality of fish harvested from the Mackenzie River. They indicated that their concern has caused them to change their fishing habits since 1980; that they now eat fewer fish and do more of their fishing in lakes. (Lutra Associates Ltd. 1989; see also Bissett 1972). [NOTE: Lutra Associates Ltd. 1989 indicated that broad whitefish were one of the main fish species harvested. This is unlikely. Broad whitefish are uncommon in the region relative to lake whitefish is an important harvest species.]</p>
"Ekali Lake"			See below unnamed lake [Ekali Lake].
"Gargon Lake"			See below unnamed lake [Gargon Lake].
Goose Lake			See FORT SIMPSON--Goose Lake.
Horn River			See FORT PROVIDENCE--Horn River.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Jean-Marie Creek 61°31'35"N, 120°37'45"W			Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1971-73 for the Mackenzie Valley pipeline and in 1981 for the Interprovincial Pipeline. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. Longnose sucker, northern pike, walleye and possibly emerald shiner and mountain whitefish spawn in this system. The sucker and walleye spawn in late May after ice breakup. The Jean-Marie Creek is a major nursery area for burbot, longnose sucker and walleye. It is also a nursery area for emerald shiner. The presence of well-oxygenated water in March suggests that fish may overwinter in the river. Residents of the community of Jean-Marie River harvest fish at the river mouth from spring to fall for subsistence. Sport anglers also harvest northern pike and walleye where Highway #1 crosses Jean-Marie Creek. (see below unnamed lake [Ekali Lake], unnamed lake [Gargon Lake], unnamed lake [Sanguex Lake]) (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; Jessop et al. 1974; McCart et al. 1974; McCart and McCart 1982; Fernet 1986) (95H)
McGill Lake 61°18'N, 121°00'45"W			Residents of Jean Marie River have fished for subsistence in September at McGill Lake. (Bissett 1972) (95H)
Poplar River			See FORT SIMPSON--Poplar River.
Rabbitskin River 61°46'55"N, 120°41'40"W			Baseline fisheries studies of this Mackenzie River tributary were conducted in 1971-74 for the Mackenzie Valley pipeline. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction, diet and movements. Species reported from this system are listed in Appendix 1. Arctic grayling, lake and mountain whitefish, and longnose and white sucker are non-resident species that migrate into the Rabbitskin River to spawn and/or feed. Soon after spawning they disperse in the Mackenzie River, usually within 36 km of the Rabbitskin. Most grayling tagged at the Rabbitskin River were recaptured in the river--some during subsequent spawning runs, others ranged upstream in the Mackenzie River to Jean-Marie Creek (see above) or downstream to Trail River (see FORT SIMPSON--Trail River). Three were recaptured in June and July 1973 up to 43 km downstream in the Mackenzie River. A walleye tagged at the river was recovered at the Spence River (see below). Northern pike, slimy sculpin, trout perch, and several species of cyprinids are resident in the river but sometimes move into the estuary. One pike tagged at the Rabbitskin was recaptured 48 days later in the Mackenzie River near Norman Wells, a distance of 378 km. Arctic grayling migrate into the river to spawn in early to mid-May, spawn in mid- to late May, and then emigrate from the river in late May to mid-June. The river is an important nursery area for Arctic grayling and longnose and white sucker. Northern pike spawn in the river from late May to mid-June, longnose sucker from mid-May to mid-June, and white sucker in early June. Longnose sucker tagged at the river in 1972-73 were recaptured either near the tagging site the following year, in the Mackenzie River or in Jean-Marie Creek upstream or the Martin River downstream. There is a small spawning run of walleye in early June, and a small spawning run of mountain whitefish from mid-September to early October. The estuary is an important nursery area for the lake whitefish, northern pike, and walleye. The river provides overwintering habitat for Arctic grayling, burbot, lake whitefish and northern pike. (see also FORT SIMPSON--Mustard Lake) (Hatfield et al. 1972; Dryden et al. 1973; Jessop et al. 1973, 1974; Stein et al. 1973; Jessop and Lilley 1975)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Rabbitskin River, continued.			There is a small sport fishery for Arctic grayling, northern pike, and yellow walleye by anglers from Fort Simpson and Jean-Marie River at the Rabbitskin River. (Dryden et al. 1973; NLUIS 95H) The stock of Arctic grayling in the Rabbitskin River was adversely affected by the 1989 die-off of Arctic grayling in the upper Mackenzie River, Beaver Lake, Providence Rapids area, however it has not been fully assessed. (K. Davidge, pers. comm.) (95H)
"Sanguez Lake"			See below unnamed lake [Sanguez Lake].
Spence River 61°34'40"N, 120°40'50"W			Residents of Jean Marie River fish for subsistence in June and July near the mouth of the Spence River. (Bissett 1972)
Trout River			See TROUT LAKE--Trout River.
unnamed creek 61°48'N, 120°44'W			See FORT SIMPSON--unnamed creek 61°48'N, 120°44'W.
unnamed lake [Ekali Lake, Kelly Lake] 61°17.5'N, 120°35'W		1994--36 cisco, --59 lake whitefish, --23 northern pike, --32 walleye; 1995--281 lake cisco, --26 lake whitefish, --7 northern pike, --16 walleye.	During fisheries studies in May-August 1994 and December 1996, DFO collected data on catch effort, growth, and flesh mercury concentrations in fish from this lake which flows into Jean-Marie Creek, a tributary of the Mackenzie. Lake cisco, lake whitefish, northern pike and walleye were sampled. (G. Low, unpubl. data) (95H)
unnamed lake [Gargon Lake] 61°15'N, 120°23'W		1995--27 lake whitefish 56 kg, --2 northern pike 5 kg.	During a fishery study in December 1996, DFO collected data on the catch effort, growth, and flesh mercury concentrations of lake whitefish and northern pike from this lake which drains into "Sanguez Lake" (see below unnamed lake [Sanguez Lake]) and eventually via Jean-Marie into the Mackenzie. (G. Low, unpubl. data) (95H)
unnamed lake [McEwan Lake; MacEwan Lake] 60°49'N, 119°57'W			See FORT PROVIDENCE--unnamed lake 60°49'N, 119°57'W [McEwan Lake; MacEwan Lake].
unnamed lake [Sanguez Lake] 61°15'N, 120°29'W		1994--9 lake cisco, --19 lake whitefish, --6 northern pike, --6 walleye; 1995--14 lake cisco 3.8 kg, --31 lake whitefish 61 kg, --48 northern pike 122 kg, --51 walleye 53 kg.	During fisheries studies in May-August 1994 and December 1996, DFO collected data on catch effort, growth and flesh mercury concentrations of fish from this lake which drains into "Ekali Lake" and from there via Jean-Marie Creek into the Mackenzie. Lake cisco, lake whitefish, northern pike and walleye were sampled. (G. Low, unpubl. data) (95H)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Kakisa Lake, continued.	northern pike--no quota.	<p>1975--walleye 20,200 kg; 1976--walleye 17,374 kg; 1977--walleye 19,745 kg; 1978--walleye 1,555 kg; 1979--walleye 19,808 kg; 1980--walleye 18,727 kg; 1981--walleye 18,144 kg; 1982--walleye 17,501 kg; 1983--walleye 21,874 kg; 1984--walleye 19,278 kg; 1985--walleye 20,443 kg; 1986--walleye 19,040 kg; 1987--walleye 17,194 kg; 1987--walleye 18,958 kg; 1988--walleye 19,844 kg; 1989--walleye 19,056 kg; 1990--walleye 4,452 kg; 1991--walleye 20,396 kg; 1992--walleye 18,503 kg; 1994--walleye 19,610 kg; 1995--walleye 19,800 kg; 1996--walleye 21,005 kg; 1997--walleye 20,749 kg; 1998-- walleye 16,655 kg; 1999--walleye 11,746 kg.</p> <p><u>By-catches:</u></p> <p>1960--northern pike 5,100 kg; 1961--northern pike 2,353 kg; 1967--lake whitefish 864 kg, --northern pike 1,031 kg; 1968--lake whitefish 3,941 kg, --northern pike 478 kg; 1972--northern pike 64 kg; 1975--northern pike 105 kg; 1976--northern pike 5,100 kg; 1995--northern pike 540 kg; 1996--northern pike 3,341 kg; 1997--northern pike 6,811 kg; 1998--northern pike 10,705 kg; 1999--northern pike 8,528 kg.</p>	<p>the Tathlina River (see below) provide important spring spawning habitat for northern pike, trout perch, walleye and white sucker--some suckers also spawn near the north shore of the lake. Lake cisco and lake whitefish spawn near the south and east shores of the lake in the fall (September). There may be several discrete spawning stocks of walleye in Kakisa Lake. These stocks are apparently discrete from those in Tathlina and Beaver Lakes as there does not appear to be any interchange of tagged fish with Tathlina Lake upstream (see below) and upstream movement of fish from Beaver Lake is prevented by Lady Evelyn Falls (see below Kakisa River). Flesh of the lake whitefish was heavily infested with the parasite <i>Triaenophorus crassus</i>. The University of Alberta also studied northern pike in Kakisa Lake in 1974. Data were collected on fish growth, diet, and movements. (Fuller and Lamoureux 1973; Lamoureux 1973; Christianson 1974--in DFO lake files; Falk and Dahlke 1975; Clarke et al. 1989; Mackay 1989)</p> <p>Commercial fishermen began harvesting walleye from Kakisa Lake in 1946, and the harvest has continued annually since 1966. The walleye harvest quota has varied considerably over the years and this is reflected in the annual commercial harvest. In the 1950's through 1961 it was 91,000 kg rd wt; in 1962-66 it was 89,000 kg rd wt to be taken over a 6 year period; in 1967 through 1979 it was 18,700 kg rd wt; and since then it has stayed at 20,000 kg rd wt. Fishermen from the Northwest Territories and Alberta have participated in the fishery but, since 1977, under the Northwest Territories Fisheries Acts and Regulations, licences to harvest fish from Kakisa Lake for commercial sale are only issued to people who have resided continuously in the community of Kakisa for at least six months preceding the licence application [Section 13(2)]. Like Great Slave Lake, the lake's commercial harvest quota is open between 1 November and 31 October. This change from the normal dates of 1 April to 31 March is at the request of the fishermen to ensure that there will be quota available for the winter fishery. The fishery harvests post spawning walleye from the upper Kakisa River (see below), mostly in June near the mouth of the Kakisa River where it flows into Kakisa Lake (60°52'N, 117°37'W). Due to the timing and location of this fishery, catch effort data from the fishery cannot be considered a reliable measure of the relative abundance of the walleye population. The magnitude of the commercial harvest has varied widely, from 5,095 kg in 1955 to 72,365 kg in 1966 (excluding the 1978 harvest see Footnote 2), likely due to fluctuations in fishing effort and quota system. The annual commercial harvest in the 1980's averaged 0.85 kg/ha, which is in the upper range for northern Canadian walleye fisheries.</p> <p>DFO experimental fisheries sampled lake cisco, lake whitefish, longnose and white sucker, northern pike, and walleye from the lake in 1946, 1968, and 1978 for data on catch effort, growth, reproduction and parasitism. In 1977-78, DFO Fish Inspection sampled northern pike and walleye from the Kakisa Lake commercial fishery for their heavy metal concentrations. DFO has collected biological samples from the Kakisa Lake fishery annually since 1977 (excluding 1978). Over the period from 1977 to 1993, the average size and age of fish taken increased steadily. Fish sampled from the 1994 commercial catch, however, were smaller than usual, likely because they were taken from a late fishery that missed the post-spawning run. This sample included smaller immature fish and was not typical of the fishery. The fishery has harvested significant by-catches of northern pike or lake whitefish which were marketed, and thus recorded, only in certain years. A commercial fishery has</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Kakisa Lake, continued.			<p>not developed for the whitefish because their flesh is heavily infested with cysts of the parasite <i>Triaenophorus crassus</i> (293 cysts per 45.5 kg) (Kennedy 1962; Johnson 1976; Moshenko 1980; Roberge et al. 1986; Wong 1986; Clarke et al. 1989; Yaremchuk et al. 1989; DFO 1991, 1992a+b, 1993, 1995, 1996, 1997, 1998, unpubl. data)</p> <p>There is a subsistence fishery on Kakisa Lake, but its extent and effects are unknown. Families from Kakisa harvested an estimated 4,545 kg of whitefish and walleye for subsistence from Kakisa and Tathlina lakes in the summer and fall of 1972. (Bissett 1972; Clarke et al. 1989)</p> <p>In 1989, DFO recommended that the commercial harvest be monitored annually, the subsistence harvest be monitored for 3 consecutive years, and that the commercial harvest quota be reviewed and adjusted as necessary in five years. In 1996, DFO recommended an increase in the quota to 22,000 kg but the Ka'a'gee Tu First Nation declined the quota increase and it remains at 20,000 kg. DFO fishery managers are currently re-assessing the Kakisa Lake walleye stock(s) in response to concerns raised by commercial fishermen who observed declines in the catch of fish per unit of fishing effort (CPUE) during the 1998 and 1999 fishing seasons. (Clarke et al. 1989; DFO unpubl. data) (85C)</p>
Kakisa River 61°04'N, 117°09'W		<p>Harvest of Arctic grayling from the Kakisa River by anglers interviewed by DFO creel censuses and catch rate (fish per angler hour):</p> <p>1974--181 grayling kept, 0.5 fish Cangler⁻¹Ch⁻¹;</p> <p>1975--159 grayling kept, 0.4 fish Cangler⁻¹Ch⁻¹;</p> <p>1976--601 grayling kept, 0.3 fish Cangler⁻¹Ch⁻¹;</p> <p>1977--365 grayling kept, 0.4 fish Cangler⁻¹Ch⁻¹;</p> <p>1978--639 grayling kept, 0.4 fish Cangler⁻¹Ch⁻¹;</p> <p>1979--808 grayling kept, 0.3 fish Cangler⁻¹Ch⁻¹;</p> <p>1980--679 grayling kept, 1.0 fish Cangler⁻¹Ch⁻¹;</p> <p>1983--655 grayling kept, 0.8 fish Cangler⁻¹Ch⁻¹;</p> <p>1984--603 grayling kept, 0.7 fish Cangler⁻¹Ch⁻¹.