



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Science

Sciences

C S A S

Canadian Science Advisory Secretariat

Proceedings Series 2011/005

Central and Arctic Region

S C C S

Secrétariat canadien de consultation scientifique

Compte rendu 2011/005

Région du Centre et de l'Arctique

**Proceedings of the Regional Advisory
Process on the Buffalo River Inconnu
(*Stenodus leucichthys*) population,
Great Slave Lake, Northwest
Territories**

**March 30-31, 2010
Yellowknife, NT**

**Michael Papst
Meeting Chairperson**

**Compte rendu du processus de
consultation scientifique régional sur la
population d'inconnu (*Stenodus
leucichthys*) de la rivière Buffalo, Grand
Lac des Esclaves, Territoires du Nord-
Ouest**

**30-31 mars 2010
Yellowknife, TNO**

**Michael Papst
Président de réunion**

Fisheries and Oceans Canada / Pêches et Océans Canada
Freshwater Institute / Institut des eaux douces
501 University Crescent / 501, University Crescent
Winnipeg MB R3T 2N6
Canada

May 2011

Mai 2011

Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings include research recommendations, uncertainties, and the rationale for decisions made at the meeting. Proceedings 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.

Avant-propos

Le présent compte rendu a pour but de documenter les principales activités et discussions qui ont eu lieu au cours de la réunion. Il contient des recommandations sur les recherches à effectuer, traite des incertitudes et expose les motifs ayant mené à la prise de décisions pendant la réunion. En outre, il fait état de données, d'analyses ou d'interprétations passées en revue et rejetées pour des raisons scientifiques, en donnant la raison du rejet. Bien que les interprétations et les opinions contenues dans le présent rapport puissent être inexactes ou propres à induire en erreur, elles sont quand même reproduites aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considérée en tant que reflet des conclusions de la réunion, à moins d'indication précise en ce sens. De plus, un examen ultérieur de la question pourrait entraîner des changements aux conclusions, notamment si l'information supplémentaire pertinente, non disponible au moment de la réunion, est fournie par la suite. Finalement, dans les rares cas où des opinions divergentes sont exprimées officiellement, celles-ci sont également consignées dans les annexes du compte rendu.

Proceedings Series 2011/005

Compte rendu 2011/005

Central and Arctic Region

Région du Centre et de l'Arctique

**Proceedings of the Regional Advisory
Process on the Buffalo River Inconnu
(*Stenodus leucichthys*) population,
Great Slave Lake, Northwest
Territories**

**Compte rendu du processus de
consultation scientifique régional sur la
population d'inconnu (*Stenodus
leucichthys*) de la rivière Buffalo, Grand
Lac des Esclaves, Territoires du Nord-
Ouest**

**March 30-31, 2010
Yellowknife, NT**

**30-31 mars 2010
Yellowknife, TNO**

**Michael Papst
Meeting Chairperson**

**Michael Papst
Président de réunion**

Fisheries and Oceans Canada / Pêches et Océans Canada
Freshwater Institute / Institut des eaux douces
501 University Crescent / 501, University Crescent
Winnipeg MB R3T 2N6
Canada

May 2011

Mai 2011

© Her Majesty the Queen in Right of Canada, 2011
© Sa Majesté la Reine du Chef du Canada, 2011

ISSN 1701-1272 (Printed / Imprimé)
ISSN 1701-1280 (Online / En ligne)

Published and available free from:
Une publication gratuite de :

Fisheries and Oceans Canada / Pêches et Océans Canada
Canadian Science Advisory Secretariat / Secrétariat canadien de consultation scientifique
200, rue Kent Street
Ottawa, Ontario
K1A 0E6

<http://www.dfo-mpo.gc.ca/csas-sccs/>

CSAS-SCCS@DFO-MPO.GC.CA



Correct citation for this publication:

DFO. 2011. Proceedings of the Regional Advisory Process on the Buffalo River Inconnu (*Stenodus leucichthys*) population, Great Slave Lake, Northwest Territories; March 30-31, 2010. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2011/005.

