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**Proceedings of the regional assessment for Dolly Varden (*Salvelinus malma*) in the Rat River, Northwest Territories**

**March 17-19, 2008**

**Inuvik, NT**

**Chairperson: Kathleen Martin**

**Editors: Lia Kruger and Holly Cleator**

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## Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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## SUMMARY

A regional science peer-review meeting was held in Inuvik, Northwest Territories, on March 17-19, 2008, to provide advice on the status of the Dolly Varden (*Salvelinus malma malma*) in the Rat River. Meeting participants included Fisheries and Oceans Canada (DFO), the Yukon Government, Gwich'in Renewable Resource Board, Rat River Working Group and the West Side Working Group, Fisheries Joint Management Committee, char monitors from Fort McPherson and Aklavik, Fort McPherson Renewable Resource Council, Aklavik Renewable Resource Council and Aklavik Hunters and Trappers Committee. During the meeting, participants reviewed four working papers which formed the basis for discussions about the biology, population estimates, habitat requirements and threats to survival of Rat River Dolly Varden. This Proceedings report summarizes the relevant discussions and presents the key conclusions reached at the meeting. The Proceedings and the Science Advisory Report are available on the [DFO Canadian Science Advisory Secretariat \(CSAS\) website](#).

### **Compte rendu de l'évaluation régionale du dolly varden (*salvelinus malma*) de la rivière rat, territoires du nord-ouest, de 2002 à 2007**

## SOMMAIRE

Une réunion régionale d'examen scientifique par les pairs s'est déroulée à Inuvik, dans les Territoires du Nord-Ouest, du 17 au 19 mars 2008 afin de produire un avis sur l'état du Dolly Varden (*Salvelinus malma malma*) dans la rivière Rat. Les participants à la réunion étaient notamment des représentants de Pêches et Océans Canada (MPO), du gouvernement du Yukon, du Conseil des ressources renouvelables de la nation Gwich'in, du groupe de travail sur la rivière Rat et du groupe de travail du versant ouest, du Comité mixte de gestion de la pêche, des surveillants des stocks du Dolly Varden de Fort McPherson et d'Aklavik, du Conseil des ressources renouvelables de Fort McPherson, du Conseil des ressources renouvelables d'Aklavik et du Comité des chasseurs et des trappeurs d'Aklavik. Pendant la réunion, les participants ont passé en revue quatre documents de travail qui constituaient la base des discussions sur la biologie, les estimations de la population, les exigences en matière d'habitat et les menaces pour la survie du Dolly Varden de la rivière Rat. Le présent compte rendu résume les discussions pertinentes et présente les conclusions importantes tirées de la réunion. Le compte rendu et l'avis scientifique sont disponibles sur le [site Web du Secrétariat canadien de consultation scientifique \(SCCS\) du MPO](#).

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## INTRODUCTION

The Rat River, almost all of which is located within the Northwest Territories, supports Dolly Varden (*Salvelinus malma malma*). When the status of this stock was assessed in February 2001 it appeared to be stable and in no immediate danger under the harvest strategy that was in place at that time (DFO 2001). However, soon after the stock underwent a sharp decline in abundance. In 2006, co-management partners decided to close the Rat River fishery, on a voluntary basis, during the fall migration and permanently close the Rat River fish holes. These management measures were in place for 2006 and 2007 after which Fisheries and Oceans Canada (DFO) Science was asked by DFO Fisheries Management for advice on the status of the Rat River Dolly Varden stock. A regional science peer-review meeting was held in Inuvik, Northwest Territories, on March 17-19, 2008.

The objective of the meeting, as described in the Terms of Reference (Appendix 1), was to peer review the most recent information available for the purpose of assessing the current status of Rat River Dolly Varden. Participants included DFO, the Yukon Government, Gwich'in Renewable Resource Board, Rat River Working Group and the West Side Working Group, Fisheries Joint Management Committee, char monitors from Fort McPherson and Aklavik, Fort McPherson Renewable Resource Council, Aklavik Renewable Resource Council and Aklavik Hunters and Trappers Committee (Appendix 2). Four working papers were drafted and distributed in advance of the meeting to serve as the basis for the discussions. The meeting followed the agenda outlined in Appendix 3. For clarity, the initial overview presentations given on the afternoon of March 17, 2008, were combined with the later full presentations for each working paper.

