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Proceedings of the PSARC review on the recovery potential assessment on Nooksack Dace and potential critical habitat for Nooksack Dace and Salish Sucker

October 25, 2007

Alan Cass

Compte rendu de l'examen par le CEESP de l'évaluation du potentiel de rétablissement du naseux de Nooksack et de l'habitat essentiel potentiel du naseux de Nooksack et du meunier de Salish

25 octobre 2007

Alan Cass

Fisheries and Oceans Canada
Pacific Biological Station
Nanaimo, BC V9T 6N7

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Canada

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 by 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 contenus dans le présent rapport puissent être inexacts ou propres à induire en erreur, ils sont quand même reproduits aussi fidèlement que possible afin de refléter les échanges tenus au cours de la réunion. Ainsi, aucune partie de ce rapport ne doit être considéré 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.

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PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE (PSARC)

SUMMARY

The Pacific Scientific Advice Review Committee (PSARC) met October 25, 2007 at the Pacific Biological Station in Nanaimo, B.C. Two working papers were reviewed, “Recovery potential assessment for the Nooksack Dace (*Rhinichthys cataractae*)” and “An assessment of potential critical habitat for Nooksack Dace (*Rhinichthys cataractae ssp*.) and Salish Sucker (*Castostomus sp.*)”. Participants concluded that the data used in the working papers represent the best information currently available for the provision of science advice for recovery of Nooksack dace under SARA. There remains considerable uncertainty, however, regarding population abundance, habitat capacity and recovery goals, including population targets. Participants agreed that there were no data or analysis presented for Nooksack dace to counter the original COSEWIC criteria identifying mainly declining habitat quantity and quality as the critical factor jeopardizing survival or recovery. The current abundance and habitat capacity estimates are highly uncertain and could not be unanimously endorsed.

Based on the information presented, there is little scope for human-induced mortality. Permitting of activities that cause incidental mortality should consider the consequence(s) to achieving stated recovery goals in a risk management context that considers the high uncertainty in the data. Although there are significant data limitations, there is likely little scope for alternative habitat configurations based on socio-economic considerations that is consistent with recovery of dace in the Nooksack River tributary populations. Habitat restoration is essential for the survival and recovery of Nooksack dace but other human-induced mortality factors could not be ruled out given the information presented in the working papers.

Research to assess the function of potential critical habitat in relation to population survival or recovery is necessary to establish restoration priorities. This research should consider relevant and measurable performance indicators of potential critical habitat and populations. Immediate measures to reduce drying in Nooksack dace riffle habitat should be investigated. This is an obvious remedial action to increase the potential for recovery.

SOMMAIRE

e Comité d'examen des évaluations scientifiques du Pacifique (CEESP) s'est réuni le 25 octobre 2007, à la Station de biologie du Pacifique, à Nanaïmo (C.-B.). Deux documents de travail ont été examinés : « Évaluation du potentiel de rétablissement du naseux de Nooksack (*Rhinichthys cataractae*) » et « Évaluation de l'habitat essentiel du naseux de Nooksack (*Rhinichthys cataractae*) et du meunier de Salish (espèce *Castostomus.*) ». Les données utilisées dans les documents de travail représentent la meilleure information actuellement disponible pour la formulation d'avis scientifiques concernant le rétablissement du naseux de Nooksack, en vertu de la LEP. Il subsiste cependant énormément d'incertitude quant à l'abondance de la population, à la capacité de l'habitat et aux objectifs de rétablissement, notamment les cibles de population. Le « tronçon » de cours d'eau est une échelle d'évaluation appropriée du point de vue de l'espèce et de l'habitat. Les caractéristiques d'habitat homogènes (p. ex. rapides, fosses et habitat riverain) sont faciles à repérer et la nature fragmentaire et mouvante des habitats est reconnaissable à cette échelle. Les participants conviennent qu'il n'y a pas de données ou d'analyse présentées pour le naseux de Nooksack afin de contrer le critère d'origine du COSEPAC qui désigne principalement la diminution en quantité et en qualité de l'habitat comme facteur crucial nuisant à la survie ou au rétablissement. Les révisions au document de travail sur l'habitat essentiel potentiel devraient comprendre un élaboration sur la raison d'être des règles de seuil comparativement aux autres règles de définition de l'habitat essentiel potentiel.Les estimations actuelles d'abondance et de capacité de l'habitat sont hautement incertaines et ne pourraient être appuyées à l'unanimité. Il ne s'agit pas d'une faiblesse importante pour la formulation de conseils puisque l'habitat est la première contrainte qui limite le rétablissement.

