

# Valued Component – Fish Habitat, Population and Harvest (FINAL DRAFT)

## STATE OF KNOWLEDGE – WHAT IS HAPPENING?

A very brief overview of the state of knowledge with respect to fish habitat, population and harvest in the NWT is presented below. This overview is preliminary and not intended to be exhaustive.

➤ **What are the baseline conditions with respect to fish habitat, population and harvest?**

- Fish are of great cultural significance to residents of the NWT, as they are an important year round source of food. There are 48 species of freshwater and anadromous fish found in the Northwest Territories. Information on fish habitat, population and harvest is known to varying degrees in different lakes and rivers in the NWT.
- The expansive geographic area, short open water season, small human population and high costs associated with work in the north have all contributed to a limited amount of research being carried out on fish species and potential fish management and habitat issues that are not of immediate economic or subsistence importance.

### **Habitat**

- The NWT CIMP covers a wide variety of systems from small creeks to large lakes. These water bodies are naturally dynamic and changing. There can be a high level of natural variability in fish habitat and migration patterns from year to year. Thus little information exists on what habitats, such as spawning areas, looked like many years ago to compare with present conditions.

## KEY MONITORING INDICATORS

<i>Age distribution of fish stocks</i>	<i>Maturity &amp; fecundity</i>
<i>Aquatic habitat structure (substrate, Cover) and quality (importance to species)</i>	<i>Spawning, rearing and over wintering locations</i>
<i>Fish abundance, size and distribution</i>	<i>Water depth/velocity</i>

- Healthy fish stocks rely on healthy habitat. Therefore, if fish stocks are healthy and there is no decrease in fish available for subsistence or commercial endeavours, it is generally assumed that the habitat is also healthy. In the NWT however, some habitat has been degraded, particularly close to certain municipal or industrial developments. This can be reflected in a decrease in fish populations.
- There is limited baseline information on spawning, rearing, feeding and over wintering habitats, or on river/lake bottom substrate (which is related to spawning and other habitats). Habitat assessments are typically completed only if there is a specific reason, such as a proposed development or community concern.
- The potential effects of climate change on fish habitat are unknown; however, there may be impacts on certain fish species.

### **Population**

- Very little baseline information is known about non-harvested fish, including many lesser fish species such as minnows and darters, in the NWT. Non-harvested fish account for approximately 50 percent of all fish species. Some limited baseline survey data is available in the Mackenzie Valley Impact Study reports from the early 1970's. Presently, the

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distribution and habitat requirements of bull trout in the Liard and Mackenzie River basins are being studied.

- In general, stock size of fish populations are difficult to obtain for both harvested and non-harvested species, except for some anadromous stocks of Dolly Varden that return to the same over wintering locations annually. Stock status is determined by analyzing parameters such as size and age structure, sex and maturity, mortality and condition factor.

### **Harvest**

- There is a major commercial fishery on Great Slave Lake (GSL) with historical harvest data available for lake whitefish, lake trout, northern pike, inconnu, yellow walleye, burbot and long-nose sucker. Fish stocks are sustainable at present quota and harvest levels, with some notable exceptions. Lake trout stocks in the western basin were diminished in the 1940's/50s by the commercial fishery. However, they are now protected in the East Arm of Great Slave Lake and managed at a trophy fishery level. Inconnu stocks were extirpated from several tributaries, but a healthy stock continues to spawn in the Slave River. The inconnu stock(s) of the Buffalo River system were over-exploited and are now managed for recovery. The current down turn in the commercial fishing industry because of market conditions has meant that only about one third of the entire lake quota is being harvested. The small exploratory fishery on the Yellowknife River lake cisco has been closed due to concerns from the Yellowknife Dene about stock abundance and fish size. A co-management study will be initiated by DFO with the YK Dene and others to further investigate this unique stock of lake cisco which may contain SARA listed short jaw cisco.

- Historical harvest statistics and monitoring data are available for the Kakisa Lake and Tathlina Lake commercial walleye fisheries. Walleye stock problems on both of these lakes are presently being investigated.

- Harvests for the Aboriginal food fishery for Great Slave Lake have not been well documented; however, there are recent harvest statistics for Fort Resolution (Resolution Bay and Little Buffalo River), Fort Smith (Slave River), Fort Providence (Horn River) and Lutsel K'e in the East Arm of GSL.

- Total harvest of sport species in the East Arm of Great Slave Lake by itinerant anglers was estimated in 1986 and 1993. This information will be updated along with harvest estimates for the lodge and outfitter component and the Dene food fishery at Lutsel K'e. Harvest statistics for lodges on Great Bear Lake (GBL) were determined from 1987 to 1991 and optimum harvests have been recommended in each lodge area except for the Keith Arm. A recent four year lodge harvest survey (2006 - 2009) has begun on GBL to update Catch Per Unit Effort (CPUE) data.

