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Canadian Science Advisory Secretariat | **Secrétariat canadien de consultation scientifique**

Proceedings Series 2009/027 | **Compte rendu 2009/027**

Proceedings of the Central and Arctic Regional Science Advisory Process on the Recovery Potential Assessment of pure native Westslope Cutthroat Trout, Alberta Population

12 May and 5 June 2009

Teleconference

Holly Cleator
Meeting Chairperson

Kathleen Martin
Editor

Compte rendu du processus régional de consultation scientifique du Centre et de l'Arctique sur l'évaluation du potentiel de rétablissement de la truite fardée versant de l'ouest indigène de lignée pure (population de l'Alberta)

Les 12 mai et 5 juin 2009

Téléconférence

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Présidente de réunion

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September 2009 | **Septembre 2009**

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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Septembre 2009

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
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Ottawa, Ontario
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Correct citation for this publication:

DFO. 2009. Proceedings of the Central and Arctic Regional Science Advisory Process on the Recovery Potential Assessment of pure native Westslope Cutthroat Trout, Alberta Population; 12 May 2009 and 5 June 2009. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2009/027.

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SUMMARY

Regional science peer review meetings were held on 12 May 2009 and 5 June 2009 by teleconference. The purpose of the meetings was to provide science advice on the recovery potential of the Alberta population of pure native Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) based on the 17-point process outlined in the Fisheries and Oceans Canada (DFO) Recovery Potential Assessment (RPA) framework. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Alberta population of Westslope Cutthroat Trout as Threatened in 2006 and now it is being considered for listing under Canada's *Species at Risk Act* (SARA). The advice in this RPA will be provided to the DFO Minister for his consideration in any listing decision under the SARA for this subspecies and for any socio-economic analyses, consultations and recovery planning related to the Alberta population. Meeting participants included DFO Science and Habitat Management sectors of the Central and Arctic Region, and specialists from Alberta Sustainable Resource Development, Parks Canada Agency, FWR Freshwater Research Ltd, and Cows and Fish – Alberta Riparian Habitat Management Society. This proceedings report summarizes the relevant discussions and presents the key conclusions reached at the peer-review meetings.

This report will be published in the Canadian Science Advisory Secretariat (CSAS) Proceedings Series. Detailed information about Westslope Cutthroat Trout which supports the assessment will be published as a Research Document. The advice from the meeting will be published as a Science Advisory Report.

SOMMAIRE

Deux réunions régionales d'examen scientifique par des pairs ont eu lieu les 12 mai et 5 juin 2009, par téléconférence. Le but de ces réunions était de formuler un avis scientifique sur le potentiel de rétablissement de la population de truites fardées versant de l'ouest indigènes de lignée pure de l'Alberta (*Oncorhynchus clarkii lewisi*), selon les 17 étapes présentées dans le cadre pour l'évaluation du potentiel de rétablissement (EPR) de Pêches et Océans Canada (MPO). En 2006, le Comité sur la situation des espèces en péril au Canada (COSEPAC) a désigné la population de truites fardées versant de l'ouest de l'Alberta comme étant menacée, et on étudie actuellement son inscription à la liste de la *Loi sur les espèces en péril* (LEP) canadienne. L'avis formulé dans la présente EPR sera présenté au ministre des Pêches et des Océans, qui l'examinera avant de prendre sa décision concernant l'inscription de cette sous-espèce en vertu de la LEP. Cet avis servira également à orienter la tenue d'analyses socio-économiques et de consultations ainsi que la planification du rétablissement de la population de l'Alberta. Parmi les participants, mentionnons des représentants des secteurs des Sciences et de Gestion de l'habitat de la Région du Centre et de l'Arctique du MPO ainsi que des spécialistes d'Alberta Sustainable Resource Development, de l'Agence Parcs Canada et de FWR Freshwater Research Ltd. Le présent compte rendu résume les discussions pertinentes tenues et présente les principales conclusions formulées au cours de ces réunions d'examen par des pairs.

Le présent compte rendu sera publié dans la série des comptes rendus du Secrétariat canadien de consultation scientifique (SCCS). Un document contenant de l'information détaillée sur la truite fardée versant de l'ouest à l'appui de l'évaluation sera publié à titre de document de recherche. L'avis découlant de la réunion sera publié à titre d'avis scientifique.

INTRODUCTION

In November 2006, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Alberta population of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) as Threatened because the pure native populations[1] had been reduced by almost 80% as a result of over-exploitation, habitat degradation and hybridization/competition with introduced non-native trout (COSEWIC 2006). Remaining pure Westslope Cutthroat Trout persist mainly as severely fragmented, remnant headwater populations in southwestern Alberta, primarily in the upper South Saskatchewan River drainage (Bow and Oldman rivers). They are now being considered for legal listing under the *Species at Risk Act* (SARA). To inform this decision and to provide the basis for other SARA-related functions, a Recovery Potential Assessment (RPA) meeting was held by teleconference on 12 May and 5 June 2009. The RPA process was developed by DFO Science to be considered by the DFO Minister when making listing decisions under the SARA and for any socio-economic analyses, consultations, and recovery planning. It will also provide Allowable Harm information for SARA permitting purposes.