D'après l'information présentée, il existe bien peu de jeu pour la mortalité causée par l'activité humaine au-delà de la recherche scientifique et de l'évaluation du rendement des stratégies de rétablissement. Bien que les données comportent d'importantes limites, il existe très peu d'autres configurations possibles de l'habitat basées sur des considérations socio-économiques, qui aillent de pair avec le rétablissement du naseux dans les tributaires de la rivière Nooksack. La remise en état de l'habitat est essentielle à la survie et au rétablissement du naseux de Nooksack, mais on ne peut laisser complètement de côté d'autres facteurs de mortalité causée par l'homme, compte tenu de l'information présentée dans les documents de travail.

Des recherches visant à évaluer la fonction de l'habitat essentiel potentiel par rapport à la survie ou au rétablissement de la population sont nécessaires pour fixer les priorités de remise en état. Ces études devraient porter sur les indicateurs pertinents et mesurables de l'habitat essentiel potentiel et des populations. Il faudrait se pencher sur les mesures à prendre immédiatement afin de réduire l'assèchement de l'habitat de rapides du naseux de Nooksack.

C’est là une mesure corrective évidente pour accroître son potentiel de rétablissement.

INTRODUCTION

The Pacific Scientific Advice Review Committee (PSARC) met on October 25, 2007 at the Pacific Biological Station in Nanaimo, B.C. to review a draft Recovery Potential Assessment (RPA) for Nooksack dace authored by Brian Harvey and an independent working paper assessing the potential critical habitat (PCH) for Nooksack dace and Salish sucker. The PCH working paper was authored by Dr. Mike Pearson and represented the science components of the habitat assessment for Nooksack dace and Salish sucker prepared during the development of the Recovery Strategy for these species. Nooksack dace and Salish sucker are designated *Endangered* by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC) and are listed on Schedule 1 of the *Species at Risk Act* (*SARA*).

The original agenda also included a review of a draft RPA for Misty Lake stickleback. That review was deferred due to time constraints. The intent is to review the Misty Lake stickleback RPA and the Salish sucker RPA early in 2008. Misty Lake stickleback were designated *Endangered* by COSEWIC in November 2006 but currently have no status under SARA.

The meeting Chair, Al Cass, welcomed the participants and a round of introductions was completed. Representation from non-govenmental organizations, universities, the Province of British Columbia and Fisheries and Oceans Canada (DFO) attended the meeting. The Chair outlined the purpose of the meeting: to review the working papers and ultimately to provide advice on the RPA and PCH papers. An RPA is the national framework for the provision of science advice under SARA. The objectives, procedure, and deliverables were also outlined.

DFO is the lead jurisdiction under SARA and is committed to undertake RPAs of all aquatic species designated as *Threatened* or *Endangered* by COSEWIC. The purpose is to provide rationale for potential incidental harm permitting under SARA (Section 73), advise on science components of recovery strategies and action plans, provide biological input for subsequent socio-economic analyses and inform the minister on matters related to listing decisions.

The Terms of Reference for the reviews are in Appendix 1. The working papers are summarized in Appendix 2. The meeting agenda appears as Appendix 3. A list of meeting participants and reviewers is included as Appendix 4. These proceedings are organized according to the three phases of the national RPA framework and listed in the Terms of Reference (Appendix 1): Phase I) current species status; Phase II) scope for human-induced mortality; and Phase III) scenarios for mitigation and alternatives to activities.

DETAILED COMMENTS FROM THE REVIEW

Recovery Potential Assessment for Nooksack Dace (*Rhinichthys cataractae)*

B. Harvey

Potential Critical Habitat for Nooksack Dace (*Rhinichthys cataractae* ssp.) and Salish Sucker (*Catostomus* sp.)

M. Pearson

The authors of the working papers presented an overview of their assessments. Two formal reviews of the working papers were presented. This was followed by a general discussion of the assessments and advice by meeting participants. Note that only the RPA for Nooksack dace was peer reviewed. The RPA review for Salish sucker is planned for early 2008.

General Discussion

Phase I: current species status

1. Species status for abundance and range (Nooksack dace only)

Nooksack dace were designated as *Endangered* because their populations have small and fragmented distributions (four locations in Canada) and an area of occupancy of less than 20 km^2 (COSEWIC Criterion D), and there is continuing decline in the extent and quality of habitat and number of individuals (Criterion B). As one participant pointed out, COSEWIC Criterion A (declining total population) and Criterion C (small total population size and decline) were determined by COSEWIC as not applicable.

