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Proceedings of the regional peer review of the Recovery Potential Assessment of Black Redhorse (*Moxostoma duquesnei*)

December 15, 2016

Chairperson: Lynn Bouvier
Editor: Lia Kruger

Fisheries and Oceans Canada
Great Lakes Laboratory for Fisheries and Aquatic Science
867 Lakeshore Rd.
Burlington, ON L7S 1A1

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Foreword

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

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SUMMARY

A regional science peer-review meeting was held on December 15, 2016 in Burlington, Ontario. The purpose of the meeting was to assess the recovery potential of Black Redhorse Assessment (*Moxostoma duquesnei*), to provide advice that may be used for the listing decision, development of a recovery strategy and action plan, and to support decision making with regards to the issuance of permits or agreements. Participants included DFO Science and Species at Risk programs and Ontario Ministry of Natural Resources and Forestry (MNRF).

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the Black Redhorse as Threatened in 2015. The Black Redhorse is found only in a few rivers in southwestern Ontario, and is under continuing threats to habitat quality due to the cumulative impacts of pollution from urban wastewater and agriculture, and alterations to flow regimes.

This proceedings report summarizes the relevant discussions from the meeting and presents recommended revisions to be made to the associated research document. The Proceedings, Science Advisory Report and Research Document resulting from this science advisory meeting are published on the DFO Canadian Science Advisory Secretariat (CSAS) website.

Compte rendu de la réunion régionale par les pairs sur l’évaluation du potentiel de rétablissement du chevalier noir (*Moxostoma duquesnei*)

SOMMAIRE

Une réunion régionale d’examen scientifique par des pairs a eu lieu le 15 décembre 2016 à Burlington, en Ontario. L’objectif de la réunion était d’évaluer le potentiel de rétablissement du chevalier noir (*Moxostoma duquesnei*), afin de fournir des conseils qui pourraient être utilisés pour la décision concernant l’inscription, l’élaboration d’un programme de rétablissement et d’un plan d’action, ainsi que pour appuyer la prise de décisions en ce qui a trait à la délivrance de permis ou à la conclusion d’ententes. Les participants regroupaient des employés du secteur des sciences et du programme sur les espèces en péril du MPO et du ministère des Richesses naturelles et des Forêts de l’Ontario.

En 2015, le Comité sur la situation des espèces en péril au Canada (COSEPAC) a désigné le chevalier noir en tant qu’espèce menacée. Le chevalier noir se trouve uniquement dans quelques rivières du sud-ouest de l’Ontario et la qualité de son habitat est continuellement menacée, en raison des effets cumulatifs de la pollution issue des eaux usées urbaines et de l’agriculture, ainsi que des changements dans les régimes d’écoulement.

Le présent compte rendu résume les discussions tenues et expose les révisions à apporter au document de recherche connexes. Le compte rendu, l’avis scientifique et les documents de recherche qui découlent de la présente réunion de consultation scientifique sont publiés sur le site web du Secrétariat canadien de consultation scientifique du MPO.

INTRODUCTION

Fisheries and Oceans Canada (DFO) Science has been asked to assess the recovery potential of Black Redhorse. As a result, a peer review meeting was held on December 15, 2016 in Burlington, Ontario. Participants included DFO Science and Species at Risk programs, and MNRF (Appendix 1).

The intent of this meeting, as described in the Terms of Reference (Appendix 2), was to provide up to date information, and associated uncertainties, to address the following elements of Black Redhorse;

- Biology, abundance, distribution and life history parameters;
- Habitat and Residence Requirements;
- Threats and limiting factors to the survival and recovery of Black Redhorse;
- Recovery targets;
- Scenarios for mitigation of threats and alternatives to activities; and
- Allowable harm assessment.

The meeting generally followed the agenda (Appendix 3). The meeting Chair provided a brief overview of DFO's Canadian Science Advisory Secretariat's (CSAS) Science Advisory Process and the guiding principles for the meeting.

This Proceedings summarizes the relevant meeting discussions and presents the key conclusions reached during the meeting. The advice from the meeting will be summarized in a Science Advisory Report. The Research Document (Burridge et al. in prep.) that includes the technical details supporting the advice will be revised based on the information from this meeting. All reports will be published on the CSAS website.

One of the participants gave an overview of the COSEWIC process and designation and background on the *Species at Risk Act*. Black Redhorse was assessed by COSEWIC as Threatened in 2015. Some indicators of the Threatened assessment are;

- Decline in total number of mature individuals;
- Small distribution range and decline of fluctuation
- Small and declining number of mature individuals
- Very small or restricted total Canadian population
- Quantitative analysis

The official rationale for the COSEWIC designation is "This species of fish has a limited extent of occurrence and area of occupancy. It is found only in a few rivers in southwestern Ontario, and is under continuing threats due to the cumulative impacts of pollution from urban wastewater and agriculture and alterations to flow regimes".