TABLE OF CONTENTS

SUMMARY	v
SOMMAIRE	vi
INTRODUCTION	1
WELCOME AND OPENING REMARKS.....	1
PRESENTATION AND DISCUSSIONS.....	2
WORKING PAPER 1: A risk-based decision-making framework for Buffalo River Inconnu (<i>Stenodus leucichthys</i>) that incorporates the precautionary approach	2
WORKING PAPER 2: Assessment of Buffalo River Inconnu, <i>Stenodus leucichthys</i> , Great Slave Lake, Northwest Territories: harvest, tagging and biological information.....	3
WORKING PAPER 3: Analysis of size at age.....	5
WORKING PAPER 4: Area I-East Inconnu commercial independent harvests study.	5
WORKING PAPER 5: Assessment of Buffalo River Inconnu, <i>Stenodus leucichthys</i> , Great Slave Lake, Northwest Territories: history of closure zones	6
GENERAL POINTS AND SCIENCE ADVISORY REPORT DISCUSSIONS.....	7
Appendix 1. Terms of Reference	8
Appendix 2. Participants	10
Appendix 3. Agenda.....	11

SUMMARY

A Regional Science Advisory Process to assess the status of Buffalo River Inconnu in Great Slave Lake (GSL), NWT, was held in Yellowknife on March 30-31 2010. The purpose of the meeting was to review the current state of knowledge of the Buffalo River Inconnu stock. Five working papers were presented and reviewed at the advisory meeting by participants including a resource user, Great Slave Lake Advisory Committee member, Fisheries and Oceans Canada (DFO) Science and Fisheries Management, U.S. Fish and Wildlife Service and the University of Manitoba. Participants agreed that the Buffalo River Inconnu stock is currently in a state of greatly reduced abundance. This conclusion was mainly supported by trends in experimental catch-per-unit-effort (CPUE) data for mature females and all Inconnu collected during spring surveys at the mouth of the Buffalo River. DFO Fisheries Management requested the application of the precautionary approach (PA) framework to Buffalo River Inconnu which was reviewed at the meeting. Based on CPUE data, tagging experiments, and trend analysis of harvests, the participants agreed to a limit reference point of 10,000 kg (annual removal rate for the west basin of GSL). Specific uncertainty levels around this limit reference point were also suggested. The upper stock reference point was proposed at 40,000 kg (annual removal rate for the west basin of GSL), based on the assumption that other influential factors like habitat quality, environmental carrying capacity and fish health have remained constant over time. These factors were identified as important information gaps in the present assessment of the Buffalo River Inconnu stock, together with uncertainties in Inconnu stocks discrimination in GSL. Future research and monitoring priorities for the assessment of Buffalo River Inconnu were discussed in the meeting and are presented herein. A range of management strategies and uncertainties determined by committee members are also presented.

This Proceedings report summarizes the relevant discussions and presents the key conclusions reached at the meeting. Additional publications, including a science advisory report and research documents, from this process will be posted as they become available on the DFO Science Advisory Schedule at <http://www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm>.

SOMMAIRE

L'évaluation l'état de la population d'inconnus de la rivière Buffalo dans le Grand lac des Esclaves, T.-N.-O. a eu lieu, les 30 et 31 mars 2010, à Yellowknife, dans le cadre d'un Processus de consultation scientifique régional. Le but de l'exercice était d'examiner l'état actuel des connaissances sur le stock d'inconnus de la rivière Buffalo. Cinq documents de travail ont été présentés et passés en revue au cours de cette réunion de consultation scientifique à laquelle ont participé notamment un utilisateur de la ressource, un membre du Great Slave Lake Advisory Committee ainsi que des membres des secteurs des Sciences et de la Gestion des pêches de Pêches et Océans Canada (MPO), du Fish and Wildlife Service des États-Unis et de l'université du Manitoba. Les participants ont convenu que l'abondance du stock d'inconnus de la rivière Buffalo était considérablement réduite. Cette conclusion est soutenue principalement par les tendances observées dans les données expérimentales sur les prises par unité d'effort (PUE) de femelles matures et de tous les inconnus prélevés dans le cadre des relevés de printemps menés à l'embouchure de la rivière Buffalo. Gestion des pêches du MPO a demandé l'application du cadre de l'approche de précaution (PA) au stock d'inconnus de la rivière Buffalo, laquelle a été passée en revue pendant la réunion. D'après les données sur les PUE, les données provenant d'expériences de marquage et l'analyse des tendances observées dans les prélèvements, les participants se sont entendus sur un point de référence limite de 10 000 kg (prélèvements annuels pour le bassin ouest du Grand lac des Esclaves). On a également proposé des niveaux d'incertitude précis pour ce point de référence limite. On a aussi proposé un point de référence supérieur de 40 000 kg pour ce stock (prélèvements annuels pour le bassin ouest du Grand lac des Esclaves) en fonction de l'hypothèse selon laquelle d'autres facteurs influents, comme la qualité de l'habitat, la capacité biotique du milieu et la santé des poissons, demeureraient constants dans le temps. Ces facteurs ont été relevés en tant que lacunes importantes dans les connaissances au moment de la présente évaluation du stock d'inconnus de la rivière Buffalo, de même que l'incertitude entourant la séparation des stocks d'inconnus du Grand lac des Esclaves. Les priorités en matière de recherche et de surveillance pour l'évaluation du stock d'inconnus de la rivière Buffalo ont été examinées au cours de la réunion et sont présentés dans le présent document. Un éventail de stratégies de gestion et d'incertitudes soulignées par les membres du comité est également présenté.