The purpose of the meetings, as described in the Terms of Reference (Appendix 1), was to assess and provide advice on the recovery potential of the Alberta population of Westslope Cutthroat Trout. The RPA is a science-based peer review which assesses the current status of the population, what is known about its habitat, the scope for human-induced mortality, and scenarios for mitigation and alternatives to activities that negatively impact the population and its habitat (DFO 2007) by addressing 17 points in the RPA framework outlined in the Summary section of the Revised Protocol for Conducting Recovery Potential Assessments (available at: http://www.dfo-mpo.gc.ca/csas/Csas/status/2007/SAR-AS2007_039_e.pdf).

Meeting participants (Appendix 2) included DFO Science and Fish Habitat Management sectors of the Central and Arctic Region and specialists from Alberta Sustainable Resource Development, Parks Canada Agency, FWR Freshwater Research Ltd, and Cows and Fish – Alberta Riparian Habitat Management Society. The meeting generally followed the agenda outlined in Appendix 3.

This proceedings report summarizes the relevant discussions and presents the key conclusions reached during the two peer review meetings. The Research Document provides background information considered and discussed during the meetings and the Science Advisory Report is the synopsis of the advice from the meeting.

DETAILED DISCUSSION

The meeting chair provided the participants with an introduction to the RPA process and where it fits with respect to the COSEWIC assessment and SARA listing process for Westslope Cutthroat Trout. This included the intent of the meeting and how the products of the meeting might be used. A draft RPA had been developed by DFO and provided to participants in advance of the meeting. The draft report was the basis for discussion and participants were encouraged to add to or change the material, as needed, to ensure that the best and most up-to-date information was included. The report and any conclusions drawn from the report should be clear and unambiguous.

[1] In this document, pure native populations are assumed to be non-stocked populations.

Title, Image and Context sections

Both the map and image used on the cover page needed to be changed. A more current map with only pure native populations would be included along with a better photo. It was pointed out that it should be clear in both the map caption and in the context section, that stocked Westslope Cutthroat Trout were not included in the assessment. It was recommended that a footnote to this effect be included in the title and map caption to make sure this is clear. The summary bullets are intended to summarize the conclusions and advice resulting from the meeting so that they were moved to the end of the agenda. The importance of recognizing individual populations, and not simply assessing the sub-species as a whole, was pointed out.

Species Biology and Ecology

Participants indicated that the material presented in this section was accurate for the most part but that Alberta-specific references were needed and would be provided by some participants following the first meeting.

Participants discussed what constitutes migratory (i.e., fluvial and adfluvial) versus resident populations. Fluvial forms live in medium- to large-sized rivers though they are defined in the literature more by their large size and migratory behaviour. They grow in a large environment and then move into smaller creeks or the upper parts of rivers to spawn. The information in the draft RPA about migratory populations did not accurately reflect their current status as most are no longer found in Alberta. They were probably more prevalent historically but most have been lost due to hydroelectric development or hybridized out of existence by Rainbow Trout (*Oncorhynchus mykiss*). There may be some present in the Oldman and Livingston rivers but all have been lost in the Bow, Elbow, Kananaskis, Spray and Highwood watersheds although there may be fluvial forms in the Cascade region of Banff National Park. It should be clear that Westslope Cutthroat Trout have complex types of life histories across the full range of the species but that most of those remaining in Alberta are the resident form.

The size of mature females should be described as 150-250+ mm fork length as some female residents don't reach maturity below 250 mm. Both length and age information is needed. Westslope Cutthroat Trout seldom attain 10 years of age (Scott and Crossman 1973). Average age information is not needed.

Philopatry is not "strong", as indicated in the draft RPA, and is often quoted as ranging from 60% to 80%, which is low compared to Pacific Salmon. There is significant straying and this has genetic implications. High straying rates allow recolonization after stochastic events.

The number of locations where Cutthroat Trout have been introduced should be included in the report. Participants confirmed that none of the stocked watersheds in Banff National Park included those in the North Saskatchewan River watershed. Brown Trout (*Salmo trutta*) do not hybridize with Westslope Cutthroat Trout (fall versus spring spawners) but it is important to note that they would compete for resources with Westslope Cutthroat Trout as do Brook Trout (*Salvelinus fontinalis*) and in some cases Lake Trout (*Salvelinus namaycush*). Golden Trout (*Oncorhynchus mykiss aguaconita*) are not found in cutthroat waters (with the possible exception of the Castle River system) but there is no information on whether they hybridize. They should still be included as possible hybridizers although they are not in the same league as Rainbow Trout. The two issues - hybridization and competition - need to be separated.

Participants indicated that it is important to include information about overwintering habitat, especially where fish congregate in a few large pools during winter. Overwintering habitat may be limiting. This information could be included with seasonal movements and should be identified in the Habitat section of the report.

There was some discussion about what threshold should be used for deciding that an individual fish or population is pure versus hybridized. Geneticists would likely agree that anything greater than 1% would be significantly hybridized but levels can be as high as 10 to 20% before they are considered significant in terms of the literature related to management and recovery planning. The draft paragraph in the RPA was meant to identify the populations that COSEWIC assessed, to make clear their assessment did not include stocked populations or those known to be hybridized.

There was some discussion about the genetics testing and whether it was a source of uncertainty. Populations in which all the fish tested had a $\geq$ 0.99 proportion of Westslope Cutthroat Trout genome are considered pure. Subsequent discussions indicated that the reported genetic results had, in fact, reported pure populations as those in which the average of all fish tested had a $\geq$ 0.99 proportion of Westslope Cutthroat Trout genome. This means that some of the populations identified in Table 1 may contain one or more individual fish with a slightly lower proportion of WSCT genome. The analysis relied on relatively small sample sizes for most populations, making it difficult to say with certainty whether a population is pure or whether a larger sample size in the future will reveal that it contains hybrid fish. Genetic testing may not accurately describe the purity of a population unless the sample sizes are relatively large. Other factors also influence the interpretation of the genetic results, such as changes in genetics methods over time and whether natural polymorphisms exist in some populations.

