

**Integrated Fisheries Management Plan**  
**for**  
**Dolly Varden (*Salvelinus malma malma*)**  
**of the**  
**Gwich'in Settlement Area**  
**and**  
**Inuvialuit Settlement Region**  
**Northwest Territories and Yukon North Slope**  
**2011 – 2015**  
**VOLUME 1: THE PLAN**



Photo Credit: Colin Gallagher-DFO, Big Fish River 2009

## **Foreword**

The purpose of this Integrated Fisheries Management Plan (IFMP) is to identify the main objectives and requirements for a sustainable Dolly Varden (*Salvelinus malma malma*) fishery in the Gwich'in Settlement Area and Inuvialuit Settlement Region of the Northwest Territories and Yukon North Slope, as well as the management measures that will be used to achieve these objectives. This document also serves to communicate the basic information on the fishery and its management to Fisheries and Oceans Canada (DFO) staff, legislated co-management boards, Parks Canada Agency, Hunters and Trappers Committees, Renewable Resources Councils, communities, fishermen and other stakeholders. This IFMP provides a common understanding of the basic "rules" for the management of sustainable Dolly Varden stocks.

**This IFMP is not a legally binding instrument which can form the basis of a legal challenge. The IFMP can be modified at any time and does not fetter the Minister of Fisheries and Oceans' discretionary powers set out in the *Fisheries Act*. The Minister can, for reasons of conservation or for any other valid reasons, modify any provision of the IFMP in accordance with the powers granted pursuant to the *Fisheries Act*.**

Where DFO is responsible for implementing obligations under land claims agreements, the IFMP will be implemented in a manner consistent with these obligations. In the event that an IFMP is inconsistent with obligations under land claims agreements, the provisions of the land claims agreements will prevail to the extent of the inconsistency.

**TABLE OF CONTENTS****VOLUME 1: THE PLAN**

<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. JURISDICTIONAL AND CO-MANAGEMENT CONTEXT OF DOLLY VARDEN MANAGEMENT</b>	<b>3</b>
<u>2.1 Jurisdictional Context</u>	3
<u>2.2 Co-Management in the GSA and ISR</u>	4
<b>3. DOLLY VARDEN AND DOLLY VARDEN FISHERIES OF THE GSA AND ISR</b>	<b>5</b>
<u>3.1 Dolly Varden Fisheries</u>	6
<u>3.2 Fish Health</u>	11
<b>4. STOCK ASSESSMENT AND STATUS</b>	<b>11</b>
<u>4.1 Stock Status</u>	11
<u>4.2 Current Stock Status and Total Allowable Catch (TAC)</u>	12
<u>4.3 Precautionary Approach</u>	13
<b>5. MANAGEMENT ISSUES</b>	<b>14</b>
<b>6. THE MANAGEMENT PLAN</b>	<b>17</b>
<u>6.1 Objectives and Strategies</u>	17
<u>6.2 Management Measures</u>	18
<u>6.3 Stock Management</u>	19
<u>6.4 Fishing Plans</u>	21
<b>7. THE MANAGEMENT PROCESS</b>	<b>22</b>
<u>7.1 The Annual Review Process</u>	22
<u>7.2 Management of the Process</u>	24
<u>7.3 Performance Review and Modifications</u>	24
<b>8. SIGNATURE PAGE</b>	<b>25</b>

## **VOLUME 2: THE APPENDICES**

Appendix A: Abbreviations and Glossary

Appendix B: Integrated Fisheries Management Plans

Appendix C: Jurisdictional Context

Appendix D: Co-Management in the GSA and ISR

Appendix E: Habitat and Ecosystems

Appendix F: Management History

Appendix G: Harvest Levels

Appendix H: Stock Status

Appendix I: General DFO, Gwich'in, Inuvialuit and PCA Objectives

Appendix J: Objectives, Strategies and Measures for the Management of Dolly Varden

Appendix K: Research and Monitoring Plan

Appendix L: Compliance Plan

Appendix M: Selected Sources of Information

Appendix N: Contacts

## 1. INTRODUCTION

This Integrated Fisheries Management Plan (IFMP) provides direction for the management of northern form Dolly Varden (*Salvelinus malma malma*) stocks in the Gwich'in Settlement Area (GSA) and the Inuvialuit Settlement Region (ISR) in Canada's Western Arctic (see Fig. 1) where it occurs in several rivers and along the coast. Dolly Varden is an important food source for the communities of Aklavik and Teetl'it Zheh (Fort McPherson). Northern form Dolly Varden also occurs in the Sahtu Settlement Area of the Northwest Territories, the Yukon and Alaska. This IFMP, at present, is restricted to the GSA and ISR, and does not extend to the Sahtu Settlement Area, the Yukon south of the North Slope or Alaska.

An IFMP (see Appendix B) provides a planning framework for the conservation, sustainable use and recovery of fish species or stocks, a process by which a fishery and its supporting habitats will be managed for a period of time, and includes measures to prevent harm to the species or stocks. The IFMP for Dolly Varden contains objectives, strategies and measures for managing these stocks, aids in their rebuilding and will be used by fish harvesters, communities, Gwich'in, Inuvialuit, Government of Canada and other stakeholders in managing day-to-day and longer-term activities, and should achieve long-term conservation and sustainable use of Dolly Varden in the GSA and ISR.

This IFMP is based on traditional Gwich'in and Inuvialuit knowledge and practices, on 'western' knowledge, and on the underlying Gwich'in and Inuvialuit beliefs of the importance of showing respect to fish, including no overharvesting, quick and humane killing, clean handling and no derogatory talk about fish.

The IFMP identifies and addresses issues critical to the management of Dolly Varden in the GSA and ISR. Two Dolly Varden stocks, and possibly others, have declined in numbers in the last two decades, and important Dolly Varden habitat may have changed. The climate is changing too, potentially having additional effects on Dolly Varden and its habitats.

Given these changes and the relatively low numbers of fish in Dolly Varden stocks, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is considering the status of the northern subspecies of Dolly Varden, the subspecies that occurs in the GSA and ISR. Its decision is expected in November 2010. COSEWIC will recommend its assessment to the Minister of Fisheries and Oceans. After consideration of socio-economic and other factors and further public consultation, the Minister may decide to list Dolly Varden under the federal *Species at Risk Act (SARA)* as threatened, endangered or of special concern; this may affect harvesting of Dolly Varden in the GSA and ISR. If Dolly Varden is listed under the *SARA*, a *SARA* action plan, management plan or recovery strategy would be required. However the Minister may incorporate this IFMP into a *SARA* action plan, management plan or recovery strategy. The *SARA* permits certain activities, such as fishing, if they are identified under a *SARA* recovery strategy, action plan or management plan or under an approved existing plan. Therefore this IFMP may

contribute to the SARA requirements and help to allow continued harvesting. However, this IFMP will not replace the formal requirements of COSEWIC and the SARA.



Figure 1. The general area covered by the Dolly Varden Integrated Fisheries Management Plan.

The IFMP was developed and will be implemented by the Government of Canada, Gwich'in and Inuvialuit partners through an adaptive co-management process that advances community-based management. Groups involved in the preparation of the IFMP were Fisheries and Oceans Canada (DFO), the Fisheries Joint Management Committee (FJMC), the Gwich'in Renewable Resources Board (GRRB), Parks Canada Agency, the Aklavik Hunters and Trappers Committee (HTC), the Ehdiitat Renewable Resources Council (RRC), the Gwichya RRC, the Nihtat RRC, the Teetl'it RRC, elders of Aklavik and Teetl'it Zeh, the Rat River Working Group and the West Side Working

Group. The Working Groups have been instrumental in the development of the IFMP. In 2000, the Minister of Fisheries and Oceans supported community-based management, specifically in relation to Big Fish River Dolly Varden as soon as a management plan was developed and approved by DFO.