Participants agreed that, given the level of development in the lower Fraser Valley, there is no reason to discount the COSEWIC decision that identified declining habitat quantity and quality as the main factor jeopardizing survival or recovery. Participants and reviewers agreed that the population estimates are highly uncertain because the methods used to generate them are indirect and based on very limited data. They are calculated by multiplying dace density by estimates of total potential habitat and adjusting for CPUE of each dace-containing stream obtained from minnow-trapping surveys. Dace density was derived from an electrofishing survey conducted in a highly productive reach of Bertrand Creek a decade earlier. It was agreed that the abundance estimates likely represent maxima in the four populations and that they are highly uncertain. Participants could not unanimously endorse the abundance estimates derived using this methodology.

2. *Species trajectory for abundance and range* (Nooksack dace only)

Participants concurred that because of the large uncertainty in the data, population trajectories and the abundance of mature individuals remains uncertain. Participants could not discount declines that would be associated with the ongoing degradation and destruction of habitat.

3. *Amount of potential critical habitat* (Nooksack dace and Salish sucker)

Participants discussed the relevance of the "reach" concept in the determination of the quantity and quality of PCH noting the definition provided in the PCH working paper:

- Potential critical Habitat for Nooksack dace consists of reaches in their native creeks that contain or are known to have previously contained more than 10% riffle by length. It includes all aquatic habitat and riparian reserve strips of native vegetation on both banks for the entire length of the reach.

- Potential critical habitat for Salish sucker includes all reaches in streams containing populations with more that 50 m of continuous pool with a water depth exceeding 70 cm at low flow.

Participants questioned whether determination of reach boundaries is repeatable given that the choice of boundaries is subjective. The author of the PCH working paper stated that the boundaries represent obvious changes in physical stream structure. In the author's opinion, different stream ecologists would choose similar reach boundaries and therefore the identification of reaches is indeed repeatable. The author further noted that the reach concept makes it easy to identify average habitat conditions in terms of riffle, pool and riparian habitat given the fragmentary and shifting nature of the habitat within reach scales.

Most participants and reviewers agreed that the persistence of Nooksack dace requires a suitable quantity of riffle habitat. Based on the population targets and habitat inventories presented in the paper, however, all dace habitat would be considered PCH. Participants and one reviewer questioned the rationale for identifying all reaches with >10% riffle habitat as PCH. One reviewer thought the choice of the cut-off was reasonable given the level of available information. Both authors agreed that 10% was an arbitrary cut-off and would clarify this with more supporting evidence in revisions to the working paper.

One reviewer noted that the identification of PCH in the riparian zone may not be consistent with *SARA* because the species does not live in these habitats. The PCH author noted, however, that *SARA* specifies habitats upon which a species depends, directly or indirectly and that there is no requirement that the species actually resides there. The reviewer suggested deleting the riparian critical habitat designation since that is not relevant to the designation of critical instream

habitat under SARA. The reviewer further commented that consideration of riparian habitat however is very relevant to recovery planning. In his opinion, recovery planning should include a more quantitative assessment of the threats to critical habitat so that the relative roles of riparian habitat, streamflow, temperature, water quality (all of which are measurable) can be assessed. Since the implications of the threats of human activities in tables 2 (Nooksack dace) and 3 (Salish sucker) of the PCH working paper are substantial, significantly more work is needed to determine the likelihood that the remediation effort to reduce the threats will achieve recovery of the species and its habitats. The reviewer stated that riparian function operates at scales larger than the reach including all upstream habitats. Participants recognized the distinction between designating critical riparian habitat under SARA and its consideration in recovery planning but didn't support the removal of the assessment in revisions of the working paper given its potential importance in recovery.

Participants discussed the use of the Riparian Area Regulations developed under the *Fish Protection Act* to protect "salmonids, non-salmonid game fish, and other regionally significant fish" from the impacts of land development and to set riparian area buffer widths. Participants noted that the widths are not, however, explicitly tied to specific habitat requirements of Nooksack dace or Salish sucker. Participants requested a rewording of the section to provide a rationale for buffers that vary from 5-30 m and to acknowledge the uncertainty in the assumption that riparian buffer widths that are designed to buffer ecosystem function also would effectively protect habitat for Nooksack dace and Salish sucker. The authors agreed to provide more clarification in revisions of the paper.