Historic and Current Abundance and Trends

The most current number of suspected and known populations of pure native Westslope Cutthroat Trout is 50. This number will probably decline as more genetics data are gathered and analyzed. Participants will update Table 1 and provide the first two columns for the RPA. There was some concern expressed about identifying the populations as pure with the sample sizes being so small. This concern could be identified in the Sources of Uncertainty section or possibly in the Table caption by indicating that sample sizes are small and further testing might result in some populations being identified as hybridized. More genetics work is needed for several populations where preliminary results differed from the subsequent “borderline” results. Table 1 and the text in this section of the report will be updated with the most recent genetics results following the second meeting.

The participants made several other suggestions for change to this section. The information should be presented chronologically for three points in time: historic (pre-European), at the time of the COSEWIC assessment in 2006 and now (with the effects of gathering more samples). The historic information should indicate the number of km^2 of watershed or number of waterbodies known or suspected to have contained pure native Westslope Cutthroat Trout. The reference cited for the number of pure populations needs to be changed as all information does not come from the Alberta Fisheries and Wildlife Management Information System (FWMIS). It was noted that changes made to the number of wild native populations will also change the estimated number of mature individuals based on the estimated 100 adults per population.

Participants confirmed that 8 km was the average length of stream for the remaining Westslope Cutthroat Trout populations. In the most extreme cases, populations were found in streams 2-3 km in length.

Historic and Current Distribution and Trends

Participants were asked about the status of Westslope Cutthroat Trout in the Milk River. Fisheries reports up to 1990 did not indicate the presence of Westslope Cutthroat Trout in the Canadian portion of the Milk River, though a thesis had reported a single fish in the river near the border. There is no recent evidence of Westslope Cutthroat Trout occurring in the Milk River.

The overall distribution of this subspecies is so fragmented, at least in the Bow River system, and the fragments are so small that many of these populations are on the brink of extinction. A statement should be included to convey the significance or magnitude of the loss. Historically, 274 streams were believed to contain pure Westslope Cutthroat Trout. Many were lost such as the Spray Lakes population which consisted of thousands of large-bodied adfluvial cutthroat trout that disappeared following construction of a dam. Creel survey data are available for three years subsequent to the dam being built. Essentially, only stream-resident populations remain and some contain only a few dozen adults. If all the remaining populations in the Bow River watershed were added together, they probably wouldn't equal the numbers and sizes of fish lost from the adfluvial populations that used to exist in Lower Kananaskis Lake and Spray Lakes. This is because of the fact that most of the remaining populations are found in tiny streams populated by resident fish populations consisting of small numbers (10s) of small fish. The situation is far worse than indicated by simply looking at the number of remaining populations, as some of those are critically endangered.

Information to Support Identification of Critical Habitat

There is a difference between whether the occupied habitat or stream type is being characterized. If it is stream type, then this subspecies occurs in high-energy streams. But within those systems Westslope Cutthroat Trout seek out areas of slower water. Today they are typically restricted to slower waters within smaller, less productive waterbodies with high energy discharges (e.g., headwater streams and lakes, upper reaches of mainstem rivers), though they are able to handle times of rising or peak flows that allow them to negotiate seasonal barriers within systems. This needs to be clarified in the draft RPA.

Young fish are often found at the interface between water and the stream bank. This would make them particularly susceptible to sudden changes in flow. The statement about seeking out reservoirs is misleading and should be changed to lacustrine environments with cooler temperatures.

Participants initially wanted fluvial Westslope Cutthroat Trout populations to be added to this section but after discussion it was concluded that they are probably extirpated so should not be included.

Winter habitat should be emphasized. The presence of groundwater influx and the absence of anchor ice are important components of overwintering habitat along with the presence, quantity, quality and distribution of wintering pools that define how well Westslope Cutthroat Trout survive in a particular system. Several references related to overwintering habitat could be added including two reports by Brown and McKay and a report on Dutch Creek by Brown.

There is a population of genetically pure fish above the falls on the Oldman River above Cache Creek. They were likely moved there from below the falls but are worth preserving.

The information in Table 1 is now outdated and should be revised. In Jumpingpound Creek, individual pure Westslope Cutthroat Trout are still present but hybrid fish also occur in the system so by the earlier definition they are no longer considered a pure population. The five tributaries of the Elbow River also may not be pure. Small populations may be present in the upper Belly drainages. There was some discussion about most of the remaining populations being in the headwaters and on occasion being washed downstream. Sometimes the individuals are picked up in surveys and are then used as evidence of distribution. Sheep, Highwood and Bow rivers might be in this situation. It was suggested that someone look at Trevor Road's thesis and see what was used as a basis for the distribution of Westslope Cutthroat Trout in the Bow basin. Potvin *et al.* 2003 should be added as a reference for Spray River.

Participants agreed all areas where pure native Westslope Cutthroat Trout now remain would likely be considered critical to their survival or recovery. They pointed out that the watershed as a whole needs to be rehabilitated and protected. The importance of maintaining the functional attributes of habitat should be added because it is needed to allow natural stream processes to occur in association with riparian areas to create and maintain fish habitat, whether critical or not. Bank armouring with rip-rap doesn't enhance natural processes. The natural hydrological regime (at a watershed scale) has to be retained or reinstituted.