The IFMP should be read in the context of other pertinent legislation, including the Gwich'in Comprehensive Land Claim Agreement (GCLCA), Inuvialuit Final Agreement (IFA), *Fisheries Act*, *Canada National Parks Act* and *SARA*.

The Dolly Varden IFMP is a living document. The IFMP can be amended at any time if a request is submitted and agreed to by the signatories after meetings with all stakeholders. The IFMP is supported by fishing plans that also are living documents.

The IFMP is in two volumes. This volume, Volume 1, contains the Plan. Volume 2 contains 14 appendices including a list of abbreviations and glossary (Appendix A), selected sources of information (Appendix M), and the main contacts for further information (Appendix N).

## **2. JURISDICTIONAL AND CO-MANAGEMENT CONTEXT OF DOLLY VARDEN MANAGEMENT**

### **2.1 Jurisdictional Context**

DFO, the FJMC, the GRRB, HTC's and RRC's, and the Parks Canada Agency all have responsibilities for managing Dolly Varden stocks in the GSA and ISR. All groups work closely together to fulfil their specific responsibilities. They fulfil their responsibilities within the context of the two land claims agreements, *Fisheries Act*, *Oceans Act*, *Canada National Parks Act*, and the *SARA*.

DFO has the ultimate responsibility for the conservation and sustainable use of fish stocks as it is the constitutional authority for sea coast and inland fisheries. It exercises this authority through the *Fisheries Act* and its regulations and through the *SARA*. DFO also has habitat management and oceans management responsibilities exercised through the *Fisheries Act* and *Oceans Act*. Initiatives in the Beaufort Sea under the *Oceans Act* include the Tarium Niryutait Marine Protected Areas and the Integrated Ocean Management Plan for the Beaufort Sea; these contain provisions that can be used to advance management of Dolly Varden in marine waters.

DFO is incorporating precautionary and ecosystem-based approaches into fishery management decisions through the Sustainable Fisheries Framework. Application of the Framework should ensure the continued health and productivity of Canada's fisheries and fish stocks, while protecting biodiversity and fish habitats. The Framework comprises four main elements: conservation and sustainable use policies; economic policies; governance policies and principles; and planning and monitoring tools.

The FJMC and the GRRB are legislated public institutions, and are the main instruments of fishery management in the ISR and GSA respectively. Their fishery management responsibilities are outlined in the respective land claims agreements. They have a mix of decision-making, operational and advisory responsibilities. They make recommendations to and advise the Minister of Fisheries and Oceans. The GRRB and the FJMC must act in the public interest.

The HTC's and RRC's have specific fishery-related responsibilities assigned to them under the IFA and the GCLCA respectively. These responsibilities include allocating harvests amongst communities, advising the GRRB or FJMC on harvesting, participating in collecting harvest data and in research, and reviewing and approving research proposals.

Parks Canada Agency is the federal agency responsible for protecting and managing the resources within Ivvavik National Park, encompassing 9,750 km<sup>2</sup> on the Yukon North Slope. The Park includes the Firth and Babbage rivers which support Dolly Varden stocks. Parks Canada Agency manages Dolly Varden in the Park in accordance with the provisions of the *Canada National Parks Act* and the IFA.

Appendix C summarizes specific responsibilities of DFO, the FJMC, the GRRB, HTC's, RRC's and Parks Canada Agency. The full text of the GRRB's and RRC's responsibilities is in the GCLCA, and of the FJMC's and HTC's' responsibilities is in the IFA.

Many other organizations play roles in the overall management and protection of Dolly Varden in the GSA and ISR. These include other organizations created under the Gwich'in and Inuvialuit land claims settlements, the NWT and Yukon territorial governments, and other federal departments. Many of them are specifically involved in environmental protection decisions; for instance Environment Canada administers the pollution prevention provisions of the *Fisheries Act*. The territorial governments are responsible for issuing sport fishing licences. All groups are involved in the co-management of Dolly Varden appropriate to their responsibilities and interests.

## **2.2 Co-Management in the GSA and ISR**

Fishery management and fish habitat management in both the GSA and ISR are conducted through adaptive co-management processes. The processes are similar in both areas, but the details often differ. Adaptive co-management is a process that permits stakeholders to share management responsibility and to learn from their actions through multi-level feedback. It includes a shared common focus, a high degree of interaction, multiple levels of shared responsibility, some autonomy at different levels, generation and sharing of knowledge at all levels, flexible learning, and recognition of uncertainty.

Development of fishing plans through adaptive co-management in the GSA and ISR usually involves establishing a working group (e.g. the Rat River Working Group and the West Side Working Group for Dolly Varden), assembling background information, establishing conservation requirements (e.g. harvest limits as required) and setting



management objectives and strategies through consensus, developing an operational plan, implementing the plan, reviewing the results and new information, and changing the plan if necessary. A steering committee may be established to provide direction to a working group.

The process usually begins with a specific conservation issue identified by one or more fishermen at the local HTC or RRC. The concern is then formalized by the GRRB or FJMC in partnership with the HTC or RRC and DFO, and involving other appropriate community groups or government agencies. Usually a working group, composed of appointees from FJMC/GRRB, DFO, HTC/RRC and other relevant parties, is struck to coordinate the assessment of concerns and possible actions. For Dolly Varden management, the GRRB led the establishment of the Rat River Working Group with Aklavik HTC, DFO, Ehdiitat RRC, FJMC, GRRB and Teetl'it RRC membership, and with Gwichya RRC, Nihtat RRC as observers, as well as, more recently, the chair of the West Side Working Group. The FJMC later led the establishment of the West Side Working Group with Aklavik HTC and Elders Committee, DFO, FJMC and Parks Canada Agency membership, and with the Ehdiitat RRC, GRRB and the chair of the Rat River Working Group as observers. The working group annually conducts an assessment of the issues, evaluates pertinent scientific, traditional and local information and knowledge, revisits community concerns, management objectives and possible management options, and arrives at proposed management actions by consensus to address the initial concern(s). The working group consults with affected communities on any recommendations from their annual assessment.

These management actions and recommendations are presented in a community-based Fishing Plan, or possibly in a more formal IFMP. The draft plan is reviewed formally by all relevant stakeholders during all stages of development. The final version of the Fishing Plan or IFMP is ratified by the FJMC/GRRB, DFO and the appropriate HTC(s)/RRC(s), and by Parks Canada Agency as required.

More information on the application of adaptive co-management to fishery management and habitat management, with special reference to Dolly Varden, is given in Appendix D.

### **3. DOLLY VARDEN AND DOLLY VARDEN FISHERIES OF THE GSA AND ISR**

Dolly Varden is related to salmon, trout and Arctic charr (*Salvelinus alpinus*). Although Dolly Varden was considered a form of Arctic charr until 1997, it now is classified as a separate species, *Salvelinus malma* (Walbaum 1792). Dolly Varden in North America has two subspecies based on genetic and morphological analyses; their ranges do not overlap.