</p>	<p>This tributary of the Mackenzie River is accessible by road where it is crossed by the Mackenzie Highway (No. 1), about 9 km upstream from the mouth, and further upstream from the road to Kakisa Lake (see above). Lady Evelyn Falls, which is 12.2 m high and 4 km upstream from the Mackenzie Highway bridge, is a barrier to the upstream movement of fish from Beaver Lake (see FORT PROVIDENCE--Mackenzie River--Beaver Lake/Brabant Island area) into Kakisa Lake. Fish species reported from the Kakisa River system are listed in Appendix 1. Kakisa Lake and Tathlina Lake (see below) on the river produce 74% of the walleye harvested annually by commercial fisheries in the Northwest Territories. Movement of fish between these lakes may be discouraged by a particularly violent rapids about 4 km upstream from Kakisa Lake. Popular picnic and camping sites are located at the highway crossing and the falls. Angling occurs throughout the ice-free period, mostly downstream from the highway bridge and below Lady Evelyn Falls. It is most successful in the spring, after break-up, when Arctic grayling, northern pike, and walleye are undertaking spawning migrations. (Falk and Dahlke 1975; Roberge et al. 1988; Clarke et al. 1989)</p> <p>DFO conducted partial creel censuses and biological sampling of the sport fishery at the Kakisa River in the spring of 1971-80 and 1983-84, and a questionnaire survey in 1979. Anglers caught in order of frequency Arctic grayling, northern pike, longnose sucker, walleye, and whitefish. In 1984, DFO constructed a fish weir across the river to count the spring spawning run of Arctic grayling. The start of the upstream run was missed, but 5,589 grayling passed downstream after spawning. A total of 504 grayling were tagged to follow their movements. Longnose sucker (n = 66,437), northern pike (651), walleye (169), lake whitefish (135), round whitefish (16), mountain whitefish (26) and burbot (12) also passed through the weir between 28 April and 1 June 1984. Data on growth and reproduction were collected from all of these species. The Kakisa River was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. (Falk et al. 1980; Dahlke 1983; Moshenko and Low 1983; Bourque 1984; Fernet 1986; Low and Read 1987; Read and Roberge 1989; DFO unpubl. data)</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Kakisa River, continued			<p>Downstream from Lady Evelyn Falls, the river's clear water and gravel bottom provide spawning habitat for Arctic grayling, northern pike and walleye. Grayling spawn in the Kakisa River in early to mid-May and most are spent by the end of the third week in May. After spawning, most grayling migrate downstream out of the river and spend the rest of the year in Beaver Lake. Northern pike also spawn in the river in early May. Walleye spawn in the river in late May and early June. After spawning the adult walleye move downstream into Beaver Lake where they disperse along the lake shore, congregating near river mouths. Longnose sucker also run into the river in late May and early June to spawn upstream of the Mackenzie Highway bridge. Lake whitefish run into the Kakisa River from Beaver Lake in the fall to spawn in the lower reaches of the river, and return downstream to Beaver Lake before freeze-up. (Bishop 1967; Hatfield et al. 1972; Dryden et al. 1973; Lamoureux 1973; McCart et al. 1974; Falk and Dahlke 1975)</p> <p>Kakisa River where it drains Tathlina Lake (see below) into Kakisa Lake (see above) is sometimes referred to as "Tathlina River". White sucker from Kakisa Lake are believed to spawn in large numbers in this reach of the river immediately following ice break-up. There is also a large spring feeding migration of walleye from the lake into the river soon after the sucker migration. These walleye feed almost exclusively on ripe trout perch, which run into the river to spawn in very large numbers in spring. Walleye also spawn in the river before the suckers. This is the major spawning site for Kakisa Lake walleye. The spring commercial walleye fishery depends largely on catching post-spawners as they migrate back into the lake from the "Tathlina River". Northern pike spawn in two small weedy streams that enter the "Tathlina River" near its mouth. A strong set of rapids about 4 km upstream from Kakisa lake appears to prevent the upstream movement of fish from Kakisa Lake into Tathlina Lake. Spring spawning runs do occur in the Kakisa River upstream from Tathlina Lake. (Lamoureux 1973)</p> <p>Residents of Kakisa and Fort Providence harvest lake whitefish near the mouth of the Kakisa River where it enters Beaver Lake during the fall spawning run each year. In the past they harvested about 9,000 kg of lake whitefish annually, mainly for a winter supply of dog food. Fish are also harvested for subsistence at a widening of the Kakisa River (60°31'N, 118°32'W) upstream from Tathlina Lake, and at two unnamed lakes nearby (60°31'N, 118°37'W; 60°28'N, 118°40'W). This area has been proposed as a reserve by the International Biological Programme. (Lamoureux 1973; NLUIS 85D+85F)</p> <p>Sport fishing catch and possession limits for Arctic grayling were reduced from 10 and 10 to 5 and 10 in 1974, with a minimum fork length of 356 mm. In 1979 this was further reduced to 3 and 5 with the same minimum fork length. The Arctic grayling is recovering from a natural fish kill that occurred in the upper Mackenzie River, Beaver Lake, Providence Rapids area in August 1989. The kill was attributed to unusually high water temperatures which weakened the fish and enabled the opportunistic pathogens <i>Aeromonas hydrophilia</i> and <i>Pseudomonas putrificiens</i> to infect and kill them. The grayling stock which spawns in the Kakisa River and summers in Beaver Lake was severely depleted. In 1991, catch and possession limits for Arctic grayling in the Mackenzie River Management Zone were reduced to 0 daily and 0 in possession from 1 April to 31 May (catch and release only) and 1 daily and 1 in possession from June 1 to March 31 to allow recovery of the stocks. (DFO unpubl. data) (85F)</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Mackenzie River (116°W to 118°W)-- Beaver Lake/Brabant Island area			See FORT PROVIDENCE--Mackenzie River (116°W to 118°W)--Beaver Lake/Brabant Island area.
Redknife River			See FORT PROVIDENCE--Redknife River.
Tathlina Lake 60°33'N, 117°32'W	walleye 20,000	1954--walleye 4,244 kg; 1958--walleye 6,334 kg; 1959--walleye 6,488 kg; 1960--walleye 47,746 kg; 1961--walleye 26,194 kg; 1962--walleye 55,181 kg; 1963--walleye 30,488 kg; 1964--walleye 10,693 kg; 1965--walleye 13,106 kg; 1966--walleye 9,979 kg; 1967--walleye 10,338 kg; 1968--walleye 6,639 kg; 1969--walleye 10,962 kg; 1970--walleye 17,988 kg; 1971--walleye 18,327 kg; 1972--walleye 30,209 kg; 1973--walleye 28,845 kg; 1974--walleye 8,339 kg; 1975--walleye 9,426 kg; 1976--walleye 14,487 kg; 1977--walleye 2,452 kg; 1978--walleye 144 kg; ⁴ 1979--walleye 2,486 kg; 1980--walleye 5,233 kg; 1981--walleye 45,674 kg; 1982--walleye 30,643 kg; 1983--walleye 19,616 kg; 1984--walleye 7,609 kg; 1985--walleye 4,220 kg; 1986--walleye 3,641 kg; 1987-88--NA; 1989--walleye 2,067 kg; 1990--walleye 6,060 kg; 1991--NF; 1992--walleye 1,708 kg; 1993--walleye 9,792 kg; 1994--walleye 20,968 kg; 1995--walleye 19,462 kg; 1996--walleye 19,283 kg ; 1997--walleye 22,948 kg;	<p>Tathlina Lake on the Kakisa River (see above), a tributary of the Mackenzie River, is one of the most important commercial walleye fisheries in the Northwest Territories. The walleye stock is apparently resident in Tathlina Lake, since fish tagged there have not been recovered downstream in Kakisa Lake (see above). Movement of fish between the lakes may be discouraged by a particularly violent rapids about 4 km upstream from Kakisa Lake. Spring spawning runs do occur in the Kakisa River upstream from Tathlina Lake. While the walleye are assumed to be distributed throughout the lake in summer, they appear to concentrate in and near the mouth of the upper Kakisa River in winter. (Clarke et al. 1989)</p> <p>DFO first surveyed Tathlina Lake in 1946, and determined that the lake might support a commercial fishery for walleye. Because the stock was recovering from a major winterkill event in 1942-43, the fishery was postponed. Commercial fishermen began harvesting walleye from the lake in 1954, and have harvested them annually since 1958. The season in which the harvest takes place varies from year to year, but it typically occurs through the ice in the spring or late fall and winter. The magnitude of these harvests has varied from 1,708 kg in 1992 to 55,181 kg in 1962 (excluding the 1978 harvest see Footnote 2). These wide fluctuations likely reflect changes in fishing effort, quotas and walleye abundance. In the 1950's through 1966 the annual commercial harvest quota for walleye was 91,000 kg rd wt; in 1967 through 1988 it was 30,900 kg rd wt; and since then it has been 20,000 kg rd wt. Walleye abundance is affected by winterkill, since the lake has a relatively large surface area (57,000 ha) but is very shallow (mean depth 1.5 m; maximum depth 3.0 m). The intensity of the winterkill depends upon mean winter temperature, water level, and the snowfall which can inhibit oxygen production by limiting light penetration. There is no information on winter limnological conditions in the lake. The commercial yield (kg Cha⁻¹) of walleye has ranged from 0.04 to 1.00 (excluding 1978). This is within the range of yields reported from other commercial fisheries, but consistent yields of over 0.50 Kg Cha⁻¹ may result in overexploitation of the stock. Small by-catches of northern pike and lake whitefish are reported sporadically by the fishery. A commercial fishery has not developed for the whitefish because their flesh is heavily infested with cysts of the parasite <i>Triaenophorus crassus</i> (2,010 cysts per 45.5 kg) (Kennedy 1962; Clarke et al. 1989; Roberge et al. 1988; Yaremchuk et al. 1989; DFO 1991, 1992a+b, 1993, 1994, 1995, 1996, 1997, 1998)</p> <p>DFO has collected biological data on fish growth from the commercial harvest in most years since 1975. Multi-mesh experimental gillnet fisheries were conducted at the lake in 1974 and 1979. Data were recorded on catch effort and fish growth, reproduction, and diet. Burbot, lake trout, lake whitefish, longnose and white sucker, northern pike, and walleye were sampled. Walleye (n=271) captured near where the Kakisa River enters Tathlina Lake were tagged with Floy spaghetti tags to follow their movements. Tagged fish (n=20) were recovered from the lake and upper Kakisa River in 1979-82. Five tagged fish were</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Tathlina Lake, continued	northern pike-- no quota.	1998--walleye 18,928 kg; 1999--walleye 8,602 kg. <u>By-catch:</u> 1960--northern pike 898 kg; 1961--northern pike 1,270 kg; 1964--northern pike 818 kg; 1966--northern pike 469 kg; 1973--lake whitefish 179 kg; 1985--northern pike 431 kg, --lake whitefish 207 kg; 1997--northern pike 631 kg; 1998--northern pike 1,363 kg; 1999--northern pike 2,256 kg.	recaptured in June and July 1979, near the mouth of the Cameron River, 48 km from the tagging site. Changes in the size and age of the walleye stock since 1975 are difficult to interpret given the periodic winterkill, variations in the timing and location of fishing, and variable fishing effort. In 1988, while the pre-recruit fraction of the population appeared to be protected by the minimum mesh size of 108 mm (stretched measure) used by the fishery, DFO recommended that the annual commercial harvest not exceed 20,000 kg as this would exceed a yield of 0.50 kg Cha ⁻¹ and could damage the stock. (Roberge et al. 1988) The annual commercial quota on walleye was lowered from 91,000 kg to 30,900 kg effective the 1967 season and then to 20,000 kg effective the 1989 season. By DFO policy, people who have resided continuously in the settlement of Kakisa for at least six months preceding the licence application have a priority to commercial licences to fish Tathlina Lake. In 1989, DFO recommended that there be annual monitoring of the commercial catch, an investigation of winter limnological conditions, a program to determine the extent of the domestic fishery, and research to improve the understanding of the effects of fishing and climatic variation on the walleye population. DFO fishery managers are currently re-assessing the Tathlina Lake walleye stock(s) in response to concerns raised by commercial fishermen, who observed declines in the catch of fish per unit of fishing effort (CPUE) during the 1998 and 1999 fishing seasons. (Clarke et al. 1989; DFO unpubl. data) Families from Kakisa harvested an estimated 4,545 kg of whitefish and walleye for subsistence from Kakisa and Tathlina lakes in the summer and fall of 1972. Most subsistence harvesting at Tathlina Lake takes place in the winter. In 1996, DFO estimated the basic needs level for the subsistence fishery at 1,000 kg of lake whitefish and other species--walleye are avoided by this fishery. (Bissett 1972; NLUIS 85C; DFO unpubl. data) (85C)
"Tathlina River"			See above Kakisa River.
unnamed lake 60°10'N, 117°55'W	lake trout + whitefish 1,800	1982--NF.	This lake in the Cameron Hills was opened for commercial harvest in 1982, but no harvest was reported. It is located near areas visited by Kakisa residents, but is more likely to be visited by trappers from the settlements of Indian Cabins or Meander River in Alberta (Yaremchuk et al. 1982; NLUIS 85C) (85C)
unnamed lake 60°10'N, 118°10'W	lake trout + whitefish 1,100		This lake in the Cameron Hills has a commercial harvest quota but no record of fishing. It is located near areas visited by Kakisa residents, but is more likely to be visited by trappers from the settlements of Indian Cabins or Meander River in Alberta (NLUIS 85D) (85D)
unnamed river [Little River] 60°51'N, 117°25'W			See above Kakisa River. (85C)
unnamed river [Muskeg River] 60°53'N, 117°23'W			This tributary of Kakisa Lake provides important spring (May and early June) spawning habitat for northern pike, walleye and white sucker. In 1977-78, DFO Fish Inspection sampled walleye from the Muskeg River for their heavy metal concentrations. (Lamoureux 1973; Wong 1986) (85C)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
NAHANNI BUTTE			Residents of Nahanni Butte fish for subsistence in June through August at the Liard River in the vicinity of the settlement and about 16 km south near the Netla River, and year-round at the northwest and southeast ends of Trout Lake (see TROUT LAKE--Trout Lake). They harvested an estimated 2,455 kg of fish in 1962 for subsistence. (Higgins 1969; Bissett 1972)
Grainger River 61°08'N, 123°04'W			<p>Baseline fisheries studies of this Liard River tributary were conducted in 1971-72 for the Mackenzie Valley pipeline, in 1976-77 for Nahanni National Park Reserve, and in 1980-81 for the winter road to Cadillac Exploration Limited's Prairie Creek Project, a proposed lead-zinc-copper-silver mining and milling operation (see NAHANNI NATIONAL PARK RESERVE--Prairie Creek). Data were collected on stream hydrology, water chemistry and benthos and on fish growth, reproduction, and diet. Species reported from the creek include burbot, lake trout, round whitefish, slimy sculpin, and white sucker. Grainger River is a spawning and nursery areas for Arctic grayling and a nursery area for longnose sucker and northern pike which may also spawn in the system. The river may provide overwintering habitat for fish. (Hatfield et al. 1972; Stein et al. 1973; McCart et al. 1974; Wickstrom 1977; Ker, Priestman and Associates Ltd. 1980; Beak Consultants Ltd. 1981; NLUIS 95G) [NOTE: Arctic charr and Dolly Varden have been reported from the Grainger River. Recent taxonomic studies suggest that these fish are in fact bull trout (<i>Salvelinus confluentus</i>) (see Haas and McPhail 1991; Reist et. al. in review)]</p> <p>In 1977, DFO Fish Inspection sampled northern pike and walleye from the Grainger River for their heavy metal concentrations. (Wong 1986) (95G)</p>
Matou River 61°18'N, 122°26'W			A baseline fisheries study of this Liard River tributary was conducted in 1971-72 for the Mackenzie Valley pipeline. The water level in this river is low after spring runoff. In May-early July, back-up of the Liard River produces a deep area near the mouth that contains adults and/or fry of nine fish species. The Matou River is an important nursery area for longnose sucker. (Hatfield et al. 1972; Stein et al. 1973; McCart et al. 1974; NLUIS 95G) (95G)
Netla River 60°56'N, 123°18'W			The Liard Highway crosses this tributary of the Liard River at several locations (mile 78.1, 82.3, 82.6, 85.9). Baseline fisheries studies were conducted in 1974 by Synergy West Ltd. and in September 1976 and May-August 1977 by DFO, to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Arctic grayling, emerald shiner, lake chub, lake whitefish, longnose dace, longnose and white sucker, northern pike, slimy sculpin, spottail shiner, trout perch, and walleye were sampled. The river provides spawning and nursery habitat for Arctic grayling and longnose sucker, and possibly for northern pike and walleye. These species are harvested from the river for subsistence during their spring migrations (mid-May to early July) by residents of Nahanni Butte. (Synergy West Ltd. 1975; McKinnon and Hnytka 1979; NLUIS 95B) (95B)
Nizone Creek 61°45'N, 122°47'W			Suckers and walleye are reported to move from Sibbeston Lake into this tributary stream in the spring and whitefish in the fall. (NLUIS 95G) (95G)
Rabbit Creek [Rabbit River]			See FORT LIARD--Rabbit Creek [Rabbit River].
Trout Lake			See TROUT LAKE--Trout Lake.