This Proceedings report summarizes the relevant meeting discussions and presents the key conclusions reached. Science advice resulting from this meeting is published in the CSAS Science Advisory Report (SAR) series on the [DFO Canadian Science Advisory Secretariat \(CSAS\) website](#).

## DISCUSSION

Following opening remarks, three researchers gave brief summaries of their Dolly Varden research to prepare the meeting participants for the more detailed presentations and discussions that would occur the following day. At the start of the second day the meeting Chair provided an overview of the regional advisory process, meeting objectives and draft documents to be reviewed. This was followed by a presentation and discussion for each of the four working papers.

### **MARK-RECAPTURE AND LIVE-SAMPLING IN FISH CREEK**

#### **Status of anadromous Dolly Varden (*Salvelinus malma*) of the Rat River, Northwest Territories, as assessed through mark-recapture and live-sampling at the over-wintering site (1995-2008)<sup>1</sup>**

Author: S. Sandstrom and L.A. Harwood  
Presenter: Steve Sandstorm

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<sup>1</sup> Later published as Sandstrom et al. 2009.

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## **Presentation summary**

An overview of the Rat River system was presented. Fish Creek, a headwater tributary of the Rat River, has perennial springs which maintain open water year round where Dolly Varden spawn and overwinter. Both the lower and upper sites have spawning areas so it is thought there are two sub populations in this system. Locally this area is known as the Fish Hole. Based on dating sediments, this system has functioned as it is now for 600 years. Before that, parts flowed in different directions. In 1995, a science-based assessment program was undertaken to address several objectives including estimation of the anadromous stock size, and assessment of life-history composition, growth and repeat spawning of Dolly Varden at the Fish Hole. Stock size was estimated through a mark-and-recapture study. Fall tagging was undertaken in 1995, 1997, 2001, 2004 and 2007 on Fish Creek. Fish were sighted during helicopter flights over the creek after which a seine net was used on the ground to sweep the pool and “mark” fish of suitable size using Floy tags colour-coded for the year of tagging. In fall 2007, the adipose fin on the back of about 400 fish was clipped to determine the incidence of tag loss. During the fall 2008 survey the proportion of fish with a clipped adipose fin but no Floy tag observed in relation to the total number of 2007 tags recaptured was recorded to estimate annual tag loss. Flaps of skin were also collected from captured fish, then preserved and analyzed, to determine if there were genetic differences between spawners. An annual harvest monitoring study of the summer fisheries has also been underway since 1995 at several locations along the migratory route of this stock. During the harvest study, some local harvesters were hired to work as fish monitors. They recorded numbers of tagged and untagged fish, allowing researchers to use the ratio of marked to unmarked fish to produce an estimate of population size for each tagging year and assess temporal trends in population abundance.

## **Discussion**

Participants discussed various aspects of tagging. A participant asked if fish with clipped adipose fins could be mistaken for fish from other streams. That was thought to be unlikely because few fish in the Rat River system live longer than 10 years. In fall 2004 and 2007, 270 and 400 fish were tagged, respectively, and their lengths and gender were recorded. The recorded increase in mean length of male and female spawning Dolly Varden pre-2000 versus post-2000 is due to an actual increase in length at a given age, not a shift in age structure. The fact these fish are growing faster could be an indication of lower stock numbers. Sample sizes need to be added to the mean sizes of spawning fish presented in the working paper. A participant noted that the ability to estimate population size is dependent on the number of fish that are collected. The estimate improves as the number of fish collected or tagged increases. Another participant was concerned that the ability to estimate population size is becoming impaired due to a decline in the fishery.

A participant asked if any resident Dolly Varden or Grayling were caught in the seine nets. In 2004, one resident and many Grayling had been caught.

Participants discussed whether the recorded 9:1 sex ratio would affect the gene pool and population. Some thought it would while others did not.