All Dolly Varden in Arctic Canada belong to the northern subspecies, *Salvelinus malma malma*. The northern subspecies occurs from the north side of the Alaskan Peninsula and the Aleutian Islands to the Mackenzie River in Canada's Western Arctic. In the GSA and ISR it is found, from west to east, in the Fish, Malcolm, Firth, Babbage, Big Fish, Rat (Ddhah Zhit Han) and Vittrekwa rivers and along the coast west of the Mackenzie Delta

(see Fig. 1). Dolly Varden also occurs in the Upper Peel (but may not be the northern form) and the Blackstone rivers, Yukon, and in the Gayna River in the Sahtu Settlement Area. This subspecies' range extends into Asia.

The southern subspecies, *Salvelinus malma lordi*, occurs in coastal watersheds of Washington and British Columbia and in Alaskan rivers that drain south to the Gulf of Alaska.

Northern Dolly Varden has three life history strategies in the GSA and ISR: anadromous (sea-run), residual (riverine), and isolated (stream-resident). The anadromous type of Dolly Varden resides in fresh waters for about the first three years of life, after which it migrates to the sea to feed, returns in the fall to fresh water to spawn (beginning at 4-6 years) and overwinter, and then repeats the migration cycle. Known anadromous populations in the GSA and ISR occur in the Firth, Babbage, Big Fish, Rat and Vittrekwa rivers. Residual, non-anadromous Dolly Varden co-exists with anadromous Dolly Varden in all of these rivers. Isolated, non-anadromous Dolly Varden occurs above falls on the Babbage and Big Fish rivers (where anadromous and residual forms occur below the falls), in some rivers of the Peel River watershed, and in the Gayna River. Upstream in the Peel River drainage some populations are present in lakes (e.g., Horn Lake); however, their life history (e.g. lacustrine only or adfluvial stream-resident/lacustrine migratory) is unknown.

Northern form Dolly Varden (anadromous and residual populations) in the Firth, Babbage, Big Fish and Rat rivers are genetically distinct, and genetic evidence indicates that Dolly Varden from Joe Creek are distinct from those that spawn in the Firth River.

Dolly Varden uses a variety of habitats. During winter, it occurs in upstream reaches of river systems that do not completely freeze primarily because of discharging groundwater. Habitats associated with discharging groundwater are used for spawning, rearing and overwintering, but they comprise a small proportion of each system and thus are spatially limiting to the stocks. Spawning occurs in areas associated with perennial springs; this habitat type often corresponds with overwintering habitat and is considered critical and spatially limiting in most river systems. Small streams are used for spawning, rearing and overwintering. Larger rivers are migratory routes of anadromous Dolly Varden, and nearshore marine habitats are crucial feeding areas.

More information on the habitat and ecosystem needs of Dolly Varden in the GSA and ISR is contained in Appendix E.

### **3.1 Dolly Varden Fisheries**

Anadromous Dolly Varden is the target for fisheries in the GSA and ISR. The main traditional fisheries now occur on the Rat River and along the western Mackenzie Bay coast (see Fig. 1). The Fish, Malcolm, Firth, Babbage and Big Fish stocks used to be fished directly, but little or no fishing activity has occurred recently on these or other stocks except as part of the mixed coastal fishery in Canada and Alaska and/or the

Mackenzie Delta fishery. Appendix F contains a summary of the management history of Dolly Varden stocks in the GSA and ISR. No socio-economic analysis of the Dolly Varden fisheries has been performed.

### Traditional Fisheries

Anadromous Dolly Varden has been harvested ever since people first inhabited the Western Arctic about 8000 years ago. Dolly Varden fisheries have been and remain an essential part of the Gwich'in and Inuvialuit cultures for subsistence, cultural and nutritional purposes. In emergencies, Dolly Varden was fed to dog teams which were vital for the Mackenzie Delta residents' participation in the fur trade economy. Traditionally the Gwich'in and Inuvialuit use as much of the fish as possible and share a good harvest within the community. Dolly Varden also was used for various medicinal purposes. Today, the fish is often smoked, dried or frozen to preserve it.

Before 1930 there were many traditional fishing locations across the GSA and ISR. Inuvialuit fishing was concentrated along the Beaufort Sea coast between the Alaska border and the Mackenzie Delta and at the Big Fish River Dolly Varden overwintering area (fish hole). Inuvialuit began fishing the lower reaches of the Big Fish River in the 1960s. The Gwich'in fished primarily in the Mackenzie Delta and Peel River drainage, and the Vuntut Gwich'in from the Yukon fished Yukon North Slope rivers, especially the Firth and Babbage. Several Dolly Varden fishing locations were used less frequently as people moved from traditional camps and RCMP posts to Aklavik. Traditional fishing methods included baleen, sinew and willow gill and sweep nets used in deeper waters, and rock, driftwood and willow traps and spears used for shallow streams and river beds. Gear restrictions and rotational use of rivers have been used as traditional management practices. More efficient cotton and nylon gill nets now are used and the mesh size has been changed from 3.0 - 5.5 inches to 4.0 - 4.5 inches. A 3.5 inch mesh had been a popular choice as it caught smaller, tastier fish.

Now, the main fisheries for Dolly Varden occur in the Rat River and along the western Mackenzie Bay coast. Little or no fishing activity has occurred directly on other stocks in recent years, but they are harvested in mixed stock fisheries along the coast and in the Mackenzie Delta. The Big Fish River had been an important fishery, but at present it is closed because of the decline in numbers of fish.

Gwich'in and Inuvialuit currently harvest Dolly Varden at the following locations:

- Babbage River – Canoe Creek area (Fish Hole) and Shingle Point;
- Big Fish River - Shingle Point;
- Rat River - Husky (Eneekaii Han) and Peel channels, Tr'ih Zhit Tagohdii (Canoe Landing), Shingle Point, Aklavik townsite and Big Eddy (Ok Choo), but Ne'edilee (Rat River Fish Hole) is closed to fishing;
- smaller fisheries of unknown or mixed stocks occur at Thetis Bay (Herschel Island), Komakuk Beach, and to some extent at Nunaluk Spit, Catton Point and Ptarmigan Bay;

- the Vittrekwa River stock is likely harvested incidentally in Mackenzie Delta fisheries.

The Dolly Varden fisheries are conducted mainly by residents of Aklavik and Teetl'it Zheh primarily by gillnet in July, August and September.

Gwich'in and Inuvialuit do not require licences to fish for Dolly Varden for subsistence purposes.

Some general and some stock-specific harvest estimates exist (see Appendix G). Annual harvest levels and fishing effort have varied considerably. However, more Dolly Varden was consistently harvested in the 1960s and 1970s than in the 1990s and 2000s. This may be a result of lower harvester numbers and effort, and may reflect higher gas prices.

DFO has monitored harvests since 1971, and the Gwich'in Harvest Study (1995-2004) and Inuvialuit Harvest Study (1988-1997) recorded total annual Dolly Varden harvests. Appendix G provides details. The summary of recorded Gwich'in and Inuvialuit harvests is:

- *Gwich'in*: total annual Dolly Varden harvests ranged from 95 fish in 2009 to 6,500 fish in 1972;
- *Inuvialuit*: total annual Dolly Varden harvests ranged from less than 25 fish in 2001 and 2002 to 9,000-13,000 fish in 1972.