Reviewers and participants agreed that the GIS assessment of the amount of potential critical habitat and the figures in the working paper showing reach locations are a good representation of the distribution of critical habitat

Participants discussed the suggestion in the PCH working paper that all potential critical habitat in the Nooksack River tributaries (Pepin, Bertrand, Fishtrap creeks) are required in order not to jeopardize survival or recovery. The rationale for this was because the estimated maximum achievable population size, albeit uncertain, is close to the average minimum viable population size for these systems. Participants acknowledged that concluding all potential critical habitat is necessary for survival or recovery could preclude choosing different configurations of critical habitat based on subsequent socio-economic considerations. One reviewer stated that because the data on the current abundance and metepopulation structure of dace is very limited, alternative configurations of potential critical habitat should be considered. Participants acknowledged the high uncertainty in the data but concluded that there is likely little scope for optional habitat configurations based on socio-economic considerations that is consistent with dace recovery in the Nooksack River tributary populations. The information base for the Brunette River population,

although scant, implies that the habitat capacity may be larger than required for survival or recovery given that more riffle habitat is present there compared to the other populations, and that much of it appears unoccupied by dace.

A reviewer noted that recovery targets were not included in the PCH for Salish sucker. Without targets, the current analysis is only valid for the determination of the known species range. In his opinion, the lack of recovery targets means the section of the document dealing with the sucker should be renamed "Useable Habitat" or the known range of the species. The PCH author reported that indeed targets have been developed and that he would include a table of recovery targets for sucker in revisions to the document.

4. *Expected population and distribution targets for recovery* (Nooksack dace only)

Most participants and the reviewers acknowledged that abundance targets for Nooksack dace are highly uncertain but agreed with the rationale in the working paper that an appropriate guideline for minimum viable population (MVP) size for each population is likely in the range of 2000-10000 mature individual. This range, referenced in relevant conservation literature, is considered adequate to maintain genetic diversity and to buffer independent populations from random variations in survival, and thus to maintain long-term viability. One reviewer commented that the recovery targets have not incorporated the redundancy and the reduced risk of species extirpation that may exist as a result of having four separate populations. Participants acknowledged that four dace populations are currently demographically isolated but the extent of isolation historically is unknown. One reviewer was not convinced that a rescue potential from neighboring populations could be ruled out given the relatively low rates of dace tag recoveries, limited scale of sampling and potential for downstream dispersal of juvenile and adults to new habitats particularly during high flow events. Another reviewer and the PCH author indicated that despite the poor data quality, most evidence (including tagging experiments) indicates that the majority of Nooksack dace adults have very small home ranges (<50 m channel length) and rarely traverse between riffles separated by large pools.

Given the evidence that the decline in potential critical habitat is the limiting factor affecting survival or recovery, participants accepted that the currency of recovery could be in measurable units of PCH (i.e., riparian habitat, streamflow, temperature, water quality). This coupled with relative estimates of abundance based on an acceptable sampling protocol could be used to assess the effectiveness of recovery strategies. To this end, meeting participants agreed that population performance measures should be reviewed and any numerical targets will need to be re-evaluated in the future.

5. Expected general time frame for recovery to the target (Nooksack dace only)

The Recovery Strategy (June 2007) lists two objectives related to the time frame for recovery: 1) for all currently and historically suitable habitats in native streams to be occupied by 2015; and 2) to increase Nooksack dace abundance to target levels in all watersheds by 2015. Participants agreed that numerical recovery targets should be viewed as interim given the uncertainty in population sizes and revisited when more accurate population data becomes available.

6. Residence requirements (Nooksack dace only)

Participants discussed the issue of residences and nests and agreed that riffles could potentially be residences. Recovery Team members at the meeting assumed that the concept of a residence under SARA could apply but that was considered outside the mandate of the Team. They agreed that the concept of residences for Nooksack dace should be revisited, and included in the critical habitat assessment if possible.

Phase II: scope for human-induced mortality

7. Maximum human-induced mortality (Nooksack dace only)

One reviewer's main criticism was that the RPA did not adequately couple population status with specific threats in a way that would provide the Minister with credible advice regarding the scope of allowable harm. A participant noted that, as written, the RPA does not adequately inform the Minister regarding permitting and potentially could not permit scientific research. Participants acknowledged that the COSEWIC endangered designation was due to an excessive decline in PCH and not based on an abundance decline criteria. This implies that there could be scope for human-induced mortality if carrying capacity is increased through habitat restoration and subsequent reduced natural mortality to sufficiently compensate human-induced mortality. On the other hand, recovery targets may not be achievable if the targets themselves are unrealistic (they exceed carry capacity) or some mortality agent has reduced abundance in the recent past or is still preventing the population from increasing to the recovery target. The author reported that seasonal water shortages and drying is problematic. Seasonal water shortages could reduce productivity and prevent recovery, in which case it cannot be tolerated. Seasonal water shortages could render habitat unsuitable, implying that the present assessment of PCH does not describe current habitat, but instead estimates PCH once the water supply has been restored.