The Fish Hole is comprised of five main pools. People used to fish in the area and there is obvious evidence of traditional campsites nearby. Photographs of a pool taken since 1995 showed an obvious decline in water level over the years. Participants discussed possible reasons for the declining water levels including changes to groundwater sources. Another possibility is there may be less water coming into the system as a result of an earlier thaw and later freeze-up, resulting in a lengthening summer period. A participant said that the deteriorating ability of these river systems to support and sustain Dolly Varden populations since the 1980s has been the result of changing environmental conditions, not the fishery.

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The Rat River studies began in 1995 when it became evident that the stock was experiencing difficulties. In response to a question, the presenter said that temperature of the sites sampled (input from groundwater springs) during this study was about 4°C.

Silvers<sup>2</sup> were not included in this study because it is difficult to differentiate males from females. A participant commented that another presenter looked at the size of silvers and found some were as old as 5 years of age. In that study, they compared years while controlling for age. The participant wondered if it would be possible to control for size. The presenter thought that was possible. Dolly Varden in the Rat River first spawn at about 400 mm fork length (FL) so juvenile silvers are regarded as those less than 400 mm FL while adults silvers as those greater than 400 mm FL.

## **SAMPLING OF THE SUBSISTENCE FISHERY**

### **Status of anadromous Dolly Varden (*Salvelinus malma*) of the Rat River, Northwest Territories, as assessed through sampling of the subsistence fishery (1995-2007)<sup>3</sup>**

Authors: L.A. Harwood and S. Sandstrom

Presenter: Lois Hardwood

#### **Presentation summary**

Fishermen from two adjacent land claim groups, the Gwich'in and the Inuvialuit, harvest Dolly Varden from the Rat River. The fishery has been monitored through the present harvest-based sampling program annually since 1995. Monitors record size of harvest; sample and measure fish (age, length, weight, sex, maturity); process tag returned fish; and measure fishing effort. Data from tag returns are used to estimate stock size, growth, sex and maturity stages, and identify repeat spawning. Data from the monitoring program were presented.

#### **Discussion**

The presenter responded to a number of questions and comments on various aspects of the study. A participant asked if tests had been conducted on the parameter estimates. The presenter thought they had. Another participant noted that in 2008 and 2009 the fish sampled were bigger and longer than in other years and asked if sampling had been restricted to Dolly Varden. Northern Pike (*Esox lucius*) and Lake Whitefish (*Coregonus clupeaformis*) were also caught in the seine nets. Clippings from the adipose fin and the side of the fish were taken to obtain more aging and genetic information. Little Floy tags were used for tagging. A participant said that ongoing oil and gas projects and the possibility of ice breakers in the ocean may present a hazard for overwintering char. Another participant thought that Dolly Varden would not be affected because they probably stay close to shore.

A number of suggestions were posed by the participants. One was to examine the dataset to determine whether it's possible to detect effects of years of high harvest on Dolly Varden reproduction. Another was to focus on Dolly Varden habitat along the entire Rat River system. Some thought the information could be presented in a more user-friendly format (e.g., include absolute numbers as well as percentages) and that a separate forum should be developed for communities that would allow more input from local boards and communities. The Chair informed participants that the advisory document resulting from the meeting will provide a summary of the harvest study results in plain language and be publicly available.

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<sup>2</sup> "Silvers" are sea-run males and females returning from the ocean that are either immature or are mature but not spawning that year.

<sup>3</sup> Later published as Harwood et al. 2009.

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One of the findings of the harvest study was that from 1995 through 2005 there had been an increase in the mean length of Dolly Varden at a given age of female spawners, male spawners and silvers over time. There was some discussion about the timing of break up influencing the quantity and quality of Dolly Varden prey while they are at sea. Participants thought that the Results and Discussion section of the working paper contained insufficient information about FL (size) and juvenile diet, and no information about early life history. They recommended the authors include additional material and discussion concerning these topics.

The impacts of potential threats to Dolly Varden were discussed. Participants agreed that some very distinct environmental changes, such as low water, are occurring in the Rat River system that are affecting Dolly Varden habitat. It was suggested by some that this species may be moving to other areas in the system where they can spawn and overwinter. If true, other participants wondered whether the size of these new spawning and overwintering areas is large enough to sustain the population.

