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Proceedings of the Regional Advisory Meeting of the Updated Recovery Potential Assessment of Lake Chubsucker (*Erimyzon sucetta)*, 2011-2020

Meeting dates: November 16–18, 2021
Location: Virtual Meeting

Chairperson: Tom Pratt
Editors: Brajgeet Bhathal, Josh King, and Julia Colm

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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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TABLE OF CONTENTS

SUMMARY

A regional Canadian Science Advisory Secretariat peer-review meeting was held November 16–18, 2021 via the online platform Microsoft Teams. The purpose of the meeting was to assess the recovery potential of Lake Chubsucker (*Erimyzon sucetta*) in Canada to provide science-based advice that may be used for revising the listing decision under the *Species at Risk Act* (SARA), revising the Recovery Strategy and Action Plan, and to support decision making with regards to the issuance of permits and agreements. A Recovery Potential Assessment had previously been conducted for this species on March 11, 2011 (DFO 2011) so the focus of the peer-review meeting was on new information available from 2011 through 2020. Participants included Fisheries and Oceans Canada, Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, Ausable Bayfield Conservation Authority, Environment and Climate Change Canada, Parks Canada, and academic experts.

Lake Chubsucker was first assessed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1994, re-assessed as Threatened in 2001, and was listed as Threatened under Schedule 1 of SARA in June 2003. Lake Chubsucker was subsequently re-assessed by COSEWIC in 2008 as Endangered (status was confirmed in May 2021) and is listed as Endangered under SARA owing to a decline in suitable habitat and extant locations, and multiple habitat-related threats.

This proceedings document summarizes the relevant discussions from the peer-review meeting and presents revisions to be made to the associated draft Research Documents. The Proceedings, Science Advisory Report, and the supporting Research Documents resulting from this science advisory meeting will be published on the DFO Canadian Science Advisory Secretariat Website.

INTRODUCTION

Fisheries and Oceans Canada (DFO) Science has been asked to re-assess the recovery potential of the Lake Chubsucker in Canada. As a result, a virtual peer-review meeting was held on November 16–18, 2021 via Microsoft Teams. Participants included DFO (Science, Species at Risk, and Fish & Fish Habitat Protection programs), the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF), Ausable Bayfield Conservation Authority (ABCA), Environment and Climate Change Canada (ECCC), Parks Canada, and academic experts (Appendix 1).

The intent of this meeting, as described in the Terms of Reference (Appendix 2), was to provide updated information and associated uncertainties to address the Recovery Potential Assessment (RPA) elements in the following categories for Lake Chubsucker:

- Biology, abundance, distribution and life history parameters;
- Habitat and residence requirements;
- Threats and limiting factors to the survival and recovery of Lake Chubsucker;
- Recovery targets;
- Scenarios for mitigation of threats and alternatives to activities; and
- Allowable harm assessment.

The meeting generally followed the agenda outlined in Appendix 3. A representative from DFO's Canadian Science Advisory Secretariat (CSAS) provided a brief overview of the CSAS science advisory process and the guiding principles for the meeting.

The meeting Chair provided an overview of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and *Species at Risk Act* (SARA) designation and listing processes and a brief history of the Lake Chubsucker in Canada and previous assessments. The Lake Chubsucker was designated Special Concern in April 1994, the status was re-examined and designated Threatened in November 2001, then re-examined and designated Endangered in November 2008, and most recently, the status was re-examined and confirmed in May 2021. The Endangered designation was based on the following (COSEWIC 2021):

- Very specific and narrow habitat preferences, making it susceptible to habitat changes from aquatic invasive species (AIS), climate change, and agricultural practices; and,
- Three historical populations have been lost, and most extant populations are considered poor in status.

Drafts of the two Research Documents (working papers) were provided and all participants were required to complete a critical written review in advance of the meeting. An overview presentation of each working paper was provided and then group discussions focused on main issues identified during the reviews. The 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 working papers that include the technical details supporting the advice will be revised based on the information from this meeting, and published as Research Documents. All meeting products will be published on the CSAS website.