8. *Magnitude of each major potential source of mortality* (Nooksack dace only)

Reviewers and participants agreed that the RPA provided a good qualitative account of the major potential sources of human-induced mortality. The main threats, include instream and riparian habitat destruction, seasonal low stream flows, sedimentation and fragmentation due to agriculture, other industries and urbanization. Participants acknowledge that structure and flow characteristics of many streams have been drastically altered by draining, dredging, dyke building, infilling and channelization for flood control, agriculture drainage and construction projects. Habitat degradation continues due to flood control and agricultural drainage projects that appear to be greatest for Fishtrap and Pepin Creeks (Brunette River has not been assessed).

Seasonal low flow appears to be most extreme in Bertrand Creek (Brunette has not been assessed) where, as the PCH author pointed out, the riffle area of the creek becomes dry with obvious implications for Nooksack dace habitat and population survival.

Participants recognized that sedimentation has a significant impact on instream habitat by filling in riffles and restricting water flow. Participants agreed that improving riparian habitat in reaches and the catchment areas upstream of reaches will be important to prevent sedimentation. Currently the threat of sedimentation is highest in Pepin Creek and unknown in Brunette River.

Participants acknowledged that physical structures introduced in dace streams like culverts and weirs, if improperly designed, will increase fragmentation and natural dispersal within Canada.

Threats to water quality from agriculture, industry and urbanization are also recognized as a potential source of human-induce mortality. These threats are presently difficult to quantify. Participants noted that Fishtrap and Bertrand Creeks and the Brunette River are the most heavily urbanized and intensive agricultural chemical use also occurs in Fishtrap Creek. Hypoxia was identified as a potential source of mortality in the RPA but one reviewer noted that the hypoxia hypothesis does not seem strongly supported in the main dace habitat by other information presented.

One participant suggested that this section would be more understandable if the author adopted the tabular summaries from the Recovery Strategy that partition the mortality sources by watershed and types of habitat disturbance.

Phase III: mitigation and alternatives (Nooksack dace only)

Participants acknowledged the potential mitigation measures presented in the PCH and RPA working papers. Securing riparian land through purchase, lease, or easement should be a priority. In the US, the Conservation Reserve

Enhancement Program promotes a voluntary land retirement program administered by the United States Department of Agriculture's Farm Service Agency. The BC Environmental Farm Plan initiative offers some immediate opportunities for protecting fish habitat. This relatively recent voluntary program is available to agricultural producers and provides technical advice and funding for implementing approved farm plans.

Participants were particularly concerned about the severe low flow during high water use periods that results in completely dry riffle habitat in some reaches. The PCH author indicated that this is particularly problematic in Bertand Creek. An immediate mitigation measure would be to reduce drying and its obvious direct impact on survival.

Conclusions and Advice

1. The data used in the working papers represent the best information currently available for the provision of science advice for recovery of Nooksack dace under SARA. There remains considerable uncertainty, however, regarding population abundance, habitat capacity and recovery goals, including population targets.

2. The stream "reach" is an appropriate assessment scale from the species and habitat perspective. Homogeneous habitat features (e.g., riffles, pools and riparian habitat) are easy to identify, and the fragmentary and shifting nature of habitats are accommodated at this scale.

3. Participants agreed that there were no data or analysis presented for Nooksack dace to counter the original COSEWIC criteria identifying mainly declining habitat quantity and quality as the critical factor jeopardizing survival or recovery.

4. Revisions to the potential critical habitat working paper should expand on the rationale for the cut-off rules compared to alternative rules for defining PCH.

5. The current abundance and habitat capacity estimates are highly uncertain and could not be unanimously endorsed. This is not an important shortcoming in the provision of advice given that habitat is the immediate constraint limiting recovery.

6. Based on the information presented, there is little scope for human-induced mortality. Permitting of activities that cause incidental mortality should consider the consequence(s) to achieving stated recovery goals in a risk management context that considers the high uncertainty in the data.

7. Although there are significant data limitations, there is likely little scope for alternative habitat configurations based on socio-economic considerations that is consistent with recovery of dace in the Nooksack River tributary populations.

8. Habitat restoration is essential for the survival and recovery of Nooksack dace but other human-induced mortality factors could not be ruled out given the information presented in the working papers.