When Dolly Varden populations are stressed, they are more vulnerable to threats. One such threat is Infectious Pancreatic Necrosis, although no current research is underway to assess the prevalence of this virus. A stressed population may also experience significant negative effects from predation. A participant wondered about otters (*Lontra canadensis*) as a possible predator although others said they have not seen otters in the Rat River. The presence of many mergansers was reported. Dolly Varden in the Rat River seldom show evidence of bite marks. Participants discussed the higher levels of mercury that have been found in large Lake Trout (*Salvelinus namaycush*) and wondered whether the same may be true for Dolly Varden. It was thought to be unlikely as the diet of Dolly Varden is focused lower on the food chain than large Lake Trout, but worth investigating. The authors agreed to include some information about possible stressors in their working paper.

A participant asked if the catch per unit effort (CPUE) information from the monitoring sites also included released fish. Up until two years ago, the CPUE data only included fish that had been caught but since then both caught and released fish have been included in the dataset. Participants suggested that the authors include in their working paper a good description of the dataset, as well as inconsistencies, and results of statistical analyses (including standard deviation). Statistical analysis of frequency distributions would also be helpful. Participants also recommended the authors undertake additional analysis to better quantify how the harvest impacted the Rat River population in the late 1990s and to provide useful information for management purposes.

Given the potential threats and the longevity and reproductive span of Dolly Varden in the Rat River system (7 years and 5-7 years, respectively), this population will require some time to recover. Deterioration of habitat in the Rat River system will likely further lengthen time to recovery.

## **HARVEST AND ESTIMATES OF ABUNDANCE**

### **Total known or estimated Rat River Dolly Varden harvest, 1972-2006**

Presenter: Steve Sandstrom

#### **Presentation summary**

Known or estimated Dolly Varden harvests from the Rat River between 1972 and 2006 were presented. Harvest numbers or estimates were obtained from Shingle Point (50%), Aklavik, Husky Channel, Big Eddy, the mouth of the Rat River and Destruction City. Using data from the harvest and mark-recapture studies allowed researchers to calculate estimates of abundance for four different years. Abundance for 1995 was 8,448 (standard deviation (SD) = 1,004); for



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1997 was 9,734 (SD = 1,838); for 2001 was 7,436 (SD = 1,625); and for 2004 was 2,723 (SD = 467). If the Dolly Varden population in the Rat River in summer 2007 was comprised of about 3,000 fish then about 268 fish should be sampled in summer 2008 to ensure a reliable estimate of abundance.

## **Discussion**

Methods and assumptions of the mark-recapture program were discussed. Fish monitors intercepted and tagged Dolly Varden when they were leaving suspected spawning locations. It was assumed that fish with and without tags were equally vulnerable to the gill nets (i.e., tagged fish were not more susceptible to being caught) and equally distributed in the examined fish catch (i.e., tagged fish did not migrate earlier or later than untagged fish). Additionally, it was assumed that tags did not change the behaviour of fish. In reality, fish do react to tagging and handling. They will turn back or try to go around the net.

Participants considered the accuracy of the population estimates generated using mark-recapture analysis. One way to assess the presented data would be to use another method to estimate population abundance and compare the results. Someone suggested that if future sampling cannot be conducted yearly then population structure information could be used to conduct an alternate analysis for comparison. The group needs to decide what level of precision is needed, then consider methods that would produce a lower coefficient of variation (CV). Participants pointed out that the estimates of abundance generated by the mark-recapture study are not, in fact, population estimates. They are estimates of that portion of the population that is susceptible to the gill nets. Only those fish large enough to be caught in the gill nets were included in the analysis. An alternate population estimation method that would include smaller fish that are currently excluded from gill nets would be informative.

