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Proceedings of the regional peer review of the pre-COSEWIC assessment for Black Redhorse (*Moxostoma duquesnei)*

12 November 2013
Burlington, Ontario

Chairperson: Lynn Bouvier
Editor: Lynn Bouvier

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Canada

Foreword

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

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SUMMARY

A regional Science peer-review meeting was held on 12 November 2013 in Burlington, Ontario. The purpose of the meeting was to assess the revised population modelling of Black Redhorse (*Moxostoma duquesni*). The new modelling would be incorporated into a species re-assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The Research Document provided by Science will provide population modelling in support of the upcoming reassessment of the species, and incorporate new Canadian data collected since the previous assessment in 2005. Results include a sensitivity analysis and determination of recovery targets for population abundance and required habitat.

Meeting participants included experts from Fisheries and Oceans Canada (DFO), the Ontario Ministry of Natural Resources and an independent contractor. This proceedings report summarizes the relevant discussions from the peer-review meeting and presents revisions to be made to the associated research document.

This report will be published in the Canadian Science Advisory Secretariat (CSAS) Proceedings Series on the CSAS website. The working paper presented at the workshop will be published in the form of a CSAS Research Document.

Compte rendu de l'examen régional par les pairs de l'évaluation préalable à celle du COSEPAC du chevalier noir (*Moxostoma duquesnei*)

RÉSUMÉ

Une réunion régionale d'examen scientifique par les pairs s'est tenue le 12 novembre 2013 à Burlington, en Ontario. L'objectif de cette réunion était d'évaluer la nouvelle modélisation de la population de chevalier noir (*Moxostoma duquesni*). Celle-ci sera incorporée à une réévaluation de l'espèce par le Comité sur la situation des espèces en péril au Canada (COSEPAC).

Le document de recherche des Sciences fournira une modélisation de la population à l'appui de la réévaluation à venir de l'espèce et incorporera les nouvelles données canadiennes recueillies depuis la dernière évaluation en 2005. Les résultats comprennent une analyse de sensibilité et une détermination des cibles de rétablissement pour l'abondance de la population et l'habitat requis.

Parmi les participants à la réunion, il y avait des experts de Pêches et Océans Canada (MPO) et du ministère des Richesses naturelles de l’Ontario et un entrepreneur indépendant. Le présent compte rendu résume les discussions pertinentes de la réunion d'examen par les pairs et présente les modifications qui seront apportées au document de recherche connexe.

Ce rapport sera publié dans la série des comptes rendus du Secrétariat canadien de consultation scientifique (SCCS), sur son site Web. Le document de travail présenté lors de l'atelier sera publié sous la forme d'un document de recherche du SCCS.

INTRODUCTION

In 2005 the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated Black Redhorse as Threatened for the following reason:

"A freshwater fish with a very small, highly fragmented distribution and area of occupancy, as well as restricted spawning habitat preferences. Native populations are found in only 5 Ontario watersheds in areas heavily impacted by urbanization and agriculture. It is at risk of habitat loss and degradation as a result of increased siltation and turbidity. Dams may adversely affect flow regimes and have fragmented populations in the two major rivers where this species occurs."

In 2012 COSEWIC listed Black Redhorse on its Winter Call for Bids to produce a status report. At the time of the Science peer-review meeting, the species was being re-assessed.

The purpose of the meeting, as described in the Terms of Reference (Appendix 1), was to peer-review existing DFO information relevant to the COSEWIC status assessment for Black Redhorse in Canadian waters. The participants reviewed population modelling in support of the upcoming reassessment of the species, which incorporated new Canadian data collected since the previous assessment in 2005. The participants also reviewed a sensitivity analysis and recovery targets for population abundance and required habitat. The meeting was held at the Canadian Centre for Inland Waters, Burlington, Ontario, on 12 November 2013.

Meeting participants included Fisheries and Oceans Canada (DFO), the Ontario Ministry of Natural Resources and an independent contractor (Appendix 2).

This proceedings report summarizes the relevant discussions from the peer-review meeting and presents revisions to be made to the associated research document. The Research Document (Young and Koops 2013) provides information on the working paper presented at the workshop.

DETAILED DISCUSSION

The chairperson explained the objective of the meeting. A working paper on the revised population modelling had been developed by DFO and provided to the participants in advance of the meeting. This paper was the basis for discussion; the participants were encouraged to add data or provide other feedback as needed to ensure that the best, most accurate information was included.

Population Modelling

Presenter: Jennifer Young

The presenter explained that the modelling had been revised to reflect changes to the methodology that had been made since the original species assessment. New sampling data also improved the quality of the estimates (especially of survival) and provided more accurate information on life expectancy. The original modelling data had been from Missouri, where Black Redhorse has a shorter lifespan than it does in Ontario.