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek [Liard Hwy mi. 96.8] 60°43'N, 123°21'W			See FORT LIARD-- unnamed creek [Liard Hwy mi. 96.8] 60°43'N, 123°21'W.
unnamed creek [Liard Hwy mi. 99.9] 60°43'N, 123°24'W			See FORT LIARD-- unnamed creek [Liard Hwy mi. 99.9] 60°43'N, 123°24'W.
unnamed creek [Liard Hwy mi. 124.3] 60°22'30"N, 123°20'W			See FORT LIARD-- unnamed creek [Liard Hwy mi. 124.3] 60°22'30"N, 123°20'W.
unnamed creek [Liard Hwy mi. 121.1] 60°24'40"N, 123°21'W			See FORT LIARD-- unnamed creek [Liard Hwy mi. 121.1] 60°24'40"N, 123°21'W.
unnamed creek [Liard Hwy mi.115.7] 60°29'N, 123°27'W			See FORT LIARD-- unnamed creek [Liard Hwy mi. 115.7] 60°29'N, 123°27'W.
unnamed creek [Liard Hwy mi.63.7] 61°06'N, 122°51'W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry. No fish were caught but the creek appears to provide suitable fish habitat. (McKinnon and Hnytka 1979) (95G)
unnamed creek [Liard Hwy mi. 63.0] 61°06'50"N, 122°50'W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The creek provides spawning and nursery habitat for Arctic grayling. (McKinnon and Hnytka 1979) (95G)
unnamed creek [Liard Hwy mi. 59.3] 61°09'N, 122°46'W			DFO studied this small stream in 1977-81 to assess the effects of the Liard Highway culverts on fish passage. Data were collected on stream hydraulics and water chemistry and on fish growth, reproduction, diet and movements. Fish were collected at weirs, using gillnets, beach seines, dip nets, fry traps, and electro-shockers. The creek provides spawning, nursery and feeding habitat for Arctic grayling, longnose sucker, and cyprinids. Northern pike and white sucker also inhabit the creek. The highway culverts were installed during the spring and summer of 1979. The installation procedure was poorly planned and large quantities of silt eroded into the stream, adversely affecting water quality until the fall and depositing silt on the stream bed. The completed culvert installations, however, did not obstruct fish passage. Tagging studies indicate that there is some interchange of Arctic
unnamed creek [Liard Hwy mi. 59.3], continued.			grayling between this and other neighbouring creeks (e.g. unnamed creek [Liard Hwy mi. 51.9] 61°13'N, 122°37'W) (McKinnon and Hnytka 1979, 1985; Hnytka and McKinnon 1981) (95G)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek [Liard Hwy mi. 51.9] 61°13'N, 122°37'W			DFO studied this small stream in 1977-81 to assess the effects of the Liard Highway culverts on fish passage. Data were collected on stream hydraulics and water chemistry and on fish growth, reproduction, diet and movements. Fish were collected at weirs, using gillnets, beach seines, dip nets, fry traps, and electro-shockers. The creek provides spawning, nursery and feeding habitat for Arctic grayling, longnose sucker, and northern pike. Northern redbelly dace, slimy sculpin and white sucker also inhabit the creek. The highway culverts were installed during the spring and summer of 1979. The installation procedure was poorly planned and large quantities of silt eroded into the stream, adversely affecting water quality until the fall and depositing silt on the stream bed. The completed culvert installations, however, did not obstruct fish passage. Tagging studies indicate that there is some interchange of Arctic grayling between this and other neighbouring creeks (e.g. unnamed creeks [Liard Hwy mi. 48.9] 61°14'30"N, 122°32'30"W and [Liard Hwy mi. 59.3] 61°09'N, 122°46'W) (McKinnon and Hnytka 1979, 1985; Hnytka and McKinnon 1981) (95G)
unnamed creek [Liard Hwy mi. 50.7] 61°13'30"N, 122°35'W			DFO studied this small stream in 1977-81 to assess the effects of the Liard Highway culverts on fish passage. Data were collected on stream hydraulics and water chemistry and on fish growth, reproduction, diet and movements. Fish were collected at weirs, using gillnets, beach seines, dip nets, fry traps, and electro-shockers. The creek provides important spawning, nursery, and feeding habitat for Arctic grayling and longnose sucker. Brook stickleback, lake chub, northern redbelly dace, slimy sculpin, white sucker also inhabit the creek. Fish passage was not obstructed by the highway culverts which were installed before the spring freshet in 1979. (McKinnon and Hnytka 1979, 1985; Hnytka and McKinnon 1981) (95G)
unnamed creek [Liard Hwy mi. 48.9] 61°14'30"N, 122°32'30"W			DFO studied this small stream in 1977-81 to assess the effects of the Liard Highway culverts on fish passage (mile 48.9 and mile 49.9). Data were collected on stream hydraulics and water chemistry and on fish growth, reproduction, diet and movements. Fish were collected at weirs, using gillnets, beach seines, dip nets, fry traps, and electro-shockers. Some Arctic grayling, brook stickleback, finescale dace, and longnose sucker spawn in the creek which provides feeding habitat for juvenile grayling and sucker. Lake chub and slimy sculpin also inhabit the creek. Fish passage was not obstructed by the highway culverts which were installed before the spring freshet in 1979. Tagging studies indicate that there is some interchange of Arctic grayling between this and other neighbouring creeks (e.g. unnamed creek [Liard Hwy mi. 51.9] 61°13'N, 122°37'W) (McKinnon and Hnytka 1979, 1985; Hnytka and McKinnon 1981) (95G)
unnamed creek [Liard Hwy mi. 43.8] 61°16'N, 122°24'W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The lower reaches of this creek provide spawning and nursery habitat for Arctic grayling, longnose sucker, and cyprinids. Brook stickleback and finescale dace also live in the creek. (McKinnon and Hnytka 1979) (95G)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek [Liard Hwy mi. 45.9] 61°16'N, 122°29'W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The lower reaches of this creek provide spawning and nursery habitat for Arctic grayling, longnose sucker, and cyprinids. (McKinnon and Hnytka 1979) (95G)
unnamed creek [Liard Hwy mi. 29.8] 61°16'30"N, 122°01'30"W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The lower reaches of this creek provide spawning and nursery habitat for Arctic grayling. (McKinnon and Hnytka 1979) (95G)
unnamed creek [Liard Hwy mi. 39.6] 61°18'N, 122°17'W			The Liard Highway crosses this small tributary of the Liard River at a number of locations (including also mile 39.9, 40.9, 41.5). In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The lower reaches of this creek provide spawning and nursery habitat for lake chub, longnose sucker, and cyprinids. (McKinnon and Hnytka 1979) (95G)
unnamed creek [Liard Hwy mi. 42.8] 61°18'N, 122°23'W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. The stream supports brook stickleback. (McKinnon and Hnytka 1979) (95G)
unnamed creek [Liard Hwy mi. 38.5] 61°19'30"N, 122°14'W			The Liard Highway crosses this small tributary of the Liard River. In July 1977, prior to highway construction, DFO studied the creek to assess fish habitat protection requirements related to highway development. Data were collected on stream hydrology and water chemistry and on fish growth, reproduction and diet. Brook stickleback, adult and young longnose sucker and cyprinid fry were collected from the lower reaches of this creek which provide spawning and nursery habitat for forage fish. (McKinnon and Hnytka 1979) (95G)
Yohin Lake 61°12'N, 123°47'W			This small lake in Nahanni National Park Reserve has been fished for subsistence and sport by residents of Nahanni Butte. Northern pike are caught in winter by jigging at holes cut in the lake ice. (NLUIS 95G) (95G)
NAHANNI NATIONAL PARK RESERVE			
Bennett Creek 61°23'N, 126°43'W			Arctic grayling and northern pike migrate along this small tributary of the Flat River (see TUNGSTEN--Flat River) in the spring. The spawning grounds have yet to be located. (NLUIS 95E) (95E)
"Bicknell Creek"			See below--unnamed creek [Bicknell Creek].
Caribou River 61°27'N, 125°47'W			This tributary of the Flat River (see below) contains Arctic grayling. (NLUIS 95E) (95D)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Clearwater Creek 61°35'N, 125°34'W			The lower reaches of this South Nahanni River tributary provide spawning and nursery habitat for Arctic grayling which migrate into the creek from the river in May and June. (NLUIS 95F) (95F)
Flat River			See TUNGSTEN--Flat River.
Flood Creek 61°51'40"N, 126°23' 10" W			Parks Canada conducted a limnological survey of this tributary of the South Nahanni River in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Slimy sculpin were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979; NLUIS 95E) (95E)
Glacier Lake 62°05'N, 127°33'W			Parks Canada conducted a limnological survey of this headwater lake on "Bicknell Creek" (see below unnamed creek [Bicknell Creek]), a tributary of the South Nahanni, in 1978 for Nahanni National Park Reserve. Glacier Lake is upstream of the park but is important to the understanding of the zoogeography of fishes in the park. The lake and surrounding area has been proposed as an ecological reserve by the International Biological Programme. Data were collected on the hydrology, water chemistry, phytoplankton, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling and lake trout were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979; NLUIS 95L) In 1984, DFO indicated that this 175 ha lake was too small to sustain the development of a fishing lodge, and suggested that it would be better to use the lake for outfitting. (B. Wong, pers. comm.) (95L)
Hell Roaring Creek 61°52'20", 126°37'30"W			Parks Canada conducted a limnological survey of this tributary of the South Nahanni River in 1978. Data were collected on the hydrology, water chemistry, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling, lake trout and slimy sculpin were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979) (95E)
Hole-in-the-Wall Lake 61°47'N, 127°15'W			Parks Canada conducted a limnological survey of this lake on Hole-in-the-Wall Creek, a tributary of the South Nahanni River in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, phytoplankton, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling, lake trout and longnose sucker were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979; NLUIS 95E) (95E)
Island Lake 62°20'30"N, 128°11'40"W			This small lake drains via a short stream into the South Nahanni River, upstream of the Park. Visitors to the Ram Head Outfitters camp nearby (62°20'N, 128°10'W) may occasionally fish for sport at the lake. (M. Longlade, pers. comm.) (105I)
McLeod Creek 61°23'N, 126°38'W			Arctic grayling, longnose sucker, and walleye spawn in this small tributary of the Flat River (see Tungsten--Flat River) in the spring. See below McLeod Lake. (NLUIS 95E) (95E)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
McLeod Lake 61°23'W, 126°30'W			Parks Canada conducted a limnological survey of this lake on McLeod Creek (see above), in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, phytoplankton, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Burbot and lake whitefish were sampled for data on growth, maturity, diet, and parasites. (Foote 1979; Wickstrom 1979; NLUIS 95E) (95E)
Pass Creek 61°38'N, 127°23'W			Arctic grayling spawn in this small tributary of the Flat River (see TUNGSTEN--Flat River) in the spring. After spawning the adults return to the Flat River and the creek serves as a nursery area for the young. <i>Salvelinus</i> sp. and mountain whitefish may spawn in Pass Creek in the fall. [NOTE: Recent taxonomic studies suggest that Dolly Varden reported from the Flat River are in fact bull trout (<i>Salvelinus confluentus</i>) (see Haas and McPhail 1991; Reist et al. in review)] (NLUIS 95E) (95E)
Prairie Creek 61°15'N, 124°27'W			Baseline aquatic studies of this tributary of the South Nahanni River (see below) were conducted in 1976-77 for Nahanni National Park Reserve and in 1980-81 for Cadillac Exploration Limited's Prairie Creek Project, a proposed lead-zinc-copper-silver mining and milling operation located about 43.5 km (27 mi) upstream from its confluence with the South Nahanni (i.e. at 61°33'N, 124°48'W). Data were collected on stream hydrology, water chemistry and benthos and on fish growth, reproduction, diet, and tissue metals content. Species reported from Prairie Creek include Arctic grayling, bull trout, burbot, lake trout, mountain and round whitefish, slimy sculpin, and white sucker. Recent taxonomic studies have found that fish reported from the creek as Dolly Varden are in fact bull trout (<i>Salvelinus confluentus</i>). Prairie Creek is a migration route and nursery and spawning area for Arctic grayling and probably bull trout and longnose sucker. Its lower reaches may provide overwintering habitat for fish. (Wickstrom 1977; Ker, Priestman and Associates Ltd. 1980; Beak Consultants Ltd. 1981; Haas and McPhail 1991; Reist et al. in review; NLUIS 95E) (95F)
Rabbitkettle Lake 61°57'N, 127°13'W			Parks Canada conducted a limnological survey of this headwater lake on the South Nahanni River system (see below) in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, phytoplankton, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling, burbot, lake chub, longnose dace, and white sucker were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979; NLUIS 95E) (95E)
Seaplane Lake 61°25'N, 126°48'W			This isolated lake near the Flat River (see TUNGSTEN--Flat River) just upstream of Nahanni National Park Reserve supports northern pike, lake whitefish, and slimy sculpin. (Foote 1979; NLUIS 95E) (95E)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
South Nahanni River 61°03'N, 123°21'W			This tributary of the Liard River originates upstream of Nahanni National Park Reserve and flows the length of the park. Virginia Falls (61°36'N, 125°44'W) with its vertical drop of about 90 m is a natural barrier to fish movements in the river. Parks Canada conducted a limnological survey of the South Nahanni River above the falls in 1978. Data were collected on the hydrology, water chemistry, phytoplankton, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling, lake chub, lake trout, longnose sucker, slimy sculpin and white sucker were sampled for data on growth, maturity, diet, and parasites. Arctic grayling, inconnu, longnose sucker, mountain whitefish, northern pike, and <i>Salvelinus</i> sp. occur in the river above and below the falls, but those upstream of the falls are genetically isolated from those below. Recent taxonomic studies suggest that Dolly Varden reported from the South Nahanni River are in fact bull trout (<i>Salvelinus confluentus</i>). The adults of these species summer and winter in the river but spawn in small tributaries in the spring or fall. See above Clearwater Creek, Hell Roaring Creek, Hole-in-the-Wall Lake, McLeod Lake, Rabbitkettle Lake and see TUNGSTEN--Flat River. (Wickstrom 1979; Haas and McPhail 1991; Reist et al. in review; NLUIS 95E) (95E)
unnamed creek [near Dome Peak] 61°35'N, 127°10'W			Arctic grayling spawn in the spring in this creek which enters the Flat River (see TUNGSTEN-Flat River) just upstream of Nahanni National Park Reserve. After spawning the adults return to the Flat River and the creek serves as a nursery area for the young. <i>Salvelinus</i> sp. and mountain whitefish may spawn in the creek in the fall. Recent taxonomic studies suggest that Dolly Varden reported from the area are in fact bull trout (<i>Salvelinus confluentus</i>). (NLUIS 95E) (95E)
unnamed lake [OXL141553] 61°40'30"N, 125°53'10"W			Parks Canada conducted a limnological survey of this small tributary of the South Nahanni River (see above) in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling, lake trout, and longnose sucker were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979) (95E)
unnamed lake [CRL147722] 61°46'30"N, 127°21'30"W			Parks Canada conducted a limnological survey of this small tributary of the South Nahanni River (see above) in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Lake trout were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979) (95E)
unnamed lake 61°48'N, 126°37'W			In 1985, DFO recommended against sport fishing lodge development on this small lake. (B. Wong, pers. comm.) (95E)
unnamed creek [LNC152652] 61°52'25"N, 126°51'30"W			Parks Canada conducted a limnological survey of this small tributary of the South Nahanni River (see above) in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling and slimy sculpin were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979) (95E)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek [Bicknell Creek] 62°03'N, 127°22'W			Lake trout, longnose sucker, and mountain whitefish have been observed at the mouth of this small tributary of the South Nahanni River (see above). Arctic grayling from Glacier Lake (see above) may spawn in "Bicknell Creek". (NLUIS 95L) (95L)
Yohin Lake			See NAHANNI BUTTE--Yohin Lake.
TROUT LAKE			Aboriginal residents of Trout Lake/Nahanni Butte harvested an estimated 35,864 kg of fish for subsistence in 1961-62, and 10,455 kg in 1966. (Sinclair et al. 1967; Higgins 1969) Guests of Trout Lake Lodge and Trout Lake Transient Centre harvest fish for sport from Trout Lake. (See Table 2) (M. Longlade, pers. comm.)