Most the Dolly Varden sampled during the harvest study were released. Participants discussed other sampling techniques that allow more fish to be sampled to reduce the CV of the abundance estimate. A fish monitor said that a maximum of 80 samples could be obtained in one month by seining. Someone suggested using small gill nets like the kind used for Lake Trout. A sample size of at least 200, and preferably 400, would be needed to produce a reasonable population estimate but if fish died as a result of sampling and the current population size is low then this would put the population at risk. Assuming the current population size is around 3,000 fish, based on the 2004 abundance estimate, the current monitors' harvest of about 120 fish is safely below a 5% harvest level (150 fish). From a scientific perspective, a non-lethal research component using hoop nets at monitoring sites and/or seining at the fish hole would be needed to increase the current sample size in order to improve estimates of abundance. In addition to live sampling, a suggestion was raised to use one gill net mesh size instead of the two sizes currently used. However, the Rat River Fishing Plan requires that fish monitors use two mesh sizes. Someone thought that it would be possible to simplify and standardize the current capture methods by working in collaboration with the fish monitors.

## **HABITAT**

### **Photographic baseline of habitat for Dolly Varden Habitat in Three North Slope Rivers**

Authors: A. Joynt, N. Millar and A. Hoyt

Presenter: Amanda Joynt

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## **Summary**

The objective of this project was to create a photographic record of Dolly Varden habitat in the Big Fish, Rat and Vittrekwa rivers to provide a baseline for comparison with historical and future records and to serve as a starting point for future habitat studies of the northern form of Dolly Varden. Initial work involved a literature search of aerial habitat mapping techniques and fish habitat surveys. Historical fishing, overwintering and spawning areas were determined based on DFO research and completed traditional knowledge studies prepared by the West Side Working Group, the Fisheries Joint Management Committee and the Gwich'in Renewable Resource Board. Based on the background work, aerial surveys were conducted and on-the-ground data were collected. The aerial surveys were flown from a helicopter (at 200' altitude) along known Dolly Varden habitat in the Big Fish, Rat and Vittrekwa rivers taking high-quality, spatially-referenced digital photographs. A photographic record of overwintering and spawning habitat was developed for the three systems. Opportunistic ground work was conducted on the Big Fish and Rat rivers, which focused on recording habitat information for pool sites where fish were observed. Six pools were found on Fish Creek, a tributary of the Rat River. These pools had overhanging banks and vegetation and algae-covered rocks except for areas on the bottom of the pools with groundwater influx or scouring. Dolly Varden were observed within and between the pools. Recommendations for future work were to create consistent aerial and ground locations from which to photograph key areas (based on these photos) and to investigate feasibility of estimating quantitative ground measurements from the aerial photos.

## **Discussion**

Participants discussed the photographic survey. They asked if there was a better time of year to undertake the photographic survey. The survey had been conducted at a time when water levels would be full and fish present. September is not a good time because it interferes with migratory birds. Beaver dams were observed along the flight line. Participants suggested the researchers look into the availability of data from Water Survey of Canada and collect better data on water levels, flow rates and any changes that are occurring on the surveys. There are no plans to continue the surveys. Someone suggested using Google Earth to look at habitat changes over the past twenty years but the resolution for non-urban areas is not good enough for that sort of analysis.

Local participants noted that water in the Big Fish River used to be salty and undrinkable but since 1995 it has been clean, clear and very drinkable, although it has a high mineral content.

## **FUTURE RESEARCH**

Participants discussed and recommended a number of research activities and projects to address current knowledge gaps.

### **Habitat monitoring**

The baseline photographic survey has value as a monitoring tool so it should be repeated to ground-truth the photographs. Survey coverage should be extended further northward towards the Mackenzie Delta. Future surveys should be undertaken following significant climate events which would have the most impact on the river. A methods manual is needed to allow others to follow the initial survey methods and interpret the results. Efforts should be made to obtain historic photographs from researchers and community members that can be compared to the baseline photographs to document changes over time.

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## **Defining important habitat**

To define important habitat for this species it is necessary to understand the relationship between Dolly Varden and its habitat and to document environmental changes occurring in the river that may impact this habitat. To that end, groundwater upwellings, aufeis changes, water measurements (hydrology), water levels and flow, and timing of break-up (seasonal flow), and the processes that may affect them, should be monitored. Diet analysis for Dolly Varden would also be helpful.