Le présent compte rendu résume les discussions tenues et expose les principales conclusions tirées lors de la réunion. D'autres publications, y compris un avis scientifique et des documents de recherche, découlant de ce processus seront publiées lorsqu'elles seront disponibles sur le Calendrier des avis scientifiques du secteur des Sciences du MPO à l'adresse suivante : <http://www.dfo-mpo.gc.ca/csas-sccs/index-fra.htm>.

INTRODUCTION

A Regional Science Advisory Process to assess the status of Buffalo River Inconnu in Great Slave Lake (GSL) was held in Yellowknife on March 30-31 2010. Inconnu are rarely targeted in GSL, but instead they are taken as bycatch in the Lake Whitefish fishery.

The objectives of the meeting as described in the Terms of Reference (Appendix 1) were to

- Assess the status of the Buffalo River Inconnu stock including a review of past and new information, based on spring biological assessment, spring tagging results, etc.
- Provide advice on and a rationale for the limit reference point for Buffalo River Inconnu consistent with the Precautionary Approach.
- Provide harvest level recommendations for Buffalo River Inconnu for each of the identified limit reference points;
- Provide an indication of the current Buffalo River Inconnu stock status within the Precautionary Approach Framework (i.e., which management zone Buffalo River Inconnu is currently in);
- Highlight major sources of uncertainty in the assessment and, where appropriate, consider alternative analytical formulations of the assessment;
- Identify and prioritize requirements for the collection of new information, monitoring, or improved data collection.
- Based on the review and interpretation of the scientific information presented, provide advice and/or recommendations on a harvest strategy for Great Slave Lake Whitefish in areas IE, IW, II and III, to ensure the conservation of Inconnu.

(Five working papers were prepared by Fisheries and Oceans Canada (DFO) and distributed for review by the Buffalo River Inconnu meeting participants prior to the meeting. Participants at the advisory meeting included a resource user, Great Slave Lake Advisory Committee member, Fisheries and Oceans Canada (DFO) Science and Fisheries Management sectors, U.S. Fish and Wildlife Service and the University of Manitoba.

The complete listing of meeting participants is presented in Appendix 2. The agenda followed during the meeting is presented in Appendix 3.

WELCOME AND OPENING REMARKS

Meeting participants were welcomed by the meeting chair, Michael Papst, and informed that the purpose of the meeting was to review the scientific information presented in the working papers and to reach consensus on the conclusions and advice about the status of the stock resulting from the meeting discussions. It was emphasized that the meeting should not be an attempt to draft a fishing plan, but rather to reach consensus on the status of the stock based on available science.

The Chair explained the advisory process and the goal of producing research documents, a proceedings report and a science advisory report from the meeting. Participants were encouraged to express their opinions and to comment freely as experts.

PRESENTATION AND DISCUSSIONS

WORKING PAPER 1: A risk-based decision-making framework for Buffalo River Inconnu (*Stenodus leucichthys*) that incorporates the precautionary approach
Presented by C. Day

Background information on the Precautionary Approach (PA) model and the request from DFO Fisheries Management to place the Buffalo River Inconnu Stock within the PA framework were presented.

Discussions initially focused on the rationale and accuracy of using Catch-Per-Unit-Effort (CPUE) information derived from experimental data (spring samples taken at the mouth of the Buffalo River) as a stock status proxy for Buffalo River Inconnu. Participants agreed that the CPUE data appeared to be highly representative of what is going on in the stock. The use of mature female CPUE as a stock status proxy, as this reflects the regenerative potential of the stock, was discussed and agreed by all participants. However, it was noted that a measure of uncertainty (i.e., standard deviation) was not provided for this metric (mature female CPUE) as it was estimated by multiplying the percentage of mature female in the sample by the overall (all Inconnu) CPUE. Authors of the working paper agreed to go back to the original data to determine whether or not uncertainty around annual estimates of mature female CPUE could be quantified. If uncertainty cannot be quantified, it was agreed that based on the similarity of mature female and overall CPUE time series, the overall CPUE should be used as a more robust proxy of Buffalo River Inconnu stock status.