INFORMATION IN SUPPORT OF AN UPDATED RECOVERY POTENTIAL ASSESSMENT OF LAKE CHUBSUCKER (*ERIMYZON SUCETTA*) IN CANADA, 2011-2020

Authors: Julia E. Colm and D. Andrew R. Drake

Presenter: Julia Colm

ABSTRACT

The Lake Chubsucker (*Erimyzon sucetta*) is a small member of the Catostomidae family requiring clear, still, well-vegetated waters. In Canada, it is found in watersheds of southern Lake Huron through Lake Erie. The species was first assessed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1994, reassessed as Threatened in 2001, and was listed as Threatened under Schedule 1 of the *Species at Risk Act* (SARA) in June 2003. Lake Chubsucker was subsequently re-assessed by COSEWIC in 2008 (and again most recently in May 2021) as Endangered and is listed as Endangered under SARA owing to a decline in suitable habitat and extant locations, and multiple habitat-related threats. The Recovery Potential Assessment provides background information and scientific advice needed to fulfill various requirements of SARA. This research document provides the current state of knowledge of the species including its biology, distribution, population trends, habitat requirements, and threats, with updated information from 2011 through 2020. Limited information exists to adequately assess the status of most populations, as records generally represent few individuals caught over a limited number of sampling events using varied sampling protocols. A threat assessment identified the greatest threats to Lake Chubsucker in Ontario as aquatic invasive species, natural system modifications, pollution, and climate change; however, the impacts of these threats are not well understood. Mitigation measures and alternative activities related to the identified threats are presented. Important knowledge gaps remain regarding population trends, physiological tolerances to environmental conditions and pollutants, and habitat requirements by life stage.

BIOLOGY, ABUNDANCE, DISTRIBUTION AND LIFE HISTORY PARAMETERS

Discussion

Biology

There were general clarification questions on whether sex ratios or information on fish size at the time of capture exists. It was explained that such information was not found, and the species is not sexually dimorphic so sex data were not collected at the time of capture.

A participant asked for clarification on the genetics section, whether the Canadian populations are distinct from US populations, and how this could be important for considering designatable units in the future. Another participant explained that a range-wide genetic study is forthcoming, but at this time it can't be said conclusively whether the Lyons Creek population is unique across the species range, or only unique amongst the Canadian populations. Neutral genetic markers were used in the genetics study, which are not suitable for evaluating evolutionary significance, one of the criteria for defining designatable units. The author stated that US context will be described in the text.

Abundance

A participant raised a concern about the population estimate presented for the St. Clair NWA, noting that it is not a true population estimate of the area, but instead based on proportional (allometric) relationships of captured Lake Chubsucker. The authors agreed that there are uncertainties with this approach but emphasized it is the best estimate available for any population, and the only area for which a system-wide estimate could be generated. The participant suggested explicitly mentioning that this is a hypothetical density and not the actual density, and the authors agreed to make additions in the text to clarify what the estimate represents.

Current Status

A participant advocated against the use of the term “location” when describing areas occupied by Lake Chubsucker, as this could be confused with how locations are defined by COSEWIC. Use of the term “areas” was agreed to, and the term “localities” would continue to be used to describe separate but connected habitats within the larger areas.

There was discussion about inclusion of newly found data (i.e., from 2021) and its description in the final draft. This RPA is an update to a previous RPA, emphasizing data from 2011 through 2020 inclusive. Some, but not all, field data from 2021 were available, but the authors wanted to create a clean break for future updates. There was a consensus that 2021 findings should be noted where appropriate, and the footnote was an appropriate format.

There was a group discussion around connectivity of the Long Point NWA ponds after one participant noted that there are inland ponds/marshes that are fully isolated and others that are permanently or periodically connected to Lake Erie. They wondered whether this warranted splitting these into separate areas. It was agreed that clarification would be sought from Long Point NWA staff on the connectedness of the ponds (including water level data if available) and additions would be made to the text. It was also re-stated that the NWA was partitioned from Long Point Bay because of the long distance of mostly unsuitable habitat.