The results of the recovery potential assessment will be used to;

- Inform the socio-economic analysis;
- Together with socio-economic analysis, to provide basis for the Minister's listing decision;
- To provide Science Advice to recovery teams, DFO- Fisheries Protection Program; and

- To provide allowable harm information for permitting purposes if possible.

INFORMATION IN SUPPORT OF A RECOVERY POTENTIAL ASSESSMENT OF BLACK REDHORSE IN CANADA

Species Description, Population Status, Habitat Requirement, and Function, Features and Attributes Table

Presenter: Bill Glass

ABSTRACT

Black Redhorse is at the northern edge of its range in Canada. It is considered imperiled in several nearby Great Lake states including Illinois, New York and Wisconsin. Black Redhorse was designated Threatened in April 1988 and re-assessed and confirmed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May 2005. It has not been listed under Schedule 1 of the *Species at Risk Act* (SARA), due to a lack of scientific data necessary for a socio-economic analysis to determine the amount of allowable harm that this species can withstand. In 2015, this species was again assessed as Threatened due to limited extent of occurrence and area of occupancy. It is found only in a few rivers in southwestern Ontario, and is under continuing threats to habitat quality due to the cumulative impacts of pollution from urban wastewater and agriculture and alterations to flow regimes. The Recovery Potential Assessment (RPA) provides information and scientific advice needed to fulfill various requirements of SARA including permitting activities that would otherwise violate SARA prohibitions and the development of recovery strategies. This Research Document describes the current state of knowledge on the biology, ecology, distribution, population trends, habitat requirements, and threats of Black Redhorse. Mitigation measures and alternative activities related to the identified threats, that can be used to protect the species, are presented. Information contained in the RPA and this document may be used in the development of recovery strategies and an action plan.

DISCUSSION

Species Description

A participant noted that the Silver Redhorse has greater than 15 dorsal rays which is a good distinguishing feature.

Population Status

A participant thought that the sampling effort map (shows that sites were sampled, but no Black Redhorse were captured) should include all existing data. The presenter agreed and will add all existing data to the map. A participant thought that the maps should be revised to show all the creeks and tributaries that are discussed in the document.

Another participant noted that a lot of data collected in the lower watershed of the Thames River is seining and trawling data which may not be the best method for capturing Black Redhorse. The presenter agreed that Black Redhorse do not recruit well to some of the gears.

Another meeting participant noted that in the Grand River Management Plan, it mentioned that a major dam on the Nith River in the town of New Hamburg has a fish passage for warmwater species. They did not realize that there was a ladder there and wanted to share the information with the group. Another participant noted that it also says there is a record of Black Redhorse Fairchild Creek, a tributary of the Grand River but it could not be located in database (it was a

verbal communication). The record originated from the Guelph MNRF district office and should be added to the master database. There is also a record from Big Creek (same verbal communication). The Chair commented that they need to look into these records and make sure they are added to their database, if they are shown to be valid.

A participant wondered how confident DFO was in their sampling with regards to coverage. Big Otter Creek was part of a large survey conducted in 2002 with DFO and the University of Guelph looking at barriers. Crews sampled extensively on Big Otter Creek and Lower Otter Creek and there were no records from that sampling. The Lower Otter Creek was sampled recently as part of their invasive species monitoring work. Catfish Creek was sampled in 2002–2003 by the DFO lab, and the species was not detected. There has been no effort in Catfish Creek since 2002–2003. The Chair added that those systems were considered to be highly degraded and perhaps 'written off' so little sampling effort has been conducted since that time. Another participant added that other species of redhorse were abundant in the system but Black Redhorse does not appear to be present. A participant suggested that it may be due to elevated turbidity in the system

The presentation continued with the Lake St Clair drainage. A participant noted that there are records in Oxbow Creek and Fish Creek within the last ten years. The author will look into these records and make sure they are added to the document.

The presentation continued with the Lake Huron drainage. The Chair noted that the Gully Creek record is also missing from the appendix and needs to be added.

A participant commented on the abundance index (population assessment) and that it is grounded in the Grand River and everything else is relative to that. There needs to be a rationale for why Grand River is the initial grounding. The Chair thought that would be fairly simple to add to the document because Grand River is the only system that has a few years of standardized sampling behind the data. Another participant responded that that explains why they chose Grand River to be the standard but it doesn't explain the 'medium' value (relative abundance index) assigned to it. A participant added that in the tables it says 'medium' and it assumes 'stable' and relatively high abundance in the document but there isn't any information in the document for the reader to be able to confidently asses this.