Limit reference points defined in working paper 1 were discussed throughout the meeting. The limit reference point of 10,000 kg (annual removal rate for the west basin of GSL) is based on the observation of some improvement in mature female CPUE data of Buffalo River Inconnu during a period (1990-2001) when annual harvests of Inconnu from the west basin averaged 15,000 kg. A discussion of specific levels of risk around this lower limit removal rate reached consensus on Day 2 of the meeting. The committee agreed on the following risk scale:

<u>Level of Risk</u>	<u>Annual Removal (kg)</u>
Low	0
Low/Moderate	5,000
Moderate	10,000
High	>10,000

There was a general consensus to use a more conservative risk scale due to uncertainty around the PA model and reference points. Specific sources of uncertainty identified and discussed during the meeting were:

- (i) The limited number of tagged recaptures (17.3% (178/1029) of all Inconnu tagged at the mouth of the Buffalo River) which was used to establish the predominant contribution of Buffalo River Inconnu to west basin GSL fisheries;
- (ii) The unknown contribution of Buffalo River and other Inconnu stocks to the recent resurgence (increasing CPUE) of Inconnu seen in other areas of GSL (e.g., Yellowknife Bay);
- (iii) Possible inconsistencies in sampling data from the mouth of the Buffalo River in some years (2006, for example, the fish run was identified during the discussions as earlier-than-usual and thus an atypical sampling year);
- (iv) Uncertainties in harvest data (see following section on working paper 2).

Relative to the upper stock reference point of 40,000 kg (annual removal rate for the west basin of GSL), the committee agreed that it should be noted in working paper 1 that this upper value is based on the assumption that all other factors like fish health, habitat status and overall carrying capacity for the stock have remained constant over time (or since the 1970s).

The general conclusion of the PA model that the Buffalo River Inconnu population is in a state of greatly reduced abundance was supported by all participants.

WORKING PAPER 2: Assessment of Buffalo River Inconnu, *Stenodus leucichthys*, Great Slave Lake, Northwest Territories: harvest, tagging and biological information
Presented by M. VanGerwen-Toyne

This research document was reviewed by going over each of the figures and tables individually and by discussing the associated statements and conclusions.

Numerous comments and interventions on potential anthropogenic disturbance, changing environmental conditions, and fish health concerns around the Buffalo River and GSL systems were made during the course of the meeting. Revision of the "History of the Fishery" section in working papers 1 & 2 was recommended in order to take these concerns into account.

Issues to consider included:

- Potential impacts of the Pine Point Mine on GSL and Buffalo River habitats and fish populations.

Suggestions were made that the mine, which started operating in 1963, may have contributed to lower the carrying capacity of the Buffalo River system, and that discharge (or leaking) from the mine into GSL or the Buffalo River has likely occurred over time.

- Changing water levels.

The question was raised as to whether changing water levels in recent years might have affected the utility/efficiency of closure zones, and whether closure zones should follow depth contours rather than latitude. It was also noted that hydroelectric development on the Slave River likely had an impact on Inconnu, since fish were able to move upstream during high water events prior to the dam installation.

- Increasing sewage discharge and potential leaking from waste disposal sites into GSL.
- Recent observations that the condition of Inconnu caught at the mouth of the Buffalo River appears lower compared to Inconnu caught in the Slave River.