Estimates of harvest levels exist for the Big Fish River and Rat River Dolly Varden stocks and for the coastal fisheries (see Appendix G):

- *Big Fish River*: harvests ranged from 94 in 1980 to 8,000-12,000 in 1972 before the fishery was closed in 1987 except under some Licences to Fish for Scientific Purposes (scientific licences);
- *Rat River*: harvests ranged from 95 fish in 2009 to 6,500 fish in 1972 (the fishery was closed from 2006-2008);
- *Coastal fisheries (mainly Herschel Island and Shingle Point)*: harvests ranged from 37 fish in 1991 to 1,365 in 1996.

Since the early 1970s, significant decreases have occurred in the abundance of the harvested stocks in the Big Fish River and the Rat River (see Table 2) resulting in the introduction of community-supported management measures to reduce harvests of these stocks. By 1987, Aklavik residents, having observed a decline in abundance and size of Big Fish River Dolly Varden over a number of years, agreed to a legislated closure of the Fish Hole for a period of five years. Beginning in 1992 studies did not show the expected increases in abundance or size of fish. The Big Fish River currently is closed to all fishing except under scientific licences. Historic harvests of fish at levels above those the stock could support, combined with possible changes in the water flow and habitat, appear to have kept this stock at lower levels.

Concern about the health of the Rat River Dolly Varden stock led to the development of the Rat River Charr Fishing Plan in 1996 that included recommended harvest levels. The Plan is in its eighth iteration, revised in 2010. Abundance was relatively stable from 1989 to 2001, with estimates ranging from 7,953 to 11,191. A significant but temporary decline of Rat River Dolly Varden was noted in 2004 when the stock was estimated to be 2,912 fish (see Table 2). Following the 2004 decline (documented in 2005) a voluntary closure of the fishery was established in 2006 and continued for three years. Three harvest monitors were allowed to harvest a total of 120 Dolly Varden per year to collect biological data. In 2007, an estimated 14,887 Dolly Varden occurred at the overwintering site, a significant increase from 2004; these fish were composed mainly of a single cohort and showed increases in fork length of spawning fish, relatively stable sex and maturity composition and an observed pulse of juvenile production. In March 2009, the Rat River Working Group recommended a controlled harvest allocation among the communities. The voluntary harvest allocation for 2009 was 1225 fish to be distributed among the user communities and groups and the harvest monitors; approximately 25% (provisionally 419 fish) of the allocation was reported harvested. Preliminary information on catch composition and numbers of fish captured from the 2009 fall seining program suggested a potential decline in expected numbers of fish entering the fishery in 2010. Based on this information, the Working Group recommended a controlled harvest allocation of 600 fish for 2010. Ne'edilee was last fished by Gwich'in in 1978, and remains closed. The Rat River fishery continues to be monitored by the Gwich'in as it has been for the past 20 years.

Traditional fisheries for Dolly Varden also have occurred in adjacent Peel River drainages in the Yukon, and a few Dolly Varden have been taken in incidental harvests in the Sahtu Settlement Area.

### Commercial Fisheries

In 1960, the Department of Northern Affairs and Natural Resources started a Dolly Varden (then considered to be Arctic Charr) fishery at Shingle Point. The fishery closed after two years. The harvest was 13,626 kg of Dolly Varden.

In 1965 and 1966, Menzies Fisheries of Edmonton operated a commercial fishery for Dolly Varden out of Pauline Cove and Ptarmigan Bay. The harvest was 7,675 kg of Dolly Varden. Due to the high cost of shipping the catch by air from the Yukon coast to Inuvik, the fishery operated with very high losses. There have been no further attempts to establish coastal commercial fisheries.

In the 1970s, there was a small commercial fishery on the Big Fish River, with a quota of 900 kg. This was unsuccessful, and was not continued.

Commercial quotas currently are not available for any Dolly Varden stocks in the GSA and ISR. The Firth and Babbage rivers within Ivvavik National Park are closed to commercial fisheries under the *Canada National Parks Act*.

*Sport Fisheries*

Sport fishing for Dolly Varden by DEW line personnel occurred around the stations at Stokes Point and Komakuk when the sites were active; the sites closed in 1963 and 1993 respectively. In recent years, only a small number of visitors have fished recreationally for Dolly Varden, primarily in Ivvavik National Park and Herschel Island Territorial Park.

Depending on the location, a Northwest Territories Government Sport Fishing Licence, a Yukon Territorial Government Sport Fishing Licence, or a National Parks Canada Fishing Permit may be required. Sport fishing regulations differ among the jurisdictions. The Northwest Territories Fishery Regulations for Dolly Varden have been modified by a variation order; in the GSA and ISR the daily catch limit and the possession limit are zero Dolly Varden, i.e. catch and release only, and the Big Fish River is closed to all sport fishing. The Yukon Territory Fishery Regulations specify a daily limit of five Dolly Varden, a possession limit of ten Dolly Varden, and a minimum length of 20 cm. The current fishing regulations for Ivvavik National Park specify a daily catch and possession limit of three Dolly Varden. Revisions to the Ivvavik National Park Sport Fishing Regulations are under consideration to reduce the daily catch and possession limit to one Dolly Varden and to close the Firth River and Joe Creek fish holes and other sensitive areas to sport fishing.

A National Parks Fishing Permit is required to fish within Ivvavik National Park except by Inuvialuit beneficiaries. These permits are issued when visitors register for entrance to the Park. Between 21 and 56 permits have been issued each year since 2003 (Table 1). Most fishing occurs on the Firth River.

Table 1. Total number of National Park Fishing Permits issued for Ivvavik National Park, 2003 to 2010.

Year	Fishing Permits issued per year in Ivvavik National Park
2003	41
2004	21
2005	45
2006	49
2007	26
2008	22
2009	33
2010	56

### Scientific Collections

Over the past 30 years, Dolly Varden has been collected for scientific purposes from various stocks including the Firth, Babbage, Big Fish, Rat and Vittrekwa drainages, and from along the Yukon Coast. This is in addition to the monitoring of Dolly Varden for DFO, GRRB and FJMC by Gwich'in and Inuvialuit monitors. Prior to 2000, Dolly Varden occasionally were collected for scientific purposes. Since 2000, only fish from the traditional fisheries have been sampled.

Scientific sampling requires a Licence to Fish for Scientific Purposes issued by DFO. Issuing such a licence requires the support of the HTC or RRC and GRRB or FJMC, and should conform to any recommendations of the Rat River Working Group or the West Side Working Group. A research permit from the Government of the NWT or Yukon Territorial Government also may be required for non-DFO researchers. In the NWT, the Aurora Research Institute issues licences under the *NWT Scientists Act* for research covered by the *Act*.

From 2007-2009, nine Licence to Fish for Scientific Purposes have been issued for non-lethal sampling for research relating to Dolly Varden and for other projects in which Dolly Varden might be caught incidentally.

### **3.2 Fish Health**

Little information is available on contaminants, diseases and parasites of Dolly Varden in the GSA and ISR. Organochlorines were measured in Rat River Dolly Varden in 1986. Infectious Pancreatic Necrosis Virus (IPNV) was reported in Rat River Dolly Varden in 1980-84; recent tests were inconclusive. Harvesters are concerned that parasite levels are increasing in Dolly Varden flesh.

## **4. STOCK ASSESSMENT AND STATUS**

### **4.1 Stock Status**

Stock assessments have been conducted since 1972 on the anadromous Dolly Varden stocks of the Firth, Babbage, Big Fish and Rat rivers. The results are summarized in Table 2, with further details in Appendix H. Insufficient data are available from the Firth and Babbage to determine any trends in abundance over time. Although a number of abundance estimates have been generated in both the Rat River and Big Fish River assessments, the Rat River is the only system where consistent methods were used except for the 1989 assessment, allowing for within-stock comparisons. These stock assessments suggest an overall decline in abundance of Dolly Varden in the Big Fish River, and a decline in the Rat River in 2004 with a possible increase in 2007.