## **Abundance**

Every effort should be made to accurately calculate an abundance estimate for 2007 using data available from the mark-recapture and harvest monitoring studies.

The possibility of using population modelling to quantify historic harvests should be looked into, as should the value of incorporating biological measures from historic harvests into population models.

Limited information is available on resident forms of Dolly Varden and the implications of their numbers on reproductive capacity. Available data suggest there are a few residents in the Rat River thus the skewed sex ratio could be a problem especially at a lower population size. Research on resident Dolly Varden should be conducted in the Rat River.

The relationship between increased fish growth and population size in Dolly Varden should be investigated to assess whether it can be used to estimate stock size. Stock structuring should be explored during the end of July or beginning of August spawning. It was recommended that more fin samples be taken for age comparison; not many were sampled in 2007.

## **Genetics**

It would be useful for management purposes to know the genetic component of each of the anadromous stocks of Dolly Varden that mix in coastal waters in summer. This line of inquiry may already be under investigation.

It is not currently possible to identify different fish species in the Rat River using sonar but it was suggested that researchers work with fish monitors when they sample the harvest to explore this possibility. Monitoring other species fished in the system may also help to better understand any changes going on within the Rat River system.

## **Environmental conditions**

Fish monitors have recorded environmental information, including temperature, while monitoring the harvest. This information should be examined for patterns and trends.

## **Traditional knowledge**

Inuvialuit traditional ecological knowledge of Dolly Varden in rivers west of the Mackenzie River was documented in a written report produced in 2003 (Papik et al. 2003). Similar documentation of traditional ecological knowledge of Dolly Varden in the Rat River was also suggested.

## **SCIENCE ADVISORY REPORT REVIEW**

The group reviewed the Science Advisory report that had been drafted by the Chair for discussion during the meeting.

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## **Context**

No edits were made to this section.

## **Introduction**

No edits were made to this section.

### **Species Biology**

Edits were made to this section during the meeting and afterward. The following sentence was added to the first paragraph: “There are no known isolated populations in the Rat River system however residual forms are rare in the sampling programs carried on to date.”. A statement that Dolly Varden is a “short-lived *Salvelinus* (up to 10 years)” will also be inserted once the number has been confirmed. It was recommended that information about basic life history, spawning (in consecutive years), migration frequencies and feeding habits in the ocean also be included to this section.

### **Habitat**

The 2001 stock status report (DFO 2001) presents a good description of habitat and no new habitat studies have been published since then. Participants agreed to use the same information in the new report with some additions about changes in the location of the fish hole; changes in Dolly Varden habitat in the Rat River in recent years observed by researchers and fish monitors including any changes in water level and temperature; and changes that have occurred in coastal waters where Dolly Varden occur in summer.

### **Fishery**

Harvest numbers for 1994–1999 in Table 1 were updated and will be verified. A suggestion was made to include a statement in this section about harvest composition (silvers versus spawners, males versus females).

## **Assessment**

### **Sources of information**

Various sources of information including the mark-recapture study, community-based monitoring program and traditional knowledge were used to provide relevant information for the assessment of Dolly Varden in the Rat River.

### **Stock trends**

The group reviewed the sentence “Abundance was relatively stable without trend from 1995 to 2001 (7,400–9,700) however there was a significant decline ( $p=?$ ) to around 2,700 fish observed in 2004.”. One of the participants will provide the  $p$  value. Another sentence was added to this section to clarify that these estimates of abundance only apply to fish longer than about 320 mm FL.

### **Current status/future prospects**

Participants agreed that the current status of the Rat River Dolly Varden population is unknown. Preliminary results from the mark-recapture work conducted in 2006 provide some evidence for improved recruitment. The graph that shows a pulse of age 4 fish will be added to this section. Information on the several other relevant topics will also be included in this section: environmental changes and their effects on fish and habitat for Dolly Varden; numbers of spawning males and their bearing on effective population size; and instantaneous mortality rates (both natural and human caused).

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## **Biological information on growth, condition, etc.**

Information on age and length at first spawning, as well as changes in mean age and length over time and possible causes and implications of this, will be added to this section. Observed sex ratios for all fish and just spawning fish will also be included, in addition to condition information recorded by the fish monitors.