Harvest figures and tables were the subject of much discussion. It was emphasized by some of the participants that trends in harvests over the long time series (1944-2009) were biased by changes in fishing effort. A decline in the number of resource harvesters over time (from approximately 200 fishermen in the 1980s, to 70 in the 1990s, and 12 or so fishermen today) was outlined. The issue of declining fishing effort over time was deemed to be acceptable as long as the harvest data is used as a relative indication of changes in Inconnu production, rather than as a measure of Inconnu abundance in GSL. Suggestions were made to incorporate an effort profile on harvest figures and to specify that figures only reflect Inconnu harvests from commercial fisheries. In order to address the potential issue of misreporting of catches, it was suggested to assess how fish plant operation data may parallel trends in harvests over time. Peak harvests in 1977-78 and 1978-79 were explained by high Inconnu prices and a targeted fishery for Inconnu during those years. DFO Fisheries Management participants indicated that

resource harvesters fished very close to the closure zones boundaries during the more recent spike in Inconnu harvest in 2003. Concerns were raised relative to high commercial harvest figures for GSL Inconnu ($\geq 150,000$ kg annually) reported for earlier years (i.e., 1948-49 and 1962-63). It was noted that such high harvests may have been supported partly by Inconnu stocks that are now extirpated. The participants agreed that older harvest information should be broken down by management areas, where possible. It was also recommended to indicate the percentage of the total annual harvest that is represented by the west basin (areas IE, IW and III combined) in the tables. Another useful exercise would involve making a parallel between the history of closure zones and harvest fluctuations in management areas III and IE. Participants agreed that harvest information for Inconnu should be presented in conjunction with harvest data for Lake Whitefish, in order to assess whether trends in the Lake Whitefish fishery (targeted species) correlate with trends seen in Inconnu (bycatch species).

The occurrence of a small sports fishery for Inconnu in Buffalo Lake was mentioned. This was said to occur since the 1980s and mainly involve sport fishers from Alberta. There is no harvest information available to document this activity.

In comparing harvest figures among management areas, the committee pointed out the absence of a marked impact on Inconnu harvests from area V (assumed to consist mainly of Slave River Inconnu, based on tagging data), as well as the absence of big pulses in harvests and lower inter-annual variability (or overall standard deviation) in area V compared to area IE. This could illustrate the importance of consistent harvests (as opposed to repeated big pulses) over time in order to ensure the sustainability of Inconnu stocks.

The high vulnerability of immature Inconnu to the fishery was discussed. Inconnu tend to reach very large sizes before they mature. Some participants recommended marking the age/length at maturity on age/length frequency graphs in order to better illustrate the proportion of immature Inconnu in the catch. Another recommendation was to indicate the mean age of individual maturity categories (i.e., immature, mature, resting, spent) in figures showing the percent frequency of each maturity stage by sex. Uncertainty in maturity data was also addressed. Most of the uncertainty appeared to reside in the distinction between first-time maturing and resting males. It was recommended to use GSI (gonado-somatic index) data to compare and identify potential outliers in maturity categories. Participants also recommended a more thorough analysis of maturity data that would include inter-annual variations in age and length at maturity.

Age composition and the occurrence of a year class failure in 1980 was debated, as some participants argued that what seemed like a year class failure may in fact constitute an important survival event. A strong cohort of 4-year old fish first appeared in the fishery in 1983 and remained dominant until 1988. This could represent a year class failure in which the 1983 cohort was the last to be spawned (in 1979) after which recruitment dropped. Alternatively, the strong cohort could represent an atypically strong survival event in 1979 when conditions were very positive and resulted in an unusually large number of offspring produced that year.

The issue of uncertainty in ageing methods was also raised in this context. It was recognized that the ageing method used for Buffalo River Inconnu (scales) was inappropriate, as this method has been shown to underestimate older ages. The suggestion was made to re-age all samples using otolith ages, if these were available. There was a general consensus that although age information for Inconnu was very useful, it should be interpreted with extreme care until the issue of ageing methods is properly addressed.

The utility of length data for the assessment of Buffalo River Inconnu was discussed. It was suggested that back and forth trends observed in length frequency distributions may be a

reflection of mixed-stocks samples (or variable immigration of Inconnu from other stocks) in annual samples taken from the mouth of the Buffalo River. Comparing length frequencies from Slave River Inconnu in similar years was recommended to address this question. The interpretation of trends in mean fork length over time was partly limited due to changes in fishing gears. It was recognized by participants that mesh size variability likely influences the catch. A weight-based CPUE therefore (i.e., weight of Inconnu per net hour) may provide a more standardized estimate of stock status for Buffalo River Inconnu that is less sensitive to changes in length. This was identified as a potential next step, as the number of fish CPUE that is currently used provides a more straightforward proxy for stock status in the PA model context.

Other general recommendations regarding working paper 2 included the following.