This led to a discussion of the Abundance index. A participant suggested that with regard to missing distribution records, it might be good to check whether some of the waterbodies are discussed in the COSEWIC report. The participant suggested consulting with Scott Reid (MNRF) or Nick Mandrak (U of T, Scarborough) to see why these records are not included (It may be because COSEWIC was not confident with the records). The Chair agreed this should be brought up with Scott. Another participant agreed and added that there are many unknowns with regard to population trajectory, at least for the Bayfield, Saugeen, and Maitland rivers. There are probably insufficient data to determine trajectory. A participant added that all these systems are quite different than the Grand River. There are more coldwater fishes so populations could behave differently and there has not been enough sampling conducted to determine the trajectory.

The group discussed Ausable River and agreed that although a substantial amount of sampling had occurred in this system, it was not sufficient to determine the trajectory of the population. There has been a substantial amount of sampling t. The group agreed that Ausable River would remain as Unknown. The group also agreed to keep Grand River as Stable and to keep all other systems as Unknown. The Thames River would stay as Decreasing.

There was a discussion around the relative abundance in the Grand River. The Chair clarified that the relative abundance is always set to the strongest population, which currently is Grand

River (not a point in time). A participant thought that it was likely given a rating of Medium because species tend to be lower in abundance than other redhorse species in the river. Without repeated sampling, it is hard to determine the relative abundance. The group agreed to keep the relative abundance for Grand River at Medium.

The participants continued to discuss the Thames River population. A participant suggested that it should be assigned Low. Another participant commented that there has been a lot of repeated sampling in the Thames River so more is known about the population trajectory. The group agreed that if they are doing it relative to Grand River then the Thames River should be set to Low.

It was noted that some of the text below the population status table; 'relatively high abundance on Grand River' should be changed to 'relatively higher abundances'. This change will be made.

Habitat Requirements

The Chair suggested reorganizing this section as it was hard to link the Function, Features, and Attributes Table to the different sections. The Chair suggested breaking it up into the same adults, juveniles, young of the year (YOY) because they do have information on these. The group agreed.

A participant asked whether the flows were natural or regulated. The presenter responded that in reference to Chris Bunt and Steven Cooke's research, they believe that the Grand River experiences natural flows. High flows were observed during their research but this period did not correspond to the spawning season. Another participant suggested that those characteristics may have bene relevant to the study area, but the Grand River is a regulated river. A participant thought that they need to clarify when the study was conducted as it is probably relevant. Another participant added that the real question is what velocities the species is using preferentially relative to all velocities that are available to it. That will help differentiate preference for certain flows. The Chair said they will look at the study and clarify in the document.

The Chair provided more background for the Function, Features, Attributes (FFA) table for the group. It is pulled directly from recovery strategies. One column is for habitat attributes, which is difficult to complete when discussing preferred vs optimal habitats. There was a discussion about the table. A description will be added for 'relatively steep'. One participant said he uses the FFA table most often to determine whether the critical habitat is present at a site. Several participants thought that relatively steep is too vague and needs some clarification. Participants agreed to remove the term 'relatively steep gradient'. They assumed that fish were finding suitable water velocity rather than gradient.

The group discussed the egg to juvenile stages table and decided to add a separate bullet for YOY depth.

There was a discussion about groundwater seepage. The FFA table indicates preference for groundwater seepages but the supporting text indicates that the species relies on groundwater seepages. A participant commented that there is conclusive evidence to show that they rely on seepages. Another participant thought the seepages might differ based on the time of year. This will be reworded in the document.

The group agreed that the critical habitat column should include runs and riffles.

During the presentation of the adult life stage FFA table, a participant asked what the difference was with gradient ranges and if there was a big difference between those locations. Another participant responded that populations in Lake Huron tributaries were mainly located at the

mouth of the tributary, resulting in low gradients. A participant suggested adding text to the document in reference to critical habitat indicating that steep gradients may be an atypical condition.

The group discussed the spatial extent of habitat. A participant suggested changing the description of glacial deposits to sand and gravel to better reflect the substrate type. In the Thames River there are more gravel areas correlating with groundwater inflow. A participant asked for information on spatial extent of habitat to be shared with DFO Science. The group decided to that more wording will be added to the description of backwater to clarify the term since there are so many possible interpretations. In addition, Black Redhorse are known to prefer systems of lower velocities with cover; therefore, either updating the description for backwater, or utilizing a new term may be more appropriate.