Population Assessment

There was a group discussion surrounding the selection of an appropriate reference population against which to complete the Population Assessment (specifically, the Relative Abundance Index). The original RPA and the most recent COSEWIC assessment both used L Lake as the reference population, as evidence at the time suggested it was the most abundant. Thus, L Lake was selected as the reference population again. However, several participants noted that significant changes to the habitat and fish community have been observed in L Lake in recent years, suggesting it may not be the most abundant population, and therefore not the most appropriate reference anymore. Concerns were also raised around why the reference population is included in the population assessment, if it is being assessed relative to itself. There was an extensive discussion amongst participants with sampling experience in L Lake around historical and current conditions of the Lake Chubsucker population. It was suggested that the assessment could be conducted relative to the population assessment from the original RPA (i.e., each population being assessed relative to itself from 10 years earlier); however, it was flagged that this is not the usual methodology employed in RPAs and could lead to confusion. It was explained that the guidance around using the largest and/or best studied population as the reference is informal, and that the methods were not intended to be used in an updated RPA. Several suggestions were put forth, but longer-term data are needed to conduct a more objective population assessment. Ultimately, the group agreed that there were a number of approaches that could be used for completing the population assessment and as long as the chosen approach was clearly stated and strongly justified, the group was comfortable leaving the final decision with the authors.

There was a brief discussion around the population trajectory of the Long Point Bay area. An author suggested that 10 years of data exist that may allow for an increase in the certainty score. Most participants agreed, but one participant cautioned that two sets of data were collected which used the same methodology but not always in the same ponds, and the catches have been very low, which leads to uncertainty.

HABITAT AND RESIDENCE REQUIREMENTS

Discussion

There was discussion around which ponds in the Point Pelee wetland complex provide suitable habitat for Lake Chubsucker. A participant asked whether it can be assumed that the species occupies all ponds at Point Pelee (e.g., including East and West Cranberry ponds), or whether it only occupies the three ponds with historical records (e.g., Lake, Redhead, and Girardin ponds). Another participant responded that it is unknown, but the habitat in the East and West Cranberry ponds is very different from Lake Pond in terms of turbidity and macrophyte composition, and it does not seem suitable based on their knowledge of the species. It was also noted that, although detailed habitat analysis is lacking in the ponds known to support Lake Chubsucker, it is likely that the whole of the ponds serves as habitat for this species at some life stage.

Functions, Features, Attributes

It was suggested that the way the life stages were broken down in the table was confusing and/or misleading. It appeared as though young-of-the-year (YOY) and juveniles are all in their first year of life, so could be put in one category. The author stated that the breakdown by life stage will be more clearly explained.

THREATS AND LIMITING FACTORS

Discussion

Aquatic Invasive Species (Habitat-Related Impacts)

There was uncertainty raised about the *Phragmites* in the Old Ausable Channel (OAC) and whether it is the invasive or native variety. It was believed that the invasive variety will arrive within the next 10 years, if it isn't already present.

A few points of clarity regarding control of aquatic invasive species (specifically, herbicide applications for *Phragmites*) were raised by participants. A participant suggested that the short- and long-term management of *Phragmites* should be clarified. Large-scale spraying in Long Point and Rondeau bays will not be undertaken further, but localized spot treatments to restrict regrowth will be employed. A participant emphasized the need to determine the herbicide exposure and bio-availability to the species. The participant flagged that "physiological effects" should be replaced with "neurological effects", as herbicide exposure impacts the central nervous system. Alternative methods for evaluating exposure that avoid destructive sampling were also proposed.

Habitat Modifications (Old Ausable Channel)

Throughout the threat discussions, decreased dissolved oxygen and periods of hypoxia, particularly during winter, were brought up. Since there were several potential mechanisms for this, it was suggested this could be broadly discussed as a natural limiting factor. One participant noted that winterkills may occasionally occur as a natural phenomenon but usually happen due to human modified hydrology and nutrient loading (i.e., in systems like the OAC and dyked wetlands). This led to a larger discussion around the combination of factors in the OAC that have resulted in reduced water quantity and quality, including: altered hydrology (reduced water inputs), undersized culverts and aging water control structures, and removal of beaver dams. The authors agreed to describe this situation and include water level data, if available.

Invasive and Other Problematic Species and Genes

Clarification was sought around scoring Illegal Stocking as “anticipated” under the threat occurrence, as this term implies that it is expected to occur. A participant suggested using “potential” instead. The authors explained “anticipated” is the standard terminology used in the threat assessment guidance (DFO 2014), but additional text would be added to clarify that illegal stocking is not yet known, and it could happen but is not necessarily expected to happen.

Questions around whether Northern Pike were illegally stocked in the OAC were also raised. The general impression from the group was that they are native to the watershed, and the authors agreed to amend this section, pending clarification of the original source of that information.