9. Research to assess the function of potential critical habitat in relation to population survival or recovery is necessary to establish restoration priorities. This research should consider relevant and measurable performance indicators of potential critical habitat and populations.

10. Immediate measures to reduce drying in Nooksack dace riffle habitat should be investigated. This is an obvious remedial action to increase the potential for recovery.

APPENDIX 1: Terms of Reference

Terms of Reference
Regional Peer Review Meeting

Recovery potential assessment under SARA for:
Nooksack dace designated by COSEWIC as "Endangered"
Misty Lake Stickleback designated by COSEWIC as "Endangered"
and
Assessment of Potential Critical Habitat for Nooksack Dace and Salish Sucker

October 25, 2007
Pacific Biological Station, Nanaimo BC,
Chair: Alan Cass

Background

In 2003, the Committee on the Status of Endangered Wildlife in CANADA (COSEWIC) has recommended that Nooksack dace in British Columbia be listed as "Endangered" under Canada's *Species at Risk Act* (SARA).

In 2006, the Committee on the Status of Endangered Wildlife in CANADA (COSEWIC) has recommended that Misty Lake Stickleback in British Columbia be listed as "Endangered" under Canada's *Species at Risk Act* (SARA).

Canada's *Species at Risk Act* (SARA) requires that habitats *'necessary for the survival or recovery of listed species*' be identified to the extent possible and proposed for designation (and protection) as critical habitat. For aquatic species, like Salish sucker and Nooksack dace, SARA prohibits the destruction of any part of designated critical habitat wherever it occurs.

SARA is intended to protect species at risk of extinction in Canada, and promote their recovery. SARA includes prohibitions on killing, harming, harassing, capturing or taking individuals of species listed as threatened or endangered on schedule 1. SARA also prohibits sale or trade of individuals of such species (or their parts), damage or destruction of their residences, or destruction of their critical habitat. SARA also specifies that a **recovery strategy and action plan** must be prepared for species that are listed as threatened or endangered, or a management plan must be prepared for species of Special Concern.

The provisions of these recovery strategies and action plans will have to address all potential sources of harm, including harvesting activities, in a way that do not jeopardize the survival and recovery of the populations concerned, and promote recovery, where feasible and socially and economically desirable.

A Recovery Strategy and Action Plan must include a description of recovery goals for population size and distribution. The designation of recovery targets

and times for species listed under SARA is not exclusively a scientific issue, but should be informed by science advice. In that context scientific guidelines have been developed for the biological properties of suitable **recovery targets** and **recovery times** (http://www.dfo-mpo.gc.ca/csas/Csas/status/2005/SAR-AS2005_054_e.pdf).

A Recovery Strategy and Action Plan must also address **all sources of human-induced mortality**, including commercial or subsistence harvesting and bycatch, and threats to habitat. SARA allows exemptions to the prohibitions on harm when specific activities are permitted in the recovery plan. However, activities causing harm can be included in the Recovery Plan only when there is high confidence that the recovery goals can be met at the levels of those activities specified in the Recovery Plan. SARA also requires consultation with Canadians who may be affected economically, socially, or culturally by the provisions of a Recovery Strategy and Action Plan, or otherwise are interested in the listing of the species. These consultations also require information on levels of human activities that permit recovery goals to be met. These are usually presented as different scenarios of how human induced mortality is apportioned among sources, from which economic impacts are estimated. Therefore, if activities such as bycatches, subsistence fisheries, or undertakings affecting critical habitat are to continue after designation, levels of these mortality sources consistent with achieving the recovery goals have to be established. If economic, social, and cultural impacts are to be assessed, alternative extents and durations of necessary restrictions on status quo activities also have to be evaluated in the Recovery Potential Assessments.

Thus, for different assumptions about levels of the major sources of mortality and habitat quantity and quality, including the status quo, the Recovery Potential Assessment should include a scientific evaluation of the likelihood that the recovery goals will be achieved in biologically reasonable time frames. Where mitigation measures are expected to reduce the harm caused by an activity, the effectiveness of the **alternative mitigation measures** should also be assessed.

Specific Objectives

To inform decisions relating to listing and recovery planning for Nooksack dace, Misty Lake stickleback and assessment of the potential critical habitat for Nooksack dace and Salish sucker. The meeting will review analyses prepared to meet the objectives stated below.