- All connecting lines (or smoothers) on graphs should be removed due to inconsistent x-scales (missing years) which are likely to yield misleading trends and interpretations. Dots may be used instead of a line.
- Uncertainty should be displayed as standard error on all graphs.
- Several figures had misleading titles. They should indicate/differentiate between samples taken from the mouth of the Buffalo River and commercial samples taken from all over GSL.
- Tagging location and percentage of recaptures by management area need to appear on all tagging maps.
- Sample sizes by year or period (as opposed to total samples sizes) should appear on figures.
- For mean age and length figures, trends should be broken down by sex where possible, as females appear to be more vulnerable than males.
- One-way or two-way (if including sex) ANOVA should be used instead of t-tests for comparing mean age and length or harvest among pre-impact, impact and post-impact periods.
- Older tagging data (prior to 1995) should be incorporated in tagging tables if available.

WORKING PAPER 3: Analysis of size at age

Presented by K. Howland

Working paper 3 is an addendum to working paper 2.

The analysis of size-at-age presented was considered useful by all participants. It was noted that there was a general absence of older (>15) age classes in impact and post-impact periods. It was recommended to break down the analysis of mean size at age by smaller year groups, as much information was likely lost by pooling 30 years-long pre- and post- impact periods.

WORKING PAPER 4: Area I-East Inconnu commercial independent harvests study.

Presented by M. VanGerwen-Toyne

Working paper 4 presents the results of a harvest study conducted in management area IE of GSL during summer 2009. The intent of this study was to assess the relative vulnerability of Inconnu (and other species) to summer commercial fishing activities among different locations within the area.

The study demonstrates that the occurrence of Inconnu seems to be closely related to the shoreline, and identifies grid areas 5 and 11 as important locations for Inconnu during the month of August. It was pointed out during ensuing discussions that the results of this study may not be a true representation of the spatial occurrence of Inconnu in area IE. Rather, it provides a spatially-explicit picture of the incidence of Inconnu in fishermen's catch in area IE. Some

participants argued that water depth needs to be taken into consideration to evaluate patterns in the spatial distribution of Inconnu. These statements triggered further discussions as to the potential of looking into depth segregation for Inconnu and Whitefish as alternative management options. It was noted that depth information was collected as part of the area IE harvest study, and could be used to evaluate whether Inconnu density differs with depth. Further studies could also look into the eventuality of a depth preference distinction between Whitefish and Inconnu. There was a general consensus among meeting participants to evaluate the question of depth further, as this may apply to an alternate delimitation of closure zones based on depth contours, or changes in allowable maximum net depth.

It was also agreed that the area IE harvest study should be extended to other management areas of GSL, with western basin areas being a priority.

Other general notes on working paper 4 included the following.

- The methods section should be corrected to say that 100 yards (instead of 50 yards) gillnets were used.
- CPUE units should be reported.
- It should be stated that the greater catch observed on June 28, 2009, is due to the fact that more nets (four instead of one for all subsequent days) were set on that first day.
- It should be pointed out that the results of this study only provide a snapshot of spatial catches of Inconnu during summer months that this is likely to differ among years.
- Lack of tag returns should be pointed out as a negative statement

WORKING PAPER 5: Assessment of Buffalo River Inconnu, *Stenodus leucichthys*, Great Slave Lake, Northwest Territories: history of closure zones
Presented by M. VanGerwen-Toyne

The location and current timing of closure zones were presented and discussed. It was noted that the proper name of closure zones should be used in this paper, and that these were available through the NWT fishery regulations schedules.

The basis for using the 61°N parallel as the upper boundary limit for closure zones (easier limit for enforcement) was discussed in relation to changing water levels and the idea to redefine this limit based on depth contours. Other discussions mainly focused on the suggestion to change the timing of closure zones (from March 1st to November 1st) in order to protect both the spring and fall runs of Inconnu. This was generally regarded by participants as a more sustainable, long-term solution than complete, year-round, closures.

It was noted that the implementation of fishermen log books by DFO Fisheries Management in 2010 will likely provide further insights into the efficiency of closure zones. It was also pointed out that based on the results of tagging studies, only certain closure zones (i.e., those identified as A, B and C in the working paper) are actually relevant to Buffalo River Inconnu. The other zones (D-H) consist mainly of Slave River Inconnu. Another concern was raised that almost half of the Inconnu harvest from GSL currently comes from management area IW, which currently has no closure zone. The suggestion was made to extend the 61°N limit to area IW. Some participants however indicated that this would be pointless as most fishermen agree that there are no Inconnu near the shoreline in that area.