Cormack Lake 60°56'N, 121°40'W			Baseline fisheries studies were conducted at this lake on the Poplar River (see FORT SIMPSON--Poplar River) in 1971-72 for the Mackenzie Valley pipeline and in 1977-78 for the Liard Highway. Data were collected on fish growth, reproduction, and diet. The lake supports arctic grayling, burbot, longnose and white sucker, and northern pike. Residents of Trout Lake harvest fish for subsistence from Cormack Lake. (Hatfield et al. 1972; Stein et al. 1973; McCart et al. 1974; Jones 1979; McKinnon and Hnytka 1979; NLUIS 95A) (95A)
Goose Lake			See FORT SIMPSON--Goose Lake.
Island River 60°26'N, 121°14'W			A baseline fisheries study of this tributary of Trout Lake (see below) was conducted by DFO in 1972 for the Mackenzie Valley pipeline. Spawning runs of burbot, longnose sucker, walleye, northern pike (spring), and lake whitefish (fall) from Trout Lake are reported in the Island River. Longnose sucker spawn in the Island River in late May. Trappers from Trout Lake harvest fish for subsistence from Tetcho and Trainor lakes (see below) on the Island River system. (Dryden et al. 1973; Stein et al. 1973; NLUIS 95A) (95A)
Poplar River			See FORT SIMPSON--Poplar River.
Tetcho Lake 60°25'N, 120°45'W	lake trout + whitefish 1,000	1986--NA.	This headwater lake on the Island River system, a tributary of Trout Lake, was opened for commercial harvest in 1986. No harvest was reported. Trappers from Trout Lake harvest fish for subsistence from Tetcho Lake. (Yaremchuk et al. 1989; NLUIS 95A) (95I)
Trainor Lake 60°25'N, 120°18'W	lake trout + whitefish 1,900		This headwater lake on the Island River system, a tributary of Trout Lake, has a commercial harvest quota but no record of commercial harvest. It supports burbot, lake cisco, lake trout, lake whitefish, northern pike and walleye. Trappers from Trout Lake harvest fish for subsistence from Trainor Lake. (McCart et al. 1974; NLUIS 95A) (95A)
Trout Lake 60°35'N, 121°19'W	lake trout [1,000], lake whitefish [1,000], and walleye [500] northern pike--no quota	1981--lake trout 130 kg, --lake whitefish 8 kg, --northern pike 4 kg; --walleye 6 kg; 1984-86--NA;	A baseline fisheries study for the Mackenzie Valley pipeline sampled this lake on the Trout River (see below) in 1971-72. Northern pike spawn in the shallows of Trout Lake and spawning runs of burbot, longnose sucker, walleye, northern pike (spring), and lake whitefish (fall) from Trout Lake are reported in the Island River (see above) and in an unnamed river system that enters the northwest corner of Trout Lake (see below unnamed river 60°47'N, 121°16'W). The lake is a major nursery area for walleye. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; McCart et al. 1974)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Trout Lake, continued.		1987--lake trout 671 kg, --lake whitefish 8 kg, --walleye 115 kg; --northern pike and sucker 333 kg; 1989--lake trout 52 kg, walleye 34 kg; 1990--lake trout 52 kg, walleye 34 kg; 1991--lake trout 48 kg, lake whitefish 80 kg; 1992--lake trout 100 kg, lake whitefish 50 kg; 1993--lake trout 100 kg, lake whitefish 50 kg; 1998--lake trout 50 kg, lake whitefish 50 kg, walleye 50 kg.	<p>Experimental fisheries conducted at Trout Lake in the 1980's and 90's harvested lake trout, lake whitefish, northern pike, and walleye. In 1987, DFO sampled these species and burbot for growth data, and estimated the annual sport and subsistence harvest of lake trout and whitefish at 2,500 kg. Based on this estimate and on growth and catch effort data for lake trout sampled from the 1987 experimental fishery, DFO recommended an annual commercial harvest level of 2,500 kg for lake trout, lake whitefish, and walleye combined. Sample sizes to date have been too small to assess whether the existing fisheries are affecting the fish populations. DFO also tagged 200 walleye at Trout Lake/Moose River (see below unnamed river [Moose River]) in early June 1990. (McGowan 1989; Yaremchuk et al. 1989; McGowan et al. 1993; DFO 1993, 1994, 1995, 1998, unpubl. data)</p> <p>Residents of the community of Trout Lake harvest fish for subsistence year-round from Trout Lake. The main fishing activities occur near the community, at the northwest tip of the lake and across in a northwesterly direction from the lake from the community. (Dryden et al. 1973; NLUIS 95A)</p> <p>Trout Lake Dene Lodge, located on the shore of Trout Lake (60°28'N, 121°12'W), about 8 km northeast of the community has operated since at least 1972. It has 14 guest beds and operates from mid-June through mid-September. Guests angle for Arctic grayling, northern pike, lake trout, and walleye. The lodge is operated by Sambaa K'e Development Corporation and affiliated with the transient centre in Trout Lake which operates year round (6 guest beds) (D. Dowler, pers. comm.) (A.C. Day, pers. comm.)</p> <p>In 1977, DFO measured mercury levels in the flesh of lake trout, northern pike and walleye from Trout Lake. (Wong 1986) (95A)</p>
Trout River 61°19'N, 119°51'W			<p>Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1971-72 for the Mackenzie Valley pipeline and in 1981 for the Interprovincial Pipeline. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. Whittaker and Coral falls about 26 km upstream from the river mouth obstruct upstream fish passage from the Mackenzie River to Trout Lake (see above). Arctic grayling, lake chub, longnose sucker, northern pike and walleye spawn in the Trout River below the falls in late May or early June. This reach of the river is an important nursery area for Arctic grayling, longnose sucker and northern pike. The reach of Trout River between the falls and Trout Lake is a spawning area for longnose sucker and northern pike, and a nursery area for Arctic grayling. It is not known whether these fish are resident in the river or migrate from Trout Lake. The presence of well-oxygenated free water in March suggests that the river may harbour overwintering fish. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; McCart and McCart 1982; Fernet 1986)</p> <p>Hunters and trappers from the community of Trout Lake harvest fish for subsistence from three small unnamed lakes on the Trout River system immediately north of Trout Lake. There is a recreational fishery for Arctic grayling below the falls, mainly during the spawning run. Because the river is distant from the communities, fishing pressure is believed to be low. The stock does not appear to have been affected by the 1989 die-off of Arctic grayling in the Mackenzie River, but has not been fully assessed. (NLUIS 95A +95H; DFO unpubl. data) (95H)</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed river [Moose River] 60°47'N, 121°16'W			This small tributary of Trout Lake is an important spawning site for walleye; lake whitefish from Trout Lake migrate into the "Moose River" beginning in mid-September. Hunters and trappers from Trout Lake harvest fish for subsistence from two unnamed lakes on this river system (60°49.5'N, 121°42'W; 60°52'N, 121°28'W). The "Moose River" is a very popular destination for fly-in sport anglers from Fort Nelson, Fort Simpson and Hay River during the spring spawning run of walleye. DFO tagged 200 walleye at Trout Lake/Moose River in early June 1990. (DFO unpubl. data) (NLUIS 95A)
TUNGSTEN			
Cache Lake 64°25'50"N, 128°43'05"W			This lake on the Flat River system (see below) was sampled in 1975-77 during studies of the effects of the Canada Tungsten Mining Corporation Limited operation on the Flat River system. Arctic grayling, burbot, lake and round whitefish, and <i>Salvelinus</i> sp. were sampled for data on growth, reproduction, and diet. Recent taxonomic studies suggest that Dolly Varden reported from this area are in fact bull trout (<i>Salvelinus confluentus</i>). (Sigma Resource Consultants 1976; Sigma and Jemmett 1978; Haas and McPhail 1991; Reist et al. in review) (106A)
Divide Lake 62°02'N, 128°20'W			This headwater lake on the Flat River system supports lake and round whitefish. (Guinn 1982) (105I)
Flat Lakes [Trilobite Lakes] 62°05'15"N, 128°26'W			This headwater lake on the Little Nahanni River (see below) supports lake trout which are harvested by anglers from Tungsten. Data were collected on trout growth, reproduction, and diet as part of a study to assess the potential environmental effects of a road from the Cantung Highway to Howard's Pass. Arctic grayling and burbot are also present in the lake. (Envirocon Ltd. 1976) (105I)
Flat River 61°32'N, 125°22'W			<p>The Flat River is a tributary of the South Nahanni River and flows through Nahanni National Park Reserve (see NAHANNI NATIONAL PARK RESERVE--South Nahanni River). Arctic grayling, lake chub, mountain whitefish, and <i>Salvelinus</i> sp. overwinter in the river and use it as a nursery area. These fish spawn in smaller tributary streams, but may also spawn in the Flat River. Recent taxonomic studies suggest that Dolly Varden reported from the area are in fact bull trout (<i>Salvelinus confluentus</i>). See NAHANNI NATIONAL PARK RESERVE -- Bennett Creek, McLeod Creek, Pass Creek, and unnamed creek [near Dome Peak]. (Haas and McPhail 1991; Reist et al. in review; NLUIS 95E)</p> <p>Canada Tungsten Mining Corporation Limited began operating a mine/mill complex in the Flat River Valley near the head of the Flat River in 1962. For the first six or seven years the tailings were discharged from the mill directly into the river. Subsequently two ponds to contain tailings solids were built adjacent to the river. However, a later dike failure led to additional input of tailings to the river. In 1972, a tailings pond was constructed downstream from the mine site and since that time (i.e. up to 1983) it has been used for tailings containment. A culverted causeway was constructed across the Flat River in 1968 to provide access to and from the east side. The effects of the operations of the Canada Tungsten Mining Corporation Limited on the waters, sediments and biota of the Flat River were studied in July 1973 and May-September and December 1975. The preliminary</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Flat River, continued.			<p>studies in 1973 found a reduction in the diversity and abundance of benthic organisms in the river downstream of the tailings pond effluent stream. The effluent was acutely toxic to fish in laboratory bioassays and copper was the suspected toxic agent. In 1975, Arctic grayling, lake trout, mountain whitefish, <i>Salvelinus</i> sp. and slimy and spoonhead sculpin were sampled for data on growth and tissue (flesh and liver) heavy metal concentrations. Arctic grayling spawn in the upper Flat River--between Cache and Mud lakes, in the mainstem opposite the airstrip, and in the creek from the hot springs from mid-May to early June. Fish movement was apparently hindered by the presence of a causeway and weir in the river. Elevated concentrations of heavy metals were measured in sediments up to 20 km downstream of the operation but the concentrations of metals in fish flesh were within the recommended limits for human consumption. Effluent discharged from the tailings area into an unlined excavation was shown to be acutely toxic to fish under laboratory bioassay conditions. Recommendations included the cessation of use of the gravel pit for disposal of acutely lethal wastes, improvement of the system for waste treatment and disposal, modification of the causeway and weir to permit fish passage, and other measures to control the release and determine the effects of heavy metal contaminants. Studies of sediment heavy metal concentrations in June 1982 found elevated levels of copper up to 53 km downstream of the mine site, but showed a reduction in copper concentration over the period 1979-82. (see above Cache Lake and below Mirror Lake) (Sergy 1973; Sigma Resource Consultants 1976; Sigma and Jemmett 1977, 1978; Moore et al. 1978; MacDonald 1983)</p> <p>Parks Canada conducted a limnological survey of the Flat River in 1978 for Nahanni National Park Reserve. Data were collected on the hydrology, water chemistry, aquatic macrophytes, zooplankton, zoobenthos and fish. Fish were collected using gangs of multi-mesh gillnets, seines, or a Smith-Root type electrofisher. Arctic grayling, burbot, <i>Salvelinus</i> sp. and slimy sculpin were sampled for data on growth, maturity, diet, and parasites. (Wickstrom 1979) (95E)</p>
Little Nahanni River 62°29'N, 128°37'W			<p>This tributary of the South Nahanni River (see NAHANNI NATIONAL PARK RESERVE--South Nahanni River) originates at Flat Lakes (see above), north of Tungsten, NWT. In June 1975, data were collected on the streams and lakes in the system to assess the potential effects of constructing a road from the Cantung Highway to Howards Pass. Arctic grayling and lake trout were sampled for data on growth, reproduction, and diet. (Envirocon Ltd. 1976) (105I)</p>
Mirror Lake [Glacier Lake] 62°01'N, 128°17'W			<p>This lake on the Flat River system (see above) was sampled in 1977 during studies of the effects of the Canada Tungsten Mining corporation Limited operation on the Flat River system. Arctic grayling, lake trout and round whitefish were sampled for data on growth, reproduction, and diet. (Sigma and Jemmett 1978) (105I)</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
WRIGLEY			<p>In 1988, Lutra Associates Ltd. surveyed Aboriginal residents of Wrigley for information on their subsistence harvests. They did not estimate the annual harvest. Aboriginal residents of Fort Wrigley did harvest an estimated 28,727 kg of fish for subsistence in 1961-62. Fish are an important dietary item for community residents and most Aboriginal households are involved in the subsistence fishery. Most fish are harvested using gillnets but some are taken by angling. Community residents commonly fish the Mackenzie River from its confluence with the Wrigley River south to its confluence with the Willowlake River and at Paeenfee, Dahakavcho, Fish, and Greasy lakes on the River Between Two Mountains (see below). These lakes are rich in lake trout and lake whitefish. In summer and fall (June to October), some residents establish seasonal fishing camps at the confluence of the Mackenzie River with the River Between Two Mountains, the Willowlake River, and the Wrigley River (see below). In the early 1970's families from Wrigley also fished for subsistence in summer and/or fall at Cli and Sibbeston lakes and near the mouths of the Martin and Trail rivers, and year-round in the Mackenzie River between its' confluences with the Trail and North Nahanni rivers (see FORT SIMPSON). In winter, many Wrigley households establish trapping camps and fish under the ice in lakes adjacent to their camps or traplines. Blackwater, Greasy, Highland (see below) and Bulmer lakes (see FORT SIMPSON--Bulmer Lake) are fished extensively in winter. There is little fishing activity in spring (April and May). Wrigley residents eat the flesh of all species harvested and sometimes the liver and/or eggs. Fish are also fed to dogs and used to bait traps. Lake whitefish, lake trout, inconnu, and northern pike are the main species harvested. Lake whitefish are valued as a multi-purpose fish and the source of most dried fish made in the community. Lake whitefish, northern pike and sucker are fed to the dogs. Inconnu and Arctic grayling are caught during the summer and fall fishery. Inconnu are eaten fresh, frozen for storage, or given away; grayling are eaten fresh and fed to dogs. Walleye and burbot are also harvested. Wrigley residents interviewed in 1988 did not identify any changes in their fishing activities or harvests over the period from 1980-88. Some residents expressed concern over the quality of fish harvested. (Sinclair et al. 1967; Bissett 1972; Lilley 1975; Lutra Associates Ltd. 1989; NLUIS 95O) [Note: Lutra Associates Ltd. (1989) reported heavy use of broad whitefish in the Wrigley area. This is likely in error as broad whitefish are uncommon relative to lake whitefish which are heavily used.] (95O)</p>
Blackwater Lake 64°00'N, 123°05'W	lake trout + whitefish 12,500 walleye [2,000]	1974--NF; 1977--NF; 1982--NF 1990-92--NF; 1994--NF;	<p>This lake on the Blackwater River (see below) was sampled in the summer of 1971 during baseline aquatic studies for the Mackenzie Valley pipeline. It supports Arctic grayling, lake trout, lake whitefish, longnose sucker, and walleye. Residents of Déline (Fort Franklin) have reported an upstream movement of whitefish from Blackwater Lake into the Blackwater River in June, and a downstream movement to Blackwater Lake in September. (Hatfield et al. 1972; NLUIS 96B)</p> <p>Blackwater Lake was opened for the commercial harvest of lake trout and lake whitefish in 1974, 1977, and 1982; and for an experimental harvest of walleye in 1982. The commercial quota was opened by Variation Notice for 2,300 kg of lake trout and lake whitefish in 1990, 1991, and 1993. There is no record of commercial or experimental harvest. (Yaremchuk et al. 1989; DFO 1992b, 1993, 1994, 1996; unpubl. data).</p>