Phase I: Assess Current Species Status

1. Evaluate present species status for abundance and range
2. Evaluate recent species trajectory for abundance and range

3. Estimate **amount of critical habitat** currently available (using critical habitat descriptions defined in the pre-COSEWIC RAP, and considering information in COSEWIC Status Report).
4. Evaluate expected **population and distribution targets** for recovery, according to DFO Guidelines
5. Evaluate expected **general time frame for recovery to the target**, assuming only natural mortality, and estimate how time to recovery targets would increase at various levels of human-induced mortality
6. Evaluate **Residence Requirements**, if any.

Phase II: Scope for Human – Induced Mortality

7. Evaluate **maximum human-induced mortality** which the species can sustain without jeopardizing survival or achievement of recovery targets for the [species][population]
8. **Quantify** to the extent possible the magnitude of each major potential source of mortality/harm identified in the pre-COSEWIC RAP, and considering information in COSEWIC Status Report.
9. **Aggregate total mortality** / harm attributable to all human causes and contrast with that determined in tasks 5 and 7.
10. Evaluate to the extent possible the likelihood that critical habitat is currently limiting to the species' abundance or range, or would become limited before the recovery goals were reached.
11. Inventory to the extent possible the **threats to critical habitat**, and estimate their current levels of impact on habitat quantity and quality.

Phase III: Scenarios for Mitigation and alternative to activities

To the extent possible with the information available,

12. Develop an inventory of all reasonable **alternatives to the activities** in tasks 8 and 11, but with potential for less impact. (e.g. changing gear in fisheries causing bycatch mortality, relocation of activities harming critical habitat)
13. Develop an inventory of all feasible measures to minimize the impacts of activities in task 8 and 11.
14. Document the expected harm after implementing **mitigation measures** as described in 13 and determine whether survival or recovery is in jeopardy after considering cumulative sources of impacts
15. Repeat 14 for some alternative distributions of human-induced mortality among the sources of harm identified in task 8 and 11.
16. Recommend parameter values for population productivity and starting mortality rates, and where necessary, specialized features of population models that would be required to allow exploration of additional scenarios as part of the assessment of economic, social, and cultural impacts of listing the [species/population].

Working papers

Itemize the specific working papers that have been requested. One or more papers will be needed on, as a minimum:

- recovery goals (abundance, distribution, and timeframes)
- mortality sources and levels
- amount of and threats to critical habitat
- modelling of recovery scenarios

Output of the meeting

A Science Advisory Report (SAR), a Proceedings, and one or more Research Documents of the Canadian Science Advisory Secretariat (CSAS) will be produced for each species (sometimes separate SARs may be produced for different populations of a species).

The scientific information/advice issued from this meeting might be used by people who are involved in the recovery process for the [*give species*]. This information will also be used in further steps of the SARA process (e.g. socio-economic studies) and will inform the Minister who will have to decide whether or not those populations should be added to the legal list. The conclusions regarding biologically-based recovery targets and timeframes may also be useful for those who are involved in the recovery process for other species.

Participation

DFO experts from Science, FAM, OHM,
Experts nominated from British Columbia and holders of First Nations,
Invited participants from academia, relevant industries, ENGOs, and community organizations.

APPENDIX 2: Working Paper Summaries

Recovery potential assessment for the Nooksack Dace (*Rhinichthys cataractae)*

B. Harvey

Nooksack dace is a close relative of longnose dace, a freshwater minnow widely distributed in North America. The Nooksack subspecies is found in only four rivers in Canada, all of them in the Fraser Valley. Three of these rivers are in the Nooksack River basin and flow south into Washington State; the fourth (Brunette River) is a tributary of the Fraser River. Most Nooksack dace habitat is in the United States.

The Nooksack subspecies was designated *Endangered* by COSEWIC in 1996, with an updated status report in 2000. The B.C. Conservation Data Centre classifies the subspecies as S1 (*Critically Imperiled*). Nooksack dace was listed as *Endangered* (Schedule 1) under the Species at Risk Act (*SARA*) in 2003. As a member of the "Chehalis fauna", a group of fishes that emerged in unglaciated areas south of Puget Sound and diverged from those in the Columbia drainage, the subspecies has considerable scientific interest for evolutionary biologists.

Nooksack dace spend most of their lives near the bottom, within restricted stretches of river, with a strong preference for riffles (areas of faster-moving water). Population sizes for Bertrand, Pepin and Fishtrap Creeks have been estimated using an indirect process and are Bertrand Creek: 5,700; Pepin Creek: 800; and Fishtrap Creek: 300. There are insufficient data to describe any trends in abundance.