A participant raised concerns around the large increase in centrarchid abundance in L Lake in recent years, and a corresponding decrease in leuciscid minnows and Lake Chubsucker. The participant noted a similar trend has been observed in other watersheds in Ontario. It was agreed that this threat would be described under the IUCN threat subcategory of “Problematic Native Species”. The mechanism of this shift is suspected to be climate change, but is still unknown. This led to concerns around the term “problematic” as biotic interactions are poorly understood. An author suggested there are certain species expected to be problematic. Several suggestions of terminology were put forth by participants, but the preferred description was “certain native species, e.g., centrarchids and esocids”. The uncertainties around the mechanisms of increasing centrarchid abundance and the impact on Lake Chubsucker populations would be described.

THREAT ASSESSMENT

Discussion

There was a discussion regarding the expansion of the Level of Impact score to include a level of exposure/magnitude/intensity factor as well as the influence of location or habitat type effects on Lake Chubsucker populations.This effort was applauded by the participants as a step forward in clarifying threat scores, which may evolve over time to reduce subjectivity and differing interpretations.

The threat assessment scores were further refined with location- or project-specific knowledge from participants. This resulted in updates to the drawdown of dyked wetlands and other water level manipulations score in the OAC and L Lake (Likelihood of Occurrence changed to Likely for both, and Level of Impact changed to High for OAC), and the dredging score in the St. Clair NWA and Big Creek NWA (Likelihood of Occurrence changed to Likely for St. Clair NWA and Level of Impact changed to High for both), and Point Pelee National Park (Likelihood of Occurrence changed to Unlikely, and Threat Extent changed to Narrow). In the Walpole Island Dyked Marshes, the Likelihood of Occurrence of Agriculture was changed to Known, and the Level of Impact of AIS was corrected to High.

UPDATED RECOVERY POTENTIAL MODELLING OF LAKE CHUBSUCKER (*ERIMYZON SUCETTA*) IN CANADA

Authors: Simon R. Fung and Marten A. Koops

Presenter: Simon Fung

ABSTRACT

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has assessed Lake Chubsucker (*Erimyzon sucetta*) in Canada as Endangered. Population modelling is presented to assess the impacts of harm and determine abundance and habitat recovery targets in support of a Recovery Potential Assessment (RPA). This analysis demonstrated that Lake Chubsucker were most sensitive to perturbations to adult survival. Population viability analysis was used to identify potential recovery targets. Demographic sustainability (i.e., a self-sustaining population over the long term) can be achieved with population sizes of ~33,600 individuals of age-1 and older under a catastrophe frequency of 15% per generation and desired persistence probability of 99% over 100 years. Such a population would require 0.41 km^2 of lacustrine habitat or 0.12 km^2 of riverine habitat.

RECOVERY TARGETS

Discussion

Model Parameters

A participant raised concerns with the age of the life history data used in the models, being at least 20 years old. These data are likely not representative of the current state, especially as stressors have likely compounded through time. The participant acknowledged that the elasticity analyses help to provide a buffer if we are wrong or off with some of the parameter values. The authors acknowledged that the age of the data is not ideal, but is not unique to Lake Chubsucker, as most small-bodied species are data-limited. The point was also raised that there is very limited data to inform appropriate or relevant catastrophe rates. The team agreed to expand the analysis to include higher catastrophe rates and to add text to explain that these life history data are the best available but caution should be applied in their interpretation. Improvements in technology, including portable ultrasound machines, were discussed as a possibility for collecting fecundity information for future RPAs.

Minimum Viable Population and Minimum Area for Population Viability

A participant inquired about removing YOY from the minimum area for population viability (MAPV) calculations. An author stated that habitat needs differ based on the life stage, for example, as an individual fish grows it needs more habitat; however, as a cohort, the number of individuals may be declining such that they need less habitat space overall. This is especially problematic in the first year of life when growth and mortality are both high, thus starting with individuals aged 1+ is the most straightforward approach.

There was a discussion around the lack of wetland-based allometric relationships, and whether the use of riverine or lacustrine relationships is appropriate for Lake Chubsucker and the habitats it occupies. A participant noted that the OAC is essentially a linear lake, given the altered hydrology. It was agreed that the assumptions around using riverine or lacustrine values as a conservative estimate for the calculation of MAPV will be clearly stated, and that a lacustrine relationship would be used for the OAC.