Spawning locations are poorly known throughout the whole area (Bow and Oldman). That information would help an operational land manager monitor and protect populations. Overwintering habitat is likely a major factor limiting survival and recovery of populations and a good survey to identify locations would be useful for recovery efforts. It was pointed out that there is a problem with singling out spawning and key overwintering areas as potential *critical habitat*, as defined by the SARA, for Westslope Cutthroat Trout as other important areas would then be overlooked. Bank armouring, which limits summer feeding areas, seems to be occurring at an increasing rate and eliminates undercut banks, sweepers and log jams that make for good summer feeding habitat for Westslope Cutthroat Trout. Key feeding and residence areas are needed in the summer. Spawning areas tend to be considered Class A areas where instream work is prohibited with the interpretation that other areas, such as those used for feeding, are not as important. It was agreed that considering all areas where pure native populations are currently found as potential *critical habitat* addresses this concern.

Information on barriers to access and connectivity should be considered in this section as it has implications for non-indigenous species access to Westslope Cutthroat Trout habitat and as a result limits the potential habitat for pure populations.

Residence

The SARA defines *residence* for species at risk. DFO has developed an approach to identifying *residence* by answering the following questions: Do Westslope Cutthroat Trout change their physical environment by developing and investing in a structure? If so, how is the structure created? Is it occupied and, if so, when? Is it essential to the life cycle?

Participants provided more details about redds than was contained in the draft RPA. In Alberta, first-order tributaries are often dry or ephemeral. "Lower order" was considered a better

description of the tributaries used by pure populations. Redds are not restricted to the tailouts of pools or glides but clean substrate is relevant. It should be noted that Westslope Cutthroat Trout are found in close proximity to undercut banks or large woody debris, and overhead cover enhances the suitability of the area by providing cover/protection while constructing redds and spawning. Westslope Cutthroat Trout can also spawn in wide open flat slow sections of creeks. Due to this sort of variabiltiy, the description should be non-restrictive. Gravel size, "small and large gravels", should be added as the abiltiy for females to create a successful redd is a funtion of her size and the gravel size. Substrate permeability (ability of water to move up or down through the gravel) and temperature (near to or above 10°C during the spawning period) should be added.

Participants discussed the SARA definition of *residence* and how it could be applied to Westslope Cutthroat Trout. Everyone agreed that *residence* was a most imperfect concept for fish. There was a lot of discussion about investing in a structure as a requirement when considering something as a *residence*. Given the narrow criteria, redds are the only thing that fish actually construct. Everyone agreed that redds most closely fit the criteria DFO uses to define *residence*.

Participants looked at *residence* in terms of the protection that it affords under the SARA. There is additional protection afforded the *residence* from both damage and destruction whereas for *critical habitat*, damage in and of itself is not necessarily a problem as long as the functional attributes for the species remain. Redds would be protected if they were within *critical habitat*. The Act doesn't specify that the *residence* must be in *critical habitat* but a *residence* wherever it is found is afforded protection against damage or destruction. So if the recovery strategy were to identify an area as *critical habitat* and then some Westslope Cutthroat Trout were to build redds outside of the *critical habitat*, the redds would be protected under the SARA. The current approach that was agreed to under the Critical Habitat section was that all areas where Westslope Cutthroat Trout are found would be considered *critical habitat*. As an example, driving an ATV through a stream would not be considered destruction of *critical habitat* but if it were driven through redds, the driver could be taken to court for damaging *residences*. Damage to redds caused by upstream activities (e.g., sediment settling on redds) would also be prohibited.

After looking at the wording in the SARA, participants felt that the Act provides a fairly generic description (i.e., "a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating") that is broad enough to encompass overwintering areas. There was concern that DFO's interpretation of the definition of *residence* under SARA was not accurate or was too restrictive. Participants wanted to describe the *residence* as including breeding, rearing, staging, wintering, holding environments (pools) and feeding areas as well as constructed redds. All those areas in the creeks that serve those purposes would be used by resident Westslope Cutthroat Trout. Pool habitat, the areas trout use to avoid currents, is most important as they cannot continually fight the current. All previous comments about winter habitat, and the nature of pools that to allow fish to over-winter, should be included.

Information about Westslope Cutthroat Trout spawning areas is not available to the same extent as it is for fall spawners so there is some difficulty in actually knowing where redds are located. Participants were concerned that if a very restrictive interpretation of *residence* is used, it would include only redds occupied by adults, eggs and/or alevins. In the absence of detailed information to document where spawning occurs, and more precisely where redds are

constructed, the extra protection gained by designating redds as a *residence* would not be realized. In contrast, protection would be available if *residence* was interpreted more broadly to include any reaches or sections of streams where suitable water velocity, water depth and substrate type for spawning occur and, therefore, Westslope Cutthroat Trout would be expected to spawn. Participants generally agreed that a broader description of *residence* should be adopted.

The RPA will indicate that the habitat used by Westslope Cutthroat Trout for key components of their lifecycle is extremely important and is often located in the same general areas each year.

Recovery Targets

A recovery goal is needed to ensure the persistence of pure native Westslope Cutthroat Trout in Alberta, including the level of genetic diversity needed. It was considered important to secure the remaining populations so they don't decline in abundance and genetic purity. This would allow time to conduct watershed assessments, life history studies and individual population studies plan and develop a recovery plan. Securing populations will require that remnant populations are properly managed and may also require habitat restoration work.