In the spatial configuration constraint section, a participant said that there are a total of six dams where there is no allowance for fish passage on the Grand and Thames rivers, a seventh dam is present on the Maitland River at Wingham. The Chair will check to see if all of the dams have been included.

A participant thought that it should be noted that populations in the Saugeen River and other tributaries to Lake Huron, are always found downstream of dams, suggesting that the dams may be preventing movement upstream. The Chair asked the group if it would be helpful to include a map with all dam locations on it. Participants agreed and thought including an active barrier layer should be added to the map. The group continued to discuss barriers in the Grand and Thames rivers. A participant commented that there was no obstruction at Ingersoll but there is one at Woodstock; although this should not affect distribution as the known distribution is much further downstream. Another participant added that if there were no barriers then they might be found as high up as Woodstock, but they did not know how far they go. Overlying dam locations on Black Redhorse records may help explain the current distribution. A participant asked if Springbank dam in the Thames River was considered a barrier. Other participants did not think it was but a study by Scot Reid and Nick Mandrak concluded that it could affect Black Redhorse during migration.

The Chair said the dams and threats and management section in the document will get updated based on this discussion.

Recovery Potential Modeling

Presented by Adam van der Lee

The Chair asked why in the sensitivity section was a value of 1.6 selected for allowable harm. The presenter indicated that it was an estimate of maximum population growth rate based on allometry of weight from Randall and Minns (2000). It was based on a biomass productivity relationship (related to body size).

A participant asked whether the allowable harm estimates are additive and they gave an example, if juvenile survival is reduced by 15% could the adult survival be reduced by 43%? The presenter indicated that these are not additive. If juvenile survivorship was reduced by 15%, the population growth rate would be reduced to 1. Any further reduction in any of the other stages would result in a negative growth rate. Allowable harms for additive elasticities can be calculated, but it has to be done before this stage. In this equation for summed elasticities you can calculate what the percent change is, for example, to juvenile and early adult survivorship rather than doing them all independently. A participant wondered if the modelling exercise considered any other research (Scott Reid's papers). The presenter said it only used population viability analysis with community densities from 1995 (very non-specific to Black Redhorse). The

Chair thought it would appropriate to add other research if there is a direct link to this section. The Chair suggested doing a literature search on related research.

Review of Threats

Presented by Bill Glass

A participant made a comment on endocrine disruptors. They thought there were studies on the verge of being published by Environment and Climate Change Canada (ECCC) including mechanisms and specific measurements. Also, there may be additional sources of endocrine input such as sludge and pellets used in agriculture. A participant thought that contact people at ECCC might be Pattie Gillis or Gerald Tetreault.

In regard to invasive species, a participant mentioned that they requested a copy of the Niagara River Management Plan. They also do Walleye stocking and Round Goby is predicted to spread. He thought these should be included. A participant points out that there are size-related reactions (by Black Redhorse and other fishes) to invasive species, i.e., juveniles would be more susceptible to trout than adults. Research shows that gobies seem to have interactions with similarly sized species and since redhorse are much larger, they wondered if gobies would have any effects. Maybe the document needs to be more specific, about potential effects perhaps with YOY and juveniles. Another participant agreed and added impact from Round Goby may be related to indirect effects on Black Redhorse as a result of food competition. A meeting member added that there is Brown Trout stocking in the Conestogo River as well.

There was a discussion about the SARA listing of Black Redhorse. A participant noted that it was not listed last time due to the recommendations of no allowable harm and potential for bycatch and that they need to be careful with wording this time around. Another participant added that Black Redhorse has been ranked as Low for angler bycatch or bait harvest by MNRF. There was a spreadsheet with this information but they were not sure if it was available for citing. A participant wondered about the basis for those decisions. Another participant thought that it was based on where harvesting occurs. MNRF was looking at overlap between Ontario's *Endangered Species Act* (ESA) and regular fishing operations. There was also a bait review. The group discussed if no allowable harm result will create a problem. The modelling will help this time around and if bycatch is an issue it should still be identified as an issue. Models suggest that for declining populations, the adult population become more of an important factor and bycatch could then be more of a threat. The Chair added that the way the models are written, wording should be less of an issue and this time they have numbers, etc. and the wording will be proper and appropriate.