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Blackwater Lake, continued.			Residents of Wrigley and Déline harvest fish for subsistence from Blackwater Lake in support of fall trapping activities. In 1987, DFO estimated the guest bed capacity for a medium quality lake trout sport fishery at 12 beds, provided there is a voluntary possession limit of 2 trout per angler at the lodge. No lodge has been developed but the lake is visited on occasion by fly-in sport anglers. (Lutra Associates Ltd. 1989; NLUIS 95O + 96B; M. Roberge, pers. comm.) (95O)
Blackwater River 63°57'N, 124°10'W			Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1971-73 for the Mackenzie Valley pipeline and Mackenzie Highway (mile 492.0), and in 1981 for the Interprovincial Pipeline. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. Arctic grayling and slimy sculpin spawn in the Blackwater River which is also an important rearing area for both species. Round whitefish are also found in the river; lake chub, longnose sucker, juvenile Arctic grayling and spottail shiner feed at the river mouth in summer. The Blackwater River may provide overwintering habitat for fish as it contained oxygenated water in March 1981. A small tributary stream (63°59'N, 124°05'W) of the Blackwater River provides spawning and rearing habitat for Arctic grayling and slimy sculpin. It has open water in winter and likely provides overwintering habitat for both fish species. (Hatfield et al. 1972; Dryden et al. 1973; Shotton 1973; Stein et al. 1973; McCart 1974; McCart et al. 1974; Slaney and Co. Ltd. 1974; McCart and McCart 1982; Fernet 1986; NLUIS 95N + 95O) (95N)
Cli Lake			See FORT SIMPSON--Cli Lake.
Dahakaycho Lake [Big Rock Lake] 63°06'40"N, 122°59'W			Residents of Wrigley harvest fish for subsistence from this lake on the River Between Two Mountains (see below). (Lutra Associates Ltd. 1989) (95O)
Fish Lake 63°11'N, 122°35'W	lake trout + lake whitefish [2,000]	1978-79--NF; 1982--NF; 1985-86--NF.	Lake whitefish, longnose sucker, northern pike, and walleye from this lake on the River Between Two Mountains (see below) were sampled in 1974, during fisheries studies for the Mackenzie Highway. Experimental fisheries were planned for this lake in late 1970's and 1980's. There is no report of harvest. Families from Wrigley harvest Arctic grayling, lake trout, northern pike, whitefish and yellow walleye for subsistence at Fish Lake from June through August, and lake trout and whitefish from the lake in winter. The fish are cured at a permanent fishing camp near the east end of the lake. (Bissett 1972; Hatfield et al. 1972; Dryden et al. 1973; Lilley 1975; Lutra Associates Ltd. 1989; Yaremchuk et al. 1989; NLUIS 95O) (95O)
Greasy Lake 62°57'N, 122°15'W	lake trout + lake whitefish [2,268]	1979--NF.	Lake whitefish, lake trout and longnose sucker from this lake on the River Between Two Mountains (see below) were sampled in 1974, during fisheries studies for the Mackenzie Highway. An experimental fishery was planned in 1979, but there is no report of harvest. Fish are harvested for subsistence from Greasy Lake. (Lilley 1975; Lutra Associates Ltd. 1989; Yaremchuk et al. 1989; NLUIS 95J) (95O)
Highland Lake 62°49'N, 122°21'W			Lake whitefish, lake trout and northern pike from this lake on the River Between Two Mountains (see below) were sampled in 1974, during fisheries studies for the Mackenzie Highway. Fish are harvested for subsistence from Highland Lake. (Lilley 1975; Lutra Associates Ltd. 1989; NLUIS 95J) (95J)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Hodgson Creek 63°13'50"N, 123°29'15"W			Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1971-74 for the Mackenzie Valley pipeline and Mackenzie Highway, and in 1981 for the Interprovincial Pipeline. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. During the winter of 1984/85 a small (30.5 cm) diameter underground pipeline was built across Hodgson Creek as part of an ambient temperature oil pipeline from Norman Wells, NWT to Zama, Alberta. DFO studied the effects of construction and operation of this pipeline on fish and fish habitat in Hodgson Creek from 1983 to 1987. There was no detectable effect of pipeline construction or operation on stream discharge, velocity, temperature, dissolved oxygen, or water chemistry. Winter bridge construction and pipeline trenching increased the instantaneous total suspended sediment levels but these were attenuated quickly over both time and distance to pre-construction values. The headwaters of Hodgson Creek provide winter habitat for Arctic grayling, slimy sculpin and small numbers of lake chub, longnose sucker, burbot, and northern pike. The growth, reproduction and diet of Arctic grayling was studied. The creek is a spawning and nursery area for grayling, lake chub, longnose sucker, round whitefish, and slimy sculpin. Winter pipeline construction across the lower portion of this overwintering habitat did not appear to affect the fish which reside there during winter. Residents of Wrigley harvest fish for subsistence from Hodgson Creek. (Dryden et al. 1973; Shotton 1973; Jessop and Lilley 1975; McCart 1974; McCart et al. 1974; Slaney and Co. Ltd. 1974; McCart and McCart 1982; Fernet 1986; Young 1986; McKinnon and Hnytko 1988; NLUIS 95O) (95O)
Johnson River 63°42'55"N, 123°54'30"W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1971-72 for the Mackenzie Valley pipeline. Upper reaches of the Johnson River are a nursery and probable spawning area for longnose sucker. Lake chub, lake whitefish, northern pike, and trout-perch are also present in the river. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; NLUIS 95N) (95O)
North Nahanni River			See FORT SIMPSON--North Nahanni River.
Ochre River 63°28'N, 123°41'50"W			Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1971-74 for the Mackenzie Valley pipeline and Mackenzie Highway, and in 1981 for the Interprovincial Pipeline. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. Species reported from the Ochre River are listed in Appendix 1. The river appears to be a spawning and nursery area for northern pike near the the mouth, and for longnose sucker, lake chub, and possibly Arctic grayling further upstream. Movement of fall spawners may be limited by shallow water and reduced flow at the river mouth. Arctic grayling, longnose sucker, and sculpin overwinter in the river. (Hatfield et al. 1972; Dryden et al. 1973; Shotton 1973; Stein et al. 1973; Jessop et al. 1974; McCart et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975; McCart and McCart 1982; Fernet 1986; NLUIS 95O) (95O)
Paeenfee Lake [Wooden Spear Lake] 63°13'N, 122°57'W			Residents of Wrigley harvest fish for subsistence from this lake on the River Between Two Mountains (see below). (Lutra Associates Ltd. 1989) (95O)
Peekaya Lake [Fence Lake] 62°49'N, 122°57'W			Spawning northern pike and ninespine stickleback have been caught at this small headwater lake on the Willowlake River system (see below). (NLUIS 95J) (95J)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
Ram River			See FORT SIMPSON--Ram River.
River Between Two Mountains 62°56'N, 123°13'W			Baseline fisheries studies of this tributary of the Mackenzie River were conducted in 1971-74 for the Mackenzie Valley pipeline and in 1973-74 for the Mackenzie Highway. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. Species reported from the River Between Two Mountains are listed in Appendix 1. Arctic grayling, longnose dace, longnose sucker, round whitefish, and slimy sculpin spawn in the river which is a nursery area for these species and mountain whitefish. The river provides overwintering habitat for fish. Burbot, slimy sculpin and spottail shiner were captured there on 27 February 1974. Grayling and sucker may migrate along the river between the Mackenzie River and Fish Lake (see above). Northern pike and suckers are harvested at the river mouth for subsistence and Arctic grayling for sport. Lakes on the system are important subsistence fisheries for residents of Wrigley (see above Dahakaycho, Fish, Greasy, Highland, and Peekaya lakes). (Bissett 1972; Hatfield et al. 1972; Dryden et al. 1973; Shotton 1973; Stein et al. 1973; Jessop et al. 1974; McCart 1974; McCart et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975; Lilley 1975; Fernet 1986; Lutra Associates Ltd. 1989) (95J)
Root River 62°26'N, 123°18'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1971-72 for the Mackenzie Valley pipeline. Lower sections of the Root River provide spawning and nursery habitat for lake chub and longnose sucker. Guests of North Nahanni River Boat Tours, an outfitter based in Fort Simpson that offers summer boat tours on the Root River, may fish for Arctic grayling, northern pike, and walleye. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; NLUIS 95J; M. Longlade, pers. comm.) (95J)
Sibbeston Lake			See FORT SIMPSON--Sibbeston Lake.
Smith Creek 63°10'05"N, 123°20'10"W			Baseline studies of this small tributary of the Mackenzie River were conducted in 1972-73 for the Mackenzie Valley pipeline and Mackenzie Highway. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. DFO collected more detailed data on water quality, hydrology, benthic invertebrates, and fish in August-October 1975, and February 1976, as part of a study to investigate the effects of culvert construction on streams crossed by the Mackenzie Highway. Species reported from Smith Creek are listed in Appendix 1. Arctic grayling, burbot, lake chub, longnose dace, longnose sucker, northern pike, slimy sculpin, and a whitefish were sampled for data on growth, reproduction and diet. The creek provides summer nursery and feeding habitat for slimy sculpin. Arctic grayling are present year-round in the creek which is spring fed. (Shotton 1973; McCart 1974; McCart et al. 1974; Slaney and Co. Ltd. 1974; McKinnon et al. 1978; Fernet 1986; NLUIS 95O) (95O)
unnamed creek 62°40'N, 123°05'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Highway (mile 392). Hydrology and water chemistry measurements were taken. Reaches of the creek in the vicinity of the highway crossing provide rearing habitat for Arctic grayling fry. (Slaney and Co. Ltd. 1974) (95J)
unnamed creek 62°42'N, 122°46'W			This small tributary of the Willowlake River (see below) is a spawning and rearing area for Arctic grayling. It also supports slimy sculpin. (NLUIS 95J) (95J)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
unnamed creek 62°52'N, 123°09'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Highway (mile 406.4). Hydrology and water chemistry measurements were taken. Longnose sucker spawn in the creek which is a nursery area for sucker and Arctic grayling fry. Lake chub are also present in the creek. (Slaney and Co. Ltd. 1974) (95J)
unnamed creek 62°53'N, 123°10'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Highway (mile 407.5). Hydrology and water chemistry measurements were taken. The creek is a rearing and possible spawning area for Arctic grayling and longnose sucker. Slimy sculpin are also present in the creek. (Slaney and Co. Ltd. 1974) (95J)
unnamed creek 63°06'N, 123°16'W			Baseline fisheries data were collected from this small tributary of the Mackenzie River in 1973 prior to construction of the Mackenzie Highway (mile 422.7). DFO collected data on water quality, hydrology, benthic invertebrates, and fish from the creek in August-October 1975, and February 1976, as part of a study to investigate the effects of culvert construction on streams crossed by the Mackenzie Highway. Arctic grayling, lake chub, and slimy sculpin were sampled for data on growth, reproduction and diet. The creek provides summer nursery and feeding habitat for these fishes which likely emigrate in the fall to overwinter in the Mackenzie River. (Slaney and Co. Ltd. 1974; McKinnon et al. 1978) (95O)
unnamed creek 63°09'N, 123°18'W			Baseline fisheries data were collected from this small tributary of the Mackenzie River in 1973 prior to construction of the Mackenzie Highway (mile 426.5). DFO collected data on water quality, hydrology, benthic invertebrates, and fish from this small tributary of the Mackenzie River in August-October 1975, as part of a study to investigate the effects of culvert construction on streams crossed by the Mackenzie Highway. Lake chub and longnose sucker were sampled for data on growth, reproduction and diet. The creek provides summer nursery and feeding habitat for these fishes which likely emigrate in the fall to overwinter in the Mackenzie River. (Slaney and Co. Ltd. 1974; McKinnon et al. 1978) (95O)
unnamed creek 63°40'N, 123°49'W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Highway (mile 469.0). Hydrology and water chemistry measurements were taken. Spent Arctic grayling, lake chub, and slimy sculpin were captured, suggesting that they may spawn in the creek. Immature Arctic grayling, burbot, lake chub, lake whitefish, longnose dace, longnose sucker, slimy sculpin, and spottail shiner inhabit the creek from early June through until at least early October. (Slaney and Co. Ltd. 1974) (95O)
unnamed creek [Dam Creek] 63°45'30"N, 123°58'W			A baseline fisheries study of this small tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Highway (mile 479.4). Hydrology and water chemistry measurements were taken. Arctic grayling, burbot, lake chub, longnose sucker, and slimy sculpin inhabit the creek from early June through until at least early October. (Slaney and Co. Ltd. 1974) (95O)
unnamed creek 63°54'N, 124°03'W			A baseline fisheries study of this small tributary of the Mackenzie River was conducted in 1973 for the Mackenzie Highway (mile 486.3). Hydrology and water chemistry measurements were taken. Arctic grayling, lake chub, longnose sucker, and slimy sculpin inhabit the creek from early June through until at least early October. (Slaney and Co. Ltd. 1974) (95N)