The presentation included life cycle and parameter estimates, the sensitivity of the model to those estimates, abundance and habitat recovery targets, and a review of differences in the modelling methodologies, as well as key uncertainties. One reviewer could not be present for the meeting; their written comments were given at the end of the presentation to ensure that they were addressed.

The reviewer had sent the presenter a document regarding differences between Black Redhorse populations in American rivers. The presenter committed to reading that paper to see

how it might affect assumptions about Canadian populations. They also said that they would add a note that the data, which was from the Grand River, could not necessarily be extrapolated to other Canadian rivers.

The presenter also mentioned that the uncertainty around parameter values is the most important factor in determining minimum viable population (MVP). Additional sampling would improve uncertainty estimates and make the MVP more accurate.

The reviewer had asked what the modelling results said about the relative risk of harvest (incidental or otherwise) and the risk of jeopardizing population recovery. The presenter explained that any harm to the later adult stage would have minimal impact on the growth rate. Sensitivity in the earlier adult stage was much higher, but in the case of by-catch, harm to the growth rate would likely be low. The distinction between large-scale fishing of the species and incidental harvest would need to be made in the document.

Some discussion around the potential of Black Redhorse by-catch followed. A participant asked if any information on fishing mortality of Black Redhorse existed, but the group knew only of anecdotal information. The participant suggested that the author of the report contact a colleague to discuss their baitfish industry risk assessment, which addressed by-catch.

The reviewer also asked that, for the age at maturity information, the document cite the journal article they had sent (Reid 2006) instead of the 2005 status report (COSEWIC 2005). The article was developed from the report's raw data.

Another participant asked why the model gave the maximum age of Black Redhorse as 16 when a previous report (Reid 2009) gave a maximum age of 17. The participant who provided the raw data to the presenter explained that they might have missed a data point when sending the information. This probably resulted from sending one of two sets of data (a decision that was based on the needs of the presenter) and from having to search for the data beforehand.

The first participant asked if changing the age would make a difference to the model and if the age should be changed to 17. The other participant replied that they did not think it should be make a difference because they did not have the length of the species at that age. The presenter added that making the change would not alter the outcome of the modelling.

The participant also asked if hatching size should be revisited. The working paper gave a hatching size of 8.8 mm, whereas a paper that they had published gave a hatching size of 8 mm. The presenter said that the difference would not have a significant impact on the modelling.

Lastly, the participant returned to the presenter's comment that there was a lack of data on fecundity for Canadian populations. They pointed out that COSEWIC (2005) cited a Canadian source; the presenter explained that they had used the information from COSEWIC (2005) in their modelling and had mistakenly thought that the source came from outside Canada.

Another participant raised the topic of minimum area per individual (API), particularly for young of the year (YOY). When considering such factors as population size and schooling behaviours, the participant wondered if the API of 0.04 m^2 was reasonable. Given the lack of data, the presenter did not know. Another participant stated that the modelling was the most reasonable approach under the circumstances, and asked one of the participants if they had any data that could be used. The participant responded that they had some that they could revisit.

Another participant asked if they had density estimates, since API is the inverse of density. A small amount of sampling had been done, and so the participant suggested offering the calculations based on density estimates as an alternative methodology for determining API. A comparison between the two methods would provide an idea of the implications of uncertainty.

A participant who had field notes and video of the movements of juvenile fish offered to review the information, produce estimates and include them in the report if possible.

The meeting chair gave the group's next steps, which were to review the new API estimates and determine whether or not to include them in the research document. This document, in turn, would inform the upcoming COSEWIC report.

REFERENCES CITED

COSEWIC. 2005. COSEWIC assessment and update status report on the Black Redhorse (*Moxostoma duquesni*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. vi + 21 p.

Reid, S.M. 2006. Timing and characteristics of Moxostoma spawning runs in three Great Lakes rivers. Journal of Freshwater Ecology 21: 249-258.

Reid, S.M. 2009. Age, growth and mortality of black redhorse (*Moxostoma duquesnei*) and shorthead redhorse (*M. macrolepidotum*) in the Grand River, Ontario. Journal of Applied Ichthyology 25: 178-183.

Young, J.A.M., and Koops, M.A. 2014. Population Modelling of Black Redhorse (*Moxostoma duquesni*) in Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2014/020. iv + 14 p.