Discussion followed on how much of each life stage could be removed with baitfish harvesting. A participant commented that they sampled with seine nets and as 'professionals' they had a hard time catching Black Redhorse, so it probably is not a significant of a loss if commercial fishers do happen to catch some. Another participant notes that the juvenile life stage is less important (in terms of numbers) than adults. One participant clarified that they would be concerned if harvesting occurred over and over again in a location that was an important nursery hot spot for Black Redhorse. Incidental catch is not really a concern. Also, the species is protected under the ESA and that should apply to incidental catch (although it was acknowledged that Black Redhorse is difficult to identify).

A participant commented on the human intrusion slide of the presentation. He commented that there are other factors to list like monster trucks. They had witnessed these types of extreme events down the Thames River, (but the monster truck was in the Sydenham River), and they often occur at low water levels. Also boating and canoeing in the Grand River between Kitchener down to past Caledonia, especially between Paris and Brantford where there are

thousands of people that canoe down that river. With more and more incidents of boat launches and with lower water levels people will be hitting the bottom increasingly. This is a significant activity that happens in the river and is a threat to the species. The Chair asked if it is considered more of a threat to the habitat than the fish. A participant responded that the fish would probably be able to swim away but the threat to the fish's behaviour could be significant and in low flows could cause a lot of harm. The Chair will include it as a recreational activity threat in the tables.

A participant commented that the source water protection program has been a real benefit to understanding groundwater. Conservation Ontario is a great resource on groundwater movement and changes that are occurring and the resulting threats to fishes. Another participant added that it would be good to address altered geofluvial morphology as a result of dams and how this can change everything downstream. The participant thought that acknowledging these altered processes and teasing them apart may be worthwhile.

A participant noted that in the text agricultural withdrawals, specifically in Whitemans Creek with so much withdrawal that that creek dries up, needs to be mentioned.

Threats Level Assessment Table

The Chair clarified the 'Threat level assessment' section. There was a national CSAS meeting in 2013 that was the basis for this section. This is similar to how it used to do be done but now there is also a 'roll-up' from the population level threat assessment to a species level threat assessment. The Chair wanted meeting participants to know why this section looks different than in previous documents.

Grand River

A participant asked if the invasive species mentioned was the same as what was discussed earlier. The presenter confirmed that they were the same.

The group discussed the likelihood of human intrusion activities and decided to classify it as Known to occur but with Low effect. They agreed to keep it as Unknown level of impact.

Thames River

The Chair suggested changing likelihood to Known and level to Unknown for human intrusion in the Thames River. She asked the group if it should be the same across all systems. The group agreed that it occurs in all systems but the level of impact is Unknown. A participant wondered if angling should be included as human intrusion. The Chair pointed out the angling was under biological resource use but wondered if it should be changed from Likely to Occur to Known to Occur. The group decided that Gully Creek is Unlikely to occur and all other locations are Known to occur for fishing pressure. These changes will be made to the tables. There was a discussion and the group decided to put it as Low risk as opposed to Unknown and can say it is based on expert opinion as opposed to the literature (e.g., effects such as potential mishandling vs sediment resuspension from wading). Since it is unlikely to affect the population as a whole it will be considered Low.

Threat Assessment Matrix

A participant thought that 'R' for remote likelihood should be changed for some of them. Ausable River and possibly Bayfield River should be a Known threat for natural system modifications. These changes will be made.

A participant asked if the in the natural system modifications include projects (potential physical impact) beyond dams. The Chair thought it did but more should be included in text regarding natural system modifications, like shoreline hardening.

Species Level Threat Assessment

A participant asked if the natural system modification should be Unknown. The Chair clarified that it is Unknown at the species level. This table has been rolled up from the population table to summarize how the species as whole may be affected. A participant added that even though they know that the modifications are occurring, they did not know what the implications are on the species (based on the matrix used in the threat level assessment).

Definitions will be added to the table captions. Also, they will add a reference to the guidance document in the text.

A participant thought that some of the categories should be changed but the Chair said they should not be changed as they were created based on set rules for rolling up the tables. The Chair proceeded to read rules from the threat risk document that provides the guidelines. A participant clarifies that even if they change the table that is specific to Grand River population (Extensive for human intrusion), that still will not change the mode in the species level table because most other population tables are classified as R (i.e., restricted).

Participants discussed the population impacts of angling, canoeing and wading. A participant added that it is the habitat effect that then affects the fish. The Chair thought that it should be captured under system modification instead of human intrusion if they are worried about changing the river bed. The group agreed that there is definitely overlap between some of the categories.

Element 9: A participant thought that lower water levels or water withdrawal are activities that are likely to damage habitat and should be added to the list. Others agree and one participant added that water taking (i.e., golf courses, not just agriculture) in general should be highlighted.

Element 11: The Chair commented that the 'impact of threats to other species' section is a strange element. A participant added that there are situations where conditions that are favorable to some species are detrimental to others.