## **Sources of uncertainty**

The following sources of uncertainty associated with Dolly Varden were listed by participants: the mixed stock relationship within the coastal fishery; size of the summer spawning population, especially males; habitat use outside of the fall spawning period; abundance of juveniles and residents; and age and length of fish at smoltification.

## **Other considerations**

Disease, predators and other fish species in the Rat River were identified for this section. Information on each will be added to the document.

## **Summary bullets**

Participants drafted a number of summary bullets. The first bullet is the same as the first bullet in the 2001 stock status report (DFO 2001). The remaining bullets cover current stock status and trend, future prospects and uncertainty, recent management measures, and advice related to future research and management.

## **Conclusions and advice**

Text for this section will be added based on the summary bullets agreed to during the meeting.

The Chair thanked participants for attending the meeting. The documents will be updated based on the meeting discussions and then distributed to participants for review.

## **REFERENCES CITED**

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## APPENDIX 1: TERMS OF REFERENCE

### Regional Advisory Meeting

Assessment of Rat River Dolly Varden

March 17-19, 2008

Inuvik, NT

Chairperson: Kathleen A. Martin

### Background

The northern form of Dolly Varden (*Salvelinus malma*) is distributed in western Alaska north to the continental North Slope and extending eastward to the Mackenzie River system. Dolly Varden from the Rat River are considered biologically distinct from the other populations known from Arctic Canada. Although Dolly Varden are considered to be primarily anadromous, some populations are isolated by barriers and/or distance and there are co-occurring resident life history types.

Dolly Varden are harvested along the coastline of the Beaufort Sea by Inuvialuit and Alaskan harvesters (Inupiat) and by beneficiaries in the Inuvialuit Settlement Region (Aklavik) and Gwich'in Settlement Area (Aklavik and Fort McPherson). A Rat River Working Group was formed in 1995 with membership from the Gwich'in Renewable Resource Board (GRRB), Fisheries Joint Management Committee (FJMC), Aklavik Hunters and Trappers Committee (HTC), Aklavik Renewable Resource Council (RRC), Fort McPherson RRC, and Fisheries and Oceans Canada (DFO) to work towards a Fishing Plan that would support sound management of the fishery to maintain a healthy stock of Dolly Varden in the Rat River.

Since 2002, a sharp decline in the Rat River stock occurred based on evidence from harvests, catch-effort and biological characteristics of the population. In March 2006, following Working Group meetings and with the support of residents of Aklavik and Fort McPherson, a decision was taken by co-management partners to close the Rat River fishery on a voluntary basis. All fisheries (subsistence, domestic, commercial and sport fishing) would be closed during the fall migration including the entire migratory route of char, starting from the West Channel, through the Peel and Husky Channels and the Rat River; char monitors would continue to harvest a small number of fish. In addition, a permanent closure of the Rat River fish holes would be implemented. Following review of the monitoring results from 2006, the Working Group recommended a continuance of these management measures for the next two years. The Working Group will re-evaluate in the fall 2008 when a new population estimate will be available.

The status of the Rat River Dolly Varden was last assessed in February 2001.

### Objectives

This advisory meeting is being held to undertake a science-based peer review of all available information relevant to determining the status of the Rat River Dolly Varden stock. This assessment was requested by Fisheries and Aquaculture Management and should include:

- Reviewing all research results and fishery statistics collected since 2000.
- Critically examining the population estimate methods used in the assessments since 2000. Provide recommendations to modify methodology, if required.
- Determining whether there is sufficient information to assess the contribution of Rat River Dolly Varden to the coastal fishery. If not, identify required studies.

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- Reviewing any available traditional and local knowledge for Rat River Dolly Varden that would contribute to understanding the current status of the stock.
  - Assess risk/benefit of removal of 120 fish annually for population monitoring and determine if non-lethal sampling is possible.

### **Products**

All reports will be published on the Canadian Science Advisory Secretariat (CSAS) website: <http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm>. The meeting will generate a proceedings report summarizing the deliberations of the participants which will be published in the CSAS Proceedings Series. In addition, there will be a CSAS Research Document produced from the working papers presented at the workshop and a Science Advisory Report which will present the advice resulting from the meeting.