- Fish stocks in the thousands of inland lakes in the NWT are lightly to moderately exploited. Few have been studied in detail, but few problems have been reported. Stock surveys were conducted on lakes most used in the Deh Cho region and Sahtu Settlement Area. Fish resources of the Mackenzie River near Fort Good Hope were also surveyed. Lake assessments may be done on some inland lakes in the Sahtu Settlement Area in the near future.

- Arctic grayling stocks in the upper Mackenzie River system were adversely affected by a warm water outbreak of

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waterborne pathogens in 1989. Grayling which spawn in the grayling river were decimated. The Kakisa grayling stock and presumably others appear to have recovered to former levels.

- Fish stocks generally appear healthy. In the northern Mackenzie Valley, some Dolly Varden char stocks were historically over harvested, and are now being co-managed with boards and Fisheries and Oceans Canada. In the southern Mackenzie, based on angler creel surveys and First Nations knowledge, walleye stocks in the Little Buffalo River appear to be in decline. Monitoring will continue and possession limits for anglers are likely to be adjusted. Continued monitoring of the Buffalo River inconnu stock indicates that this stock is in slow recovery. The Tathlina Lake commercial fishery has been closed since 2001 but continues to be monitored through winter sampling to determine when it may be opened again. The fishery is currently open on Kakisa Lake and appears to be sustainable at current quota levels. Recent angler reports for the Kakisa River indicate a very robust spring spawning run of grayling containing multiple year classes. Pike sport harvests near Ft. Providence along the Mackenzie River remain high and monitoring via an angler creel census will continue. Lake trout populations in several lakes along the Ingraham Trail near Yellowknife continue to be of concern due to long term and heavy sport angler harvests. Updated stock assessments and creel surveys are to be completed and an integrated fish management plan (IFMP) will be developed by DFO. The community of Trout Lake is concerned about the apparent decline in the lake trout population and DFO will be initiating a stock assessment there in the near future. DFO will also be working with the community on monitoring the walleye sport fishery on the Moose River and a community harvest survey.

- Based on information from harvest study surveys within the northern Mackenzie River area, fish harvests appear to be declining (reasons could include the decline of the use of dog teams and changes in diet). Thus, fish harvesting levels are sustainable at present. Indications from the ongoing southern Mackenzie harvest surveys indicate that harvests are stable at the Horn River and in Lutsel K'e.

### RECENT AND CURRENT MONITORING

**Ongoing monitoring programs with respect to fish habitat, population and harvest in the NWT are found below.**

- Fish and marine mammal harvest - Northwest Territories (Fisheries and Oceans Canada since 1958)
  - Harvest statistics and related information from several sources are consolidated yearly to ensure harvest information is readily accessible. Data on commercial, domestic and recreational fisheries and marine mammal harvests are summarized for the Northwest Territories. Parameters measured are numbers of commercial, domestic and recreational fisheries and marine mammal harvests, number of water bodies involved in each of those activities, species harvested, number of licenses sold, total harvests and landed values, and number of licenses by resident. Annual summaries are available for "Fish and marine mammal harvest data for the Northwest Territories" and "Fish harvesting activities, Western Canadian freshwater fisheries.

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- Monitoring Northwest Territories southern area fish stocks (Fisheries and Oceans Canada since 1997)
    - To assess fish stocks, data is collected throughout the Northwest Territories through mark/recapture studies, sampling for age and growth, and catch per unit effort. Stocks were delineated through stock identification programs, and community surveys were conducted to gather traditional knowledge of stocks and fishing patterns. Parameters measured are age of fish, growth, stock identification and composition.
      - Harvest studies in Ft. Providence, Lutsel K'e and soon to be Trout Lake
      - Angler creel surveys in GBL, east arm of GSL, Little Buffalo River, Ft. Providence, and Trout Lake including the Moose River in 2007
      - Fish sampling programs in several of the above studies
      - Inconnu traditional knowledge and documentary program
      - Inconnu population monitoring program in the Buffalo River
      - Fish species, primarily whitefish, population study in the Hay River Domestic zone on GSL
      - Whitefish and walleye plant sampling program in Hay River
      - Ongoing lodge harvest survey in GBL
      - Ongoing monitoring of the Kakisa and Tathlina Lake walleye stocks
  - Peel River fish study (Gwich'in Renewable Resource Board since 1998)
  - Arctic Char Fisheries in the ISR
- DFO Fisheries Management creates integrated fisheries management plans and community working groups to manage, sustain and track harvests of arctic char throughout the ISR.
  - Big Fish River (Fisheries and Oceans Canada since 1984)
    - There is currently an attempt to create a working group that would address problems/concerns on this and other North Slope rivers.
  - Rat River Dolly Varden char monitoring program (Fisheries and Oceans Canada since 1995)
    - A Working Group comprised of DFO and co-management groups are working to protect this declining stock of northern Dolly Varden. DFO Fisheries Management and Science continue to run monitoring, harvest studies and stock assessment projects for this stock.
  - Gwich'in Settlement Area harvest study (Gwich'in Renewable Resource Board since 1995)
  - Sahtu Settlement Area harvest study (Sahtu Renewable Resources Board since 1998)
  - Inuvialuit Settlement Region harvest study (Inuvialuit Joint Secretariat since 1986 – 2000, DFO from 2000 onwards) DFO Fisheries Management currently runs numerous harvest studies for marine and fresh water fish stocks in the ISR as well as for marine mammal harvests.
  - Sahtu Settlement Area – Special harvesting area fish assessments (Fisheries and Oceans Canada since 1995)