Table 2. Stock size estimates for anadromous Dolly Varden in the GSA and ISR.

<u>Stock</u>	<u>Stock Size</u>		
	<u>Year</u>	<u>Estimate</u>	<u>95% Confidence Interval</u>
Firth River	1972	32,000*	N/A
	1989	8,250-10,700+*	N/A
Babbage River	1991	13,639	10,615-16,663
Big Fish River	1972a	20,700	15,800-27,600
	1972b	13,500	11,300-16,000
	1984	9,300	6,300-14,300
	1991a	2,840	2,014-3,666
	1991b	2,232	1,716-2,748
	1993	4,477	2,305-6,649
	1998	4,026	2,988-5,563
Rat River	1989	11,191	8,532-15,020
	1995	9,036	6,931-11,141
	1997	10,411	6,558-14,264
	2001	7,953	4,547-11,359
	2004	2,912	1,934-3,890
	2007a <sup>1</sup>	14,887	6,026-23,568
	2007b <sup>1</sup>	9,120	4,430-13,810
	2009	TBD	

\*estimates based on aerial surveys that likely included stream resident Dolly Varden and Arctic Grayling; **a, b**: some years have multiple estimates due to recaptures of tagged Dolly Varden from different locations/time of year; **a<sup>1</sup>, b<sup>1</sup>**: the 2007 Rat River estimates have not been peer reviewed

No stock assessments have been conducted for the Fish, Malcolm and Vittrekwa rivers. GRRB studies of the Vittrekwa River in 2006 and 2007 suggest the river supports a moderate population of stream-resident male Dolly Varden and a small run of anadromous Dolly Varden numbering into the low hundreds at most. Only Ne'edilee Creek on the Vittrekwa River has been identified as a spawning ground for Dolly Varden, but there is limited spawning habitat.

#### **4.2 Current Stock Status and Total Allowable Catch (TAC)**

DFO Science most recently reviewed the status of Dolly Varden stocks in 2008 (see Appendix G). The existing stock assessment time series data for most stocks are too short of duration to calculate reference points and a recommended TAC has only been calculated for the Rat River stock. DFO's conclusions on stock status were as follows:

- *Fish River*: the current status of the stock is unknown.
- *Malcolm River*: the current status of the stock is unknown.
- *Firth River*: the current status of the stock is unknown.
- *Babbage River*: the current status of the stock is unknown.
- *Big Fish River*: the current status of the stock is unknown.



- *Rat River*: an updated Stock Assessment Report is in preparation. DFO recommended a TAC of 625 fish in 2009 and 600 in 2010.
- *Vittrekwa River*: the current status of the stock is unknown.

It should be noted that the GRRB has the responsibility for setting Total Allowable Harvests, as well as Minimum Needs Levels and Gwich'in Needs Levels, when required, and that the FJMC may make recommendations to the Minister of Fisheries and Oceans on subsistence quotas when required.

COSEWIC is assessing the status of the northern form of Dolly Varden, and is expected to make an assessment decision in late 2010. The Government of the Northwest Territories considers Dolly Varden "Sensitive", meaning that it may require special attention or protection to prevent it from becoming "At Risk".

### **4.3 Precautionary Approach**

Due to the relatively low numbers of fish and limited information on each Dolly Varden stock, a precautionary approach is required for their management. A precautionary approach in fishery management is about being cautious when scientific knowledge is uncertain, and not using the absence of adequate scientific information as a reason to postpone or fail to take actions to avoid serious harm to fish stocks or their ecosystems when a decision is required.

As outlined in DFO's Fishery Decision-Making Framework, a precautionary approach to fishery management decisions entails establishing a harvest strategy that:

- identifies three stock status zones (healthy, cautious, critical) according to Upper Stock and Limit reference points;
- sets the removal rate at which fish may be harvested within each stock status zone;
- adjusts the removal rate, based on pre-agreed decision rules, according to fish stock status variations (e.g. spawning stock biomass or other index relevant to population productivity).

The Fishery Decision-Making Framework requires that a harvest strategy be incorporated into fishery management plans for three key reasons: to keep the removal rate moderate when the stock status is healthy; to promote rebuilding when stock status is low; and to ensure a low risk of serious or irreversible harm to the stock. It also requires a rebuilding plan when a stock reaches low levels.

At present, the available information for the stocks of anadromous Dolly Varden in the GSA and ISR is inadequate for establishing the Upper Stock and Limit reference points, their stock status zones and removal rates

Until this information is available, an annual harvest rate of 5% or less of the stock size estimate is considered to be a low risk option when a Dolly Varden stock is healthy. The

Dolly Varden stock from the Big Fish River did not show signs of recovery with an estimated rate of harvest between 4% and 9% but other factors, such as quality and quantity of available habitat, may have impeded recovery. The recommended 'safe harvest level' for the Rat River stock is 5% of the estimated stock size in the 2010 Rat River Charr Fishing Plan.

In addition to harvest levels, other management measures help implement a precautionary approach as do responsibilities and processes established under the GCLCA and IFA.

## **5. MANAGEMENT ISSUES**

Several issues need to be or continue to be addressed through the IFMP to help ensure the conservation, sustainable use and effective management of Dolly Varden stocks in the GSA and ISR.

### *Stock Conservation*

Current information suggests that some Dolly Varden stocks may be declining. The cause is unknown, but it is suspected to be a combination of over-fishing, predation, habitat change and climate change (see below). The causes of stock abundance changes need to be understood, and the appropriate steps taken to address them. Stock assessments and stock and harvest monitoring and reporting are required to ensure conservation and sustainable use of Dolly Varden stocks and to optimize harvest levels.

### *Mixed Stock Fisheries*

Anadromous Dolly Varden congregate to feed along the Beaufort Sea coast, west of the Mackenzie Delta, and a significant movement of Dolly Varden occurs between Canadian and Alaskan waters. These Dolly Varden originate from several stocks in Canada and Alaska, and are harvested in both Canada and Alaska. Harvests are known to include fish originating from the Babbage, Big Fish and Rat rivers, and presumably from the Vittrekwa River. The movement of fish from a given stock to any location along the coast depends on many factors, such as wind, water currents, temperature, salinity and the distribution of prey, and therefore varies annually. Mixed stock fisheries also occur in the Mackenzie Delta. When making annual harvest recommendations and other management decisions, the Rat River and West Side Working Groups consider that a portion of the total harvests for each stock is taken in mixed stock coastal fisheries. Better understanding of the origin of fish caught in the mixed stock fisheries in both Canada and Alaska is required to ensure that no stock is overharvested.

### Predation

Predation on Dolly Varden by other species, such as bears, eagles and seals is a natural occurrence. However, many community members are concerned that increased predation, especially by increasing numbers of otters and other species new to the area, may be contributing to the decline of some Dolly Varden stocks, especially by feeding in overwintering areas (fish holes). Examples of these observations and concerns are: an increase in the otter population has been reported since the 1970s, otters eat fish and travel up rivers, and the otters could wipe out Dolly Varden stocks if they reach fish holes; black and grizzly bears, especially before hibernation, have been observed feeding on Dolly Varden runs in the Rat River, especially in the shallow rapids below the Fish Hole; eagles and hawks also feast on Dolly Varden, especially in shallow areas of the channel, and high concentrations of eagles have been reported around Fish Hole; ringed Seal eat Dolly Varden along the coast and their populations may be increasing, and have been reported congregating in large numbers at river mouths. Understanding the impacts of the reported increased predation on stock size is required.