Table 1. Continued.

LOCATION ¹	QUOTA (kg rd wt) ²	HARVEST (kg rd wt) ³	STOCK STATUS (references) ⁴
White Sand Creek 63°32'N, 123°44'15"W			Baseline fisheries studies of this small tributary of the Mackenzie River were conducted in 1973 for the Mackenzie Highway. Sculpins and juvenile Arctic grayling overwinter in spring fed reaches of White Sand Creek and feed at the creek mouth in summer. The creek's north fork provides spawning, rearing, and overwintering habitat for Arctic grayling and slimy sculpin; the south fork provides spawning and rearing habitat for Arctic grayling, lake chub, longnose sucker, and slimy sculpin. Round whitefish may spawn at creek mouth. White Sand Creek was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. (McCart 1974; Fernet 1986; NLUIS 95O) (95O)
Willowlake River 62°42'N, 123°08'W			Baseline fisheries studies of this Mackenzie River tributary were conducted in 1971-74 for the Mackenzie Valley pipeline and in 1973-74 for the Mackenzie Highway. It was also examined in 1986 during water crossing evaluations for the Norman Wells Pipeline. Species reported from the Willowlake River are listed in Appendix 1. Arctic grayling, longnose sucker, northern pike, round whitefish, and walleye spawn in the river and use it as a nursery area. Lake, round, and mountain whitefish and white sucker may also spawn in the river. Spring fed areas and deeper water in the lower reaches of the river provide overwintering habit for juvenile northern pike and Arctic grayling. Fish are harvested for subsistence at the river mouth year-round. Winter catches include northern pike, suckers and whitefish; Arctic grayling, burbot, northern pike, sucker, inconnu and walleye are caught in the spring and summer. Fish are harvested for subsistence by hunters and trappers from Fort Providence, Fort Simpson, and/or Wha Ti at Bulmer (see FORT SIMPSON), Hornell, and Willow lakes (see FORT PROVIDENCE) and from numerous unnamed headwater lakes of the Willowlake River system, on the Horn Plateau (e.g. 62°02'N, 119°37'W; 62°06'N, 119°51'W; 62°15'N, 119°38'W; 62°17'N, 119°46'W; 62°06'N, 118°43'W; 62°05'N, 118°49'W). A small hot spring (62°43'N, 123°06'W) north of Willowlake River supports Arctic grayling and ninespine stickleback. (see above Peekaya Lake) (Hatfield et al. 1972; Dryden et al. 1973; Shotton 1973; Stein et al. 1973; Jessop et al. 1974; McCart et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975; Lilley 1975; Fernet 1986; Lutra Associates Ltd. 1989; NLUIS 85L + 95J) (95J)
Wrigley River 63°14'40"N, 123°34'55"W			A baseline fisheries study of this tributary of the Mackenzie River was conducted in 1971-72 for the Mackenzie Valley pipeline. Arctic grayling and longnose sucker may spawn in the Wrigley River in the spring. Lake chub and slimy sculpin are also present in the river. (Hatfield et al. 1972; Dryden et al. 1973; Stein et al. 1973; Lutra Associates Ltd. 1989; NLUIS 95N + 95O) (95O)