### **Participants**

Participants will include DFO Science, DFO Fisheries and Aquaculture Management, Gwich'in Renewable Resource Board, Fisheries Joint Management Committee, Aklavik HTC, Aklavik RRC, Fort McPherson RRC and residents of Aklavik and Fort McPherson.

### **Timetable for FY 2008/09**

Draft proceedings will be circulated to participants for comments in early spring 2008 and a final proceedings document is expected to be submitted to CSAS for publication by the end of June 2008. The Science Advisory Report will be finalized by May 2008 and the research document by June 2008.

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## APPENDIX 2: MEETING PARTICIPANTS

Participants	Affiliation
Billy Archie	Aklavik Hunters and Trappers Committee
Kevin Bill	DFO-Fisheries Management
Georgie Blake	Fort McPherson Renewable Resource Council
John Carmichael	Aklavik (RRC) char monitor
Robert Charlie	Gwich'in Renewable Resource Board
Larry Dow	DFO-District Manager
Fanny Greenland	Aklavik Renewable Resource Council
Lois Harwood	DFO-Science
Kim Howland	DFO-Science
Amanda Joynt	DFO- Habitat
Peter Kay	Fort McPherson Renewable Resource Council
Selwyn Kay	Fort McPherson char monitor
Max Kotokak	Rat River Working Group and the West Side Working Group
Kathleen Martin (Chair)	DFO-Science
Jonathan Michel	DFO-Fisheries Management
Nathan Miller	Yukon Gov - Dept of Environment
Neil Mochnacz	DFO-Science
Sheila Nasogauak	Fisheries Joint Management Committee
Steve Sandstrom	Ontario MNR
Sam Stephenson	DFO-Fisheries Management
Ross Tallman	DFO-Science
Amy Thompson	Gwich'in Renewable Resource Board
Beth (Hiltz) Thompson	DFO-Fisheries Management



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## APPENDIX 3: MEETING AGENDA

### PROPOSED AGENDA

#### Monday March 17, 2008

- 3:00 Opening remarks (K. Martin)
- 3:10 Brief presentations on recent research related to Rat River Dolly Varden (L. Harwood, S. Sandstrom and A. Joynt)
- 5:00 Adjourn until Tuesday

#### Tuesday March 18, 2008

- 9:00 Overview of regional advisory process, meeting objectives and draft documents (K. Martin)
- 9:20 **Working Paper #1** (S. Sandstrom). Status of anadromous Dolly Varden (*Salvelinus malma*) of the Rat River, Northwest Territories, as assessed through mark-recapture and live-sampling at the over-wintering site (1995-2008)
- 10:15 Health break
- 10:30 **Working Paper # 2** (L. Harwood). Status of anadromous Dolly Varden (*Salvelinus malma*) of the Rat River, Northwest Territories, as assessed through sampling of the subsistence fishery (1995-2007)
- 12:00 Lunch
- 12:45 **Working Paper # 3** (S. Sandstrom). Total known or estimated Rat River char harvest, 1972-2006.
- 12:55 **Working Paper # 4** (A. Joynt). Photographic Baseline for Dolly Varden Habitat in Three North Slope Rivers
- 1:15 Review and revision of draft Science Advisory Report
- Context
  - Introduction/Background (Species biology, Habitat)
  - The fishery
- 1:30 Discussion of the material presented as it relates to the stock assessment:
- Assessment
  - Sources of information
  - Stock trends
  - Current status/future prospects
  - Biological information on growth, condition, etc.
  - Sources of uncertainty
- 3:00 Health break
- 3:15 Continue discussions
- Other considerations
  - Summary bullets
  - Conclusions and advice
- 4:45 Closing remarks for the day
- Summary of the editorial and approval process for Science Advisory Report, Proceedings and Working Papers.
  - Assigning of revisions
- 5:00 Adjournment

#### Wednesday March 19, 2008\*

- 9:00 Continue discussions
- 11:00 Adjournment