### Habitat Change

Changes or loss of critical habitat (e.g. spawning and overwintering habitats) would severely affect Dolly Varden stocks and may have contributed to declines in the Big Fish and Rat rivers. Habitat changes may result from local anthropogenic stresses, climate change or natural variability. Some specific concerns include: groundwater levels at overwintering sites; reduced water flow in rivers especially at overwintering sites; less saline water at the Fish Hole on the Big Fish River; physical disturbance of spawning grounds and riparian habitats; and possible disruption of offshore migrations by man-made structures and activities in the nearshore Beaufort Sea coast.

Critical Dolly Varden habitat should be identified, monitored and protected. On-land and off-shore industrial and other projects that may affect Dolly Varden habitat should be carefully reviewed to ensure appropriate protection requirements are included.

More information on Dolly Varden habitats and ecosystems is provided in Appendix E.

### Climate Change

Impacts of climate change may affect Dolly Varden directly and indirectly. Climate change is projected to have effects on the physical environment (e.g. temperature, ice, storms etc.) which may have subsequent effects on Dolly Varden and other species. The following are some projections and concerns. The distribution of Dolly Varden could contract or shift northwards in response to temperature changes. Other species, such as Pacific salmon (*Oncorhynchus* spp.), may become more numerous in the area and compete with Dolly Varden. Climate changes may render Dolly Varden habitat less suitable by altering substrate composition through bank and shoreline erosion and silting, and by shifting the amount of groundwater at spawning and overwintering sites upon which eggs, fry and overwintering fish depend. Climate change may be a cause of

reduced water flow in the rivers and of decreased salinity in the Big Fish River. Coastal erosion may be affecting Dolly Varden's nearshore migration corridor. Climate change is projected to enhance productivity in the offshore pelagic environment, which would provide Dolly Varden with increased quality and quantity of food during the summer; Dolly Varden monitoring from 1995 to 2007 suggests this to be the case, with increased growth rates of Dolly Varden documented during this period. To the extent possible, the effects and implications of climate change on Dolly Varden should be predicted and monitored, and considered accordingly in all management actions. The Gwich'in, Inuvialuit and DFO should continue to participate in circumpolar climate change initiatives.

### Over-Fishing

Over-fishing of some Dolly Varden stocks may have contributed to recent declines. Harvesters and managers should work together to ensure that over-fishing does not occur and to provide complete and accurate harvest information that is essential for the proper management of these fisheries.

### GSA and ISR Overlap

Dolly Varden is distributed and harvested in both the GSA and ISR. The Overlap Agreement between the Gwich'in Tribal Council, the Inuvialuit Game Council and the Inuvialuit Regional Corporation states that wildlife (including fish) populations with ranges falling partly or entirely within the Aklavik 1400 Land will be managed jointly by the Aklavik HTC and the Ehdiitat RRC, and that each group will waive its exclusive and preferential harvesting rights. HTCs and RRCs make inter- and intra-community allocation decisions; for instance in 2009 the Aklavik HTC, the Ehdiitat RRC and the Teetl'it RRC decided on the inter-community allocation of the Rat River Dolly Varden harvest.

A formal working agreement is in place to ensure coordination and cooperation between the Rat River Working Group and the West Side Working Group. The chairs of the Working Groups are formally invited to participate as observers in the proceedings of the other Working Group. This helps to ensure a cooperative approach to managing Dolly Varden overlap issues.

As more knowledge accrues, participation of Sahtu and Yukon organizations may benefit the management of these Dolly Varden stocks.

### Canada and Alaska

Some Dolly Varden stocks are shared between Canada and Alaska. No formal Dolly Varden management agreement exists between Canada and the USA, or among the Gwich'in, Inuvialuit and Inupiat. Informal information exchange has occurred. If more formal arrangements are required, the Inuvialuit/Inupiat Beluga Whale and Polar Bear commissions provide possible models.

### Potential SARA Listing

If Dolly Varden is listed under *SARA*, harvesting might be affected. The purposes of the *SARA* are “to prevent wildlife species from being extirpated or becoming extinct, and to provide for the recovery of a wildlife species that is extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened”. The northern subspecies of Dolly Varden is being assessed under the COSEWIC process. COSEWIC’s designation, expected in 2010, will be considered by the Minister of Fisheries and Oceans. After gathering more public input and consulting affected communities to consider the political and socio-economic impacts of listing the species, the Minister could choose or decline to list Dolly Varden under *SARA*, or could request more information; consultation with key stakeholders is a required part of the Minister’s decision-making process. The *SARA* can allow certain activities, such as fishing, to continue if they are permitted under an action plan, management plan or recovery strategy. If Dolly Varden is listed under the *SARA*, the Minister may incorporate an approved IFMP into a *SARA* action plan, management plan or recovery strategy. It is intended that this IFMP for Dolly Varden would contribute to that plan, potentially allowing harvesting to continue and providing guidance on other management actions. An IFMP does not replace the formal requirements of the *SARA*.

## **6. THE MANAGEMENT PLAN**

Management to ensure the long-term conservation and sustainable use of Dolly Varden stocks in the GSA and ISR through this IFMP is based on:

- objectives and strategies for the management of the Dolly Varden stocks and fisheries;
- estimated stock sizes;
- monitoring of harvests and biological indicators;
- management measures, e.g. for research, habitat protection, education and compliance, to achieve the objectives;
- fishery management actions for each stock;
- fishing plans for each harvested stock; and
- application of the adaptive co-management process to the annual reviews of management of the Dolly Varden stocks (see Section 7).

### **6.1 Objectives and Strategies**

The following objectives for Dolly Varden management are broad in scope and require a long-term timeline for completion. They support the goals of achieving conservation and sustainable use of Dolly Varden in the GSA and ISR. Each objective has strategies for achieving the objective.

*Stock Conservation*

- To maintain healthy stocks of Dolly Varden throughout the GSA and ISR.
  - Conduct stock assessments of all known anadromous Dolly Varden populations.
  - Identify other harvestable Dolly Varden stocks in the GSA and ISR.
  - Ensure the harvesting of Dolly Varden is sustainable in the long term.

*Ecosystem*

- To preserve and protect Dolly Varden habitats in all rivers in the GSA and ISR and along the Beaufort Sea coast to ensure that the Dolly Varden stocks continue to thrive.
  - Identify and assess critical habitats.
  - Protect Dolly Varden and its habitats from adverse effects of development.

*Stewardship*

- To manage the Dolly Varden fisheries using adaptive management processes with full community participation.
  - Manage the Dolly Varden fisheries in the GSA and ISR through the Rat River Working Group and the West Side Working Group.
  - Monitor coastal and inland fisheries.
  - Involve the harvesters and communities in decision-making and information exchanges.
  - Ensure compliance with requirements for the conservation and sustainable use of Dolly Varden.

*Socio-economic*

- To ensure the maintenance of Dolly Varden in rivers, streams and other waters of the GSA and ISR, primarily for the purpose of subsistence food and as a mechanism for the support of traditional Gwich'in and Inuvialuit culture.
- To manage, to the extent possible, the Dolly Varden fisheries in a manner consistent with Gwich'in and Inuvialuit cultural practices.
  - Ensure the subsistence food fishery is the first priority for sustainable use.
  - Ensure effective allocation of the harvestable fish.
  - Promote traditional practices in implementing Dolly Varden management decisions.