Another participant noticed that sometimes in these documents the tables for very similar species are different (e.g., certain mussel species). The Chair said that is a result of the way these tables are created. It is based on expert opinion and who is in the room and participating at that time.

Review of Projects and Activities in Black Red horse Habitat

Presented by Dave Balint

The presenter noted that this review looks over a five-year period (as opposed to usual three years in previous RPAs). Additionally, due to changes to the *Fisheries Act* that changed how project review and reporting is conducted, a lot of activities may have taken place but were not captured in the DFO's Program Activity Tracking System for Habitat (PATH). A participant wondered who asked for the change in timeline for the review. The presenter said it was the Policy group that made the new timeframe decision at the steering committee meeting.

A participant wondered if the flooded riparian area is important in place of the 'backwater' scenario the presenter spoke of. This is in terms of stockpiling vegetation in the new elevation along the shoreline and recreating specific habitat as part of mitigation.

The presenter clarified that all these projects were conducted in areas within the distribution of Black Redhorse. It does not include the area in the vicinity or adjacent to it (including critical habitat areas). There was a discussion about mitigation. The presenter asked the group if there were any other mitigation guides that should be included besides the ones that were outlines in the document and presentation. A participant commented that there are different types of turbidity, and short term bursts of turbidity might be better for fish than long term turbidity levels. Not sure what other mitigation measures we can add to those already listed.

The Chair provided some background on the questions that are posted on the discussion slide. (e.g., are there other feasible mitigation options that we have not considered, are the number of works likely to increase or /remain the same, do we think the number of projects will differ significantly from what was presented?). They are based on questions that Policy thought were important to identify.

A participant asked if any larger developments are being forecasted in these regions. The presenter did not think so, but based on the high growth forecast for the region, he anticipates increased storm water inputs, increased development (London, Stoney Creek and other tributaries), increase in drain maintenance activities (especially Thames River tributaries). Conservation authorities (i.e., Grand River) talk about expected population growth, and development, in their plans (another resource that should be cited). Another participant added that in past Recovery Potential Assessment meetings, conservation authorities have attended and they wondered if anyone approached them in this instance and whether the group should be contacted. The Chair responded that they are always invited, but they did not specifically ask them this question (those being discussed from the presentation). Also, a lot of the information that is being discussed isn't in the document and will be incorporated.

A participant said that a new development in Kitchener, near one of the meanders in the Grand River, that will have impact on storm water, sewage, etc. As well, there is a new LRT (Light rail transit) being developed in Kitchener that may be crossing the river. A participant said that there is a source water protection plan (Grand River). Waterloo is projected to grow to 729,000 people (60%) in the next 30 years and the Waterloo region has a good chunk of Black Redhorse habitat. The participant wondered if they should add some of those projections to the document if they are concerned about development.

A participant commented that housing developments really influence groundwater quality (salt, nutrient content and other substance within that inflow) and there are probably zero mitigation measures regarding groundwater change through urban development but if there are, they should figure out how to implement them. Another participant agreed and added that once chloride is in groundwater there aren't any stormwater mechanisms to get it out.

A participant suggested contacting the different conservation authorities and seeing what documents they have and reference those documents.

Pathways of Effects and Non-habitat Related Threats

Presented by Bill Glass

A participant asked if the alternatives to activities were alternatives that DFO would be implementing. The Chair clarified that these are alternatives that DFO Science would recommend to DFO management.

A participant thought that on the one slide (biological resource use) should be 'recommend' and they wondered if those are reasonable alternatives (i.e., prohibit all baitfish harvest) since threat is so low. The Chair responded that DFO Science has the flexibility to recommend any actions that we see fit. Once these recommendations are made, management will consider additional

factors to determine what type of management they would like to implement. The Chair suggested that the actual reference to the website for the regulations needs to be added to this section.

When discussing the human intrusion section, a participant suggested adding the wording 'promote focused effort by enforcement'. The group agreed and thought enforcement would appreciate that guidance. A participant said that an alternative would be to provide an alternative way for motorists (i.e., ATVs) to cross a stream/river (i.e., cattle crossing or bridge).

A participant suggested including a little bit more about drainage maintenance (feasibility of restoring habitat). Another participant suggested recommending incorporating natural channel design to drain maintenance activities (agricultural community has found this is helpful for them as well).

The Chair commented that Elements 19–21 were left blank in the document. These are really hard questions to answer the group was asked if they had any ideas to share for these elements. One participant suggested looking at the population modeling and using those parameters for Element 21. A participant clarified that all the values used were only for one population, Black Redhorse from the Grand River.