GENERAL POINTS AND SCIENCE ADVISORY REPORT DISCUSSIONS

Participants agreed on the following risks levels to Inconnu from various management options:

Low Risk: close fishery on west basin of GSL.

Moderate-Low Risk: close south shore year-round and extend closure to management areas IW and V.

Moderate Risk: close south shore from March 1st to November 1st and extend closure to management areas IW and V.

Moderate-High Risk: current status quo (2009)

High Risk: old status quo (prior to 2007)

The proposed management measures aim for an increase in the number of mature females present at the mouth of the Buffalo River.

The utility of performing additional tagging studies on GSL Inconnu was discussed. In this context, the high vulnerability of Inconnu to handling, and potentially high tagging mortality, were mentioned. It was generally agreed that continuing tagging studies would reinforce the accuracy of past tagging data in light of recent observations of a potentially increasing Slave River Inconnu population. Some participants argued that spatial information would be gained from additional tagging studies and via the fishermen logbook initiative currently implemented by DFO Fisheries Management. Other participants suggested that existing financial resources should instead be directed towards genetic studies that will complement the information obtained from tagging assessments. It was pointed out that more useful tagging studies should be done within river systems to estimate stock size. In this context, the issue of identifying the spawning location for Buffalo River Inconnu within the Buffalo River system was brought forward. It was suggested that telemetry studies may be a better solution for identifying spawning site(s) location(s) for Inconnu. In conclusion, tagging studies were deemed to be useful but do not constitute an immediate priority for stock assessment of Inconnu.

The measure that was identified as a priority is the continuance of spring assessment surveys at the mouth of the Buffalo River. Although labor intensive, the information gathered during these spring surveys forms the basis of the information and conclusions that are currently drawn on the Buffalo River Inconnu stock. It was agreed that these surveys should be maintained. It was further recommended that the sampling should ideally continue to include a dead sample of 200 Inconnu annually. If not possible, a dead sample of 200 Inconnu every third year was identified as the minimum required, while 200 Inconnu every second year would be preferable.

The participants also agreed that some novel methods like stable isotope analysis that could further the understanding of species interactions and habitat use in GSL on a larger (ecosystem) scale should be explored in the near future, especially when considering eco-certification perspectives for GSL fisheries.

Appendix 1. Terms of Reference

Assessment of Buffalo River Inconnu, *Stenodus leucichthys*, Great Slave Lake, Northwest Territories

Regional Advisory Meeting

March 30-31, 2010

Yellowknife, Northwest Territories

Chairperson: Michael Papst

Background

There was a targeted fishery for Inconnu, *Stenodus leucichthys*, from the Buffalo River in the late 1970s, but currently their harvest occurs as a result of bycatch in the Great Slave Lake (GSL) Lake Whitefish commercial gillnet fishery. Historically, Inconnu were highly vulnerable to commercial gillnets when fish were concentrated at the mouth of the Buffalo River, which lies on the south shore of GSL. A series of area closures along the south shore of GSL have been instituted and expanded to reduce the bycatch of this species in the commercial Lake Whitefish fishery. The recreational and subsistence fisheries are thought to take few Inconnu. And although it is unknown how much Inconnu the domestic fishery may harvest, the impact is thought to be minimal.

Historical tagging data from the 1970s, as well as recent studies from the 1990s to the present, strongly suggested that approximately 90% of Inconnu harvested in management areas IE, IW, II and III of the GSL West Basin were from the Buffalo River stock. It is believed that the stock is recovering very slowly based on analyses of the biological data collected from 1947 to the present. Size and age structure, and the percentage of mature females in annual samples, have improved after the heavy harvesting years of 1978 and 1979 and since fisheries management initiated the area closures in the early 1990s. While this is encouraging, the index of abundance based on catch per unit effort has not improved significantly since

Objectives

The following objectives will be addressed:

- Assess and report on the current status of the Buffalo River Inconnu stock including a review of past and new information, based on:
 - Spring biological assessment;
 - Spring tagging results;
 - Other past projects.
- Provide recommendations on limit reference points for Buffalo River Inconnu that are consistent with the requirements outlined in the *Decision Making Framework incorporating the Precautionary Approach*. A rationale for the proposed indices will also be included;
- Provide harvest level recommendations for Buffalo River Inconnu for each of the identified limit reference points;
- Provide an indication of the current Buffalo River Inconnu stock status within the Precautionary Approach Framework (i.e. which management zone Buffalo River Inconnu is currently in);

-
- Highlight major sources of uncertainty in the assessment, and where appropriate, consider alternative analytical formulations of the assessment;
 - Identify and prioritize requirements for the collection of new information, monitoring, or improved data collection.
 - Based on the review and interpretation of the scientific information presented, provide advice and/or recommendations on a harvest strategy for Great Slave Lake Whitefish in Areas 1E, 1W, II and III, to ensure the conservation of inconnu.