¹ Old or alternate names for the fisheries are shown in brackets.

² A round weight (kg rd wt) is that for a whole fish, while a dressed weight is that of a fish with the viscera and gills removed. Square brackets indicate provisional test quotas. The quota and harvest years are the same as the federal government fiscal year (e.g. the 1999 quota extends from 1 April 1999 to 31 March 2000). They are not the normal calendar years. There are two exceptions to this in the Deh Cho area. Prior to 1978 the quota year (fishing season) for Tathlina Lake extended from 1 November of the previous year to 31 October of the year listed (i.e. data presented for 1970 include harvests from 1 November 1969 to 31 October 1970) (Roberge et al. 1988). Beginning in 1978, the fishing season was changed to extend from 1 April of the year listed to 31 March of the following year as per most other fisheries. Because of this change the 1978 harvest data for Tathlina Lake are not comparable with other years. The second exception is the Kakisa Lake quota which, like Great Slave Lake, has been and continues to be open between 1 November and 31 October (Roberge et al. 1986). This is done at the request of the fishermen to ensure that there will be quota available for the winter fishery. "NA" indicates that a harvest may have taken place but that no data are available; "NF" indicates that a waterbody was opened for fishing by Variation Order but was not fished. "No quota", or a blank quota cell, indicates that DFO has not assigned a commercial quota to a waterbody, either as a whole or for a particular species. This does not necessarily mean that there are no commercial fishing opportunities in the waterbody or for that species.

Table 1. Continued.

³ Unless otherwise noted the harvests were taken by commercial fisheries. The "Aboriginal food fisheries" and "subsistence harvests" were undertaken by residents for their own use, "experimental harvests" (formerly known as exploratory or test fisheries) were taken for scientific purposes, and the "sport harvests" were taken by anglers.

⁴ References to "DFO unpubl. data" denote information from the "Lake Files" held by Resource Management Section of DFO Central and Arctic Region. References to "Table 4" are followed by the name of the pertinent researcher as listed in Table 4. Alphanumeric codes at the end of each waterbody discussion (e.g. 95B) indicate the number of the 1:250,000 scale National Topographical Series map whereon the waterbody coordinates are located.

Table 2. Sport fishing lodges and their outpost camps in the Deh Cho area (Figure 3)¹.

LODGE - OUTPOST	COORDINATES	OPERATING SEASON	GUEST BED CAPACITY	SPECIES SOUGHT	COMMENTS (references) ²
Aurora Sport Fishing and Tours		June-September		Arctic grayling lake trout northern pike walleye	Aurora Marketing Ltd. established a sport fishing-naturalist camp on the southwest shore of Willow Lake in the early 1970's (tent camp in 1972 at 62°12'N, 119°18'W) (D. Dowler, pers. comm.). The firm now offers mainly outfitting of naturalist/cultural boat tours along the Mackenzie River and from Fort Providence into Mills Lake and Deep Bay. The operation has been listed regularly since at least 1985. It does not have licenced guest beds on Willow Lake and was not listed in 1998 or 1999 but continues to outfit trips to Willow Lake.
Brabant Lodge	61°03'N, 116°36'W	mid-June to mid-September	36	Arctic grayling lake whitefish northern pike walleye	Located on Brabant Island at the outlet of Great Slave Lake into the Mackenzie River, this lodge offers fishing, touring, and ecoventures. It has operated continuously since 1966, and was listed in 1999. Lodge guests angle for Arctic grayling along the shores of Lobstick, Brabant, and other islands in the area and for northern pike at Beaver Lake. See Table 1 (FORT PROVIDENCE--Beaver Lake and Mackenzie River) and Table 3 for details of creel censuses and angler surveys at the lodge. (Gillman and Dahlke 1973; Falk and Gillman 1974, 1980)
Deegahni Lake Camp	60°17'N, 119°05'W	mid-May to late September	12	lake whitefish northern pike walleye	Deegahni Lake Camp operates a fly-in sport fishing lodge at Dogface (Trefiak) Lake. The camp has 12 guest beds and is located on an island in the lake. It has operated since the early 1970's and was listed in 1999. (NLUIS 85D; A.C. Day, pers. comm.)
Nahanni Mountain Lodge	61°58'N, 123°24'W	June to September	14	Arctic grayling lake trout walleye	This lodge on Little Doctor Lake offers fishing as an activity but is primarily a naturalist lodge. It has operated since at least 1988 and was listed in 1999.
North Nahanni Naturalist Lodge	61°57'N, 123°21'W	yearround	24	Arctic grayling lake trout walleye	This lodge, located on Cli Lake, was listed in 1998 and 1999. The lodge owners also operate Nahanni River Boat Tours which has offered sport fishing trips on the Mackenzie, Liard, North Nahanni, Root, Tetcela, and Ram rivers from its base at Fort Simpson and from the Ndulee ferry crossing on the road to Wrigley from June to September since 1995. Species sought by tour guests include: Arctic grayling, inconnu, lake whitefish, northern pike, and walleye.
Trout Lake Dene Lodge	60°28'N, 121°12'W	mid-June to mid-September	14	Arctic grayling lake trout northern pike walleye	This lodge on the shore of Trout Lake, about 8 km northeast of the community has operated since at least 1972 and was listed in 1999. It is operated by Sambaa K'e Development Corporation and affiliated with the transient centre in Trout Lake which operates year round (6 guest beds). (D. Dowler, pers. comm.) (A.C. Day, pers. comm.)

¹ The main sources of information for this table were the GNWT Economic Development and Tourism (M. Longlade, pers. comm.; S. Ranson, pers. comm.), the GNWT Explorers Guides 1988-99, and DFO (C. Craig, pers. comm.). Other sources of information are referenced with the lodge to which they refer. Lodges located in communities or on the shores of Great Slave Lake, and outfitters operating from communities or with moveable camps, are not listed. The outfitting operations are discussed in Table 1 with other information on the lakes that they frequent.

² Lodges "not listed" in a particular year were not advertised in the Explorers Guide in that year, and presumably were not in operation.

Table 3. A summary of harvest and creel census data from sport fishing lodges in the Deh Cho area, NWT.

SPECIES	ESTIMATED TOTAL HARVEST (# of fish killed) ¹	AVERAGE NUMBER OF FISH CAUGHT PER ANGLER HOUR	ESTIMATED TOTAL NUMBER OF ANGLER DAYS	COMMENTS (references) ²
BRABANT ISLAND LODGE				Established in 1966, this lodge is situated on Brabant Island at the outlet of Great Slave Lake into the Mackenzie River (Figure 2; see also Table 1: FORT PROVIDENCE--Beaver Lake and Mackenzie River). It operates from mid-June to mid-September, with a guest bed capacity of 36. Arctic grayling, lake whitefish, northern pike, and walleye are the main fish species sought. Lodge guests fish mainly around Brabant, Lobstick, and other nearby islands for Arctic grayling, and in Beaver Lake for northern pike. The use of barbless hooks and catch release are encouraged. In 1991-93 the lodge participated in DFO's angler diary program. Angler response rates to the surveys were estimated at 32% in 1991, 22% in 1992, and 12% in 1993. Data from this program are provided for Arctic grayling, northern pike, walleye, and other species. Harvests were not estimated in 1993 due to the low response rate. (Falk and Gillman 1980; DFO 1993, 1994, 1995).
Arctic grayling	1972--1092, 1973--648, 1978--1419, 1991--123, 1992--192, 1993--N/A.	1972--1.73, 1973--1.11, 1978--1.86, 1991--1.6, 1992--2.1, 1993--N/A.	1972--N/A, 1973--N/A, 1978--N/A, 1991--621, 1992--795, 1993--582.	DFO conducted a partial creel census and biological sampling program at Brabant Island Lodge in the summers of 1972, 1973, and 1978. Arctic grayling and northern pike are the main target species. Most angling for grayling takes place in the clearer, faster waters adjacent Brabant, Lobstick, Naylor and Matheson islands. Pike are abundant throughout the shallow inshore areas but are concentrated in portions of Beaver Lake. Growth and reproduction data from the grayling (n = 386) were compared with data collected in 1965-66 by Bishop (n = 666). Over that period the mean length, weight, and age of the fish decreased. Concern was expressed that the grayling were susceptible to overfishing so, in 1974, a minimum size limit of 356 mm (14") was imposed. A 1977 study by Renewable Resources Consulting Ltd. and a follow-up study conducted by DFO in June-July 1978, found that the mean length and age of grayling caught had stabilized, and that the trophy fishery was being maintained. DFO Fishery Officers have reported that the size of northern pike angled from Beaver Lake declined after the 1950's. Large pike (>1100 mm fork length) were present in the 1972-73 samples but absent from the 1977-78 samples. In 1980, to protect these trophy fisheries, DFO fishery managers recommended a reduction in the daily catch and total possession limits to 3 and 5 respectively for both Arctic grayling and northern pike, imposition of a maximum size limit on northern pike such that only one of the retained fish shall be over 895 mm fork length, and the use of barbless hooks. They also recommended that there be a follow-up study in 3 years and a tagging study to assess the movements and distribution of the grayling and pike. (Bishop 1967; Gillman and Dahlke 1973; Falk and Gillman 1974, 1980; Renewable Resources Consulting Ltd. 1978)
northern pike	1972--551, 1973--820, 1978--2126, 1991--1,183, 1992--1,586, 1993--N/A.	1972--2.87, 1973--1.70, 1978--2.86, 1991--4.9, 1992--4.9, 1993--N/A.		
walleye	1972--N/A, 1973--N/A, 1978--N/A, 1991--129, 1992--400, 1993--N/A.	1972--N/A, 1973--N/A, 1978--N/A, 1991--1.2, 1992--1.0, 1993--N/A.		
other species	1972--N/A, 1973--N/A, 1978--N/A, 1991--4, 1992--0, 1993--N/A.	1972--N/A, 1973--N/A, 1978--N/A, 1991--4.3, 1992--4.2, 1993--N/A.		Experimental angling in July 1965 caught grayling (n = 545) at a rate of 2.2 fish per rod hour. By comparison, sport anglers creel censused during the study caught 382 grayling at a rate of 0.9 fish per rod hour. (Bishop 1967)

¹ Estimates of the total number of fish killed include fish retained ("kept") as trophies, eaten for shore lunches, and that died after being released (estimated at 7% by Falk et al. 1974). These data are based only on the lodge guests. They do not consider lodge employees or other who may have been fishing in the vicinity of a lodge.

² Sources of information are referenced with the lodge to which they refer. Outfitters operating from communities or with moveable camps are not listed.

Table 4. Licences to take fish from the Deh Cho area for scientific purposes issued by the Department of Fisheries and Oceans (DFO), Central and Arctic Region, to DFO (1990-98) and non-DFO (1984-98) researchers. Note: DFO did not begin issuing licences to their own fisheries programs until 1990.