Sources of Uncertainty

Presented by Bill Glass

A participant commented that in the first part where lack of long term monitoring projects is mentioned, there is no way specified to address this uncertainty and suggested that it might be worth adding a sentence that provides a solution.

Review of Terms of Reference

Presented by Lynn Bouvier

The Chair reviewed the elements listed in the Terms of Reference to make sure the group has covered them all.

The Chair thought they did not answer Element 11 and asked the group if there were existing monitoring efforts that needed to be added. A participant suggested asking conservation authorities and the Chair agreed to pull together a list of questions for them. Another participant noted that the Ausable Bayfield Conservation Authority does a lot of monitoring. The author will look into this and add any relevant information under this bullet point (Element 11).

A participant thought Element 13 was not done. They are missing important information on limitations, not knowing abundance. Element 14 and 15 are unknown. A participant asked if Element 17 were recovery actions. Another participant reminded the group that they discussed this when talking about alternatives and adding in signage or crossing for ATVs. Element 17 would be focused on what activities could be done. The Chair thought Element 17 was not done and the group continued talking about these ideas. A participant suggested agricultural best management practices; so, reduce runoff, help mitigate sediments running into the system, (e.g. wind rows, grassy swales, and riparian work). Another participant added farm management plans, stewardship programs. A participant commented that agriculture is the primary land use in this region and best management practices already exist so they did not think much else could be done. The Chair thought all the ideas need to be incorporated into the section.

Next Steps

The Chair asked the group if there was a need to circulate the research document, science advisory report and proceedings document. The groups agreed that both the research document and the proceedings document did not need to be sent out for review, while they requested to review the science advisory report once it was complete.

REFERENCES CITED

Randall, R.G., and Minns, C.K. 2000. Use of fish production per unit biomass ratios for measuring the productive capacity of fish habitats. Can. J. Fish. Aquat. Sci. 57 (8): 1657–1667.

APPENDIX 1: PARTICIPANTS

Name	Affiliation
Lynn Bouvier (Chair)	DFO, Science
Maja Cvetkovik (rapporteur)	DFO, Science
Bill Glass	DFO, Science
Shelly Dunn	DFO, Species at Risk
Dave Balint	DFO, Species at Risk
Andrew Drake	DFO, Science
Marten Koops	DFO, Science
Adam van der Lee	DFO, Science
Jason Barnucz	DFO, Science
Joshua Stacey	DFO, Species at Risk
Rebecca Dolson	Ontario Ministry of Natural Resources and Forestry
Collin Gyles	DFO, Policy and Economics (WebEx)

APPENDIX 2: TERMS OF REFERENCE

Terms of Reference

Recovery Potential Assessment – Black Redhorse (*Moxostoma duquesnei*)

Regional Peer Review Meeting – Central and Arctic Region

December 15, 2016
Burlington, ON and via teleconference/WebEx

Chairperson: Lynn Bouvier

Context

After the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses an aquatic species as Threatened, Endangered or Extirpated, Fisheries and Oceans Canada (DFO) undertakes a number of actions required to support implementation of the *Species at Risk Act* (SARA). Many of these actions require scientific information on the current status of the wildlife species, threats to its survival and recovery, and the feasibility of recovery. Formulation of this scientific advice has typically been developed through a Recovery Potential Assessment (RPA) that is conducted shortly after the COSEWIC assessment. This timing allows for consideration of peer-reviewed scientific analyses into SARA processes including recovery planning.

In support of listing recommendations for Black Redhorse (*Moxostoma duquesnei*) by the Minister, DFO Science has been asked to undertake an RPA, based on the national RPA Guidance. The advice in the RPA may be used to inform both scientific and socio-economic aspects of the listing decision, development of a recovery strategy and action plan, and to support decision making with regards to the issuance of permits or agreements, and the formulation of exemptions and related conditions, as per sections 73, 74, 75, 77, 78 and 83(4) of SARA. The advice in the RPA may also be used to prepare for the reporting requirements of SARA s.55. The advice generated via this process will update and/or consolidate any existing advice regarding Black Redhorse.

Objectives

- To provide up-to-date information, and associated uncertainties, to address the following elements:

Biology, Abundance, Distribution and Life History Parameters

Element 1: Summarize the biology of Black Redhorse.

Element 2: Evaluate the recent species trajectory for abundance, distribution and number of populations.

Element 3: Estimate the current or recent life-history parameters for Black Redhorse.