The objectives are consistent with the general objectives of the land claims agreements, DFO and Parks Canada Agency (see Appendix I and the GCLCA and IFA). They are explicitly or implicitly reflected in this Dolly Varden IFMP.

**6.2 Management Measures**

Management measures for each strategy implement the objectives in section 6.1. They have been developed primarily by the Rat River Working Group, the West Side Working Group in consultation with the HTC, RRCs and communities. Appendix J provides the full list of measures identified for the management of Dolly Varden in the GSA and ISR

arranged under the appropriate objective and strategy. Many of the management measures are voluntary.

The main management measures are:

- taking a precautionary approach in making decisions on Dolly Varden management;
- developing fishing plans for harvested stocks ;
- continuing with existing stock conservation measures;
- monitoring harvest levels and biological indicators annually;
- maintaining a regular stock assessment program;
- ensuring harvest levels do not exceed levels set out in Table 3 (Section 6.3);
- implementing fishery management measures as identified in Section 6.4;
- adjusting harvest levels (but not to exceeding levels in Table 3) and allocations each year if necessary to ensure continued sustainable use;
- protecting freshwater and marine habitats of Dolly Varden stocks;
- complying voluntarily with the harvest requirements;
- conducting compliance activities as necessary;
- developing and undertaking with the communities an integrated research and monitoring plan to address stock conservation and habitat protection requirements; and
- developing and delivering a comprehensive cultural and educational program.

More information on these and other management measures is in Appendix J. Appendix K contains more information on the Research and Monitoring Plan, and Appendix L contains more information on the Compliance Plan.

### **6.3 Stock Management**

The Dolly Varden IFMP assigns stocks to one of four management categories, with associated management actions, to aid their management and recovery. The categories are:

- Healthy (Green)
- Cautious (Yellow)
- Critical (Red)
- Undetermined (Grey)

In 2010, existing stock assessment time series data for most stocks are too short of duration to calculate reference points, and a recommended TAC has only been calculated for the Rat River stock in the GSA and ISR. Hence insufficient stock assessment data exist to calculate stock status zone or reference points as identified in the Precautionary Approach for assigning any Dolly Varden stocks in the GSA and ISR to a management category. However, a preliminary qualitative assignment of Dolly Varden stocks to management category was made based on the relatively low numbers of fish, past history

and current knowledge of the stocks and their harvests. Table 3 identifies the preliminary assignment of stocks to management categories, the rationale and the associated management actions. This approach is precautionary, and will be used until stock assessment data are available to calculate reference points and stock status zones or until other information warrants a change in the assignment of a stock to a category.

Table 3. Preliminary Assignment of Stocks to Management Categories with Rationale and Stock Management Objectives.

Management Category	Stocks	Rationale	Management Actions
Healthy (Green)	None		<ul style="list-style-type: none"> <li>• 5% removal rate, based on the most recent stock size estimate</li> <li>• Voluntary harvest management</li> <li>• Only general legislative requirements and sport fishing limits apply</li> </ul>
Cautious (Yellow)	Rat River	<ul style="list-style-type: none"> <li>• Low fish population numbers during last stock assessment (2004)</li> <li>• Population may be stable or increasing currently</li> </ul>	<ul style="list-style-type: none"> <li>• Less than 5% removal rate, based on the most recent stock size estimate</li> <li>• Promote rebuilding of the stock through education and specific management measures</li> <li>• Voluntary harvest management</li> <li>• Only general legislative requirements and sport fishing limits apply</li> <li>• Maintain regular stock assessments to determine population status and trend</li> </ul>
Critical (Red)	Big Fish River	<ul style="list-style-type: none"> <li>• Historic declines in fish stocks</li> </ul>	<ul style="list-style-type: none"> <li>• No targeted harvest</li> <li>• Harvest closure in regulations</li> <li>• Promote rebuilding of the stock through education and specific management measures</li> <li>• Maintain regular stock assessments to determine population status and trends</li> </ul>
Undetermined (Grey)	Firth	<ul style="list-style-type: none"> <li>• No current data</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain regular stock assessments to determine population status and trend</li> </ul>
	Babbage	<ul style="list-style-type: none"> <li>• No current data</li> </ul>	<ul style="list-style-type: none"> <li>• Less than 5% removal rate</li> </ul>
	Fish	<ul style="list-style-type: none"> <li>• No current data</li> </ul>	<ul style="list-style-type: none"> <li>• Promote rebuilding of the stock if required through education and specific management measures</li> </ul>
	Malcolm	<ul style="list-style-type: none"> <li>• No current data</li> </ul>	<ul style="list-style-type: none"> <li>• Voluntary harvest management</li> <li>• Only general legislative requirements and sport fishing limits apply</li> </ul>
	Vittrekwa	<ul style="list-style-type: none"> <li>• Small population</li> <li>• More data required</li> </ul>	



## **6.4 Fishing Plans**

Fishing plans present the relevant management measures (Section 6.2 and Appendix J) and management actions in Table 4 as specific requirements for managing the major Dolly Varden stocks and fisheries in the GSA and ISR. Fishing plans help guide harvesters, HTC's, RRC's, co-management boards and government agencies in the management of the stocks. A fishing plan has been implemented successfully for the Rat River stock since 1996.

Fishing plans exist or are being developed as follows:

- Big Fish River (new in 2010);
- Rat River (updated in 2010);
- Vittrekwa River (in progress).

Fishing plans for other stocks and fisheries will be developed if warranted.

This Dolly Varden IFMP provides the framework for the fishing plans. The fishing plans are or will be based on the Rat River Charr Fishing Plan. They include sections on goals, recommended harvest levels, recommended fishing gear and methods, allocation of harvest, storage and processing, and research and monitoring.

Key fishery management measures of the fishing plans are:

- implementation of a stock assessment program that will lead to the development of safe harvest levels and other necessary management measures for the Dolly Varden fisheries;
  - stock assessments of Firth River, Babbage River and Vittrekwa River are planned for 2011;
- a comprehensive annual harvest monitoring program that will provide complete and accurate harvest and other information that may indicate whether positive or negative changes are occurring to the Dolly Varden stocks and harvests;
- application of the appropriate management actions from Table 3;
- no commercial fishing;
- sport fishing regulated;
- use of identified fishing gear and fishing methods
  - 4" or 4.5" mesh nets,
  - nets no more than 30 meshes deep,
  - no more than three nets per household,
  - nets no more than 25 yards long,
  - nets checked twice per day;
- water quality and quantity monitoring as needed;
- identification of other required research;
- appropriate habitat protection measures;
- appropriate compliance and education actions.

Relevant information on the stocks and harvests will be reviewed annually to determine whether changes need to be made on any aspect of a fishing plan. The fishing plans will undergo a formal review every three to five years.

## **7. THE MANAGEMENT PROCESS**

The Dolly Varden fishing plans require annual review and updating to reflect new information. The effectiveness of the IFMP, the fishing plans and their implementation also requires periodic assessment. These requirements need to be managed well.

### **7.1 The Annual Review Process**

Each year, the Rat River Working Group and the West Side Working Group will lead the annual review of their fishing plans. Their meetings will review the success of the year's fishing season and management activities, plus any new information that has been collected. The Working Groups will involve the HTC and RRCs, communities, harvesters, DFO, GRRB, FJMC, Parks Canada Agency and others as appropriate. The Working Groups will hold joint meetings as required. The performance review process will follow the adaptive co-management process (see Section 2.2 and Appendix D).