Products

A Canadian Science Advisory Secretariat (CSAS) Research Document will be produced from the working paper being presented and reviewed at the meeting. The advice from the meeting will be published as a Science Advisory Report. A proceedings report summarizing the deliberations of the participants will be published in the CSAS Proceedings Series.

Participants

Participants from DFO Science and Fisheries Management, the Great Slave Lake Advisory Committee, local communities, and external experts are invited.

Appendix 2. Participants

Name	Affiliation	E-mail
Arthur Beck	Fort Resolution	
James Boraski	DFO – Yellowknife	James.Boraski@dfo-mpo.gc.ca
Randy Brown	U.S. Fish and Wildlife Service	Randy_J_Brown@fws.gov
Chris Day	DFO – Science, Winnipeg	Chris.Day@dfo-mpo.gc.ca
Stacey Frame	DFO – Fisheries and Aquaculture Management, Hay River	Stacey.Frame@dfo-mpo.gc.ca
Alex Hood	DFO – Fisheries and Aquaculture Management, Yellowknife	Alex.Hood@dfo-mpo.gc.ca
Kim Howland	DFO – Science, Winnipeg	Kimberly.Howland@dfo-mpo.gc.ca
Yamin Janjua	University of Manitoba	Yaminjanjua@hotmail.com
Deanna Leonard	DFO – Fisheries and Aquaculture Management, Yellowknife	Deanna.Leonard@dfo-mpo.gc.ca
Michael Papst Chairperson	Retired DFO – Science, Winnipeg	
Grant Pryznk	Great Slave Lake Advisory Committee	
Marie-Julie Roux (Rapporteur)	DFO – Science, Yellowknife	Marie-Julie.Roux@dfo-mpo.gc.ca
Ross Tallman	DFO – Science, Winnipeg	Ross.Tallman@dfo-mpo.gc.ca
Fred Taptuna	DFO – Fisheries and Aquaculture Management, Yellowknife	Fred.Taptuna@dfo-mpo.gc.ca
Melanie Toyne	DFO – Science, Winnipeg	Melanie.Toyne@dfo-mpo.gc.ca
Paul Vecsei	Golder Associates	Paul_Vecsei@golder.com
Xianhua Zhu	DFO – Science, Winnipeg	Zinhua.Zhu@dfo-mpo.gc.ca

Appendix 3. Agenda.

Day 1: March 30 2010, 8:30AM to 4:45PM

- 8:30 Coffee and breakfast
9:15 Welcome, Introductions (round table) and Meeting Objectives (M. Papst)
9:30 Presentation of Working Document 1: A risk-based decision-making framework for Buffalo River Inconnu (*Stenodus leucichthys*) that incorporates the Precautionary Approach (C. Day) and related discussions.
10:30 Break
11:00 Presentation of Working Document 2: Assessment of Buffalo River Inconnu, *Stenodus leucichthys*, Great Slave Lake, Northwest Territories: Harvest, Tagging, Biological information (M. VanGerwen-Toyne) and related discussions.
12:15 Lunch
1:15 Presentation of Working Document 2 (continued) (M. VanGerwen-Toyne) and related discussions.
3:30 Presentation of Working Document 3: Analysis of Size at age (K. Howland) and related discussions.
3:45 Break
4:00 Presentation of Working Document 4: Area 1 East Inconnu commercial independent harvest study (M. VanGerwen-Toyne) and related discussions.
4:45 Meeting adjourned
-

Day 2: March 31 2010, 8:30AM to 3:30PM

- 8:30 Coffee and breakfast
9:00 Presentation of Working Document 5: History of Closure Zones (M. VanGerwen-Toyne) and related discussions.
10:15 Break
10:30 Discussions on the recommendations/conclusions to be included in the Science Advisory Report (SAR).
12:00 Lunch
1:15 Discussions on the recommendations/conclusions to be included in the SAR (continued).
3:00 Concensus and Concluding remarks (M. Papst)
3:30 Meeting adjourned
-