Habitat and Residence Requirements

Element 4: Describe the habitat properties that Black Redhorse needs for successful completion of all life-history stages. Describe the function(s), feature(s), and attribute(s) of the habitat, and quantify by how much the biological function(s) that specific habitat feature(s) provides varies with the state or amount of habitat, including carrying capacity limits, if any.

Element 5: Provide information on the spatial extent of the areas in Black Redhorse's distribution that are likely to have these habitat properties.

Element 6: Quantify the presence and extent of spatial configuration constraints, if any, such as connectivity, barriers to access, etc.

Element 7: Evaluate to what extent the concept of residence applies to the species, and if so, describe the species' residence.

Threats and Limiting Factors to the Survival and Recovery of Black Redhorse

Element 8: Assess and prioritize the threats to the survival and recovery of the Black Redhorse.

Element 9: Identify the activities most likely to threaten (i.e., damage or destroy) the habitat properties identified in elements 4-5 and provide information on the extent and consequences of these activities.

Element 10: Assess any natural factors that will limit the survival and recovery of the Black Redhorse.

Element 11: Discuss the potential ecological impacts of the threats identified in element 8 to the target species and other co-occurring species. List the possible benefits and disadvantages to the target species and other co-occurring species that may occur if the threats are abated. Identify existing monitoring efforts for the target species and other co-occurring species associated with each of the threats, and identify any knowledge gaps.

Recovery Targets

Element 12: Propose candidate abundance and distribution target(s) for recovery.

Element 13: Project expected population trajectories over a scientifically reasonable time frame (minimum of 10 years), and trajectories over time to the potential recovery target(s), given current Black Redhorse population dynamics parameters.

Element 14: Provide advice on the degree to which supply of suitable habitat meets the demands of the species both at present and when the species reaches the potential recovery target(s) identified in element 12.

Element 15: Assess the probability that the potential recovery target(s) can be achieved under current rates of population dynamics parameters, and how that probability would vary with different mortality (especially lower) and productivity (especially higher) parameters.

Scenarios for Mitigation of Threats and Alternatives to Activities

Element 16: Develop an inventory of feasible mitigation measures and reasonable alternatives to the activities that are threats to the species and its habitat (as identified in elements 8 and 10).

Element 17: Develop an inventory of activities that could increase the productivity or survivorship parameters (as identified in elements 3 and 15).

Element 18: If current habitat supply may be insufficient to achieve recovery targets (see element 14), provide advice on the feasibility of restoring the habitat to higher values. Advice must be provided in the context of all available options for achieving abundance and distribution targets.

Element 19: Estimate the reduction in mortality rate expected by each of the mitigation measures or alternatives in element 16 and the increase in productivity or survivorship associated with each measure in element 17.

Element 20: Project expected population trajectory (and uncertainties) over a scientifically reasonable time frame and to the time of reaching recovery targets, given mortality rates and productivities associated with the specific measures identified for exploration in element 19.

Include those that provide as high a probability of survivorship and recovery as possible for biologically realistic parameter values.

Element 21: 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 in support of the listing process.

Allowable Harm Assessment

Element 22: Evaluate maximum human-induced mortality and habitat destruction that the species can sustain without jeopardizing its survival or recovery.

Expected Publications

- CSAS Science Advisory Report
- CSAS Proceedings
- CSAS Research Document(s)

Participants

- Fisheries and Oceans Canada (Science Sector, and Species at Risk and Fisheries Protection programs)
- Ontario Ministry of Natural Resources and Forestry
- Academics
- Conservation Authorities
- Other invited experts

References

COSEWIC. 2015. COSEWIC assessment and update status report on the Black Redhorse *Moxostoma duquesnei* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 50 p.

APPENDIX 3: AGENDA

Recovery Potential Assessment – Black Redhorse

Regional Peer Review Meeting – Central and Arctic Region

Location: Canada Centre for Inland Waters

867 Lakeshore Road, Burlington, ON and WebEx

Date: 15 December 2016

Chairperson: Lynn Bouvier

9:00	Welcome and Introductions	Lynn Bouvier
	Purpose of Meeting	Lynn Bouvier
	Species Description	Bill Glass
	Population Status	Bill Glass
	Habitat requirements	Bill Glass
	Functions, Features and Attributes Table	Bill Glass
	Recovery Potential Modeling	Adam van der Lee
12:00	LUNCH	
1:00	Threat Status	Bill Glass
	Review of Projects and Activities in Black Redhorse Habitat	Dave Balint
	Pathways if Effects and Non-habitat Related Threats	Bill Glass
	Sources of Uncertainty	Billl Glass
	Review of Terms of Reference	Lynn Bouvier
5:00	END	

** Lunch is not provided. There is a cafeteria on site.*