A participant noted that a female-based density estimate was used to calculate the MVP based on an assumed 50:50 male to female sex ratio, and inquired whether this assumption of an equal sex ratio is valid for this species. The authors explained that this species is not sexually dimorphic, so field data do not offer information on sex ratios, and in the absence of information on differential survival between the sexes, conservative assumptions were made. Another participant shared publications detailing use of fecundity rates and recruitment failures in other species as an alternative approach.

There was discussion around the large MAPV value resulting from the St. Clair NWA density estimate. It is assumed that this habitat is poor quality, likely not functioning well for all life stages, and therefore a larger area is required to fulfill life-history functions than other, less disturbed locations. The authors noted that most density estimates for species at risk are derived from depleted populations, which leads to a very large MAPV that likely over-estimates the size needed for a healthy population. There was discussion around whether it is best to use species-specific density estimates from depressed populations that likely over-estimate required habitat, or to use a density estimate from a healthy population of a surrogate species that may not be representative of the target species.

This led to a discussion around the possibility of using volumetric measurements instead of areal measurements for MAPV calculations. The authors noted that there may be value in this for aquatic taxa, but the allometric relationships currently available are for areal habitat spaces and would need to be re-done for volumetric habitat space.

Several participants flagged concerns around the habitat sizes for each Lake Chubsucker area that were presented alongside MAPV calculations. The author team noted that these were based on estimates made in the recovery strategy and were presented only as a rough approximation of available habitat and were not intended to be definitive. The author team agreed to update the habitat sizes based on recent detections, and to provide additional text to contextualize how the sizes were estimated, noting they are coarse metrics that may over- or under-estimate the habitat needed for carrying out life-history processes.

A participant inquired about whether wetland restoration or expansion could be a possible recovery action in a system like Point Pelee National Park. Other participants noted that a similar offsetting approach has been conducted in Long Point Bay. It was discussed that, in theory, MAPV calculations could be compared against available habitat in each area to determine where additional habitat creation may be most needed, but this would require that sufficient area of habitat be created that actually functions for Lake Chubsucker, and in the case of wetlands, that connecting channels allowing the species access to alternative habitats are used.

ALLOWABLE HARM ASSESSMENT

Discussion

A participant was interested in the theoretical allowable harm scenarios presented, and what information would be needed to identify the initial state of population growth to evaluate harm of a specific project in a given location. The author team explained that additional field sampling data would be required, particularly abundance estimates through time to more reliably estimate population growth rate and choose an appropriate initial state of population growth. The participant further stated that most threats to Lake Chubsucker relate to habitat degradation/loss and less so to direct mortality of individuals, and thus wanted further explanation of how habitat-related threats could be evaluated using the elasticity analysis. The author team explained that one could look at whether habitat changes result in a drop below the MAPV to understand what the impacts would be at the population level, but that the modelling evaluates small-scale disturbances, and more complex equations with different assumptions would be needed for larger-scale disturbances and habitat loss. The author team also provided caution in interpreting the maximum allowable harm, reiterating that the upper bound is a threshold to stay well away from, and that allowing harm up to that threshold is risky. When you lose habitat, you reduce the carrying capacity of the system (i.e., reduces the number of individuals that can be supported). This results in a reduction of population growth, possibly to a negative or non-growing state, which will shift the elasticity values resulting in a population that is more sensitive to adult survival and less sensitive to juvenile survival. Another participant noted that the elasticity of life stage-specific densities could be loosely thought of as elasticity of habitat loss, and the model could be re-structured to get at the impact of habitat loss on each life stage. If we understand what components of habitat that a specific project might impact (i.e., something that destroys spawning beds), we can better understand what vital rate might be affected (e.g., egg to age-1 survival) and how that will impact population growth. This might allow us to rank threats in terms of greatest impact on the population, aiding in prioritization of mitigation measures.

A member of the author team brought up that allowable harm is contingent on the initial state of population growth, and defining the absolute value of maximum harm requires you to know, with certainty, that initial state of growth. In reality, that initial state is seldom known. The modelling paper provided a range of initial states, showing how populations are expected to respond to harm. This range of uncertainty was appreciated by participants. In addition to evaluating a range of initial states of population growth to understand allowable harm, a final state of population growth could be set to ensure that recovery is achieved under different recovery/mitigation scenarios.