APPENDIX 1. TERMS OF REFERENCE

Pre-COSEWIC Assessment for Black Redhorse (*Moxostoma duquesnei*)

Regional Peer Review Meeting – Central and Arctic Region

12 November 2013

Burlington, Ontario

Chairperson: Lynn Bouvier

Context

The implementation of the federal *Species at Risk Act* (SARA), proclaimed in June 2003, begins with an assessment of a species' risk of extinction by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC is a non-government scientific advisory body that has been established under Section 14(1) of SARA to perform species assessments, which provide the scientific foundation for listing species under SARA. Therefore, an assessment initiates the regulatory process whereby the competent Minister must decide whether to accept COSEWIC's assessment and add a species to Schedule 1 of SARA, which would result in legal protection for the species under the Act. If the species is already on Schedule 1 of SARA, the Minister may decide to keep the species on the list, reclassify it as per the COSEWIC assessment, or to remove it from the list (Section 27 of SARA).

Fisheries and Oceans Canada (DFO), as a generator and archivist of information on marine species and some freshwater species, is to provide COSEWIC with the best information available to ensure that an accurate assessment of the status of a species can be undertaken.

Black Redhorse *(Moxostoma duquesnei)* was listed on COSEWIC's Winter 2012 Call for Bids to produce a status report. This is a species re-assessment. In 2005 Black Redhorse was designated as Threatened with the following reason for designation:

"A freshwater fish with a very small, highly fragmented distribution and area of occupancy, as well as restricted spawning habitat preferences. Native populations are found in only 5 Ontario watersheds in areas heavily impacted by urbanization and agriculture. It is at risk of habitat loss and degradation as a result of increased siltation and turbidity. Dams may adversely affect flow regimes and have fragmented populations in the two major rivers where this species occurs."

Objectives

The overall objective of this meeting is to peer-review DFO existing information relevant to the COSEWIC status assessment for Black Redhorse in Canadian waters, considering data related to the status and trends of, and threats to this species inside and outside of Canadian waters, and the strengths and limitations of the information. This information will be available to COSEWIC, the authors of the species status report, and the co-chairs of the applicable COSEWIC Species Specialist Subcommittee. Publications from the peer-review meeting (see below) will be posted on the CSAS website.

Specifically, DFO information relevant to the following will be reviewed to the extent possible:

1) Life history characteristics

- Growth parameters: age and/or length at maturity, maximum age and/or length
- Total and natural mortality rates and recruitment rates (if data are available)
- Fecundity
- Generation time

- Early life history patterns
- Specialised niche or habitat requirements

2) Review of designatable units

Available information on population differentiation, which could support a COSEWIC decision of which populations below the species' level would be suitable for assessment and designation, will be reviewed. Information on morphology, meristics, genetics and distribution will be considered and discussed.

See COSEWIC 2008 "Guidelines for recognizing Designatable Units below the Species Level"

3) Review the COSEWIC criteria for the species in Canada as a whole, and for each designatable units identified (if any).

COSEWIC Criterion – Declining Total Population

a. Summarize overall trends in population size (both number of mature individuals and total numbers in the population) over as long a period as possible and in particular for the past three generations (taken as mean age of parents). Additionally, present data on a scale appropriate to the data to clarify the rate of decline.

b. Identify threats to abundance— where declines have occurred over the past three generations, summarize the degree to which the causes of the declines are understood, and the evidence that the declines are a result of natural variability, habitat loss, fishing, or other human activity.

c. Where declines have occurred over the past three generations, summarize the evidence that the declines have ceased, are reversible, and the likely time scales for reversibility.

COSEWIC Criterion – Small Distribution and Decline or Fluctuation: for the species in Canada as a whole, and for designatable units identified, using information in the most recent assessments:

a. Summarise the current extent of occurrence (in km^2) in Canadian waters

b. Summarise the current area of occupancy (in km^2) in Canadian waters

c. Summarise changes in extent of occurrence and area of occupancy over as long a time as possible, and in particular, over the past three generations.

d. Summarise any evidence that there have been changes in the degree of fragmentation of the overall population, or a reduction in the number of meta-population units.

e. Summarise the proportion of the population that resides in Canadian waters, migration patterns (if any), and known breeding areas.

COSEWIC Criterion – Small Total Population Size and Decline and Very Small and Restricted: for the species in Canada as a whole, and for designatable units identified, using information in the most recent assessments:

a. Tabulate the best scientific estimates of the number of mature individuals;

b. If there are likely to be fewer than 10,000 mature individuals, summarize trends in numbers of mature individuals over the past 10 years or three generations, and, to the extent possible, causes for the trends.

Summarise the options for combining indicators to provide an assessment of status, and the caveats and uncertainties associated with each option.

For transboundary stocks, summarise the status of the population(s) outside of Canadian waters. State whether rescue from outside populations is likely.