LICENCE HOLDER	AREA	PURPOSE	PERIOD
DFO RESEARCHERS			
A.C. Day DFO, Winnipeg, MB	Great Slave Lake and its tributaries	Biological sampling of inconnu and lake whitefish to obtain information necessary for the management of the sport, subsistence, and commercial fisheries of Great Slave Lake and its tributaries.	1994
M. Healy DFO, Yellowknife, NT	NWT west area	General sampling program permit for the collection of various species of fin fish from any waterbody in the area. (See below B. Hunt, G. Low and D. McKenna).	1996
B. Hunt DFO, Yellowknife, NT	South Central Arctic	General sampling program permit for the collection of various species of fin fish from any waterbody in the area. (See above M. Healy and below G. Low and D. McKenna).	1993, 1994
T. Johnston DFO, Winnipeg	Trout Lake	Study of walleye in Trout Lake (60°35'N, 121°10'W) as part of an examination of the interpopulation variation in egg size and fecundity with respect to female age and size for walleye populations over their entire North American range.	1998
G. Low DFO, Hay River, NT	Beaver Lake , Kakisa River, Redknife River	Monitoring the sport fishery for Arctic grayling to assess the effects of the 1989 fish kill.	1990
	Kakisa River, Providence Creek, Redknife River, Axe River, Bouvier River	Creel census and biological sampling to monitor the spring sport fishery and assess the effect of the 1989 die-off on Arctic grayling stocks.	1991
	Trout Lake, Moose River, Island River	Investigation of the stock status of the Trout Lake (60°35'N, 121°10'W) walleye population	1990
	Hay River and Great Slave Lake	Collection of harvest and biological data on lake trout, lake whitefish, and walleye from the commercial fishery.	1990
	South Central Arctic	Collection of samples for fish health diagnosis in response to requests from resource users (see also M. Healy and B. Hunt below, and D. McKenna above).	1990
	Hay River	Monitoring of the walleye sport fishery to assess stock status.	1990
	Mackenzie River drainage	General sampling program permit for the collection of fish from any waterbody in the Great Slave Lake/Mackenzie River watershed northward to the northern boundary of the Sahtu Settlement area. Waterbodies specifically included in this permit included "Ekali", "Sanguez", "Gargon", Kakisa, and Beaver lakes and the Kakisa and Redknife rivers.	1994 1995 1996

Table 4. Continued.

LICENCE HOLDER	AREA	PURPOSE	PERIOD
G. Low, continued.	NWT West area	Cooperative fishery management programs, including the collection of walleye egg samples for a comparative study from all or any of Mosquito Creek, Trout Lake, Dore Creek, or Little Buffalo River.	1998
D. McKenna DFO, Yellowknife, NWT	NWT West areas	General sampling program permit for the collection of various species of fin fish from any waterbody in the area. (See above M. Healy, B. Hunt and G. Low).	1996
NON-DFO RESEARCHERS			
M.R. Digel Golder Associates Ltd. Calgary, AB	Hay River	Environmental baseline sampling of aquatic biota in the vicinity of Hay River (and north of Great Slave Lake in the vicinity of Thor Lake 62°06'N, 112°37'W) in preparation for development of the Highwood Resources Thor Lake Beryllium Project.	1997 1998
R. Dillinger Memorial University St. John's, Newfoundland	Liard and Mackenzie rivers	Sampled Arctic cisco from the Liard River and lower Mackenzie River for genetic analyses of population variation. (Bickham et al. 1987).	1985
M.S. Evans Environment Canada Saskatoon, SK	Cli and Little Doctor lakes	Sampling of all components of the food web from plankton and benthos to forage and predatory fishes to investigate why predatory fish inhabiting Cli Lake (61°59'N, 123°18'W), and by inference other northern lakes, have high mercury concentrations. Sampling will also be conducted at Little Doctor Lake (61°53'N, 123°16'W)	1998
A. Fisk University of Windsor Windsor, ON	Mackenzie River	Collection of fin fish from the Fort Simpson and Norman Wells areas for contaminants research.	1993
M. Prevost Environment Canada Regina, SK	Mackenzie River	Biological monitoring of the Mackenzie River. Cisco, lake chub, flathead chub, and trout perch were captured from the Mackenzie River upstream of the Liard River (Martin Island) and at Wrigley (Rocky Island), and from the Liard River (Truesdell Island) for chemical analysis. Other stations downstream were also sampled. The fish were analysed for	1985 1986
S. Reed Rescan Environmental Services Ltd. Vancouver, BC	Prairie Creek	Baseline study of aquatic biota and limnology in the Prairie Creek (61°15'N, 124°27'W) area—including tributary creeks Harrison, Big Quartz, and Galena and adjacent waterbodies, that might be affected by mining activities of the San Andreas Resources Corporation's Prairie Creek Project.	1994
J.A. Scott Dept. of Natural Resources Lansing, Michigan	Providence Creek	Collected eggs from Arctic grayling for rearing at the Wolf Lake State Fish Hatchery. See below H. Westers	1987
G. Smith Hatfield Consultants Ltd. Vancouver, B.C.	Mackenzie River system	Captured fish from the Mackenzie River at Fort Simpson and the Jean-Marie River highway crossing, and from the Liard River at the ferry crossing, using a variety of methods. Collected growth data.	1985

Table 4. Continued.

LICENCE HOLDER	AREA	PURPOSE	PERIOD
D.M. Trudeau Dept. Indian and Northern Affairs Fort Simpson, NWT	Fort Liard area	No data.	1988
H. Westers Dept. of Natural Resources, Lansing, Michigan	Hay River area	Collection of Arctic grayling eggs and sperm for rearing and re-introduction of the species into Michigan waters. This project was licensed but not completed. See above J.A. Scott.	1988

Appendix 1. Fish species reported from selected river drainages in the Deh Cho area of the N.W.T., and from Great Slave Lake (Fig. 1). See below for footnotes and references.

	GREAT SLAVE LAKE AND TRIBUTARIES		MACKENZIE RIVER AND TRIBUTARIES DOWNSTREAM OF GREAT SLAVE LAKE													
	Great Slave Lake (A)	Hay River (1)	Mackenzie River mainstem (B)	Kakisa River (2)	Trout River (3)	Redknife River (4)	Rabbitskin River (5)	LIARD RIVER AND TRIBUTARIES		Martin River (8)	Trail River (9)	North Nahanni River (10)	Willowlake River (11)	River Between Two Mountains (12)	Smith Creek (13) ⁴	Ochre River (14)
								Liard River (6)	South Nahanni River (7)							
Arctic charr (<i>Salvelinus alpinus</i>) ²	-	-	-	-	-	-	-	-	-	P ²	-	-	-	-	-	-
Arctic cisco (<i>Coregonus autumnalis</i>)	-	-	P	-	-	-	-	P	-	-	-	-	-	-	P	-
Arctic grayling (<i>Thymallus arcticus</i>)	P ¹	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Arctic lamprey (<i>Lampetra japonica</i>)	P	P	P	-	-	-	P	-	-	P	-	-	-	-	-	-
broad whitefish (<i>Coregonus nasus</i>)	-	-	P	-	-	-	-	P	-	P	-	-	-	-	-	-
brook stickleback <i>Culea inconstans</i>	-	P	-	-	-	P	-	P	-	-	-	-	-	-	-	-
bull trout (<i>Salvelinus confluentus</i>)	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
burbot (<i>Lota lota</i>)	P	P	P	P	P	P	P	P	-	P	P	-	P	-	P	P
chinook salmon (<i>Onchorhynchus tshawytscha</i>)	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-	-
chum salmon (<i>Onchorhynchus keta</i>)	P	P	-	-	-	-	-	P	-	-	-	-	-	-	-	-
deepwater sculpin (<i>Myoxocephalus quadricornis thompsoni</i>)	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dolly Varden (<i>Salvelinus malma</i>)	-	-	-	-	-	-	-	-	P ⁶	-	-	P ⁵	-	-	-	-
emerald shiner (<i>Notropis atherinoides</i>)	P	-	P	-	-	-	P	P	-	P	p	P	P	-	-	-
finescale dace (<i>Chrosomus neogaeus</i>)	-	P	-	-	-	-	-	P	-	P	-	-	P	-	-	-

Appendix 1. Continued.

	GREAT SLAVE LAKE AND TRIBUTARIES		MACKENZIE RIVER AND TRIBUTARIES DOWNSTREAM OF GREAT SLAVE LAKE													
	Great Slave Lake (A)	Hay River (1)	Mackenzie River mainstem (B)	Kakisa River (2)	Trout River (3)	Redknife River (4)	Rabbitskin River (5)	LIARD RIVER AND TRIBUTARIES		Martin River (8)	Trail River (9)	North Nahanni River (10)	Willowlake River (11)	River Between Two Mountains (12)	Smith Creek (13) ⁴	Ochre River (14)
								Liard River (6)	South Nahanni River (7)							
round whitefish (<i>Prosopium cylindraceum</i>)	P	-	P	P	P	-	P	P	-	P	P	P	P	P	-	P
slimy sculpin (<i>Cottus cognatus</i>)	P	-	P	P	P	P	P	P	P	P	P	P	P	P	P	P
sockeye salmon (<i>Onchorhynchus nerka</i>)	P ³	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
spoonhead sculpin (<i>Cottus ricei</i>)	P	-	P	-	-	-	P	P	-	-	-	-	-	-	-	-
spottail shiner (<i>Notropis hudsonius</i>)	P	P	P	P	-	-	P	P	-	P	-	-	P	-	P	P
trout perch (<i>Percopsis omiscomaycus</i>)	P	P	P	P	-	-	P	P	-	P	P	P	P	-	P	P
walleye (<i>Stizostedion vitreum vitreum</i>)	P	P	P	P	P	P	P	P	-	P	P	P	P	P	-	P
white sucker (<i>Catostomus commersoni</i>)	P	P	P	P	P	-	P	P	-	P	-	P	P	-	P	P
yellow perch (<i>Perca flavescens</i>)	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

¹ "P" indicates that a fish species has been reported to occur in a particular river drainage or lake. "-" indicates that we did not find a report of the species occurring within the South Slave area in a particular drainage basin. "S" indicates that the species has been stocked in lakes within the drainage basin.

² These fish were identified as being from the Arctic charr-Dolly Varden complex, so the species identification is uncertain. Recent taxonomic studies suggest that they are likely either Dolly Varden or bull trout (Reist et al. in review).

³ Two non-anadromous sockeye were taken in the Hardisty area and may have originated in the Slave River drainage (G. Low, unpubl. data).

⁴ Slaney and Co. Ltd. 1974 reported catching an immature peamouth (*Mylocheilus caurinus*) in the Smith River. This report has not been confirmed and the species is well outside its reported range.

⁵ Locals have reported the occurrence of Dolly Varden in Little Doctor Lake (Foote 1979). Recent taxonomic studies suggest that Dolly Varden reported from the North Nahanni and South Nahanni river systems are likely to be bull trout (Reist et al. in review)

Appendix 1. Continued.

REFERENCES:

- A) GREAT SLAVE LAKE** ----- McPhail and Lindsey 1970; Scott and Crossman 1973; Lee et al. 1980; G. unpubl. data.
1) Hay River ----- Harris 1962; McPhail and Lindsey 1970; Nursall and Buchwald 1972; Scott and Crossman 1973; Lee et al. 1980; McLeod and O'Neil 1983; G. Low, unpubl. data.
- B) MACKENZIE RIVER** ----- McPhail and Lindsey 1970; Hatfield et al. 1972; Stein et al. 1973.
2) Kakisa River ----- McPhail 1963; Lamoureux 1973; Read and Roberge 1989.
3) Trout River ----- Stein et al. 1973.
4) Redknife River ----- Lilley and Jessop 1975; Katapodis et al. 1978.
5) Rabbitskin River ----- Jessop et al. 1973.
6) Liard River ----- McPhail and Lindsey 1970; Hatfield et al. 1972; Stein et al. 1973; Foote 1979; Lee et seq. 1980; O'Neil et al. 1982; McLeod and O'Neil 1983; Dillinger et al. 1992.
7) South Nahanni River ----- McPhail and Lindsey 1970; Jessop et al. 1974; Haas and McPhail 1991.
8) Martin River ----- Stein et al. 1973; Porter et al. 1974; Slaney and Co. Ltd. 1974.
9) Trail River ----- Jessop et al. 1974.
10) North Nahanni River ----- Dryden et al. 1973; Jessop et al. 1974; Stephansson 1973 (also lists threespine stickleback *Gasterosteus aculeatus*); Foote 1979.
11) Willowlake River ----- Dryden et al. 1973; Shotton 1973; McCart et al. 1974; McCart 1974; Jessop and Lilley 1975; Lilley 1975.
12) River Between Two Mountains ----- Dryden et al. 1973; Shotton 1973; Stein et al. 1973; McCart et al. 1974; Slaney and Co. Ltd. 1974; Jessop and Lilley 1975; Lilley 1975.
13) Smith Creek ----- Shotton 1973; Slaney and Co. Ltd. 1974; McKinnon et al. 1978.
14) Ochre River ----- Shotton 1973; Stein et al. 1973; McCart et al. 1974; Slaney and Co. Ltd. 1974.