Quantitative targets are needed to measure performance. Participants felt that further discussion was needed about realistic targets to determine how many populations could be maintained, which ones are needed for genetic diversity and of what size. There was some discussion about effective population size. Based on modelling, 2,000 adults would be needed to be reasonably sure that a population would persist for 40 generations. If random catastrophic events are considered, the population size would need to be even larger. Participants felt that the estimated 7,000 adults needed to ensure a 99% probability of existence for at least 40 generations was not realistic. Even 2,000 adults would not be realistic as most populations reside in streams averaging only 8 km in length with ≤ 100 adults. These populations are unexploited, have not been subjected to logging or cattle grazing, and are probably at carrying capacity for the available habitat. Some populations are so small they may be lost as a result of stochastic events or inbreeding. Participants agreed to not include a population size target in the RPA.

Estimates based on modelling indicate that the size of population needed to ensure long term survival, and to withstand catastrophic events, is much larger than the number of fish that would have been present historically. The strategy that maintained Westslope Cutthroat Trout populations in the past relied heavily on connectivity which allowed recolonization of areas following stochastic events. Participants recognized that preventing loss of populations would require expansion of habitat downstream so that populations could re-establish their former meta-population structure. This would require removing competing and hybridizing non-indigenous fish from downstream areas to provide habitat into which Westslope Cutthroat Trout could expand and increase in numbers. In essence, this approach would reclaim habitat from Rainbow Trout and Brook Trout and their hybrids and restore connectivity. This would conflict with Rainbow Trout and the Rainbow Trout fishery (Brook and Brown trout as well) posing major political and economic issues. If it were possible to completely remove competitive non-indigenous salmonids, barriers would have to be erected to prevent recolonization. There could be also some fluvial Bull Trout impacts from restoration activities (e.g., in the Highwood watershed) which would have to be considered. In the upper part of the Bow system in Banff National Park, there are locations with suitable habitat where, if non-indigenous fish were moved out, more isolated populations of Westslope Cutthroat Trout with more diverse genetics

could be secured. This would require a social decision to remove the non-indigenous salmonids.

Re-establishing extirpated populations would be problematic as the original genetic strain would not be available and stocking from other sources would ignore the loss of genetic diversity.

It is important to provide protection from anthropogenic activities in watersheds. For example, a pipeline project currently planned to cross Cutthroat and Deep creeks could negatively impact the pure native populations that reside there.

It was agreed that it is important to focus effort where it will have the most impact. The populations would be prioritized based on their importance and size. For example, the relatively large populations in the Upper Carbondale basin and upper Oldman Livingston basin will probably survive fairly well. Minimal efforts to protect them will have reasonable chance of success. Other populations may survive given some help. Populations in the third group, such as those found in Iron Creek and Corral creeks, likely have an effective population size of only a few dozen. They are on the brink of extinction and be best managed under a "palliative care" approach. It was agreed the population objective would be reframed based on the triage approach and the distribution objective would be to maintain the current range. There was also general agreement that even if some populations listed in Table 1 might contain one or more fish with a slightly lower proportion of WSCT genome, the conservation value of all these populations is high enough that recovery efforts should be afforded to all of them.

During the discussion of recovery targets, use of terminology was considered. For example, the term "restore" might imply stocking to some people so that "recover" was a better term to use. Originally there was a reference to "transferring fish" in the document. Participants agreed that this should be removed. It was recognized that, as part of the recovery effort, there might be some transferring of fish however it shouldn't be equated with stocking of hatchery fish. Some transfers could potentially change the status of a transferred fish from native to non-indigenous from COSEWIC's perspective. To mention fish transfers in the RPA would require a detailed explanation to avoid the misconception that stocking any Westslope Cutthroat Trout anywhere would lead to recovery of the subspecies.

Participants agreed that the recovery goal for Alberta Westslope Cutthroat Trout should be to protect and maintain all remaining pure native, non-stocked, populations of Westslope Cutthroat Trout, each containing at least their current number of fish, with their historical degree of connectivity within drainage systems (except where it would permit invasive non-indigenous species to establish) throughout their current range to ensure their persistence until at least 2020. The aim over the long term is to recover populations within their historic range, where possible.

Threats to Survival and Recovery

There are four general categories of threats to survival and recovery for Westslope Cutthroat Trout which one participant called "the four horsemen of extinction": climate change, land-use habitat damage and loss, invasive non-indigenous species and overexploitation.

It was pointed out that the order of items in a list infers importance so information on threats in the RPA should be presented in decreasing order of importance. Some introductory re-wording was suggested: Three general types of threats of anthropogenic origin have led to the steady decline in numbers of Westslope Cutthroat Trout in Alberta over the last century: initially

overexploitation, then the introduction of non-indigenous species and/or genotypes, and more recently habitat degradation and loss, and climate change. Currently the greatest threat is invasive non-indigenous species. Non-indigenous salmonids were widely introduced in large numbers beginning in 1913 (essentially when settlers arrived), long before major habitat damage occurred, like we have today.

Overall, overexploitation is currently considered a relatively minor threat to the subspecies relative to non-indigenous interactions. Its impact is not usually at the population level. The closure for fishing from November to June protects the fish during vulnerable overwintering periods and spawning migration. Both intentional illegal harvest (i.e., poaching) and unintentional illegal harvest (i.e., misidentification) should be included in the report.