In the annual review of fishing plans, the Working Groups will:

- use the information from the stock assessment and harvest monitoring programs and any other sources to determine:
  - whether a change in harvest levels (consistent with the levels in Table 3) is warranted;
  - whether other management changes are required,
  - whether the management category for a stock should be changed,
  - when new stock assessments are required,
  - whether additional research initiatives (e.g. on habitat) should be undertaken,
  - whether the harvest monitoring program should be changed;
- determine whether any changes are required to improve habitat protection;
- determine whether additional research is required;
- determine whether to undertake other new initiatives; and
- determine whether any new educational initiatives are required.

Under the guidance of DFO and the Working Groups, the communities monitor Dolly Varden fisheries each year. Monitors collect information on numbers of fish caught, the numbers of harvesters and their effort, fish size, sex and maturity. Monitors and harvesters also may record other relevant observations such as numbers of migrating fish, numbers of overwintering fish, habitat changes etc. The monitors provide the information to the Working Groups, DFO, the FJMC and GRRB for the annual reviews

Ideally, stock assessment surveys would be conducted for each Dolly Varden stock every year so that management measures could be changed as necessary to reflect any increase

or decrease in stock numbers. However, annual stock assessments are not financially or logistically feasible for the Dolly Varden stocks. An alternative is to use a catch per unit effort index (CPUE), or possibly other indicators, for each Dolly Varden stock or fishery. In most fisheries, indices are developed from the catch and effort observed in the commercial, subsistence or sport fisheries, (typically from harvest monitors, log books, port/dock sampling) augmented by periodic scientific surveys. The use of CPUE for Dolly Varden stocks and fisheries, based on information provided by the monitors, will enable the provision of advice, in the absence of annual stock assessments, on harvest levels that should result in sustainable harvests.

In addition, the annual variability of Dolly Varden populations, like most fish species, is large reducing the usefulness of many potential indicators. Likely, large annual changes in environmental conditions affect natural mortality, and this interacts with fishing mortality often radically affecting population abundance. Increasing harvest levels to reflect short term increases in abundance could lead to significant declines in abundance because of the synergistic effect of high natural mortality and increased fishing mortality. This IFMP advocates a consistently low harvest rate in the Dolly Varden fisheries until stocks can sustain a 5% harvest rate.

When new stock assessment information becomes available, the annual reviews will include a detailed consideration of harvest levels. In addition, the resultant calculated stock status zone and reference points will enable the stock to be assigned to the appropriate management category, and the corresponding management actions will be implemented (see Table 3). Once a stock has been assigned to a management category based on calculated reference points, its management category will not change until new information from a stock assessment becomes available.

In the absence of annual stock assessment information, CPUE information will be an essential component of the annual reviews. Information on other indicators, such as fish size, fish condition, sex ratio, maturity, number of migrating fish, number of overwintering fish, etc. also will be considered but their limitations will be recognized.

Changes in harvest levels are not desirable without new stock assessment information. However, if significant changes in CPUE or any other indicator are noted, changes in harvest management measures will be considered. If significant increases in CPUE or other indicators occur then a cautious increase in harvest levels to no more than 5% of the most recent stock size estimate could be considered, or if significant decreases occur then a cautious decrease in harvest levels should be considered. Similarly significant increases or decrease in any indicator(s) could lead to other changes in harvest management measures such as in the number of harvesters, fishing areas, fishing time and fishing gear.

The Working Groups will propose any modifications of management measures that are needed to ensure the objectives continue to be met. They will provide their annual reports to the Steering Committee (see Section 7.2). The Steering Committee will be required to approve any significant changes to the fishing plans.

## **7.2 Management of the Process**

The implementation of the Dolly Varden IFMP needs to be managed well.

- A Steering Committee of senior representatives of DFO, the FJMC, the GRRB and Parks Canada Agency will be formed with clear Terms of Reference.
- The Terms of Reference for the Rat River Working Group and the West Side Working Group will be reviewed and modified as necessary to ensure they reflect the Working Groups' key roles in implementing the Dolly Varden IFMP.
- The parties of the Steering Committee will work together to ensure that funds are available to the extent possible to support the effective implementation of their responsibilities in this Dolly Varden IFMP and the fishing plans, and for their revisions.

The Steering Committee will lead the development of the two sets of Terms of Reference, and all parties will work together to manage the implementation of the IFMP.

## **7.3 Performance Review and Modifications**

Every three to five years the IFMP and fishing plans will undergo an in-depth evaluation to determine whether their objectives are being achieved and whether any changes are required. The in-depth evaluation will include assessment of the IFMP and fishing plans, the process for developing the IFMP and fishing plans and the effectiveness of the management measures. The evaluation will make recommendations and suggestions for improvements. Evaluation criteria and measurable indicators will be developed to help guide this process.

If Dolly Varden is listed under the *SARA*, the resultant action plan, management plan or recovery strategy would have to be reviewed every five years. The *SARA* review process and the IFMP review process would be linked closely.

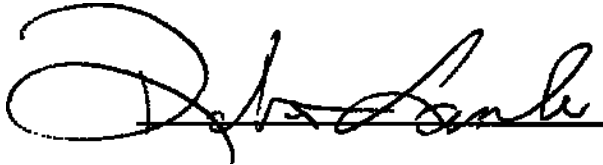
A specific requirement is to determine whether and when to formally involve the Sahtu, Vuntut Gwich'in and Alaska in the IFMP for the Dolly Varden stocks of the GSA and ISR.

## 8. SIGNATURE PAGE

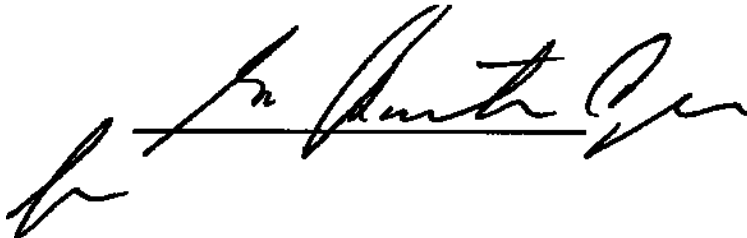
The Department of Fisheries and Oceans, the Fisheries Joint Management Committee, the Gwich'in Renewable Resources Board and the Parks Canada Agency support this Dolly Varden Integrated Fisheries Management Plan for the Gwich'in Settlement Area and the Inuvialuit Settlement Region, and are committed to its effective implementation.

The signatories wish to acknowledge the roles of the Aklavik HTC, the Ehdiitat RRC, the Teetl'it RRC, the Rat River Working Group and the West Side Working Group in the development of the IFMP, and their roles and responsibilities for its implementation.

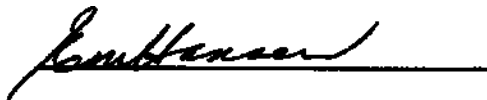
The signatories undertake to conduct an in-depth review and evaluation of the Dolly Varden IFMP every three to five years.



R. Lambe, Regional Director General, Central and Arctic Region  
Department of Fisheries and Oceans



V. Gillman, Chair  
Fisheries Joint Management Committee



L. Hansen, Member, on behalf of  
Gwich'in Renewable Resources Board



I. Thomas, Superintendent, Western Arctic Field Unit  
Parks Canada Agency