Critical habitat for Nooksack dace is defined as "reaches in their native creeks that contain or are known to have previously contained more than 10% riffle by length." The locations of stream channel and riparian habitat identified as critical are shown in Figures 1-8 of this RPA. The human activities that most threaten Nooksack dace in Canada are those that alter, destroy or break up critical habitat. The threats to dace habitat are the result of more than a century of agricultural, industrial and urban development of the Fraser Valley. They include physical destruction, seasonal low flows, sedimentation and fragmentation. Nooksack dace habitat continues to be lost to flood control and agricultural drainage projects. Riffles and marginal pools are the most affected

There are options not only for reducing the instances of habitat destruction and fragmentation, but also for minimizing their effects. The first approach relies on using our knowledge of the threats, their effects and the existing regulatory mechanisms to develop reach-specific best management practices. The second approach accepts that habitat loss has already occurred, and concentrates on

remediation. Restoration of damaged habitat, creation of new riffle habitat and riparian planting are all technically feasible.

Alternatives to activities that affect dace habitat include removing land from agricultural production. One model is the Conservation Reserve Enhancement Program (CREP), a voluntary land retirement program administered by the United States Department of Agriculture's Farm Service Agency (FSA). The voluntary BC Environmental Farm Plan initiative also offers some immediate opportunities for protecting fish habitat.

An assessment of potential critical habitat for Nooksack Dace (*Rhinichthys cataractae ssp.*) and Salish Sucker (*Catostomus sp.*)

M. Pearson

Potential critical habitat for Salish sucker and Nooksack dace was defined using reach-scale, in-stream habitat characteristics. It includes 166 km of channel and 328 km of bank in140 reaches and 11 watersheds. Potential riparian critical habitat (PRCH) was assessed using an adaptation of British Columbia's Riparian Area Regulation (RAR) assessment methodology. It extends laterally from the high water mark along both banks of the full length of each potential critical habitat reach. PRCH width is equal to the widest zone of sensitivity (ZOS) calculated for each of 6 riparian functions: shade, large woody debris supply, fish habitat value, rooted vegetation, insect and debris fall, and filtration. Widths of PRCH ranged from 5 to 30 m, with an average of 21.4 m (s. dev = 6.77) and total area encompasses 717 ha of land.

Existing riparian vegetation is sparse, with 60% of bank length supporting discontinuous bands of vegetation less than 5 m wide, which highlights the need for recovery activities focused on riparian enhancement and restoration. Permanent structures such as roads, farm crossings, buildings, and yards restrict the width of 106 km (32%) of PRCH length to less than its calculated value. Actively farmed land and golf course fairways impinge on an additional 112 km (34%) of PRCH length. Securing this land should be a priority for conserving these species and would provide benefits to a number of other *SARA* listed species, in addition to salmonids, surface water quality, and agricultural drainage.

APPENDIX 3: PSARC Meeting Agenda, October 25, 2007

PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE
RECOVERY POTENTIAL ASSESSMENTS

OCTOBER 25, 2007
SEMINAR ROOM, PACIFIC BIOLOGICAL STATION
NANAIMO, B.C.
- Draft agenda -

THURSDAY – October 25	
Introduction and procedures	**9:00 – 9:15**
• **Recovery Potential Assessment for Nooksack Dace** • **Critical Habitat for Nooksack Dace**	**9:15 – 12:00**
Lunch Break	***12:00 – 1:00***
• **Recovery Potential Assessment for Misty Lake Stickleback (Deferred until 2008)**	**1:00 – 4:00**

APPENDIX 4: List of Attendees

Subcommittee Chair: Al Cass

External Participants	
Name	**Affiliation**
Barlee, Gwen	Wilderness Committee
Hartman, Gordon	Emeritus, DFO
Harvey, Brian	Consultant
McPhail, Don	Emeritus, UBC
Pearson, Mike	Pearson Ecological
Pinkus, Susan	Ecojustice
Rosenfeld, Jordan	Ministry of Environment
Wilhelmson, Christianne	Georgia Strait Alliance
DFO Participants	
Bradford, Mike	
Brown, Tom	
Cass, Al	
Coopper, Tola	
Davis, John	
Eros, Carole	
Lynch, Cheryl	
Mahaux, Patrick	
Patterson, John	
Riddell, Brian	
Schubert, Neil	
Webb, Allison	
Wood, Chris	

The reviewers for the PSARC paper presented at this meeting are listed below. Their assistance is invaluable in making the PSARC process work.

Bradford, Mike	Fisheries and Oceans Canada
McPhail, Don	Emeritus, University of British Columbia