In presenting the threats from non-indigenous salmonids, it should be clear that the number of fish introduced is less important than the fact that they are widely introduced into large numbers of waterbodies within the native range of Westslope Cutthroat Trout. It is not known if Golden Trout hybridize with Westslope Cutthroat Trout. Brown, Brook and Lake trout are considered competitors.

It was not clear how or why degradation of habitat leads to increased hybridization in Westslope Cutthroat Trout but participants agreed that it does. It is associated with increased replacement, invasiveness by Brook Trout over cutthroats and increased hybridization with non-indigenous salmonids. Increases in water temperature, caused by climate change, also result in Brook Trout having a competitive advantage over cutthroats.

There was some discussion about prescribed burns, including information obtained from wildfires in Kootenay National Park where the negative impacts predicted did not happen and habitat complexity may have been positively influenced. There may be some examples from the U.S. but there are no contemporary local examples. It was suggested that the predicted negative impact may relate to situations where non-indigenous species are present. If stream temperatures change beyond a threshold, the other salmonids may have a competitive advantage over Westslope Cutthroat Trout. More information is needed about the impact of burns. A statement will be added to the background document about the effect of salvage logging.

Recreation as an activity (e.g., camping) affects habitat. Local extirpation of beaver populations have changed permanently flowing streams to ephemeral streams and fish populations have disappeared as a consequence.

During the first meeting participants worked through a threats table filling out the magnitude of each threat based on its extent (widespread, localized or unknown), occurrence (historic, current, imminent, anticipated or unknown), and severity (high, moderate, low or unknown). There was some confusion about the organization of the threats table and a number of changes were suggested to make it more useful. Following the first meeting it was decided the information should be presented differently (see ‘Table 1’ section of this document).

Limiting Factors for Population Recovery

Participants suggested adding deep pools and appropriate conditions for overwintering as limiting factors for recovery. In addition, suitable spawning habitat and watersheds that don’t have high sediment loads (fine sediments) should be added.

Mitigation and Alternatives

It was agreed that mitigation and alternatives should be presented in the same order as the threats appear in the Threats section.

Participants agreed with the mitigations presented in the Invasive Non-indigenous Species subsection.

One alternative that should be included under the non-indigenous salmonid threat is to archive selective genetically pure stocks of Westslope Cutthroat Trout in appropriate waters with suitable habitat (i.e., a gene-banking approach). This approach would not be appropriate for all stocks, but would be useful for archiving local genetic stocks so they could be reintroduced in the future. Details would be included in the recovery plan.

Another alternative would be to introduce barriers to isolate and protect pure populations above the barriers to prevent the recolonization or the upward migration of non-indigenous species.

Education is very important as it reduces the potential for people to sabotage recovery efforts. It is important to emphasize the value of this subspecies. Westslope Cutthroat Trout are a reusable resource, excellent fly fish, more readily caught than other salmonids, grow larger than some non-indigenous salmonids and resilient to catch-and-release. All these factors can be used to gain support from the public and anglers.

One more alternative is to remove non-indigenous and hybridized fish and restore pure native Westslope Cutthroat Trout. Again it should be clear that restoring Westslope Cutthroat Trout is more than stocking any strain in any waterbody. Conservation stocking may be appropriate although in some cases this may not be necessary. In Quirk Creek, for example, if Brook Trout are removed the pure native Westslope Cutthroat Trout already in the system will remain.

Under the Land Use (barriers/impoundments) subsection, there was general agreement with the clawback of habitat. It was suggested that the rationale for not allowing new barriers should be added. It was also suggested that mitigations should be considered for older barriers such as asking for changes to the conditions of current operating procedures (e.g., stabilizing water levels and retrofitting dams with fish passage) where appropriate.

Under the Land Use (resource extraction, road construction, agriculture, ranching and urbanization) subsection, add significant changes in flow during winter for holding habitat as something to be avoided as well as in spring. Removal of unused roads should be considered.

In the Fishing subsection, participants noted that it important to recognize that the goal is to protect the pure remaining remnant populations and that Alberta also has pure non-indigenous (i.e., stocked) Westslope Cutthroat Trout populations, so fishing regulations are waterbody specific. Several fishing-related mitigation measures were suggested to better reflect the current approaches used in Alberta: instituting a program of severe fines (and other measures) for poaching, increasing fish identification education for anglers, and regulating or encouraging fishing practices that improve fish survival for catch-and-release fisheries. Participants noted that enforcement is different in the National Parks and that the remnant populations fall under both Alberta Government and Parks Canada jurisdictions.

The promotion of fish watching was suggested as an alternative to angling.

Allowable Harm

Participants discussed permitting of activities, the various sections of the SARA related to this and implications of the recovery plan for permitting activities.

There are a broad range of populations, and participants considered that the extent to which harvest or hooking mortality is creating a problem for Westslope Cutthroat Trout is low. Some of the creeks with few fish don't have fishing. Bag limits and bait bans are in place in all locations. In some cases, closing streams to angling is unlikely to have much effect on the populations and participants felt that it could put some populations at risk from disgruntled anglers sabotaging recovery efforts by introducing non-indigenous salmonids. Picklejar Lake and Canyon Creek were given as examples of populations where fishing effort is not having a negative impact on Westslope Cutthroat Trout. Unintentional harvest due to misidentification, which is a different issue than overexploitation, could be mitigated by having anglers pass a fish identification test before being allowed to harvest fish in certain areas.