A participant sought clarification on whether a 1% probability of extinction implicitly meant a 99% probability of persistence, and the authors confirmed this is correct, over the 100 year simulation timeframe. Another participant inquired about periodic/transient perturbations, and what the population might look like immediately following and several years after a perturbation. The authors noted that the current results depict what happened in the last 15 years of the 100 year simulation. When perturbations are happening periodically (e.g., every 5 or 10 years), the population may recover between those events but may not get back to 100% pre-disturbance levels. Different outputs could be extracted from the simulations to look at inter-annual variation, but outcomes over a longer time frame are generally more appropriate for data-limited scenarios.

Concern was raised around making definitive risk tolerance cut-offs for management programs, and it was cautioned that providing extinction risk values of 1% or 5% could come off as too prescriptive. The recommended approach was that equations be provided in the Science Advisory Report in lieu of calculations with set extinction risk values so that users can adjust the values themselves for specific scenarios.

A participant also suggested removing links to the COSEWIC criteria/thresholds for declines, but rather state that a range of declining/crashing growth rates were investigated to avoid misinterpretation. The authors agreed to make the proposed change.

CONSENSUS

The chair summarized the main discussion points brought up during the meeting and associated revisions for the working papers. This included clarifying the methods for the St. Clair NWA abundance estimate; additional justification for choosing L Lake as the reference population for the population assessment; revising the descriptions of threats related to water-level changes in the OAC, increases in centrarchid abundance in L Lake, and illegal stocking; revising the threat assessment; contextualizing habitat sizes provided in relation to MAPV estimates; inclusion of a broader range of catastrophe rates; clarifying uncertainties related to life-history data; and noting riverine and lacustrine allometric relationships are used conservatively in the absence of wetland relationships. The chair and CSAS representatives then asked participants to give formal agreement that the working papers are acceptable as Research Documents, following the minor revisions discussed. The group gave approval.

REVIEW TERMS OF REFERENCE

The chair reviewed the 22 RPA elements listed in the Terms of Reference to make sure that all were adequately addressed. If information was not available to address certain elements, it was explicitly stated. Additional questions related to elements 3, 12, 15, and 22 were raised and clarified by the author team (and are mentioned in relevant sections above).

DRAFTING OF THE SCIENCE ADVISORY REPORT SUMMARY BULLETS

The chair presented the draft Science Advisory Report (SAR) summary bullets for discussion and finalization. Discussions focused primarily on prioritizing items to remain in the summary bullets versus items to be included in the main body of the SAR or working papers. For example, the value of including a genetics bullet was discussed, and it was agreed this would be moved to the body of the SAR as it may cause confusion regarding designatable unit structure. Calculations of MVP and MAPV had been re-done following discussions on the first day, and values were updated to reflect those changes. Additional discussion on the prioritization of threats in the final bullet occurred. Editorial changes were also suggested verbally or through the Teams chat function and agreed upon. A consensus was reached on the final summary bullets.

NEXT STEPS

The chair informed the group of the next steps, the expected timeframe for finalization of meeting products. The group agreed that beyond the inclusion of issues addressed in the meeting, the revised Research Documents need not be sent to all the participants; the chair will review them and ensure that all the suggested changes have been incorporated. The Proceedings document and Science Advisory Report would be made available to the participants for review.

REFERENCES CITED

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APPENDIX 1. LIST OF MEETING PARTICIPANTS

Name	Organization/Affiliation
Jason Barnucz	DFO – Science, Ontario and Prairie Region
Julia Colm	DFO – Science, Ontario and Prairie Region
Andrew Drake	DFO – Science, Ontario and Prairie Region
Simon Fung	DFO – Science, Ontario and Prairie Region
Kevin Hedges	DFO – Science, Ontario and Prairie Region
Marten Koops	DFO – Science, Ontario and Prairie Region
Tom Pratt (Chair)	DFO – Science, Ontario and Prairie Region
Adam van der Lee	DFO – Science, Ontario and Prairie Region
Kyle Antonchuk	DFO – FFHPP, Ontario and Prairie Region
Josh Stacey	DFO – Species at Risk, Ontario and Prairie Region
Scott Reid	NDMNRF - Science and Research
Tarra Degazio	Parks Canada - Point Pelee National Park
Gerald Tetreault	Environment and Climate Change Canada
Kari Jean	Ausable Bayfield Conservation Authority
Nick Mandrak	University of Toronto Scarborough
Fielding Montgomery	Nova Scotia Salmon Association