4) Describe the characteristics or elements of the species habitat to the extent possible, and threats to that habitat

Habitat is defined as "in respect of aquatic species, spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced".

The phrasing of the following guidelines would be adapted to each specific species and some could be dropped on a case-by-case basis if considered *biologically* irrelevant. However, these questions should be posed even in cases when relatively little information is expected to be available, to ensure that every effort is made to consolidate whatever knowledge and information does exist on an aquatic species' habitat requirements, and made available to COSEWIC.

a) Describe the functional properties that a species' aquatic habitat must have to allow successful completion of all life history stages.

   In the best cases, the functional properties will include both features of the habitat occupied by the species and the mechanisms by which those habitat features play a role in the survivorship or fecundity of the species. However, in many cases the functional properties cannot be described beyond reporting patterns of distribution observed (or expected) in data sources, and general types of habitat feature known to be present in the area(s) of occurrence and suspected to have functional properties. Information will rarely be equally available for all life history stages of an aquatic species, and even distributional information may be missing for some stages. Science advice needs to be carefully worded in this regard to clearly communicate uncertainties and knowledge gaps.

b) Provide information on the spatial extent of the areas that are likely to have functional properties.

   Where geo-referenced data on habitat features are readily available, these data could be used to map and roughly quantify the locations and extent of the species' habitat. Generally however, it should be sufficient to provide narrative information on what is known of the extent of occurrence of the types of habitats identified. Many information sources, including Aboriginal Traditional Knowledge (ATK) and experiential knowledge, may contribute to these efforts.

c) Identify the activities most likely to threaten the functional properties, and provide information on the extent and consequences of those activities.

   COSEWIC's operational guidelines require consideration of both the imminence of each identified threat, and the strength of evidence that the threat actually does cause harm to the species or its habitat. The information and advice from the Pre-COSEWIC review should provide whatever information is available on both of those points. In addition, the information and advice should include at least a narrative discussion of the magnitude of impact caused by each identified threat when it does occur.

d) Recommend research or analysis activities that are necessary.

   Usually the work on the other Guidelines will identify many knowledge gaps.

Recommendations made and enacted at this stage in the overall process could result in much more information being available should a Recovery Potential Assessment be required for the species.

5) Describe to the extent possible whether the species has a residence as defined by SARA

SARA s. 2(1) defines Residence as “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.”

6) Threats

A threat is any activity or process (both natural and anthropogenic) that has caused, is causing, or may cause harm, death, or behavioural changes to a species at risk or the destruction, degradation, and/or impairment of its habitat to the extent that population-level effects occur. Guidance is provided in: Environment Canada, 2007. Draft Guidelines on Identifying and Mitigating Threats to Species at Risk. *Species at Risk Act* Implementation Guidance.

List and describe threats to the species considering:

- Threats need to pose serious or irreversible damage to the species. It is important to determine the magnitude (severity), extent (spatial), frequency (temporal) and causal certainty of each threat.
- Naturally limiting factors, such as aging, disease and/or predation that limit the distribution and/or abundance of a species are not normally considered threats unless they are altered by human activity or may pose a threat to a critically small or isolated population.
- Distinction should be made between general threats (e.g. agriculture) and specific threats (e.g. siltation from tile drains), which are caused by general activities.
- The causal certainty of each threat must be assessed and explicitly stated as threats identified may be based on hypothesis testing (lab or field), observation, expert opinion or speculation.

7) Other

Finally, as time allows, review status and trends in other indicators that would be relevant to evaluating the risk of extinction of the species. This includes the likelihood of imminent or continuing decline in the abundance or distribution of the species, or that would otherwise be of value in preparation of COSEWIC Status Reports.

Working Papers

One working papers related to the status of Black Redhorse will be submitted for review:

- Population modelling of Black Redhorse in Canada: An update

Expected Publications

Include a bulleted list the types of publications that are expected to be produced from the meeting.

- Proceedings
- Research document

Participation

Participation is expected from:

- Relevant DFO Sectors
- COSEWIC status report author
- Members of COSEWIC (SSC expert)

Participation may also include:

- Ontario Ministry of Natural Resources
- Other invited external experts as deemed necessary

APPENDIX 2. PARTICIPANTS

Black Redhorse Pre-COSEWIC Meeting

12 November 2013

Canadian Centre for Inland Waters

Last name	First name	Affiliation
Bouvier	Lynn	Fisheries and Oceans Canada
Bunt	Chris	Independent Contractor
Koops	Marten	Fisheries and Oceans Canada
Mandrak	Nick	Fisheries and Oceans Canada
Reid	Scott	Ontario Ministry of Natural Resources
Young	Jen	Fisheries and Oceans Canada