There was some discussion about whether or not harm should be allowed from land-use activities. Most remaining pure remnant populations are critically endangered. Participants felt that current mitigation measures may not be effective, there is no testing to ensure they are and even mitigation measures produce impacts, thus no development activities should be undertaken in Westslope Cutthroat Trout watersheds. All remaining pure populations should be protected from habitat destruction.

Preliminary stage-based modelling provides a general picture of how sensitive populations are to changes in demographic parameters. The modelling also provides insight into how much potential harm could be allowed without jeopardizing survival and recovery. Ideally there should be mortality estimates for the different threats. Analyses consider how sensitive population growth is to changes in specific bio-rates such as survival of each of the life stages or fecundity. For Westslope Cutthroat Trout, all three life stages (young-of-the-year, juveniles, adults) were equally sensitive to changes in mortality. When probability of catastrophic events is included in the model, viable population size for long-term persistence must be very high, much higher than the current population levels. This suggests that connectivity between populations, to allow recolonization following catastrophic events, was and still is an important requirement for long-term persistence of Westslope Cutthroat Trout. It is very important to indicate that Westslope Cutthroat Trout can't tolerate harm from activities that allow invasive species the opportunity to hybridize or compete with them.

Participants agreed that research activities should be allowed, even if they cause some incidental harm, so long as the research is beneficial to Westslope Cutthroat Trout as a whole and does not jeopardize the survival or recovery of individual populations.

It was pointed out that allowable harm can be quite complicated as it has to be considered within the context of policy and land use. There was a statement in the draft RPA about managing locally but in some cases frameworks are in place that guide activities and do not allow management at the local level.

The statement about no introductions of non-indigenous salmonids was qualified so that it would not impact put-and-take fisheries for Rainbow Trout in locations where there are no pure native Westslope Cutthroat Trout.

The text related to fishing was discussed and revised. Angling does not generally cause population-level impacts although monitoring should occur to ensure appropriate actions can be taken in the event fishing pressure increases to the point that remnant populations are being impacted at the population level. Monitoring provides managers with data on which to base decisions.

Data and Knowledge Gaps

Participants reviewed and agreed with the data and knowledge gaps identified in the draft RPA. They also identified a few other gaps (e.g., spawning and overwintering locations).

Sources of Uncertainty

Participants considered the genetics of Westslope Cutthroat Trout as a source of uncertainty. This included estimating the degree of introgression at the population level and at what threshold a fish or population is considered pure. Additionally, it is uncertain whether Westslope Trout will be able to adapt isolating mechanisms in the future that would reduce or prevent hybridization and/or increase competitiveness with invasive non-indigenous salmonids. Participants reviewed and agreed with the content of this section.

Conclusion

Participants reviewed and agreed with conclusions (i.e., advice) in the draft RPA.

Summary

Participants reviewed and agreed with the summary bullets (i.e., summarized advice) in the draft RPA.

Other Considerations

This section is optional in an RPA. Participants suggested that the text contained in the section was relevant and should be included in the RPA but that it might be more appropriate in the Context or Background sections. It is not made clear elsewhere in the document why Westslope Cutthroat Trout should be protected, apart from the biological and legal necessity to do so. Westslope Cutthroat Trout are an eminently reusable angling target. They are very durable, relatively easy to catch and ideal fly fish because they are surface feeders. They have shown themselves to be very resilient to catch and release and are prized by the local angling community. These advantages will be included in the RPA.

Table 1

Table 1 lists the pure native populations of Westslope Cutthroat Trout for each of the watersheds based on the latest genetics analysis. All waterbodies in Banff National Park appear in the section of the table labeled as Bow/upper Bow River drainage above the falls at Banff. Populations identified as being upper and lower waterbodies should only be identified separately if there is some barrier between them. The numbers of fish sampled from each population are included in a separate column.

There was discussion as to whether known and suspected pure Westslope Cutthroat Trout populations that were introduced should be identified in the Table. Genetic purity has been tested in Banff National Park in the Bow River, in the Upper Bow in the section between Bow Lake and Hector Lake, and elsewhere. Some national park populations might have received local introductions. There are records indicating that pure Westslope Cutthroat Trout were stocked on top of native pure populations. The genetic data reveal those populations as being "pure" and they don't cluster with the genetic results obtained from stocked locations. Even when stocking has occurred it is unknown whether the stocked fish survived and reproduced. It may be those stocked fish had little or no genetic exchange with the pre-existing population. It was suggested that these stocked populations should be included but identified in Table 1 with an asterisk to indicate there could have been impact on the original genetic population by stocking. It was agreed that hatchery (cultured) origin stocks should not be included as they are not native populations. Barren lake introductions will also not be included in Table 1.

Three types of genetic analytical approaches were used for testing over the years: allozymes, mitochondrial DNA and microsatellites. This has an impact on comparison of the results. It was suggested that a statement be included that there had been an evolution in the methods used.

Participants agreed to fill out Table 1 following the second meeting and that it would be included in the final RPA Science Advisory Report. Participants decided that Table 1 should include columns indicating the current population status and recovery potential of each population. Population status would be rated as low, medium, high or unknown risk of extinction based on population size, length and width of the stream and degree of connectivity. For example, a small population in a short stream with no connectivity would be rated as low. Recovery potential would also be rated, as low, medium, high or unknown, on the basis of whether anything that can be done to address threats and reduce the chance of extinction.