APPENDIX 2. TERMS OF REFERENCE

UPDATED RECOVERY POTENTIAL ASSESSMENT OF LAKE CHUBSUCKER (*ERIMYZON SUCETTA*), 2011-2020

Regional Advisory Meeting – Ontario and Prairie

November 16–18, 2021
Location: Virtual (MS Teams)

Chairperson: Tom Pratt

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.

The Lake Chubsucker (*Erimyzon sucetta*) was listed as Threatened under SARA in June 2003. The species was re-examined and assessed as Endangered in 2008. An RPA was conducted by DFO in March 2011 (DFO 2011), and it was listed as Endangered in June 2011. It was again assessed as Endangered by COSEWIC in May 2021 (COSEWIC 2021). Lake Chubsucker has very specific habitat requirements that make it vulnerable to cumulative habitat-related impacts from invasive species, climate change and agricultural practices. There is limited new information available regarding this species in Canada since 2011; however, new methods exist for conducting recovery potential modelling that will improve recovery targets and allowable harm estimates. This RPA will address elements for which there is substantial new information or methods; other elements will be revisited as appropriate. Only new information presented will require review.

In support of listing recommendations for Lake Chubsucker 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 this Lake Chubsucker.

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 Lake Chubsucker.

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 Lake Chubsucker.

Habitat and Residence Requirements

Element 4: Describe the habitat properties that Lake Chubsucker 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 Lake Chubsucker'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 Lake Chubsucker

Element 8: Assess and prioritize the threats to the survival and recovery of the Lake Chubsucker.

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 Lake Chubsucker.

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 Lake Chubsucker 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.

Sources of uncertainty in SAR

Expected Publications

- Science Advisory Report
- Proceedings
- Research Documents

Participants

- Fisheries and Oceans Canada (Science, Species at Risk Program, Fish and Fish Habitat Protection Program)
- Ontario Ministry of Natural Resources and Forestry (OMNRF)
- Ontario Ministry of Environment, Conservation and Parks (MOECP)
- Academia
- Ontario Conservation Authorities
- Other invited experts

References

DFO. 2011. Recovery potential assessment of Lake Chubsucker (Erimyzon sucetta) in Canada. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2011/033.

APPENDIX 3. MEETING AGENDA

Updated recovery potential assessment of lake chubsucker (*Erimyzon sucetta*) in Canada, 2011-2020

CSAS Regional Science Peer Review Meeting
Ontario and Prairie Region

November 16–18, 2021
MS Teams Virtual Meeting
Chair: Tom Pratt
Rapporteurs: Brajgeet Bhathal, Josh King

Day 1 – Tuesday November 16th – 10:00-3:00 EST

10:00-10:15	Introductions and Roundtable	Chair
10:15-10:30	CSAS Peer Review Process	Joclyn Paulic
10:30-10:50	Intro to RPA process (ToR)	Chair
10:50-12:00	Presentation: Information in Support of a Recovery Potential Assessment – working paper	Julia Colm
12:00-13:00	Lunch Break	-
13:00-14:00	Presentation: Recovery Potential Modelling – working paper	Simon Fung
14:00-15:00	Questions and discussion of working papers: general comments	All

Day 2 – Wednesday November 17th – 10:00-3:00 EST

10:00-10:15	Recap Day 1	Chair
10:15-12:00	Discussion of working paper : Info in Support of RPA	All
12:00-13:00	Lunch Break	-
13:00-14:30	Discussion of working paper: Recovery Potential Modelling	All
14:30-15:00	To finalize working papers	All

Day 3 – Thursday November 18th – 10:00-3:00 EST

10:00-10:15	Recap Day 2	Chair
10:15-12:00	Draft Science Advisory Bullets	All
12:00-13:00	Lunch Break	-
13:00-14:30	Draft Science Advisory Report	All
14:30-15:00	Final Remarks and Next Steps	Chair