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- Locations include 13 lakes, most used by Sahtu communities, and the Mackenzie River. Lake trout stocks in the Keith Arm of Great Bear Lake have been assessed hence completing the entire lake.
- Aquatic effects monitoring program (BHP Diamonds Inc. since 1998)
  - Lakes and streams near the EKATI mine are monitored to determine potential effects of the mine. Fish are sampled as part of this program. A surveillance network program monitors the health of lakes and streams, providing an early warning system. Specific effects monitoring is undertaken where potential adverse effects have been identified. Aquatic baseline and monitoring data was gathered from 1993 to 1997.
- Monitoring of fish health and habitat (Diavik Diamond Mines Inc. since 2000)
  - The Fisheries Act authorization issued to Diavik Diamond Mine Inc. requires monitoring in Lac de Gras for fish health, habitat utilization, fish palatability and contaminants.
- Monitoring of fish, and other animals and their habitats (Tariuq (Ocean) Monitoring Program).
  - This program was piloted in Inuvik, Aklavik and Tuktoyaktuk as part of Oceans Marine Environmental Quality (MEQ) Program. It is a community based program and monitoring activities began in the fall of 2001. (Fisheries and Oceans Canada). Monitoring concluded after the 2005 field season and the program underwent an assessment process which includes looking at community based monitoring and how it may fit in with the development of monitoring plans for the

proposed Tarium Nirvutait Marine Protected Area and the Beaufort Sea Large Ocean Management Area.

- Winter Beaufort Sea fish and fish habitat survey project under development by Fisheries and Oceans Canada.

### GAPS AND RECOMMENDATIONS FOR MONITORING

**A list of monitoring gaps and recommendations for future monitoring under the NWT Cumulative Impact Monitoring Program is found below.**

#### **Gaps**

- Monitoring of harvested fish stocks across NWT and associated biological information such as age distribution, fish size, maturity and fecundity.
- Data and information on spawning, rearing, and overwintering locations/habitat due to high monitoring costs.
- Monitoring of physical changes to habitat, which might result from natural occurrences as bank slumping or from industrial activity.
- Information on distribution and abundance of all non-harvested species.
- Understanding of what might make good indicators and whether they will provide the necessary trigger in order to respond to negative changes.

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### **Recommendations**

- Monitoring of fish distribution, abundance, size, age distribution and maturity of harvested species including inconnu in the Buffalo River and walleye in the Little Buffalo River, Kakisa and Tathlina lakes
  - Initiate a lake trout stock assessment of the east arm of GSL in the next 1-2 years
  - Initiate another intensive angler creel survey on the east arm of GSL in the next 1-2 years
  - Complete a stock assessment of lake trout in Trout Lake
  - Initiate a study on the Yellowknife River lake cisco stock, including determining the potential presence of short jaw cisco, and expand to other known GSL cisco stocks
  - Establish an IFMP for the Ingraham Trail and continue to monitor its lake trout populations
  - Continued community-based monitoring through index netting or other programs, which are more comprehensive in biological data collection than harvest studies.
  - Identification and monitoring of spawning, overwintering and rearing habitats of major harvested species.
  - Development and implementation of a fish habitat and population monitoring program, driven by communities with advice by expert agencies. Coordinate with existing monitoring programs.
- Monitoring of spawning locations/habitat for spring and summer spawning species (including walleye, northern pike, white and longnose suckers, grayling and lesser known species)
  - Annual monitoring of selected streams along the Mackenzie River to determine baseline water velocity, discharge, substrate composition and fish and invertebrate abundance/distribution. Representative small watersheds could be selected up and down the valley. This type of research may provide important information on changes over time.
  - Monitor physical changes to fish habitats such as bank slumping. Historic aerial surveys might be able to be used or measurements of cabins from river banks over time.
  - Strong linkages with other VCs such as Fish Quality, Water Quality and Quantity.
  - Monitoring of minnows, darters, sculpins and lesser (forage) species to determine if their range has expanded (possibly through the use of an electrofishing boat or streamside shockers)

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### REFERENCES

Relevant monitoring reports, past monitoring programs, research documents, and scientific publications are found below.

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Database of fish research in the Gwich'in Settlement Area (Gwich'in Renewable Resource Board)