Table 2

During the first meeting, participants found it difficult to rate threats when each was thinking of a different population. It was decided that a better approach would be to assess threats by population. A revised threats table (Table 2) was developed following the first meeting, in which threats were presented by general activity and only current threats would be considered. The magnitude of each threat would be rated as low, medium, high or unknown based on a combination of likelihood of occurrence and level of severity. Participants agreed to fill out the Table 2 following the meeting and that it would be included in the final RPA Science Advisory Report. A detailed criteria matrix would be developed to help participants rate the population status, threats and recovery potential of each population.

Sources of information

DFO, 2007. Revised Protocol for Conducting Recovery Potential Assessments. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2007/039.

Appendix 1. Terms of Reference

Recovery Potential Assessment for Westslope Cutthroat Trout (Alberta Population)

Regional Advisory Meeting (Central and Arctic)

Teleconference call
Part 1: 12 May 2009, from 10:00 a.m. to 5:00 p.m. (Central Daylight Time)
Part 2: 5 June 2009, 11:00 a.m. - 4:30 p.m. (Central Daylight Time)
Chairperson: Holly Cleator

Background

In November 2006, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Alberta population of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) as Threatened because the pure native populations had been reduced by almost 80% as a result of over-exploitation, habitat degradation and hybridization/competition with introduced non-native trout (COSEWIC 2006). Remaining pure Westslope Cutthroat Trout persist mainly as severely fragmented, remnant headwater populations. They are now being considered for legal listing under the *Species at Risk Act* (SARA).

In advance of making a listing decision for Westslope Cutthroat Trout, Fisheries and Oceans Canada (DFO) Science has been asked to undertake a Recovery Potential Assessment (RPA). DFO Science developed the RPA framework to provide the information and scientific advice required for the Department to meet various requirements of the SARA including listing decisions, authorizations to carry out activities that would otherwise violate the SARA and development of recovery strategies. The information in the RPA may be used to inform both scientific and socio-economic elements of the listing decision, as well as development of a recovery strategy and action plan, and for assessing SARA Section 73 agreements and permits.

A preliminary fact-finding workshop was held in February 2006 to consider the scientific data available for development of an RPA and recovery strategy. A second workshop was held in January 2007 to complete scientific review of the available data. This advisory meeting is being held to assess the recovery potential of pure native Westslope Cutthroat Trout (Alberta population). The resulting RPA Science Advisory Report (SAR) will summarize the current understanding of the distribution, abundance and trend of this subspecies in Alberta, along with recovery targets and times to recovery while considering various management scenarios. The current state of knowledge about habitat requirements, threats to both habitat and Westslope Cutthroat Trout, and measures to mitigate these impacts, will also be included in the SAR.

Objectives

The intent of this meeting is to assess the recovery potential of Westslope Cutthroat Trout (Alberta population) using the 17 steps in the RPA framework outlined in the Summary section of the Revised Protocol for Conducting Recovery Potential Assessments (available at: http://www.dfo-mpo.gc.ca/csas/Csas/status/2007/SAR-AS2007_039_e.pdf). The advice will be provided to the DFO Minister for his consideration in meeting various requirements of SARA including any listing decision for the Alberta population.

Products

The meeting will generate a proceedings report summarizing the deliberations of the participants. This will be published in the Canadian Science Advisory Secretariat (CSAS) Proceedings Series on the CSAS website. Also, the advice from the meeting will be published in the form of an RPA SAR.

Participation

Participants from DFO, Parks Canada Agency, Alberta Sustainable Resource Development, the University of Calgary, and Piikani First Nation, as well as other experts, are invited to this meeting.

Appendix 2: Meeting Participants

Name	Affiliation	E-mail
Holly Cleator (Chairperson)	Fisheries and Oceans Canada -Science	Holly.Cleator@dfo-mpo.gc.ca
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Appendix 3: Agenda

Recovery Potential Assessment for Westslope Cutthroat Trout

(Alberta Population)

Chair: Holly Cleator

Part 1:12 May 2009, from 10:00 a.m. to 5:00 p.m. (Central Daylight Time)

10:00	Introductions (round table)
10:10	Objectives of the meeting (Cleator)
10:25	Commence review of RPA
	Image of the species and map
10:35	Context and Rationale for Assessment
10:50	Species Biology and Ecology
11:35	Abundance and Trends
12:00	Distribution and Trends
12:20	Critical Habitat
1:00	*Lunch*
1:30	Residence
1:45	Recovery Targets
2:35	Threats and Mitigation/Alternatives
3:35	*Coffee break*
3:50	Limiting Factors for Population Recovery
3:55	Allowable Harm
4:20	Data / Knowledge Gaps and Sources of Uncertainty
4:30	Other Considerations
4:40	Conclusion and Summary
4:55	Concluding remarks / next steps
5:00	Meeting adjourns

Part 2: 5 June 2009, 11:00 a.m. - 4:30 p.m. (Central Daylight Time)

11:00	Introductions (round table)
11:05	Opening remarks (Cleator)
11:15	Review of revisions to draft RPA (excluding Tables 1 and 2, and Allowable Harm)
12:30	Mitigation and Alternatives

1:00 *Lunch*

1:30 Allowable Harm

1:45 Data and Knowledge Gaps

2:00 Sources of Uncertainty

2:15 Conclusion and Summary

2:45 Other Considerations, Sources of Information

2:50 *Coffee break*

3:00 Table 1: recovery potential

4:00 Table 2: threats

4:30 Meeting adjourns